C.H. ROBINSON

# Accelerating Electric Drayage Adoption at Scale

## Summary

Electric drayage represents one of the most direct opportunities to reduce $CO_2e$ emissions around major global ports and improve air quality of neighboring cities. Yet adoption has lagged due to high upfront costs, inconsistent access to equipment and charging infrastructure, and operational processes that were not designed for electric fleets. These challenges create meaningful barriers, even as electrification offers a scalable path to reducing port-adjacent emissions. As customer expectations, regulatory scrutiny, and port-level decarbonization timelines accelerate, forwarders and carriers are increasingly pressed to move electric drayage from pilot activity to scalable operations.

The Electrifying Drayage Alliance (EDA), led by Smart Freight Centre, works to address these barriers by simplifying adoption and improving utilization. C.H. Robinson participates in EDA, alongside more than 30 other companies and organizations, to help advance practical, scalable solutions that move the transportation and logistics industry forward. As a global forwarder operating daily electric drayage capacity, C.H. Robinson brings an execution-focused perspective on what is required to move electric fleets from pilots to repeatable operations.

> *"One of the key challenges in decarbonizing drayage is moving from isolated pilots to scalable, repeatable operations," said Rik Arends, Senior Director at Smart Freight Centre. "C.H. Robinson's approach demonstrates how coordinated planning, shared capacity, and alignment with recognized emissions frameworks can turn electric drayage into a viable solution at scale rather than a one-off initiative, exactly why we set up the Electrifying Drayage Alliance."*

## Aligning forwarders, carriers, and shippers to scale adoption

For forwarders, meaningful progress typically begins with customer demand. However, the premium associated with lower-carbon alternatives often limits what can be adopted at scale. EDA helps close this gap by aggregating volume and improving utilization, making electric drayage easier to plan, easier to report, and easier for customers to understand the impact of their choices. Even when shipments fall outside an optimal electric radius, the EDA model creates more predictable pathways to scale low-carbon drayage across diverse freight flows.

Carriers—most of which are small or medium-sized operators—face significant hurdles. Electric trucks require higher upfront investment, and adoption demands new charging

strategies and operational processes. Predictable commitments and high utilization are essential to justify these investments and ensure financial viability. Incentive programs in regions such as Los Angeles/Long Beach and Rotterdam help support the transition, but they often involve complex administrative requirements and limited funding windows, which can make access challenging. At the same time, carriers are increasingly asked to support sustainability goals without additional compensation, despite providing a core transport service.

Shippers are seeking clear, measurable ways to reduce emissions within their supply chains. However, small volumes, premium costs, and limited visibility within bundled drayage services can limit meaningful action. EDA provides shippers with access to verified $CO_2e$ reductions backed by primary operational data and full transparency into impact. Even lower-volume shippers can participate, see their results, and report reductions with confidence.

While the opportunity and constraints vary across the ecosystem, scalable electric drayage ultimately depends on how capacity, data, and verification are operationalized.

## Turning utilization and data into measurable impact

To support transparent reporting, the EDA model incorporates third-party assurance, with independent auditors verifying $CO_2e$ reductions and underlying activity data. Independent auditing adds trust and integrity by validating methodologies and ensuring consistency across the value chain. While auditing introduces additional cost, it reinforces credibility and mitigates the risk of double counting—an increasingly important consideration as regulatory scrutiny grows.

> *"With increasing regulatory and stakeholder scrutiny of transport emissions reporting, independently audited electric drayage programs are better positioned to meet evolving expectations," said Patricia Pinilla, Sustainability Initiatives Director at Normec Verifavia, a Smart Freight Centre approved verifier. "C.H. Robinson's use of primary data, transparent allocation mechanisms, and third-party verification provides a strong foundation for credible reporting today and in the future."*

Registries provide the chain-of-custody foundation needed for secure and transparent allocation of environmental attributes. They simplify administration, reduce risk, and give participants confidence that emissions reductions are tracked accurately. Over time, this consistency enables greater scalability across the drayage ecosystem.

ROI improves significantly when electric trucks are deployed at high utilization rates and supported by primary, real-world data. Green port zones—where freight within a defined radius is allocated to electric trucks—support more efficient deployment. Through voluntary

market-based mechanisms, carriers are compensated across all shipments, allowing forwarders to commit electric capacity without financial exposure from non-participating customers. Shippers gain access to verified $CO_2e$ reductions, while sustainability, procurement, finance, and transport teams benefit from greater transparency into results.

## A scalable model for zero-emission drayage

To further scale adoption, the ecosystem must continue improving access to renewable energy data, strengthening primary-data reporting, and enabling volume-allocation models that increase utilization. Together, these advancements will expand the commercial, operational, and environmental value of EDA, establishing a scalable and repeatable model for zero-emission drayage at ports around the world.

> *"Scaling electric drayage comes down to practical execution—consistent utilization, clear operating models, and credible data. When those pieces are in place, we can move beyond pilots and make zero-emission drayage a repeatable part of day-to-day freight movement," said Tom Fisher, Global Alternative Fuel Program Director, C.H. Robinson.*

Electric drayage requires durable operating models that align shipper demand, carrier economics, and verifiable data across the value chain. By focusing on utilization, transparency, and consistent execution, EDA demonstrates how zero-emission drayage can move from aspiration to a repeatable, scalable part of everyday freight operations.

# Key learnings

These learnings are most relevant for shippers, carriers, and forwarders working to scale electric drayage within existing operational, commercial, and data constraints.

Across C.H. Robinson electric drayage operations, several lessons have emerged. In day-to-day operations, allocating freight to an electric carrier often requires evaluating multiple variables before a final assignment can be made. These additional operational, commercial, and data-related considerations extend decision-making cycles and introduce additional planning steps.

## Electric drayage capacity constraints

- Even though electric vehicle (EV) capacity may be available, it is not automatically utilized unless shipments meet specific requirements related to radius, charging windows, and driver hours.

- Planning EV drayage requires more granular coordination, including managing state of charge, working hours, dwell time, and routing—well beyond standard diesel workflows.
- Freight may be available in the market, but EVs often remain underutilized when no green premium exists to offset the additional operational effort.
- Running empty miles to secure a "green load" is not viable, making consistent and predictable volumes essential.
- Carriers cannot sustain EV operations on a small number of loads per month; consistent utilization is required to maintain financial viability.
- Sharing charging data across providers remains challenging, as reporting standards vary.
- Claims related to renewable electricity are difficult to verify when charging networks, card operators, or energy suppliers lack full data transparency.

## Shipper barriers to scaling electric drayage

- Many shippers have enough volume within EV-eligible radii, but these shipments are often bundled into broader service packages that limit scalability.
- Freight is frequently split across providers to diversify risk, diluting the volume needed for efficient EV deployment.
- Even when multi-carrier green solutions are technically feasible, established carrier relationships and long-standing operating models can slow adoption.
- Warehouses operated by third-party providers add complexity, particularly when schedules or constraints do not align with EV requirements.
- Decision-making is often fragmented across modes—drayage, ocean, air—making it difficult to coordinate unified green lanes across the supply chain.

## Forwarder planning and allocation challenges

- Forwarders often allocate volumes to carriers in fixed packages, limiting flexibility to optimize EV utilization across multiple providers or dynamically adjust assignments based on state of charge, driver availability, or charging constraints.
- These packaged allocations can prevent EV-eligible freight from being assigned to carriers with available electric capacity, reducing overall scalability.
- Import and export flows introduce different constraints. Exports tend to be more time-sensitive due to documentation and port cutoffs, leaving less flexibility to switch carriers when EV options become available.
- Vessel delays affect both import and export planning, but the impact is more pronounced on exports, where documentation, customs cut-offs, and booking windows can quickly become misaligned.

- When drayage is not bundled with other modes, forwarders may lack visibility into which shipments could realistically be assigned to EVs, complicating coordinated planning.

# Recommendations

Operating daily electric drayage capacity in global port environments, C.H. Robinson has seen that consistent utilization depends on the right commercial and operational model. A key enabler is having a clear mechanism to spread the cost of electric operations across multiple shipments, rather than applying a premium to every load. This approach helps keep electric moves cost-competitive while allowing carriers to maintain the utilization levels required for financial sustainability.

Operationally, prioritizing assignment of the next feasible load to available electric capacity—rather than matching specific trucks to specific shipments—improves flexibility and reduces planning friction in dynamic port environments. When combined with reliable data and aligned incentives, electric trucks can operate reliably at scale.

Based on these insights, the following recommendations are offered:

- Adopt electric drayage capacity consistently to send a clear market signal that EV trucks can be utilized daily, not just for pilot or one-off shipments.
- Use EV capacity even when a green premium is not applied to every shipment, allowing $CO_2e$ reductions to be captured and allocated across participating customers.
- Report all $CO_2e$ reductions using primary operational data and verify results through independent auditing to build credibility and trust.
- Utilize registries to allocate emissions reductions as environmental attributes, ensuring transparent chain-of-custody and preventing double counting.
- Spread green premiums across multiple shipments to lower the effective cost of operating electric equipment and support higher carrier utilization.
- Offer operational incentives—such as prioritization at ports, faster turn times, or preferred handling at facilities—to encourage continued carrier investment in zero-emission assets.