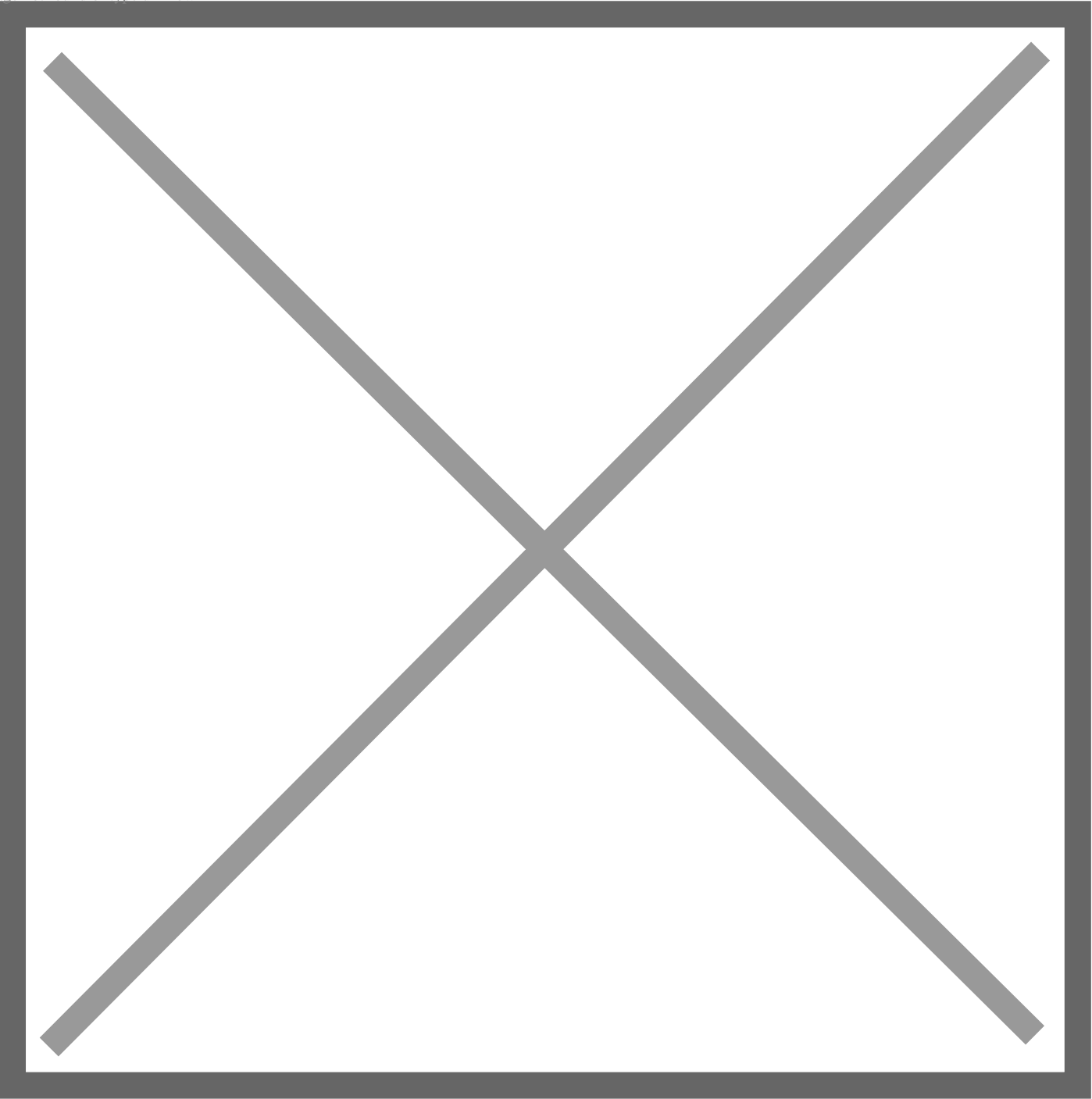


Toyota Research Institute: Behavioral Science Can Unlock More Carbon Reductions from Electric Vehicles

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PALO ALTO, Calif., and TOKYO (Sept. 16, 2025) — The Toyota Research Institute (TRI) today released new research showing that behavioral science-based interventions significantly improve electric vehicle (EV) charging habits, helping reduce carbon emissions. The studies, conducted in the U.S. and Japan, tested [ChargeMinder](#), a prototype app developed by TRI's Human-Centered Artificial Intelligence (HCAI) division, which incorporates insights from behavioral science to improve EV charging behavior.

Key findings:

- In the U.S., behavioral interventions increased charging by 10% for plug-in hybrid electric vehicle (PHEV) drivers.
- In Japan, PHEV and battery electric vehicle (BEV) drivers shifted charging to peak renewable energy hours by 59%, adding nearly 30 minutes of daytime charging per vehicle, per day.
- Interventions increased the satisfaction of U.S. PHEV drivers with their vehicles by 16 percentage points, bringing it to 100%.

“Technology is not the only way to reduce emissions — people’s choices matter too,” said [Dr. Gill Pratt](#), Chief Scientist for Toyota Motor Corporation and CEO, Toyota Research Institute. “This research and development shows how science-based behavioral interventions can both help us reduce carbon emissions as much as possible, as soon as possible, and increase customer satisfaction.”

Why Behavior Matters

Technology is not the only path to lower emissions. To reduce their total carbon impact, electrified vehicles must be charged regularly and at the optimum times when cleaner energy sources are available. Without changes in charging behavior, vehicles like PHEVs and BEVs cannot deliver their full climate benefit.

“Behavioral science is a powerful, scalable tool to help achieve carbon neutrality,” said [Dr. Laura Libby](#), Manager, Carbon Neutrality, Human Centered Artificial Intelligence, Toyota Research Institute. “Research in behavioral science shows that small, targeted interventions can have a large impact on people’s decisions and actions. Furthermore, compared to other causes of behavior change such as public charging infrastructure initiatives and consumer financial incentives, behavioral interventions are inexpensive and can be deployed quickly.”

The ChargeMinder Research App

ChargeMinder applies behavioral science to EV charging by:

- Delivering just-in-time reminders — up to 50% more effective than generic prompts in laboratory studies.
- Providing positive reinforcement with streaks, summaries, and encouraging messages.
- Surfacing engaging educational quizzes that leverage memory science to enhance learning.

ChargeMinder integrates more than a dozen interventions based on well-replicated findings from behavioral science research that have been tailored for specific charging behavior change goals. These interventions are surfaced through in-app features and mobile push notifications. The ChargeMinder platform can also securely and anonymously ingest and surface user data from multiple sources, including vehicle telematics and charging locations. With this data, we can provide a personalized intervention experience and conduct advanced data analytics while preserving user privacy.

What’s Next

Technologies that account for how people think, feel, and behave will play a crucial role in the future of lower-carbon mobility.

TRI and Toyota's Carbon Neutral Center plan to extend ChargeMinder research to focus on personalized, data-driven interventions, making EV charging even more consistent with Toyota's global carbon neutrality strategy.

“This work emphasizes the importance of incorporating behavior change as a key part of a decarbonization strategy. We need to build technologies that bridge the gap between human behavior and carbon reduction,” added Manabu Handa, Assistant Manager, Carbon Neutral System Planning Department, Toyota Motor Corporation.

NOTE: Both studies were randomized controlled trials (RCTs) involving EV drivers from 12 different brands. For more information and complete data, please visit [TRI's Medium blog](#).