Decarbonising Forestry

Log haulage in Ireland

FTA Ireland

Analytiqa

COILLTE

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Contents

Foreword

The purpose of this report is simple, turn good intent into organised action for Ireland's log haulage industry. Rather than revisiting the case for decarbonisation already addressed in the *Decarbonising the Road Freight Sector* report, published by FTA Ireland in 2024, this document focuses on what to do to address the needs of forestry as a specific sector, who needs to be involved, and how we will measure progress.

Log haulage is the core part of Ireland's forestry logistics. When trucks move efficiently and cleanly, mills run on time, roadside stacks clear faster, and communities experience fewer heavy-vehicle miles and emissions. Getting this right creates confidence for hauliers to invest, for energy providers to build infrastructure, and for policymakers to back solutions that work on Irish roads and in Irish forests.

This report delivers a clear baseline for today's operations and costs, one version of the truth to underpin decisions and a pilot pipeline that prioritises real routes, real fleets and real constraints, so lessons transfer quickly from trial to daily practice. It recognises the forest industries specific challenges such as collecting product at maximum GVW from remote and often mountainous locations on unbound gravel roads.

However, it also plays to the forest industries strengths and opportunities such as developing a shared data backbone via a standard system of telematics delivered via Coillte's Haulage Logistics and Telematics (HLT) platform, enabling standard metrics and standard reporting, so results are credible and comparable across fleets and time. Therefore, the industry can have a practical finance conversation, led by Total Cost of Ownership, that helps micro-SMEs plan upgrades and access support.

What do we ask our industry stakeholders to consider?

Hauliers: participate in pilots, share operational data in a secure, standard format, and help stress-test training and vehicle specs in real duty cycles.

Mills and forest managers: coordinate yards, dwell times and turn-arounds to unlock charging/refuelling opportunities and reduce empty running.

Energy and infrastructure providers: use the proposed Forestry Logistics Heatmap to target investments where demand is proven and clustered.

Vehicle and trailer manufacturers: co-design Irish-fit solutions, payload-aware, crane-ready, forest-road capable and support uptime with local service.

Policy and finance: align supports with verified outcomes, fund what reduces tCO_2e/tonne-km, what improves safety, and what scales without subsidy drift.

What is within the reach of the forest industry in the short term?

Success should be tracked with a concise set of KPIs: tCO_2e/tonne-km by lane, energy use per duty cycle, idling, empty miles, safety and uptime, and verified cost per delivered tonne.

Results can be reported periodically, using common definitions, so every stakeholder can see where progress is real and where we need to adjust.

Consider the following as areas for immediate focus:

- Conduct an academic study to deliver a functioning Forestry Logistics Heatmap that guides connection requests and hub locations.
- Develop a scaled eco-driving programme embedded across participating fleets.
- Produce a replicable playbook that other forestry nodes, nurseries, engineering, establishment, milling can adopt with minimal re-work.

This is a living document for a heavy-duty industry that is ambitious about delivering a sustainable future. Let's move quickly, learn openly, and scale what works, so Ireland's forestry supply chain stays productive, competitive and sustainable.

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FTA Ireland

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Introduction

Addressing the challenge of decarbonising forestry transport is not a matter of simply switching fuels or updating a single segment of the fleet. Instead, it represents a fundamental system wide change that affects every component of the forestry value chain. Understanding the scale and interdependence of the challenge is critical as we set out to transform our industry. We prioritise log haulage in this report, which stands out as the most visible and impactful lever for progressing the decarbonisation of Ireland's forestry logistics.

By starting here, we aim to generate the essential data, build effective partnerships, and develop the confidence needed to progress decarbonisation of this supply chain node, then apply lessons learnt to the remaining segments of the forestry supply chain. Our objective is both practical and immediate. Decarbonising Forestry Log Haulage aims to establish a transparent baseline, uncover the real operational constraints specific to the Irish industry, and outline a credible pathway for hauliers, mills, original equipment manufacturers (OEMs), alternative energy providers, and policymakers to work together in delivering solutions.

A current constraint we are experiencing is Storm Éowyn which has reshaped the context for decarbonising log haulage. The storm caused unprecedented windblow, damaging 26,000 ha of forests, with Coillte estimating 50 million trees affected and the clean up now expected to continue into mid-2027. In response, the sector has redirected capacity at pace, dozens of additional harvesters have been mobilised and over 80.0% of national harvesting effort is now focused on windblow sites driving a surge in short notice, high intensity haulage from dispersed locations to mills and ports.

This report highlights the benefits of a strategy that is grounded in data and driven by practical pilots. By leveraging telematics, advanced analytics, and standardised reporting, we will quantify key metrics such as energy use, idling times, duty cycles, and route profiles. Targeted "Pilot–Learn–Deliver" projects will be used to test and refine solutions, ensuring that scaling of solutions occurs only after results have been proven effective. Concurrently, we aim to explore the development of an industry wide Forestry Logistics Heatmap to guide us and industry partners in alternative fuels and infrastructure and the priority of targeted investments in charging infrastructure, biomethane, and hydrogen where they will have the greatest impact. Recognising the importance of cost, we will prioritise the establishment of Total Cost of Ownership considerations, making it easier for micro-SMEs that are the life blood of our industry to clearly understand the financial implications and transition to new practices with confidence.

We outline the initial actions we are taking, including the need to develop an electric vehicle (EV) concept for log haulage in Ireland, a biomethane pilot project, the large-scale implementation of accredited eco-driving, and academic partnerships focused on optimising network and infrastructure placement. A sustainable fuels scheme that progresses emissions reduction, value for money and fuel availability will also be evaluated. HVO will be the first alternative fuel to be evaluated under this scheme. Importantly, the report also incorporates feedback from our haulier representatives and suppliers of log haulage trucks and trailers, underscoring that success depends on collaborative co design rather than top-down directives.

Our industry is committed to turning ambition into action, evidence into investment, and pilot projects into lasting practices through engagement on results and iterating rapidly. Whether you operate a truck, manage a mill, finance equipment, approve planning, supply energy, or shape policy, you have a role to play in this transformation.

Let us begin with log haulage, demonstrate what works and then apply those lessons across the entire supply chain, ensuring Irish forestry remains competitive, safe, sustainable and aligned with 2030 targets and beyond.

Des Phelan
Sustainable Transport Manager
Coillte

Chairman
Forest Industry Transport Group

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Key takeaways

There is a lot of work to be done to achieve decarbonisation in the heavy-duty vehicle sector and especially for log haulage in Ireland's forestry sector. This document is designed to help 'progress the conversation'.

Operationally and financially, the transition to decarbonised heavy-duty transport faces several barriers:

- **Long-haul requirements and payload demand present sector specific challenges**
- **Ireland's infrastructure for charging and refuelling remains underdeveloped, particularly in rural areas**
- **Alternative fuel vehicles come with high upfront costs**

Despite these challenges, promising solutions are emerging.

Hydrotreated Vegetable Oil (HVO), supplied by Inver, offers a drop-in replacement for diesel, enabling immediate emissions reductions without major vehicle modifications.

Biomethane, supported by Gas Networks Ireland, presents a regional opportunity for decarbonisation, particularly where supply chains can integrate renewable gas production.

Electrification, promoted by Source EV, is gaining traction internationally, with log haulage pilots progressing in Scotland and Sweden.

Hydrogen, advocated by Hydrogen Mobility Ireland, is emerging as a future proof energy solution for long distance heavy duty fleets.

Solutions beyond alternative fuels and drive-trains are also needed. FTA Ireland are the first service provider to be granted approval from Ireland's Department of Transport as an Eco-Driving service provider. Their case study demonstrates measurable fuel savings, improved safety and emissions reductions through driver training.

This document promotes three key learnings...

1

Pan industry collaboration and engagement with policymakers is essential

There is no single solution that will solve all the challenges. Whilst it is correct to acknowledge the size of the challenge and the complexity of the forestry industry, Ireland's timber sector does not stand alone. Significant learnings can be gained from looking beyond our shores.

Encouraged by the ongoing success of projects in Sweden and Scotland, this document, and the collaborations fostered during its publication process, must act as a trigger for progress in Ireland. Our learnings to date tell us:

- It is vital to involve all key stakeholders from the start
- Design pilot schemes to generate practical insights
- Maintain a flexible approach, with a consensus to share both what works and what doesn't
- Focus on collective progress for the benefit of all

Decarbonising heavy-duty log haulage is not just a technical challenge, it is a strategic imperative. By fostering collaboration across industry partners and with continued support from policymakers, Ireland can take decisive steps toward a resilient, low-carbon forestry supply chain.

2

The transition to decarbonisation must be financially feasible

Fleet operators in Ireland's log haulage do not draw upon the resources of multinational logistics groups. Typically, they are micro-SMEs, requiring guidance and innovative financial models that will support their transition to a decarbonised fleet.

- The sector is highly dependent on small fleets. 82.0% of hauliers have, at most, five HGVs
- Significant 'unknowns' remain regarding the financial cost of transitioning to alternative fuels. Grant funding must be provided that services the particular challenges of hard to abate sectors such as forestry
- The financing of pilot projects must be given immediate consideration in order to de-risk individuals that will be the innovators

Alongside this, stakeholders must collaborate to innovate. Coillte's proposed HVO – Sustainable Fuels Scheme evaluation, to identify the potential for a scheme that achieves a 'Win – Win' for fuel suppliers and haulage contractors, leads the way.

3

The transition must be data-led

Ireland's timber industry has an incredibly rich data set that is a huge asset on the pathway to decarbonisation. It can support business cases for vehicle specifications and infrastructure investment, highlighting opportunities that might not otherwise be considered.

- The development of a Forestry Logistics Heatmap, in partnership with TU Dublin, will guide optimal placement of refuelling/charging sites, forecast energy needs and align with the industry's decarbonisation goals.
- TU Dublin also proposes an academic study on the optimisation of forestry logistics, integrating digital data streams with mathematical optimisation for more intelligent deployment of haulage assets and measurable reductions in emissions per tonne delivered.
- FTA Ireland is supporting the transition to sustainability with a Government approved Eco Driving training programme supported by industry telematics data. Alongside this, together with strategic partners, it is assisting fleet operators to de-risk financial strategies with the development of a bespoke TCO Calculator.

Decarbonisation comes at a cost, but the cost of doing nothing, resulting in delayed climate action and loss of the log haulage industry's competitiveness, is far higher.

Decarbonising forestry log haulage

Targeted, short-term actions can accelerate emissions reduction while preparing the sector for longer term transition. These steps, outlined on the following page, prioritise practical pilots, improved data, and collaboration across the supply chain to support effective decarbonisation of forestry logistics.

Short-term next steps

Sustainable fuels scheme – HVO

Evaluate the feasibility of a scheme enabling fuel suppliers to provide a reliable, best-in-class supply of HVO for forestry contractors, with aims to:

- **Reduce emissions in hard-to-abate forestry vehicles in the short to medium term while alternative fuels evolve**
- **Deliver competitive pricing as partner suppliers scale market share**
- **Improve access to HVO through fuel cards and bulk delivery as supply infrastructure grows to meet established demand**

Forestry logistics heatmap – Academic Study

Commission an academic study to build the business case for a web-based forestry logistics heatmap using telematics data to:

- **Identify fuel consumption hotspots and support alternative fuel suppliers in assessing demand**

Ireland's first log haulage EV Truck

Co-ordinate supply chain partners to design, cost and develop a business case for Ireland's first EV log haulage truck and trailer pilot, building on learnings from Sweden and Scotland to:

- **Define the requirements and timeline for scaling electrified log-haulage logistics**

Ireland's first log haulage Biomethane Truck

Work with Gas Networks Ireland and industry partners to pilot a biomethane-fueled truck and trailer combination to:

- **Assess the short-to-medium-term role biomethane could play in decarbonising log-haulage operations as other alternatives mature**

Eco-driving programme

Establish a business case that supports the delivery of a feasible, effective, efficient and cost-efficient eco-driving programme to:

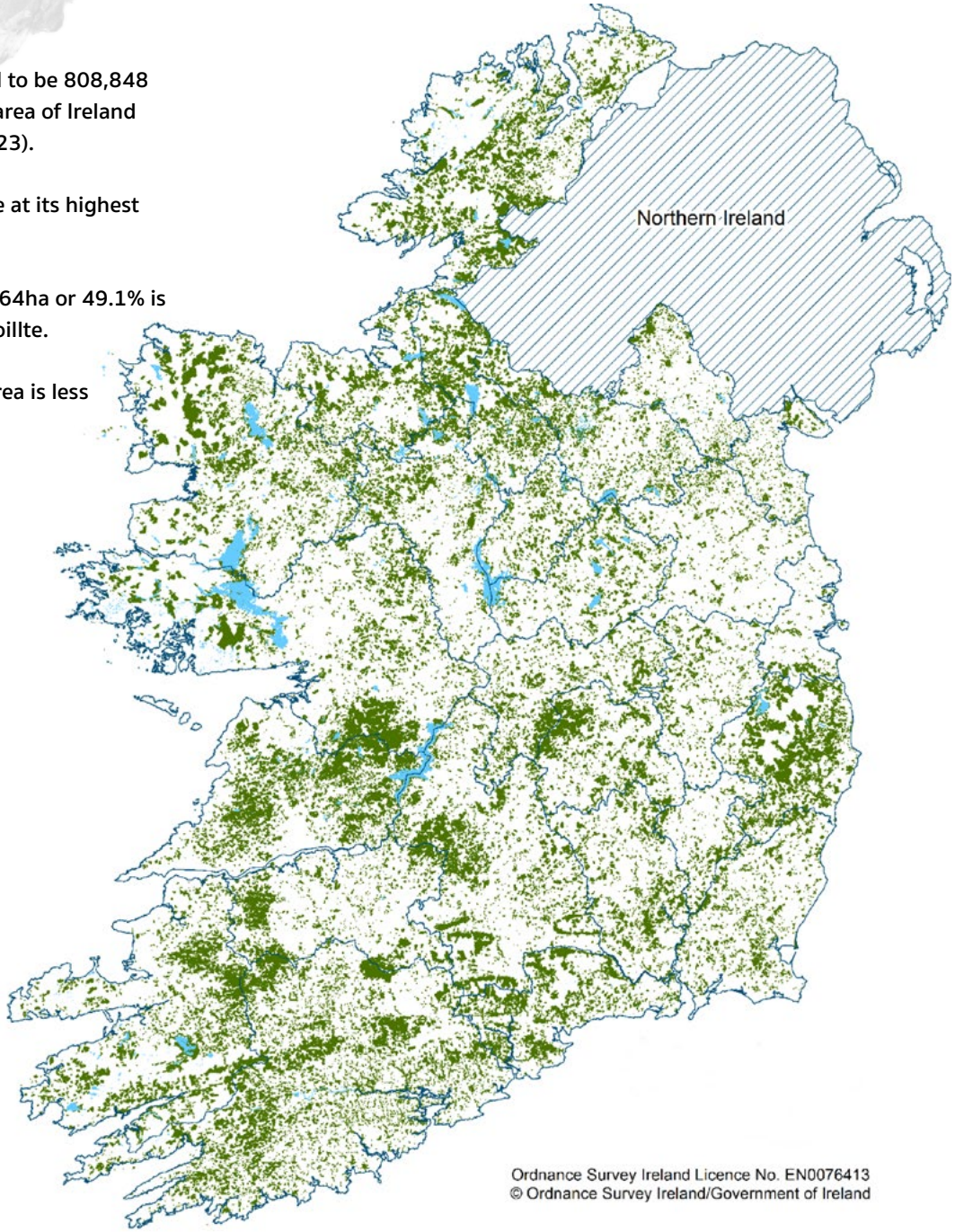
- **Upskill drivers with approved eco-driving best practice in safe and fuel-efficient driving**
- **Adopt the EcoFleet sustainability initiative administrated through Enprova**

Ecofleet is a system whereby a company who can demonstrate fuel savings can receive a financial support to contribute to those savings. Typically for every 10,000 litres a company saves on fuel usage they receive a payment of up to €2,000 per Litre equivalent. In addition, Operators can save up to €4,000 per Litre equivalent for all savings made on the gas vehicles and if operators report in Tonne kilometres, they could increase payout potential to €6,000 per Litre equivalent based on kWh/Tonne.Km.

Understanding the forestry supply chain

This section educates and informs stakeholders to the contribution made by Ireland's forestry sector to the nation.

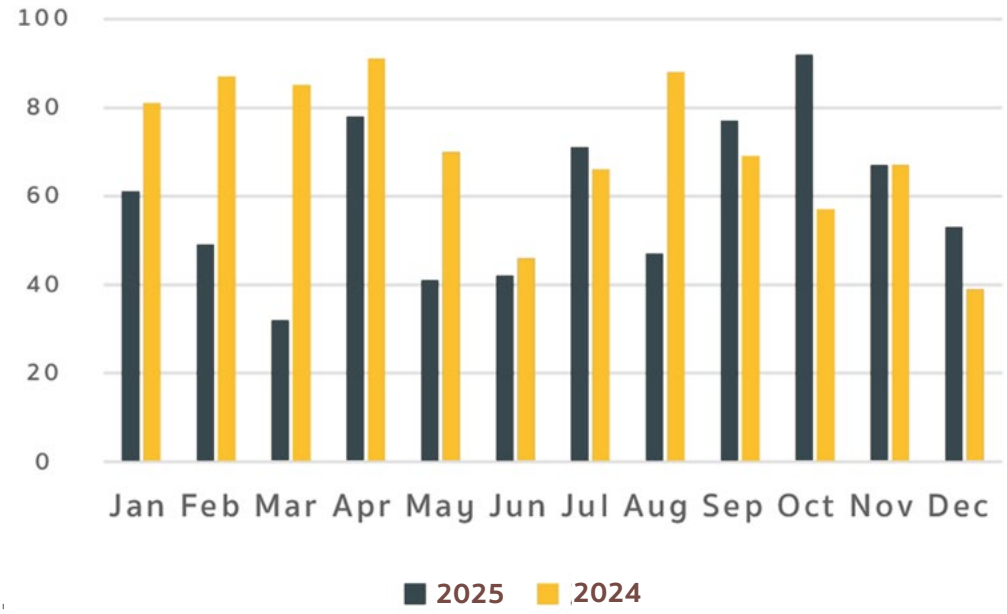
- **This map shows the current level of forest cover in Ireland** (1)
- **The area of forest is estimated to be 808,848 ha or 11.6% of the total land area of Ireland (National Forest Inventory 2023).**
- **Forest cover is estimated to be at its highest level in over 350 years**
- **Of the total forest area, 397,364ha or 49.1% is in public ownership, mainly Coillte.**
- **70.0% of the stocked forest area is less than 30 years of age.** (2)



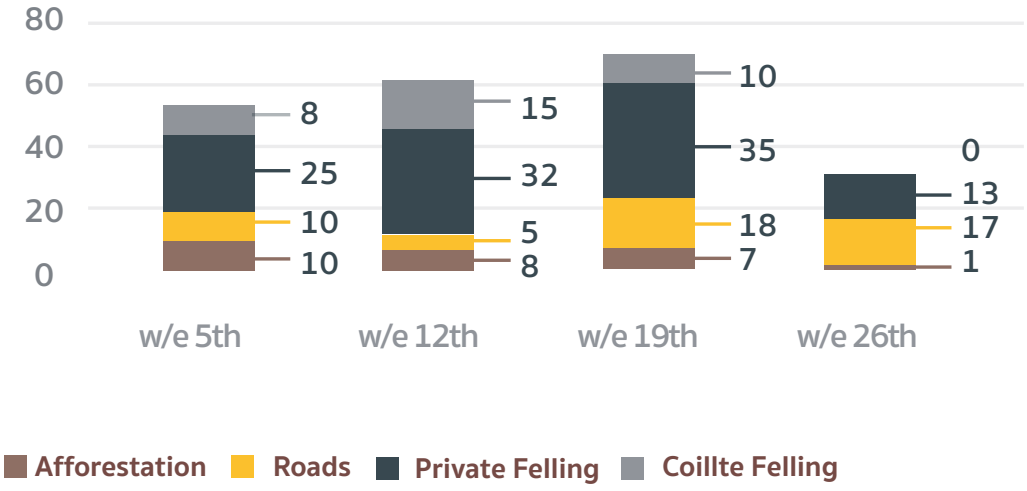
1 https://assets.gov.ie/static/documents/Forest_Statistics_Ireland_2025_260525.pdf
2 https://www.gov.ie/en/department-of-agriculture-food-and-the-marine/campaigns/forestry-in-ireland/

Forestry licensing dashboard (1)

Number Road Licences issued



Number of licences issued - Example month: December 2025



A 2022 report suggested that the Irish forestry sector's economic contribution to the country is estimated at over €2.0 billion per annum. (2)

1 https://assets.gov.ie/static/documents/ccf4c7cb/Forestry_Dashboard_-_Week_Ending_2nd_January_2026.pdf

2 https://www.gov.ie/en/department-of-agriculture-food-and-the-marine/press-releases

Heavy duty transport and mobility in the forestry supply chain

The Forestry Transport & Mobility Supply Chain Map highlights that decarbonising the forestry sector involves more than just addressing emissions from log haulage trucks. Heavy-duty transport and mobility are integral to every stage of forestry operations. Each node within the supply chain possesses unique assets, fuelling requirements, and operational duty cycles.

- *Nurseries* – Agri tractors, telehandlers and forklifts to prepare seedbeds and handle plants, rigid trucks distribute seedlings to forests.
- *Engineering* – Excavators, bulldozers, graders, compactors and quarry trucks build/maintain forest roads. Rigids move aggregates.
- *Establishment* – Mounders, excavators, mechanical planters and ATVs prepare and plant new forests. These are dispersed, low-speed NRMM (non-road mobile machinery) profiles with frequent redeployments.
- *Harvesting* – Harvesters and forwarders, plus cable logging systems where terrain demands, extract and stack timber at roadside. Low-loaders reposition machines between harvest units.
- *Log Haulage (multi-modal)* – Articulated tractor and trailers (typically 46 t GVW), self loaders with cranes, rigids with drawbar trailers manage first/last mile on forest roads. Rail wagons and coastal vessels move large volumes where feasible.
- *Milling & Distribution* – Log-feeders, loading shovels, yard cranes and chippers feed mills. Outbound movements use curtain sider artics, flats and containers to distribute finished goods.
- *Support fleets* – 4×4s, vans and cars (white/grey fleet) underpin supervision, inspections and site support across the chain.

Despite these differences, all nodes are closely interdependent. As a practical starting point, this report centres on the decarbonisation of log haulage, which represents the most significant and visible challenge within the sector. By concentrating efforts on this area, valuable insights can be gained informing the analysis of other nodes in future work. Ultimately, this approach aims to transform isolated advancements into comprehensive, system wide reductions in carbon emissions throughout the forestry supply chain.

Why log haulage utilisation is hard to optimise

Vehicle specialisation limits what you can legally and practically carry on the backhaul.

- Log bunks and high stakes are perfect for irregular, round loads, but incompatible with pallets/IBC/cages without refitting superstructures and alternative load-restraint.
- Even “convertible” flatbeds need time to remove bunks and add different securing hardware, so planners often can’t rely on mixed-freight backhauls day-to-day.
- Imbalance in origin/destination flows and the forest road network.
- Timber flows originate on tertiary roads and end at mills clustered in specific regions; the reverse direction seldom presents suitable, legal loads (height/width, cleanliness, contamination).

Regulatory heterogeneity

- Where Nordic high-capacity transports (HCTs) (up to 34.5 m and 74 t+) deliver cost and emission benefits on approved roads, those configurations aren’t generalised across Europe/Ireland, which constrains vehicle pooling and cross-border fleet interoperability.
- Weight variability (moisture content) and legal GVW caps.
- The same stacked volume can be under or overweight depending on species, bark, and moisture content (seasonality).

Terrain and fuel/CO2 penalties on hills

- Energy use rises sharply with gradient.
- Loaded timber trucks on 8% slopes can consume ~3 L/km vs ~1.2 L/km on flat [1], increasing cost exposure for non-revenue movements.
- Operational autonomy demands cranes.
- Self-loading cranes (very common in Ireland/Nordics) add tare mass and reduce payload but are essential for roadside collection.
- Again, narrowing the economic case for general backhauls.

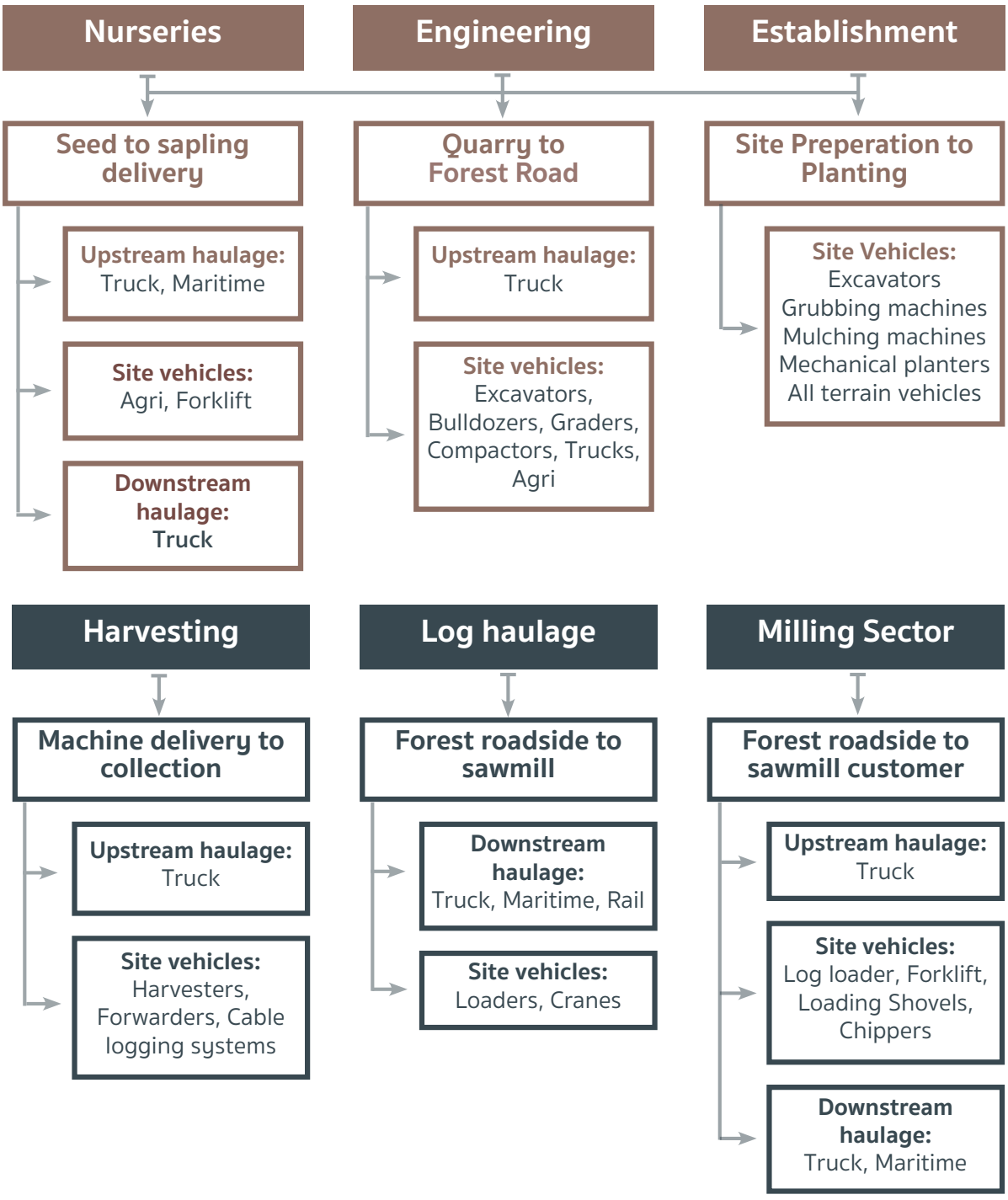
1 Energy Efficiency of Timber Transport by Trucks on Hilly and Mountainous Forest Roads - https://pdfs.semanticscholar.org/abc2/b5de712a064699a557c8943b34a3fa15feaa.pdf

Empty-run baseline is high

European research suggests that around half of trip legs are without cargo in log haulage; even well-designed backhaul/triangle routing cuts empties by ~17–20.0%, but not to zero because of the structural issues highlighted on the previous page.

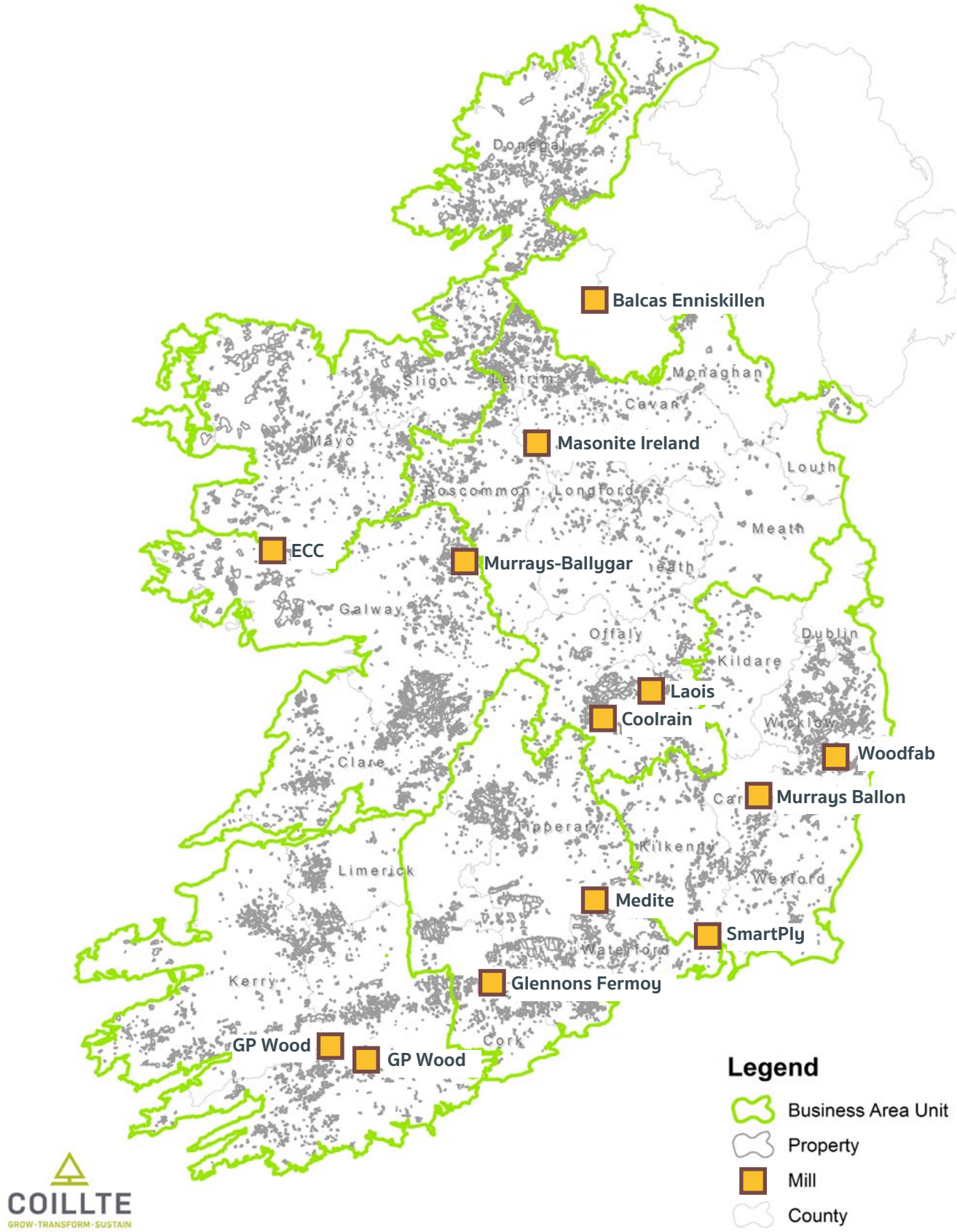
For context, across all industry sectors, 34.7% of road freight distances travelled in Ireland were empty in 2024, a figure well above the EU average (1)

The forestry supply chain



1 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Road_freight_transport_by_journey_characteristics

Milling Sector



Operating costs and emissions

For context, this section provides an 'at-a-glance' overview of headline cost and operating metrics.

Headline costs and operating data dashboard

The forestry logistics sector in Ireland is characterised by companies operating small vehicle fleets. For example, in Ireland's Forestry Sector there are 147 hauliers operating 483 vehicles, largely Scania and Volvo trucks.

- **Operators with a single HGV account for 46.0%,**
- **Operators with two HGVs account for 15.0%,**
- **Operators with three HGVs account for 11.0%**
- **82.0% of the hauliers have, at most, five HGVs**.

Log haulage is a unique challenge within forestry. A log haulage vehicle usually consists of a six-axle articulated combination. Vehicles must carry heavy payloads (46 Tonne GVW in ROI) over rural networks, often on narrow roads and steep gradients, before connecting to national routes for onward delivery. The challenges of operating in the log haulage sector are highlighted in a report published by The Forest Industry Transport Group (FITG) in Q1, 2026 entitled *'Good Practice Guide for Managing Sustainable Timber Transport'*. (See page 62 for a link to download the guide)

This operational reality results in high fuel consumption and significant emissions. Whilst log haulage has its own unique characteristics, with estimates suggesting around 10.0% of a vehicle's time is spent off-road, we can provide guidance towards a truck's operating profile using data collated in Freight Transport Association Ireland's annual *'Manager's Guide to Distribution Costs'* report, the latest edition of which was published in November 2025. For 46 Tonnes articulated vehicles across Ireland's road transport industry, the share of operating costs accounted for by drivers is 31.4%, whilst fuel accounts for a 47.2% share.

46 Tonnes Articulated Vehicles GVW (3 Axle Tractor Unit)

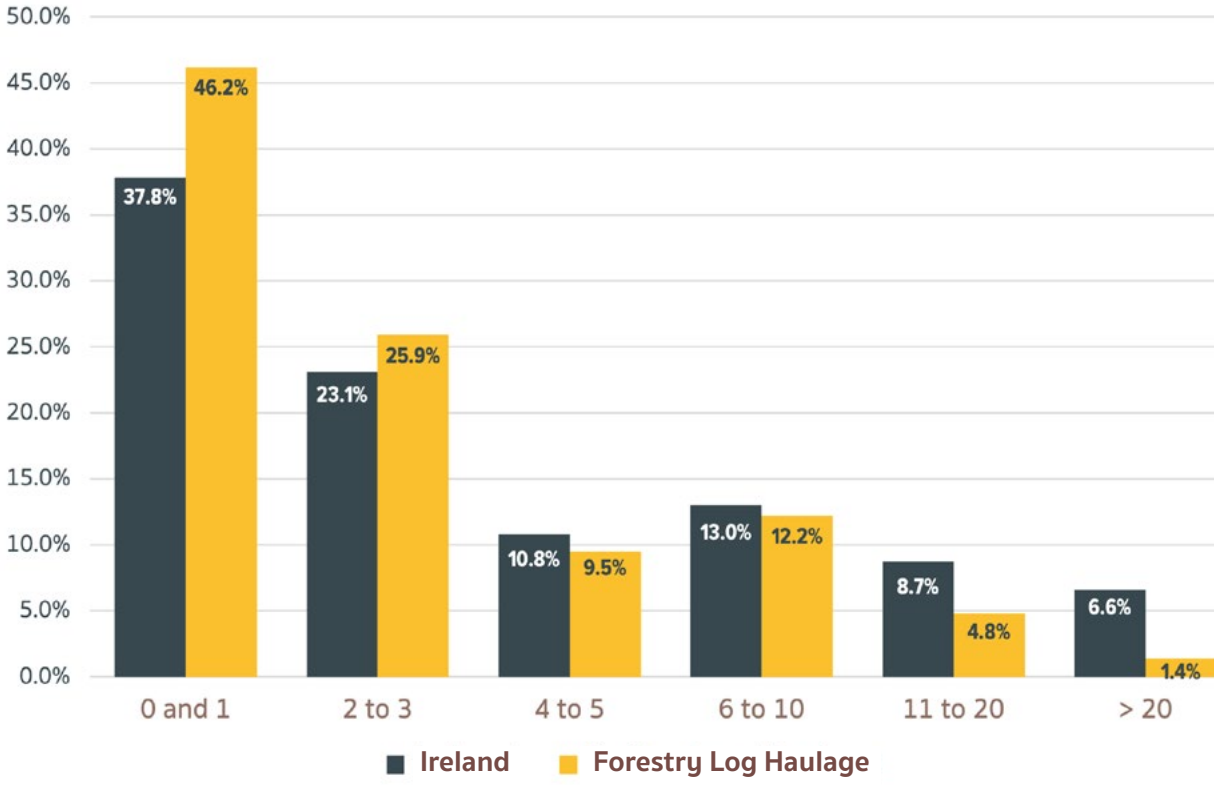
Purchase Method:	26.2% purchased outright
Depreciation Rate:	16.9%
Annual Distance:	126.018 km per vehicle
Average Age:	4.7 Years per vehicle
Anticipated Vehicle Life Span:	6.7 Years
Fuel Consumption:	33.2 litres per 100 km
Anticipated Tyre Life Span:	107,028 km
Share of Maintenance Costs on Parts:	43.4%

Source: FTA Ireland Manager's Guide to Distribution Costs 2025

Operational data from Coillte, combined with Telematics data from its Haulage Logistics & Telematics (HLT) system, which is standard across Ireland's log haulage fleet, highlights the scale of diesel dependency and the opportunity for targeted interventions.

Vehicle type:	Arctic 73.8% / Rigid 1.6% / Rigid with trailer 24.6%
Maximum legal weight:	44 Tonnes 17.3% / 46 Tonnes 82.7%
Use of cranes:	Vehicles with crane 55.3% / Vehicles without crane 44.7%
Average Tare weight:	18.03 Tonnes
Average max legal weight:	45.65 Tonnes
Fleet distance:	28,149,813.7 km per annum
Average speed:	46 km/hr
Idling time:	12.4%
Fuel used:	13,061,280.0 litres per annum
Share of fuel use by Power Take-Off unit (PTO):	4.6%
Fuel consumption:	46.9 litres per 100km
CO2:	34,351,166.4 kg per annum

Fleet size comparisons - Ireland & Forestry Log Haulage



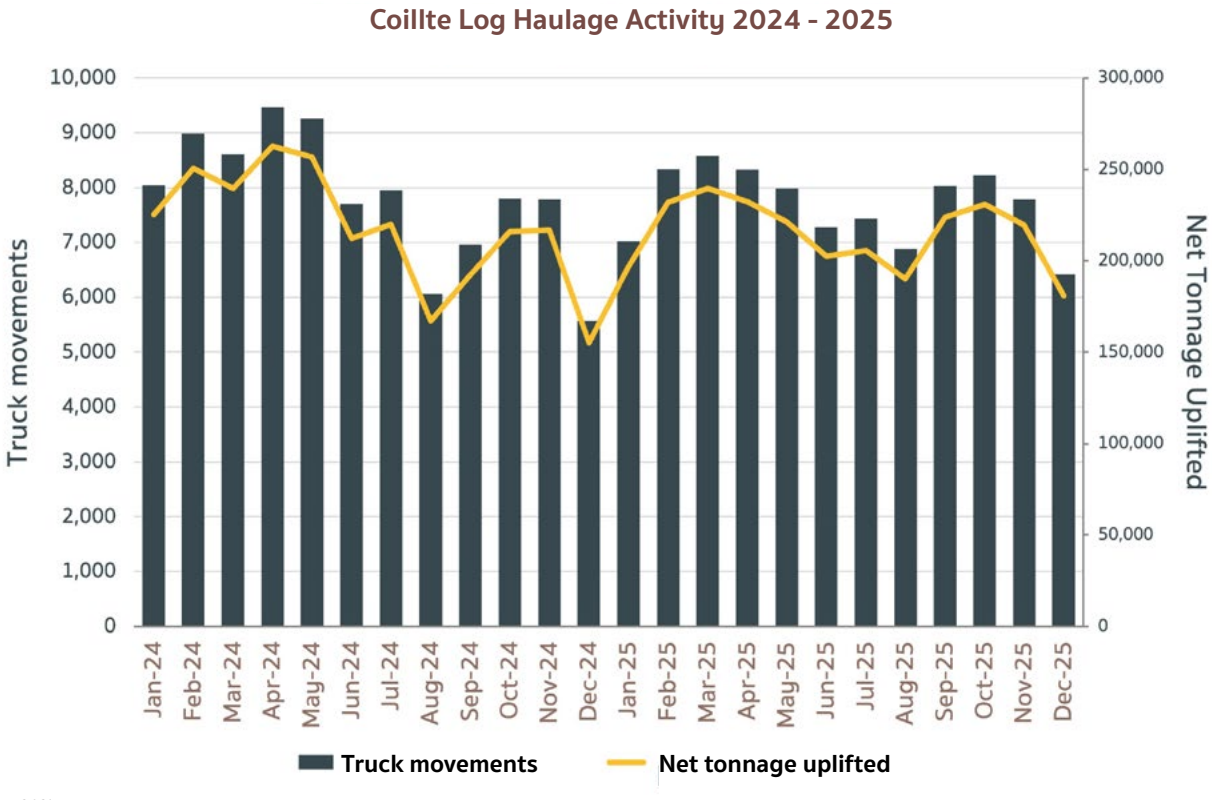
Fleet size comparisons: Ireland & Forestry Log Haulage

	Ireland		Forestry Log Haulage	
0 and 1	1,430	37.8%	68	46.2%
2 to 3	876	23.1%	38	25.9%
4 to 5	410	10.8%	14	9.5%
6 to 10	491	13.0%	18	12.2%
11 to 20	329	8.7%	7	4.8%
>20	250	6.6%	2	1.4%
Total Operators	**3,786**	**100.0%**	**147**	**100.0%**
Total Vehicles	**25,321**		**483**	

Source: Department of Transport / FTAI Manager's Guide to Distribution Costs (Oct-2025) / Trimble (Jan-2026)
Note: HGV Operators and fleet sizes excluding own account operators

Timber industry truck movements

The following chart details weekly uplifts for 2024-2025, plotting seasonality in activity.
(Full data for the graph below can be found in the Appendix at the end of the report on page 58).



1. Only Timber Removal Permits(TRPs) were included, either from a Forest or its associated Transfer Bay to a Mill.
2. Timber Transfer Dockets (TTDs) were not included, as these would double count uplifts. The data describes a load was moved from a Transfer Bay to the Mill on a TRP.
3. For Staged Journeys, the data only includes Stage Part 1 (uplift from the Forest to the Staging Bay, a Coillte approved area where load staging can take place), not the Stage Part 2 delivery to the Sawmill.
4. Other lorry movements in forests were excluded (Loading Lorries and Machine Movement TTDs).
5. The Uplift date from the Forest was used for the Date, not the Delivery Date to the Mill.

Total cost of ownership

TCO framework and assessments begin with understanding existing diesel energy use as the business-as-usual baseline, against which projected costs and emissions savings are measured.

The TCO should also consider the impact of supporting infrastructure investments, such as depot charging or on-site fuel storage, amortised across fleet and asset lifetimes.

This analysis focuses on Diesel, Battery Electric Heavy-Duty Vehicles (BEHDVs) and BioCNG, reflecting their availability, technical maturity and suitability for Irish operating conditions.

"Operators can't compare new low carbon technologies on purchase price alone as it hides the real cost picture. A Total Cost of Ownership (TCO) approach exposes both hidden costs and hidden savings, giving a realistic view of what each truck costs to run over its working life. It replaces guesswork with transparent, operationally grounded evidence.

The TCO model presented here reflects the components of BWGs upfront investment after grants, a seven year repair and maintenance contract, energy costs based on real world consumption (ESB €0.20 /KWh, Gas €1.17/KG, Diesel €1.50/L + Adblue €0.08), a fixed duty cycle of 500 km per day, and conservative residual value assumptions. This keeps the analysis practical and comparable across technologies. The cost of charger infrastructure or diesel tank (bunker) investment is not included in the TCO.

The real value of TCO is its flexibility. By changing assumptions, energy price, daily kilometres, grants or R&M rates, operators can build a cost picture that reflects their business. This turns the transition to low and zero emission vehicles from a leap of faith into a commercially grounded decision supported by clear long term economics."

Mark Crowe,
Head of Transport
BWG Foods

	E600 Mercedes	Mercedes 25.51	Scania R410 CNG
Inputs / Assumptions	**Electric**	**Diesel**	**CNG**
Purchase price	€330,000.00	€130,000.00	€165,000.00 *
Less grant	-€100,000.00	€0.00	-€10,000.00 **
Net Price (A)	**€230,000.00**	**€130,000.00**	**€155,000.00**
7 Year Operation			
R&M - per month	€250.00	€560.00	€800.00
R&M - 7 Year Total (B)	**€21,000.00**	**€47,040.00**	**€67,200.00**
Energy Cost			
Distance * **	910,000 Km	910,000 Km	910,000 Km
Energy Consumption	1.2 kWh/Km	0.30L/Km	0.30Kg/Km
Total Energy Cost (C)	**€218,400.00**	**€409,500.08**	**€319,410.00**
Sub Total (A) + (B) + (C)	**€469,400.00**	**€586,540.08**	**€541,610.00**
Less Residual	-€15,000.00	-€20,000.00	-€15,000.00
TOTAL COST OF OWNERSHIP	**€454,400.00**	**€566,540.08**	**€526,610.00**

* CNG truck price based on Scania R410, Iveco alternative now priced at circa €135,000
**Electric grant at 50.0% price differential of electric vs diesel baseline. CNG grant at GNI €10,000 grant
***Assumed 500Km per day across 260 working days per year (5 days per week for 52 weeks) for seven (7) years

This TCO model indicates that HDV articulated BEHDVs can deliver both the lowest seven-year operating costs and significant carbon reductions, with BioCNG offering complementary solutions where full electrification is constrained.

There will potentially be additional costs e.g. putting a dedicated alternative fuel / energy facility and infrastructure at operator depots i.e. Gas tank and own pump or an electric charger, cabling, MIC (2) etc. (Estimated investment of €50,000 for charging infrastructure to start a depot). These costs can be spread over entire site, fleet or number of years you expect them last e.g. 10-20 years, but the vehicle lifecycle will vary.

Assumptions

CO_2 calculations and conversion factors can be found on SEAI see https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/

Carbon tax is included in all the above figures, fossil diesel pays the highest rate, but is still discounted by 10.0% for B10 mix with HVO, BioCNG and HVO pay no carbon tax and electricity pays the same rate as diesel but with up to 40.0% renewable now and 80.0% by 2030 - greatly reducing the carbon tax you pay.

For alternative energy HDVs, dealer can provide a (1) VECTO (3) CO_{2e} certificate or projected fuel and energy use for your work and duty cycle in L/100km or kWh/100km with your desired payload, routing and trailer / coachwork as a design figure (real world use will vary, but you can make like for like comparisons in a reliable transparent way).

For definitions of (1) VECTO (2) MIC and (3) CO_{2e} please see page 60

Lifetime CO_2 emissions by fuel / energy type, together with energy consumption comparisons

	Electric	Diesel	B100 (HVO)	CNG	BioCNG
Lifetime tonne CO_2 from fuel (using SEAI factors)	244.72	667.92	0.00	737.81	0.00
Energy consumption comparison in kWh	1,092,000	2,776,137	2,822,901	3,603,600	3,603,600

For further information, visit: https://www.seai.ie/sites/default/files/data-and-insights/seai-statistics/conversion-factors/SEAI-conversion-and-emission-factors.xlsx

Insight provided with support from:

Authentic ENERGY MANAGEMENT SERVICES

"Fuel suppliers run limited promotions that deliver price parity between HVO and Diesel to stimulate interest. However, government changes to the tax code or a rebate to incentivise HVO over fossil fuel in hard to abate sectors such as log haulage would be a game changer in the short to medium term."

Des Phelan

Sustainable Transport Manager - **Coillte**

Pros and cons of alternative fuels

The Freight Transport Association Ireland published a report in 2024 entitled *"Decarbonising the Road Freight Sector"* helping owners and operators of commercial Heavy Duty Vehicles and policy makers grapple with understanding the challenges decarbonisation poses from a cost and timeline perspective.

The Report was crowned winner of the 'Best Publication' category at the 2025 Association and Institutes Awards. Included within the report is an at-a-glance summary, outlining the pros and cons of alternative fuels. The full report can be downloaded from the FTAI or Analytiqa websites.

PROS AND CONS BY FUEL TYPE

Fuel type	B7	B20	HVO 100	Bio CNG	Electricity	Hydrogen
Capital costs	No capital cost	No capital cost	No capital cost,	Capital cost for vehicle	Capital cost for vehicle	Capital cost for vehicle
Fuel costs	Base	Premium over diesel	Premium over B100	Fuel Premium over CNG, CNG less expensive	Cheaper fuel / energy	More expensive
Infrastructure	None	None	None	Very expensive Infrastructure	Very expensive Infrastructure	Very expensive Infrastructure
Carbon Tax	Yes (Diesel Duty)	Yes (Diesel Duty)	Yes (Diesel Duty)	No / Yes (Diesel Duty)	Yes (Diesel Duty)	Yes (Diesel Duty)
Vehicle Grant Duty	No	No	No	Yes	Yes	Yes
Tax Treatment				Yes	Yes	Yes
Tax Relief	No	No	No	No	Yes	No
Vehicle availability and compatibility	All EN590 diesel vehicles	Most HGVs - no modification required. Restricted to commercial fleets	Warrantied by leading manufacturers Blend up to 50% to remain with EN 590	Good availability of vehicles from leading manufacturers in both rigid and articulated bodies up to 460HP	Viable and affordable electric trucks available. Battery electric heavy-duty vehicle technology changing at pace.	Compressed H2, Fuel Cell Vehicle – very limited availability
Fuel availability	Available on demand	Available on demand, now in use in Ireland	Available on demand, now in use in Ireland	9 Public fast fill stations in Ireland.	Available but limited charging network	Certified green available on demand. Large scale green hydrogen available from 2027
Refuelling infrastructure	National retail and wholesale Network	Depot Based - nationwide Can be stored locally	Depot Based - nationwide Can be stored locally Available in retail forecourts	Limited network availability. GNI now have 9 public stations in operation currently	Developing charging infrastructure - different capacity / voltage. Rapid Chargers required. Network capacity restrictive	Refuelling network non existent. 5 years minimum to develop minimal network
Cost	Baseline	Premium over diesel Little to no Capex No vehicles premium	Premium over biodiesel Little to no Capex No vehicles premium	Premium over diesel. Capex for refuelling HGV's infrastructure 10-25k additional per vehicle	Energy is cheaper than diesel when adjusted for efficiency Capex for charging Infrastructure and vehicles required. Cost of electric HGVs is currently higher than diesel equivalents.	Presently sold as an industrial gas Expensive. Large capex required for vehicles and infrastructure

Source: Decarbonising the Road Freight Sector 2024 - FTA Ireland (updated March 2026)

Policymaker collaboration with industry

ZEVI

Zero Emission Vehicles Ireland (ZEVI) is a dedicated Office within the Department of Transport, charged with supporting consumers, the public sector and businesses to continue to make the switch to zero emission vehicles. Des Phelan, Sustainable Transport Programme Manager at Coillte, chairs the ZEVI Pathway Working Group on HDV Electrification.

In 2026, ZEVI will publish and begin implementing a refreshed national strategy that sets out the next phase of Ireland EV-charging rollout. This updated plan will build on the progress of recent years and ensure charging infrastructure keeps pace with rapidly growing EV adoption. Work will continue at pace on the Light Duty Vehicle (LDV) charging programmes moving into full delivery. These initiatives will significantly expand high power charging availability across the national, regional and local road network, creating a more convenient and reliable system for drivers nationwide. While substantial progress has been made in electrifying the LDV fleet, decarbonising HDVs present a more complex challenge. Work is underway and ZEVI's focus will intensify in 2026, on exploring how it can decarbonise freight, logistic and heavy-duty transport, HDV Charging Infrastructure will be a key component in the new EV Infrastructure Strategy (2026-2028) while a pathway report from the HDV Electrification Working Group was published in early 2026 (see page 40). At the launch of this report, it was announced that there will be enhanced supports, now providing up to €500,000 annually for zero emission HDVs and up to €300,000 for charging infrastructure, marking a significant step forward for decarbonising Ireland's logistics sector.

Road Freight Forum

Ireland's Road Freight Forum was established in 2023, bringing together officials from the Department of Transport with government agencies including the Road Safety Authority, Transport Infrastructure Ireland and the National Transport Authority, as well as industry representatives and academics. The Forum meets regularly, providing a platform for industry to engage with policymakers and for all parties to drive the work of the Road Haulage Strategy 2022-2031. The Forum has discussed a wide breadth of topics, including the challenges of decarbonisation, HGV interaction with the national tolling network, and the development and implementation of broader Governmental plans, including the National Ports Policy and the All-Island Strategic Rail Review. The Freight Transport Association Ireland is represented on the Forum by Niall Cotton and Des Phelan.

Department of Transport

In 2024 the Department of Transport commissioned a report to assess the potential role of Hydrotreated Vegetable Oil (HVO) as a transitional fuel for decarbonising Ireland's Heavy Goods Vehicle (HGV) sector, in line with the objectives of Ireland's Road Haulage Strategy 2022–2031. While full electrification remains the preferred pathway to zero emission for the sector, the analysis explores whether increased HVO use can offer substantial emissions reductions in the medium term and what policy instruments could support this shift without undermining longer-term goals. The report indicates that, without accompanying reform of the Renewable Transport Fuel Obligation, increasing the use of HVO in the HGV sector will shift biofuel use away from other road users, thereby resulting in modest reductions in overall emissions compared to the baseline.

Additionally, the study forecasts that a subsidy to equalise the price of HVO with diesel in the year 2030 would cost the Exchequer €502.0 million. This is a single year cost with additional costs incurred if the subsidy was provided for more than one year.(1)

The Renewable Transport Fuel Policy 2025-2027 identifies the need for further research into the optimal utilisation of biofuels within both transport and non-transport sectors. To address this requirement, the Department has commissioned a study to examine the hierarchy of HVO application across land transport, aviation, maritime, and other relevant industries. The study will take into account factors such as sustainability, availability, alternative energy sources, and supply incentives.

The June 2025 policy paper can be read by going to the link listed at the bottom of the page.(2)

1 https://assets.gov.ie/static/documents/0fa7985b/Assessment_of_the_Availability_of_HVO_for_the_Irish_Heavy_Goods_Freight_Secto.pdf

2 https://assets.gov.ie/static/documents/Renewable_Transport_Fuel_Policy_2025-2027_2.pdf

The view from the log haulage supply chain

As Ireland's Timber industry seeks clarity about the pathway to decarbonised operations, we sought the views of key stakeholders, truck and trailer manufacturers and vehicle operators.

Key takeaways

- **Log hauliers face major challenges in decarbonising operations, primarily due to fuel availability, cost uncertainty, and lack of clear information.**
- **HVO is seen as a practical interim solution especially if price parity with diesel is achieved. Bio-methane is promising if supply is reliable, while hydrogen remains complex and infrastructure-limited.**
- **EV adoption is hindered by unknown costs, charging infrastructure, and operational metrics. Hauliers need clarity on vehicle cost, range, charging time, and battery replacement.**
- **Eco-driving offers immediate fuel savings of 5–15%.**
- **Government support is critical through clear policy, incentives (e.g., excise reductions on HVO), and infrastructure planning.**
- **The transition to decarbonisation must be data-led, collaborative, and supported by innovative financial models to reduce risk.**

View from the log hauliers

Q: What do you see as the major obstacles / hurdles, irrespective of fuel types, to decarbonising your fleet operations?

"Fuel availability is certainly the major obstacle. Amongst hauliers there is a great deal of uncertainty regarding the cost of alternative fuels, the locations where they will be available and the quantity of fuel or energy that will be available."

"This uncertainty is, in part, driven by a perceived lack of information available from fuel suppliers to fleet operators that may answer the questions we have."

Is HVO an interim solution?

"Hauliers are a traditional breed. We will use what works if the price is competitive. I understand there's been a small adoption, but it is not challenging. I understand there has been a 4-5 cents price difference, at most 11-12 cents? That is a big amount of you consider a truck using 250-300 litres per day, that's 1,250-1,500 litres per week. With parity we, as an industry, would certainly be heading in the right direction in terms of decarbonisation."

"I would say, though it is just an estimate, that the sector is 70:30 split in terms of fuel card use versus bulk."

"There is certainly confidence in HVO as a solution. It would be great to get a headline figure, to be able to quantify emission savings if HVO was supporting 300 trucks in their daily operations. Can we quantify the savings? Can we assume its 85%?.

Could bio-methane and hydrogen present long-term solutions?

"The biggest current challenge is, I think, the unknown infrastructure capability. Where will we get our fuel? Our mills will stay in the same place, but pick-up points change regularly, and that has to be factored in."

"Bio-methane will be a part of the solution, without a doubt, and if its available and competitive, hauliers will 'sign up' but you cannot expect hauliers to take risks. We will need assurances on fuel supply when our routes are changing."

"The hydrogen scenario is extremely complex, and we're still in its infancy, but certainly no one cap will fit all. In Ireland the feeling is that we are some 10 years behind the Continent in terms of infrastructure."

"That said, we do not want investment in infrastructure where its not needed. Very little timber comes through Dublin!"

"Our industry, and the hauliers that serve it will support infrastructure development, but we will need to see the results of trials on paper. We would fully support the development of the 'heatmap'. Through Trimble, we have the data for a 5-year analysis, mapping an industry under pressure because of the storm. Once we have the data, it becomes easier to make decisions."

What are the key financial considerations or information requirements that you need to consider the introduction of EVs to the log haulage sector in Ireland?

"The transition to decarbonisation has to be data-led."

"I would suggest that the overall purchase cost of a vehicle remains an unknown. "At the moment, in our current operations, hauliers can estimate costs per km etc., but I would suggest that with EV's this is unknown."

"As fleet operators we feel that information needs to be supplied by manufacturers regarding how many units per vehicle charge. Without this, the cost per km cannot be calculated and drivers' journeys cannot be planned."

"Aside from the day-to-day operating costs, vehicle charging is a vital consideration and there are many questions that remain unanswered, here also. For example, the future availability of charging points, and timescales for their introduction remains unclear. What are the financial costs of investing in the installation of charging points at our own depots, what infrastructure needs to be in place, and how long do projects take to complete?"

"EVs are in their infancy, so who knows what might be achievable in a few years' time? It is just my personal view, but with a long-term investment view, solar power can make a contribution and is a viable solution for those that are able to do it. There may be a €100k cost, but of you are spending €300 per day and more on fuel, you will soon see a return.

What insight do you fleet operators need from truck manufacturers to be able to develop and execute a decarbonisation strategy for your fleet?

"We, as an industry, need to talk to all of the manufacturers and widen the discussion. We have to de-risk the solutions for the hauliers and re-think innovative financial models for truck finance."

"I'd suggest there are at least seven key pieces of insight a haulier would need before being able to proceed with the decarbonisation of their fleets with EVs: 1.Unit cost of vehicles / 2. Estimated maintenance costs / 3.Time to full charge in hours / 4. Unladen vehicle weight / 5. Vehicle longevity or useful life / 6. Vehicle range in km / 7. Battery replacement. Is this feasible, and at what cost?"

What role can eco-driving play in the industry's efforts to decarbonise?

"Back in 2008, when fuel got really expensive, I took on a consultant to sit with our drivers to educate them over a one month period. The results? We saved between 10.0%-15.0% in fuel! As technology evolves, even today, 5.0%-8.0% savings can be made, no doubt."

"I would say that there are not that many operators who do not have well-educated drivers. Perhaps 90.0% are 'on the case' when it comes to monitoring their fuel usage via telematics, but there is always room for improvement."

What role, if any, should Government play?

"There is a feeling that the haulage industry is always somewhat overlooked, certainly in comparison to the grants available in the agricultural sector."

"The Department of Agriculture are certainly seen to lead the way, and we need greater leadership. If there is a clear message stating what is to be achieved, the log haulage sector will support it, but the Department of Transport and Department of Environment need to put a stake in the ground and speak with a common voice."

"Any incentives or systems to encourage decarbonisation are not widely known or promoted. We need to be handing over our industry to future generations in the best way possible."

"It does not have to be grants, we just need clarity and the long-term conditions to be right. Take HVO as an example. Reducing the excise would increase demand significantly. In Ireland we are not incentivised to care about the environment in the

same way that companies in other countries are. We need the support of our policy makers."

Liam Mackey,
Director,
Ground Control Ltd
& Forestry Industry Transport Group Sustainability Brief Holder

View from the trailer manufacturers

What does a future trailer look like in a decarbonised heavy duty truck world in the forestry sector?

"That's a very difficult question to reply to at the current time, as we simply have too many open questions around the specifications of the trucks themselves that remain unanswered."

"That's a key reason why I am keen to participate in this research, as we need to drive stakeholder collaboration forwards to be able to make meaningful progress."

Why does Ireland need its own alternative vehicle trials?

"I would suggest that the timber sector in Ireland is quite distinct to other countries. We have pockets of timber in many different locations across the country."

"It is distinct from heavy duty general haulage. Timber hauliers look to maximise their payload at all times. The trucks and trailers are punished more heavily on difficult terrain. It is the vibrations that do the damage. In the timber sector 8.0%-10.0% of a vehicle's lifetime is spent off-road."

What design adaptations might be needed to maintain payload efficiency for log haulage?

"It is so difficult to assess. What I can suggest is that trucks are likely to be 2-3 tonnes heavier, their lifespans will be shorter and their range will shorten each year. The viability of trailers with electric axles and batteries will depend upon the weight of batteries and the loss of payload."

"Currently, on average, you might be looking at an 8-10 year truck lifespan and 10 years for trailers, though that could be 15 years. I would say most larger companies will only run them for 3-4 years."
"The trailer industry would depend on grants to support the bespoke design process of new trailers. Trailers will not be able to be mass produced straight away."

"New trailer designs to support trials could be set up fairly quickly, depending upon the changes being introduced, under national small series guidelines, or individual vehicle inspections for one-off prototypes. Wider EU approval could take more than one year."

What are implications for timber hauliers when considering alternative fuelled vehicles and trailers?

"I would suggest that a timber haulier could not operate electric trucks today. That is from a physical, financial and operational perspective. There are so many dynamics driving higher costs for vehicle operators."

"Drivers have a limit on the hours they can work. Refuelling now might be every one and a half days. With EVs this will be every day, perhaps for 2-3 hours. How and when will this be scheduled?

"Aside from the trucks themselves, electric drive trailers will require more maintenance. We haven't seen electric crane systems yet, but for sure we will see separate electric motors driving the pump for the hydraulics for the crane."

"Where will hauliers be able to charge their vehicles? They need big enough charge points at sites within 10 minutes of their locations. Could we consider mobile charging stations? Swapping out battery packs?"

"If payloads fall as a consequence of the heavier trucks and downtime extends as maintenance increases, will hauliers' commercial rates need to be increased? Will the market accept that?"

How can hauliers be encouraged to collaborate?

"A haulier taking part in electric vehicle trials will need to be fully compensated or subsidised for his participation. The amount of grant funding has to be relative to running a diesel truck, perhaps 75.0% grant funding. Remember that the truck will not be operational all the time. It will likely need to be shown at industry events, and things like this must be compensated for as well."

"Where do the grant opportunities lie? At national level or the EU? The truck build alone could go to €500,000, so if the project is going to cost €1.0 million, the funding must be that and not €300,000 short, otherwise there is simply no incentive to take part. I am trying not to be negative, but no-one would take it on."

"We have to de-risk individuals that will be the innovators. They must be subsidised. If we do not de-risk the trials, they won't happen."

"We must get all stakeholders on board. Focus on the weakest link in the supply chain and make sure that is secure and on-board. We need to get the concept working, fully working. Not just port trials. We need to get cranes working in forests. It will be a complex undertaking."

What role, if any, should Government play ?

"In Ireland we have insufficient incentives to 'go green'. In our business we export to many countries and see governments incentivising companies to look at renewable energy, but not in Ireland."

"There is a monopolised sale of electric power. As individuals, we can't sell the power we generate. Where will the country get its electricity from?"

"Gas is an alternative option and we see it is working, in Finland, for example, but will higher prices of gas make it competitive?"

"I understand it's a complex issue but I believe Ireland was at the same level as Europe, but we've fallen 20 years behind now. If we can get the supply of energy right the timber sector would be one of the biggest winners."

Scott Robinson,
Managing Director,
Robinson Distribution Ltd

View from the truck manufacturer

What EV truck solutions are current offered for forestry transport?

"Scania refers to the term 'e-Forestry'. What do we mean by that? It is the transformation of logistics flows by introducing technology which enables CO2 neutral operations based on electrification. The transport solution covers all products and services needed to make our customers transition as simple as possible. The aim is to electrify the transport flows by maximising value and minimising impact on the customer's existing operating model. There are no 'silver bullets'. The forestry sector is certainly one of the more complex industry sectors to decarbonise. A range of solutions will be required."

"In terms of current battery electric truck models suitable for log haulage in Ireland, (e.g., up to 46 tonne GVW), Scania offers BEV 6x2 or 6x4. This is a tractor or rigid, with 400 or 450 kW electric engine power output, with GTW up to 74 T. Depending on specific needs, different gearbox and electro-mechanical PTOs (power take-off) are available."

What is the battery configuration and estimated range in forestry transport?

"The 'rule of thumb' for a quick estimation of an average BEV truck kWh consumption in forestry application, is to take the diesel consumption in L/100 km of the equivalent diesel truck and multiply it by five to get the BEV consumption in kWh per 100 km. For example, if a diesel truck consumption is 40 L per 100 km, the equivalent BEV consumption should be about 200 kWh per 100 km."

"I stress however, that this is not a rule, just a method for a rough estimation."

Battery range & configuration

NO OF BATTERIES	INSTALLED CAPACITY	USAGE CAPACITY	RANGE (1)	RANGE (2)	CHARGING TIME 10 - 80% (375 KW)
4	356 kWh	320 kWh	213 km	160 km	36 min
4	445 kWh	400 kWh	267 km	200 km	45 min
5	445 kWh	400 kWh	267 km	200 km	45 min
6	534 kWh	480 kWh	320 km	240 km	54 min
7	624 kWh	560 kWh	373 km	280 km	63 min

Range 1	Calculated with 1.5 kWh/km consumption, dependent on vehicle specification and operating conditions.
Range 2	Calculated with 2.0 kWh/km consumption, dependent on vehicle specification and operating conditions.

What charging infrastructure recommendations does Scania provide for log haulage operations, and how can Scania Group assist with site assessments or grid connections in Ireland?

"For forestry transport operations it is our general recommendation to have a good charging infrastructure both at depot and if possible, some suitable public charging points en-route that you can rely on. Of course, that does depend on the routes."

"To acquire depot and destination charging infrastructure we offer our customers support via our subsidiary company Erinion (www.erinion.com). Everything starts with an operational analysis and a depot site energy assessment."

"Whilst Erinion does not have operations in Ireland at this moment, our Erinion office in the UK can provide support in this matter. Our recommendation is for interested parties to first organise a meeting with Erinion, for them to present and to clarify the support they can provide.

What future developments in Scania's BEV lineup could enhance suitability for Ireland's log haulage sector?

"Scania is continuously expanding and enhancing our portfolio of battery electric vehicles (BEVs). When it comes to features for forestry applications, in particular, in 2026 we will launch the MCS (Mega Watt Charging system, up to 750 kW) together with an updated robust leaf suspension. Later on, Scania will as well be able to offer MCS (up to 1000 kW). A new Heavy Duty robustness kit will also be introduced in the coming years. Furthermore, and among many other features, new battery configurations for long distance/high energy consumption will be introduced."

What guidance would you offer Irish stakeholders planning the first log haulage BEV pilot, including vehicle selection and strategies to overcome barriers like high initial costs or infrastructure limitations?

"For every new customer BEV sales case, the local Scania distributor/dealer will collect information about the customer's routes and destinations, distances, charging locations, operational cycles, shifts / resting times, road and climate conditions. etc."

"Adding to this, we can also utilise operational data from existing vehicles to perform an operational analysis. Together with the legal weights, payload and cargo requirements, choice of trailer/body and other auxiliary equipment needed, Scania can then recommend a suitable solution, including an optimised truck specification, service offer and financing solution."

How can Ireland learn from Scania collaborations with forestry operators in projects like the TREE initiative in Sweden that could apply to an Irish pilot?

"The ***HDV EV Charging Infrastructure supporting Sweden's TREE project (as seen in the photo alongside)***, will power future discussions and can of course be shared with the Irish Forestry transport industry. However, at this moment, the project is still in too early a phase to be able to share any major findings."

"As for running a pilot project? We can already conclude that having all the different stakeholders in the forestry transport system involved in the project from the beginning really brings a lot of value and power to the discussions."

Tobias Ejderham,
Head of Global Sales
e-Truck Solutions, Scania Group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Transitioning to alternative fuels

This section highlights how the Irish timber industry's rich data reservoir can drive smarter infrastructure planning and alternative fuel development

Key takeaways

- **A fleet-level energy audit tool is needed, requiring expertise in big data processing**
- **Energy demand depends on duty cycles and factors like road type, load weight, and idle time, not just distance**
- **A Forestry Logistics Heatmap will guide optimal placement of refuelling/charging sites, forecast energy needs, and align with decarbonisation goals**
- **The heatmap will serve as a critical reference for energy solution contributors, enabling data-driven justification for infrastructure roll-out. Collaboration with hauliers will accelerate zero-emission transition and reduce investment risk**

Developing a 'Heat Map'

The timber industry has an incredibly rich data set that is a really big advantage for national infrastructure planning. It can support the business case to develop alternative fuels in locations that might not otherwise be considered.

Existing infrastructure planning is based on high level vehicle (truck) movement numbers on national roads. Whilst the heavy-duty vehicle (HDV) sector will account for a smaller share of movements but with a higher share of energy demand.

A tool needs to be developed that can be interrogated at a fleet level to create 'energy use audits'.

The development of the tool requires individuals with significant experience in efficiently making data accessible and processing massive volumes of data.

Infrastructure providers look for locations that have a fairly even distribution of truck journeys, over a given level, across the year. However, the 'duty cycle' analysis is critical. It is not just distance travelled. Fuel / energy use will also depend upon 'energy intensity':

- The type of roads, local geography
- The location of road tolls, that are often avoided by fleet operators
- The weight of loads being hauled.
- Time spent idling or stationary and in what context

Hauliers in the sector are likely to be open to collaboration and cooperating with the development of the tool as long as complex data is communicated in a 'common, simple language'. A 'check-list' or 'crib-sheet' of key questions should be developed to identify the information required from hauliers to help support the development of the tool.
The 'ideal' solution for a fleet operator is to combine a favourable use case with suitable energy costs. They need to be in a position where they can be comfortable with their energy choices that X% of their movements can make it back to base without the need to re-fuel and Y% will have to divert and Z% will have to remain as they are because the flexibility isn't available to support the routes they serve.

The timber sector can be certain that the locations of product (forests) and customers (mills) are relatively static. The level of 'endurance' required either side of the customer locations should be straightforward to calculate, but the development of a heatmap should bear in mind that energy demands should be considered for 2030, 2035 and 2040... not just today.

Support from Academia

Enabling Energy Infrastructure Planning in the Forestry Sector

Decarbonisation of heavy-duty log haulage through a Forestry Logistics Heatmap is strongly supported by recent research on spatial analytics and energy infrastructure planning in forestry (1), as well as studies highlighting how digital technologies such as sensor networks, big data analytics, and advanced planning systems are transforming forestry logistics (2, 3, 4), and supply chain decarbonisation (5).

The Forestry Logistics Heatmap will serve as a foundational data resource for stakeholders across the sector, but not least alternative fuel infrastructure providers, including hydrogen refuelling networks, battery-electric charging infrastructure, biomethane distribution systems, and hybrid powertrain solutions. The visualisation of log haulage patterns, vehicle dwell times, route frequencies, and seasonal demand fluctuations across Ireland's forestry operations in the heatmap enables solution providers to:

(a) identify optimal locations for refuelling and charging infrastructure based on actual operational corridors and depot locations,

(b) forecast energy consumption patterns at regional and temporal scales to inform infrastructure sizing and capacity planning, and

(c) align infrastructure investment timelines with the sector's decarbonisation roadmap and operational logistics rhythms.

This data-driven approach reduces investment risk, minimises range anxiety for fleet operators, and ensures that infrastructure deployment aligns with actual logistics demand rather than theoretical projections.

Data Integration and Digitalisation

The use of rich, consistent data sources, such as GPS tracking, trip summaries, and load data from platforms like VIACHAIN and Trimble, mirrors the global trend toward integrating sensorised, automated, and data-driven systems in forestry operations. These technologies enable high-precision mapping of vehicle movements, load characteristics, and operational timing, which are essential for supply chain optimisation [8,9] and energy demand forecasting [1].

Spatial Analysis for Infrastructure Planning

Mapping and analysing vehicle movement data to identify high-density logistics corridors and temporal patterns is important for forecasting energy needs and planning alternative fuel infrastructure.

GIS-enabled tools have been developed to spatially map energy costs, trip frequencies, and route intensities, directly supporting the siting of charging depots, refuelling stations, and other infrastructure for electric and alternative fuel vehicles [1]. Such spatial analysis allows infrastructure developers to align investments with actual logistics rhythms and demand hotspots, reducing range anxiety and supporting the transition to zero-emission vehicles [1].

Heatmap Outputs and Visualisations

The heatmap will deliver multiple data layers essential for infrastructure planning:

- Geographic density maps showing vehicle movement intensity across Irish forestry regions, highlighting primary haulage corridors and secondary distribution routes
- Temporal demand patterns capturing hourly, daily, weekly, and seasonal fluctuations in logistics activity, enabling infrastructure providers to forecast peak energy demand periods
- Energy consumption hotspots identifying high-intensity zones where vehicles spend significant operational time, indicating priority locations for charging or refuelling infrastructure
- Route frequency analysis quantifying the number of vehicle passes along specific corridors, supporting capacity planning for multi-vehicle charging or refuelling facilities
- Dwell time mapping at key nodes (forest yards, processing mills, customer delivery points) to identify opportunities for depot-based charging or refuelling during operational downtime
- Vehicle payload and configuration data enabling differentiation between light-duty and heavy-duty haulage requirements, informing technology-specific infrastructure needs

These outputs will be presented through interactive GIS-based visualisations, enabling infrastructure providers to query specific regions, timeframes, and vehicle categories relevant to their proposed solutions.

Duty Cycles, Seasonality, and Realistic Energy Demand

The importance of analysing duty cycles, seasonal variability, and road typologies, rather than relying solely on annual movement totals, will achieve a more accurate representation of energy intensity and infrastructure needs [1,9].

References 1 to 9 (see page 60)

This approach supports future-proofed investment decisions, especially as projections extend to 2030 and beyond.

Pilot Projects and Standardisation

The recommendation to begin with a pilot project and develop standardised data templates will help validate data integration methods and ensure that analytics are robust and actionable in real-world settings (8,9).

Decarbonisation and Supply Chain Optimisation

The heatmap will serve as a critical reference for energy solution contributors, enabling data-driven justification for infrastructure roll-out (1) and accelerating the sector's decarbonisation journey (5).

Integration with Infrastructure Solutions

Contributors proposing specific energy solutions will reference the heatmap data when developing their infrastructure strategies.

Specifically:

- Infrastructure placement justification: Solution providers should cite heatmap-derived data on route densities, depot locations, and vehicle dwell patterns to justify proposed refuelling or charging site locations (e.g., "Heatmap analysis identifies the M7 corridor between Portlaoise and Roscrea as supporting 450+ log haulage trips per week, justifying hydrogen refuelling infrastructure at a location, as an example.)
- Capacity and sizing decisions: Energy demand forecasts derived from heatmap temporal patterns and vehicle configuration data should inform infrastructure capacity specifications (e.g., "Peak demand analysis from the heatmap indicates a requirement for 6 MW charging capacity at...")
- Phased deployment strategies: Priority corridors and regions identified through heatmap intensity analysis should guide the sequencing of infrastructure roll-out (e.g., "Phase 1 deployment focuses on the three highest-density corridors identified in the heatmap, representing 60.0% of national log haulage activity...")
- Business case validation: Contributors will leverage heatmap data to demonstrate alignment between their proposed infrastructure and actual operational patterns, strengthening investment cases and de-risking deployment decisions

This standardised data foundation ensures that all solution providers work from consistent operational assumptions, facilitating comparison between alternative fuel pathways and supporting integrated infrastructure planning across the sector.

Implementation Pathway

Development of the Forestry Logistics Heatmap should commence with a pilot project, focusing on a representative regional subset of forestry operations (e.g., Leinster region or a high-activity corridor). The pilot will validate data integration protocols between VIACHAIN telematics and Trimble operational systems, establish standardised data templates, and refine analytical methodologies for extrapolation to national scale. Following pilot validation, full national deployment should be completed, with quarterly data updates to reflect seasonal variations and operational changes. Coillte should maintain heatmap ownership and data governance, with controlled access provided to vetted infrastructure solution providers and energy transition stakeholders through secure data-sharing agreements. Long-term sustainability requires integration with emerging forestry fleet management platforms and periodic recalibration as the sector transitions to alternative fuel vehicles, ensuring the heatmap remains an accurate representation of evolving logistics patterns through 2030 and beyond.

Dr Nikolaos Valantasis Kanellos
with additional support from **Declan Allen**, Head of Discipline for Logistics, Supply Chain and Project Management.

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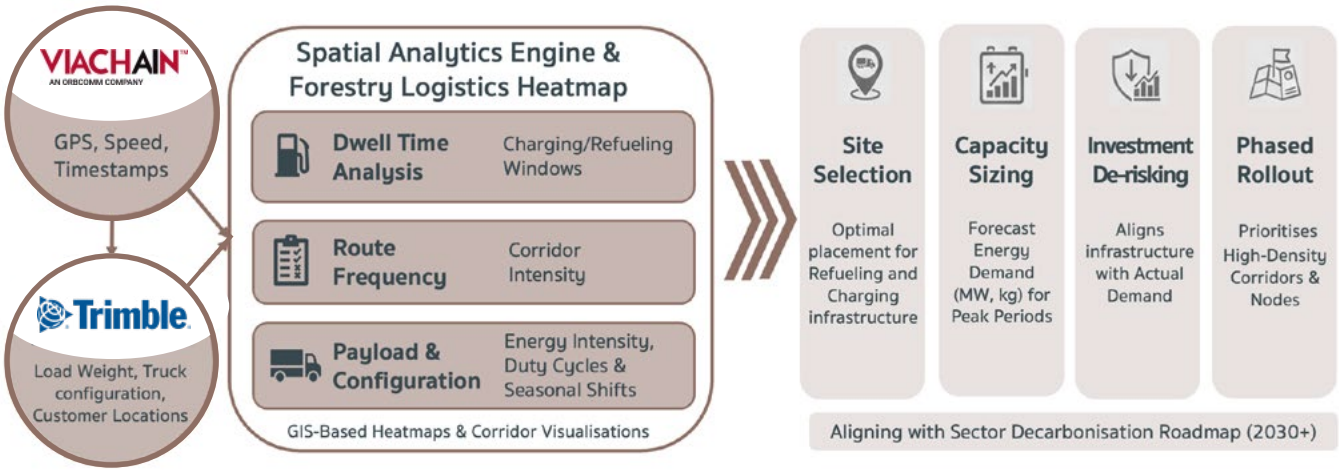
TU Dublin

References 1 to 9 (see page 60)



Collaboration from industry partners and stakeholders

From a commercial, private-sector, perspective, those responsible for infrastructure strategy and planning require key data points to define the business case at any given site. That is what will either bring the investment, or permit policy makers to identify what supports are required to accelerate the transition. The success of depot charging solutions is more complex and can depend upon the model being adopted and can be a 'bespoke' discussion. Who 'owns' the infrastructure, the land owner or a third party brought in to fund or JV on infrastructure delivery? Who will the depot serve? Is it just a single fleet that may all need charging at the same time each day? Can the fleets change operating mobility so that charging infrastructure is utilised continuously?

Industry partners and stakeholders would like to see an industry heatmap incorporate the following features and suggestions:

- GIS data to include existing refuelling locations in the background data.
- Road network layer control. It would be helpful to have layers available to show the different road infrastructure layers to be available to "turn on" and "turn off" as required (Motorway, National roads, secondary, regional etc.)
- Number of truck movements shown as a per day, week, month, year option.
- The number of movements at any given location on the average day, with min/max sliders at either end of the scale so that the areas of interest can be very readily identifiable, to highlight periods of year when demand for fuel changes.
- If a particular data point was selected, would it be possible to download data on truck information like fuel capacity remaining or locations of refuelling? This could be done at a node identified as a possible refuelling location and aid site selection along with truck movements at these locations.
- Dwell time/back to base. This could help develop a heat map that shows locations of fleet base or where a truck may be stored. This would help identify locations for electrical recharging also along with identifying the locations of hauliers' base locations and where numbers of trucks may return to and not just the pick-up and delivery locations.
- For any given start/finish point in the data, a bell curve indicating the distribution of distances travelled on the inbound and outbound legs to that point.
- For HVO use, identifying the share of use allocated to fuel cards or bulk deliveries is important to support infrastructure planning.
- Route energy intensity overlay displaying the average L/km or kWh/km consumed, ideally with a modifier for laden and unladen travel. It will be important to specify what vehicle type the number is derived from (presumably Diesel in all cases at present, but important to call out nevertheless) as drivetrain efficiency will have a significant impact on the primary energy requirement.

Lessons could be learned from work already undertaken with specific industry sectors such as the dairy industry. It is suggested that a 'trial' or development meeting be established between a telematics provider, an alternative energy supplier and two or three 'representative' fleet operators to do in depth analysis, looking at a small selection of fleets that'll educate the sector further in defining a 'template' for a tool that can then be developed for everyone to: **a)** Recommend fuel types for fleet operators (or not if that is the best currently available option) **b**) Inform energy suppliers on the future direction of demand to support infrastructure planning

"While EVs are rapidly emerging as the preferred solution for land-based transport globally, the HDV space is only getting started on its journey, and the absence of high-quality and cost-effective infrastructure to support fleet electrification ambitions remains a barrier to broader adoption. Understanding the areas of the road network where the greatest degree of service can be delivered to transitioning fleets is key to accelerating the development of the high-powered facilities needed to support the sector, making this heat map a must-have for the achievement of transport decarbonisation targets."

Seán O Callaghan,
Lead Project Delivery Manager - Ireland
Source - EV

"Developing an industry heatmap is a critical step on the pathway to decarbonisation of this specific industry. It not only highlights where the greatest opportunities lie but also provides insights for infrastructure planning, such as identifying optimal locations for new CNG refuelling sites. It will also identify routes that can leverage the existing nine public CNG refuelling locations in Ireland. By leveraging this data, fleet operators and planners can align routes and operational strategies to accelerate the transition to BioCNG to achieve their sustainability goals. Coupled with this the availability of a wide range of CNG HGV's currently on offer, supports flexibility in terms of vehicles and range."

Fran McFadden,
Customer Acquisition Manager,
Gas Networks Ireland

"Identifying areas of high energy consumption provides valuable insights, that helps energy suppliers invest in their supply capabilities where it will deliver the most value. The alignment between market insight, infrastructure planning, and energy supply will result in the right energy solutions being available to the industries and locations where is it needed and will accelerate the shift towards lower carbon energy solutions. Inver is committed to supporting the transition by making Hydrotreated Vegetable Oil (HVO), also known as Renewable Diesel, available nationwide through our supply network. This ensures reliable renewable fuel supply to customers across multiple industries and sectors."

Daniel Fitzpatrick,
Commercial Director,
Inver Energy

"A variety of low- and zero emission solutions exist to decarbonise the forestry sector and it is clear that multiple solutions will be needed. It is only with real-world data that we can really match the needs of a specific application with the best technological solution, and implement these solutions where and when they are needed, and in a coordinated manner. Data driven insights ensure that we plan effectively and spend efficiently on infrastructure and fleet solutions, supporting demand aggregation and coordination of deployment in order to minimise the risk of stranded assets. This is particularly important in the nascent hydrogen mobility sector, where rapidly scaling demand from end users who are unable to electrify is needed to anchor infrastructure investments."

Hannah Bryson-Jones,
Director,
Delta H Consulting &
Hydrogen Mobility Ireland Secretariat

"The electrification of heavy-duty vehicles (HDVs) is a vital component of Ireland's transition to Net Zero. Delivering this transition will require significant development of electrical infrastructure to support widespread HDV charging. The proposed Heatmap represents an important and innovative step toward a data-driven approach, enabling industry stakeholders to identify optimal charging locations and understand the infrastructure options available to them. By providing early visibility of anticipated charging demand, this heatmap will support proactive and more informed engagement with ESB Networks, helping to assess and plan the network reinforcements necessary to facilitate these future connections."

Pádraig Coughlan,
Electrification Manager,
ESB Networks


Orchestrated by BEV_
TREE
Lecab | Lastbila
HPC
ELECTR
FORES
TRAN

An EV concept vehicle for log haulage

This section reviews international best practices in electrifying log haulage, drawing on Sweden's TREE Project and Scotland's Net Zero Timhaul, and guidance from ZEVI. Additionally, guidance from Zero Emission Vehicles Ireland (ZEVI) and the HDV Electrification Pathway Working Group provides a framework for addressing infrastructure challenges.

Key takeaways

- **A phased approach. The transition to BEVs should be gradual, starting with partial fleet conversion rather than an "all or nothing" approach**
- **Success depends on stakeholder collaboration, that is active engagement from forest companies, hauliers, vehicle manufacturers, researchers, and infrastructure providers**
- **Limited charging infrastructure, depot modifications, payload constraints, and grid capacity are among the key issues that require strategic planning**
- **Clear KPIs and continuous monitoring are essential; Scotland's trial achieved 80 tonnes CO_2 savings in its first year**
- **Financial support, shared charging hubs, and future-proofed planning (e.g., Megawatt Charging Systems) are critical to inform Ireland's transition to zero-emission transport in the timber sector.**

Learning from other countries

Across earlier pages in this report, we have heard hauliers will need sufficient funding to de-risk participating in a forestry sector trial. What can we learn from trials that have been undertaken outside of Ireland? Whilst each country will have its own specific characteristics and operating conditions, for Ireland, lessons can undoubtedly be learned from work that has already been undertaken in Sweden and Scotland.

Whilst these two projects operated independently, the outcomes achieved and recommendations to their 'colleagues' in Ireland are remarkably similar: collaboration across all stakeholders is vital.

The Swedish Skogforsk TREE Project focusses on electrifying heavy road transport in Sweden's forestry sector, including system demonstrators and goals for 50.0% electrification of new trucks by 2030. The project operates Battery Electric Vehicles (BEV) at high gross combination weights (up to 94 tonnes) in real forestry duty cycles with different types of charging infrastructure, across multiple routes and regions to capture different terrain, temperature, and road-surface conditions.

In Scotland, Net Zero Timhaul is a collaborative pilot project involving multiple partners, established to test BEV timber trucks in active forestry haulage operations. The initiative aims to explore how electrification can contribute to the decarbonisation of timber transport. A three-year trial has been designed to collect detailed operational data, facilitate knowledge sharing, and inform future decision-making across the sector. Elsewhere, the development of a BEV concept vehicle for the Log haulage Sector can also draw upon the expertise of Zero Emissions Vehicles Ireland (ZEVI) in stakeholder engagement through its facilitation of the HDV Electrification Pathway Working Group, focusing on heavy-duty vehicle (HDV) electrification strategies.

Lessons from Sweden

The TREE project is mainly funded by Vinnova through the FFI programme, which supports collaborative R&D and demonstration projects between industry, researchers, and public actors. Sites have also received investment support for charging infrastructure through Klimatklivet, and additional co-funding from regional electrification pilot programmes. Before any BEV concept vehicle is considered, it is important to note that fleet management strategies are a key element in the process. The transition to BEVs should not be considered an 'all or nothing' approach. A first step may only see a proportion of the fleet electrified, without a need for any major changes in the transport planning or routes, where the remaining share would require a very changed setup, or new generation of BEVs. "The key here is that it is not – at least not in the near future – a question of electrifying or not but rather "how much" and "when"."

Visit the TREE LinkedIn page to access short video clips of EV's in action

The project identified that if it were to reach the goal of having 50.0% of new forestry trucks electrified by 2030, it would correspond to an annual reduction of approximately 260,000 tons of CO_2 emissions. The TREE Project has sought to define a series of "starting KPI's" that it will begin to follow-up, including, for example, the amount of power that a hydraulic crane loader uses.

The development of operating costs (related mainly to changing fuel/energy prices) has been hard to predict. Though a comprehensive data set has not yet been captured, it has been observed that in terms of certain performance metrics, BEV already stands very strong against traditional technologies. Whilst operational and performance capabilities are paramount, the vehicles must be 'driver-friendly'. Trials in Sweden noted that once the drivers have tested BEVs, after some initial reluctance, they tend to prefer that to diesel. It is anticipated that BEVs will naturally transition business relationships from transactional to more collaborative (and long-term). The key to the success is the inclusion of all stakeholders, collaborating together. This includes forest companies, logistic companies, local hauliers, vehicle manufacturers, researchers, and infrastructure operators. They must come together to jointly co-design, test, and refine solutions under real-world operating conditions. Front runners from each stakeholder group have played a crucial role as drivers of change, testing boundaries, sharing results openly, and demonstrating what is possible. Although the participants may often be competitors, they have recognised the shared purpose of building knowledge and accelerating electrification for the entire sector.

Measuring success

The project's success is measured through objectives defined within each work package, focusing on areas such as technical performance, operations, economics, and policy. Having clear goals in each area helps maintain direction over the long duration of the project.

And advice to peers in Ireland?

"Don't over-think it - just get started. Most learning happens once the trucks are on the road, not before." It is key to involve all key stakeholders from the start and design the pilot to generate practical insights. Keep it flexible, share what works and what doesn't, and focus on collective progress over competition.

David Fridner,
Researcher at Skogforsk and Doctor of Business Administration
Stockholm University
Assistant Project Manager
TREE
(Transition to Efficient Electrified Forestry Transport)

Lessons from Scotland

In Scotland, the Net Zero Timhaul identified a range of key performance parameters to assess, including payload impacts, daily mileage, range and state-of-charge patterns, charging duration and site requirements, vehicle downtime, maintenance variability, comparative fuel and energy consumption, Total Cost of Ownership (TCO), and lifecycle carbon performance (carbon-payoff distance).

Scottish Forestry provided funding of approximately £452,000 through the Strategic Timber Transport Fund to support the project. Its aim is to demonstrate the practical viability of BEV heavy goods vehicles (HGVs) for log haulage and to quantify associated carbon savings, thereby enabling the industry to develop informed pathways towards decarbonisation.

During the first two years of the trial, several operational barriers were identified, including limitations in charging infrastructure, the need for depot and site modifications, payload and kerb-weight implications, and constraints within the existing charging network. These findings have informed subsequent decisions regarding vehicle, trailer, and body design, as well as highlighted the importance of access to skilled and experienced service engineers. For example, the Volvo BEV tractor units were subsequently adapted to accommodate specialist timber bodies to meet the operational requirements of the forestry sector.

The principal practical challenges observed to date include the limited availability of public and commercial HGV fast-charging infrastructure, constraints associated with site design and electrical capacity, reduced operational range compared with diesel vehicles, necessitating careful route and shift planning, and payload variations arising from battery mass.

Furthermore, while operational savings may arise from improved reliability and reduced mechanical wear, the project noted that these were partially offset by increased tyre wear observed during the trials.

The project has identified that BEV HGVs demonstrate the highest operational suitability on regular, predictable routes that allow for depot-based charging and deliver sufficient daily mileage to justify the capital investment, for example, sawmill distribution and port-to-mill transport flows where charging infrastructure can be reliably established.

Further development and optimisation of vehicles are required for operations involving remote or forest-edge collections, extended long-haul routes lacking dependable charging infrastructure, and sites constrained by limited grid capacity.

What does success look like?

To evaluate progress toward net-zero goals integration-specific key performance indicators (KPIs) are monitored and measured, including loaded-to-empty ratios, dead mileage, charging downtime per leg, schedule deviations, vehicle availability, and carbon savings. In addition, vehicle uptime, reliability issues, and recurring faults are systematically recorded, reported, and addressed as part of the project's continuous improvement process.

After the first year of operation, the trial vehicles had collectively covered approximately 40,000 miles, achieving an estimated reduction of around 2 kg CO_2 per mile. This corresponds to a total greenhouse gas (GHG) saving of approximately 80 tonnes over the initial year of the trial. (1)

The trial demonstrates that battery electric timber trucks can be effectively integrated into the forestry supply chain.

However, full integration remains challenging, primarily due to the limited availability of charging infrastructure, particularly at forest-access points and remote locations. Vehicle configurations must also be compatible with existing body, trailer, and timber load practices.

And advice to peers in Ireland?

It is recommended that operators map their haulage flows to identify the segments of their supply chain most suited to BEV heavy goods vehicles, such as routes with return-to-base operations, predictable scheduling, and reliable charging access.

Body, trailer, and payload configurations should be optimised for BEV operations, taking into account battery weight to ensure that payload capacity and revenue potential are not unduly compromised.

1 https://www.forestry.gov.scot/publications/net-zero-timhaul-progress-report-2024

Depot infrastructure and logistics must also be adapted to support electrified haulage. Vehicles should ideally complete their shifts at sites equipped with charging facilities, or have intermediate charging options planned into their schedules. Early engagement across the forestry supply chain, including forest owners, haulage contractors, sawmills, and ports, is essential to align charging availability, turnaround times, and vehicle scheduling within the BEV operational framework.

Insight provided by:
Suzanne Irvive,
Creel Maritime

Leveraging expertise from ZEVI

ZEVI is a key stakeholder facilitating the HDV Electrification Pathway Working Group. The purpose of the Group is to:

- **Ensure strong industry input into the development of a HDV Electrification Pathway**
- **Share knowledge and learnings with a view to progressing HDV electrification**
- **Investigate barriers to the uptake of zero emission heavy duty vehicles**
- **Establish the strengths and opportunities for the roll out of HDV infrastructure**
- **Identify domestic and international case studies that provide opportunities for further knowledge sharing.**

The Working Group was tasked with producing a report for ZEVI. The objective of the Report is to support the electrification of the heavy-duty fleet in Ireland and offer practical solutions and a pathway towards 2040.

The report, entitled "HDV Electrification Pathway: Navigating the Path to Heavy Duty Electrification in Ireland" (2) was published in Q1, 2026. Its recommendations include:

- Promoting the grants and infrastructure supports available
- Supporting strategic depot and corridor charging infrastructure
- Encouraging long-term funding certainty through multi-year CAPEX-focused incentives.
- Supporting workforce upskilling and safety training.
- Enhancing stakeholder communication through transparent data, pilot projects, and peer learning

The Group's work stresses that accountability from industry itself through collaboration, partnership and data collection is vital. It also highlights the incentives currently available to support HDV electrification, including financial support.

The transition to electric will require significant investment. Clear, tailored incentives and targeted supports can help businesses make the move. By turning policy goals on carbon, into actions, financial support can give operators the confidence to invest in cleaner fleets. Learning from the aforementioned international projects is key. Ireland's approach should:

- **Prioritise depot charging for predictable routes**
- **Plan shared hubs at ports and logistic nodes**
- **Prepare for Megawatt Charging Systems (MCS) adoption for long haul HDVs. This will be critical for long haul routes and should be integrated into future planning for Ireland's ports and motorways**
- **Consider smart charging and energy management to minimise grid stress.**

And advice to stakeholders devising the first log haulage BEV pilot?

- **Based upon the HDV Electrification Pathway Working Group's insights, the Log haulage sector should:**
- **Research critical insights into the performance, infrastructure needs and cost-effectiveness of these technologies**
- **Establish the fuelling and charging infrastructure needed to support adoption and development of supply chain technologies and scalable solutions for the wider log haulage sector.**

When the pilot scheme is up and running, it should aim to demonstrate the feasibility of battery-electric trucks in real-world applications.

zevi Zero Emission Vehicles Ireland

2 https://www.zevi.ie/hdv-electrification-pathway-report

Lowering emissions beyond alternative fuels

This section highlights how heavy-duty fleet operators can adopt technology and training to drive the sustainability agenda in their day-to-day operations.

Key takeaways

- **Consider an academic study that identifies the development of best in practice logistics optimisation tools to support the development of a business case to procure a solution**
- **Establish the most feasible method of implementing an eco-driver training programme that ensures the introduction of eco-driving for all log haulage drivers**

The Haulage Logistics & Telematics Project (HLT)

The HLT Project was initiated to deliver improvements to Coillte's existing systems that manage the process of timber removal from the forest to the mill. Coillte in collaboration with Log Haulage Operators, Trimble and VIACHAIN, developed a solution that evolves to meet current and future business requirements. HLT is Coillte's end to end managed logistics and telematics system that integrates electronic Timber Removal Permits (eTRP/TRP), geofenced in-cab workflows, real-time telematics and automated weighbridges. It is delivered through Trimble Forestry's WSX platform (including WSX Mobile on in-cab devices) and VIACHAIN's fleet telematics, forming the operational backbone of Coillte's Connected Forest strategy that will underpin opportunities for reducing emissions via initiatives such as Logistics Optimisation, Forestry Logistics Heatmap development and Eco-Driving.

Optimisation through advanced analytics

Optimisation through advanced analytics represents a core enabler of decarbonisation in forestry logistics. The integration of digital data streams with mathematical optimisation allows for more intelligent deployment of haulage assets and measurable reductions in emissions per tonne delivered (2). Unlike traditional scheduling methods, advanced analytics provide continuous feedback on fleet utilisation, travel patterns, and load balance, turning operational data into dynamic business intelligence.

The forestry sector lends itself particularly well to this approach because of its stable network of forests, mills, and ports, which supports repeat data patterns and reliable model calibration (2).

When analysed through optimisation frameworks, this data reveals inefficiencies such as empty running or prolonged turnaround times, enabling targeted interventions that improve energy productivity and cost performance (3).

Optimisation through analytics therefore acts both as a short-term operational lever and as a long-term enabler of a smart, low-carbon transport system for Ireland's forestry sector.

Methodological considerations: prescriptive analytics and AI integration

The methodological foundation for optimisation in forestry logistics builds upon multi-objective mixed-integer linear programming (MOMILP). In this context, the model seeks to minimise fuel-related emissions per tonne-kilometre while maximising fleet utilisation and service reliability. Reviews of hybrid simulation–optimisation frameworks (4) have demonstrated how multi-objective mathematical programming can be integrated within complex, data-driven decision environments.

Recent advances in prescriptive analytics extend this foundation by embedding artificial intelligence (AI) and machine learning (ML) within optimisation loops. A systematic review (5) identifies a growing use of hybrid and multi-stage AI–optimisation frameworks in logistics. By combining forecasting modules with mathematical programming, logistics systems can achieve more responsive and energy-efficient operations, an approach directly relevant to forestry-haulage decarbonisation. Key methods relevant to forestry-logistics optimisation include:

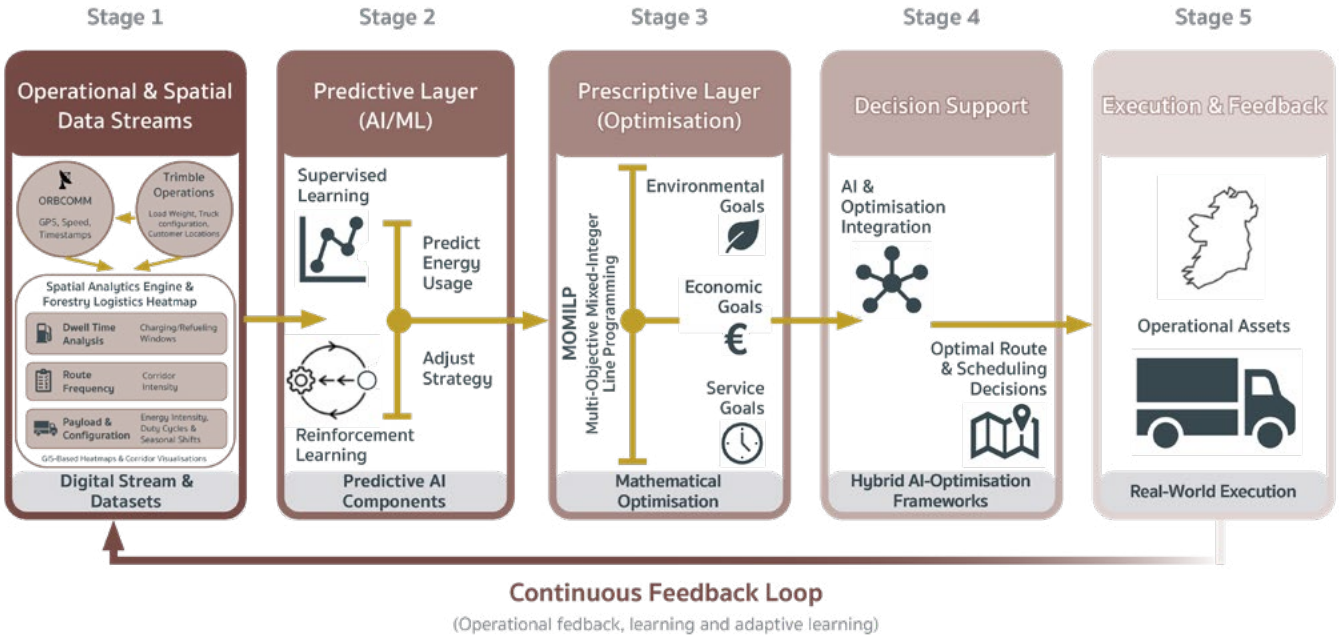
- Supervised learning: predicting trip-level energy use from route, load, and weather variables to support emissions forecasting (1).
- Reinforcement or adaptive learning: dynamically adjusting routing and scheduling strategies based on operational feedback loops, consistent with adaptive and circular optimisation principles (3).
- Metaheuristic optimisation algorithms: such as genetic algorithms or ant-colony optimisation, widely used to efficiently explore large, nonlinear decision spaces in supply-chain logistics (6).
- Hybrid MILP–ML frameworks: combining deterministic optimisation with adaptive learning to support near-real-time decision-making in complex transport systems (4) (5).

These methods collectively align with the continuing evolution of simulation–optimisation integration, where algorithmic models are validated within digital-twin environments. Such integration allows decision-makers to test alternative decarbonisation strategies under realistic operating conditions, strengthening system resilience and policy credibility.

Dr John Crowe
with additional support from **Declan Allen**, Head of Discipline for Logistics, Supply Chain and Project Management.

School of Business Technology, Retail, and Supply Chain - Faculty of Business - TU Dublin

References 1 to 6 (see page 60)



Approved Eco-Driving for HGV's

Background

The Freight Transport Association of Ireland (FTAI) conducted a series of Eco-driver training sessions as part of a pilot initiative aimed at promoting sustainable and efficient driving practices within the log haulage sector. The course was delivered in accordance with the standards set out by the Department of Transport's Eco Driver Training Programme.

Objectives

The objective of this initiative was to assess current driver capabilities and demonstrate the real-world benefits of Eco-driving, including improved fuel efficiency, reduced emissions, enhanced operational performance and increased road safety in the Log haulage industry.

Data analysis

Data was compiled for the three weeks immediately pre and post training as well as during the initial training, see below.

Session 1 recorded the drivers current driving style whilst Session 2 was under coaching conditions.

Data analysis from telematics over the pre and post training period. Telematics data obtained from the VIACHAIN telematics system was analysed for the three weeks prior to, and post training.

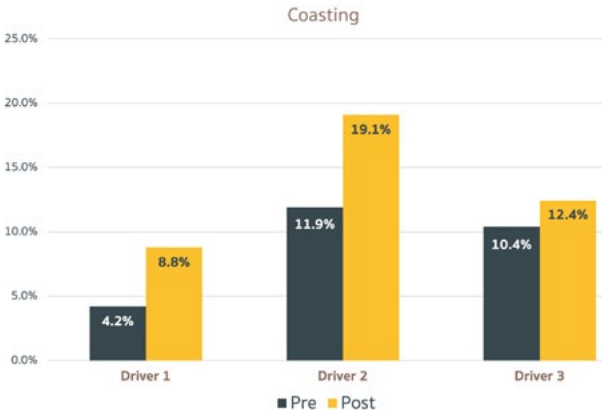
The table below outlines the results.

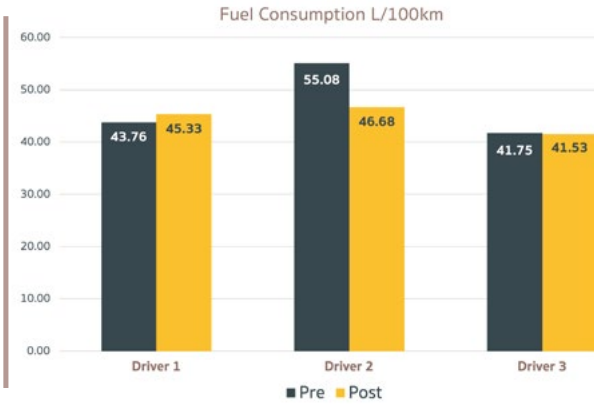
Coillte - HGV Driver Training Pilot Results 2025

	Driver 1		Driver 2		Driver 3	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Fuel used / Litres	21.30	19.70	37.03	33.53	11.98	8.28
Litres / 100km	31.0	28.7	52.9	48.6	44.4	34.5
Saving fuel	1.6 Litres		3.5 Litres		3.7 Litres	
Saving Litres / 1000 km	2.3L/100km		4.3L /100km		9.9L/100km	

Fuel savings

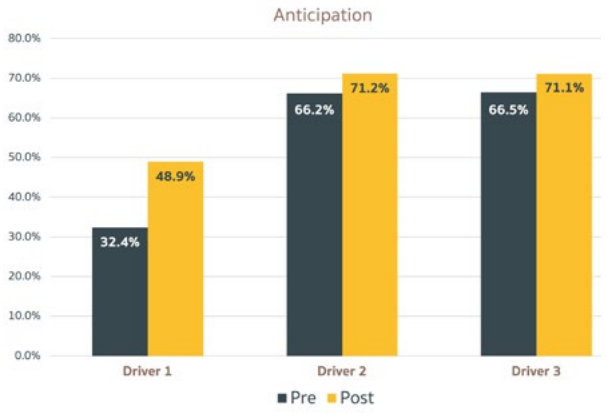
- The use of coasting as a fuel saving skill increased (When the accelerator is not depressed no fuel is injected into the engine, yet momentum is maintained).
- The litres per 100km (A fuel usage metric under, United Nations Economic Commission for Europe, GLEC framework, & EN16258) is generally lower for the driving element however this data must be carefully analysed as the idling due to use of the PTO can give incorrect readings if this is not taken into account. The VIACHAIN system can separate the two.
- There was a reduction in harsh acceleration which was another key metric in the driver's fuel saving skill-set covered under the Eco driver training programme, leading to an overall reduction in fuel use.

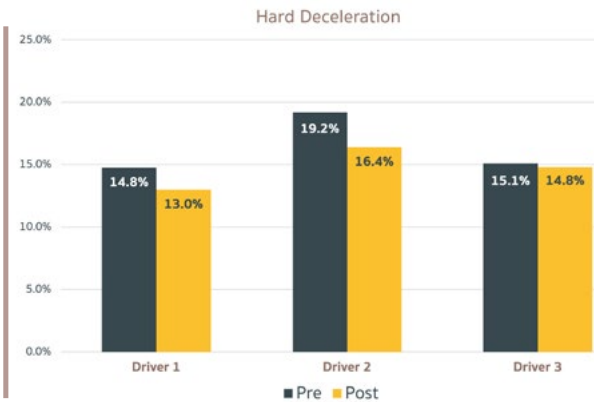




Road safety

- Anticipation scores increased indicating that drivers displayed increased awareness of the changing dynamic environment in which they operate and reacted appropriately.
- A combination of increased anticipation and a reduction in harsh braking events showed an increase in observation and anticipation thus an increase in road safety and leading to a reduction in vehicle maintenance costs and wear and tear on the vehicle over the longer term.
- There was a significant reduction in all metrics measuring sudden deceleration showing an improved driving style focused on defensive driving and overall safety.





Data analysis summary

The following figures are averaged out over the three drivers

- The use of coasting as a fuel saving tool increased from 8.83% to 13.40%
- The Percentage of over-revving incidences were reduced over the recorded period.
- The Percentage of harsh acceleration incidences reduced overall.
- General Braking incidences reduced from 150 incidences per 100km to 119 incidences per 100km.
- Anticipation scores increased meaning drivers were paying more attention to vehicle movements ahead of them.
- Idling remained level due to the nature of the work (Use of PTO for crane operations).
- Fuel consumption reduced from 46.79 L/100km to 44.51 L/100km an average sustained reduction of 2.27 L/100km. (Average in general haulage is 3.2L/100km, the cross country / off road element reduced this).

The log haulage sector is highly demanding, where safety is paramount for both drivers and operators.

Eco-driver training not only improves safety but also reduces fuel consumption, lowers maintenance costs, and minimises environmental impact through decreased CO_2 emissions. The following points should be noted from the training carried out:

- All drivers responded positively to the training, as reflected in the course feedback forms. They demonstrated strong engagement, professionalism, and openness to the concepts presented.
- The training highlighted the practical benefits of Eco-driving, including improved fuel efficiency, reduced emissions, and enhanced operational performance - evidenced by fewer instances of harsh braking and acceleration, as well as lower fuel consumption measured in litres per 100 km, the international benchmark for Eco-driving success.

Other relevant information:

Leveraging the VIACHAIN system and fuel monitoring will streamline scope emissions tracking, making compliance reporting more efficient.

- It is essential for the continued success of any Eco-driver training programme implemented that driver metrics are monitored and drivers debriefed regularly.
- Communication and engagement with stakeholders and partners are essential for the success of the scheme.
- Operators implementing Eco driving should be encouraged to sign up for EcoFleet to avail of a cash payment based on fuel savings, currently €2,000 per 10,000 litres saved.
- FTA Ireland is the sole approved body authorised to deliver the Department of Transport's Eco-Driver Training Standard course, which is listed among the subsidised programmes under CILT Skillnet.
- Eco-driver training forms a key component of the Government's 10-year haulage strategy, designed to enhance efficiency, raise standards, safeguard employment, and support the transition of the road freight sector to a low-carbon future.

It is recommended that this training be extended to all forestry subcontractors. Feedback gathered through the ongoing audit process indicates strong support for wider implementation. It should also be noted that many contractors further outsource work to other hauliers, amplifying the potential impact of this initiative.

Refer to additional data tables and fuel saving calculations in the *Appendix and references* section at the end of this report.

Pilot co-ordinated by:

Paul Maguire
Training Manager
FTA Ireland

Two steps to measurable fleet savings

Eco Driver Training + EcoFleet reporting

FTA Ireland

Save fuel.
Cut costs.
Reduce driver risk.
Reduce emissions.

Eco Driver Training delivers real operational improvements for fleet operators which include; reduced fuel use, lower maintenance costs, and improved on-road safety.

Eco driving isn't about slowing down – it's about driving smarter. By using efficient driving techniques, drivers enhance their situational awareness, reduce fuel consumption, and improve overall driving performance.

Integrating **Eco Driver Training** with **Ecofleet** enables operators to maximise fuel-efficiency gains by being rewarded for the fuel they don't consume. Together, these programmes form a strategic pillar of any fleet operator's fuel-saving and sustainability action plan.

Step 1: Eco Driver Training

Driver up-skilling, which results in behavior changes that reduces fuel use, improves road safety, reduces driver stress, and reduces operator risk.

- Average fuel savings of 8%
- Lower operating and maintenance costs
- Safer driving through better observation and anticipation.
- Reduced emissions and stronger sustainability performance
- Approved by the Department of Transport (HGV Eco Driving Training Standard)

Step 2: EcoFleet reporting

Measurement + reporting that keeps improvement on track.

- Establish a baseline and set improvement targets
- Track post-training change (e.g., L/100km, idling, events)
- Identify coaching needs to lock in long-term gains
- ESG-ready evidence for customers, tenders and internal reporting

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Alternative fuels

This section of the report provides an introduction and overview of four alternative fuels to traditional diesel and begins by laying out the key 'asks' of each fuel, as Ireland's log haulage sector looks to progress towards a sustainable future.

Key Takeaways

- **HVO – Develop a business case for the introduction of a Sustainable Fuels Scheme that delivers a win-win for the fuel supplier (increased market share) and the haulage contractor (access to HVO via Fuel Card and Bulk Delivery at a reduced cent per litre rate)**
- **ELECTRIFICATION – Establish a business case to design and procure Ireland's first electric Log Haulage truck, trailer and crane combination**
- **BIOMETHANE – Conduct a limited trial of a Biomethane truck, trailer and crane combination**
- **HYDROGEN – Post delivery of the Forestry Logistics Heatmap and an electrification trial, establish the demand case for hydrogen**

HVO

Establish a Sustainable Fuels Scheme

Ireland's log haulage sector asks HVO suppliers to evaluate the potential of developing a Sustainable Fuels Scheme, offering both fuel card access and bulk delivery options to participating log haulage contractors. The scheme would need to deliver a clear unit cost advantage, e.g., discounted cent per litre vs. standard HVO rates at agreed volumes, while guaranteeing ISCC (or equivalent) sustainability certification and traceability for all HVO supplied.

Success would include a contracted supply pathway (with geographic coverage matching harvesting clusters). The business case will need to demonstrate supplier market share growth aligned with an agreed discount ladder.

Electrification

Design and procure Ireland's first electric log haulage truck, trailer and crane

Electric stakeholders must prepare a business case to pursue a procurement contract with an OEM/ integrator consortium for a fit-for-purpose electric tractor/truck, self-loading crane, and forestry trailer tailored to Irish axle weight, bridge, and road constraints.

The business case will need to include a validated duty cycle model (gross weight, gradients, forest road access, crane energy use, backhaul assumptions) and a charging strategy (depot/DC fast charging and, where feasible, on route options) with secured grid capacity and delivery plan.

Biomethane

Establish a limited truck, trailer and crane trial

Stakeholders should establish a data-rich operational trial of a biomethane powered truck with forestry trailer and self-loading crane that validates real world fuel economy, payload productivity, uptime, refuelling practicality, and well-to-wheel CO_2e savings. The trial will need guaranteed biomethane supply, refuelling access along priority corridors, and training for drivers and workshop staff.

It will establish what is comparable or acceptable torque and crane cycle performance versus diesel under typical forest road conditions, with no material detriment to maintenance intervals or cold-weather reliability.

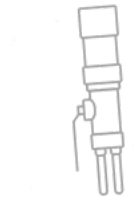
A final report should present a TCO comparison, sensitivity analysis (fuel price, certificate premiums, station access), safety case validation (high-pressure gas systems), driver acceptance scores, and an implementation pathway that identifies minimum viable station density, priority geographies, and conditions under which biomethane can scale in the forestry segment.

Hydrogen

Demand case post-heatmap and electrification trial

Ireland's log haulage sector requires a quantified hydrogen demand case grounded in the completed Forestry Logistics Heatmap (defining spatial and temporal energy demand) and observed electrification performance (identifying duty cycles not addressable by battery electric due to range, payload, dwell times, or terrain). It will need to include site short-listing for H_2 refuelling aligned to timber flows, a techno-economic model (CAPEX/OPEX of stations, green vs. blue H_2 pathways, compression / dispensing options), safety and permitting roadmap.

The output provides a credible pathway to scale for segments where hydrogen offers net operational and emissions advantages over other alternatives.



BIOMETHANE

HVO

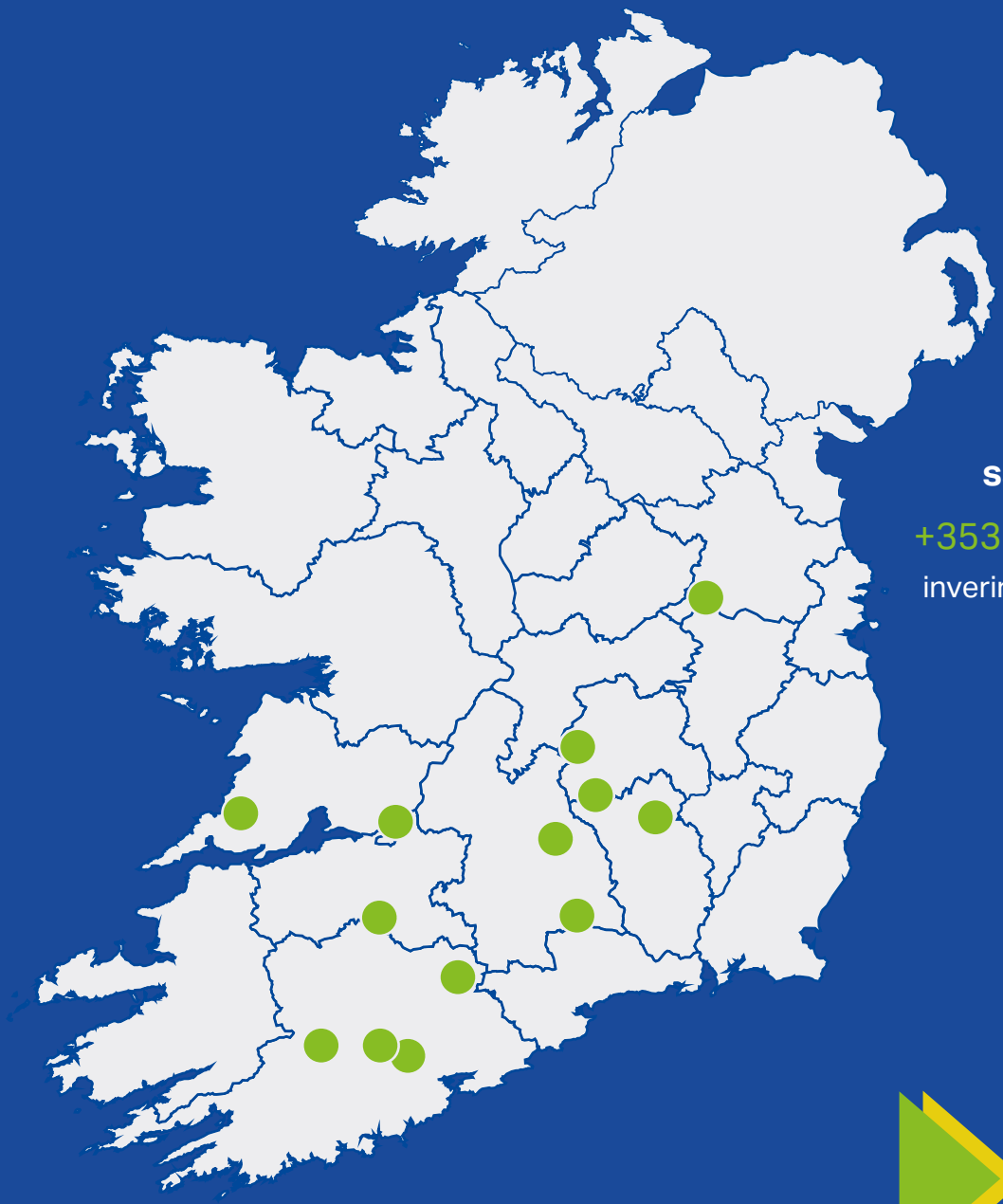
HYDROGEN

ELECTRIC

Reduce your carbon emissions by up to 90% compared to conventional diesel.

inver HVO

Renewable Diesel



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HVO

Immediate emission savings with HVO

As Ireland transitions to lower-carbon energy, renewable fuels will play a key role in reducing greenhouse gas emissions, particularly across hard-to-abate sectors. Forestry, agriculture and commercial haulage fleets are industries where heavy-duty operational demands and infrastructure limitations have affected the shift to alternative energy solutions such as electrification. Renewable fuels such as Hydrotreated Vegetable Oil (HVO) and biodiesel, present an immediate solution.

HVO also known as renewable diesel, is a readily available and practical fuel solution that can be easily adopted and can support industries reliant on heavy duty vehicles to start reducing their emissions immediately.

HVO can be used in existing diesel vehicles and equipment, without needing engine or infrastructure modifications, and delivers up to 90% reductions in greenhouse gas emissions compared to conventional diesel. Switching to HVO can support businesses to achieve their decarbonisation goals without compromising operational efficiency.

What is HVO?

HVO is an advanced biofuel produced from waste-derived raw materials such as used cooking oil, agricultural residues and non-food crops. Meeting EN 15940 standards for paraffinic diesel,

HVO can be used as a 100% replacement for conventional diesel or blended at any ratio, with many Original Equipment Manufacturers (OEMs) already approving its use.

HVO for hard-to-decarbonise sectors

HVO is stable in storage, has an extended shelf life and requires less seasonal additives than conventional diesel to perform well in all weather conditions. In industries such as forestry and log haulage, HVO can be adopted immediately in diesel vehicles and equipment without the need for investment in new technology or modifications to vehicles and refuelling procedures, ensuring minimal operational impact.

HVO supplied by Inver

The HVO supplied by Inver is sourced through sustainable supply chains, ensuring traceability and compliance with EU regulations. HVO is available at selected forecourts and for delivery directly to commercial sites from Inver's jointly owned Foynes terminal, making it a reliable, convenient fuel solution.

Daniel Fitzpatrick,
Commercial Director,
Inver Energy


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Electric

Battery technology is rapidly advancing

Since the publication of the *Decarbonising the Road Freight Sector report* in 2024, adoption of eHDV's across Europe has continued to grow at a substantial rate. Most notable at present are Dascher who are operating over 140 electric trucks across Europe and who have most recently added seven eActros 600 Long-Haul trucks to the fleet with the expectation that, inclusive of mandated driver rest breaks they expect to cover well over 1000km/day ; and DFDS who, as of October '24 were operating 115 eHDV's with another 110 ordered and have already covered 1.2 Million Miles in the first half of that year. All of which is to say that eHDV have shifted from being a great idea but only practical in limited circumstances, into being real-world useful in many roles. This is largely down to rapid and ongoing improvement in battery technology leading to increased range and reliability at reduced price – the energy density of principle battery chemistry for eHDV's, LFP (Lithium Iron-Phosphate) has been increasing rapidly, up 20.0% over just the last three years ; and owing to even greater improvements in LFP's well documented advantages in terms of stability and longevity, battery manufacture confidence in their product is also growing with CATL now advertising batteries with 15year, 1.5Million km warranties! The combination of these factors, along with constantly increasing production, has led to traction battery prices in China dipping below $100/kWh towards the end of last year and Bloomberg forecasting further reductions through 2025 whilst Goldman-Sachs anticipate the market hitting $80/kWh as early as 2026. All of which means cheaper, more reliable, longer-range trucks coming to the market all the time.

Building infrastructure should be the focus

So, what implications does this all have for the role of eHDV in forestry operations? Well, the principal point is that the trucks are well capable. They have the range and the power, and the prices are on the way to where they need to be – what we don't have is the infrastructure to support them, and that is where the work needs to be done now. As opposed to more general haulage however, forestry benefits from being a very well-defined use case as we know where the Forest Harvesting Blocks are; where the Sawmills are; what the most trafficked routes are and what the harvesting schedule is. What all of this means is that we can readily determine the endurance required in these trucks to meet the requirements of any given site, and we can quite easily contrast and compare this requirement against what can be achieved with the options on the market today. The most logical approach in this regard seems, intuitively, to centralise the recharging infrastructure at the most trafficked locations rather than trying to bring it into every site. Considerations required in this regard will include availability of power, the extent of the resource required and the phasing of trucks through these locations with least impact to haulage routes and schedules. None of these are unique problems, in fact these are the key concerns throughout the industry however the data available to forestry haulage through Trimble and VIACHAIN present unique advantages to the sector over the industry as a whole – and may even present co-benefits to the broader fleet by forming the basis for the development of infrastructure across the country.

Sustainable energy generation can drive success

So, with all of that good news out of the way, we reach the fly in the ointment. Grid connections are expensive, as are land, chargers and the works required to install them. What this means is that in order for the price of the energy at these sites to be useful to eHDV operators, the cost of the energy itself needs to also be low. The best way to achieve this is to include sustainable energy generation as part of the site (read: Solar and/or wind), or with the appropriate legislation, to draw in private wires from offsite generating assets to achieve the same effect and there is legislation pending at present to permit their use [(1)]; and either the space required for the former or proximity to offsite opportunities in the case of the latter, should also be considered when selecting a site for this infrastructure.

Seán O Callaghan,
Lead Project Delivery Manager - Ireland
Source - EV

1 https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/private-wires-policy-statement/

Gas Networks Ireland

RENEWABLE GAS

Biomethane

Moving Ireland's energy

We're working to bring more sustainable energy into our network.

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BioCNG is a cleaner and efficient alternative transport fuel for Ireland's heavy commercial trucks producing up to 90% less carbon emissions than diesel.

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Biomethane

Decarbonising log haulage with CNG and BioCNG

As Ireland intensifies its efforts to meet climate targets, the decarbonisation of the heavy-duty vehicle (HDV) sector, particularly in industries like log haulage, has become a national priority. Among the most promising alternatives to diesel as a fuel for the HDV sector are compressed natural gas (CNG) and its renewable counterpart, biomethane (bioCNG).

These fuels offer a practical, scalable, and low-emission pathway for reducing the carbon footprint of timber transport.

An established refuelling network

In 2025, Gas Networks Ireland delivered its ninth public CNG station, significantly enhancing accessibility for heavy duty vehicle operators across the country. These high-capacity, fast-fill stations are strategically located to support long-haul routes, including those used in forestry logistics.

The development of these stations is part of Gas Networks Ireland's broader Causeway Project, which also included the development of a renewable gas injection facility and a CNG vehicle fund to support fleet transitions. This infrastructure is crucial for enabling the widespread adoption of CNG and bioCNG in sectors such as log haulage, where vehicles often operate in rural and remote areas.

Biomethane (BioCNG): a renewable game-changer

While switching from diesel to CNG alone already offers a c.20.0% reduction in CO_2 emissions, bioCNG produced from organic waste via anaerobic digestion - can reduce emissions by up to 90.0%. This makes it one of the most effective low-carbon fuels currently available for HDVs. BioCNG is chemically identical to CNG, allowing it to be used in the same vehicles and infrastructure without modification.

The use of renewable gas in Ireland is tracked through the Renewable Gas Certification Scheme, administered by Gas Networks Ireland, which ensures traceability from production to end-use. This system allows fleet operators to claim verified emissions reductions, a critical factor for sustainability reporting and compliance with EU regulations.

Comparative advantages over other alternatives

CNG and BioCNG offer:

- Immediate availability: Ireland's CNG refuelling network is already operational.
- Lower total cost of ownership: Fuel and maintenance costs are generally lower than diesel.
- Vehicle technology: Scania and Iveco have introduced new 6x2 CNG trucks, offering the power and torque required for heavy loads. These vehicles are viable alternatives to diesel trucks, even in the most challenging forestry environments.
- Minimal operational disruption: Refuelling times are comparable to diesel, and vehicle range is sufficient for long-haul routes (600km range and growing for new dedicated gas vehicles).
- Scalability: Gas Networks Ireland plans to further increase the numbers of CNG stations across the country, making this critical infrastructure available in more locations and on more routes.

Conclusion

CNG and bioCNG represent a mature, cost-effective, and environmentally sound solution for decarbonising Ireland's log haulage sector. With infrastructure expanding, vehicle technology advancing, and renewable gas becoming increasingly available, now is the time for organisations to act. By integrating bioCNG into its logistics operations, Ireland's forestry sector can not only reduce its carbon footprint but can also demonstrate leadership in sustainable transport.

Fran McFadden,
Customer Acquisition Manager,
Gas Networks Ireland

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2 Heavy-Duty Vehicles', European Commission, accessed August 2025
3 HyHaul to roll out UK's first hydrogen HGV refuelling corridor', FleetNews, accessed August 2025
4 IVECO delivers two S-eWay Fuel-Cell trucks to BMW', IVECO, February 2025
5 Hydrogen on the Horizon', V.D.VList, Accessed August 2025
6 MAN expands its zero-emission portfolio', MAN, April 2024

Hydrogen

Decarbonising the forestry sector

Renewable hydrogen, produced using electrolysis powered by renewable energy sources, is a necessary energy vector to deliver emissions reductions. Hydrogen both supports the integration of renewable energy sources into the power grid by acting as a flexible source of demand, and the abatement of hard-to-reach sectors, where direct electrification is challenging.

The advantages of Hydrogen

Hydrogen can be used in a fuel cell or in an internal combustion engine to provide power with zero CO2 emissions at the tailpipe. The only other solution able to similarly offer zero CO2 tailpipe emissions today is battery electric technologies. Hydrogen as a fuel offers high energy density, short refuelling times, and can be flexibly transported to temporary end-use sites, fulfilling the needs of applications where battery electric solutions are not able to meet operational requirements. Hydrogen is therefore best suited to mobility use cases with the need for: 1) Long ranges or heavy loads: due to its high energy density, hydrogen can outperform battery electric options in heavy-duty use cases, achieving less frequent refuelling needs 2) Fast recharging: not only do hydrogen solutions require fewer refuelling stops than battery solutions, hydrogen also offers a fast-refuelling solution for applications where time for refuelling / recharging is limited. 3) Off-grid power: Certain end-use sites cannot access the charging infrastructure or grid capacity to deploy battery electric options: hydrogen offers a flexible refuelling solution for temporary or grid-constrained sites.

A strong use case

These needs are prevalent within forestry vehicles and machinery, which present a strong use case for hydrogen technologies, including: 1) Non-Road Mobile Machinery (NRMM), a broad category which includes mobile machinery and transportable industrial equipment or vehicles, used in sectors such as agriculture, construction, and forestry. Construction equipment manufacturer JCB has developed a range of hydrogen-powered NRMMs (1), which are suited for decarbonising high-power applications and work in remote locations. 2) Trucks are widely used in forestry for the transportation of timber. The EU's Heavy-Duty CO2 Standard requires HDV manufacturers to reduce their fleet-wide emissions by 90.0% by 2040 (compared to a 2019 baseline), driving the development of hydrogen trucks.(2) Under this legislation, only battery electric and hydrogen solutions are to be classed as zero emission vehicles. 3) A number of HDV manufacturers are currently demonstrating hydrogen solutions. Scania has developed a right-hand drive hydrogen truck and will provide up to 30 hydrogen fuel cell trucks to the UK's first hydrogen refuelling corridor under the HyHaul Project. (3) Iveco has recently delivered hydrogen trucks to BMW and HyLane under the H2Haul project, (4) and MAN has developed a hydrogen combustion engine truck, with deliveries starting from 2025. (5)(6) 4) Hydrogen usage in mobile power enables the direct replacement of diesel generators with hydrogen powered alternatives, providing zero-carbon power to temporary sites with limited access to electrical infrastructure.

A long-term solution

Hydrogen is expected to be a key long-term solution for forestry vehicles and machinery with long ranges, heavy loads, and limited recharging time, and/or with limited access to recharging infrastructure. The development of hydrogen technology, production, and supply chains across NRMM, trucks, and mobile power, alongside increasingly stringent decarbonisation requirements, will facilitate the transition of forestry vehicles and machinery to hydrogen technology. In the short to medium term, whilst hydrogen alternatives are developed for the forestry sector, biofuels are likely to be used to support attainment of decarbonisation targets. While the drop-in nature of these fuels supports accelerated uptake, hydrogen offers advantages in terms of diversification of feed-stocks and will be a necessary complimentary technology in order to meet the level of demand to achieve net zero.

Hannah Bryson-Jones,
Director,
Delta H Consulting
& Hydrogen Mobility Ireland Secretariat

Appendix and references

Coillte Log Haulage Activity 2024 - 2025 *(as referenced on page 18)*

Date	Truck Movements	Net Tonnage Uplifted	m3 Uplifted	Net Tonnage Uplifted per Movement	m3 Uplifted per Movement
Jan-24	8,050	225,209.1	247,830.4	28.0	30.8
Feb-24	8,984	250,666.8	275,252.3	27.9	30.6
Mar-24	8,610	239,576.8	265,487.6	27.8	30.8
Apr-24	9,460	262,687.7	295,490.5	27.8	31.2
May-24	9,255	256,749.2	296,664.3	27.7	32.1
Jun-24	7,700	212,224.4	252,713.3	27.6	32.8
Jul-24	7,957	219,850.8	263,413.5	27.6	33.1
Aug-24	6,055	167,123.8	198,693.2	27.6	32.8
Sep-24	6,960	192,195.8	226,543.1	27.6	32.5
Oct-24	7,807	216,038.0	249,337.5	27.7	31.9
Nov-24	7,785	216,854.8	244,773.4	27.9	31.4
Dec-24	5,570	155,262.7	172,302.8	27.9	30.9
Jan-25	7,027	196,423.1	215,972.9	28.0	30.7
Feb-25	8,334	232,072.8	256,130.4	27.8	30.7
Mar-25	8,584	239,534.2	270,837.1	27.9	31.6
Apr-25	8,333	232,412.8	271,421.4	27.9	32.6
May-25	7,980	221,221.9	264,899.8	27.7	33.2
Jun-25	7,283	202,469.1	243,611.2	27.8	33.4
Jul-25	7,436	205,629.9	249,601.4	27.7	33.6
Aug-25	6,885	190,122.2	234,179.8	27.6	34.0
Sep-25	8,030	223,881.2	268,201.2	27.9	33.4
Oct-25	8,226	230,988.2	272,039.2	28.1	33.1
Nov-25	7,787	219,650.1	252,489.7	28.2	32.4
Dec-25	6,414	180,708.1	203,285.4	28.2	31.7

Source: Trimble

Coillte - HGV Driver Training Pilot Results 2025

Annex A

Driver data from the VIACHAIN system for the three weeks prior to and three weeks post training.

	Hard Accel (%)	Hard Decel (%)	Anticipation (%)	Coasting (%)	Brake (per 100)	High Speed Brake (per 100)	Driving - Fuel (Consumption) L/100 km	Fuel (Consumption) L/100 km
Driver 1 - Pre	2.33	14.75	32.39	4.2%	101.3	37.8	40.86	43.76
Driver 1 - Post	2.12	13.01	48.93	8.8%	97.4	30.2	42.47	45.33
Driver 2 - Pre	5.57	19.2	66.21	11.9%	209	43.1	43.91	55.08
Driver 2 - Post	4.49	16.42	71.22	19.1%	127	30.4	41.49	46.68
Driver 3 - Pre	3.34	15.1	66.58	10.4%	141	59	40.35	41.75
Driver 3 - Post	3.26	14.81	71.13	12.4%	134.5	55.9	39.62	41.53

Annex B

To determine how this training would save fuel in the company you should use the following formula:
Saving [Annual litres x Price] = €

To work out the CO_2 savings you should use the following formula:
Total diesel used(litres) x2.7 = CO_2kg

To work out the CO_2 savings from HVO you should use the following formula:
Total HVO used(litres) x0.195 = CO_2kg

Annex C - Coillte HGV Pilot

	Driver 1		Driver 2		Driver 3	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Odometer start	160423	160492	204181	204251	60615	60642
Odometer finish	160492	160561	204251	204320	60642	60669
Distance	69	69	70	69	27	27
Start time	12:28:48	14:24:00	12:56:00	14:25:00	16:00:00	16:35:00
Finish time	14:10:00	15:41:00	14:08:00	15:40:00	16:27:00	16:59:00
Time taken	70	77	64	75	27	24
Gear changes	Automatic	Automatic	Automatic	Automatic	Automatic	Automatic
Fuel used	21.30	19.70	37.03	33.53	11.98	8.28
L/100 km	31.0	28.7	52.9	48.6	44.4	34.5
Saving - fuel	1.6 Litres		3.5 Litres		3.7 Litres	
Saving - L/100 km	2.3L / 100 km		4.3L / 100 km		9.9L / 100 km	

Note: There was heavy congestion on session 2 for driver 1 and 2 due to school traffic.

References - Page 20

(1) **VECTO** means Vehicle Energy Consumption calculation Tool a standardised way to compare HDVs, to quote https://climate.ec.europa.eu/eu-action/transport-decarbonisation/road-transport/vehicle-energy-consumption-calculation-tool-vecto_en "VECTO is the new simulation tool developed by the European Commission to determine CO_{2e} emissions and fuel consumption from heavy-duty vehicles (HDVs). As of January 2019, the use of VECTO has been gradually extended to cover an increasing number of vehicle groups: heavy lorries with standard axle configurations; medium lorries; lorries with specific axle configurations; buses and coachesA variety of mission profiles for lorries, buses and coaches have been developed and incorporated into the tool. VECTO is available as a downloadable executable file designed for use on a single computer.

(2) **Maximum Import Capacity (MIC)** (For which there is a cost to install and a monthly cost to maintain) is the upper limit on the total electrical demand you can place on the network system, so it should be high enough to meet the requirements of your business and vehicle charging. Capacity is measured in kilovolt-amps (kVA). https://www.electricireland.ie/business/help/detail/what-is-the-maximum-import-capacity-(mic) VECTO relies on characteristic parameters to determine the power consumption of each relevant vehicle component, including rolling resistance, air drag, masses and inertias, gearbox friction, auxiliary power, and engine performance. These input values are used to simulate CO_{2e} emissions and fuel consumption on standardised driving cycles.

(3) **CO_{2e}** stands for CO_2 equivalent. Can be expressed as CO_{2e} or $CO_{2e}q$. It's a calculated value for all the CO_2 emitted by burning a fossil fuel in a diesel engine or more often a power generation station.

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coming soon...

Decarbonising Forestry:
Non Road Mobile Machinery


ESTABLISHMENT


ENGINEERING


NURSERIES


HARVESTING


MILLING SECTOR

FTA Ireland

A follow up report is being produced that explores the challenges of decarbonising the NRMM nodes of the forestry supply chain such as Nurseries, Engineering, Establishment, Harvesting and the Milling Sector. For further information contact Analytiqa or FTAI, please see the contact page at the back of this report.

COILLTE

Analytiqa

Further information

- **Coillte**
https://www.coillte.ie/

- **Department of Transport**
https://www.gov.ie/en/department-of-transport/

- **Forestry Facts and News, Department of Agriculture, Food and the Marine**
https://www.gov.ie/en/department-of-agriculture-food-and-the-marine/campaigns/forestry-in-ireland/

- **Freight Transport Association Ireland**
https://ftai.ie/

- **Forest Industry Transport Group**
https://www.fitg.ie/

- **Good Practice Guide for Managing Sustainable Timber Transport**
https://www.fitg.ie/wp-content/uploads/2026/03/FITG-Good-Practice-Guide-Jan-26-Final.pdf

- **Net Zero Timhaul**
https://www.netzerotimhaul.co.uk/

https://timbertransportforum.org.uk/net-zero-timhaul-project-continues-to-demonstrate-electric-timber-haulage-in-action/

- **School of Business Technology, Retail, and Supply Chain, Faculty of Business, TU Dublin**
https://www.tudublin.ie/explore/faculties-and-schools/business/business-technology-retail-supply-chain/

- **TREE: Transition to efficient electrified forestry transport**
https://www.skogforsk.se/english/projects/tree/

https://www.skogforsk.se/projekt/tree-transition-to-efficient-electrified-forestry-transport/publikationer-och-resultat/

https://www.skogforsk.se/projekt/tree-transition-to-efficient-electrified-forestry-transport/various-information-in-english/

- **Zero Emission Vehicles Ireland**
https://www.zevi.ie/

Contact and feedback

Freight Transport Association Ireland

The Freight Transport Association Ireland CLG is a not-for-profit membership trade association for the Irish freight and logistics industry. We are wholly owned and governed by our members and act solely in advancing their best interests.

FTA Ireland covers all aspects of private and public freight transport, passenger transport and logistics supply chain, including road, rail, sea and air. Our work enhances the influence and image of the freight industry in Ireland by promoting the highest standards of safety and compliance.

Our experience and expertise in the transport industry puts us at the forefront of new information and changes to legislation, ensuring our members are the first to know about the latest developments in supply chain activity and policy.

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Analytiqa

Analytiqa assists clients across the supply chain to grow and profit in challenging and competitive markets. Analytiqa supports its clients' commercial and strategic objectives through research, analysis and actionable insight.

Analytiqa assists 3PLs and industry service providers to win new business and supports manufacturers and retailers to improve the performance of their logistics operations.

Analytiqa provides research, consulting and AEO services globally, along the supply chain, across industry verticals. Analytiqa assists clients' to better understand their 3PLs, customers or competitors, deliver market strategies, identify opportunities for service expansion or merge with, or acquire competitors.

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