

CHINA AND JAPAN DRIVE A GLOBAL EV CHARGING EFFORT

The new standard will be backward compatible with select charging stations

➤ **Two leading industry groups,** Japan's CHAdeMO and the China Electricity Council, announced last year they would codevelop an ultrafast charging protocol for electric vehicles. Now, the partners, under the supervision of the Japanese and Chinese governments, are inviting other countries to join them. Their goal is to develop a global standard for all types of EVs by 2020.

CHAdeMO, a consortium of automotive, power-generation, and IT companies (including Nissan and Volvo), has the largest global installation of DC

chargers for electric vehicles: 22,647 units operating in 71 countries as of September. This includes more than 2,900 in North America and 7,900 in Europe.

CHAdeMO's Chinese counterpart, the China Electricity Council (CEC), counts 270,000 chargers using its GB/T standard installed in China and India. Together, the two groups account for more than 90 percent of the installed EV fast-charger market—that is, DC charging stations up to 120 kilowatts that connect directly to the battery.



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RECHARGING: A Nissan Leaf fills up at a CHAdeMO charging station.

The new EV charger standard is code-named Chaoji. Like its predecessors, the Chaoji standard will use the Controller Area Network (CAN) bus to coordinate communications between the electronic control units for features such as airbags and audio systems, without requiring dedicated wiring.

Maximum power for the new standard is tentatively set at 900 kW (1,500 × 600 amperes), which will be capable of quickly charging large vehicles such as earth-moving equipment, buses, trucks, and helicopters. Whereas

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a 50-kW charger takes about 30 minutes to charge a 25-kilowatt-hour battery today, a 900-kW charger of the future could charge a 450-kWh battery in 30 minutes.

Before that happens, though, CHAdeMO must modify its specifications for upcoming chargers to handle 350 kW and 500 kW-plus in the new ChaoJi standard. The specifications will also require manufacturers to include a new connector design and liquid cooling cables.

Makoto Yoshida, secretary general of the CHAdeMO Association and general manager at Nissan, said in a recent press briefing in Tokyo that the new protocol will be backward compatible with the present CHAdeMO and GB/T standards. Yoshida added that the partners are also thinking of developing a standard that covers vehicles such as scooters, forklifts, and lightweight cars. Such a charger would be rated at between 2 and 20 kW.

Despite the current dominance of the CHAdeMO and GB/T standards, a third standard, developed by SAE International, could pose a long-term threat to ChaoJi. Named Combined Charging System (CCS), it's backed by BMW, Ford, General Motors, Volkswagen, and others. Although CCS was introduced in 2014, (five years after CHAdeMO's debut), its acceptance is reportedly growing fast. And a fourth proprietary standard, devised by Tesla, is also gaining ground.

Confusion caused by incompatible charger standards is one obstacle preventing faster EV adoption. Other hurdles include high price, limited charging infrastructure, driving-range anxiety, and slow charging times.

Should CHAdeMO and the CEC gain support for an industry-wide standard for ultrafast charging, it could eliminate some of these hurdles. But the introduction of another standard will likely be a major headache for hardware developers, says Kouhei Sagawa, an assistant professor in electrical engineering at Tokai University, in Tokyo. "This will lead to an increase in the development period and in the cost," he says.

Sagawa points out that manufacturers need to change the electrical design of cars for each new standard, swap out hardware mountings, and test electro-

magnetic compatibility. To reduce this burden, Sagawa says, the new standard should maintain a close affinity with the existing standards.


Meanwhile, CHAdeMO and the CEC are pushing ahead. Yoshida says that, provided there is agreement on backward compatibility and the CAN bus, "we welcome countries who are interested to participate in developing the standard."

Just how many countries take up that invitation will likely determine whether the new effort creates a truly global standard or merely adds to the present confusion. —JOHN BOYD

An extended version of this article appears in our Energywise blog.

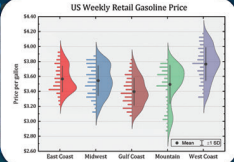
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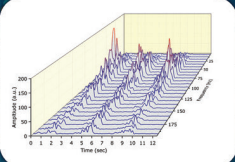
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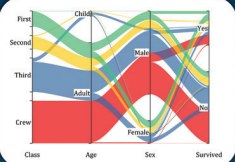


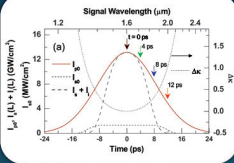
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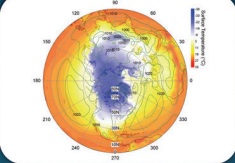
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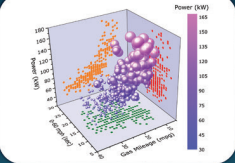


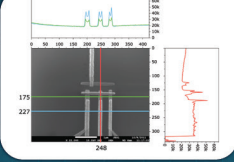


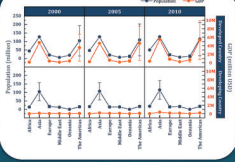


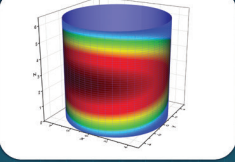


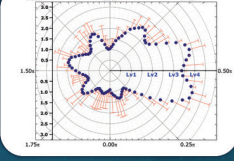


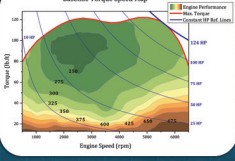


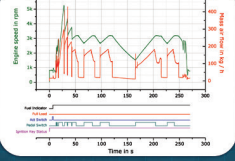













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