

Press Release

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Volvo ReCharge Concept: a plug-in hybrid

For immediate release

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GÖTEBORG (September 6, 2007) - At the 62nd Frankfurt Motor Show, Volvo Car Corporation will introduce the Volvo ReCharge Concept, a concept car with a plug-in hybrid powertrain, batteries -- recharged using a regular electrical outlet -- and four wheel-mounted electric motors.

On a full charge, the Volvo C30-based show car can be driven up to 100 kilometres on battery power alone before the car's four-cylinder, Flexifuel engine is needed to assist.

"A certain proportion of electrical vehicles will be necessary to meet the CO₂ emission demands of the future," says Magnus Jonsson, Senior Vice President of Research and Development at Volvo Cars. "Since the Volvo ReCharge Concept combines an excellent battery range with a backup combustion engine, it is a very interesting concept."

The ReCharge Concept was developed at the Volvo Monitoring and Concept Center (VMCC) in Camarillo, California.

"This is a ground-breaking innovation for sustainable transportation," says Jonsson. "A person driving less than 100 kilometres a day will rarely need to visit a filling station. In the USA, this may apply to almost 80 per cent of drivers."

Thanks to the excellent range on battery power, from a fuel consumption perspective, the Volvo ReCharge Concept is exceptionally kind to the car owner's wallet. When driving on electric power only, operating costs are expected to be 80 per cent less than a comparable petrol-powered car. When driving beyond the 100 km battery range, the engine has fuel consumption rating of 5.5 L/100 km.

"This plug-in hybrid car, when used as intended, should have about 66 per cent lower emissions of carbon dioxide compared with the best hybrid cars available on the market today," says Jonsson. "Emissions may be even lower if most of the electricity in intended markets comes from CO₂-friendly sources such as biogas, hydropower and nuclear power."

An electric motor at each wheel

The Volvo ReCharge Concept combines a number of technological innovations to become a "series hybrid," a vehicle with no mechanical connection between the engine and the wheels.

The battery pack is integrated into the luggage compartment and uses lithium-polymer battery technology. The batteries are designed to have a useful life beyond that of the car itself. Four electric motors, one at each wheel, provide independent traction power.

A 1.6-litre, four-cylinder Flexifuel engine drives an advanced generator that can efficiently power the wheel-mounted motors.

Electric car with a combustion engine as backup

In principle, the Volvo ReCharge Concept is an electric car with an efficient generator, an Auxiliary Power Unit (APU), that steps in when the battery's charge becomes insufficient for adequate driving performance.

The APU is designed to distribute electrical power to the individual motors at each wheel. Since the combustion engine only powers the APU, it can operate in an optimal fashion, both for regulated emissions and CO₂.

As well, the APU is powerful enough to supply an entire villa with electricity. For example, it could -- with minor modifications -- become an electrical generator for the owner's home in the event of a power failure.

The driver can choose the power source

The combustion engine is programmed to start up automatically when 70 per cent of the battery power has been used. However, the driver also has the option of controlling the four-cylinder Flexifuel engine manually via a button in the instrument panel.

By starting the engine manually, the vehicle's battery charge can be maintained while on the highway and used when driving through a town.

"There is a considerable difference between our plug-in hybrid and today's hybrids," says Ichiro Sugioka, project manager for the Volvo ReCharge Concept. "Today's hybrids use the battery only for short periods to assist the combustion engine. Our solution is designed for most people to run on electric power all the time, while providing the extra security that comes with having a combustion engine as a secondary source of electrical power. What is more, our C30 with plug-in hybrid technology retains its lively and sporty driving properties. Acceleration from 0-100 km/h takes 9 seconds and top speed is 160 km/h."

Specially developed electric motors

The central electrical components in the Volvo ReCharge Concept show car -- the generator for the APU and the wheel-mounted motors -- were developed together with British electromagnetic specialists PML Flightlink.

With an individual electric motor at each wheel, weight distribution as well as mechanical efficiency and traction are maximized, while friction of mechanical gears is eliminated. As the Volvo ReCharge Concept does not have a transmission found in today's conventional cars, there is no need for a gear selector.

To help maximize the environmental benefits, the Volvo ReCharge Concept sports high-efficiency tires developed by Michelin that have been designed to accommodate the wheel-mounted motors. Furthermore, the car has All Wheel Drive in the truest sense of the term: power to each wheel is controlled individually.

Similar to today's hybrid vehicles, kinetic energy that is generated during braking is transmitted to the battery pack. Volvo Cars believes that should the ReCharge Concept be developed for production, traditional wheel brakes would be replaced by electrical brakes for minimal energy wasted through friction and improved regenerative function.

To ensure reliable operation of the drivetrain and braking system, driver inputs in the ReCharge Concept are fed through a quadruple-redundant electronic control system.

Ecologically sound for commuters

The Volvo ReCharge Concept is best suited to drivers who cover moderate distances every day. For example, a commuter who has less than 100 km to drive between home and work can cover the entire round trip on electric power alone. The equivalent daily fuel economy would register as zero litres per 100 km.

Even drivers who cover more than the battery-only range will benefit from the ReCharge Concept.

For a 150 km drive with a full battery charge, the car will require less than 2.8 litres of fuel, giving the car an average fuel economy of 1.9 L/100km for the trip.

"The only requirement is that the car owner has access to electrical outlets at convenient places, such as at home or at the workplace," says Jonsson. "A full recharge takes 3 hours. However, even a one-hour quick charge should provide enough charge to drive about 50 kilometres."

Volvo Cars of Canada Corp. is part of the Volvo Car Corporation of Göteborg, Sweden. The company provides marketing, sales, parts, service, technology and training support to the 43 Volvo automobile retailers across the country. The company's product range includes the stylish and sporty C30, the elegant C70 hardtop convertible, the compact S40 sedan, the S60 sport sedan, the S80 flagship sedan, the versatile V50 wagon and the award-winning XC90 sport utility vehicle. For 2008, the company is introducing two all-new models: the redesigned V70 wagon and the capable and comfortable XC70.

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