

A smart way to charge up

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Customers can enter their requirements via a touchscreen on the charging station. Costs and energy readings can also be displayed during the recharging process. (© Fraunhofer ISE)

(PhysOrg.com) -- Electromobility makes sense only if car batteries are charged using electricity from renewable energy sources. But the supply of green electricity is not always adequate. An intelligent charging station can help, by adapting the recharging times to suit energy supply and network capacity.

Germany aims to have one million electric vehicles - powered by energy from renewable sources - on the road by 2020. And, within ten years, the German environment ministry expects "green electricity" to make up 30 percent of all power consumed. Arithmetically speaking, it would be possible to achieve CO₂-neutral electromobility. But, in reality, it is a difficult goal to attain. As more and more solar and wind energy is

incorporated in the power grid, the proportion of electricity that cannot be controlled by simply pressing a button is on the increase. In addition, there is a growing risk that the rising number of electric vehicles will trigger extreme surges in demand during rush hour.

"What we need is a smart grid that carries information in addition to power," says Dominik Noeren of the Fraunhofer Institute for Solar Energy Systems ISE. The structure of the grid has to change from a push system based on [energy demand](#) to a pull system based on production output. In Noeren's opinion, "[electric cars](#) are best equipped to meet this challenge." Introduced in large numbers, they have the capacity to store a lot of energy. On average, a car is parked for at least 20 hours out of 24. That is more than enough time to recharge them when the wind picks up or the demand for electricity is low.

Developed by Fraunhofer researchers, the "smart" charging station is a device that enables [electric vehicles](#) to recharge when the system load is low and the share of energy from renewable resources is high. In this way, load peaks can be avoided and the contribution of solar and [wind power](#) fully exploited.

"For us, it is important that end consumers are completely free to decide when they want to recharge. We do not want them to suffer any disadvantages from the controlled recharging of their vehicles' batteries," Noeren emphasizes. That's why he favors electricity rates that adapt to the prevailing situation in the [power grid](#) - ones that are more expensive in periods of peak demand and particularly cheap when there is a surfeit of renewable energy.

The person using the "smart" charging station could then choose between recharging immediately or opting for a cheaper, possibly longer, recharging time. If they go for the second option, all they need to do is enter the time when their vehicle has to be ready to drive again. The

[charging station](#) takes care of everything else, calculating the costs and controlling the recharging process. Via the display the user can track the progress of recharging and also see the costs incurred and the amount of energy used. The experts will be presenting their charging device at the Hannover Messe from April 19 through 23.

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