

U.S.-Sweden Joint PHEV Research

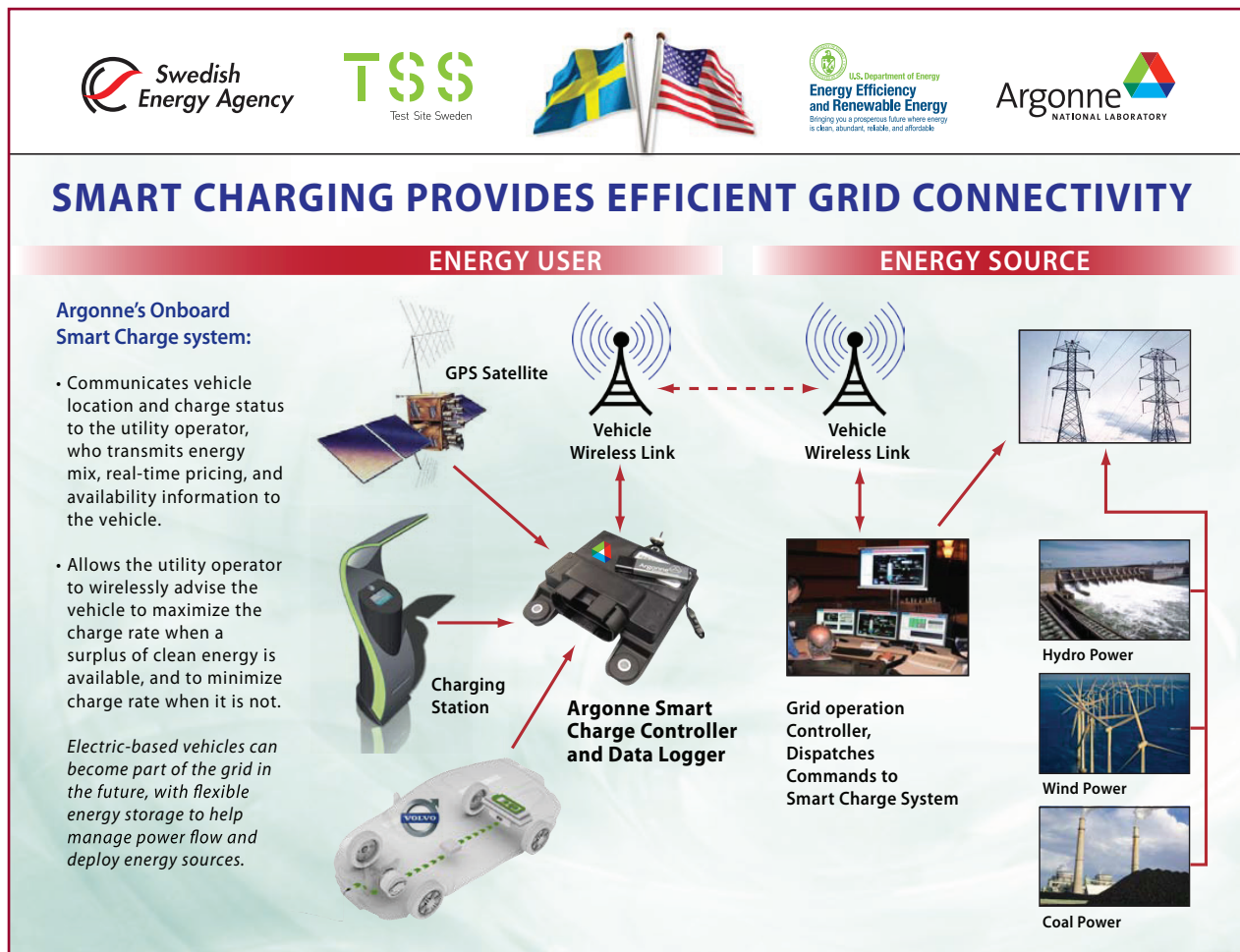
Looking to jointly develop new plug-in hybrid vehicle (PHEV) technology and accelerate its consumer acceptance and commercialization, the U.S. Department of Energy (DOE) and Sweden signed a Memorandum of Understanding (MOU) in July for a one year, \$1 million cost-sharing agreement to be equally funded by DOE and the Swedish Energy Agency.

Through contacts developed over many years conducting international technology assessment for the Department of Energy, Argonne National Laboratory initiated the MOU, which was signed by DOE Assistant Secretary Alexander

Karsner and Director General of the Swedish Energy Agency Tomas Kåberger, on the Swedish island of Gotland. The ceremony included comments by Swedish Deputy Prime Minister Maud Olofsson and U.S. Ambassador to Sweden Michael Wood, who were on hand for Almedalen Week (“politician’s week”), traditionally held in the ancient walled city of Visby on the island, three hours (by ferry) southeast of Stockholm. The cooperative activity is made possible by the U.S.-Sweden Science and Technology Implementing Agreement that was signed in June 2006 by Karsner and Olofsson—who



Assistant Secretary Karsner and Swedish Deputy Prime Minister Maud Olofsson (center) at the MOU signing ceremony.



How the Smart Charge System Works

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demonstrated their support for the activity by “plugging in” the Volvo ReCharge PHEV concept vehicle to a futuristic interactive charger concept developed for this project.

Over the next year, Argonne and Test Site Sweden will collaborate and

- Develop PHEV vehicle instrumentation, vehicle-to-grid hardware and smart-charging systems;
- Research customer behavior in field testing;
- Quantify national, utility and customer benefits; and
- Develop convenient “open” charging stations (for all electric-based vehicles).



The Argonne Smart Charge System

“The recent development of our unique technology for onboard data acquisition and analysis, in combination with our expertise in vehicle testing, allowed us to quickly develop a ‘smart charging’ system for electric/hybrid vehicles and respond to Assistant Secretary Karsner’s direction to establish international cooperative programs to address our common global objective to reduce petroleum consumption,” commented

Keith Hardy, one of the developers of Argonne’s data acquisition tool, ARDAQ (Argonne Real-Time Data Acquisition).

Argonne engineers developed ARDAQ to provide onboard data collection and diagnostics of PHEVs. ARDAQ will enable the U.S.-Sweden joint PHEV research in vehicle-utility interface and communication, and PHEV use patterns and user characteristics in combination with smart-charging.

The concept of Argonne’s Smart-Charge System is to provide the vehicle data and the communication capability to inform both the user and the grid regarding the vehicle’s energy needs, and to control the vehicle charging based on feedback provided by the grid operator. In combination with the interactive charger concept developed by Test Site Sweden, users will be informed by the grid operator regarding the energy sources used for recharging (hydro, wind, coal, nuclear) as well as the consequences of recharging at a specific time and location—giving an informed user the choice of when to recharge.

The objective is optimal accommodation (both environmental and economical) of a large number of electric or plug-in hybrid electric vehicles recharging in the future. Specifically, the onboard vehicular system:

- Communicates vehicle location and charge status to the utility operator, who transmits energy mix, real-time pricing and availability back to the vehicle
- Allows the utility operator to wirelessly advise the vehicle to maximize the charge rate when a surplus of clean energy is available, and to minimize charge rate when it is not.



The Test Site Sweden interactive charger concept and the Volvo ReCharge PHEV concept vehicle.

The off-board charging stations will inform the user, provide an opportunity for user input to the recharge process, and manage the billing automatically.

Joint activities include a U.S. technology transfer meeting in Sweden and demonstration of the Volvo ReCharge PHEV concept vehicle this fall. The Smart-Charge System will be used in production-intent PHEVs from Swedish manufacturers in Test Site Sweden’s field test program in 2009. Results from the field test will be presented at the International Electric Vehicle Symposium in Stavanger, Norway (May) and the UN Climate Change Conference in Copenhagen (December).

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