Mobility Systems Analysis

Our Expertise

Digital Twins Capabilities | EVI-X Modeling Suite of Electric Vehicle Charging Infrastructure Analysis Tools | Future Automotive Systems Technology Simulator (FASTSim™) | HIVE™ | Infrastructure Perception and Control Laboratory | Lithium-Ion Battery Resource Assessment Model (LIBRA) | Mobility Energy Productivity Tool (MEP) | NREL Open Platform for Agile Trip Heuristics (NREL OpenPATH™) | Route Energy Prediction Model (RouteE) | Technologist in Communities Program | Transportation Energy & Mobility Pathway Options (TEMPO™)

The Need

Powerful Transportation Analysis at a Systems Scale

Achieving the nation's clean transportation goals will require more than increasing the numbers of electric vehicles (EVs) on the road or solar panels on homes. It will require visionary transformation of foundational systems in our society—from the supply chains that provide the things we need to the mobility systems that move people and goods.

What will propel the monumental transition to sustainable transportation? Bold, systems-level analysis that can capture the complex interactions between the different parts of our energy systems and provide objective answers to sweeping energy questions.

The Solution

A Whole-System Approach Transition

NREL is distinguished by its holistic, systems-of-systems approach, which allows for rigorous, thorough exploration of alternative energy scenarios. Through large-scale ensembles of simulations, researchers can unlock essential insights to fuel transportation transformation.

NREL researchers leverage powerful modeling and simulation tools in partnerships with some of the largest software and automotive companies in the world—like Google, Ford, General Motors, and Volvo. Using the FASTSim, RouteE, and HIVE tools, they enable partners to create fuel-saving opportunities using vehicle connectivity, automation, and intelligent routing and operation.

In the battery recycling arena, NREL researchers harness a system dynamics approach within the LIBRA model, which

compiles and simplifies how various factor changes—such as costs, battery adoption scenarios, and international actions—affect long-term trends in the battery supply chain.

And as the world scrambles to plan for accelerating EV adoption, NREL researchers are rising to the challenge using the EVI-X modeling suite of EV charging infrastructure analysis tools. In the White House-commissioned 2030 National Charging Network study, researchers used the EVI-X modeling suite to estimate the charging infrastructure needed to support an anticipated 30–42 million light-duty EVs on the road by 2030.

These insights aren't just novel. They go on to shape policies, infrastructure, and action on a national scale.

The Impact

Focused Solutions for the Renewable Energy Transition

NREL's systems analysis research is creating powerful insights into complex and rapidly evolving transportation systems and powering the renewable energy transition. By illuminating the most difficult-to-quantify elements of mobility systems—from individual behavior to the interactions of global markets—and

driving progress toward the U.S. National Blueprint for Transportation Decarbonization, NREL researchers enable informed decisions to guide the clean transportation systems of tomorrow.

🤝 Partners

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