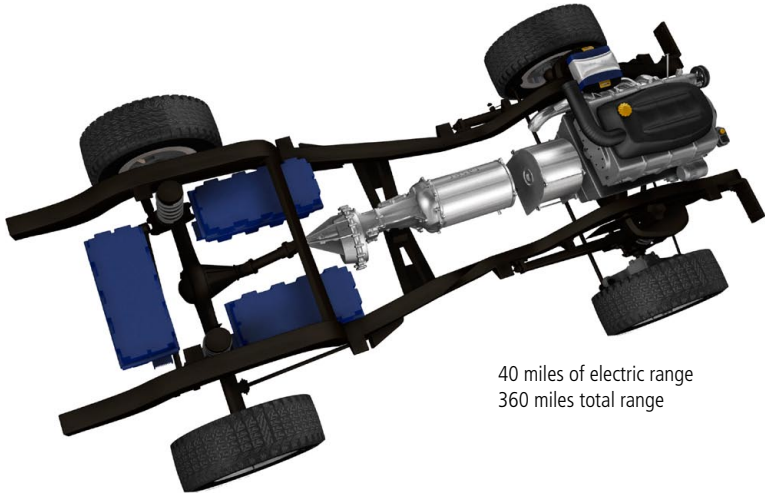


RASER INTRODUCES

# SERIES PHEV DRIVE SYSTEM

## 100 MPG SUV'S AND LIGHT TRUCKS

Raser has teamed with FEV in the development of this advanced plug-in series, hybrid drive system designed to drive SUVs and light trucks under full electric power to achieve over 100 mpg in local daily driving.



40 miles of electric range  
360 miles total range

### COMPLETE DRIVE SYSTEM

This advanced plug-in series hybrid drive system by Raser Technologies and its development partner FEV, will enable larger vehicles including SUVs and light trucks to drive up to 40 miles in all electric mode on clean renewable electric fuel with near zero emissions. For most drivers this means over 100 mpg in typical local daily driving and about 5 cents per mile versus the 20 cents per mile of the typical gas version.

### TRACTION DRIVE SYSTEM

The vehicle is propelled by a 200 kW Symetron Enhanced AC induction motor and drive system designed by Raser Technologies. It is one of the most powerful electric motor offered in a passenger vehicle today. The traction motor will also provide regenerative braking to help recharge the batteries and slow the vehicle. The high power Symetron™ Controller drives the motor at maximum efficiency using proprietary control algorithms. All vehicle systems are managed by the hybrid master controller.



200 kW Symetron Enhanced AC induction motor



Symetron™ Controller

4WD Performance Criteria	Base Vehicle (Estimated)	E-REV Version
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### Simulation Results

Acceleration: 0 – 60 mph (seconds)	9.5	8.8
Electric Range:	0	60
Combined Range: (miles)	300 (20 gal. tank)	360 (12 gal. tank)
60 Mile Fuel Economy: (mpg)	13 city / 16 hwy	280
Overall Fuel Economy: (mpg)	13 city / 16 hwy	26 city / 38 hwy
Max Vehicle Speed: (mph)	>100	>100

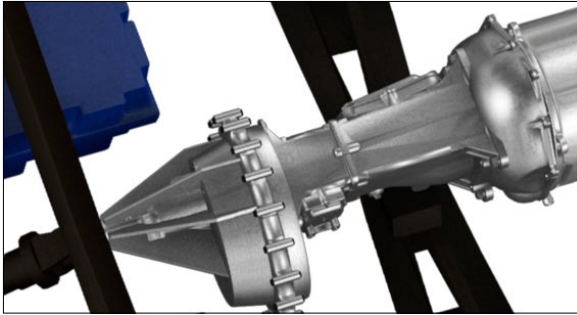
### Assumptions

ICE: (Engine)	4.6L V8	2.2 Liter
Curb Weight: (lbs)	4800	5720
Battery Capacity: (kWh)	N/A	30
Rear Axle Ratio:	3.73:1	3.73:1
Transmission Gear Ratios:	3.08:1 1.63:1 1:1	3.08:1 1.63:1 1:1
Air Density: (kg/m3)	1.293	1.293
Frontal Area: (m2)	3	3
Coefficient of Drag:	.43	.43
Rolling Resistance at 55 mph: (kWh)	11.5	11.5



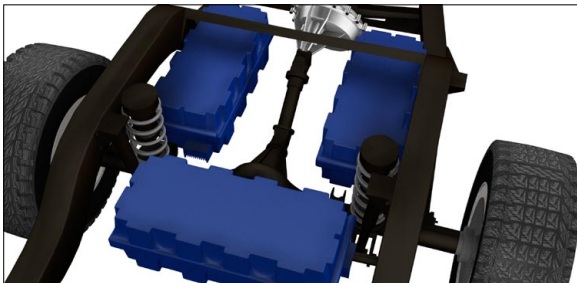
Raser's Plug-in Series Hybrid Drive System Architecture is designed to Light Trucks and SUV's to achieve over 100 mpg in typical local daily driving with near zero emissions under full with electric power using an onboard range extender.





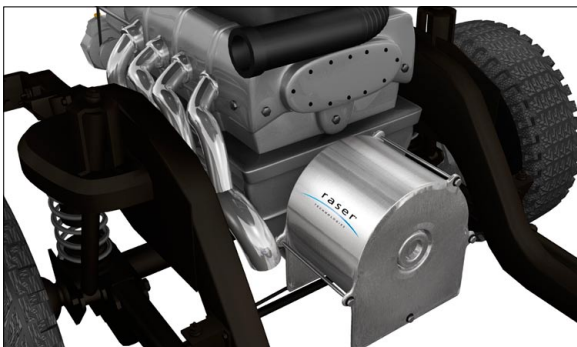
#### 4WD TRANSMISSION

Four wheel drive performance is delivered through a high performance automatic transmission and transfer case sharing power between the front and rear axles maintaining the performance of a full powered 4 wheel drive SUV .



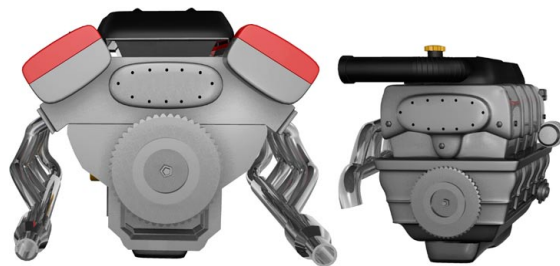
#### LITHIUM ION BATTERIES

Advanced technology lithium ion batteries deliver 700 volts of DC power directly to the 3-phase inverter, eliminating a DC/DC converter. High power architecture helps improve system efficiency and reduce manufacturing costs. Three liquid cooled battery packs are safely mounted between frame rails to provide 40 miles of electric range under full electric power. They can be recharged conveniently at home using a standard 110 or 220 Volt outlet.



#### GENERATOR

The batteries can also be recharged rapidly and efficiently by the onboard 100 kW, Symetron Enhanced, PM Synchronous generator. The Generator also provides direct power to the electric motor when batteries are low. The Symetron PM generator was custom designed to match the most efficient operating speeds of the combustion engine. This allows the engine to operate only at its peak efficiency range and only when needed to recharge the lithium ion batteries. This is an electric vehicle with a range extender.



A large standard V8 engine can be replaced with a smaller 2.0 liter engine used to generate electricity.

#### V-8 ENGINE VERSUS 2.0 LITER ENGINE

Most SUVs and trucks of this size require a large V-8 combustion engine. In Raser's plug-in series hybrid architecture, the combustion engine is only used occasionally to recharge the batteries. A much smaller, more efficient 1 to 2 liter combustion engine can replace the stock 5-6-liter engines. The combustion engine is connected only to the electric generator and is not connected to the drive system. The engine is used only generate electricity and recharge the batteries when the vehicle drives beyond its 40 mile battery range.

And when driving beyond battery range, a vehicle using Raser's electric drive system should get twice the highway gas fuel economy over the base vehicle. This is primarily achieved by operating the engine only at its peak efficiency of about 30% to recharge batteries, rather than at the average of 15% efficiency when accelerating the vehicle.

#### RASER AND FEV

This complete "drive system" designed by Raser and developed by FEV can play a large role in reducing green house gas emissions in popular larger vehicles.