

Transitional Period - Additional Weights Needed on Zero Emission Vehicles		Prepared by:	Approved Manger:
		Andrew Barnes	18/11/2024
Document Number AMTA-CRA-PP-10-2024	Document Classification: Controlled	Document Level: Policy Position	Approved President: 21/11/2024

1. PURPOSE

The Alberta Motor Transport Association (AMTA) has been actively engaged in the field of Zero Emission Vehicles (ZEVs), promoting industry trials and experimentation with alternative fuel types. ZEV models, such as those powered by hydrogen and battery electric technology, possess increased TARE weights that reduce available payload. It is critical to allow for a temporary increase in the allowable gross vehicle weight by 3,500 kilograms for new ZEV heavy-duty vehicles sold in Alberta (and Federal, effective through 2040). This adjustment is intended to help these vehicles maintain payload capacities close to their diesel counterparts, facilitating accelerated industry adoption of ZEVs in supporting emissions reduction targets.

2. SUBJECT MATTER

Additional gross vehicle weight allowances for ZEVs to support industry transition to ZEVs technology and align with provincial and federal emissions targets.

3. WHO IS BEING LOBBIED

Ministries:

- Alberta Transportation and Economic Corridors (TEC)

4. BACKGROUND

The AMTA has been a leading partner in multiple zero-emission vehicle projects, including the delivery of Canada’s first heavy duty hydrogen, and a low emission vehicle such as diesel hydrogen vehicle demonstrations. Educational tools and materials will be developed to aid in the introduction of hydrogen as a safe and clean energy alternative. The latter parts of the trial will highlight the benefits associated with heavy duty hydrogen fuel cell electric vehicle.

In starting to work with the Original Equipment Manufacturers (OEMs) and manufacturers of ZEVs , it became clear that a temporary increase of a vehicle’s maximum allowable gross vehicle weight up to 3500 kg would be required, this does not include exceeding any gross vehicle or axle rating from the manufacturer. The current technology involves multiple hydrogen fuel tanks and fuel cells which add considerably more weight than what is expected in the future. Currently the developmental research and development evolved around liquid hydrogen which is expected to be very close to legal current weights of diesel truck tare weights by 2040.

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5. ANALYSIS

Overview

The transportation sector is a significant contributor to greenhouse gas (GHG) emissions, accounting for 25% of Canada’s GHG emissions as of 2019. In 2019, Alberta Heavy-Duty Diesel Vehicles produced 8,740 kt CO₂ eq, 20.7% of the 42,300 kt CO₂ eq released by transportation in Alberta and 39.6% of Alberta on-road transportation GHGs, with the newest, heavier, and longer-haul trucks contributing largely to this. The heavy-duty transportation industry is under pressure to meet the target of achieving near zero emissions by 2040. Current federal goals for medium- and heavy-duty vehicles (MHDVs) require 35% of total MHDV sales to be zero-emission by 2030, with a near full transition targeted by 2040

With the newest and longest haul vehicles contributing largely to emissions, this will allow the carriers to the maximum weight allowed in Alberta of 63,500kgs, as per the report completed by Zachary Redick, MSc, University of Calgary, under the supervision of Dr. David B. Layzell, FRSC, The Transition Accelerator, CESAR, University of Calgary.

AMTA Work in Zero Emission Vehicles

AMTA’s hydrogen fuel cell electric vehicle (FCEV) demonstration project aligns with Natural Resources Canada’s Zero Emission Vehicle (ZEV) Awareness Initiatives (ZEVAI). The project introduces hydrogen as a clean alternative fuel for long-range heavy-duty vehicles, suited to the high-demand commercial trucking sector due to the similar refueling speed, vehicle range, and torque. However, barriers remain including capital costs, increased TARE weights, limited fueling infrastructure, and market acceptance.

Challenges with Additional Weights

The increased TARE weight of ZEVs reduces payload capacity under current gross vehicle weight (GVW) limits. Without regulatory adjustments, industry adoption is hindered, as payload reductions impact operational efficiency and emission reduction targets.

Real-World Case Study

A member carrier with a fleet of 600 concrete trucks faces operational challenges in meeting its internal mandate of 30% ZEV adoption by 2030 and near 100% by 2040. The added weight of ZEVs would require an increase in fleet size by 78 trucks to maintain current load capacity, incurring substantial CO₂ emissions from additional truck manufacturing and significant capital costs. In addition, we will see further strain on driver shortage estimated at 40,400 by 2030 according to Trucking HR Canada.

Comparative Weight Analysis

Battery electric vehicles add an average of 3,375 kilograms over diesel counterparts, while hydrogen fuel cell vehicles add between 1,200 and 3,500 kilograms. Some Canadian provinces, such as British Columbia and Alberta, have begun to accommodate this with increased axle weight allowance in Alberta and a GVW weight increase of 1500kgs in BC for alternative fuel vehicles.

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Manufacturer	Model	Tare	Freightliner Daycab	Additional Weight
Battery Electric				
Lion	Straight Truck	9,997	8,675	1,322
Lion	EV 5 Battery	10,727	8,700	2,027
Lion	EV 6 Battery	11,339	8,700	2,639
Lion	EV 7 Battery	11,952	8,700	3,252
Lion	EV 8 Battery	12,564	8,700	3,864
Lion	EV 9 Battery	13,179	8,700	4,479
Volvo	EV VNR	11,113	8,700	2,413
Peterbilt	579 BEV Day Cab	11,375	8,700	2,675
Navistar	BEV (eMV607)	14,682	8,700	5,982
Nikola	EV	13,800	8,700	5,100
	Average			3,375
Hydrogen Fuel Cell				
Hyzon	Fcell	9,933	8,700	1,233
Nikola	Fcell	12,200	8,700	3,500
	Future Fcell development Esimate			3,000
	Average			3,500
Hydrogen Fuel Injection				
			Weight of system only	
Hydra	H2/Hydrogen		8,700	680
DTI	Hydrogen Fuel Injection		8,700	680
	Average			680

Required FCEV and BEV Totals to Meet Emission Targets

Considering the growing adoption of zero-emission vehicles (ZEVs) and their integration into Alberta's and Canada's transportation networks, we must carefully evaluate their potential impacts on road infrastructure. The following analysis highlights key considerations and balances these with the benefits of ZEV adoption.

1. Minimal Fleet-Wide Impact on Road Infrastructure

- By 2040, projections indicate only 9,952 vehicles will operate at full load weights within Alberta's expanded ZEV fleet. This constitutes a small percentage of the total fleet, suggesting that the majority of vehicles will not exert maximum stress on road infrastructure.
- Note: While this small proportion reduces fleet-wide concerns, the minority of fully loaded vehicles exert disproportionate stress, and their cumulative effect on infrastructure must be carefully addressed. These vehicles, often long-haul heavy-duty vehicles (HDVs), cover more miles than their underloaded counterparts, amplifying their impact on wear and tear.

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2. Current Truck Load Statistics and Implications

- Historically, 84.3% of drive axles and 88.3% of trailer axles weigh less than 7,700 kg, as indicated by a 2014 Michelin study (Attached 1 & 2). This leaves 13.7% of trucks operating at full capacity, with most trucks reducing their per-axle loads by approximately 1,600 kg.

3. Addressing Infrastructure Wear Concerns

- Fully loaded HDVs travel significantly more kilometers than underloaded vehicles, disproportionately contributing to road wear.
- While the proposed GVW increase of 5.5% (from 63.5 tonnes to 67 tonnes) seems modest, infrastructure not designed for these higher weights could experience disproportionate wear. Quantifying this effect requires further analysis, but general research suggests:
 - Pavement damage escalates non-linearly with weight increases, potentially exceeding the proportional 5.5% rise.
 - However, fewer trips due to increased payload capacity can offset this wear, as the alternative—purchasing and deploying more vehicles—would result in greater cumulative road wear and emissions.

4. Environmental and Operational Benefits

- Emission Reductions: A heavier payload capacity for ZEVs, such as battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs), supports Alberta's and Canada's GHG reduction targets.
- Competitiveness of ZEVs: Increasing allowable weights ensures ZEVs can match the operational efficiency of diesel counterparts, promoting industry-wide adoption while avoiding the need for additional vehicles.
 - Each additional truck in the fleet increases road wear and operational costs, further stressing infrastructure and supply chains.

6. Balancing Industry Needs and Infrastructure Integrity

- The proposed GVW increase is critical to the competitiveness and practicality of long-haul ZEVs. However, the potential for increased road wear must be acknowledged and mitigated through:
 - Strategic reinvestment in road maintenance to account for heavier vehicles.
 - Collaboration with industry and municipalities to ensure road design aligns with future needs, including accommodating higher GVWs.

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Conclusion

The adoption of ZEVs, supported by a modest GVW increase, is crucial for achieving emission reduction targets and supporting a sustainable transportation sector in Alberta and Canada. While the impact on infrastructure must not be overlooked, careful analysis suggests the proposed weight allowance is manageable and less impactful than deploying additional vehicles to compensate for current payload limitations.

Further research and collaboration with industry stakeholders will ensure a balanced approach that protects infrastructure while fostering environmental and economic progress.

MANDATE LETTERS REFERENCES (ALBERTA / FEDERAL GOVERNMENT)

The AMTA’s recommendation aligns with federal and provincial mandates to support ZEV adoption and the development of alternative fuel infrastructure:

1. **Canada Ministry of Transport:** Accelerate ZEV adoption and decarbonize on-road freight.
2. **Canada Minister of Environment and Climate Change:** Develop ZEV sales mandates for MHDVs, aiming for 100% by 2040.
3. **Alberta Minister of Transportation and Economic Corridors:** Advance technology in transportation and reduce regulatory barriers for carriers.
4. **Alberta Minister of Energy:** Improve regulatory regimes to incentivize investments in hydrogen and other alternative fuels.
5. **Alberta Service Alberta and Red Tape Reduction:** Partner with private sector to develop a network of hydrogen and EV recharge stations.

6. RECOMMENDATIONS

1. **Recommendation for a Transitional Weight Allowance (Proposed as “Exemption Period”):**
The Alberta Motor Transport Association (AMTA) suggests that the Canadian Weights and Dimensions Task Force collaborate with Alberta Transportation and Economic Corridors to implement a temporary weight allowance for zero-emission vehicles (ZEVs). This allowance would permit an increase of up to 3,500 kilograms above the standard diesel TARE weight. The additional weight allowance, capped at 3,500 kilograms, would help ZEVs achieve payload capacities comparable to diesel trucks. This measure will support industry adoption and provide time for advancements in vehicle technology, particularly the shift towards liquid hydrogen, which will reduce vehicle weight.

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2. **Implementation of a Defined Exemption Period for additional ZEV Weights (Suggested Through 2040):** AMTA suggests the introduction of a transitional exemption period for additional ZEV weights valid through 2040. During this period, ZEVs would be allowed an additional weight allowance of up to 3,500 kilograms, as needed, to maintain an equivalent payload capacity to that of a diesel truck. This exemption will aid industry in adopting ZEV technology, foster the development of liquid hydrogen fueling infrastructure, and incentivize a shift towards lighter liquid hydrogen technology. This may require approved routes for this transitions period.

3. **Lifetime Weight Allowance for ZEVs Purchased During Exemption Period:** The AMTA further recommends that ZEVs acquired within the exemption period retain their additional weight allowance for their operational lifetime. This ensures consistency in regulatory support for early adopters and helps optimize the return on investment for ZEV purchases.

REFERENCES

- 1 - Government of Canada. (2023). “Greenhouse gas emissions projections.” Accessed February 2nd, 2023, from <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/projections.html>

- 2 - Council of Deputy Ministers Responsible for Transportation and Highway Safety. (2022). “Minutes: Task Force on Vehicle Weights and Dimensions Policy.” Accessed February 2nd, 2023, from <https://comt.ca/english/programs/trucking/2022/VWD%20Minutes%20Dec%207%202022.pdf>

- 3 - Province of British Columbia. (2023). “Weight allowance greenlit for low-carbon commercial vehicles.” Accessed February 2nd, 2023, from <https://news.gov.bc.ca/releases/2021TRAN0035-000920>

- 4 - Government of Alberta. (2022). “New Weight Allowances for Commercial Vehicles with Alternative Fuel Sources.” Accessed February 2nd, 2023, from <https://open.alberta.ca/dataset/3104590e-89cd-46a6-8878-54ff3a75f095/resource/e08b8eb4-500b-48c7-9977-75ae40121666/download/trans-new-weight-allowances-for-commercial-vehicles-with-alternative-fuel-sources.pdf>

- 5 - McKinsey & Company. (2022). “Preparing the world for low-emission trucks.” Accessed February 2nd, 2023, from <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/preparing-the-world-for-low-emission-trucks>

- 6 - GreenBiz. (2022). “Trucking needs to U-turn on its carbon emissions — here’s how.” Accessed February 2nd, 2023, from <https://www.greenbiz.com/article/trucking-needs-u-turn-its-carbon-emissions-heres-how>

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7 - Liquid Hydrogen Technologies Workshop (Virtual) Feb 22 – 23 2022 On-board Liquid Hydrogen Storage for Long Haul Trucks - Liquid H2 Workshop PDF
<https://www.energy.gov/sites/default/files/2022-03/Liquid%20H2%20Workshop-ANL2.pdf>

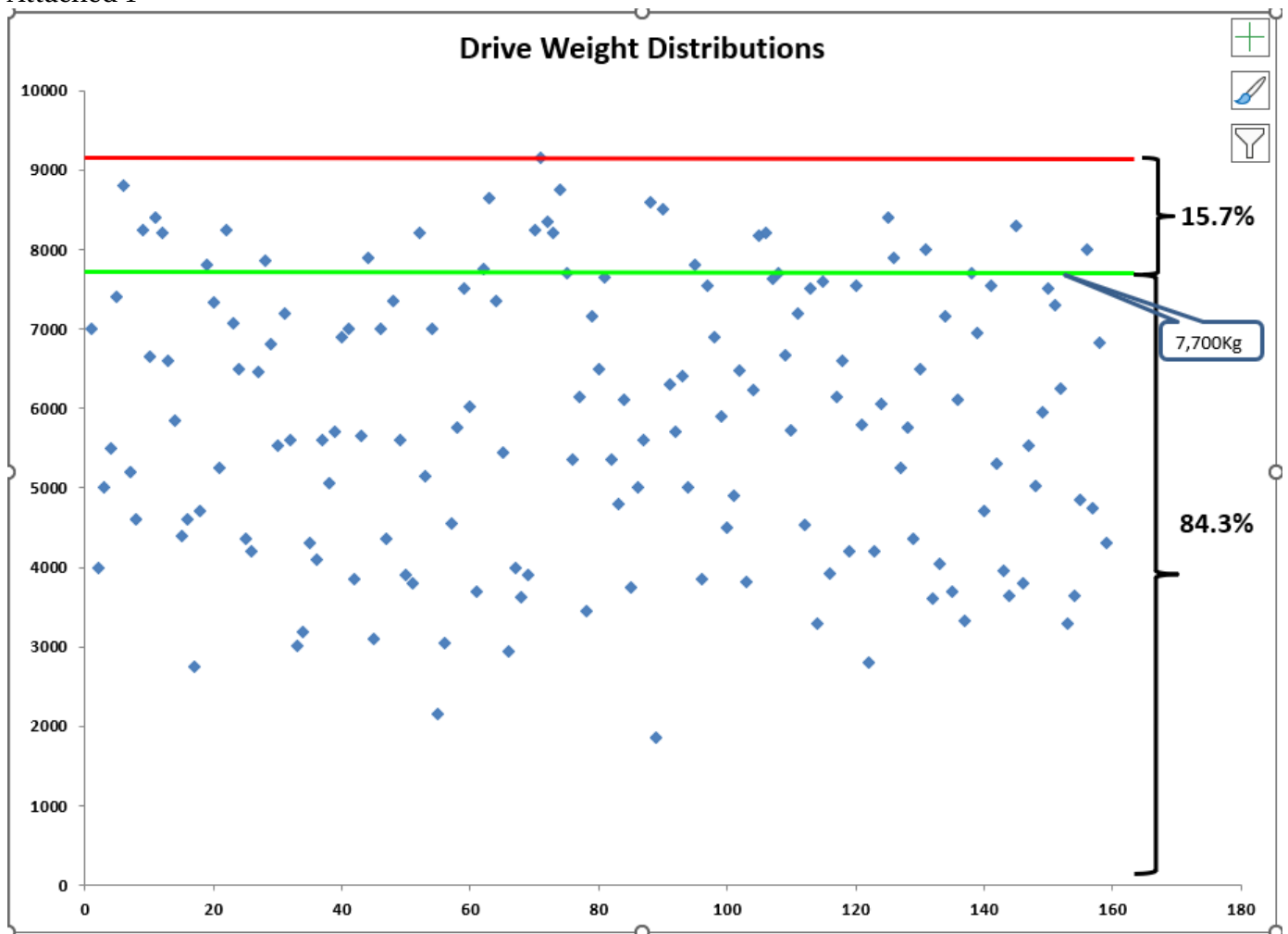
8 - Transitioning Heavy Duty Trucking in Alberta: A. Magnitude of the Challenge - Zachary Redick, BSc Graduate Student, Dept. Civil Engineering, University of Calgary

ATTACHMENTS



Axles Weight Study
- Alberta Summary.xl

Attached 1



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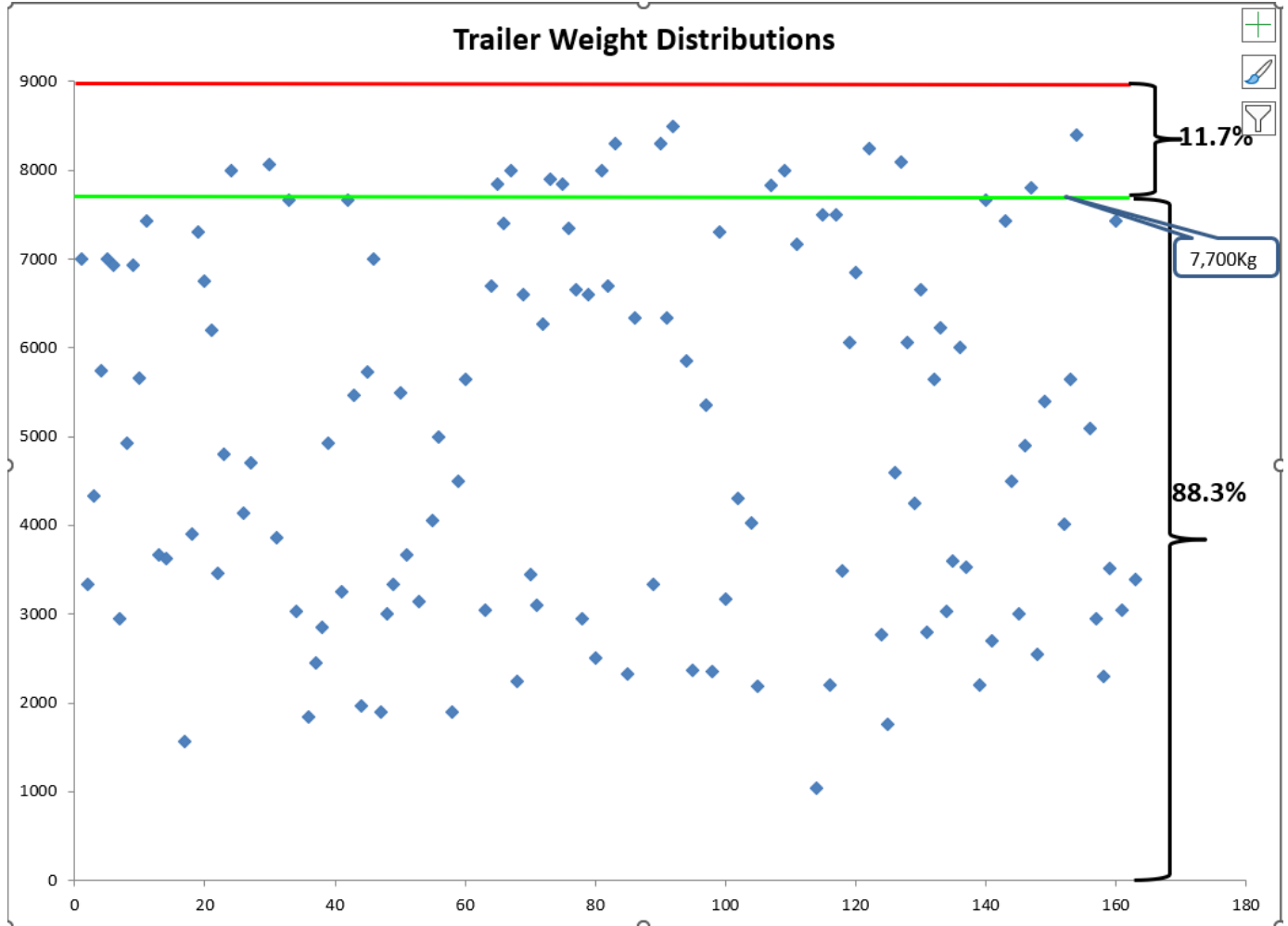
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Attached 2



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Attached 3

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November 16, 2024

Andrew Barnes
Senior Advisor, Compliance & Regulatory Affairs
Alberta Motor Transport Association (AMTA)

Re: Letter of Endorsement in Support of AMTA's Policy Proposal on Transitional ZEV Weight Allowances

Dear Mr. Barnes,

I am writing to express my support for the Alberta Motor Transport Association's (AMTA) policy proposal advocating for a transitional period permitting additional weight allowances for zero-emission vehicles (ZEVs), which you are presenting to Alberta Transportation and Economic Corridors (TEC) and the Council of Ministers Responsible for Transportation and Highway Safety. As a recent graduate of the University of Calgary with a Master of Science in Civil Engineering, specialising in transportation engineering, I am well aware of the importance of policies that enable sustainable transitions in the heavy-duty vehicle (HDV) sector.

My thesis, titled "*The Transition to Net-Zero of Heavy-Duty Road Freight in Alberta: A Scenario Model*", examined Alberta's ability to meet the Canadian government's stringent targets for ZEV adoption in heavy-duty freight. A critical issue highlighted in my research is the limited development and manufacturing capacity for 63.5-tonne vehicles, which presents a significant barrier to the industry's transition to net zero and achieving government targets. The AZETEC Project, officially launched in September, represents Alberta's first on-road testing of 63.5-tonne ZEV trucks. These trucks are in their infancy and face numerous challenges in competing with diesel vehicles. Not only do they fall short in range, achieving only 700 kilometres compared to the 1,500+ kilometres typical of long-haul diesel trucks, but their increased tare weights further hinder payload capacity, adding yet another barrier to their competitiveness. Without regulatory flexibility, these factors will continue to impede the adoption of battery electric and hydrogen fuel cell vehicles, ultimately hindering progress toward net-zero goals.

AMTA's policy proposal aligns closely with my findings and addresses a critical barrier to ZEV adoption. Providing a weight allowance of up to 3,500 kilograms during a defined exemption period would enable carriers to maintain operational efficiency while facilitating the transition to cleaner


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technologies. This policy is important for ensuring that new ZEVs can compete effectively with diesel counterparts, thereby supporting Canada's federal targets and maximising the effectiveness of associated grants and subsidies.

Given the pivotal role of HDVs in Alberta's freight transportation sector and their disproportionate contribution to greenhouse gas emissions, measures like the proposed weight exemption are fundamental. As my research indicates, Alberta's HDV sector accounts for significant kilometres travelled and emissions, making it a key area for impactful policy interventions. Provided that road wear impacts are managed, this initiative represents a practical step to encourage the adoption of ZEVs and support Alberta's leadership in sustainable transportation.

I commend AMTA's efforts to drive this important transition and would be happy to provide additional insights or data from my research if required.

Sincerely,

X 
 Zachary Redick
 MSc in Civil Engineering (Transportation)