EVGrid Assist: Accelerating the Transition

Comprehensive VGI Technical Assistance Initiative

A new cross-DOE coordination and technical assistance effort focused on the interface between vehicle charging and the electric grid considering the full spectrum of the R&D, deploy, use, learn cycle.

Purpose:
• Increase stakeholder knowledge
• Drive actions to resolve VGI challenges and barriers
• Provide pathways for stronger VGI coordination

Objectives: Activate the community to
• Prioritize challenges to solve
• Accelerate planning and decision making
• Enable proactive infrastructure investments and supporting markets, rates and regulations
• More quickly achieve decarbonization goals
Vehicle Grid Integration Initiative
Inflation Reduction Act Tax Credits for Freight

• Commercial Clean Vehicle Credit (I.R.C. 45W)
  – BEVs and FCEVs: lesser of 30% of vehicle cost or the incremental cost
  – Up to $40,000 for vehicles weighing ≥ 14,000 lbs.

• Alternative Fuel Refueling Property Tax Credit (I.R.C. 30D)
  – 30% of cost per item of property (e.g. charger, storage)
  – Up to $100,000 for businesses
  – Low-income communities or Non-urban areas

• irs.gov/cleanvehicles and IRS Notice 2023-9
Medium- and Heavy-duty Charging Station Applications

- **Fleet Depots, MHD EVs**
  - 200-300 miles roundtrip and long overnight dwell periods
  - DCFC (150-350 kW), possibly AC Level 2 (19 kW) for MD local delivery

- **Travel Centers, HD EVs**
  - Short dwell times necessitate 1-3 MW charging
  - DCFC (~100kW) when dwell periods (>4hrs) per hours of service regulations
  - Potentially 25-125 MW site power requirements
Transmission, Distribution, and other Challenges

• For high levels of EV penetration, challenges exist at the transmission and distribution levels
  ▪ Managing the magnitude and variation in charging according to vehicle schedules
  ▪ Serving site charging loads within legacy infrastructure across dense urban or rural areas
  ▪ Thermal overloading, stability, reaching rated capacity of distribution assets
  ▪ Substation and transmission constraints

• Transportation and energy sector integration is required to ensure reliability and resilience are maintained/improved
Load Forecasting Tools

Does energy storage lower charging costs?
**EVI-EDGES**
Accounts for rate structure, battery life, and cost

Where should the charging stations be located?
How many chargers and ports are needed?
**EVI-RoadTrip**
Based on conventional long-distance travel patterns

What are the equity implications of station location?
**EVI-Equity**
Charging infrastructure accessibility from environmental-justice perspective

How should the stations be designed?
**EVI-EnSite**
Station performance, load profile, charge management, and quality-of-service metrics

What is the station cost?
**EVI-FAST**
Investor payback period, net present value, and break-even first-year charging cost considering both site and grid infrastructure upgrades

Does on-site solar reduce charging costs?
**EVI-EDGES**
Accounts for annual solar insolation, building loads, weather, and electricity rates

What power levels are needed?
**EVI-EnSite**
Queueing model to identify wait times based on vehicle/power levels
Technologies to Integrate EVs@Scale

High-power Electric Vehicle Charging Hub Integration Platform

Example Protocols for Site Energy Management

- DIN70121
- ISO 15118-2
- ISO 15118-20
- OCPP 1.6J
- OCPP 2.0.1
- MQTT
- J3271
- J1772 CCS
EVGrid Assist: Strengthening Coordination and Communication

*Enhancing decision making and resolving challenges*

- VGI Vision and DOE Road Map
- Educational Webinar Series and Resource Library
- Stakeholder Processes to Resolve Challenges
- EV Rate Design Considerations
- State-Specific Tool Demonstration Reports
- Direct Technical Assistance
Noel Crisostomo
Office of Policy
EVGrid@hq.doe.gov

https://www.energy.gov/eere/evgrid-assist-accelerating-transition
U.S. National Transportation Decarbonization Blueprint

Summary of vehicle improvement strategies and technology solutions for different travel modes that are needed to reach a net zero economy in 2050

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<th>Battery/Electric</th>
<th>Hydrogen</th>
<th>Sustainable Liquid Fuels</th>
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<td>Medium, Short-Haul Heavy Trucks &amp; Buses (&lt;14%)</td>
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<td>Pipelines (4%)</td>
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### Additional Opportunities
- Stationary battery use
- Grid support (managed EV charging)
- Heavy industries
- Grid support
- Feedstock for chemicals and fuels
- Decarbonize plastics/chemicals
- Bio-products

### RD&D Priorities
- National battery strategy
- Charging infrastructure
- Grid integration
- Battery recycling
- Electrolyzer costs
- Fuel cell durability and cost
- Clean hydrogen infrastructure
- Multiple cost-effective drop-in sustainable fuels
- Reduce ethanol carbon intensity
- Bioenergy scale-up

* All emissions shares are for 2019

¹ Includes hydrogen for ammonia and methanol
References

- The U.S. National Blueprint for Transportation Decarbonization (energy.gov)
- Electric Vehicles at Scale (EVs@Scale) Laboratory Consortium Deep-Dive Technical Meetings: High Power Charging (HPC) Summary Report (nrel.gov)
- The Supply Chain Crisis Facing the Nations Electric Grid_12.12.22.pdf (energy.gov)