

Vehicle Electrification and Grid Infrastructure

Planning for State and Regional
Infrastructure and Accessibility

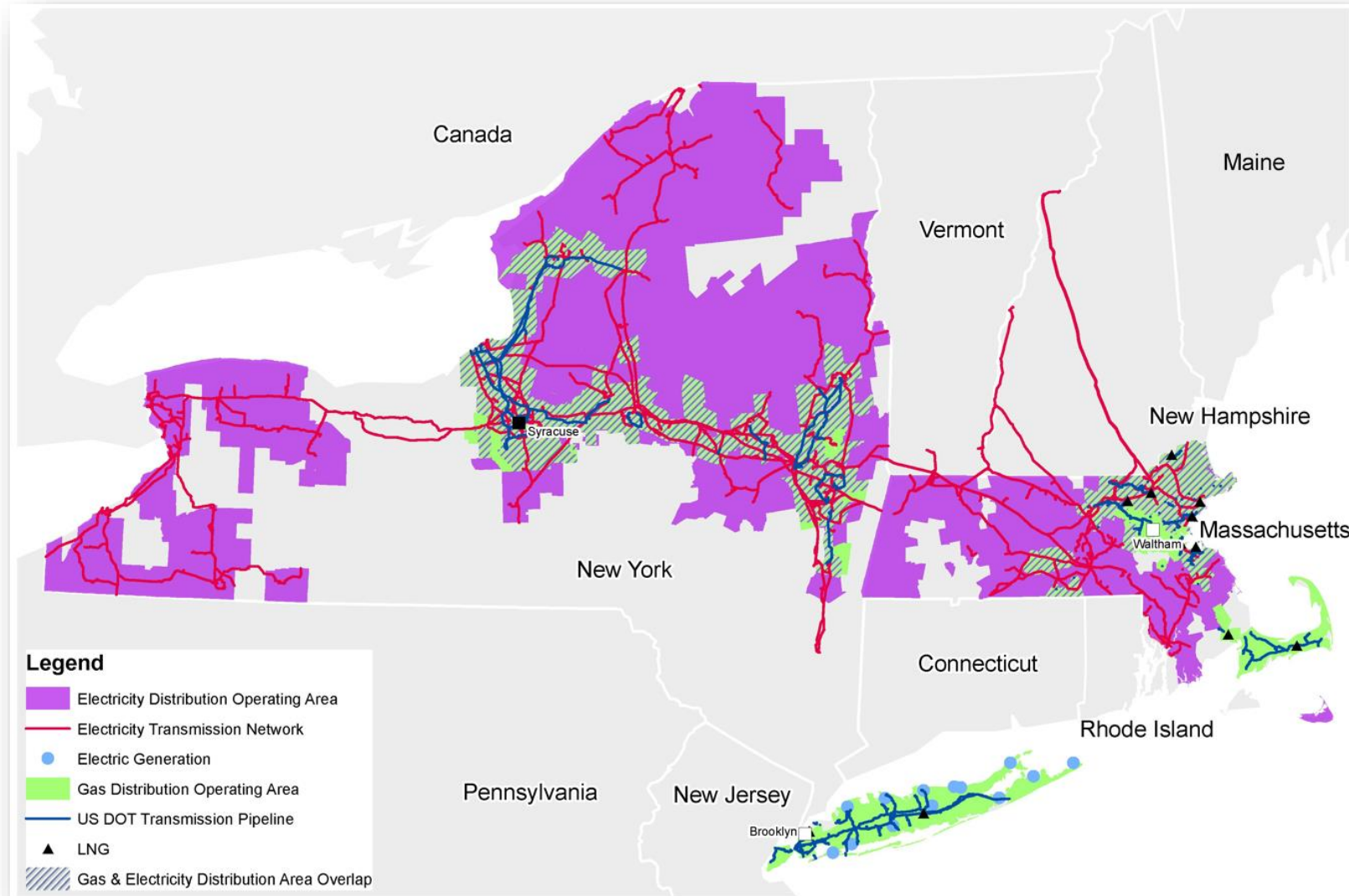
NETC Advanced Air Mobility Regional Plan

February 13, 2024

nationalgrid



Overview: National Grid USA



- Electric and natural gas delivery company serving more than 20 million people through our networks in Massachusetts and New York
- Nation-leading Make-Ready EV programs in both states
- Over 6,200 charging ports installed, 50% 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

- States and companies have ambitious electric vehicle adoption targets. New air travel technologies are using electric power.
- Highway fast-charging sites and electrified fleet depots (and airport ecosystems) 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 future demand.

Approach

Our work is helping us answer key questions:

- What charging needs will we have to meet?
- Where will they be?
- When will they materialize?
- 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.

Projected charging capacity for 71 Northeastern highway sites

Megawatts of power to meet annual peak demand, over time



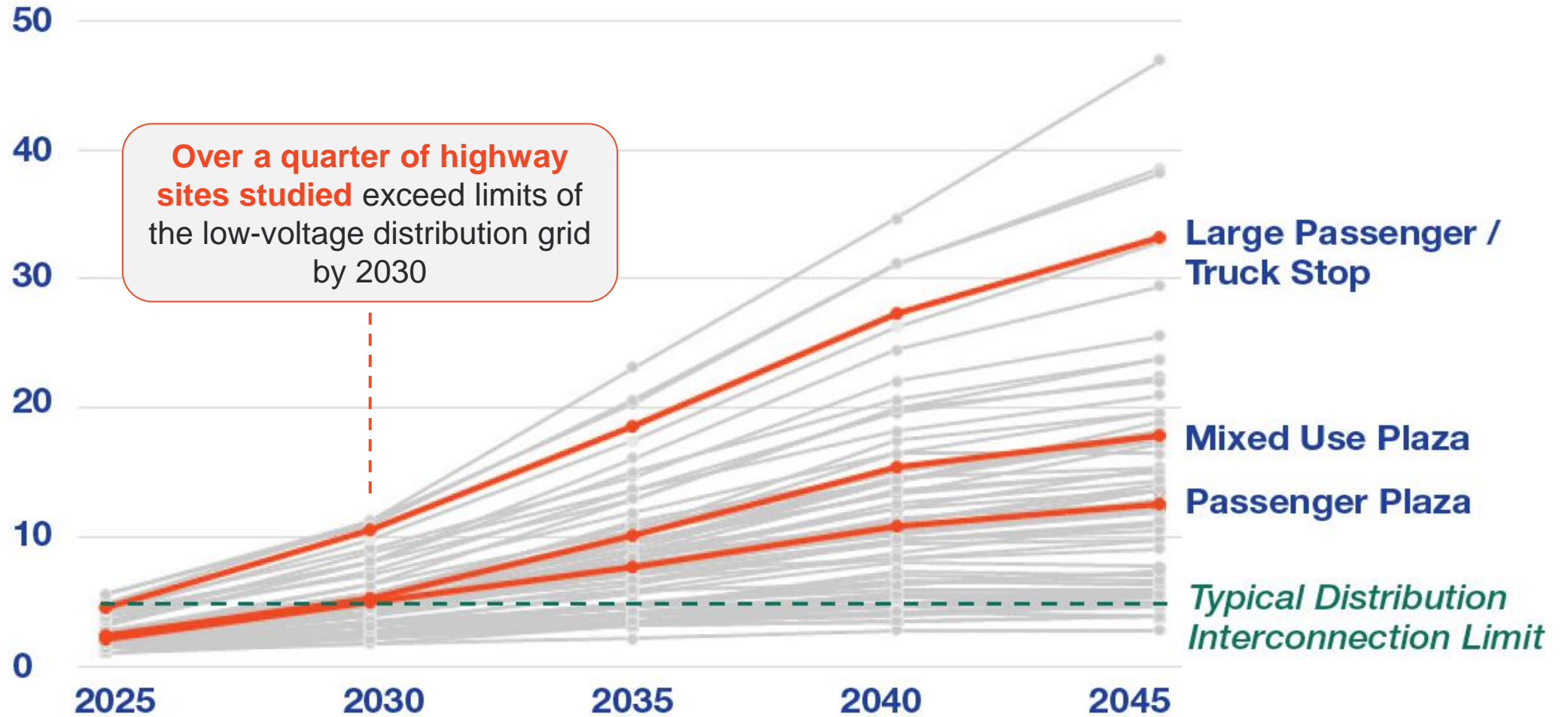
Large Industrial Plant
(40+ Megawatts)



A Small Town
(20 Megawatts)



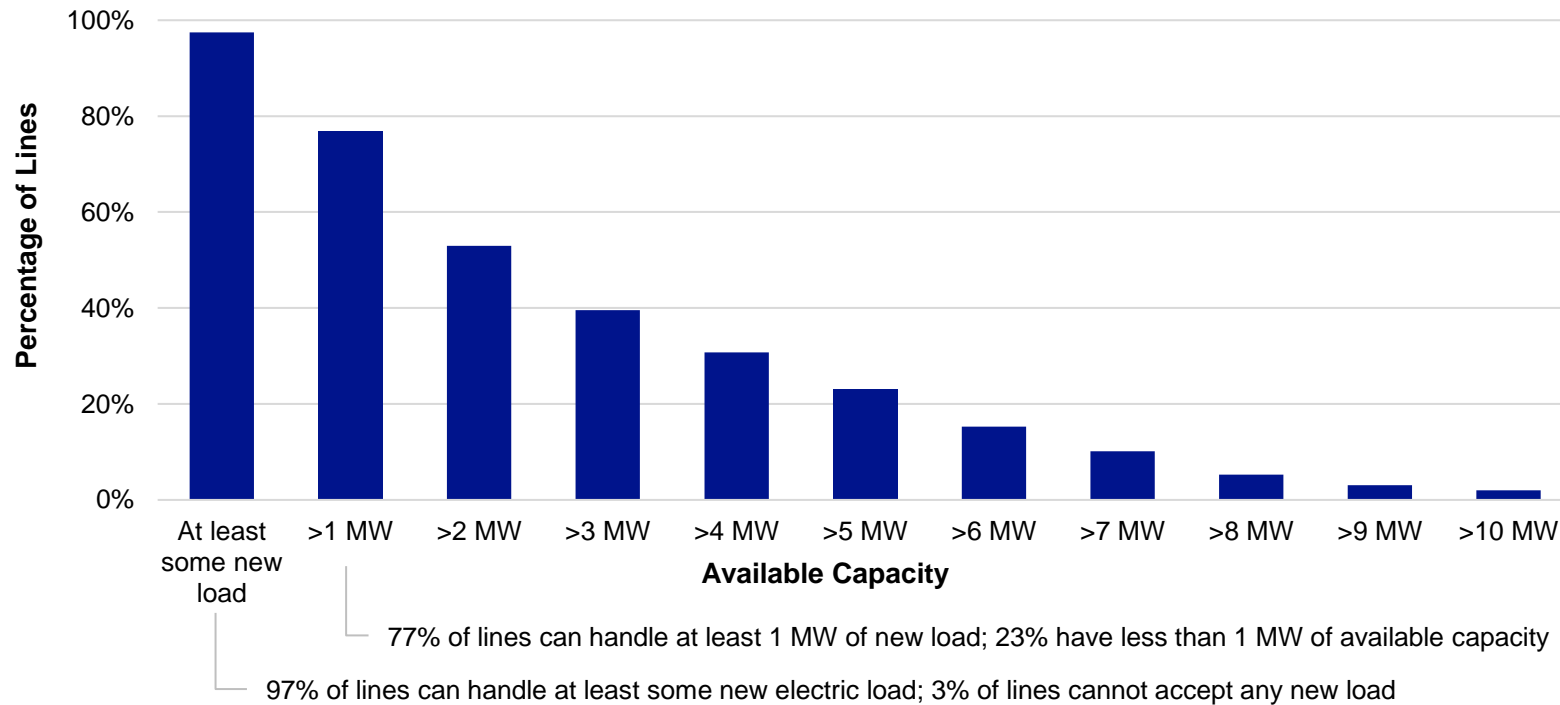
A Stadium
(5 Megawatts)



Available grid capacity for EVs (and other uses) will depend on the area

How much load can distribution lines handle?

Based on National Grid's system



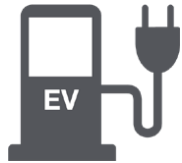
National Grid distribution lines have **median ~2 MW** of available capacity – enough for just 14 trucks at 150 kW.

Some parts of our grid are “Areas of Capacity.” They can accommodate early, accelerated EV charging.

Other parts of our grid are more constrained – these are “Areas of Need,” where proactive investment will be needed.

There is a critical need to align infrastructure timelines with electrification roadmaps

~6-12 Months
to Construct



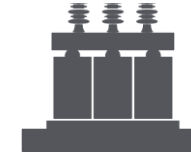
Onsite Upgrades

~1-4 Years to
Construct



Distribution Upgrades

~4-8 Years to
Construct



Transmission Interconnection
and Upgrades

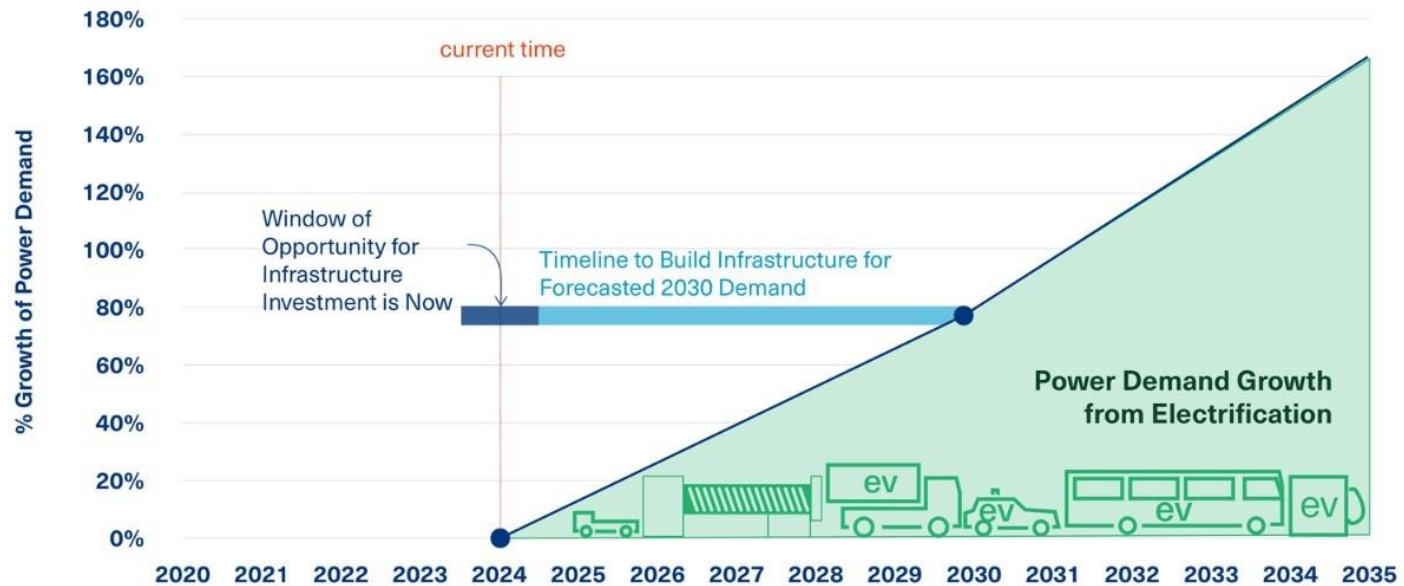
National Grid is seeking to de-risk investment and avoid EV adoption outpacing utility infrastructure.

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

Airports are already anticipated to see large electric demand for operations and passenger needs – before considering air mobility

Electrifying Airport Ecosystems by 2050
Could Require Nearly Five Times the
Electric Power Currently Used

Invest Now for 2030 Power Needs



Source: [Enterprise Mobility](#)

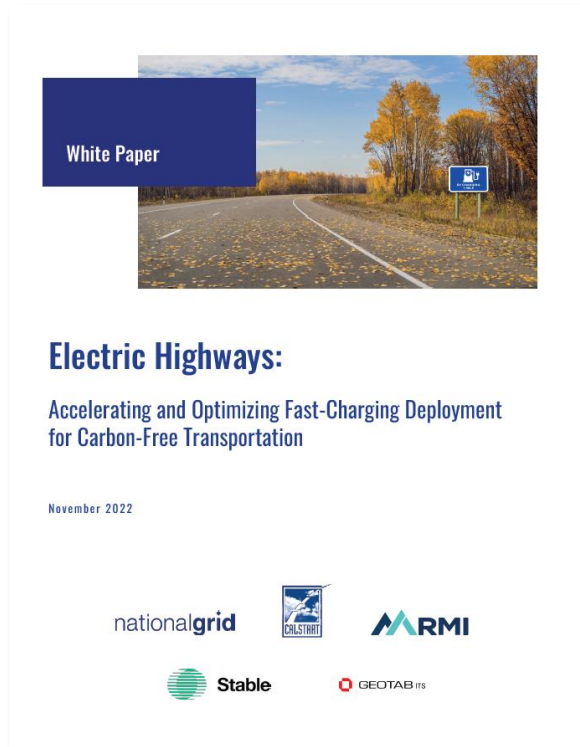
The grid can handle EV charging needs, but planning and coordination will be critical to supporting it economically and quickly

- **System impacts start to materialize at relatively low levels of EV adoption.** In some instances, a handful of highway chargers or a single fleet depot would necessitate upgrades (and already have).
- **New grid infrastructure will be needed to serve electric fleets.** In areas with limited grid capacity, new substations and transmission will be needed. Energy storage could provide a useful tool to defer investments and allow grid infrastructure to be developed, and to support resilience. Further work is needed to understand its economics as a solution to large-scale MHDV adoption, but technological advances and cost reductions could open up more opportunity in the future.
- **Proactive planning and utility-fleet engagement will be key** to delivering new grid infrastructure for clusters of MHDV EV fleets **in time** and at **least cost**. Utility infrastructure could take years to develop, but *utilities are not typically allowed to build in anticipation of needs* (risk of infrastructure not being “used and useful”).

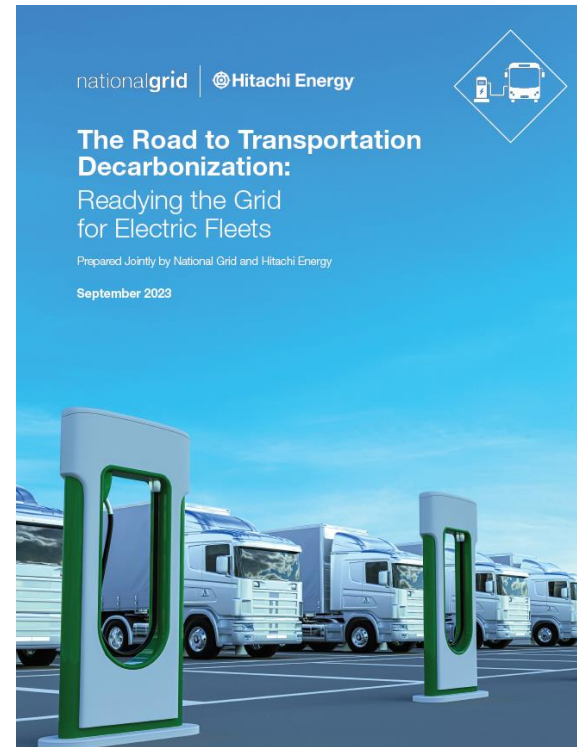
*Collaboration with DOTs and companies on air mobility sites, adoption/sales plans, and charging needs could provide clarity on upcoming needs and allow utilities to proactively target infrastructure to ideal locations **and overcome challenges in planning for vehicle electrification***

For more information

Our Electric Highways study is available at nationalgrid.com/us/EVhighway



“The Road to Transportation Decarbonization: Readyng the Grid for Electric Fleets” is available at nationalgrid.com/us/ev-fleet-charging



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