**Haul Truck Intelligence System for Effective Decarbonisation**

P McBride

1. Australian Director, Cascadia Scientific, Sydney NSW 2000. pmcbride@cascadiascientific.com:

Keywords: Haul Truck Intelligence System, Decarbonisation, Greenhouse Gas (GHG) Emissions, Machine Learning (ML) Optimization, SmartRView System, Diesel Fuel Efficiency, Carbon Emissions Reduction, Short Interval Control (SIC), Sustainability

# ABSTRACT

Mining haul trucks are a significant source of greenhouse gas emissions, contributing up to 80% of total emissions in open pit mines. As the mining industry faces increasing pressure to reduce its carbon footprint while meeting growing global mineral demand, there is an urgent need for immediate, cost-effective decarbonization solutions. This white paper presents Cascadia Scientific's innovative approach to reducing emissions from mining truck fleets through advanced machine learning optimization and high-precision fuel monitoring.

The SmartRView system, Cascadia's flagship solution, combines proprietary hardware and software to measure fuel consumption with 99% accuracy, significantly exceeding traditional Engine Control Module estimates. By integrating real-time fuel measurement with comprehensive mining metrics, the system provides actionable insights for improving operational efficiency, maintenance practices, and reducing emissions. The solution requires no major infrastructure changes and can be implemented immediately, offering fuel savings and carbon emission reductions of 2-15%.

Case studies from global mining operations demonstrate the system's effectiveness. In 2023, implementations across various sites showed average savings of $42,000 (USD) in diesel fuel costs and 163 tonnes of CO2 emissions per truck annually. The solution provides multiple pathways for emission reduction through operator performance optimization, HME maintenance efficiency improvements, and haul road management.

Beyond immediate benefits, the system generates valuable data to inform future investments in low-carbon technologies such as battery electric or hydrogen-powered trucks. This approach allows mining companies to roadmap progress with precision toward their decarbonization goals while maintaining operational efficiency and preparing for future technological transitions. The solution addresses the industry's critical challenge of increasing production while reducing environmental impact, providing a pragmatic pathway to achieve ambitious 2030 emission reduction targets.