

LOCKING IN ZEV Charging Infrastructure

The future of transportation is zero-emission—governments and industry around the world confirm this with a growing number of new decarbonization targets and regulations. With increasing model availability, declining costs, and innovative business models accelerating the electrification journey, **commercial vehicle charging must be available, accessible, reliable, clean, and bankable**. The transportation and electricity systems, which have operated in silos for decades, are merging—to be successful and cost-effective, deep collaboration across stakeholders, long-term planning, and short-term problem-solving must start now.

Ten success factors will ensure charging infrastructure for commercial vehicles is developed at the speed required and able to satisfy fleet needs.






1. E-trucks are on the market to create demand
2. Plans to increase charging infrastructure are in place
3. Grid connections and upgrades respond to demand
4. Land slots are made available for charging sites
5. Permitting is accelerated while maintaining safeguards
6. Charging infrastructure and services are operational
7. Data are available, accessible and shared
8. Business and finance models support the transition
9. Broader social, economic and environmental effects are managed
10. Stakeholders are informed and collaborate

Source: Modified from S. Punte, [Actionable Framework for E-trucks and Charging – a reference paper to organize climate action](#), October 2023.

Prioritize Three Action Items

While the [Actionable Framework for E-trucks and Charging](#) offers a list of 30 concrete steps to lock in these success factors, stakeholders should focus now on **three immediate priorities** in alignment with the [Breakthrough Agenda 2023](#) and the Global ZEV Transition Roadmap:

	STEP 1	<p>What: Set long-term targets and regulations to drive zero-emission commercial vehicle adoption.</p> <p>Who: Governments and companies</p> <p>How: Targets send a strong demand signal to manufacturers and create a pathway for binding policies and regulation that create certainty and ensure an ecosystem-wide transition. Through the Global Memorandum of Understanding on Zero-Emission Medium- and Heavy-Duty Vehicles (Global MOU), 33 nations and over 115 endorsers (and counting) have agreed to work together to achieve 100 percent new zero-emission truck and bus sales by 2040, with an interim goal of 30 percent by 2030. Supply-side regulations like the Advanced Clean Trucks rule in California, the Heavy-Duty Vehicle CO2 standards in the European Union (in discussion), and the fuel economy standards in Chile (under development) are clear cases of regulation enacting binding timelines for the transition. Fleets are also sending strong demand signals through leading first-mover initiatives like EV100+, the First Movers Coalition, the Fleet Electrification Coalition, and India's E-FAST platform.¹</p>
	STEP 2	<p>What: Establish a governance structure that can assign responsibilities and accelerate deployment.</p> <p>Who: Governments</p> <p>How: A clear governance structure that creates accountability and timelines can coordinate all relevant stakeholders and ensure action. Permitting and interconnection processes can be complex, vary substantially across jurisdictions, and take months or even years to complete. Having clear roles and responsibilities and a government agency tasked with keeping progress on track can facilitate deployments and reduce soft costs. The National Charging Infrastructure Agenda in The Netherlands provides a binding multiyear policy agenda for all stakeholders to align on planning, forecasting, and implementation.</p>
	STEP 3	<p>What: Identify future electricity needs and develop long-term plans that ensure the grid is ready to satisfy future demand.</p> <p>Who: Governments and utilities</p> <p>How: Many sites with high vehicle activity will face electricity demand that the grid is not currently equipped to handle. Mitigating increases in peak demand through smart charging and distributed energy resources will help utilities get the most out of the existing infrastructure. For sites where mitigation measures are insufficient, grid infrastructure upgrades will be needed, which can take many years to complete. Grid upgrades must start now and be planned for the long term to avoid unnecessary and costly replacements down the road due to insufficient capacity. CALSTART's Phasing in Charging Infrastructure model will help visualize where and when demand is likely to concentrate based on long-term adoption targets.²</p>

¹ EV100+: 100 percent zero-emission medium-duty vehicle procurement by 2030 and a full deployment of zero-emission medium- and heavy-duty vehicles by 2040;

First Movers Coalition: 100 percent zero-emission medium-duty vehicle procurement and 30 percent zero-emission heavy-duty vehicle procurement by 2030;

Fleet Electrification Coalition: Aggregated demand for 60,000 electric heavy-duty trucks in the United States and Europe by 2030;

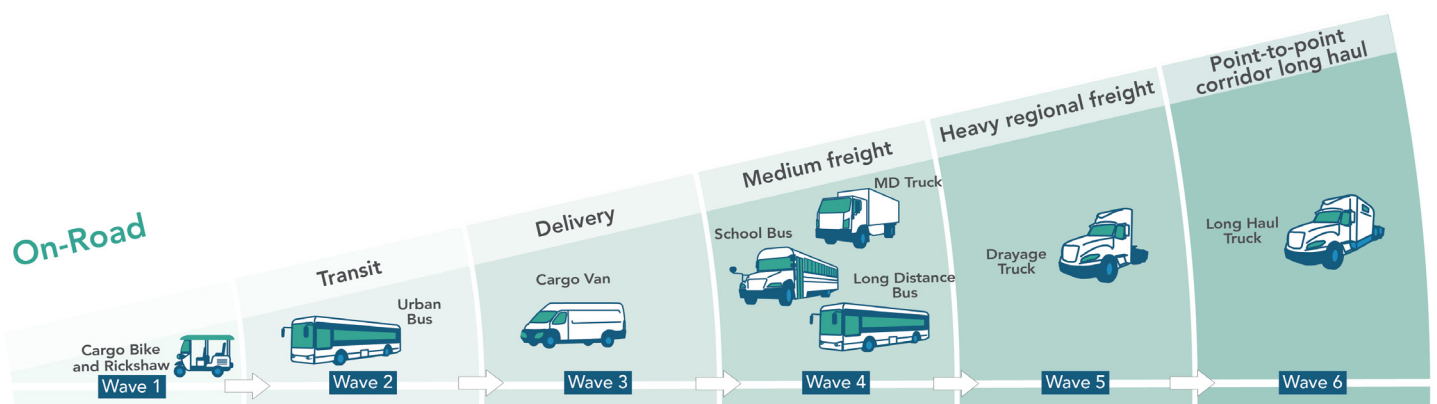
E-FAST: Aggregated demand of 8,000+ electric trucks by 2030.

² The model is currently available for the United States and being expanded to other Global MOU signatory countries.

Phase-in Approach: How It Works

Targets and regulations align stakeholder actions around the timeline and scale of the transition. Knowing how many vehicles will be electric and by when provides certainty to utilities and investors, allowing them to plan for the long term and ensure charging is in place to meet future demand.

Zero-emission commercial vehicle adoption is happening in waves. First waves include those easiest to electrify (i.e., short- to mid-distance, back-to-base operations, predictable operational patterns, lighter loads), such as two- and three-wheelers, followed by urban transit buses and cargo vans. These first applications are followed by medium-duty trucks, then heavy-duty regional freight, and finally long-haul trucking. Knowing which applications will electrify first allows stakeholders to prioritize locations for charging infrastructure buildout.



Market Progress Over Time

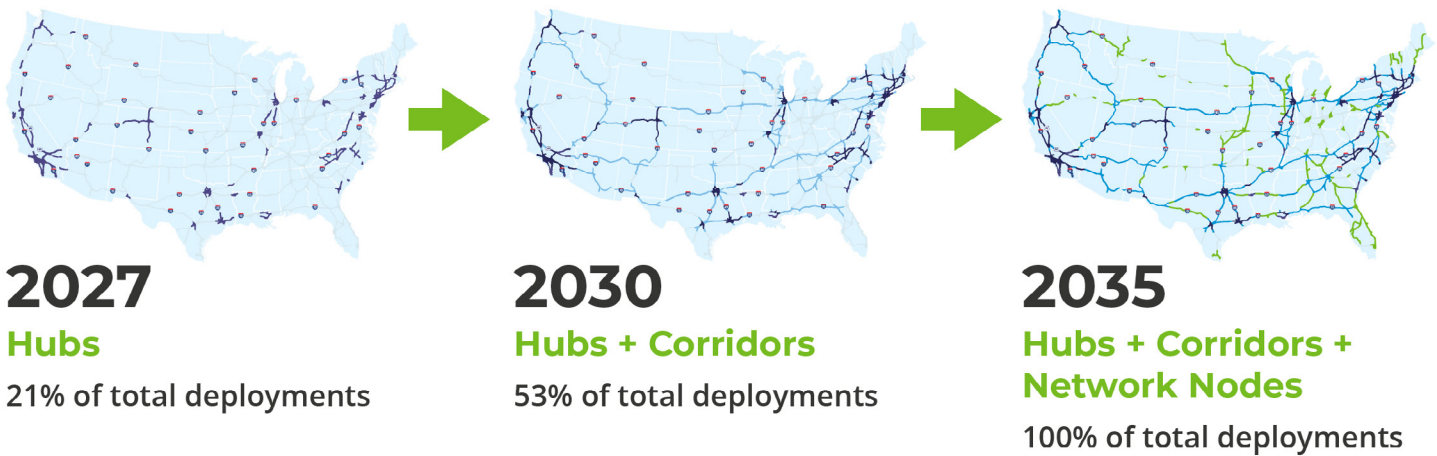
Similar drivetrain and component sizing can scale to early near applications

Expanded supply chain capabilities and price reductions enable additional applications

Steadily increasing volumes and infrastructure strengthen business case and performance confidence

Source: Modified from California Air Resources Board, [Long-Term Heavy-Duty Investment Strategy](#). 2023.

As with vehicle adoption, charging infrastructure phase-in is expected to follow waves, with early demand coming from depot charging facilities in or around urban centers, then main highway corridors, and finally secondary network nodes to provide full geographic coverage. Visualizing this process offers a starting point for governments and utilities to coordinate on long-term infrastructure planning, aided by input from the entire stakeholder ecosystem. CALSTART's [Phasing in Charging Infrastructure model](#) combines the waves of adoption with traffic data, policy priorities, and business cluster data to provide a first impression of where and when charging infrastructure will be needed.



Legend

- Hubs
- Corridors
- Network Nodes

Source: Modified from CALSTART, [Phasing in U.S. Charging Infrastructure](#). 2023.

Ready to take action? Here is what you can do...

<i>...this week.</i>	<i>...this quarter.</i>	<i>...this year.</i>
<ol style="list-style-type: none"> 1. Reach out to Drive to Zero/ The Netherlands to learn more about joining the Global MOU. 2. Set up a meeting between transport and energy authorities to start planning. 	<ol style="list-style-type: none"> 1. Identify key stakeholders that need to be engaged. 2. Set up a governance structure to lead charging infrastructure planning and deployment, with clear responsibilities and timelines. 3. Engage with authorities responsible to adopt regulation that locks in a timeline for the transition. 4. Identify datasets related to vehicle operations and grid capacity. Support is available to emerging markets through the Zero Emission Vehicle Rapid Response Facility, and to Global MOU signatories through CALSTART's Phasing in Charging Infrastructure model. 	<ol style="list-style-type: none"> 1. Publish a long-term infrastructure phase-in plan to meet zero-emission vehicle charging demand. 2. Engage with fleets and charge-point operators to identify bottlenecks. 3. Engage with utilities to resolve any investment barriers to infrastructure buildout. 4. Engage with authorities responsible for permitting and utility oversight to facilitate investment and deployment procedures.