Smart Freight Centre

Unlocking Your Carrier's Electrification Buy-in

A Guide with the 3rd Party Electrification Framework

March 2024

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About Smart Freight Centre

Smart Freight Centre is an international non-profit organization focused on reducing greenhouse gas emissions from freight transportation. Smart Freight Centre's vision is an efficient and zero emission global logistics sector. Smart Freight Centre's mission is to collaborate with the organization's global partners to quantify impacts, identify solutions, and propagate logistics decarbonization strategies. Smart Freight Centre's goal is to guide the global logistics industry in tracking and reducing the industry's greenhouse gas emissions by one billion tonnes by 2030 and to reach zero emissions by 2050 or earlier, consistent with a 1.5°C future.

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Executive Summary

Road freight accounts for a significant portion of global greenhouse gas emissions, posing a substantial challenge to achieving climate goals. E-trucks offer a promising solution, reducing emissions dramatically. However, wider adoption faces hurdles due to:

- **Market uncertainty:** Carriers hesitate due to concerns about long-term market stability and the evolving ecosystem.
- **Knowledge gaps:** Operating e-trucks requires new skills and strategies, which carriers lack and need to learn.
- **Limited resources:** Early-stage experimentation comes with financial and resource constraints that carriers struggle with.

Despite significant influence on demand ("pull-effect"), freight buyers have been surprisingly overlooked in their potential to drive the electrification of the trucking industry. Traditionally, "push-effects" from solution providers and policies have been emphasized. However, customers ultimately determine market demand, making freight buyers key players in shaping the service landscape. While acknowledging the roles of others, this highlights the crucial and underestimated power of freight buyers in accelerating electrification.

This document empowers **freight buyers**, with their significant influence, to become key drivers of carrier electrification. It introduces the **3rd Party Electrification Framework (3PEF)**, a comprehensive guide for freight buyers to engage carriers and overcome these challenges. Interspersed between the framework description are stories of decarbonization leaders who have taken the initiative to support their carriers proactively in the joint electrification journey.

3rd Party Electrification Framework (3PEF)

The 3PEF is underpinned by three driving questions:

- What actions are necessary to ensure that freight buyers and carriers are aligned with the same vision?
- How to establish an effective and efficient partnership model?
- What are operational ways to support carriers?

These questions lead to three parts of the framework, each with its own objectives and recommendations. Organizations seeking to implement the framework should be driven by the interplay of these questions rather than the recommendations provided here.

Building a Vision of Electrification

Alignment between freight buyers and carriers on the vision of electrification is essential to working effectively together. Freight buyers seeking to accelerate fleet electrification must navigate the challenge of bridging divergent perspectives on anticipated outcomes and the electrification process itself.

The 3PEF framework addresses these critical areas through three key actions:

- **Internal Electrification Alignment:** Ensure internal stakeholders across departments share a unified understanding and commitment to the electrification vision.
- **Understanding Carriers through Dialogue:** Establish open communication channels with carriers to gather insights and tailor engagement strategies based on their unique needs and concerns.
- **Double-Loop Learning in Electrification:** Foster a collaborative learning environment where knowledge and information are freely shared, enabling all parties to adapt and evolve alongside the dynamic e-truck ecosystem.

Creating a Supportive Partnership Model

Building strong partnerships with carriers is crucial after establishing alignment and action plans. This requires a shift from traditional buyer-seller dynamics to a true collaborative model. Freight buyers must actively select and guide suitable partners, focusing on supplier selection and contract negotiations for maximum impact.

The 3PEF addresses these critical areas through two key actions:

- **Attracting the Right Carriers:** Seek partners committed to electrification and possessing the capabilities to navigate this transition through carefully selected criteria communicated in the sourcing process.
- **Enhancing Contracts for Electrification:** Craft contracts that incentivize and support carrier investment in e-trucks, addressing factors like charging infrastructure and risk sharing.

Providing Operational Support

After solidifying partnerships, freight buyers and carriers can move towards collaborative efforts. While beneficial contract terms might suffice for some carriers, many may need further support resembling **pseudo-vertical integration**. This strategic collaboration creates an electric transport network with the benefits of vertical integration without ownership mergers. It offers mutual advantages like improved coordination, risk sharing, resource provision, and a learning environment for both parties.

Three key areas for collaboration addressed in the 3PEF:

- **Cooperating through Digital Integration:** Streamline information flow and improve coordination by integrating freight buyer and carrier systems unlocks benefits of e-trucks and helps overcome operational barriers.
- **Optimizing Carriers' Charging Strategies:** Facilitate access to charging services via partnerships, on-site facilities, or co-development ventures with other stakeholders to enable the most beneficial charging strategies.
- **Support for Vehicle Acquisition:** Offer financial assistance or partnerships to help carriers acquire e-trucks, exploring various ownership models.

Scaling Up Together

By implementing the 3PEF and actively collaborating with other stakeholders, freight buyers can **become leaders in nurturing the e-trucking market.** This begins with consistently addressing carrier needs, updating procurement policies to incentivize electrification, and fostering learning initiatives that attract and retain engaged partners. Sharing best practices and leveraging collective strength alongside **other freight buyers creates a ripple effect**, amplifying the impact of these efforts.

But the ripple effect does not stop there. Synergies naturally emerge between individual electrification efforts, **encouraging organizations to join forces and tackle shared challenges** like charging infrastructure development and financing mechanisms. Existing initiatives like demand signaling, shared infrastructure development, and joint financing exemplify the power of collaboration in overcoming hurdles.

The combined force of leadership and collaboration **drives a significant acceleration in demand for e-truck services**. This surge in demand fuels the establishment of a robust and continually innovative market for zero-emission logistics solutions. Market growth is driven not only by societal and legislative pressures to decarbonize, but also by the growing availability and demand for these services. As a result, most carriers are incentivized to **transition away from fossil-fuel vehicles**. This marks a significant shift towards the dominance of low-carbon solutions, actively mitigating the climate impact of road freight transportation.

Glossary

Carriers: Organizations or individuals who provide freight transportation services.

Carrier selection criteria: Specific factors or attributes used to evaluate and choose carriers or logistics partners, often based on performance, capabilities, and alignment with organizational goals.

Charging services: Facilities or infrastructure for recharging electric vehicles, often including charging stations and related services.

Charging strategy: A plan or approach for managing the charging of electric vehicles, including factors such as timing, location, and frequency of charging.

Contract lifecycle: The stages involved in the creation, negotiation, execution, performance, and termination of a contract, from initiation to closure.

Double-loop learning: A learning process that involves questioning and challenging underlying assumptions, values, and mental models, leading to fundamental changes in thinking and behavior.

E-trucking industry: Shortened form of electric trucking industry, which refers to the segment of the trucking industry transports goods using electric trucks.

Freight buyers: Organizations or individuals who purchase freight transportation services.

Framework: A structured set of concepts, principles, or guidelines used to address complex issues or achieve specific objectives.

Grid access: The ability to connect to and utilize the electrical grid for charging electric vehicles or accessing electricity.

Market demand: The total quantity of a good or service that consumers are willing and able to purchase at a given price.

Mental models: Internal representations or cognitive frameworks that individuals use to interpret information and guide their behavior.

Opportunity charging: Charging an electric vehicle whenever the opportunity arises, such as during scheduled stops or breaks in operations.

Procurement processes: The procedures and methods used by organizations to acquire goods or services, often involving sourcing, negotiation, and contract management.

Pseudo-vertical integration: Strategic collaboration among companies to achieve benefits similar to vertical integration without merging or acquiring other entities.

Pull-effect: The influence of freight buyers on market demand, driving the electrification of the trucking industry by expressing preferences for sustainable transportation solutions.

Push-effect: Influence exerted by solution providers and policies to promote the adoption of electric trucking, traditionally emphasized over the role of freight buyers.

Scope 2 emissions: Indirect greenhouse gas emissions associated with the generation of electricity consumed by an organization.

Socio-technical transition: A process involving changes in both social practices and technological systems.

Telematics systems: Technology that combines telecommunications and informatics to send, receive, and store information about vehicles' location, movements, and diagnostics.

Total cost of ownership: An evaluation method that considers all costs associated with owning and operating a vehicle over its lifetime, including purchase price, maintenance, and fuel.

Vehicle acquisition: The process of acquiring vehicles, which may involve purchasing, leasing, or other arrangements.

1 Introduction

The Unlocking Your Carrier's Electrification Buy-in guide is part of Smart Freight Centre's collection of resources on road freight electrification.

Electric trucks (e-trucks) significantly reduce greenhouse gas emissions in road freight, achieving up to an 85% emission intensity reduction in regions with low-carbon electricity[i]. Total cost of ownership analysis indicates e-trucks are becoming cost-competitive with conventional diesel trucks[ii]. Despite this, e-trucks remain a niche technology used in freight, constituting a small percentage of overall sales (Figure 1). Various technical, operational, financial, and infrastructural challenges act as barriers to wider adoption[iii]. Many of these challenges, such as low vehicle model variety and charging infrastructure availability, are critical barriers but are only short term features of the market. Some of these challenges stem from the entrenched dominance of internal combustion engine truck technology, creating a significant market lock-in.

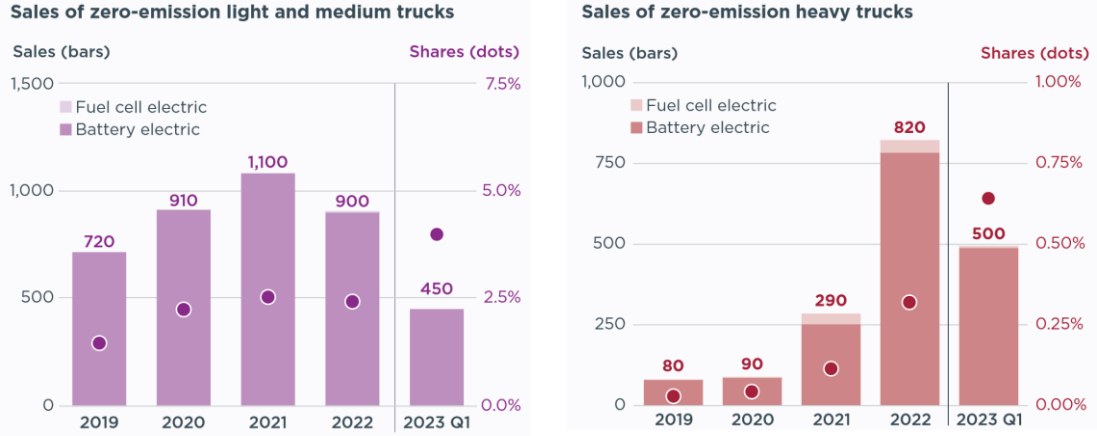


Figure 1 Sales and sales shares of zero-emission light, medium and heavy trucks in Europe[iv]

Transitioning from this lock-in poses disruptions to carriers' business models and wider repercussions for the logistics sector, which can explain the inertia and hesitation of the characteristically risk-averse road freight sector[v]. The current (innovation) state is difficult to navigate not only because of the existing challenges but also because of the uncertainty of how the ecosystem that e-truck operations rely on will develop, and whether there will be continued market demand for electric trucking (e-trucking) services. The uncertainty hampers decisions that need to be made now, namely those that enable the sector to learn how to create and run a transport business using e-trucks.

While it is uncertain how this may look once e-trucks become mainstream, in the transition stage, it is expected that carriers will need more than the usual support from the freight ecosystem: vehicle and charging suppliers, policymakers, and freight buyers. This document represents a step towards helping the last group mentioned in that list, the freight buyers, define a systematic support strategy to nudge carriers towards providing or scaling up e-trucking services.

Critical conditions to enable carriers to transition

Before diving into the description of the framework let's outline the main challenges faced by carriers in the early adoption stage. The themes outlined here lean heavily on the literature on innovation transitions and studies conducted on carrier decarbonization[vi,vii,viii,ix,x].

- **Carriers seek assurances for the long-term development of a stable market.** Transitioning carriers are embarking on a potentially significant overhaul of their business and operating model and may need to invest heavily in new assets and business partnerships. While legitimacy derived from he regulatory framework is essential, the long-term profitability of the business model is primary. In this regard, both freight buyers and carriers must be aligned as to where the early electrification steps are heading.
- **Carriers must be equipped with knowledge about running a successful electric freight operation and business**. Swapping a conventional vehicle with an e-truck is not a simple substitution but involves at the operator level, a variety of new strategies and planning devices, including selecting and implementing charging strategy, based on constraints of the e-truck, available charging services, and the transport service parameters. These changes impact the co-design of operations with the freight buyer, the viability of the carrier's business model, and the price of services.
- **Carriers need starter resources and an experimental environment to enable the required learning in the early adopter stage of electrification.** Entry to the market is not only defined by the significant capital investment but also the need to learn by doing. Characteristic of a socio-technical transition, the technology, businesses, and practices are all developing at the same time. Until there is some stability, carriers will need the space (i.e., timewise, contractually, and financially) to gain a deeper understanding of the new reality.

None of these challenges are insurmountable. However, they do require the proactive engagement of more actors than 'usual' in the ecosystem. And one of the key stakeholders that have both the most influence and can receive the most direct benefit out of the transition, is the buyers of logistics services, whether cargo owners or logistics service providers. In this document, this group of actors will be collectively referred to as freight buyers.

Framework for a new carrier engagement strategy

Among the various stakeholders that have an influence over the ecosystem transition, the one whose role has traditionally been underestimated is the role of the freight buyer. However, this is a strange phenomenon, especially since in the business relationship between freight buyer and carrier, the "pull-effect", i.e., the influence of demand for a service, is much stronger than the "push-effect", e.g., the promotion of a service towards a customer[xi]. It is often the customer that defines the environment in which the business and operational relationship takes place. This is not to diminish the role of solution providers or policy makers, which enable or even put pressure on the provision of services, but ultimately, the market demand for services defines the market for service provision.

Fortunately, freight buyers, as a broad group, are becoming increasingly aware of and engaged in their role to push for decarbonization of logistics, thanks in part to the few freight decarbonization frontrunners. Nevertheless, a large percentage of organizations - at least 45% according to the Decarbonizing Freight 2022 Survey[xii] - do not engage with their subcontractors to decarbonize their transport operations. The development of a market for service provision will require these organizations to be persuaded and to emulate good practices of decarbonization leaders.

The framework presented in this document has been put together to provide freight buyers with a feasible means to begin to play their electrification role effectively, that is, to persuade carriers to electrify their operations on their behalf. While presented as a framework, these actions can be taken individually, depending on the context the organization is in. However, the reason why they are put together as a framework is to address the three challenges of a carrier holistically.

The next chapter presents this framework and sets the stage for identifying what to do in the subsequent chapters.

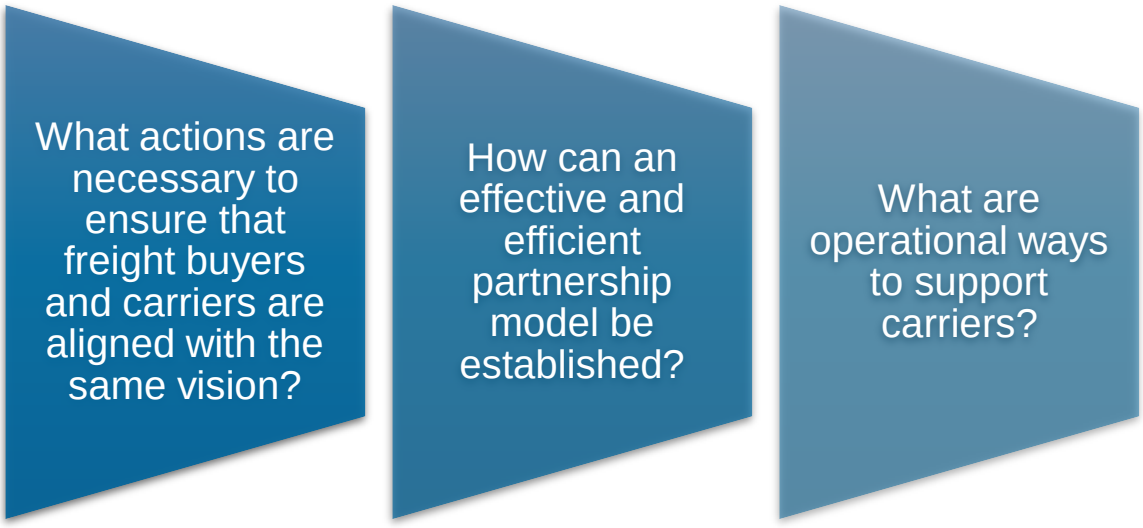
2 3rd Party Electrification Framework

Freight buyers can drive carrier electrification by gradually integrating the 3rd Party Electrification Framework (3PEF) into their essential procurement processes.

Before delving into the framework's details, let's review the primary challenges encountered by carriers in the early adoption phase:

- **Market uncertainty**: Carriers hesitate due to concerns about long-term market stability and the evolving ecosystem.
- **Knowledge gaps**: Operating e-trucks requires new skills and strategies, which carriers lack and need to learn.
- **Limited resources**: Early-stage experimentation comes with financial and resource constraints that carriers struggle with.

These represent crucial conditions for the continued and accelerated adoption of e-trucks by carriers. The 3PEF is specifically designed to address these conditions and is built around the following key questions:



While this publication suggests responses to these questions, it is crucial for the implementing organization to independently determine and consistently refine the best answers. The next section presents the rationale behind the questions.

What actions are necessary to ensure that freight buyers and carriers are aligned with the same vision?

Ensuring alignment between freight buyers and carriers in their electrification vision requires addressing key aspects. The term 'vision' pertains to how individuals or organizations perceive the electrification outcomes and its process. Alignment on crucial elements is paramount, recognizing that perspectives may differ, encompassing both favorable and unfavorable aspects for freight buyers and carriers. Achieving alignment involves collaboratively strategizing to mitigate unfavorable aspects and enhance favorable ones.

Freight buyers and carriers could also **envision the outcomes** differently. For instance, some freight buyers may be aiming for exclusive e-truck-based logistics by 2030, while their carriers may see e-trucks as just one emissions reduction option among many or do not see the need to

completely electrify so urgently. While complete alignment of the shared outcomes isn't always necessary, sufficient overlap is needed to justify mutual support.

A shared understanding of the **electrification process** is crucial to avoid misunderstandings. For instance, if freight buyers are unaware of the complexities in applying for vehicle subsidies, they may harbor unrealistic expectations about the cost of the service. On the carrier side, clarity on how to calculate and report logistics emissions from electric vehicles is essential for maximizing the emission reduction value proposition, a key reason freight buyers are interested in e-trucks. These examples underscore the importance of aligning the understanding of the electrification process to ensure successful collaboration.

The 3PEF introduces three concurrent **actions aimed at resolving misalignments in expectations and fostering the strategic and operational knowledge crucial for a successful partnership and seamless transition** (Figure 2). They revolve around a continuous learning model, joint-knowledge production, and they take into intra-company dynamics.

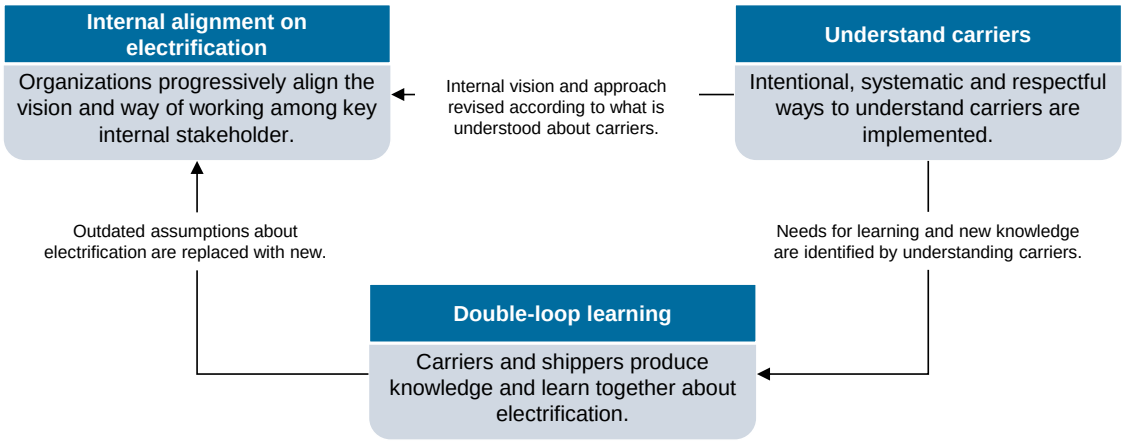


Figure 2 Interplay between internal alignment, actions to understand carriers, and double-loop learning towards a shared understanding and vision of electrification

Integrating these three actions in the freight buyer's engagement strategy will keep the mental models of both internal and external stakeholders aligned, as well as ensure that the overall knowledge about electrification is kept up to date. These actions pave the way for establishing a suitable partnership model and identify necessary areas to collaborate.

Details about each action are presented in their separate chapters.

- Internal electrification alignment
- Understanding carriers through dialogue
- Double-loop learning in electrification

How to establish an effective and efficient partnership model?

With aligned mental models and a clear roadmap of actions, the next phase is **to build strong partnerships with carriers**. In this critical second stage, freight buyers must proactively guide the transformation of selected carriers into collaborators. This entails a reciprocal shift, where carriers are treated and function as collaborators, leading to freight buyers evolving into collaborative partners, instead of just clients. While acknowledging the broader procurement process, the 3PEF places its primary emphasis on **supplier selection** and **negotiations on contractual terms**. These two steps are deemed the most pivotal within the overarching procurement process[xiii].

Key questions emerge:

- **Identifying ideal partners:** Who aligns with our values and electrification goals?
- **Market signaling and transformation:** How can we effectively attract and guide potential partners?

- **Mutual benefit partnership model:** How can we structure agreements that support both parties' growth?
- **Assuring market development and early-stage resources:** How can we provide stability and resources during the transition?
- **Addressing short-term carrier challenges:** What support can we offer in exchange for their collaboration?

These inquiries form the **foundation for shaping a partnership that ensures shared success in the electrification journey**.

Details about each action are presented in their separate chapters.

- Attracting the right carriers
- Enhancing contracts for electrification

What are operational ways to support carriers?

In the subsequent phase, once the formal partnership model is solidified, freight buyers and carriers can begin collaborative efforts. At this juncture, carriers may find beneficial contractual terms for e-trucking services sufficient. However, it is more probable that, at this stage, **carriers will seek enhanced support resembling pseudo-vertical integration**. Pseudo-vertical integration involves strategic collaboration among companies to establish an electric transport network that replicates the advantages of vertical integration without actual mergers or acquisitions. These actions provide mutual benefits to both freight buyer and carrier which improves coordination, reduces risks inequality, provides resources, and creates an environment for learning by both parties.

Three main areas have been identified that provide a clear opportunity for collaboration: **integrating logistics management systems, provision of charging services, and support for vehicle acquisition.** These address major barriers facing carriers that also are real-world proven models of support.

Details about each action are presented in their separate chapters.

- Cooperating through digital integration
- Optimizing carriers' charging strategies
- Support for vehicle acquisition

Combining the pieces

The 3PEF provides the freight buyer a clear means to begin their journey of electrifying their 3rd party service providers. While each action described above is useful in and of itself, putting them together in a cohesive system for engagement amplifies their effectiveness.

Building a Vision for Electrification	Creating a Supportive Partnership Model	Providing Operational Support
Internal electrification alignment	Attracting the right carriers	Cooperating through digital integration
Understanding carriers through dialogue	Enhancing contracts for electrification	Optimizing carriers' charging strategies
Double-loop learning in electrification		Support for vehicle acquisition

Figure 3 3rd Party Electrification Framework

The rest of the document presents what organizations can do organized under the three main headings described above. These recommendations are not exhaustive and should be taken as template for designing an organization's unique engagement strategy with carriers.

Building a Vision for Electrification

What actions are necessary to ensure that freight buyers and carriers are aligned with the same vision?

3 Internal electrification alignment

To ensure effective electrification, the organization's external engagement strategy must commence with a cohesive narrative that aligns with the mental models of individuals, departments, and implemented business processes.

The electrification of third-party logistics is a strategic decision with far-reaching implications across various aspects of a business, impacting departments from supply chain management to logistics operations and procurement. Organizations that achieve internal alignment on desired outcomes, strategies, and resource allocation are better positioned to develop a cohesive and effective carrier engagement strategy in the context of electrification initiatives.

Electrification strategy alignment

Electrification involves various organizational actors, including sustainability teams, procurement, operations and supply chain, sales and marketing, and finance and legal. Achieving inter-departmental alignment is often challenging, highlighting the critical role of executive teams. Their responsibility is to ensure that "the company structure, operational processes, capital planning, and internal policies support the transition"[xiv].

To foster alignment, several actions can be taken:

- Creating a safe environment for collaboration within and between departments[xv].
- Conveying and co-creating a shared vision of sustainable logistics through the electrification of third-party logistics.
- Identifying actions, projects, and policies to support the shared vision.
- Aligning departmental and project key performance indicators (KPIs) toward the defined actions.

Figure 4 Alignment across departments

Alignment is a continuous process as the understanding of their carriers and fleet electrification deepens.

Carrier engagement strategy alignment

Beyond aligning with the overall strategy, organizations should embrace a new engagement paradigm with carriers. Presently, many carrier relationships are predominantly 'transactional,' particularly when centered on short-term contracts for transport services. As detailed in subsequent chapters, a recommended approach for the decarbonization of logistics involves adopting a collaborative and relational model[xvi]. This shift in relationship format serves as the foundation for building trust[xvii], mitigating risks associated with electrification, and facilitating more meaningful two-way knowledge sharing.

Different departments, particularly the operations and procurement departments that typically lead engagement with carriers, will need to be aligned on the approach taken, especially considering their understanding of carriers.

By starting small and gradually expanding, organizations can incrementally improve alignment and communication, ultimately working towards broader and more comprehensive alignment across teams and departments.

4 Understanding carriers through dialogue

Electrification necessitates more in-depth conversations - updating and aligning mental models of both freight buyers and carriers.

The widespread use of e-trucks by carriers is changing the transport service market in ways that are hard to predict. This is happening alongside ongoing trends like a shortage of labor[xviii] and stricter public policies. Even assumptions about the transport sector before COVID-19 that were considered safe may no longer be valid, as industry and economy have faced significant geopolitical crises. Freight buyers planning to electrify their carriers need to stay informed about the sector and specifically their carriers because the situation is evolving.

Building towards two-way communication

The current norm involves transactional communication between freight buyers and carriers in the context of operational planning, sales, and procurement. Electrification necessitates more in-depth conversations, even if time-consuming, fostering understanding and collaboration. Buyers electrifying carriers must understand the market, especially with small and medium-sized carriers. Effective communication towards carriers involves sharing visions and assumptions about electrification, testing ideas, and signaling intentions. While challenging, a favorable outcome would be for alignment between both freight buyers' and carriers' mental models[xix] with respect to the end state and process of electrification.

To initiate the process, clearly convey the organization's vision for electrifying the road freight sector, extending beyond environmental performance to include carriers' evolving roles and well-being. Additionally, emphasize to carriers that the collected information will be utilized productively, generating present value, particularly through survey results that enhance their understanding of the carrier market. This communication signals a transition from transactional to collaborative engagement.

With that in place, other types of communication approaches (Figure 5) could be tailored to fit the situation.

Workshop and focus groups	Town hall meeting	Anonymized surveys
• Small number of carriers, specific questions, physical or virtual locations • Creates rich information, builds stronger relationships, suitable for sensitive information when involving a single party	• Medium number of carriers, physical setting • Facilitates two-way communication of more superficial information, suitable for introductions and networking	• High number of carriers, widespread geographic location, third-party neutral survey company needed • Potential for rich information in terms of breadth, sensitive information can be pseudonymized, • Low response rate possible unless tied with incentives

Figure 5 Communication approaches tailored to function and context

Maintaining dialogue

To improve communication quality and maintain the dialogue in the long term. The following strategies can be used.

- Create value based on the dialogue for the active (and passive) network, such as sharing the learnings or case studies through a publication.
- Create an environment where individuals feel comfortable sharing their ideas and concerns without fear of judgment or repercussions – socially or commercially[xx].
- Allocate time and resources for hosting events, training and implementing technology to enhance and improve communication.
- Nudge carriers to participate in the events. Be transparent about the role of these communication channels, while stressing the importance and benefits of participating.

5 Double-loop learning in electrification

Navigating electrification's early stages requires double loop learning for freight buyers and carriers, integrating mental models and decision-making rules into the adaptive process.

Staying abreast of the rapid evolution of e-truck technology, charging infrastructure, and business practices, while ensuring alignment with each other, will provide a competitive edge for both freight buyers and carriers. Firsthand learning by both parties, therefore, becomes primary, enabled by the provision of resources and space for real-world experiments that freight buyers can provide.

Double-loop learning

Freight buyers and carriers shape electric freight operations together. As electrification enhances and constrains service parameters set by buyers and transport services offered by carriers, both parties must engage in double-loop learning that continuously updates assumptions and values that go into design and decision making[xxi].

Some aspects expected to evolve with e-truck use include transport service description, compensation, buyer support, and evaluation criteria for supplier selection, and contract management.

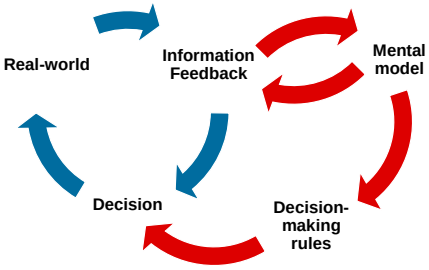


Figure 6 Double-loop learning

Learning channels

Freight buyers, especially if the trust between buyer and carriers are high, can play an active role to facilitate learning, especially by engaging with trusted 3rd parties, such as universities and non-governmental organizations. It is helpful to distinguish between three types of learning channels that could be adopted depending on the function, context, and available resources.

These are presented here in decreasing order of priority and present need.

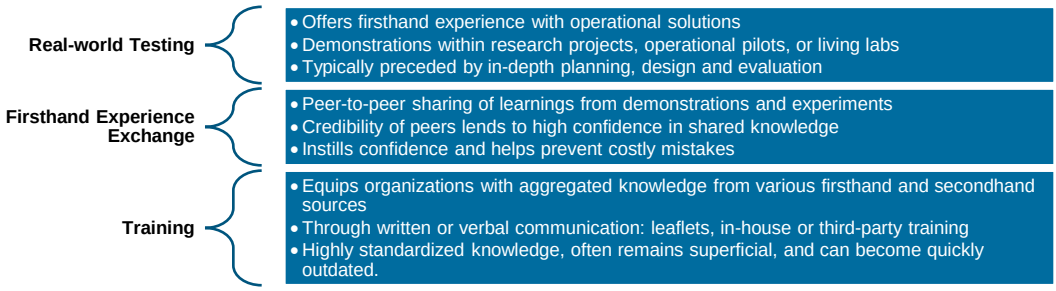


Figure 7 Types of learning channels

Organizations need to recognize that the 'new' information is added to the existing pool of knowledge of the individual, within their organization, and within the sector. Resistance to new knowledge at various levels necessitates a strategic learning approach to ensure that the quality of the pooled knowledge continually improves[xxii].

Embedding learning in the engagement strategy, particularly through partnerships with freight electrification associations, will greatly benefit the road freight sector and electrification ecosystem by fostering industry skill development, providing valuable insights to policymakers, manufacturers, and infrastructure providers.

Zero emission transport community building with Colruyt

Colruyt is steadfast in its commitment to achieving zero-emission logistics operations by 2035 through strategic partnerships with subcontractors, transitioning to electric and hydrogen fuel cell trucks. During a December 2022 event hosted by Colruyt, which brought together 150 small and large trucking companies, including subcontracted transport partners, the company unveiled its proactive approach towards phased electrification, offering valuable insights for other organizations.

The company initiated its pilot phase by experimenting with various e-trucks, conducting tests over a 3-to-4-year period. This phase involved a collaborative learning process drawing and sharing insights from the experiments.

In the subsequent preparation phase, spanning up to 4 years, Colruyt plans to make early investments based on the lessons learned, await improved products, and explore the economic aspects of the transition. Colruyt is dedicated to supporting subcontractors in their successful transition by providing operational support, including charging infrastructure and investments. The company also facilitates the shift to e-trucks by aiding carriers in vehicle acquisition through joint truck procurement.

In the final adoption phase, Colruyt is committed to an incremental implementation of a zero-emission fleet. The initial transition of the company's internal fleet to a zero-emission fleet is set to occur by 2030, followed by the entire fleet, including partnered carriers, by 2035.

Such events, coupled with unwavering commitments and continuous communication, foster strong trust and relationships among transport stakeholders, a critical element for resilience during the transition period. By signaling that Colruyt will take the lead in decarbonization while also supporting their carriers through the transition, they instill confidence in trucking companies to trust Colruyt and become more open to experimenting with the technology.

Piloting Sustainable Technologies at ALDI SOUTH Group

ALDI SOUTH Group has implemented strategic and systematic learning to lay the foundation for a smooth sustainable transportation journey in each country where they operate. ALDI South Group has defined global sustainability targets. While each individual country is responsible for ensuring the targets are met, a central Supply Chain team provides support to all countries. The central team is focusing on global coordination, knowledge sharing, creating global partnership, and more, all to ensure they are benefitting from synergies and making sure all countries are working in the same direction. The country teams support with understanding local requirements, site specific details, and many other topics. The collaboration of central and local teams allows for them to ensure they are looking at the full picture and progressing towards the overall ambition: reducing the company carbon footprint.

As part of this focus, they have investigated many technologies, including electric vehicles, which are the focus of this case study. The ambition is to understand the feasibility of electric vehicles within their supply chain and the associated challenges. Urgent topics that need to be addressed include understanding the benefits and drawbacks of the various sustainable transportation options, maturity of market participants and partners within the electrification realm, and the limitations of all the various grids within Europe. Their approach aims to test new technologies within the various regions, compile learnings, and share a best approach to each country while considering their unique market requirements and stages of technology development.

One of the main challenges that they have recently investigated was how to overcome challenges to provide charging infrastructure- which currently faces structural barriers (e.g. grid capacity), lot size limitations and operational requirements, and significant capital expenditure to retrofit facilities. They carried out two separate pilots in two different regions to test different types of charging solutions.

The summary of the pilots is presented below. Both pilots were used for trucks servicing their outbound flows (from regional distribution centers to stores).

	Region 1	Region 2
Charging Solution	The carrier used a mobile electric charger to charge its trucks	The ALDI country made an agreement with a stationary charging network operator to help carriers charge their trucks.
Benefits	- Eliminates the high investment required to develop charging infrastructure. - Requires less space at the warehouse.	

Both trials are helpful to understand more about the capabilities of an e-truck without the implications of high investments in charging infrastructure or truck trials. The business is strategically researching and piloting various set ups to ensure the country teams have a variety of decarbonising options available, such as rental constructs, truck-as-a-service model, and others.

However, there are still major challenges to electrification, namely that any impact on logistics costs can impact other aspects of the business. Challenges range from scalability of e-trucks due to grid capacity constraints and projections of truck availability not matching the demand, to significantly longer refuelling times when compared to standard diesel operations and a more limited range.

The ALDI SOUTH Group continues to share learnings among its national teams, and will continue to develop its organizational structure to support effective and cost-efficient learning between the central, the regions, and carrier networks serving the different locations.

Creating a Supportive Partnership Model

How can an effective and efficient partnership model be established?

6 Attracting the right carriers

Organizations can embed expectations early into the existing procurement processes, using carrier selection criteria, which is a high impact and cost-effective way to kick start electrification.

Freight buyers, armed with a comprehensive understanding of the steps they should take to electrify, as well as a realistic understanding of what is feasible in the existing carrier market, can leverage their insights to articulate criteria for selecting partners, described here as carrier selection criteria.

Amplify criteria across all engagement channels for emphasis.

Using carrier selection criteria in the logistics partner sourcing[xxiii] provides a clear target for carriers to aim for. By embedding expectations early into the procurement process, organizations create a strong link between their stated ambitions and the types of carriers they are looking to partner with. Strive for coherent message from private policy documents to the enforcement of the criteria.

Promote vision of the industry as a general carrier policy or Third-Party Code of Conduct.

- Establish the framework for collaboration, narrowing down applications to carriers demonstrating both interest and qualification. Articulate a comprehensive vision statement for the industry and potential partners, encompassing elements like:
  - Environmental KPIs that are used internally for the logistics procurement department.
  - Public commitments, such as done within the EV100+ and First Movers Coalition.
  - Sustainable logistics roadmap or ambitions.
  - Social sustainability aspects, such as commitment to fair pay or better working conditions in alignment with CSR Europe's Truck Transport Social Guidelines.

Be transparent about criteria used to obtain environmental performance desired

- Aim to not only successfully procure services, but to also provide a clear demand signal to the industry and to open high-quality lines of communication with the industry to aid electrification.
  - Communicate explicitly your organization's environmental criteria in any procurement Request-For documents.
  - In the early phases, allow for information sessions for carriers to understand the changes to past practices and to offer feedback.
  - Take their feedback into consideration to revise the Request-For documents (see Section 4), as well as the contract terms (see Section 7).

Monitor and enforce the criteria in the on-going relationship

- Embed double loop learning in the monitoring and enforcing practices, while maintaining commitment to the terms of the agreements.
  - Embed the terms in the contract.
  - Revise the criteria depending on feedback from the logistics and sustainability team.

Figure 8 Use carrier selection criteria in different modes of communication with carriers

Embed electrification needs in the criteria.

After receiving responses from carriers, the procurement department assesses each using predefined criteria (Figure 9). Organizations should allow carriers to provide information on needed support, which could be part of the commitment offered by the freight buyer.

General environmental performance	Improvement in environmental performance	Allocation of environmental attributes to the shipper	Support needed for electrification
• Number of e-trucks in the fleet. • Ratio of e-trucks to own charging points • Certified fleet emissions intensity	• Past and planned growth of e-trucks in the fleet • Improvement of fleet emissions intensity compared to the previous year and planned over the next years.	• Availability of e-trucks to be used in the shipper's operation. • Certified fleet emissions intensity assigned to the shipper's operation	• Charging infrastructure needs

Figure 9 Example criteria to provide a clear description of a carrier's electrification journey

Threshold values that both reflect regional maturity and encourage growth could be used in the evaluation. These criteria should work alongside other criteria used to assess logistics service quality.

7 Enhancing contracts for electrification

Organizations can leverage these contract terms to show tangible commitment to electrification, while supporting this growing and maturing service sector.

In fostering electrification and ensuring logistics performance through carrier agreements, organizations must experiment to optimize their critical elements: the purchased transport service, service level, and environmental performance, along with financial terms.

Redesign contract lifecycle and terms.

To optimize carrier agreements for electrification and improved logistics performance, freight buyers should start by strategically considering using e-trucks in a transport service as an opportunity rather than just a constraint. In this approach, freight buyers can make electric freight operations appealing through attractive freight rates, longer and more stable contracts, and tailored assistance for electrification. When both parties have a long-term perspective, freight buyers can incorporate clauses that specifically address the scale-up of electrification over the contracting period. The goal is to gently guide partners towards the right direction without causing long-term harm, balancing the short-term needs of the freight buyer.

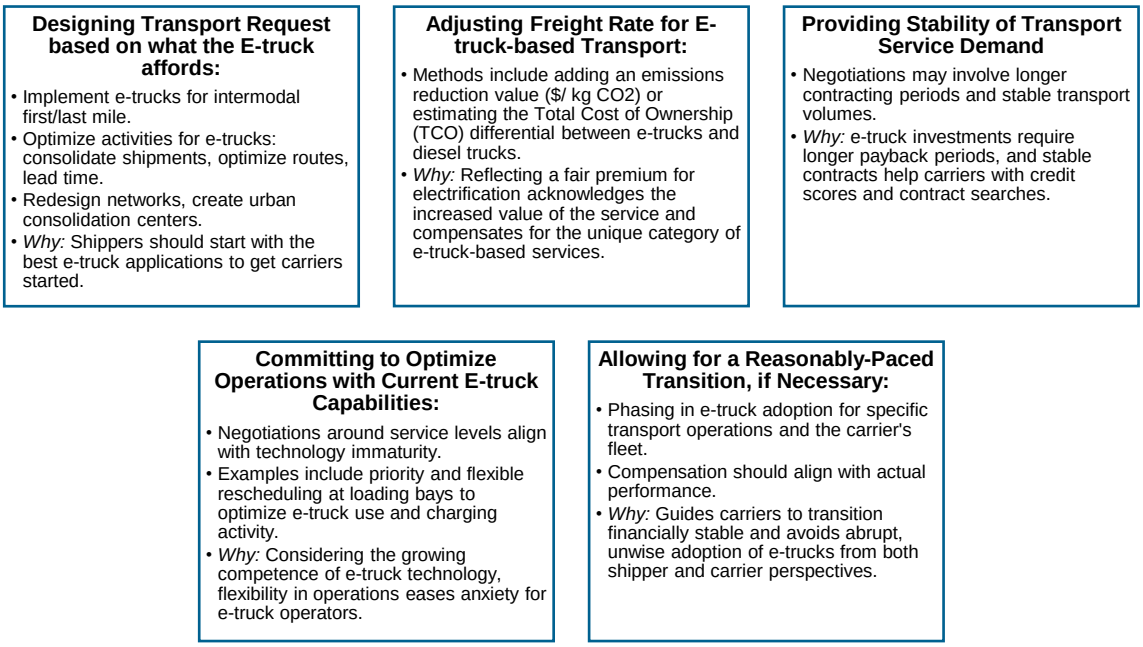


Figure 10 Elements within the contract lifecycle that supports electrification.

Nudge carriers towards terms that align with internal priorities.

While conventional transport contracts primarily involve monetary transactions for services, the landscape shifts in electrification. In this context, where freight buyers actively contribute to a carrier's business model transformation, their role extends beyond the norm. Therefore, it becomes imperative for freight buyers to ensure that contractual terms safeguard their interests, particularly in bolstering future electrification endeavors. This could include:

- securing detailed emissions and energy data for an enhanced emission reduction roadmap,
- facilitating operational learning about electric vehicles that can be transferred to other carriers,
- aiding procurement with comprehensive cost data.

This, however, necessitates deep trust and legal protections between both parties.

Towards normalizing electric road freight procurement at Scania

Scania has the vision to drive the shift towards a sustainable transport system. The company sees electrification as an important part of its sustainability journey. The first step Scania has taken in this journey has been to develop a company-level electrification strategy. Based on the strategy, further initiatives and actions will be taken.

One key aspect Scania has addressed is the question of how to integrate procurement of electric road freight services into its usual procurement processes. To develop a deeper understanding, the company conducted a pilot on one of its inbound transport lanes in Södertälje, Sweden. The approach taken had five main steps and ended with a detailed post-pilot evaluation of the learnings.

The first step in the pilot involved identifying a suitable transport flow to electrify. Scania's team has identified one transport flow with a short distance and a high volume of goods, which represents the highest potential of feasibility for electrification and simplicity of use in the pilot. Moreover, the company has performed a detailed analysis of the driving capability of the vehicle while simultaneously identifying when and where the vehicle would need to be charged.

Based on this analysis, Scania was able to be concrete about the demand for the transport flow, request that within a tender, and issue a request for quotation. The request for quotation included electrification and charging station requirements. The process for signing on a carrier was successful. Negotiation with the carrier resulted in a clearer understanding of the route the vehicle needed to take and the charging station requirements. Before implementation, Scania and the selected carrier performed a vehicle simulation. The simulation helped ensure and assure that the vehicle and charging infrastructure could perform the transport required and that the supply to the production line would not be impacted. With the pre-work done, the implementation of the pilot went well, resulting in learnings for both Scania, as freight buyer, and for the carrier involved in the project.

Figure 11 Operationally efficient: charging-while-loading!

A critical consideration that determined the success of the pilot was identifying collaborative and forward-looking carriers that would be in line with Scania's way of working. Scania, while willing to support carriers, was clear that carriers needed to contribute to a successful collaboration in the pilot. For instance, in this pilot, the carriers were expected to provide their charging infrastructure. In addition, Scania provided the carrier with priority for loading slots to help maintain operational efficiency and reduce the impact of any transport delays.

Scania's pilot was very successful, for both them and the carrier. Taking an incremental approach to slowly build up competence and design a new electric road freight business model was very successful. One critical challenge that remains is to get buy-in from carriers at an early stage, as well as to perform a rigorous analysis of transport flows that fit the EV and charging infrastructure profile.

Providing Operational Support

What are operational ways to support carriers?

8 Cooperating through digital integration

Developing a digital integration strategy is pivotal for advancing electrification efforts and optimizing logistics operations.

Digital integration in road freight, a longstanding strategy to mitigate operational risks and inefficiencies, encounters added complexity and urgency with the introduction of electric vehicles and charging infrastructure. This necessitates enhanced communication and data-driven decision-making, ultimately building resilience into e-truck-based logistics operations.

Supporting electrification through digital technology.

Within the logistics domain, multiple digital management systems, including fleet, transport, and warehouse management, coexist. The ongoing technological progress aims to integrate these systems, enhancing visibility and decision-making capabilities, particularly in responding to disruptions. Despite advancements, industry implementation still lags. The integration of electric vehicles, equipped with telematics systems, and charging infrastructure, incorporating payment and reservation systems, remains an outstanding challenge.

Below, we outline potential opportunities arising from integration or data analysis within this context.

Table 1 Opportunities for digital integration in support of electrification

Opportunities	How	Why
Improve precision of vehicle-to-route operational and energetical match	Analyze telematics and battery state-of-charge data per route to improve vehicle routing strategies and make use of heterogeneous fleets.	Reduce energy consumption, optimize battery use, suggest eco-driving behaviors, will extend the economic value of each vehicle.
Extend vehicle capabilities by integrating charging services	Include available charging points in the routing and scheduling plan, while reserving the charging points.	Selecting an appropriate charging strategy extends daily driving range of the vehicle, while reducing range anxiety[xxiv].
Mitigate congestion and delay risks in transport with flexible charging reservation system.	Update charging point (or loading bay) reservations based on estimated time of arrival based on real-time vehicle telematics.	Ensure charging availability by dynamically adjusting charging point or loading bay reservations with short time windows according to dynamic estimated time of arrivals[xxv].
Benefit from lower prices and emissions of electricity	Analyze historical data or receive real-time updates to determine optimal charging schedule, and integrating in route and scheduling optimization	Exploit benefits of the prices of and availability of renewable electricity which vary during the day[xxvi].

Note that the prerequisite for the integration is that carriers are persuaded to share data or integrate the systems. Establishing trust and incorporating safeguards in contracts can mitigate these challenges.

Streamlining digital integration as it develops

Ongoing enhancements in technical communication protocols pose another obstacle, requiring alignment with evolving market and technology. In addressing these challenges, freight buyers play a pivotal role. They must advocate for interoperability in emerging standards, preventing issues like lock-in and compatibility. Moreover, emphasis on quality implementation is crucial to ensure practical effectiveness. Freight buyers can contribute by supporting carriers and solution providers in experimenting with digital solutions before widespread migration to new systems.

9 Optimizing carriers' charging strategies

Companies face a dual opportunity in ensuring the success of their carriers' electrification efforts: infrastructure provision or facilitating their access to charging services.

The reliance of electric vehicle systems on charging infrastructure poses challenges in purchasing, installing, and accessing it, acting as a significant hurdle for fleets.[xxvii] Despite truck operators expected to manage their own infrastructure, freight buyers can enhance the appeal of electrification collaboration by actively providing support here.

Types of charging strategy and infrastructure

The charging strategy refers to the carrier's method of incorporating charging services into vehicle operations, typically characterized by the driver's activities, the vehicle's operating condition, and the charging location[xxviii]. The main types of charging strategies, expected to be used in most truck operations, are described briefly below.

Overnight (or downtime):	Opportunity fast:	Opportunity ultra-fast:
• ***How:*** 50-150 kW at depots or long-duration truck parking. • ***Why:*** Default charging during the truck's idle period of 8 to 10 hours daily, especially in single-shift operations. This is not easily available to trucks used in multi-shift operations.	• ***How:*** 150 – 350 kW at destination locations (loading bays, temporary parking, depots). • Why: Quick top-up during logistics activities, mandatory breaks, or between shift changes, crucial in long-haul operations.	• ***How:*** 750 kW – 3 MW at destination locations and truck break sites. Technology still in development. • ***Why:*** Similar to opportunity fast but suited for larger battery vehicles with higher charging demand, particularly critical in long-haul operations.

Figure 12 Charging strategies, descriptions, and purpose[xxix]

Opportunities that make investment in charging infrastructure appealing

Freight buyers could facilitate access to the above charging services in different ways.

- **Establishing a partnership with (semi-) public charging service operators** involves negotiating rates for charging services before the actual implementation and securing exclusive access for co-owned charging sites.
- **Providing charging services on their premises** can include the installation of chargers at loading bays to facilitate opportunity charging and the sharing of charging points at freight buyer-owned depots.
- **Exploring co-development or joint-financing of semi-public charging hubs** entails freight buyers and carriers collaborating to install chargers and receiving potentially favorable financing terms from institutions based on the quality of their relationship.

Supporting carriers in establishing charging infrastructure offers advantages like securing grid access early and avoiding higher costs associated with public charging. The investments which carry higher costs and risks to the company, could be introduced into cost-sharing terms or energy price indexing in carrier compensation contracts. In addition, freight buyers can exploit synergies with their Scope 2 emission reduction measures, such as securing renewable energy, if charging takes place on-site.

Despite the benefits, companies must navigate this support mechanism with care. Obtaining governmental permission to sell charging services and building approvals from facility owners may add to the complexity. Implementing reservation systems for charging is essential for optimal infrastructure use. However, if chargers are installed at loading bays, it may complicate logistics loading bay scheduling optimization.

10 Support for vehicle acquisition

Companies providing vehicle acquisition support mitigate financial risks and expedite market development, addressing a key obstacle in electrification efforts.

Fleet operators are primarily concerned about the profitability and affordability of providing e-trucking services. Buyers are focused on the long-term cost-efficiency of electric freight services, seeking the best CO_2 reduction per price efficiency and affordability relative to transportation needs. There is a significant opportunity for collaboration between carriers and buyers to mutually support each other as electrification gains traction.

Understand the carrier's vehicle acquisition model

Despite significant improvements in the value-intensity of e-trucks (e.g., trucks are becoming better and cheaper) in recent years, with expectations for continued enhancement in the coming decade, carriers aiming to electrify currently encounter challenging financial risks. These risks primarily include high initial capital investment, limited availability of public subsidies[xxx], and uncertainties regarding total cost of ownership (TCO) and potential revenue[xxxi].

The method of acquiring vehicles within a transportation business can vary, ranging from purchases or leases of new or secondhand vehicles, and may rely on external financing or the use of internal funds. Large operators are more likely than small and medium operators to purchase or lease new vehicles and to depend on external financing[xxxii], and would therefore be more likely to acquire electric freight vehicles as the market develops.

Ways to support vehicle acquisition

Depending on the circumstances and available resources, companies have the ability to assist carriers with vehicle acquisition. Figure 13 illustrates several examples of how companies can offer support, such as facilitating access to financing or fleet leasing services, or actively participating in vehicle ownership.

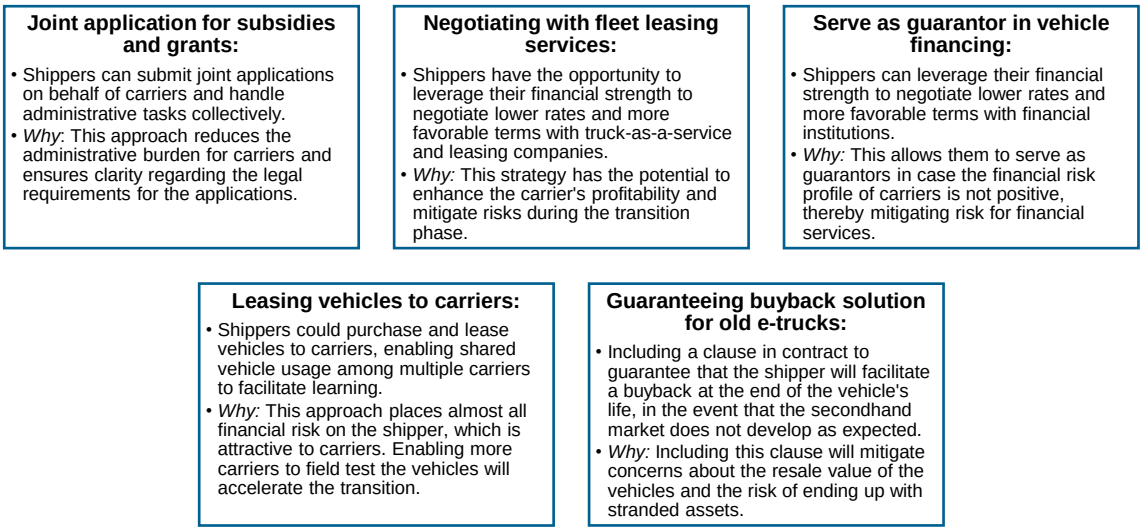


Figure 13 Vehicle acquisition support measures

Freight buyers are reminded that ownership costs and risks are shared between them and carriers, prompting a caution in selecting partners (Section 6) and ensuring explicit protections espoused in contracts (Section 7).

Daimler Truck’s goal to electrify delivery to Wörth plant and deploy charging infrastructure

Daimler Truck has set itself the ambitious goal of 100% electrification of delivery traffic to its largest truck plant by the end of 2026, to make a significant part of its direct supply chain CO2-neutral.

Together with logistics service providers and freight forwarders who supply the German Daimler Truck plants daily, the company is working to integrate e-trucks into their fleet. The core elements of the approach revolve around piloting vehicles, deploying charging infrastructure tied with the most fitting charging strategy for their logistics operations, and providing planning advice to their freight forwarders.

Both the eActros 300 and eActros 600 models will be used in real-world conditions. In December 2023, twelve eActros tractors were handed over to forwarders and are currently employed in transporting goods to the plants. Starting from the first quarter of 2024, these vehicles will conduct approximately 50 all-electric transports to German plants daily. Moving forward they aim to build on the learnings of the pilots to electrify all transport within a 200-kilometer radius as an interim goal.

The most challenging aspect of the ambition was to deploy charging infrastructure. These were deployed at the Wörth site and the German plants in Kassel, Mannheim, and Gaggenau. Charging columns, including megawatt charging stations for high-performance battery charging, are planned at key points for delivery traffic near the production plants.

Figure 14 eActros charged at Wörth plant

It is crucial to not lose valuable process time for additional charging so that the e-truck can be used as efficiently as a diesel truck. Hence, each route has to be analyzed in detail to find the optimized combination of routes, charging stations, and time slots for delivery. This is only possible if the freight buyer, forwarder and, if necessary, further involved parties, e.g. suppliers, work together in partnership and at eye level. The ambition is that the time during which the e-truck's cargo is unloaded will be used to recharge the vehicle's battery. In this way, the vehicle ideally does not have to schedule further downtime and can resume its route directly after parts delivery.

To develop a targeted concept for zero-emission delivery logistics to the Wörth plant and to further plants in Daimler Truck’s production network the first step is to work with freight forwarders to analyze their regular routes. This provides information on travel times and distances between delivery locations, charging options, and individual truck ranges. They also receive support integrating e-trucks into their existing fleets and in realigning their logistics centers, including advice on setting up the appropriate in-house charging infrastructure.

Realizing that a collaborative approach is required to reach their own sustainability goals, they have launched the Sustainable Logistics Consulting program. In this program, Daimler Truck will leverage the insights from the Wörth plant pilots to support other organizations to electrify their logistics processes.

Conclusion

11 Scaling the e-trucking industry together

The publication outlines **a carrier engagement strategy to accelerate electrification of the shipper's carrier network by addressing fundamental concerns** that carriers have that hinder electrification.

- **Market uncertainty**: Carriers hesitate due to concerns about long-term market stability and the evolving ecosystem.
- **Knowledge gaps**: Operating e-trucks requires new skills and strategies, which carriers lack and need to learn.
- **Limited resources**: Early-stage experimentation comes with financial and resource constraints that carriers struggle with.

While some markets are slightly further along the transition than others, it is safe to say that the **trucking industry around the world is merely at the early adopter stage of electrification**. Any practice or business model with e-trucks at its core is out of place in the current freight ecosystem. Hence, many elements that previously supported the ICE-based trucking industry need to be revamped or replaced to support e-truck operations instead. This includes the transformation of market expectations, competence of all logistics actors, and business norms.

The 3rd Party Electrification Framework (3PEF) offers **a comprehensive approach to address electrification concerns within existing freight buyer-carrier relationships and help freight buyers navigate the transition at the early adopter stage**. It emphasizes three main questions: aligning the vision of electrification, designing a suitable partnership model, and providing operational support to carriers. The framework comprises eight types of actions that enhance a freight buyer's carrier engagement or procurement strategy for electrification. It is essential to consider that the actions are most effective when integrated into a cohesive system of behavior, rather than implemented piecemeal, but also that they are not necessarily part of a linear process. The elements mutually reinforce each other.

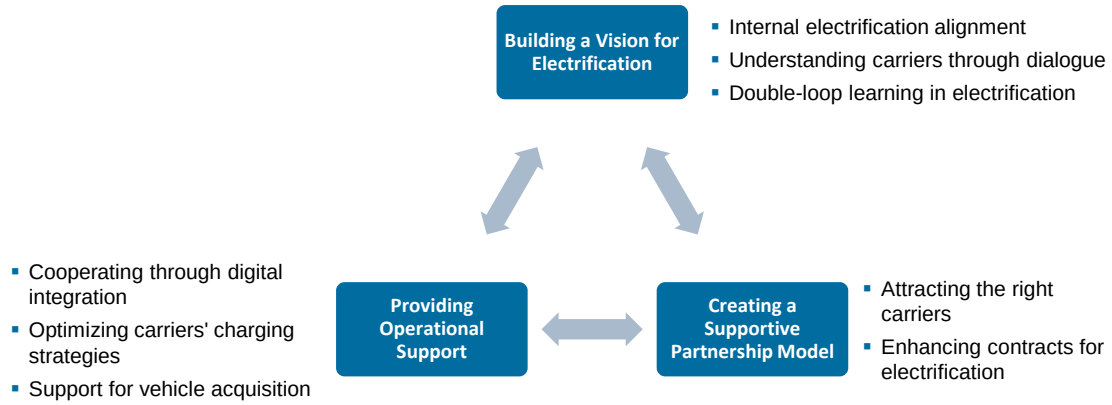


Figure 15 Mutual reinforcement of each element in the framework.

The result of implementing the framework stack up. Through consistent addressing of carrier needs, updating procurement policies, and fostering learning initiatives, the **freight buyer will gradually be identified as a leader in nurturing** the e-trucking market, with effects extending beyond their own network. The leadership role effectively inspires other freight buyers to adopt similar ambitions and approaches, fostering collaboration and cooperation with their suppliers.

Eventually, **synergies between the electrification efforts of other freight buyers and large carriers will begin to emerge and organizations will recognize opportunities for collaboration** to address other persistent ecosystem barriers. Several effective collaborative

initiatives have already begun spurred by the commitment of freight decarbonization leaders to truck electrification. These include activities like demand signaling, development of shared charging infrastructure, joint development of instruments to finance the transition, support for zero emission trucking policies, and adoption of zero emission logistics procurement guidelines. These align with the strategy outlined in this publication and address these challenges from a different angle.

This will drive a **significant acceleration in demand for e-trucking services** across diverse regions, establishing a robust yet continually innovating market for zero-emission logistics. Market growth will be fueled not only by societal and legislative pressures to decarbonize but also by the growing availability and demand of these services. As a result, the majority of carriers will transition away from fossil-fuel vehicles, marking a shift towards low-carbon solutions dominance and mitigating climate impact.

In conclusion, the 3PEF framework goes beyond a simple set of guidelines; it acts as a catalyst for positive change across the entire e-trucking ecosystem. By fostering leadership, encouraging collaboration, and ultimately accelerating market demand, it paves the way for a more sustainable electrified future for all actors and stakeholders.

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