Fueling the future with Ford

The Electric Way

"At Ford Motor Company, we're committed to offering you the right vehicles with the right fuels at the right time and, as you can see, we're living up to it."

- Alex Trotman, Chairman of the Board, Ford Motor Company

Choosing the right vehicle for your fleet is a big decision. If you're like most fleet managers, you make that decision carefully, weighing all the facts in light of how they serve the particular needs of your company, and at what cost.

Ford vehicles, designed with fleet needs in mind, are popular with fleet managers across the United States and Canada because they offer exceptional performance, reliability and value. Our offering of alternative fuel vehicles (AFVs) is no exception.

With more than 30 years experience, Ford Motor Company has sold more AFVs since 1990 than all other Original Equipment Manufacturers (OEMs) combined. No other OEM offers you more alternatives in alternative fuels: propane, natural gas, methanol, ethanol, and electricity.

Flexibility. Economy. Quality. Reliability. When you buy a Ford AFV, you get it all. It's all part of Ford's promise to offer you the right vehicles with the right fuels at the right time.

Ford Ranger & Electric Power Offer Clear Value

If you're considering the alternative fuel option, the electric-powered Ford Ranger may be the right choice for you. Here's why:

1. **Flexibility.** You can comply with federal government mandates, including EPA and Clean Air Act regulations. The Ranger EV is a Zero Emission Vehicle (ZEV), which is ideal for the environment. As such, Ranger EV can be of crucial importance to your corporate and fleet vehicle strategies.
2. **"Ford Tough" & Ford Warranted.** Within its driving range, your Ranger EV can do virtually anything its gasoline-powered counterpart can do. It's a rugged, full-function pickup. Ranger is covered by the same Ford limited warranty as the gasoline-powered Ranger. (The lead acid battery pack is covered by a separate 2-year warranty.)*
3. **Superb Quality.** Ranger EV is a Ford OEM vehicle, so Ford Quality is reflected in Ranger's dynamic engineering, design, fit and finish. Ranger EV is the product of rigorous durability testing and the unique, Ford Tough truck heritage.
4. **Ford Is The AFV Sales Leader.** It makes sense to rely on the experience and leadership of the company that has sold more alternative fuel vehicles since 1990 than all other OEMs combined.

* See your dealer for copies of the limited warranties

The Ranger EV Compact Pickup

A Practical Zero Emission Vehicle. The 1998 Ford Ranger EV, Ford' s newest AFV and first factory-produced electric vehicle, begins production in December of 1997. A Zero Emission Vehicle (ZEV), it will be available to fleets and individuals in the First Quarter of 1998.

Best-in-Class Range. Based on the best-selling compact pickup in North America, the Ranger EV is quiet, responsive and "Ford Tough." With a Best-in-Class Range of 58 miles FUDS* [50 Customer Miles (80 KM)] at optimal temperature†, Ranger EV is a very practical truck for a wide range of fleet applications. It will be offered in a Styleside Regular Cab with a short wheelbase.

To optimize range and efficiency, Ranger EV has regenerative braking with 4-wheel ABS and an Economy Drive selection, along with an internal cooling system for the battery pack and an available battery heating system for colder climates.

Power & Performance. The Ranger EV was designed with rear-wheel drive durability. Power to the rear wheels is provided by a 90 hp, high efficiency, liquid-cooled 3-phase AC induction motor, working with a single speed transaxle. This vehicle is at home in high speed traffic with its 0-50 performance (12.5 seconds, only one second slower than the gasoline-powered Ranger). Top speed is governed at 75 mph (120 kph). In addition, its payload of 700 lbs (317 kgs.) more than meets this vehicle's anticipated work applications, making Ranger EV a fully functional work truck.

The electro-hydraulic steering system was designed especially for the Ranger EV and comes as standard equipment. Climate controls consist of an electric resistance heater and pump-type air conditioner, which are also special EV designs.

Conductive Charging Is Simple, Safe & Economical By Design. The vehicle's power source consists of a battery pack containing 39 eight-volt, sealed lead acid battery modules. The Ranger EV uses a safe and convenient Conductive Charging System, which features an on-board charger and a simple Power Control Station located off-board as an interface with the customer's power source. Charging the battery requires a 240 volt, 40 amp circuit, very similar to what a household stove or electric clothes dryer requires. It takes approximately 6 hours to completely recharge the vehicle from "empty," while an 80% charge can be attained in about 3 hours.

Ranger EV is as safe and easy to operate as a gasoline vehicle. All connections are secured by the Power Control Station before electricity is released into the vehicle's system.

Electric RANGER

Same Warranty As 1998 Gasoline-Powered Ranger. The 1998 Ranger EV is manufactured by Ford Motor Company and comes with the same warranty** as the 1998 Ranger - 3 years/36,000 miles (60,000 km). There is a separate warranty** on the lead acid battery pack of 2 years, with the second year prorated.

Added Incentives. Incentives may be offered by local utilities or state governments. And Ford supports its AFV products with flexible 3- and 4-year lease plans. For more information on incentives and leasing, please call 1-800-ALT-FUEL.

* Federal Urban Driving Simulation
† Without A/C or heater operation
** See your dealer for copies of the limited warranties

Ford Ranger EV Compact Pickup

- Zero Emission Vehicle (ZEV)
- Styleside, Regular cab, short wheelbase
- 90 hp, high-efficiency 3-phase AC induction
- Single-speed transaxle, rear-wheel drive using half-shafts (integrated with motor)
- 39 eight-volt sealed lead-acid modules; 312 volt system
- On-board charger, 240 volt/30 amp conductive charging system
- 5400 lbs. (2450 kgs) GVWR
- 700 lbs. (317 kgs) payload
- 58 miles (93 km) range - FUDS* cycle @ 72° F/22° C, w/o A/C or heater operation
- 50 miles (80 km) Customer Range, @ 72° F/22° C (35 miles/56 km at 32° F/0°C with heater operation)
- 0-50 mph/80 km acceleration in 12.5 seconds
- 75 mph (120 kph) top speed, governed
- 4-wheel ABS
- 3-yr/36,000 mile / 60,000 km new vehicle limited warranty** (identical to gasoline-powered Ranger), with a 2-yr battery warranty**, 2nd year prorated
- Lightweight aluminum wheels & low rolling resistance tires
- Special Features:
  - Electro-hydraulic power steering
  - Regenerative braking
  - On-board charger
  - Conductive charging
  - Reprogrammable electronics
  - Economy driving mode
- Available options:
  - Air conditioning
  - Battery heater
  - Spare tire and jack

NEWS

Ford Motor Company

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IMMEDIATE RELEASE

FORD SETS THE STANDARD FOR ELECTRIC VEHICLE SALES

ORLANDO, Fla., Dec. 12, 1997 Š Ford Motor Company announced today a nationwide network of dealers to sell and service the 1998 Ranger Electric Vehicle (EV). The Ranger EV is now officially on sale.

Dealers from California to Florida will sell, service and repair the Ranger EV pickup truck. Ford believes that selling EVs this way will make the Ranger EV the number one choice for fleet customers around the country.

We want our EV customers to know that they will receive the same service and dealership knowledge they expect when they purchase any Ford vehicle, said John Wallace, director of Ford's Alternative Fuel Vehicles. By combining the solid driving performance of the Ranger EV with ease of service, we've developed a package that really fits the needs of fleet customers.

Ford also announced the names and locations of the 40 new Ranger EV dealerships, which are located in Alabama, Arizona, California, Colorado, Florida, Georgia, Massachusetts, Michigan, New York, Ohio, Oklahoma and Oregon. More EV dealers will be announced in the future.

To become certified to sell and service Ford EVs, dealerships must agree to undergo rigorous technical and safety training. They are also required to have their service center employees specially trained as EV technicians. Ford will help provide the dealers with the necessary training and tools required to service the Ranger EV.

The dealer response to this program has been extremely positive, said Wallace. They realize that this is a new market that has a unique learning curve. They also realize that by targeting fleet customers now, we are helping to ensure a

successful retail market in the future as battery technology improves.

Ford has worked hard to set the industry standard in terms of ease of service for the Ranger EV. From a unique diagnostic system that allows the 39-module battery pack to be evaluated in under one minute, to the fact that just six bolts need to be removed to service the 2000-pound battery pack, Ford has designed the vehicle to spend it's time on the road, not in a service bay.

JOB ONE CEREMONIES

Earlier this week, company chairman Alex Trotman drove the very first production Ranger EV off the line. The vehicle is built at the Edison Assembly Plant in New Jersey, which has built the gasoline-powered Ranger since 1982. The Ranger EV is produced on the same line as that conventional truck.

After leaving the Edison plant, the vehicle goes to Ford's Electric Vehicle Final Assembly (EVFA) operation in Detroit. There the truck is completed with the addition of an electric motor/transaxle, battery pack, electronic modules and other EV-specific components.

Based on the best-selling compact truck and the Built Ford Tough tradition of Ford trucks, the Ranger EV offers the same reliability and durability as the conventional truck.

Powered by lead-acid batteries, the Ranger EV has a real world driving range between charges of approximately 50 miles, although it achieved a 77 mile range on the federal trade commission test, and accelerates from 0-50 in 12.5 seconds, similar to the gasoline-powered Ranger. The truck has been well received by fleet customers, who generally have shorter, more predictable driving patterns than retail customers.

With nearly 15 years of EV research and testing behind us, we've developed the most sophisticated battery management system available, said Wallace. This gives the Ranger a very high level of reliability and performance that you can't get with most other EVs.

From its battery systems to its powertrain, the Ranger EV is loaded with world-class components developed during EV research and demonstration programs. In 1993, Ford launched its demonstration Ecostar program Š which was powered by an advanced battery Š to gain real world EV experience with potential customers. During the program, Ford gained more than one million miles of EV driving experience.

Based on the knowledge accumulated during demonstration programs, Ford engineers designed the Ranger EV's traction battery system to perform as part of

the overall vehicle, not as a separate component. The second-generation battery management system monitors each of the 39 individually sealed, lead-acid modules and continuously talks to other vehicle components, such as the powertrain. This level of systems management ensures tight control of battery condition throughout the pack, improving battery life and driving range, and optimizing daily charging conditions.

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NEWS

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IMMEDIATE RELEASE

1998 FORD RANGER EV -- BUILT FORD TOUGH

Ford Motor Company's successful truck line will be "electrified " in 1997 as the automaker introduces its new electric Ranger pickup truck.

The 1998 Ranger electric vehicle (EV) is based on Ford 's best-selling compact truck, the Ford Ranger. The debut of the EV at the 1997 Greater Los Angeles Auto Show marks the first time Ford will show the new, updated design of the full Ranger line. Bob Rewey, Ford group vice president of Marketing and Sales Operations, said the EV will continue the Ranger heritage of meeting or exceeding customer requirements.

"Our customers asked for an EV that drives with the safety, reliability and durability of a conventional vehicle and that 's what they 'll get with the Ranger EV, " said Rewey. "This vehicle incorporates the same best-in-class design features as the gasoline Ranger, with proven advanced EV technology to guarantee it is 'Built Ford Tough '. "

Rewey also said that Ford's target customers for these vehicles are fleets around the country, which generally have shorter, more predictable driving patterns than retail customers. Powered by lead-acid batteries, the Ranger EV will have a driving range between charges of approximately 60 miles. The vehicle will go into production at Ford 's Edison, N.J. facility at the end of 1997 and be available to customers shortly afterwards.

Ranger EV Includes Third-Generation Technology

From its battery systems to its powertrain, the Ranger EV is loaded with world-class componentry developed since Ford began its most recent EV programs in 1982. In 1993, Ford launched its demonstration Ecostar program -- which was powered by an advanced battery -- in order to gain real-world EV experience with potential customers. Throughout the program, Ford gathered more than one million miles of EV driving experience.

"The 1998 Ranger EV you see today is the product of some of the most advanced, sophisticated EV testing ever performed by an automaker, " said John Wallace, director of Ford 's alternative fuel vehicle programs. "We have known for years that the only way our customers will accept EVs is if they meet their basic transportation needs. By testing and proving out EV componentry through an advanced test fleet, we ensured that every part of the Ranger EV is state-of-the-art. "

Advanced Battery System Separates Ranger EV from Competition

While focusing on reliability, durability and safety, Ford engineers designed the Ranger EV 's traction battery system to perform as part of the overall vehicle, not as a separate component. The second-generation battery thermal management system monitors each of the 39 individually sealed lead-acid modules and continuously "talks " to other vehicle components, such as the powertrain. This level of systems management ensures tight control of temperature throughout the battery pack, improving battery life and driving range, and optimizing daily charging conditions.

"All EV batteries perform best at controlled temperatures and must be managed in order to maintain maximum performance and efficiency, " says Wallace. "From our experience with advanced batteries in the Ecostar program, we have developed the most sophisticated battery management system available. The bottom line is that with the Ranger EV, you have a superior level of reliability and performance you can't get with most other EVs. "

A 2000-pound battery is necessary to give the Ranger EV the amount of range fleet customers require on a daily basis. Ford engineers designed the battery pack assembly, made of strong, lightweight composite materials, to accommodate the weight and size of the battery modules without sacrificing efficiency. The assembly is located underneath the vehicle and consists of a supporting tray that holds the battery modules in a two-tier stack.

Ranger EV Powertrain Represents "Best in Class " Product

The Ranger EV powertrain is controlled by a sophisticated device known as the Traction Inverter Module (TIM), located in the rear of the vehicle, directly behind the motor and transaxle. The TIM is a highly specialized computer that continuously monitors driver controls, such as accelerator and brake, and at the same time is in constant communication with other vehicle systems. This sophisticated interaction allows the powertrain to simultaneously determine actions the driver wants to take, what power is needed for the vehicle to perform those actions and what energy is available from the battery -- resulting in virtually seamless coordination between driver and vehicle.

The unique transaxle, part of the overall powertrain, is a second-generation version of the successful Ecostar transaxle. It was designed to be used in front-wheel-drive applications or rear wheel drive applications, as on the Ranger EV. This is significant because it allows optimum use for any vehicle application and can adapt to future EV battery and technology breakthroughs that may require switching the location.

Customer Safety. Service and Support are Priorities

Ford engineers have made the design of safety features in the 1998 Ranger EV their number-one priority.

"Ford puts a premium on safety, with an EV or gasoline-powered vehicle, " said Wallace. "We built the Ranger EV with safety features that not only protect our customers, but also give them peace of mind about a relatively new technology. "

Safety features in the 1998 Ranger EV include:

- **Current Leakage Detection System**, controlled by the Battery Control Module (BCM), constantly monitors the high voltage system for electrical current leakage. If leakage is detected, the BCM will illuminate the electric hazard warning lamp in the instrument cluster.

- **High voltage interlocks** prevent electrical accidents by shutting off high voltage energy when connectors are disconnected or when the internal circuitry of the high voltage power distribution box is exposed.

- The **Inertia Shutoff Switch** on a gasoline-powered vehicle cuts off power to the fuel pump in the event of an accident. The carryover inertia shutoff switch in the Ranger EV performs a similar function, cutting off the high voltage energy to the vehicle.

- The **Emergency Power Off** (EPO) is a fail-safe feature that safeguards against personal injury and protects the vehicle from damage whenever the inertia shutoff switch is triggered or a high voltage interlock is disconnected. An EPO signal is sent to disable all high voltage loads and shut down the vehicle.

Charging -- Safe and Easy

The Ranger EV features a convenient onboard charger that can be used with a

240 volt plug. The vehicle can be fully recharged in approximately six hours. The charger uses a conductive charging system, which is inexpensive, safe and easy-to-use.

We chose a conductive charging system for our production EVs for numerous reasons, said Wallace. We believe conductive charging is safe and the most efficient and cost-effective method of charging available today. Also, conductive technology is well understood by professional electricians and requires no special tools, expensive diagnostic equipment or specialized training for widespread installation.

Conductive charging -- the traditional method of connecting electrical equipment to power sources -- uses mating contacts to transfer the electricity. Home electric clothes dryers, with their specially designed mating plugs, use conductive connections. Like them, EVs will use a unique -- yet standardized -- plug.

Ranger EV Part of the World 's Largest Offering of AFVs

The Ranger EV joins the long list of alternative fuel vehicles (AFV) that Ford currently offers for sale to fleet and retail customers. Ford, with a broader lineup of AFVs than any other auto manufacturer, offers vehicles for sale that run on electricity, ethanol, methanol, natural gas and propane. This diversity of offerings gives our customers access to the right vehicle, with the right fuel at the right time.

Ford has been developing, producing and selling AFVs worldwide for more than 30 years. These activities are directed from Ford 's new, world-class AFV Center in Dearborn, Michigan, where the automaker is headquartered. Ford also is researching other forms of advanced vehicle technology such as fuel cells, turbines and other hybrid vehicle engines.

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