

Briefing Paper

Global Green Road Corridors: Enabling Factors for Successful Launch, Development, and Scale

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WHY GREEN ROAD CORRIDORS?

All sectors of the world economy are starting to flatten or reduce their carbon emissions—except transportation [1]. Within this sector, the fastest growth in emissions comes from medium- and heavy-duty commercial vehicles (MHDVs) [2]. A rapid transition to zero-emission (ZE) MHDVs is crucial to reverse this trend and improve air quality in communities heavily burdened by diesel pollution.

While the first big growth of ZE-MHDVs is taking place in return-to-base applications (such as urban transit and local goods movement), the greatest climate and health impacts come from regional and long-haul segments, which utilize the largest trucks driving longer distances between major depots, hubs, cities, and ports, and along key transportation routes. For example, these segments make up less than 15 percent of the U.S. fleet but are responsible for approximately 60 percent of greenhouse gas (GHG) emissions, urban nitrogen oxides, and particulate matter [3] due to their higher mileage and more intensive use. As the demand for freight transport continues to grow globally, these numbers are expected to increase.

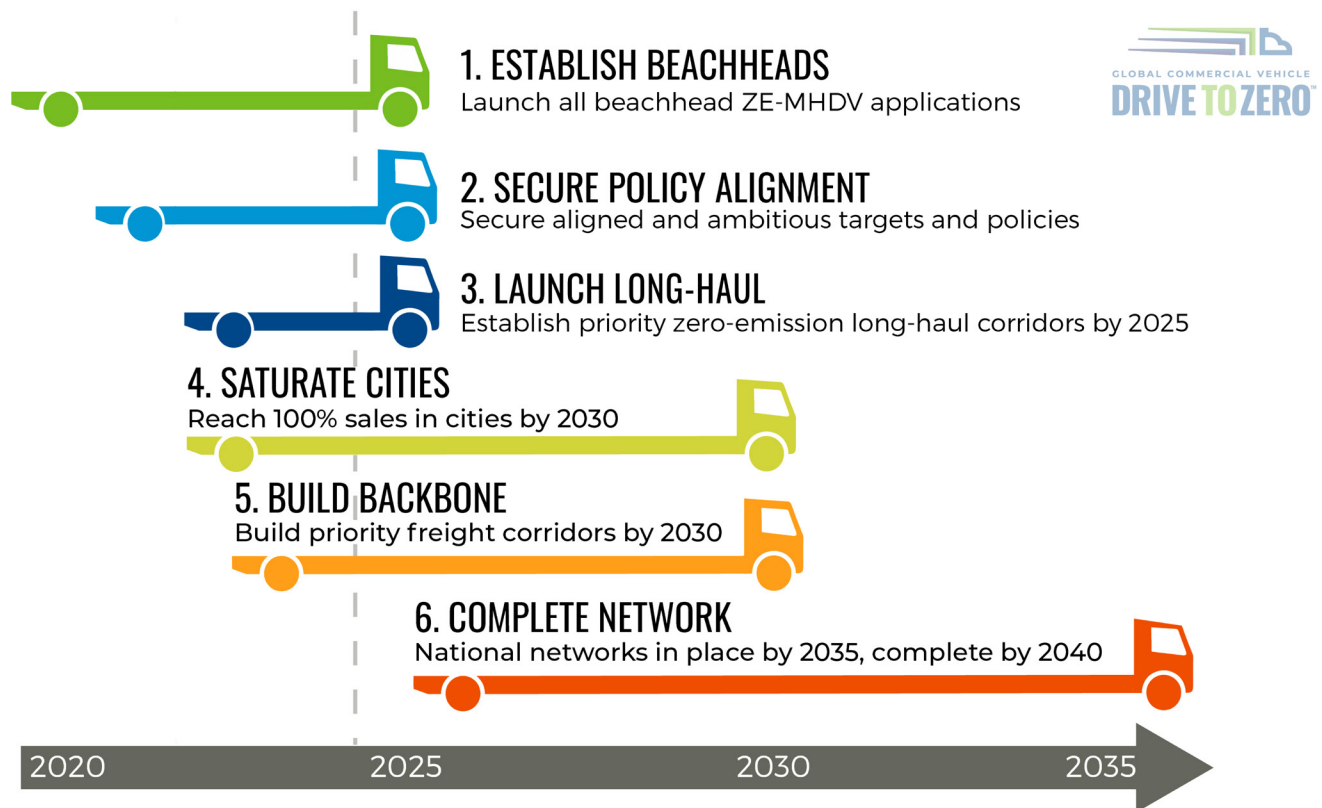
Road corridors provide the connections that make the transport system work. ZE-MHDV technology is now able to serve these highest impact segments and turn the world's corridors green.

WHY ACT NOW?

To avoid the worst impacts of climate change, the world must achieve a net-zero economy by 2050. For trucks and buses, this means 30 percent of new sales must be ZE by 2030 and 100 percent by 2040, as is being carried forward by 38 nations through the Global Memorandum of Understanding (Global MOU) on ZE-MHDVs [4]. To achieve these targets, efforts to organize and develop green road corridors must advance.

It is imperative to begin the buildout of these first corridors by 2025 to stay on track to 2040 outcomes (Figure 1) [5]. Acting now provides valuable lead time to address the unique requirements of ZE regional and long-haul vehicles, including capital costs, operational demands on longer routes, and high-power infrastructure. Building the first key corridors proactively positions the world to stay on pace to reach climate neutrality and sends a powerful message of certainty to the entire market.

Figure 1. 6-Stage Strategy to Enable 100% ZE-MHDVs by 2040 (and 30% by 2030)

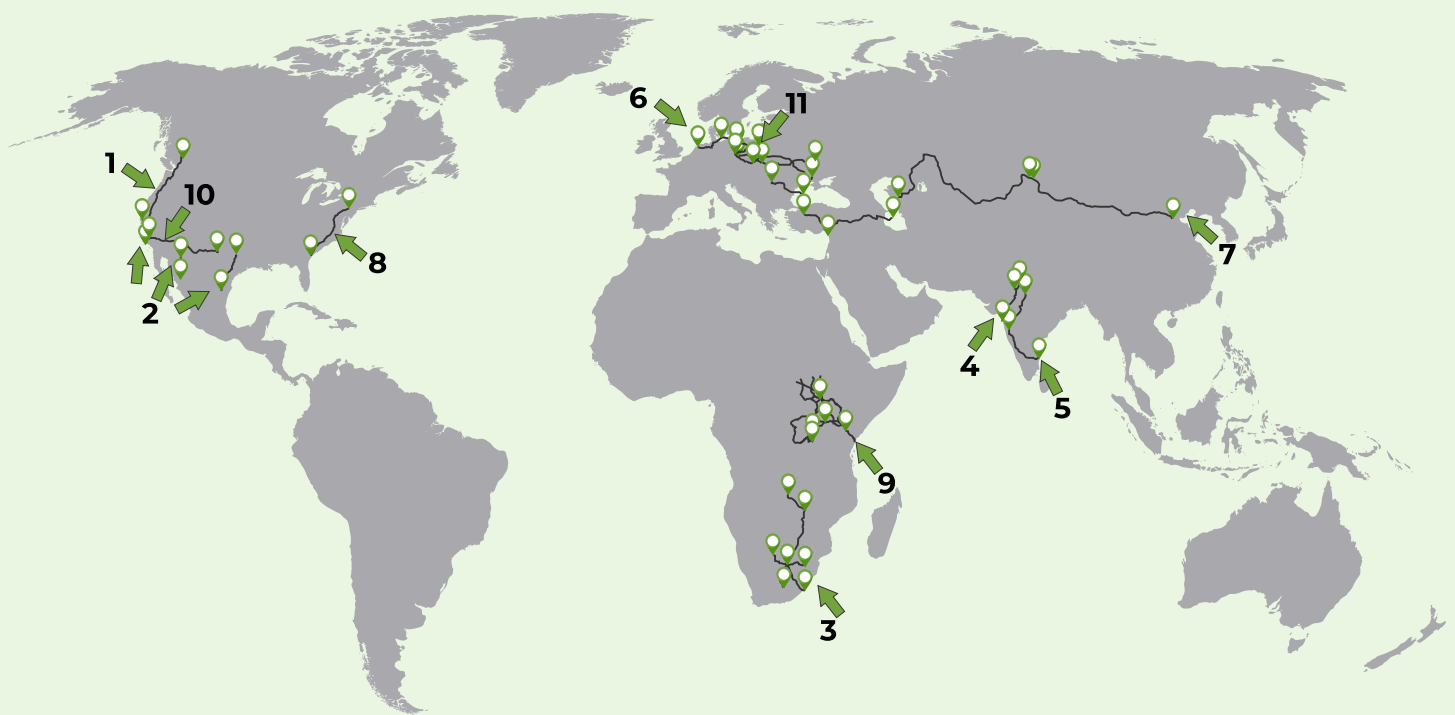


Note: Original first published in Drive to Zero's "Global Roadmap for Reaching 100% ZE-MHDVs by 2040" [5]. Modifications made to show present day (dashed line).

GLOBAL GREEN ROAD CORRIDORS INITIATIVE

CALSTART's Global Commercial Vehicle Drive to Zero Program, alongside partners and allies in the ZEVWISE coalition, have launched an ambitious effort to advance a diverse set of the world's road corridors to transition to a ZE-MHDV ecosystem (Figure 2). These autonomous Global Green Road Corridors (GGRC), each led and/or supported by an array of partners worldwide, will establish the basis for a replicable, adaptable models that will serve as a real-time resource and framework for growth and success. Beyond the scope of the initiative, Drive to Zero has identified nearly 30 green road corridors in development worldwide, showing the momentum, scale, and benefit of this effort.

Figure 2. Set of Corridors Supported by Global Green Road Corridors Initiative



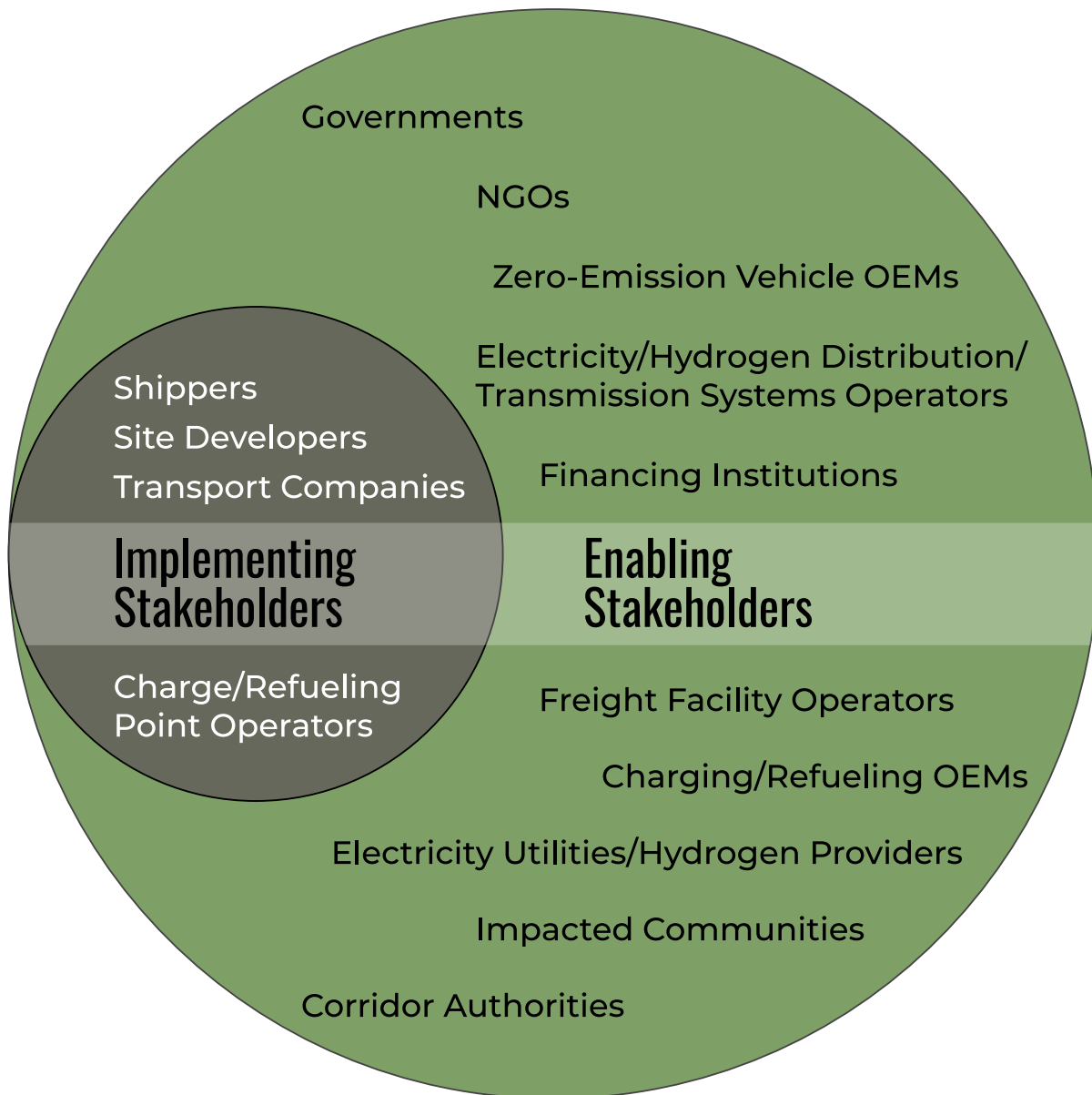
- 1 **FIFA 2026 Corridor:** Canada – USA – Mexico (*U.S.*)
- 2 **USA-Mexico Border Corridors:** California – Baja California, Texas – Nuevo Leon, Arizona – Sonora (*WBSCD*)
- 3 **Southern Africa Container Corridor:** Port of Durban, including South Africa, Lesotho, Eswatini, Zimbabwe, Botswana, and Zambia (*UNEP (ZEVWISE Focal Point)*)
- 4 **India Corridor:** Mumbai – Delhi and Delhi – Jaipur (*WBSCD*)
- 5 **India Corridor II:** NH48: Delhi – Mumbai – Chennai (*ICCT*)
- 6 **European Corridor to Zero:** Netherlands, Germany, Poland, and Ukraine (*AVERE Ukraine / EVConsult*)
- 7 **Trans-Caspian International Transport Route (TITR) Corridor:** China, through Kazakhstan, Azerbaijan, Georgia, and Turkey to Europe (*UNEP (ZEVWISE Focal Point)*)
- 8 **USA I-95 Corridor:** Georgia – New Jersey (*CALSTART*)
- 9 **Northern Corridor:** Kenya, Uganda, South Sudan, Rwanda, Burundi, and DRC (*NCTTCA*)
- 10 **I-10 Corridor:** California – Los Angeles, Palm Springs, Blythe, Arizona – Tuscon, New Mexico – Lordsburg, Vado (*Smart Freight Centre*)
- 11 **Poland Corridor:** Poznan, Warsaw, Wroclaw, Krakow (*Smart Freight Centre*)

WHO NEEDS TO BE INVOLVED?

Corridors are complex, dynamic transportation systems that require involvement and coordination of multiple stakeholders to be successful including government, authorities, industry, nonprofit organizations, and communities. Stakeholders involved in green road corridor development can be categorized into two primary groups (Figure 3):

- **Enabling stakeholders** focus on creating the conditions necessary for the successful development of corridors.
- **Implementing stakeholders** are directly engaged in the deployment, use, management, and maintenance of the corridor network and associated publicly available infrastructure.

Figure 3. Stakeholders Involved in Road Corridors Development



FOUNDATIONAL CONDITIONS FOR GREEN CORRIDORS AND STAKEHOLDER INVOLVEMENT

A corridor is much more than a line on a map, and developing one requires more than simply assembling key entities. In evaluating the initial global corridors emerging worldwide, some foundational base conditions and steps have become clear. Three base conditions outline the initial needs spurring corridors and define the first stages of a corridor's launch.

DEMAND SIGNALS

Demand is the overriding prime condition. For a green corridor to be developed, there must be conditions, requirements, or other factors that create near-term demand for ZE transport. Market forces alone will not drive ZE-MHDV adoption fast enough in the early years to meet the emissions reductions needed nor drive most corridors. Strong policy and regulatory signals requiring the transition to ZE transportation are required, combined with supportive policy and public investments and incentives to assist the early market.

PRIORITIZED LOCATIONS

To succeed, green road corridors must first be located where there is sufficient high-volume freight flow, early demand for ZE-MHDVs, supportive policy and funding, availability of power/fuels, and willing early adopters. While many locations can provide one or two, corridors need a strong combination of these elements to justify launch. Such prioritization creates a staged or phased roadmap for growth and provides clear guidance to investors and stakeholders on where to begin.

COORDINATION AND GOVERNANCE

These two conditions ideally work together for the success of implementing a green corridor.

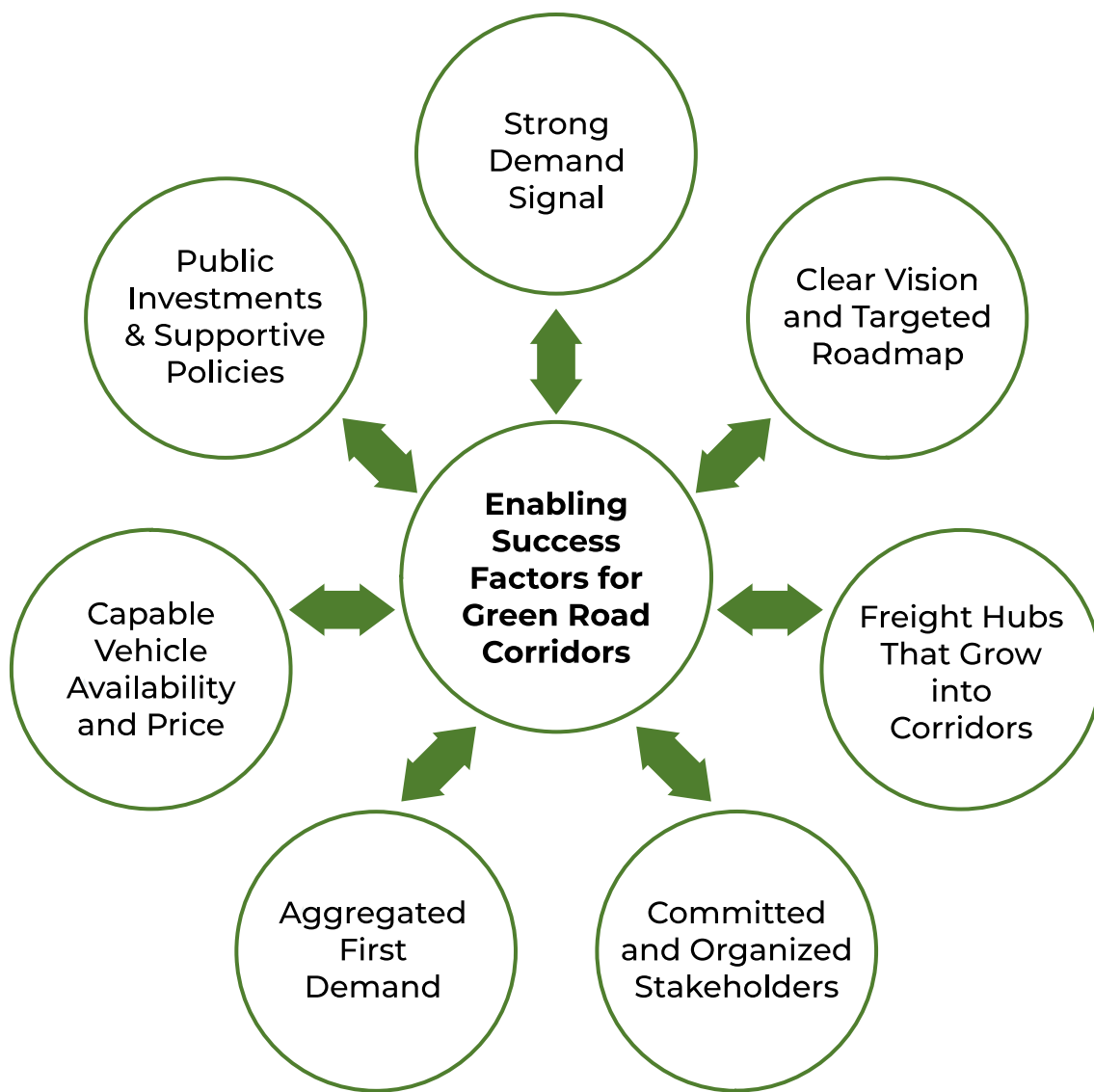
- **Coordination:** The needs and integration of the core implementing and enabling stakeholders must be brought together and aligned with the timing and requirements of the corridor, encouraging cooperation and joint action. Governments, corridor authorities, and non-governmental organizations (NGOs) are well suited to play this role.
- **Governance:** A core set of stakeholders must agree to a set of rules, responsibilities, and objectives on how they will work together to fund, operate, and use a green corridor. In essence, this governance defines the basic “rules of the road” for launching a corridor.

Looking at how these conditions roughly sequence in time highlights the need for establishing strong demand signals as the primary step. Identifying and prioritizing corridor locations is valuable but has less impact without established demand. Similarly, while coordination and governance working in advance of demand can help identify issues, there is little urgency to address them without demand.

ENABLING SUCCESS FACTORS

The foundational conditions described above frame the necessary starting point for green road corridors, but alone they are not sufficient. The more complete framework for developing green road corridors requires understanding key factors that drive their establishment and effectiveness (Figure 4). Governments and authorities have a significant role to play. By engaging and coordinating stakeholders on all these factors early on, leaders can speed up action and increase the likelihood of success. These factors form an interconnected ecosystem of support, all of which should be implemented in tandem with one another. The following preliminary factors distill the learnings from leading site developers, charge point operators, shipper and transport companies, and governments interviewed by Drive to Zero.

Figure 4. Key Enabling Success Factors for Developing Green Road Corridors



STRONG DEMAND SIGNAL

Driving and supporting vehicle and infrastructure demand is both the main foundational condition and the primary enabling success factor to establish green road corridors on the timeline needed. This demand can be driven by several elements, but based on stakeholder discussions, the strongest form comes from government regulations that require an increasing number of ZE-MHDVs to be bought and sold each year. Examples include supply-side regulations (SSR) such as Advanced Clean Trucks (ACT) [6] in California and other U.S. states or the heavy-duty CO₂ emission standards [7] in Europe. Demand-side regulations, such as California's Advanced Clean Fleets (ACF) [8], which requires fleet purchase of ZE-MHDVs, can complement SSR. These regulations establish a clear transition timeline, encourage production at scale and associated price reductions, and bring certainty to companies—and investors—to plan for the future.

PUBLIC INVESTMENTS AND SUPPORTIVE POLICY

Demand must also be backed by strong initial government funding and supportive policy. While private capital will provide the backbone for the long-term buildout of road corridor infrastructure, initial public co-funding of infrastructure deployments, for purchasing ZE-MHDVs and even underwriting the charging business case, is a critical enabling condition. This can take the form of grants, incentives, loan funding utilization guarantees, or other innovative financial mechanisms that reduce the risk of investing in and using ZE-MHDVs and infrastructure. Together with funding, three additional supportive policy categories are important for corridor success:

- Requiring the energy sector—and the electric power industry—to invest in and support rapid infrastructure deployments.
- Providing greater flexibility in vehicle operations to encourage ZE-MHDV use.
- Streamlining and aligning local regulations to speed permitting and siting of infrastructure.

CLEAR VISION AND TARGETED ROADMAP

Alongside regulatory certainty and financing, identifying and prioritizing the locations where corridors can succeed first is vital. Infrastructure site operators and fleets cannot afford to launch their efforts everywhere all at once. They require targeted locations chosen for success metrics, including high-volume freight traffic, supportive policy and financing mechanisms, available energy and conducive energy rates, proximity to high-volume freight hubs, and where emissions reduction of local and non-local air pollutants would produce the greatest benefits to air quality and GHG reduction. Such prioritization can also help the energy industry by focusing capacity optimization, expansion, and interconnection resources in key areas to start and develop a national roadmap for investment timing.

ENGAGED AND ORGANIZED STAKEHOLDERS

Effective stakeholder coordination and governance are foundational conditions and essential success factors for developing green road corridors. Achieving a successful corridor requires early and ongoing collaboration and some level of organization. Trusted and well-resourced governments, independent authorities, and/or NGOs can serve this role. Integrating both top-down and bottom-up strategies is ideal. Top-down engagement from central authorities, like national governments or corridor management bodies, provides policies, resources, and guidance. Bottom-up involvement from industry (such as shippers and carriers), infrastructure services providers, and other stakeholders can move quickly. Including local governments and community groups, for instance, also ensures sensitivity to local contexts and support for development efforts.

AGGREGATING FIRST DEMAND

While regulations will provide broad demand certainty, aggregating initial specific demand from shippers and transport companies in targeted regions can help accelerate early corridor deployment, mitigate risks, reduce costs, and unlock finance. Fleets in the same location can coordinate timing on truck orders and infrastructure installation to promote asset sharing and help utilities coordinate. Realistically, most early users will not represent sufficient utilization of first sites on their own for third-party site developers to attract capital—unless the demand from additional users can be combined. This activity is critically important because charge point operators require a minimum level of utilization to justify investment. Several NGOs are providing such valuable coordinative services to bring fleets and developers in business parks or hubs together, and more of this creative coordination around shared asset-use is needed.

CAPABLE VEHICLE AVAILABILITY AND PRICE

While ZE-MHDVs are available in multiple models and applications from most of the world's major manufacturers, longer-distance, faster-charging vehicles need to enter the market at high production volumes sooner than currently planned. Their price must also be low enough to ensure affordability (especially for small and medium enterprises), support a viable life-cycle business case, and render investments in diesel vehicles impractical. In the near term, strong regulations combined with public incentives can help bridge the gap as vehicle volumes rise and supply chains grow. Manufacturers offering more competitive pricing to stimulate early market growth would provide significant support. Other forcing mechanisms may be required, such as competitive solicitations for high-volume purchases.

FREIGHT HUBS THAT GROW INTO CORRIDORS

At their core, corridors are high-volume freight routes that connect important freight hubs, such as ports and major centers of distribution. Most stakeholders believe the first focus of any corridor must be to build out an effective regional charging capability at hubs and consequently grow the planned corridor from these success points. The first wave of market penetration for ZE-MHDVs will be in regional applications and expand

as capabilities grow. This sequencing concept is based on two proven models of change for the ZE-MHDV transition: the beachhead strategy [9], the foundational paradigm for Drive to Zero, and the infrastructure phasing-in [10] strategy, which was developed to inform national infrastructure prioritization efforts in the United States.

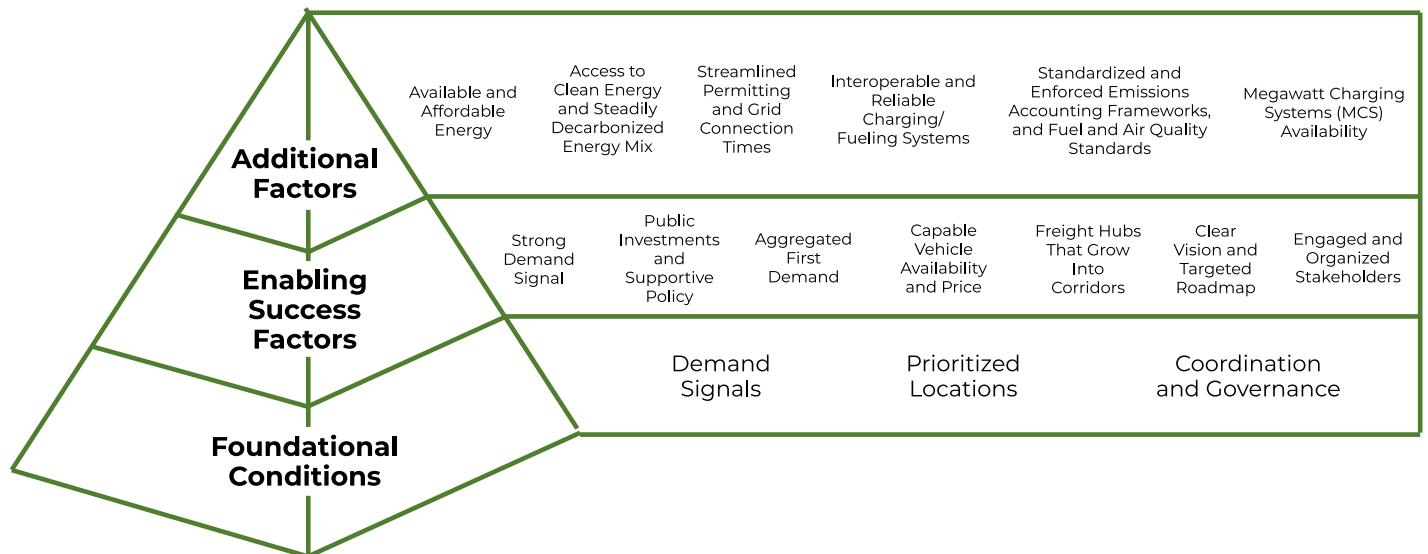
ADDITIONAL ENABLING FACTORS

- Available and affordable energy
- Access to clean energy and steadily decarbonizing energy mix
- Streamlined permitting and grid connection times
- Interoperable and reliable charging/fueling systems
- Standardized and enforced emissions accounting frameworks, and fuel and air quality standards
- Megawatt Charging Systems (MCS) availability

INTERCONNECTING SUCCESS FACTORS: AN INTERACTIVE ECOSYSTEM

When considering both the foundational conditions and the enabling success factors, it is vital to realize that they represent interconnected elements of a complete system (Figure 5). Each factor influences and is influenced by the others, and if one is missing, it can reduce overall effectiveness.

Figure 5. An Interactive Ecosystem for Global Green Corridors



WHAT CAN MOTIVATED GOVERNMENTS DO?

- Establish clear goals, strong regulations, and supportive, equitable policies for ZE-MHDVs and their infrastructure.
- Develop a national/sub-national prioritized and phased ZE freight infrastructure plan to identify and target first hub and corridor locations.
- Provide government co-funding and incentives to launch hub and corridor infrastructure and reduce vehicle cost.
- Coordinate, assist, or actively take part in stakeholder collaboration around priority corridors to support faster development and launch.
- Enable and require utilities and energy providers to accelerate and prioritize investments in and support for ZE-MHDV interconnection, renewable energy, and competitive rates.
- Support innovative financial mechanisms—and inclusive access to them—that reduce the risk of investment and operation of ZE-MHDVs and infrastructure.
- Engage with the partners and allies in the GGRC initiative to advance ZE transportation together.

WHAT CAN MOTIVATED TRANSPORT INDUSTRIES DO?

- Prioritize decarbonized transportation, speed evaluation of integrating ZE-MHDVs into operations, and engage sooner to launch pilot projects to demonstrate the benefits and feasibility of ZE-MHDVs along corridors, collecting data to inform future decisions.
- Collaborate and create partnerships with shippers, carriers, infrastructure providers, government, utilities, and other stakeholders to develop comprehensive and timely solutions that benefit all parties (e.g., by aggregating demand, utilization agreements, alternative energy contracts, etc.).
- Adopt sustainable practices that provide both economic and operational benefits. Acting early allows organizations to capitalize ahead of regulatory requirements, positioning them as leaders in sustainability and gaining a competitive advantage in the market.
- Engage with policymakers to advocate for supportive regulations and policies that facilitate the development of public and semi-public infrastructure.
- Make use of public funding and utilize innovative financing models that lower the barriers and risks to deploy vehicles and infrastructure.

WHAT CAN MOTIVATED ENERGY SECTORS DO?

- Prioritize powering decarbonized transportation projects and consider their needs into all grid modernization and integration planning.
- Collaborate with government oversight agencies to prioritize electric and hydrogen transportation investments to enhance grid infrastructure in hub and corridor areas to accommodate increased electricity demand from charging stations.

- Develop long-term charging infrastructure programs in collaboration with governments and industry to invest in and/or incentivize the installation of charging stations at strategic locations.
- Offer competitive pricing to transportation customers, find creative new business models to mitigate high utility demand charges in the early ZE-MHDV market, and make investments in distribution grid capacity and faster connections for charging infrastructure.
- Invest in renewable energy sources, including decentralized and off-grid systems, to ensure that ZE-MHDVs operate with minimal environmental impact.
- Utilize power purchase agreements to secure long-term contracts between energy producers and transport/charger operators, ensuring stable pricing and supply for charging operations.

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