



Envisioning Tomorrow's Sustainable Mobility Systems

In the race to achieve efficient, accessible, affordable, and decarbonized transportation, which mobility solutions and strategies will get us to the finish line?

Thought leaders from government, industry, and academia convened in mid-2023 at the National Renewable Energy Laboratory (NREL) to propose answers to this question. They worked to determine the research, development, and deployment **challenges** and **opportunities** that should be prioritized to create **tomorrow's sustainable mobility systems**.

Workshop breakout sessions spanned six topics:

- Complex travel behaviors, focused on emerging travel modes and pandemic impacts.
- Emerging trends in freight.
- Strengthening connections between research and deployment.
- Evolving ground mobility at airports leveraging automation and electrification.
- Novel transit solutions for underserved communities.
- Cutting-edge operations concepts for intelligent infrastructure.

Over the course of two days, crosscutting themes emerged:

Convenience and Reliability Are Key

There are many strategies to achieve lower-emission transportation, but to encourage adoption, these solutions must be as or more convenient and cost-effective than energy-intensive modes. Workshop participants identified a combination of technologies, operational changes, and new modes that are critical to decarbonizing transportation. Potential solutions include more flexible and efficient high-quality public transport (e.g., on-demand transit, bus rapid transit); improving safety for nonmotorized modes of travel; e-bikes and e-scooters; equitable access to ridehailing; expanded electric vehicle infrastructure; continued development of intelligent connected and autonomous vehicles; and freight demand management, among others.

Solutions in this space must seamlessly integrate various modes of travel to create greater efficiencies. For instance, more flexible work schedules for those who take transit or delivery schedules for cargo and freight can reduce the carbon intensity of the passenger and freight transportation systems.

Stakeholder Input Is Critical

Researchers, industry leaders, and technology operators alike called for opportunities to convene, share knowledge and best practices, identify common challenges, and connect with providers of potential solutions. They identified a need for clear, distilled communication about emerging technologies, findings, and deployment guidance, which can be leveraged to make business cases, mitigate risk, and point policymakers toward actionable solutions. Input from system users is also critical to ensure the success of new technologies and deployment strategies.

Participants also called for greater data-sharing, including open data protocols and frameworks, to help accelerate early deployments and push emerging technologies closer to mainstream use. One productive approach may be facilitating reverse pitch sessions in which stakeholders are invited to present the challenges they face, then begin conversations about innovative solutions with researchers and vendors.

Mobility Solutions Must Serve All People

To achieve system-level decarbonization, clean mobility and energy solutions cannot be concentrated among affluent communities. They must create opportunities for all people to participate in the clean energy transition regardless of race, gender, income, or geographic location.

Solutions and deployment strategies in this space should be aimed at reducing burdens and disproportionate impacts of traditional transportation systems on disadvantaged communities, as well as providing equitable access to the opportunities presented by the clean energy transition. Improved access to jobs, goods, electric vehicle charging, and high-quality transit, as well as opportunities to participate in community-level decision-making, are all aspects of this work.

How NREL Can Help

NREL is viewed as a trusted, objective third party capable of bridging the gaps between industry, government, and academia. The laboratory's technological capabilities enable NREL to serve as a science-grounded, neutral arbiter between societal needs and viable solutions. The laboratory is well-positioned to de-risk clean energy solutions, along with safe, equitable, and responsive mobility solutions, in order to accelerate their safe, efficient, and equitable deployment.

Participants called for NREL to serve as:

- An evaluator of emerging technologies and pilot programs.
- An expert advisor for real-world applications.
- A convener of stakeholders and solution providers.
- A neutral data aggregator.
- A developer of innovative solutions, models, methods, and metrics.

Each of these roles will be instrumental in charting the path to a sustainable transportation future.

Call to Action

Read more about the crosscutting solutions:

nrel.gov/news/program/2023/eems-workshop.html

Partner with NREL's transportation experts:

nrel.gov/transportation/working-with-us.html

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