Justin Barnhart

Washington State Department of Ecology
Clean Fuels Program Rulemaking

Thank you for the opportunity to provide informal comments regarding the proposed amendments to Chapter 173-424 WAC and WAC 173-455-150 implementing SSHB 1409.

I submit these comments as an executive in the heavy-duty truck and transportation sector. My opposition is not rooted in a rejection of decarbonization goals. Rather, it is grounded in concerns about scientific rigor, physical feasibility, economic distortion, and unintended environmental and social consequences that are likely to arise from accelerating the Clean Fuel Standard to a 45 percent carbon intensity reduction by 2038, with the possibility of 55 percent.

Transportation is indeed Washington's largest source of greenhouse gas emissions. However, policy effectiveness depends on physical realities, supply constraints, and second-order effects. The proposed expansion of the Clean Fuel Standard does not adequately account for these constraints.

1. Physical and Thermodynamic Constraints in Heavy-Duty Transportation

From a physics standpoint, heavy-duty trucking is fundamentally constrained by energy density. Diesel fuel contains approximately 35 to 38 MJ per liter. Battery electric systems currently store energy at roughly 1 to 2 MJ per liter when accounting for full system packaging. This is not a minor efficiency gap. It is an order-of-magnitude difference rooted in chemistry and materials science.

For Class 8 vocational and long-haul applications, high gravimetric and volumetric energy density is essential. Mandating rapid reductions in fuel carbon intensity without commercially scalable, energy-dense alternatives risks:

- Reduced payload capacity due to heavier powertrains
- Increased total vehicle miles traveled due to lower range and charging downtime
- Higher infrastructure costs passed through to shippers and ultimately consumers

These are not speculative concerns. They arise directly from conservation of energy principles and battery chemistry limits.

A policy target does not override thermodynamics.

2. Life Cycle Assessment Uncertainty and WA-GREET 4.0

The proposal to update the carbon intensity model to WA-GREET 4.0 is presented as a scientific improvement. However, life cycle assessment models are highly assumption-dependent and sensitive to boundary conditions.

Key concerns include:

- Indirect land use change assumptions for biofuels

• Grid decarbonization forecasts embedded in electric vehicle carbon intensity
• Regional feedstock availability constraints
• Treatment of renewable diesel feedstock competition

Small changes in modeling inputs can materially alter carbon intensity scores. When policy compliance is tied to modeled values rather than directly measurable atmospheric outcomes, the system becomes vulnerable to credit distortions and unintended arbitrage.

From a scientific perspective, models are approximations, not ground truth. When regulatory burdens are attached to modeled outputs, uncertainty must be transparently quantified and conservatively treated. It is unclear that the current proposal incorporates sufficient sensitivity analysis or uncertainty bounds.

3. Supply Constraints and Market Distortion

Renewable diesel and sustainable aviation fuel rely heavily on limited feedstocks such as used cooking oil, animal fats, and certain crop oils. These feedstocks are finite and globally competed for.

Accelerating demand via regulatory mandate risks:

• Diverting feedstocks from other industrial uses
• Driving indirect land use change through expanded oilseed cultivation
• Increasing food commodity prices
• Encouraging imports from jurisdictions with weaker environmental safeguards

From a systems biology perspective, large scale interventions in complex global supply chains often produce compensatory effects. Increasing demand in one region does not eliminate emissions. It often displaces them.

If Washington tightens standards more aggressively than neighboring states, fuel supply will not necessarily decarbonize. Instead, carbon-intensive fuels may flow to Washington at higher prices while lower-carbon fuels are drawn from other regions, creating economic leakage rather than net atmospheric benefit.

4. Disproportionate Impact on Working Class and Small Businesses

Heavy-duty trucking underpins:

• Agriculture
• Construction
• Food distribution
• Municipal services
• Small fleet operators

Fuel costs are one of the largest operating expenses in these sectors. Increasing compliance costs through aggressive carbon intensity reductions will disproportionately impact:

• Independent owner operators
• Rural carriers
• Small contractors
• Municipal budgets

In biological systems, stress applied to foundational infrastructure cascades upward. In economic systems, cost increases in freight propagate through every consumer good.

Environmental justice requires not only emission reductions but also protection against regressive cost impacts.

5. Reliability and Infrastructure Risk

The proposal implicitly assumes that:

• Grid capacity will scale sufficiently
• Charging infrastructure will expand in parallel with vehicle turnover
• Renewable fuel supply chains will remain stable

However, Washington's grid is already under seasonal strain during peak demand. Electrification of heavy-duty fleets requires massive upgrades in transmission, substations, and local distribution capacity. These upgrades require time, capital, and permitting coordination that far exceed typical vehicle replacement cycles.

Mandating fuel carbon intensity reductions without synchronized infrastructure buildout creates operational risk for essential services.

6. Question of Marginal Benefit Versus Marginal Cost

The difference between a 20 percent reduction target and a 45 to 55 percent reduction target by 2038 is not incremental. It is exponential in difficulty and cost.

As carbon intensity approaches lower thresholds, each additional unit of reduction requires disproportionately higher economic input. This is analogous to diminishing returns in biological adaptation or asymptotic approaches in physics.

The critical question is not whether reduction is good. The question is whether the marginal cost of accelerated reduction meaningfully alters global atmospheric concentration trajectories.

Washington represents a small fraction of global emissions. A policy that materially disrupts regional freight economics while producing marginal global atmospheric impact must be carefully scrutinized.

7. Recommended Alternative Approach

Rather than accelerating mandated reductions to 45 or 55 percent by 2038, I recommend:

• Maintaining the original 20 percent trajectory while rigorously evaluating real world atmospheric

outcomes
• Incorporating explicit uncertainty ranges in WA-GREET modeling
• Prioritizing technological neutrality rather than pathway favoritism
• Conducting full supply chain impact assessments for renewable fuel feedstocks
• Implementing staged infrastructure readiness benchmarks before increasing reduction mandates
• Publishing transparent cost impact modeling on freight and consumer pricing

Decarbonization is a complex engineering and economic challenge. Durable solutions arise from innovation and infrastructure readiness, not from aggressive statutory multipliers.

Conclusion

The goal of reducing transportation emissions is understandable. However, accelerating the Clean Fuel Standard to a 45 to 55 percent reduction by 2038 imposes scientific, economic, and infrastructural risks that are not adequately resolved in the current proposal.

Public policy must respect physical constraints, supply chain realities, and the foundational role of heavy-duty trucking in Washington's economy. A disciplined, data-driven, and infrastructure-aligned approach will produce more durable and equitable results than an aggressive expansion driven primarily by statutory targets.

Thank you for considering these comments.

Respectfully submitted,

Justin Barnhart