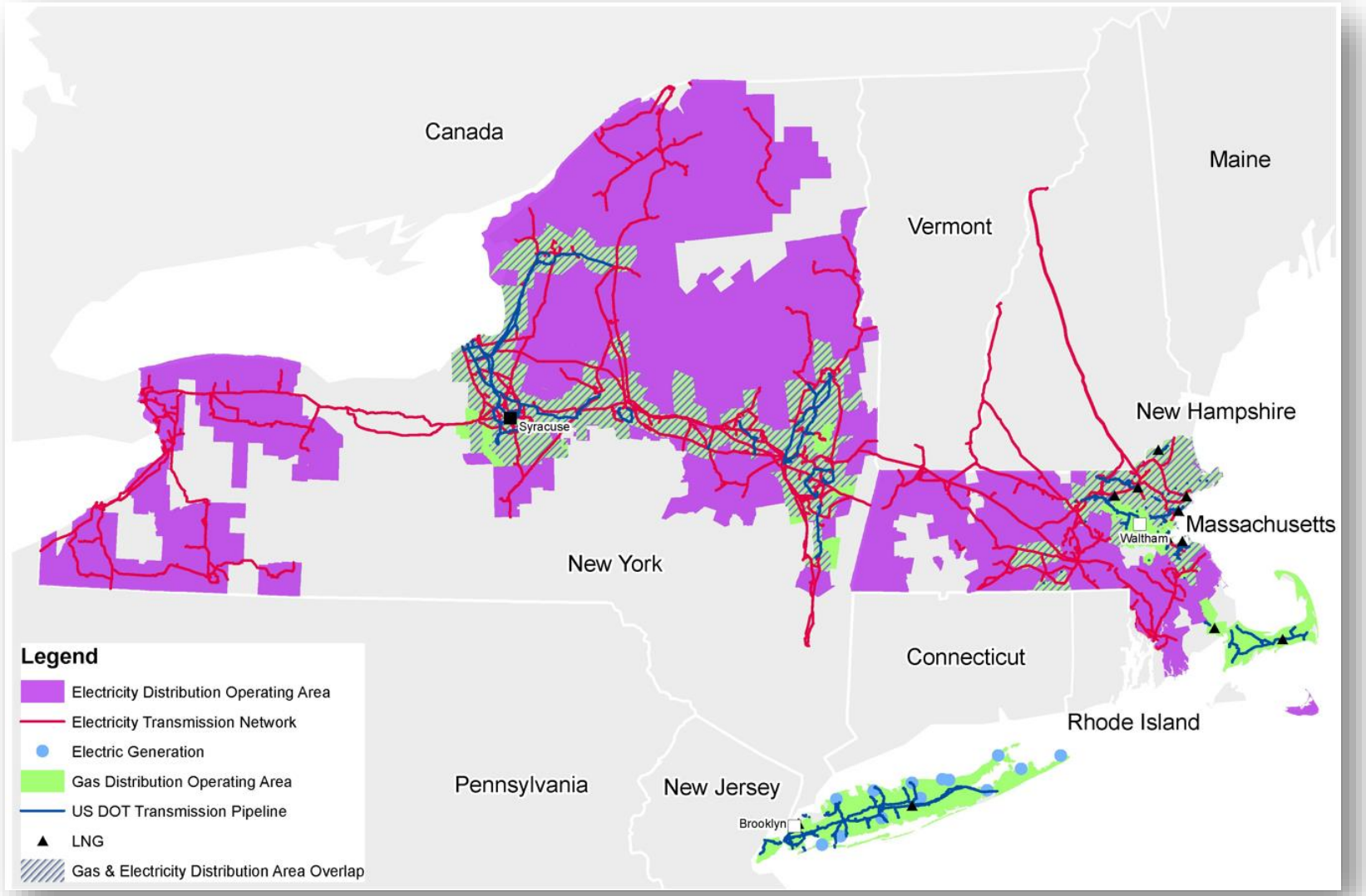
Overview: Electric Highways Study

MA Electric Vehicle Infrastructure Coordinating Council (EVICC)
June 29, 2023

nationalgrid

Overview: National Grid USA



- Electric and natural gas delivery company serving more than 20 million people through our networks in New York and Massachusetts
- Nation-leading Make-Ready EV programs in New York and Massachusetts
- Over 5,300 charging ports installed, 49% in environmental justice and disadvantaged communities
- We are leading by example as we electrify our entire internal light-duty fleet by 2030. **We will electrify 1,600 vehicles in the US by 2030**.

Why is it so important to plan for EV charging?

EV charging will have significant demands from the power grid. Preparing for this will be critical to ensure the electric grid can support EV adoption in the most cost effective, efficient, and timely manner.

Context

- Massachusetts and New York both have ambitious electric vehicle adoption targets.
- **Highway** fast-charging sites and electrified **fleet** depots could introduce significant new demands on the electric grid.
- Meeting these demands at the pace of market adoption and at lowest cost requires an understanding of location and peak demand.

Approach

Our work is helping us answer key questions:

- *Where* will charging loads be?
- *When* will they materialize?
- *What* needs will they have from utilities?
- *How* do we address quickly and at least cost?

We are using the results from studies and other efforts to develop partnerships, inform system planning, and propose projects that can meet future EV needs.

Electric Highways Study Partners

CALSTART

RMI ENERGY, TRANSFORMED.

GEOTAB.

Stable

Study Site Selection

We chose sites that provide coverage on major roadways across NY and MA.

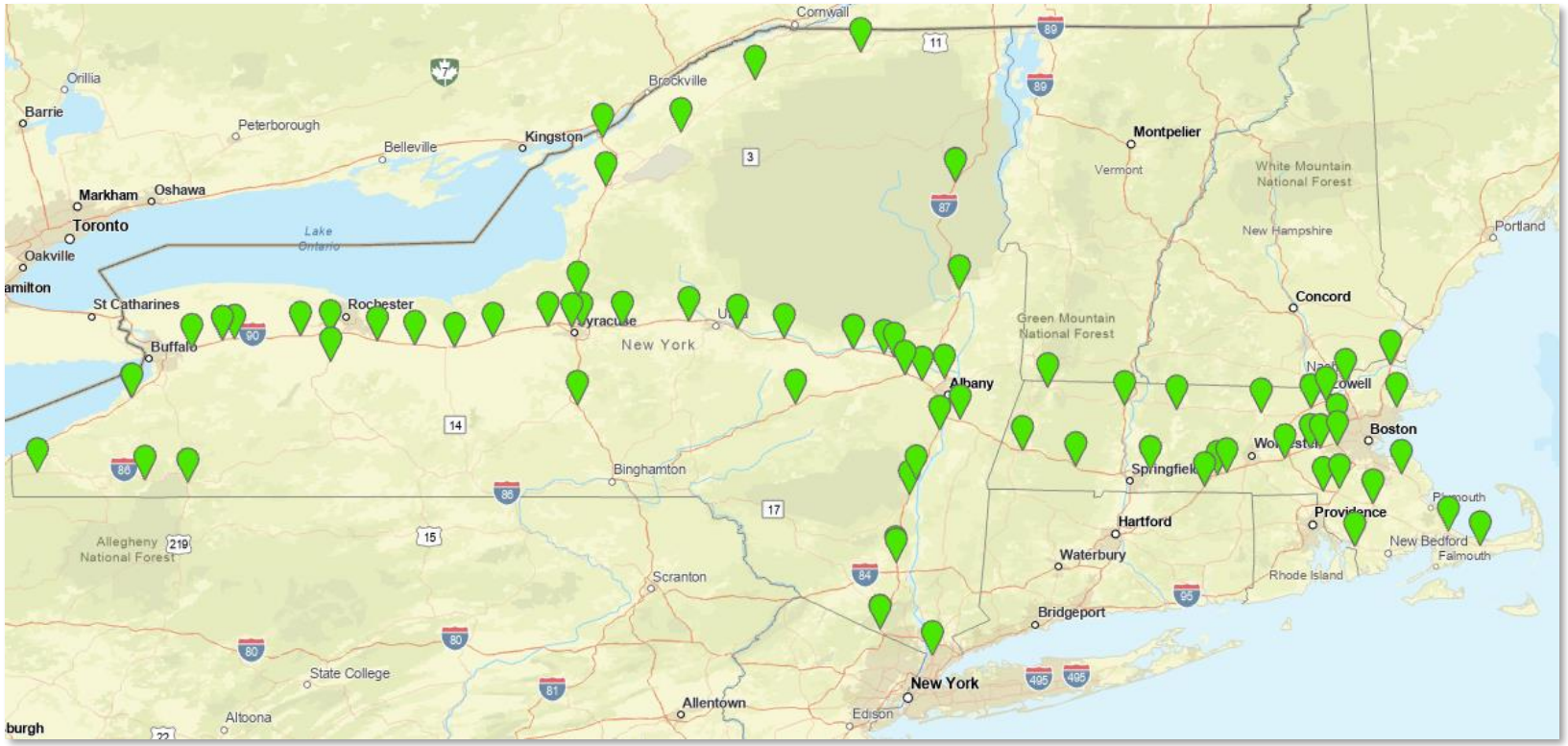
Selection Criteria:

1) **Distance between sites -** ~30-50 miles apart.

2) **Proximity to highway -** on highway or close to exit.

3) **Commercial activity at the site -** assuming ~10 minutes or longer for MHDV charging.

4) **Proximity to NG transmission and substation infrastructure,** as a proxy for long-term lowest cost with an expectation that some sites will be large loads and may need to expand in the future. Distribution line available capacity was reviewed but not a key factor.

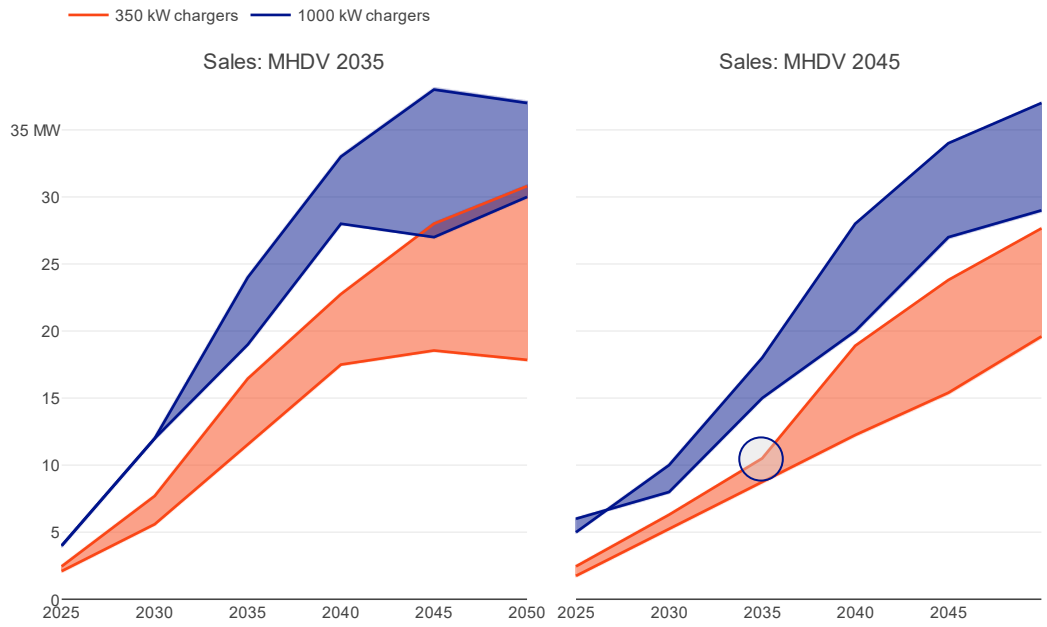


Highway Charging Study Site

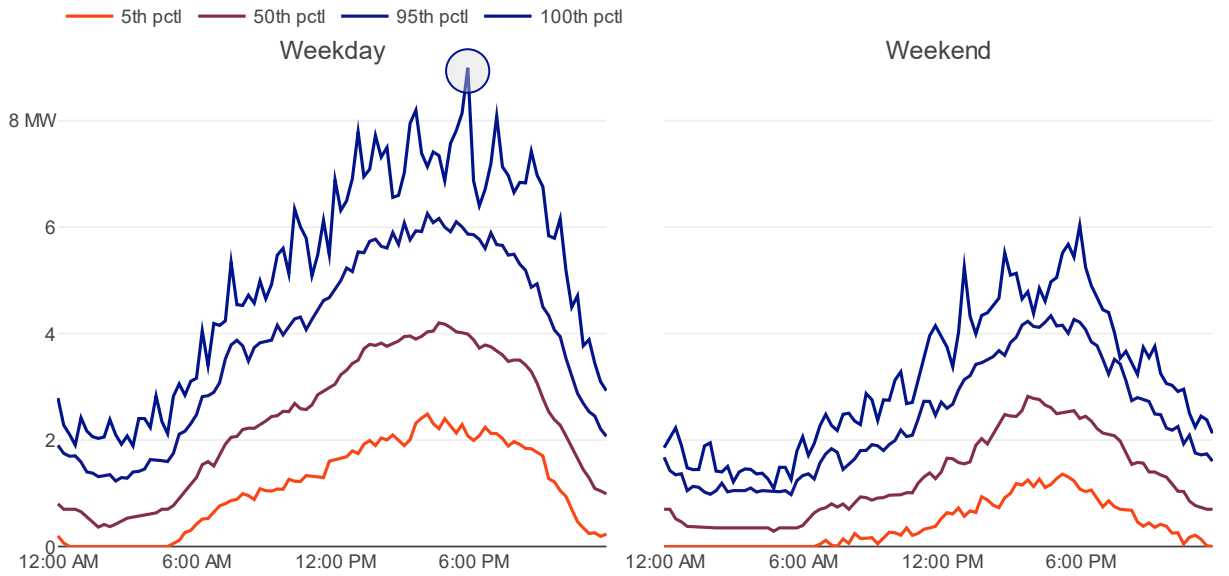
We include some sites outside of National Grid's service territory where they add coverage of major roadways and would be informative to broader plans. We do not have visibility to the infrastructure at these points.

Medium- and Heavy-Duty Results: Large Passenger/Truck Stop

Capacity Needed to Meet Annual Peak Demand for MHDVs



MHDV Load Curve Variation, 2035



Methodology

1. Identify all stops at candidate site in Geotab data
2. Get arrival time, distance traveled to site, and departure time from site for each stop
3. Charge vehicle, at either 350 kW or 1 MW, until vehicle recovers energy expended from journey to site or vehicle leaves site.

As soon as 2035, this site could need **10 MW** of power to meet the MHDV charging demand.

Upper bound of each area represents charging unconstrained by vehicle dwell time

Lower bound is constrained by vehicle dwell time

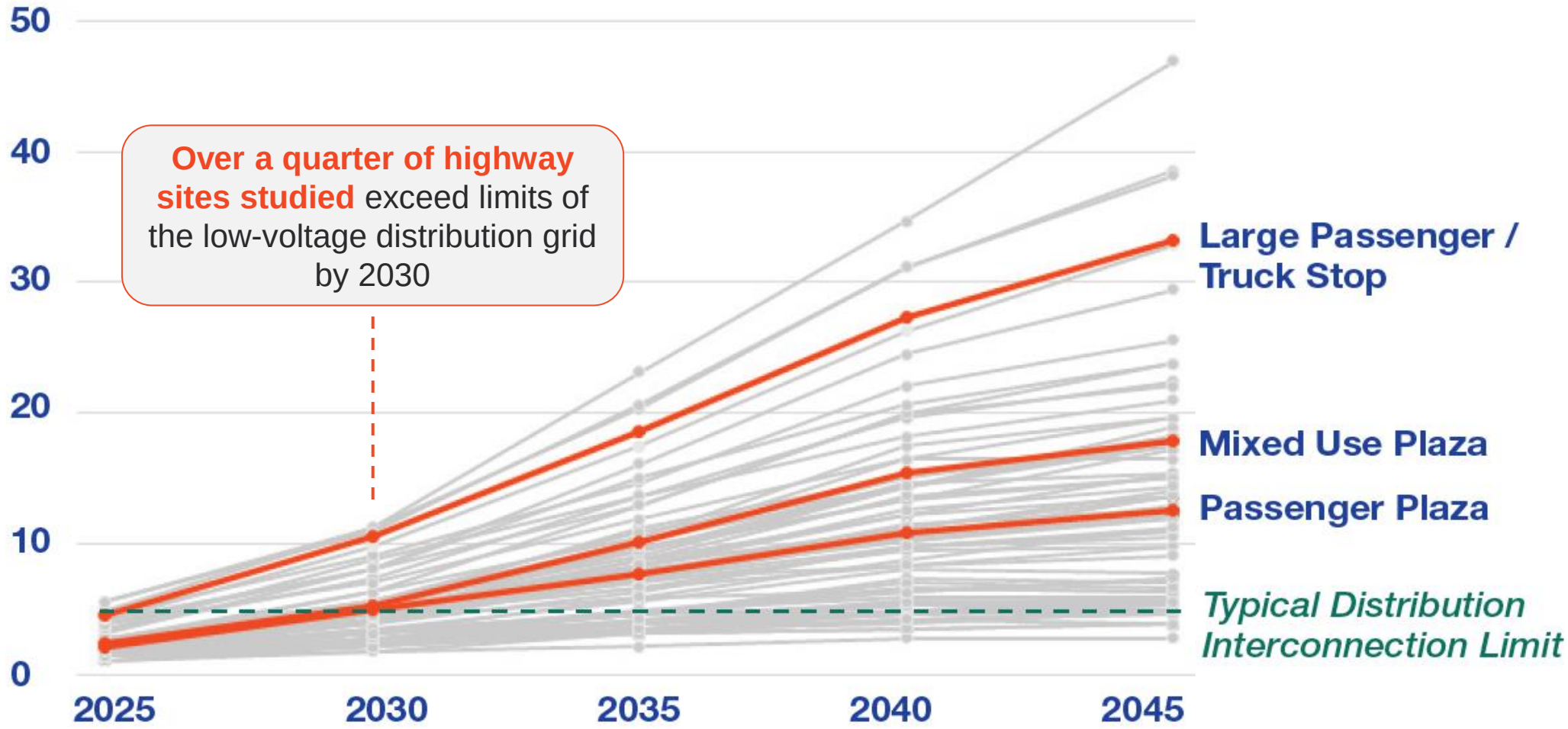
Projected charging capacity for 71 Northeastern highway sites

Megawatts of power to meet annual peak demand, over time

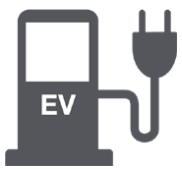
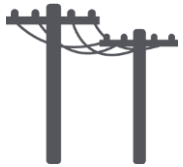
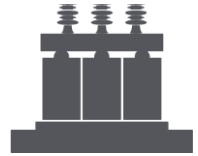
Large Industrial Plant
(40+ Megawatts)

A Small Town
(20 Megawatts)

A Stadium
(5 Megawatts)



We need to align infrastructure timelines with electrification roadmaps.

~6-12 Months to Construct	~1-4 Years to Construct	**~4-8 Years to Construct**
		
Onsite Upgrades	**Distribution Upgrades**	**Transmission Interconnection and Upgrades**

National Grid is seeking to de-risk investment and avoid EV adoption outpacing utility infrastructure.

Utility timelines are much longer than for EVSE providers. To meet electrification goals and driver needs, National Grid must develop solutions that account for future EV growth

Shared planning on strategic locations, site sizes, and timelines should involve utilities, transit agencies, energy offices, regulators, and industry

There is an opportunity to coordinate planning and deployment of highway (and fleet) charging

Utilities, regulators, fleet operators, and others in industry could develop **coordinated, actionable plans for large-scale charging** to accelerate transportation electrification at lowest total system cost by enabling utilities to make targeted, anticipatory investments in infrastructure to support charging**.**

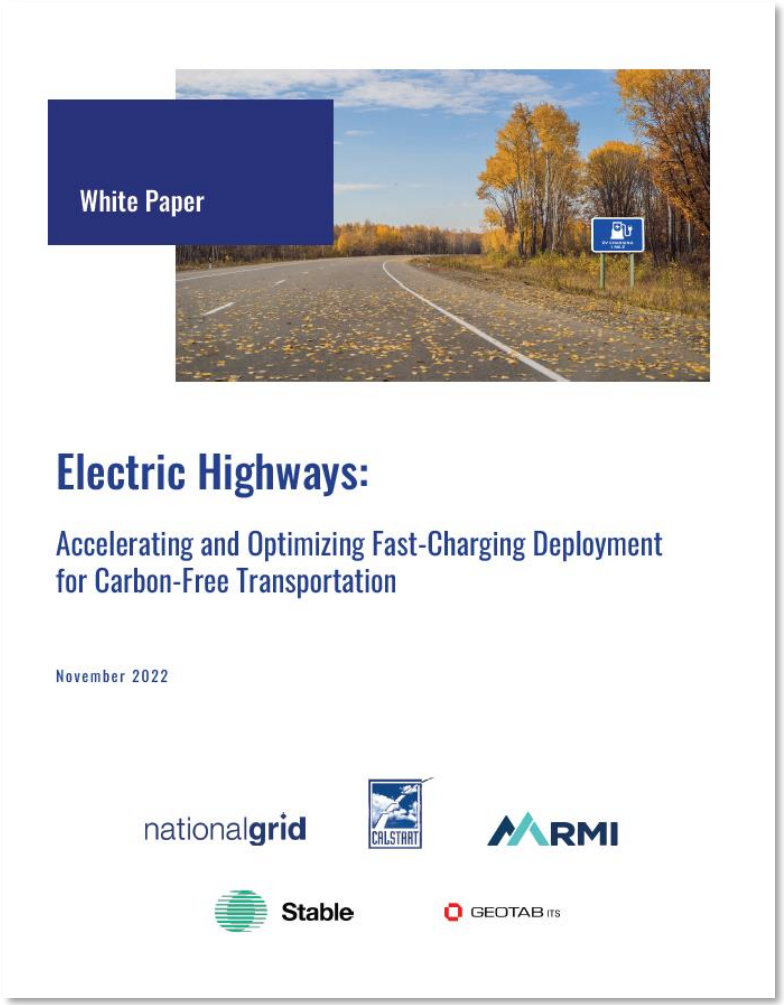
These Action Plans Could:

- **Coordinate** identification of “no regrets” highway sites and fleet clusters that will have large demands (***the what and where***)
- **Forecast** how many chargers are needed at each site to serve vehicles (***the when***)
- **“Plug” those sites into neighboring electric transmission or distribution lines** to deliver the power necessary for fast-charging (***the how***)
- **Empower utilities to build required upgrades in time** to meet growing demand from drivers by making anticipatory investments in line with directional forecasts (***the how***)

Benefits:

- ✓ **Drive down costs** by eliminating duplicative investments – even bring the chargers to areas of capacity, rather than the other way around
- ✓ **Avoid long wait times** by eliminating bottlenecks to charging deployment
- ✓ **Seamlessly enable the EV transition** for passenger and commercial vehicles
- ✓ **Improve air quality and support fleet electrification** in neighboring communities
- ✓ **Achieve climate mandates and market development** at lower total system costs

The Electric Highways Study is available online



The full report and a shorter summary are available at **nationalgrid.com/us/EVhighway**

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