

**Fuji Heavy Industries and Tokyo Electric Power Begin Joint Development of Electric Vehicles**

-- Based on the Subaru R1e, the new EV prototype will be used and field-tested by Tokyo Electric Power --

Tokyo, September 2, 2005 – Fuji Heavy Industries Ltd. (FHI), the maker of Subaru automobiles, and Tokyo Electric Power Co., Inc. (TEPCO) today announced the beginning of joint development of an electric vehicle (EV). The two companies plan to spend approximately one year designing and manufacturing the new EV for commercial uses, basing it on the Subaru R1e concept car. While TEPCO will determine the specifications for use in TEPCO's business and services, FHI is responsible for developing and manufacturing 10 prototype vehicles to meet its requirements. TEPCO will use them as part of its fleet for business and service, and examine their performance as well as analyze the vehicles' economic benefits.

While the reduction of greenhouse gases such as CO<sub>2</sub> has been discussed on the global level, CO<sub>2</sub> emissions in the transportation industry increased in Japan during the fiscal year ending March 31, 2004 (fiscal 2004) by 19.8% compared to the level in fiscal 1991. The reduction in CO<sub>2</sub> emissions is an urgent issue industry-wide.

TEPCO has a large fleet of vehicles to operate its power business and service its customers, and the company has set goals to reduce fuel consumption in its fleet,<sup>1</sup> and to augment the use of low-emission vehicles.<sup>2</sup> The new EV development project represents significant cooperation between TEPCO, a power company with strengths in developing electric charging systems for EVs, and FHI with its plans to manufacture and market EVs by further improving on Lithium Ion (Li-Ion) batteries<sup>3</sup> suitable for the new vehicles.

In the joint project, which will result in 10 prototypes, FHI will be in charge of producing the model, based on the Subaru R1e, which will meet specifications determined by TEPCO, including such conditions as fitting the dimensions of Japan's mini-cars and other requirements, as well as a per-day driving distance of 80km. After delivering the 10 vehicles to TEPCO's branches, FHI will monitor the daily-use performance data and economic benefits collected and analyzed by TEPCO. Using such information, FHI plans to examine carefully optimal battery capacity and will continue its efforts to develop lighter weight, lower cost EVs. TEPCO, on the other hand, will develop a rapid electric charger, capable of charging up to 80% of the battery within 15 minutes by capitalizing on its accumulated research and technology in electric charging systems.

Based on the anticipated results of this joint development work, TEPCO will also study the possibility of switching a part of its fleet of approximately 8,300 vehicles to EVs in the fiscal year ending March 31, 2008 (fiscal 2008) and beyond. Such a shift to EVs will represent a change in 3,000 vehicles that are currently compact cars of gasoline engine displacement of 1,500cc or less. The new vehicles will transport only small cargo and will be limited to a daily driving distance of 80km. TEPCO estimates the changeover of 3,000 vehicles to EVs will reduce annual CO<sub>2</sub> emissions by 2,800 tons<sup>4</sup>, and cut yearly fuel cost by 190 million yen.<sup>5</sup>

FHI envisions that the corporate fleet vehicle market is a promising growth area for EVs. By accurately understanding the needs of such vehicles at TEPCO and accumulating additional know-how, FHI will continue improvements on EVs, strive to market them to other companies and expand the use of EVs.

Note1) TEPCO set numeric targets to reduce fuel consumption of its fleet vehicles during the fiscal year ending March 31, 2006 (fiscal 2006). Specifically, it plans to lower consumption by 20% from the level of fiscal 2001, which stood at 0.112 L/km per vehicle on average. The company achieved a 13% reduction in fiscal 2005 (0.098 L/km) from fiscal 2001.

Note 2) By replacing regular gasoline engine vehicles with low-emission vehicles (EV, hybrid, and others recognized as low-emission vehicles by Japan's Ministry of Land, Infrastructure and Transport), TEPCO plans to increase the number of low-emission vehicles in its fleet. The company set a goal of 100% replacement during fiscal 2011. In fiscal 2005, its replacement ratio was 51%.

Note 3) Li-ion batteries have a longer life than other batteries, because their mechanism is fundamentally the transfer of Li-ion between negative and positive electrodes during charging and discharging, and this type of battery does not require chemical reactions in its electrodes or electric dissolvent. They also have high specific energy and high-energy efficiency, which are deemed suitable for EV applications. While their high cost was an issue, the rapid penetration of Li-ion batteries into laptop and cellular phone markets has substantially lowered the cost of small-sized Li-ion batteries. The EV prototypes will be mounted with Li-ion batteries developed by NEC Lamillion Energy Co., Ltd., a joint venture company between FHI and NEC. The battery has prolonged longevity and its safety has been improved through the use of manganese in its positive electrode.

Note 4) Basis of estimate of 2,800 ton CO<sub>2</sub> reduction

Premise

Fuel economy	Mini cars: 17.5km/L	EV: 10km/kWh
CO <sub>2</sub> emission unit	Gasoline: 2.32kg- CO <sub>2</sub> 2/L	Electricity: 0.381km- CO <sub>2</sub> /kWh

\* Approx. 0.945 ton reduction per vehicle yearly (based on an average of 10,000km driving distance) =  
(10,000km /17.5km/L x 2,32kg-CO<sub>2</sub>/L) – (10,000km/10km/kWh x 0.381km-CO<sub>2</sub>/kWh)

\* Reduction of 2,834 ton of CO<sub>2</sub> = 0.945 tons x 3,000 vehicles

[Data sources]

- 17.5km/L: Japan Mini Vehicles Association (web page)
- 10km/kWh: Target set by the joint development project
- 2.32kg- CO<sub>2</sub> 2/L: “Guideline for calculating greenhouse gas emissions fro business and industries” by Japan’s Ministry of the Environment, Global Environment Bureau
- 0.381km-CO<sub>2</sub>/kWh: Result of CO<sub>2</sub> emission unit during fiscal 2005 at TEPCO

Note 5) Estimated cost reduction effects of 190 million yen

Premise

Fuel economy	Mini cars: 17.5km/L	EV: 10km/kWh
Cost	Gasoline: 128 yen/L	Electricity: 10.07 yen/kWh

\* Approx. 62,000 yen reduction per vehicle yearly (based on an average of 10,000km driving distance) =  
(10,000km /17.5km/L x 128 yen/L) – (10,000km/10km/kWh x 10.07 yen/kWh)

\* Reduction of approx. 190 (187) million yen = 62,000 yen x 3,000 vehicles

[Date sources]

- 128 yen/L: The Oil Information Center, the Institute of Energy Economics, Japan (An average price in the Kanto area, including sales tax, based on the Center’s oil market research)
- 10.07 yen/kWh: TEPCO’s rate contracts for commercial users; supply voltage of 6kV or less; contract power of less than 500kW [Basic rate, excluding sales tax, for the period between October 1 to June 30]

## **[Supplemental Information]**

### Major specifications of the EV to be jointly developed

2 seater

Driving distance: 80km (city-driving with the battery capacity of 8kWh)

Rapid charging: 15 minutes with AC200V outlet (filling up to 80% of the battery)

Normal charging: 8 hours with AC100V outlet

Battery capacity deterioration tolerance: within 20% lower than the initial capacity (after the 7-year use, over 70,000km)



### Development schedules

September-December 2005: Joint designing work on the EV prototype

Mid-October 2005: Completion of the first prototype and delivery

March 2006: Completion of the 10th vehicle and delivery

[When each vehicle is completed, it will be delivered to and field-tested by TEPCO]

### Responsibilities of joint development work

TEPCO: development and determination of specifications of the vehicle and major devices; design and manufacture of a power-charging system; and data collection and analysis of EV uses and performance

FHI: development of specifications of the vehicle and major devices; design, development and manufacture of 10 EV prototypes

[FHI will manufacture the prototypes at its Subaru Technical Research Center located in Mitaka, Tokyo]

Cooperation by NEC Lamillion Energy Co., Ltd. (51% owned by NEC, 49% by FHI): design and manufacture of Li-ion batteries for the EV prototypes

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