CENTER FOR GREEN MARKET ACTIVATION

ACCELERATING MOMENTUM FOR ZERO-EMISSION TRUCKING

Lessons Learned From GMA Trucking's Pilot Procurement

A WHITE PAPER

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www.gmacenter.org

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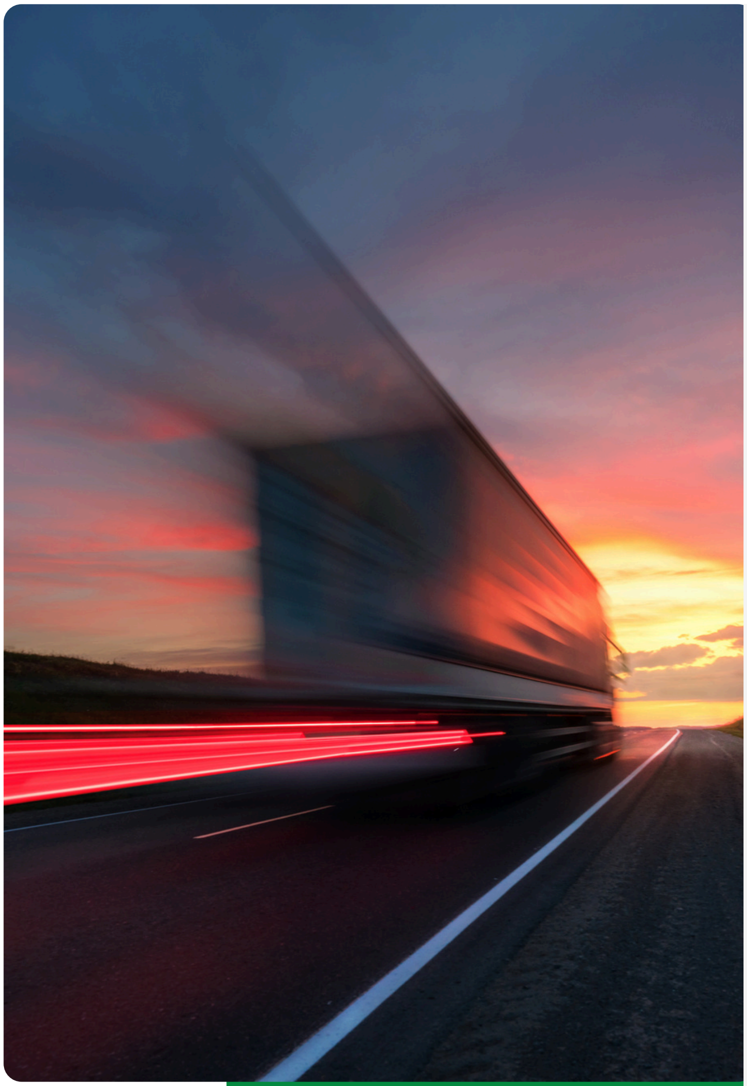
Introduction

Responsible for 1.2 gigatons of annual CO_2 emissions, the heavy-duty trucking sector must act to reduce its climate impact. Low-carbon solutions, however, have been slow to scale, particularly in the United States. New technologies remain expensive, charging infrastructure buildout proceeds slowly, and additional investment is sorely needed.



GMA Trucking was created in 2023 to address these challenges. A buyers alliance with member companies from tech, e-commerce, consumer packaged goods, and other sectors, GMA Trucking aims to leverage corporate demand for cleaner trucking services in order to drive carriers to purchase and deploy zero-emission[1] heavy-duty vehicles. The program combines demand aggregation with a book and claim system to connect companies with carriers ready to decarbonize, facilitating multiyear offtake contracts that put zero-emission trucks on the road.

GMA Trucking is run by the Center for Green Market Activation (GMA), a U.S.-based, globally focused non-profit that develops book and claim systems, buyers alliances, and innovative procurement approaches to accelerate decarbonization of hard-to-abate sectors such as trucking, aviation, maritime, cement and concrete, and chemicals. As a strategic partner to GMA Trucking, the Smart Freight Centre (SFC) brings its international expertise in freight decarbonization, emissions accounting, and transport-focused book and claim systems, ensuring the program aligns with industry standards and best practices.

[1] "Zero-emission" trucks refers to tailpipe emissions only, not inclusive of upstream manufacturing emissions.

Introduction (continued)

In late 2024, GMA Trucking launched a pilot procurement that aggregated its members' demand for zero-emission trucking service attributes. GMA Trucking ran a competitive request for proposals (RFP) that offered carriers an opportunity to deploy zero-emission trucks and sell the environmental attributes from running those trucks (in the form of Zero-Emission Trucking Certificates, or ZETc) to GMA Trucking members.

In September 2025, GMA announced Nevoya as the winning carrier of the procurement. Buoyed by contracts with GMA Trucking members, Nevoya will deploy approximately forty Class 8 battery electric trucks on an all-electric route in Texas. This project represents the largest known zero-emission heavy-duty truck deployment in the state and is poised to catalyze major charging infrastructure investment along the Houston-Dallas route.

This White Paper provides details of GMA Trucking's pilot collective procurement process, from launch through evaluation, selection, and contracting. It identifies the factors that drove the most competitive proposals and presents insights that can guide future, larger procurements to accelerate the decarbonization of the road freight sector.

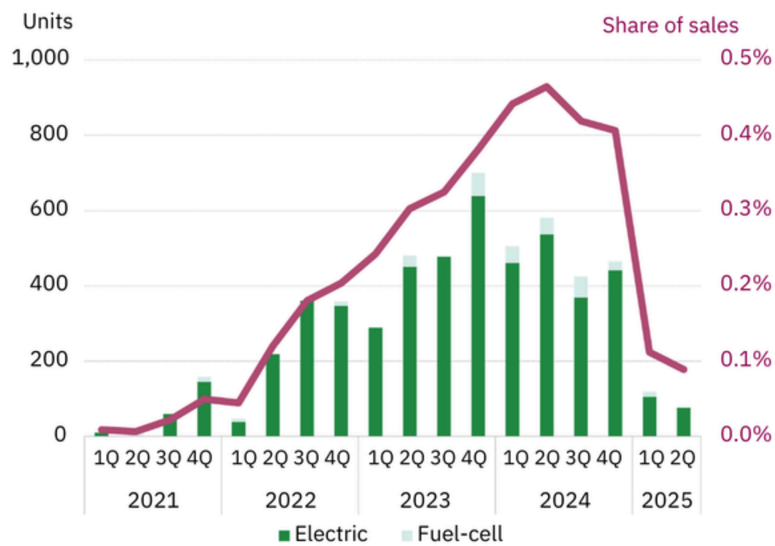
The Heavy-Duty Trucking Emissions Challenge

Heavy-duty trucks, defined as commercial vehicles that can safely operate at a gross weight over 12 metric tonnes,[2] constitute a significant and growing share of greenhouse gas (GHG) emissions. Globally, heavy-duty trucks emit 1.2 gigatons of CO_2, roughly equivalent to more than 3% of global energy-related emissions, and emissions have increased by an average of 2.2% per year since 2000.[3] In the United States, the share is even higher, with heavy-duty vehicles accounting for roughly 4.5% of total GHG emissions.[4] Despite representing just 9% of the U.S. truck fleet, heavy-duty trucks are responsible for 48% of total truck fleet emissions.[5] Decarbonizing this segment is essential: without rapid reductions in heavy-duty road freight emissions, global climate objectives cannot be achieved.

To stay on a net-zero trajectory for 2050, the International Energy Agency (IEA) estimates that 35% of heavy-duty truck sales must be zero-emission by 2035.[6] While global sales of zero-emission medium- and heavy-duty trucks are slowly increasing (on pace for upwards of 4% of all new sales in 2025), that increase is driven almost entirely by China, where sales approach 15%.[7] In contrast, the U.S. market has stalled. Bloomberg NEF and Smart Freight Centre's *Accelerating the Transition* report notes that zero-emission truck sales peaked at under 0.5% in Q2 2024 and dropped below 0.1% in the first half of 2025, with fewer than 200 zero-emission medium- and heavy-duty trucks sold nationwide.[8]

[2] Note: To maintain consistency with globally applicable measurement standards, and in alignment with ISO conventions, all weights in this paper are reported in kilograms and metric tonnes.
[3] https://www.iea.org/fuels-and-technologies/trucks-buses
[4] https://www.edf.org/sites/default/files/documents/EDFMHDVEVFeasibilityReport22jul21.pdf. 4.5% represents an estimate. Statistics for truck sales frequently mix medium- and heavy-duty sales together, so this analysis estimates the impact of heavy-duty trucks alone.
[5] Ibid.
[6] https://www.iea.org/reports/net-zero-by-2050
[7] https://assets.bbhub.io/professional/sites/24/Zero-Emission-Commercial-Vehicles-Factbook-2025.pdf
[8] Ibid.

Exhibit 1: SAF and Bloomberg NEF's Analysis of the Zero Emission Truck Market in the United States[9]



Adapted from "Zero-Emission Vehicles: Accelerating the Transition," by Smart Freight Centre and BloombergNEF

Recent policy retrenchment, including the withdrawal of California's Advanced Clean Fleets rule[10] and efforts to roll back regulations such as the Advanced Clean Trucks Standard[11] and the EPA Phase 3 GHG Emissions Standards for Heavy Duty Trucks,[12] has contributed to this decline. However, this is not just a policy issue. Even in a more supportive policy environment, Q4 2024's peak represented only around 700 zero-emission trucks sold, a tiny fraction of what is needed in absolute terms. The slow pace of adoption in the U.S. reflects multiple challenges – new technologies are maturing, zero-emission infrastructure buildout is happening too slowly, and high upfront capital costs are hindering investment.

The Market Gap

With zero-emission trucking policy momentum reversing in the United States, corporate customers interested in decarbonized freight services to help meet their ambitious, voluntary climate targets could serve as a key demand-side driver that incentivizes carriers to purchase, deploy, and operate zero-emission trucks.

[9] Ibid.
[10] https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets
[11] https://www.epa.gov/newsreleases/epa-takes-action-deny-californias-latest-illegal-power-grab-heavy-duty-vehicles
[12] https://www.fleetowner.com/emissions-efficiency/article/55274187/epa-to-dismantle-ghg3-clean-truck-rules-unrealistic-mandates

The structure of today's freight market, however, creates supply and demand challenges between corporate shippers, carriers, and charging infrastructure providers that makes it difficult to translate this demand into action. Many companies want to move their goods on zero-emission trucks but find their goods travel on routes that lack sufficient charging infrastructure or carriers with zero-emission fleets. Conversely, when leading carriers want to deploy zero-emission trucks on a route where charging infrastructure can be more easily installed, the carrier often struggles to find sufficient corporate demand for the more expensive low-carbon trucking services on those targeted routes. Compounding this mismatch is the fact that shippers often don't communicate directly with carriers, instead working through logistics service providers (LSPs) to manage the transportation of their goods. While LSPs can play a helpful role in aggregating shipments across buyers, it can also hamper demand and supply signals between shippers and carriers.

Furthermore, most individual shippers do not represent a sufficiently large, consistent volume with any single carrier to support large-scale purchases of zero-emission trucks and infrastructure. Freight demand can be seasonal and variable, making it difficult for carriers to rely on any single shipper's volumes as a stable foundation for zero-emission trucking investments at scale. This volatility drives the short-term contracts—typically less than a year—that shippers prefer, which are at odds with the capital-intensive nature of zero-emission trucking investments that need to be amortized over a multi-year period.

Finally, without precedent in the market, dealerships and carriers often assume little to no residual value for zero-emission trucks. Conversely, heavy-duty diesel trucks often assume residual values as high as 35% of face value.[13]

These factors all impact how the market currently prices battery-electric heavy-duty trucking services. Lacking confidence in long-term contracts or residual value, carriers frequently try to offload the entire green premium of a zero-emission truck onto whichever shipper is willing to pay, even if that shipper is only using a portion of the truck's potential utilization and for a fraction of its expected lifespan. As a result, shippers looking for decarbonized trucking services are often quoted prices far exceeding the cost of traditional trucking services.

Such operational and economic barriers create substantial uncertainty that stalls investment, even among carriers motivated to decarbonize. To move forward, corporates with ambitious decarbonization goals need a mechanism to signal demand to carriers more directly, at greater scale, over a longer term. The innovative demand aggregation and book and claim model pioneered by GMA Trucking offers a practical solution to overcome these barriers.

[13] https://theicct.org/wp-content/uploads/2023/04/tco-alt-powertrain-long-haul-trucks-us-apr23.pdf

Leveraging Aggregated Buyer Demand and Book and Claim

The persistent mismatch between corporate demand for zero-emission trucking services and carrier ability to provide these services economically and at scale is unlikely to naturally resolve on the timeline needed to avoid the worst impacts of climate change. However, coordinated buyer demand, paired with a system that allows investment even when that demand is geographically dispersed, presents a near-term lever to drive decarbonization.

Two mechanisms, working in tandem, make this possible:

- **Book and claim systems,** which allow buyers to procure verified Zero-Emission Trucking certificates (ZETc) even if their freight does not actually move on zero-emission trucks themselves.
- **Buyers alliances,** which aggregate corporate buying power and give carriers a clear demand signal for zero-emission freight. By moving as a collective group, buyers can create scale, lower costs, and provide the predictability carriers need to deploy high-CAPEX assets like zero-emission trucks.

What is a book and claim system for zero-emission road freight?

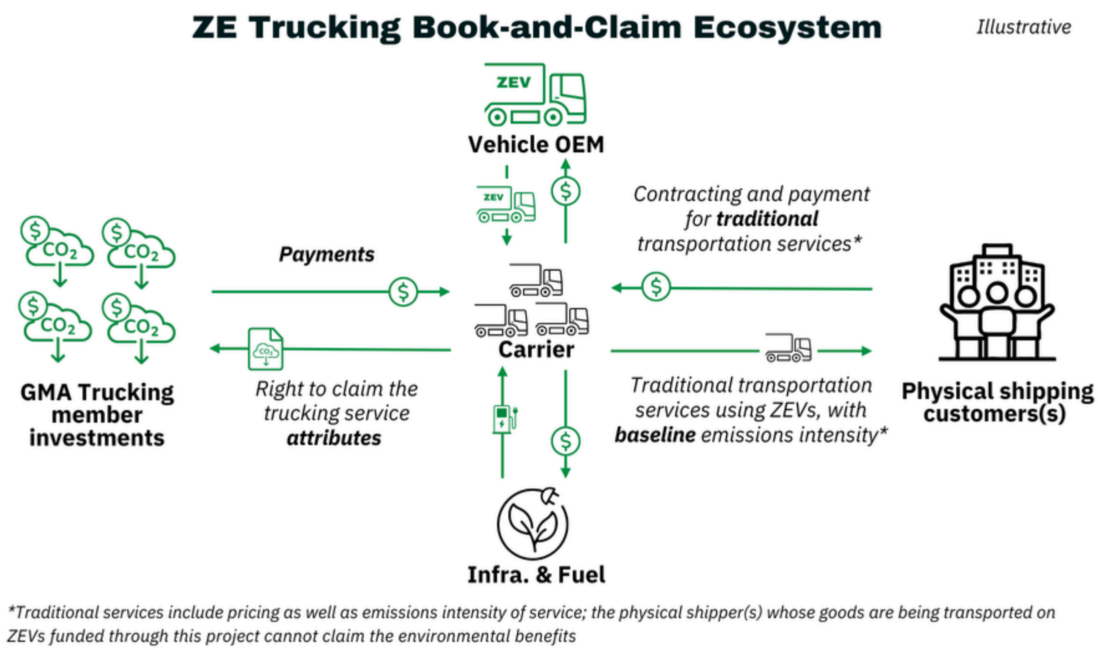
A book and claim system decouples the Environmental Attribute (EA) of the low-emission product or service from the physical delivery of that product or service. An Environmental Attribute Certificate (EAC) represents the emission benefit of that EA per unit of product or service. Book and claim systems are already used in other, similar contexts, such as the electricity industry's use of Renewable Electricity Certificates (RECs) and the aviation industry's use of Sustainable Aviation Fuel Certificates (SAFc).

In a book and claim system for heavy-duty trucking, shippers (or those that have road shipping activity in their value chain) pay for the right to claim the EACs that are generated by a carrier operating zero-emission heavy-duty trucks. Unlike electricity, where the functional unit for a REC is the quantity of energy (one MWh of renewable electricity), the functional unit in the trucking sector is the quantity of trucking service provided (moving one tonne of goods one kilometer on a zero-emission truck).[14] The tonne-kilometer functional unit incentivizes efficient utilization of trucks by rewarding carriers that maximize kilometers travelled and payload transported per zero-emission truck. This can be achieved through maximizing the number of loaded trip legs, as compared to deadhead[15] or unloaded trips, for example.

[14] This model follows the Market Based Measures (MBM) Framework released in 2023 by SFC. The MBM Framework provides guidance on reporting book and claim certificates in transportation decarbonization.
[15] A "deadhead" trip occurs when, after transporting goods from Location A to Location B, that truck is unable to secure goods for the return leg back to Location A. In a system with a functional unit of tonne-kilometers, deadhead trips have a payload value of zero and therefore generate no EACs.

To generate ZETc, carriers will procure trucks, access to charging infrastructure, and energy contracts as needed to deploy zero-emission services. Carriers then calculate the emissions profile of those ZETc (in grams of CO_2e/tonne-kilometer) in accordance with the Global Logistics Emissions Council (GLEC) framework and ISO 14083. These ZETc are sold to GMA Trucking members, who then own the emissions profile, which they can claim in their GHG reporting.

Exhibit 2: Zero-Emission Trucking Book and Claim Ecosystem

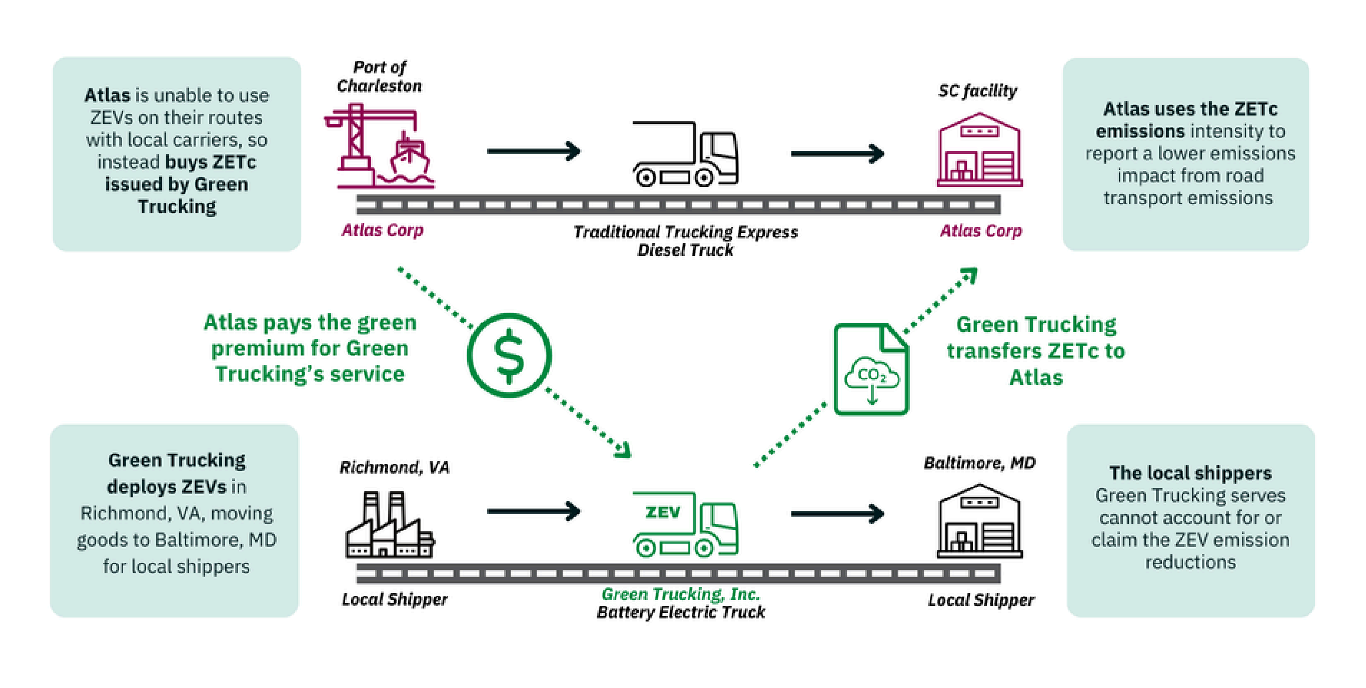


By decoupling the EA from the physical trucking service, a book and claim system can solve many of the existing challenges in the freight decarbonization space. It enables carriers to deploy zero-emission trucks and infrastructure where they are the most operationally efficient, ensuring maximum utilization of trucks and charging infrastructure. And, because buyers commit to purchasing ZETc rather than to moving their physical freight on zero-emission trucks, buyers are more comfortable entering into longer, multi-year contracts. Together, these factors contribute to more economic and feasible projects that can be deployed quickly.

EXAMPLE BOOK AND CLAIM TRUCKING MODEL

Atlas Corporation, a consumer goods company, runs a distribution center in South Carolina that receives goods trucked from the Port of Charleston. Atlas has ambitious climate goals, with a notable focus on their road freight emissions. However, their shipment timing is sporadic and shifting buyer behavior has created uncertainty in long-term demand volumes for their goods. As a result, Atlas is unwilling to commit to a long-term logistics contract to move their physical goods with their usual carrier, Traditional Truck Express. Without any secured future revenue, Traditional Truck Express determines an investment in zero-emission vehicles and chargers to be untenable considering the higher upfront capital costs and limited availability of public charging facilities. The same holds true for other carriers in the region, leaving Atlas with no viable solutions to address their road emissions on this lane.

Meanwhile, Green Trucking, Inc. has identified Interstate-95 from Richmond to Baltimore as an efficient and well-suited corridor for battery electric trucks and their operations, with ample routes that match battery electric truck capabilities and shipping demand to maximize utilization. Unfortunately, Green Trucking cannot locate a shipper in the area willing to pay the additional cost for their zero-emission service as compared to traditional diesel services, or engage in a long-term contracting model that provides demand assurance. Therefore, Green Trucking will not buy zero-emission trucks or install charging infrastructure. At this point, both Atlas and Green Trucking are stuck in their decarbonization journeys.



GMA Trucking's book and claim system provides a solution via a multiyear offtake agreement for ZETc between Green Trucking and participating corporations, such as Atlas. This enables Green Trucking to offer its zero-emission services at traditional market rates to any local shipper in the Mid-Atlantic, while they recoup the green premium through the sale of ZETc to Atlas and others. The multi-year contract structure provides Green Trucking with the financial security to proceed with buying zero-emission trucks and partnering with charging point operators to ensure available charging capacity. Importantly, the local "physical customers" whose goods are transported by the zero-emission trucks cannot account for or claim the emission reductions associated with the environmental attributes of the zero- emission trucking service.

As the zero-emission trucks are utilized, Green Trucking transfers the ZETc to Atlas, which can then retire and claim them in their emissions reports and public communications. Atlas can now contract with Traditional Truck Express for diesel trucking services to move their physical goods in South Carolina.

What is a demand aggregating buyers alliance for zero-emission road freight?

A buyers alliance is a group of like-minded companies that work together to mobilize collective demand to procure low-emission goods or services in a particular sector. These alliances are typically run by a non-profit that recruits member companies, aggregates their demand for a competitive procurement, and facilitates contracting with procurement winners. Buyers alliances have proven particularly effective in hard-to-abate sectors, such as the aviation industry's Sustainable Aviation Buyers Alliance (SABA) and the maritime industry's Zero Emission Maritime Buyers Alliance (ZEMBA),[16] which have successfully converted collective demand into executed contracts that lead to new investment and deployed technologies.

GMA Trucking follows a similar model as SABA and ZEMBA, with members that span the tech, e-commerce, and consumer packaged goods sectors, among others. Members have substantial road freight emissions in their value chains and a shared commitment to accelerating trucking sector decarbonization.

As a demand aggregating buyers alliance, GMA Trucking delivers four core benefits to its members:

1. **Amplified market signals**. By pooling demand, GMA Trucking sends larger signals to the market than any single member could alone. This demand signal motivates carriers, OEMs, and infrastructure providers to invest in decarbonized solutions to meet the market opportunity.
2. **Cost optimization.** Aggregated demand creates larger project sizes, enabling carriers to achieve economies of scale and optimize asset efficiency. Competitive procurement processes then help find the best deal within this improved context.
3. **Peer-to-peer learning.** As companies enter new markets and work to decarbonize operations in hard-to-abate sectors, they benefit from a collaborative space where they can share effective strategies, evaluate options, and avoid common pitfalls.
4. **Non-profit support and expertise**. Few corporate sustainability teams have the time to evaluate all decarbonization options. GMA's team of experts provides the market research, project due diligence and policy expertise needed, all from the perspective of a trusted environmental non-profit.

[16] GMA serves as the secretariat for SABA, managed in partnership with RMI and EDF and provides technical support to the Aspen Institute, which runs ZEMBA.

GMA Trucking's Pilot Procurement

Taking concept into action, GMA Trucking pooled member demand and launched a competitive procurement process in late 2024. The request for proposals (RFP) targeted carriers seeking to electrify their fleets that needed additional demand or revenue to make the investment possible. It offered carriers a potential pathway to contract directly with GMA Trucking members for offtake of ZETc, enabling the carriers to purchase and deploy zero-emission trucks. Carriers had roughly four months to review their operations and submit their proposal. They had the opportunity to work with truck original equipment manufacturers (OEMs), charging infrastructure providers, and potential physical shipping customers to assemble the needed components for their response.

Because the model leveraged a book and claim system and did not need to tie directly to the routes where GMA Trucking members shipped their goods, the RFP accepted proposals from projects across the continental United States. Additional criteria were included to ensure the project's environmental integrity and impact. Namely, respondents were required to:

- Operate Class 8 battery electric trucks fully backed by renewable electricity[17], or fuel cell electric trucks using hydrogen that meets the strictest requirements of the 45V tax credit.[18]
- Comply with the principle of Regulatory Surplus[19], going beyond any emissions reductions required by law.

Respondents were also required to adhere to the following safeguards to ensure **transparency and environmental integrity:**

- **Service Verification:** carriers committed to working with an ISO-accredited third-party verifier to verify the accuracy of the ZETc and that all ZETc meet GMA Trucking's sustainability requirements.
- **Avoidance of Erroneous Double Counting:** carriers committed to passing along a default/average diesel emissions factor to the physical shipper whose goods move on the zero-emission trucks. Because the EA associated with the trucking service are sold to GMA Trucking members, simultaneously passing along the same lower emissions factor to the physical shipping customer would result in erroneous double counting of the EA.

[17] Either through the use of behind the meter renewables or through the purchase and retirement of Green-e eligible RECs.
[18] The 2022 Inflation Reduction Act (IRA) provides a production credit under section 45V of the Internal Revenue Code for each kilogram of clean hydrogen produced at a qualified clean hydrogen production facility that meets certain requirements.
[19] The principle of Regulatory Surplus states that emission reductions being claimed for use toward voluntary climate targets will need to generate emissions reductions beyond those already incentivized by compliance obligations.

- **Transparent Registry:** carriers committed to using a GMA-approved registry for issuance and transfer of ZETc to buyers in order to ensure full traceability throughout the ZETc lifecycle.

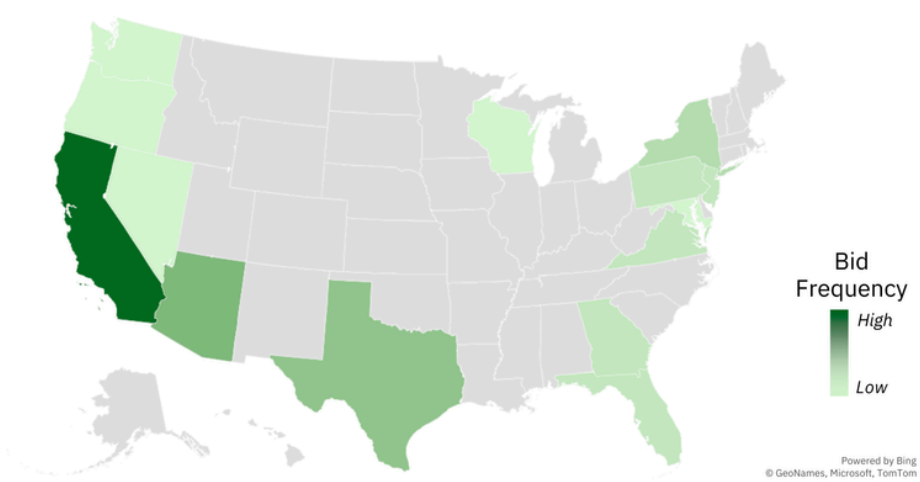
RFP Results

GMA Trucking received 36 proposals from 9 distinct carriers.[20] The proposals covered 14 states and represented over 1,400 million tonne-kilometers of potential zero-emission trucking service. Notably, 95% of proposals were for battery electric rather than fuel cell electric trucks, reflecting broader market shifts towards battery electrification in the US transport sector as battery densities increase, battery prices decrease, and the policy outlook for hydrogen becomes more uncertain.

The submissions also demonstrated strong competitiveness across a wide range of geographies. GMA Trucking received competitive proposals for geographies outside of California, where already-deployed infrastructure and supportive policy have reduced the expected green premiums for zero-emission trucking projects. The geographic diversity of proposals showcased the desire of carriers to decarbonize major freight corridors in regions including the Pacific Northwest, Mid-Atlantic and across the south along Interstate-10 (I-10).

Generally, the quantity of trucks proposed and geographic diversity of deployment locations reflected in the proposals exceeded GMA Trucking's initial expectations, demonstrating that carriers are prepared to invest in and deploy zero-emission trucking services when presented with a clear demand signal.

Exhibit 3: Geographic Distribution of Proposals Received



[20] Carriers could submit multiple proposals. Each proposal represented a unique lane, location, or vehicle drivetrain.

The Evaluation Process

In May 2025, GMA Trucking began an initial assessment of all proposals, reaching out to carriers for additional information as needed to confirm pricing methodologies, project timelines, and compliance with GMA Trucking's Sustainability Criteria. Proposals were then evaluated and scored on criteria including:

- expected start date of operation
- route viability
- carrier financial strength
- comprehensiveness of bid
- price per attribute
- volume of attributes offered (in tonne-kilometers)

By July, GMA Trucking shortlisted six carriers and conducted detailed interviews to assess proposal viability and address questions raised during the initial review process. Questions were tailored to each carrier and covered key operational, commercial, technical, and financial details. Common questions aimed to obtain more detail on the anticipated truck delivery date, the status of proposed charging infrastructure (stage in the permitting process, availability of power, etc), and how the carrier planned to procure renewable electricity.

Following these interviews, GMA Trucking selected three proposals that best aligned with the RFP's goals and contracted with a third-party consultant to conduct an in-depth technical review of the finalists. The consultant analyzed the final three proposals based on parameters including route feasibility for battery electric trucks, truck efficiency, range, state-of-charge, payload, annual usage, and project costs and timelines for truck procurement and infrastructure installation.

While the final three companies each demonstrated distinct strengths and risks, ultimately the winning carrier's combination of price, volume flexibility and project timeline highlighted its proposal as the clear frontrunner.

The Winning Proposal

After completing this review, GMA Trucking announced Nevoya as the winner of its pilot procurement at Green Markets Day during Climate Week NYC on September 23rd, 2025.

RFP WINNER: NEVOYA

Nevoya is a San Francisco-based electric carrier founded in 2023, dedicated to making zero-emission freight transport simple and scalable.

Nevoya will install new charging infrastructure and deploy approximately 40 Class 8 battery-electric trucks on a new all-electric route along Interstate-45 (I-45) between Houston and Dallas. The trucks are expected to travel up to 11.27 million kilometers annually, reducing an estimated 60,000 metric tonnes of CO_2e over the multi-year contracts.

Nevoya identified the I-45 corridor in Texas for its economic and operational advantages. These included:

- Significant freight volumes moving in both directions between Houston and Dallas.
- The total roundtrip distance was within the expected battery range of the Tesla Semi, selected for this project because of its high range and low cost compared to other comparable Class 8 battery electric trucks, and its megawatt charging capabilities.
- The low cost of renewable electricity in Texas.
- The ease of permitting and accessing power at the charging locations.

Once selected, the GMA Trucking team quickly moved into the contracting phase of the project. This entailed creating a template offtake agreement that was developed by GMA and Nevoya, then iterated on with the GMA Trucking buyers. Final templates were provided to each buyer to negotiate any further components, then signed bilaterally between the buyer and Nevoya.

From left to right: Andre de Fontaine (GMA), Sami Khan (Nevoya), Melissa Bauer (eBay), and Christoph Wolff (Smart Freight Centre) speak as part of a decarbonized trucking panel at Green Markets Day in September 2025, following the announcement of Nevoya as the winner of GMA Trucking's pilot procurement.

Lessons Learned on the Benefits of Book and Claim and Demand Aggregation

GMA Trucking's pilot procurement was an invaluable opportunity to explore the real-world dynamics of the zero-emission trucking market. It provided a test case to identify friction points, gather actionable data, and understand the values, priorities, and constraints of different stakeholders. The pilot highlighted how demand aggregation and book and claim can overcome market barriers, unlock operational flexibility, and strengthen project economics:

1. **Book and Claim's Impact on Truck Utilization:** Book and claim incentivizes and enables increased truck utilization above typical, current BEV usage, significantly reducing costs per mile.
2. **Demand Aggregation + Book and Claim Impact on Charger Utilization:** Increased demand, aided by the flexibility of book and claim, can enable charger maximization and optimization, spreading CAPEX across more trucks and decreasing service costs.
3. **Book and Claim Impact on Contract Length:** Book and claim allows longer contract terms and the ability to spread costs over a longer time horizon with increased assurance of charger and truck utilization, leading to a reduction in overall project costs and increased bankability.
4. **Demand Aggregation Impact on Contract Risk Mitigation and Incentives:** GMA worked with all parties to develop a contract with a tiered pricing of attributes that reduced risk exposure, ensured high-integrity outcomes, and aligned incentives across parties.
5. **Demand Aggregation Impact on Contracting Efficiency:** Having a single entity facilitate alignment on key terms, such as the criteria for high-integrity ZETc, minimizes administrative burden when multiple parties are signing contracts.

Book and Claim Impact on Truck Utilization

The green premium between zero-emission trucks and incumbent diesel trucks exists almost entirely in the upfront capital costs of purchasing trucks and charging infrastructure. Carriers and their customers, therefore, benefit from spreading these high fixed costs over more revenue-generating activity. Because operational costs of zero-emission trucks are frequently lower than incumbent diesel trucks,[21] due in large part to the increased energy efficiency of electric drivetrain technology,[22] higher truck utilization drives greater operational savings. Put another way, when trucks are used inefficiently, the green premium is higher.

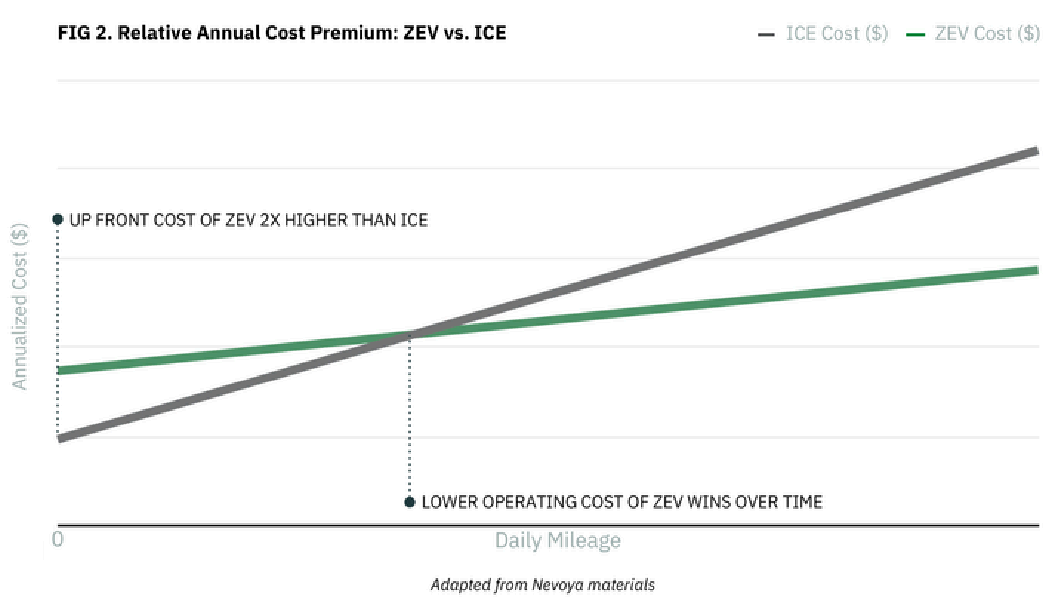
[21] If electricity prices increase above a certain point compared to diesel, this can no longer be the case.
[22] https://afdc.energy.gov/fuels/electricity-benefits

Pilot Procurement Insights:
Book and claim allows carriers to maximize truck utilization, thereby reducing the green premium. Carriers have flexibility to source routes where most operationally feasible, increasing the number of routes driven and minimizing deadhead trips. This results in reduced costs and improves the competitiveness of zero-emission trucks.

In the pilot procurement, the most competitively priced proposals were predominantly those with more annual distance travelled. Conversely, carriers that planned to use battery electric trucks on less frequent, short-haul routes typically had a higher price per ZETc, as the increased capital expenses were spread over a smaller volume of tonne-kilometers. Several proposals, for example, assumed annual distances less than 50% of the winning proposal, resulting in a price per ZETc more than 50% higher. Nevoya's bid is a clear example of book and claim's impact on truck utilization. With book and claim, Nevoya can source movements from any number of shippers or LSPs between the Dallas and Houston corridor, leveraging their proprietary software to reduce inefficiencies and increase revenue-generating loads to their full capacity. Nevoya is not limited by any particular shipper's operations, enabling them to run zero-emission trucks nearly 24/7. By running their trucks at or near their maximum capacity, Nevoya realizes operational savings faster and can offer a lower green premium per shipping activity.

While a 24/7 utilization model won't always be feasible, it makes strategic sense at this early market stage. Given that the premium for zero-emission trucking services remains high, deploying these trucks where they're most economical and efficient first accelerates both cost reduction and market development.

Exhibit 4: Illustrative Cost Diagram of ZEV vs ICE Over Time



Demand Aggregation and Book and Claim Impact on Charger Utilization

Along with increasing truck utilization, maximizing charger utilization is another form of operational efficiency that carriers can employ to mitigate the high upfront cost of zero-emission trucking projects. Before charging point operators (CPOs) can reach final investment decision (FID), they need assurance that the chargers they build will be used. Without long-term assurance of high utilization, CPOs will charge higher costs per kWh at their stations to recoup the investment costs. When CPOs have greater assurance that site capacity will be maximized and optimized, they can offer a lower charging cost to carriers.

Pilot procurement insights:
Demand aggregation combined with book and claim is a potent combination to maximize charger utilization. Demand aggregation gives carriers higher volumes with more secure contracts, and the flexibility of book and claim allows carriers to move loads from any shipper. Together, higher volumes and load flexibility allow carriers to optimize charging schedules and usage. This includes both running more trucks per charger because the carrier can plan charging times from a higher number of routes, and also optimizing charging to avoid high peak electricity load costs.

The pilot procurement clearly demonstrated the relationship between charging more trucks on a given charger, and a lower green premium per ZETc. Carriers that were able to make operational adjustments to spread fixed infrastructure costs across more trucks had more competitive bids. For example, one carrier noted they could increase their fleet size by one third with the same number of chargers, which would reduce the green premium per ZETc by 8%.

Book and Claim Impact on Contract Length

Shipper logistics teams tend to favor short-term contracts (ranging from on-demand to one-year) due to seasonal factors and changes in business conditions and priorities. Since there is a limited number of shippers willing to pay the premium for a battery-electric service, these short-term contracts create substantial risk for carriers. If they have a short-term contract for battery electric services from a shipper, and that shipper does not renew the contract, the carrier may be unable to find another shipper who is willing to sign a contract and pay the premium. For carriers, this means they have less assurance and confidence in future income. As a result, carriers are less willing to make purchases with high upfront costs, such as zero-emission trucks, and when they do, the associated costs are spread across a shorter time period.

Long-term contracts, by contrast, de-risk projects by demonstrating secured future revenue streams, lowering the cost of capital on any required financing. Further, the length of the contract impacts the timeline over which carriers will amortize their project costs, allowing carriers to spread those costs over longer durations.

Pilot Procurement Insights:
GMA Trucking's Pilot Procurement highlighted the importance of long-term contracts to reduce costs and overcome barriers to zero-emission truck deployment. The flexibility provided by a book and claim system to utilize trucks to move any shippers goods alleviates the pressures that make shippers wary to engage in long term logistics contracts. Shippers are more willing to commit to multi-year offtake agreements for ZETc, which, in turn, allows Nevoya to lower its green premium per tonne-kilometer of service provided to the shipper.

GMA Trucking indicated a preference for four-year contracts in its RFP, and contract length emerged as a critical factor in proposal pricing for ZETc. According to one carrier, reducing the expected contract length from four years to three would have increased the green premium by more than 45%. This reflects the combined impact of losing a year of guaranteed revenue and the need to amortize upfront costs over a shorter period.

EXAMPLE OF CONTRACT LENGTH IMPACTING PRICE

Green Trucking, Inc. faces $200,000 in upfront cost premium above those for a diesel truck, financed at 5% interest. Amortizing that amount over three years results in an annual payment of approximately $73,000. However, extending the amortization period to six years would reduce that annual payment to about $39,000. With a longer repayment schedule, Green Trucking, Inc. needs significantly less annual revenue to meet its financing obligations. Assuming the same annual activity, the volume of ZETc doubles between a 3- and 6-year contract, resulting in approximately a 43% reduction in financing costs per ZETc.

Although contract terms of five years or longer would further reduce the green premium, GMA Trucking had to balance maximizing cost reductions while delivering acceptable contract terms to participating members. When seeking internal approval to purchase ZETc, members typically weighed the priorities of both their logistics teams and their sustainability teams. Logistics teams generally favor short-term contracts that range from 6-months to one year to provide flexibility and account for seasonality, while sustainability teams are more comfortable with longer-term offtake agreements (such as in the form of power purchase agreements). The four-year term of this pilot project represented a compromise that reduced costs while remaining acceptable to members.

Looking ahead, GMA Trucking expects carriers to gradually begin amortizing assets over a multi-year period, regardless of contract length, given increased assurance of market demand for ZETc and technology maturity. But this will take some time. In the meantime, book and claim can be a useful mechanism to help shippers get comfortable with multi-year contracts for low carbon trucking services.

Demand Aggregation Impact on Contract Risk Mitigation and Incentives

In any logistics contract, there is a fundamental balance to strike between the interests of the carrier and the shipper. Reaching consensus on a commercial structure that benefits both parties equally is essential for the long-term success of any partnership. The novelty and dynamic nature of this aggregated book and claim deal presented a special set of challenges and opportunities that were addressed through the contracting process.

In the big picture, Nevoya needed assurances that if its services performed as expected it would receive a minimum level of payment from shippers to recoup its investment in the trucks and charging equipment; meanwhile, shippers needed protection in case the ZETc failed to materialize at the anticipated rate, an acute consideration in light of the first-of-its-kind nature of this project. The carrier and shippers also wanted to share in any upside benefits if the trucks performed better or longer than expected.

Pilot Procurement Insights:
GMA played a critical role in defining the ZETc product in such a way that aligned carrier and shipper incentives while minimizing risks. This balance was created through three key components of the contract:

1. **Payment upon ZETc delivery.** Due to the nature of the project, members were eager to insulate themselves from the risk of carrier underperformance. At the same time, emissions benefits to buyers are only realized when the trucks are utilized. As such, the contract was structured so that members did not make any upfront payments and only paid for ZETc after they had been generated.
2. **Tiered pricing of ZETc.** Final truck utilization rates cannot be predicted ahead of time with full accuracy. This introduces some uncertainty in pricing because if the trucks overperform and travel more tonne-kilometers than expected, the price per ZETc will drop. The reverse is true in cases of underperformance. To address this dynamic in the Nevoya-shipper contracts, ZETc start at a higher price up to a minimum quantity per year; any ZETc delivered in excess of that minimum quantity in a given year are sold at a lower price, because a larger portion of the premium is already covered. Because payment for ZETc is on delivery, Nevoya wanted a high level of confidence through the ZETc pricing structure that it would be able to recoup the majority of the costs associated with its investment. A tiered pricing system reduces the carrier's exposure, while still incentivizing Nevoya to maximize utilization and run the trucks beyond that minimum. Importantly, it also allows the shippers to benefit from any overperformance in the form of lower priced ZETc.

3. **Contract extension option.** Members have the right of first refusal to extend their contracts and purchase the ZETc generated by the trucks after the conclusion of the four-year deal. These ZETc are priced at a discount to reflect that most of the CAPEX for the trucks and charging infrastructure would be recouped during the initial contract term. This option incentivizes Nevoya to continue running the trucks beyond four years so they may continue selling ZETc, and encourages members to extend their contracts to access lower priced ZETc.

Demand Aggregation Impact on Contracting Efficiency

Negotiating key commercial terms, obtaining legal review, and securing internal approval adds significant administrative burdens for shippers and carriers alike. In complex transactions involving emerging technologies, such as zero-emission trucks, these burdens are magnified. GMA's role was to clearly define the product being bought and sold in this transaction to align incentives and preferences across the shippers and carrier. Standardization and clarity on product definition, including appropriate guardrails to ensure high-integrity outcomes, accelerated time-to-signature, and helped get contracts signed before priorities shift.

Pilot Procurement Insights:

GMA Trucking played a central role in gathering member preferences and ensuring those preferences were reflected in how the product was defined in the draft contract. This centralized approach significantly reduced the time needed to get contracts executed, transforming what could have been months of bilateral negotiations into a streamlined, coordinated process.

The stakes of coordination in this pilot were particularly high. This pilot procurement was a first-of-its-kind transaction for the trucking sector. It is the only known instance where multiple buyers aggregated their demand together to purchase environmental attributes from a single carrier. Given the aforementioned impact of charger utilization, the interdependencies between participants were significant. If any member substantially changed the contract terms late in the process, or dropped out of the project during contracting, it could have necessitated reconfiguring all contracts to reflect a new price. This increased the need for effective coordination and a streamlined contracting process to avoid excess administrative burden.

The contracting process demonstrated the impact of a central entity that can define the product in way that meets buyer preferences and shipper needs, while also guiding the process to completion in an efficient manner.

Looking Ahead to Procurement II

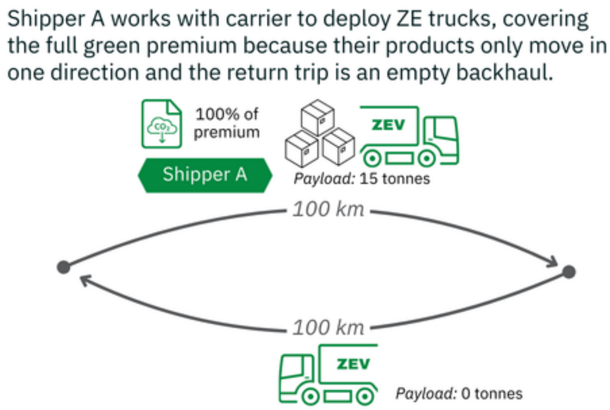
Nevoya's purchase of forty Class 8 battery-electric trucks is the largest known deployment of these vehicles in Texas. Beyond the estimated emissions reduction of 60,000+ metric tonnes of CO_2 compared to traditional activities, the project will catalyze the deployment of charging infrastructure along I-45 that can be used for many years. With this procurement, GMA Trucking members and Nevoya have demonstrated how demand aggregation and the use of a book and claim system can overcome market barriers, align corporate climate goals with carrier operations, and drive tangible change in one of the hardest-to-abate sectors. Over time, by driving increased deployment, procurements like this will help reduce the green premium for zero-emission trucks, making them more accessible to both carriers and shippers.

GMA Trucking is already at work on its next procurement and is actively working with SFC and others to determine how demand for environmental attributes could be paired with physical shipping demand[23] to generate greater system-level impacts. There are already projects underway across various geographies to aggregate demand from multiple physical shipping customers to create decarbonized shipping corridors, however these projects are facing challenges to turn demand into signed contracts and deployed trucks. Adding book and claim revenue and flexibility to these projects would complement existing efforts and overcome potential barriers, including through increasing truck utilization, charger optimization, and long-term contracting.

Book and claim can serve as a critical system unlock for these corridor projects and accelerate deployment in the coming years. For example, one typical challenge in these physical demand projects is the high proportion of deadhead moves. To illustrate this, consider an example: "Shipper A" moves goods over Leg 1 of a route. If the carrier cannot fill the return leg with a participating "Shipper B", then "Shipper A" must absorb a larger share of the green premium than would be attributed to Leg 1 alone. This concentrates costs over a lower volume of zero-emission tonne-kilometers, resulting in a higher marginal abatement cost that will often dissuade "Shipper A" from moving forward with the logistics contract.

[23] Physical demand in this context refers to the movement of a corporation's actual goods on zero-emission vehicles. With physical demand, corporates directly receive the low-emission factor from the carrier, and therefore do not need to purchase book and claim certificates to make a claim that they have reduced their road freight footprint.

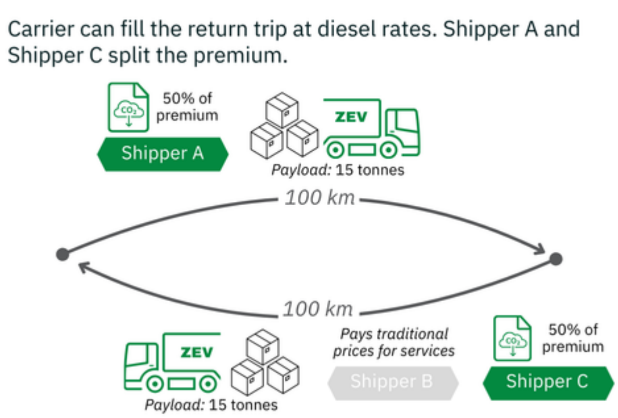
Exhibit 5: Decarbonized Lane with Significant Empty Backhauls



For this illustrative example above, assume a green premium of $0.20 / kilometer. Since the carrier was unable to secure a shipper for the return leg that is willing to also pay the green premium, "Shipper A" would have to absorb the full green premium for the 200-km round trip, equating to $40, which they are unlikely to do.

However, with book and claim, carriers could work with LSPs and Freight Forwarders to find demand to fill otherwise empty backhauls by offering moves at diesel prices and recouping the green premium through the separate sale of ZETc. This would significantly lessen the premium burden on the physical shipping customer. Now, "Shipper A" only bears the green premium for Leg 1, since the carrier can sell ZETc to "Shipper C" to cover the return leg. Assuming the same $0.20 / kilometer, the cost to "Shipper A" declines to $20.

Exhibit 6: Decarbonized Lane with Book and Claim



GMA Trucking supports and encourages direct procurement of decarbonized road freight services where feasible. However, recognizing market realities, layering book and claim demand on top of physical demand could provide a near-term solution that helps move physical zero-emission corridor projects from proposals to contract execution.

How to Get Involved

GMA Trucking needs engagement from all stakeholders across the zero-emission road freight value chain to succeed. Additional details on how demand aggregation and book and claim can benefit various players in the zero-emission trucking ecosystem are provided below. To explore opportunities to get involved, please contact trucking@gmacenter.org.

If you are a company interested in purchasing ZETc to meet your climate goals:
GMA Trucking provides a high-integrity opportunity for companies to address their road freight emissions by purchasing ZETc that directly fund the deployment of zero-emission trucks. These purchases send a strong demand signal that accelerates scale and drives the technology toward cost parity. GMA Trucking is currently recruiting new members to join the buyers' alliance and participate in our second collective procurement.

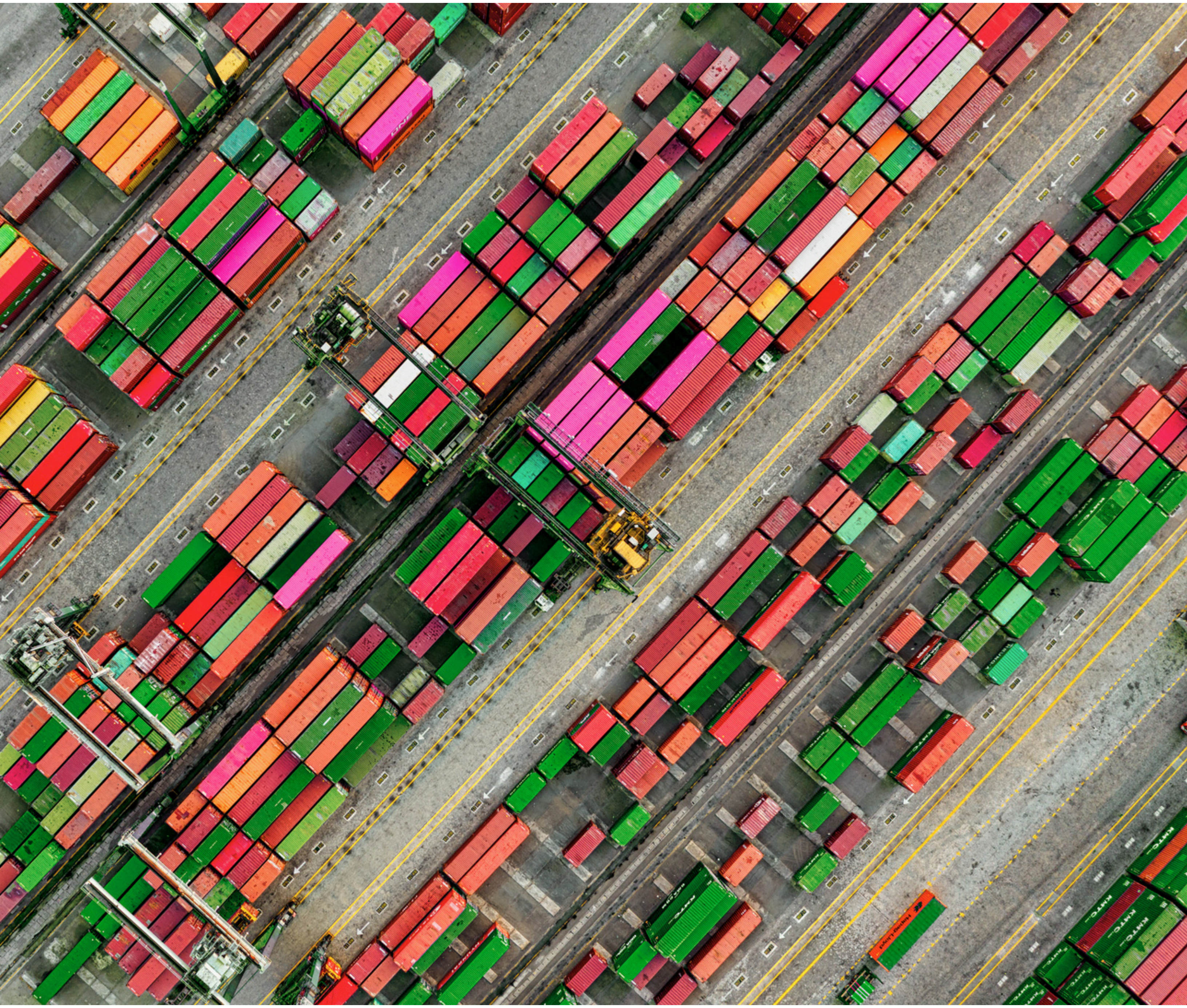
If you are a trucking carrier:
Use of GMA Trucking's book and claim system offers a new revenue stream for carriers investing in zero-emission trucking, capitalizing on aggregated, multi-year offtake agreements to cover the green premium and providing the confidence to make long-term investments. Carriers will be the primary target and respondents for GMA Trucking's second collective procurement. Carriers are encouraged to respond to that RFP and bid towards the opportunity to contract with participating GMA Trucking members.

If you are an infrastructure provider:
Use of GMA Trucking's demand aggregation and book and claim system can help distribute upfront fixed costs across a larger customer base and over longer time horizons, strengthening the investment case for zero-emission charging and fueling infrastructure. GMA Trucking encourages infrastructure providers to engage with carriers to make them aware of the opportunity GMA Trucking provides to fund the deployment of zero-emission trucks.

If you are an LSP or freight forwarder:
Use of GMA Trucking's book and claim system can be a significant value add to customers seeking zero-emission trucking services. GMA Trucking is prepared to help LSPs or freight forwarders procure ZETc through a collective procurement to resell to their customers. LSPs or freight forwarders who sell ZETc to their customers may also co-claim the environmental benefit attributed to their role in enabling zero-emission transport. LSPs can also get involved on the carrier side, forwarding moves to those issuing certificates and supporting the overall adoption of ZEVs participating in this model.

If you are an OEM:

The GMA Trucking procurement model, as well as book and claim more broadly, can be a significant business development tool to help enable customers to reach FID where they otherwise may not. OEMs can help educate their potential customers on this mechanism by connecting them with GMA Trucking or helping them prepare a response to the forthcoming procurement process.



Learn more at:
www.gmacenter.org

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