An Roinn Iompair
Department of Transport

zevi Zero Emission Vehicles Ireland

HDV Electrification Pathway

Navigating the Path to Heavy Duty Electrification in Ireland

About the Working Group

The HDV Electrification Pathway Working Group was established by ZEVI to support the electrification of the heavy-duty fleet in Ireland.

Following an open invitation seeking expressions of interest, the Working Group was established with representatives from groups including the road transport and logistics sector, charge point operators, vehicle manufacturers, motor industry representatives, academia and public policy officials.

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 the following report which focuses exclusively on electrification. This is not to exclude other alternative fuels but recognises the level of maturity of the technology adoption both nationally and internationally.

In addition, the report recommendations have been developed through a collaborative process with the sector, based on detailed analysis from the sector which considered the respective merits and challenges of all alternative fuel options.

The recommendations provide potential policy measures based on the collaborative work undertaken with the sector and other key stakeholders facilitated by ZEVI.

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1. Message from the Chair

Ireland's transition to a low carbon economy requires decisive action across all sectors including transport, and in particular heavy-duty vehicles (HDVs).

The electrification of HDVs, both on-road and off-road, presents a complex but necessary challenge that will require coordinated action across government, industry, energy providers, infrastructure developers, and the wider logistics ecosystem.

The Pathway Working Group was established by ZEVI to identify the core enablers and barriers to HDV electrification in the Irish context.

The Pathway Working Group believes the transition cannot be viewed in isolation. It must be approached as a systemic transformation involving vehicle technology, charging infrastructure, energy systems, regulation, workforce and active participation of freight companies.

The transition must also be facilitated with sufficient support for low carbon fuels to ensure that the progress being made to reduce emissions now, does not stall as the systematic transformation takes place.

A Whole-System Approach is Essential

The successful rollout of heavy-duty electrification depends on understanding how each element, from vehicle types to charging networks, interacts within a broader ecosystem. Tailored solutions will be required for different segments, including long-haul freight, municipal fleets, construction, and agriculture, as well as for companies of all sizes, from small businesses to large logistics operators.

A 'one size fits all model' will not work.

Public and private stakeholders must align on the pace and scale of rollout. This includes determining how quickly grid upgrades and renewable energy generation can be deployed to meet increased electricity demand while maintaining grid stability. Strategic coordination is needed to ensure investments in charging hubs, substations, and depots occur where and when needed.

Investment, Funding and Market Stability

Transitioning to electric HDVs comes with significant upfront capital expenditure. Targeted public funding such as the ZEHDV grants, both for vehicle procurement and infrastructure, are essential to reduce early adoption risk. However, support schemes must be designed to last long enough for a viable market to emerge and must account for the realities of different vehicle classes and operating environments, including competitive electricity costs (kWh), particularly in relation to public infrastructure.

Equally important is maintaining confidence across the supply chain for service providers, vehicle dealers, and logistics operators. In addition, business models must also evolve to offer viable pathways. As the technology advances, there must be clear guidance on the Total Cost of Ownership (TCO), vehicle resale, and maintenance costs.

National Strategy Tailored to Ireland's Needs

As an island nation, Ireland requires a bespoke national strategy for HDV electrification. The strategy must consider geographic dispersion, the wide range in capacity and capability of freight companies, energy import/export constraints, and the mix of urban and rural transport needs.

While the following Report is focused exclusively on electrification, Heavy Duty Vehicle charging will be considered in Irelands National EV Charging Network Plan to support the transition to cleaner transport and meet Climate Action Plan targets.

The report will also be developed alongside other low carbon strategies as part of a broader transport decarbonisation approach.

Education and Workforce Readiness

Skills shortages within the sector will require education and upskilling to enable workforce readiness. Drivers, technicians, emergency services, and fleet managers must be trained in safety, fire prevention, and the operation of electric HDVs.

Safety standards for trailers, depots, and charging points will also be considered alongside potential legislative updates to support vehicle classification, roadworthiness testing, and data-sharing for operational efficiency.

Collaboration is the Cornerstone

A just and efficient transition requires partnership across Government, regulators and the sector, to offer clarity on long-term goals, incentives, and regulatory pathways. Following the publication of this document, stakeholder engagement will continue across the working group as part of the ongoing collaborative approach.

Industry will need to invest in innovation, workforce upskilling, and customer engagement.

The success of this transition depends on our collective ability to build cross-sectoral trust and communicate the environmental and economic benefits of electrification clearly and consistently.

With a collaborative approach, there is an opportunity for Ireland to build a competitive advantage in sustainable transport, support economic resilience, and make meaningful progress toward its climate targets.

The Working Group is confident that, by working together, we can enable a strong, practical, and future proof path for heavy duty electrification.

Des Phelan
Chair of the Pathway Working Group

2. Executive Summary

The HDV Electrification Pathway Report presents a collaborative approach to support the electrification requirements of the heavy-duty fleet in Ireland.

Developed by the HDV Electrification Pathway Working Group, the report identifies key enablers, timelines, barriers, and the actions necessary to achieve the decarbonisation of freight and transport operations, in line with Ireland's Climate Action Plan and EU Green Deal objectives.

Context and Vision

Heavy-duty vehicles represent just 5% of Ireland's road fleet but contribute over 20% of road transport emissions. With freight demand projected to double by 2050, the electrification of the sector is essential to achieving national climate targets.

The EU has mandated a 45% reduction in HDV CO_2 emissions by 2030 compared to 2019 levels and 90% by 2040, with all new urban buses required to be zero-emission by 2035.

Key Findings

- Economic and Environmental Benefits: Electric HDVs offer lower operating and maintenance costs, significant emission reductions, and improved air quality and driver welfare.
- Challenges: High upfront capital costs limited public charging infrastructure, vehicle availability constraints, and workforce readiness gaps remain key barriers.
- Opportunities: Ireland's compact geography, growing renewable energy capacity, and policy alignment with EU targets provide strategic advantages for early adoption.

Pathway to Electrification

The report proposes an integrated, system-wide approach founded on four key requirements:

- Collaboration & Partnership: Cross-sectoral cooperation among government, industry, utilities, and academia to deliver coordinated infrastructure and policy.
- Financial Support: Explore expanding schemes such as the ZEHDV Vehicle Purchase Grant and ZEHDV Infrastructure Grants, Fleet Assessment Grants, to reduce early adoption risks, and incentivise fleet investment.
- Skills & Education: Development of accredited training for key staff including drivers, technicians, and fleet managers to ensure workforce readiness.
- Policy & Legislation: Harmonisation of national regulations with EU frameworks, including planning, safety, and data standards.

Early Adopters

The Working Group identifies urban transit, regional delivery, construction, and refuse collection as the sectors most suitable for early transition due to their predictable routes and centralised depots. These sectors can demonstrate feasibility, stimulate market demand, and act as a catalyst for wider adoption.

International Learnings

In addition, case studies from France, Germany, Denmark, the Netherlands, Sweden, and the UK highlight the importance of:

- Shared high-power charging hubs at strategic corridors and ports
- Smart depot charging and energy management systems
- Demonstrator programmes to collect real-world performance data
- Megawatt charging systems (MCS) for long-haul applications

Recommendations

To accelerate HDV electrification, the report recommends:

- Promoting the grants and infrastructure supports available, targeting the early transition sectors.
- Supporting strategic depot and corridor charging infrastructure, including cross border tourism aligned with the TEN-T network, town and city development plans.
- 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 to build confidence across the sector.

In Summary

The electrification of Ireland's HDV fleet is both a complex challenge and an economic opportunity. A whole-system approach, integrating technology, funding of vehicles and infrastructure, policy, and people, will be essential. By acting decisively now, Ireland can position itself as a leader in sustainable freight, improve national resilience, and make substantial progress toward its climate goals.

3. Where are we now?

3.1 Policy and Climate Context

Europe

The European Green Deal commits to reducing greenhouse gas emissions by 55% by 2030, while the 'Fit for 55' package sets out the laws necessary to reduce these emissions and to achieve climate neutrality by 2050.

The European Commission has put in place CO_2 emission reduction targets[1] for HDVs with milestones of 2025, 2030, 2035 and 2040 in place. The targets set out the following reductions in CO_2 emission from heavy duty lorries:

- 15% reduction by 2025
- 45% reduction by 2030
- 65% reduction by 2035
- 90% reduction by 2040.

In addition, 90% of new urban buses in the EU will need to be zero emissions as of 2030 and all of them by 2035. The legislation is technology neutral, and it is for manufacturers to decide which technologies that they use to achieve these targets.

Ireland

In Ireland, the Climate Action Plan lays out the roadmap of actions which will enable us to meet our national climate objectives. Electrification of the national fleet is expected to provide the largest share of emission abatement within the transport sector in the short to medium term.

The Road Haulage Strategy 2022 – 2031[2] identifies electrification as the preferred technology for decarbonising the HDV fleet.

In 2022, Ireland became a signatory of the Global MOU on Zero Emission Medium and Heavy-Duty Vehicles. The MOU agreed to target:

- 30% of new sales to be zero emission by 2030
- 100% of new sales to be zero emission by 2040

In 2021, Ireland's Clean Vehicle Directive (CVD)[3], was transposed which mandates that Irish public sector bodies meet minimum targets for purchasing or leasing clean (low- and zero-emission) vehicles in their fleets, including cars, vans, buses, and trucks, with stricter rules kicking in from 2026 to drive the transition to green mobility in public procurement.

1 https://climate.ec.europa.eu/eu-action/transport-decarbonisation/road-transport/heavy-duty-vehicles_en

2 https://assets.gov.ie/static/documents/irelands-road-haulage-strategy-20222031-9750150b-53f9-4ce5-a5c0-592ea8a9f1ec.pdf

3 https://transport.ec.europa.eu/transport-themes/clean-transport/clean-and-energy-efficient-vehicles/clean-vehicles-directive_en

3.2 Current Trends

Europe

According to the European Automobile Manufacturers' Association, 15.9%[4] of new buses across the EU are electrically charged vehicles, 12.8% are hybrid electric, 9% run on alternative fuels, while diesel still fuels 62.3% of all buses sold in the European Union.

The share of EU electrically chargeable bus registrations increased from 16.4% in H1 2024 to 21.6%. Germany, the largest market by volume, saw an impressive 105.2% growth, while Belgium recorded the second-largest number of registrations, 523 electric buses compared to 110 in 2024.

As across Europe, Hybrid-electric bus registrations experienced a double-digit decline of 35.5%, accounting for 6.9% of the market. Diesel bus registrations declined by 6.7%, now holding a 64.7% market share, down from 66.2% in the same period last year.

In 2023, 95.7% of all new trucks across the EU ran on diesel with 2.6% fuelled by alternative fuels (e.g. natural gas, LPG or ethanol), and 1.5% electric trucks. While only 1.5% of new trucks are electric, this reflects over a sixfold increase in a five-year period.

Ireland

In Ireland, road freight vehicles make up just 5% of Ireland's road fleet but account for over 20% of road transport CO_2 emissions, reflecting a disproportionate impact similar to global trends[5] [6]. With freight demand expected to double by mid-century[7], cutting emissions in this sector will become even more challenging.

3.3 Ireland's Fleet Composition 2025

There are 66,476 vehicles registered as N2, N3, M2 and M3 in Ireland under taxation as of 31st December 2025. The number of vehicles where the power/fuel source is electric is 492 as of 31st December 2025.

Category[8]	All	Electric
N2: Vehicles designed and constructed for the carriage of goods and having a maximum mass 3,500 kg and not exceeding 12,000 kg e.g. larger vans and trucks	10,897	**115**
N3: Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 12,000 kg e.g. trucks	41,245	**50**
M2: Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat and having a maximum mass not exceeding five tonnes. Generally, this includes small buses and minibuses.	6,699	**2**

4 https://www.acea.auto/figure/buses-eu-fuel-type/ Sept 2024

5 https://www.nature.com/articles/s41598-024-52682-4

6 Number of vehicles from CSO, TFA11 - Road Freight Transport Activity

7 https://www.sciencedirect.com/science/article/abs/pii/S0967070X21001001

8 https://www.rsa.ie/services/vehicle-owners/vehicle-categories#:~:text=Vehicles%20designed%20and%20constructed%20for%20the%20carriage%20of%20goods%20and,new%20browser%20tabtested%20annually

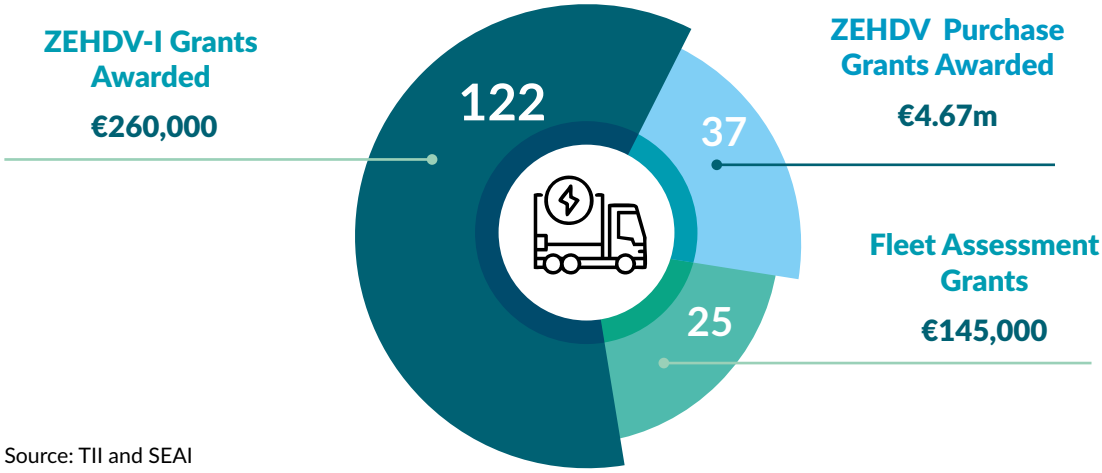
M3: Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat and having a maximum mass exceeding five tonnes e.g. large buses.	7,635	**325**
Total	**66,476**	**492**

Source: National Vehicle and Driver File (as of 31st December 2025).

3.4 Zero Emission HDV Grants

The Zero-Emission Heavy Duty Vehicle (ZEHDV) Purchase Grant Scheme is funded by the Department of Transport and administered by Transport Infrastructure Ireland. The Scheme awards grants to assist companies and enterprises who wish to buy zero-emission heavy duty vehicles (ZEHDV) which are supported by the Scheme instead of buying the diesel equivalent. Zero Emission Heavy Duty Vehicle Infrastructure (ZEHDVI) grants assist businesses with installation of charging stations at their depots, logistics hubs, and other commercial premises. A fleet assessment scheme was introduced in July 2025 and is administered by SEAI on behalf of ZEVI.

Number of grant drawdowns under the schemes:



Source: TII and SEAI

3.5 Vision for 2030 and Beyond

With EU Targets encouraging a shift to zero emission heavy duty vehicles beyond 2030, it is envisaged that there will be a significant shift to electric HDVs by the end of this decade. Analysis of Irish road freight decarbonisation suggests that by 2030, electric vehicles should make up about 10% of light trucks and 4% of heavy trucks in the overall vehicle fleet .

This anticipated transition is coupled with milestone targets under the Alternative Fuels Infrastructure Regulation which sets specific requirements for refuelling infrastructure for 2030 and beyond including:

- Boosting market uptake via continuation of vehicle incentives
- Grid integration
- HDV electrification pilots in Ireland to give real data and learnings
- Infrastructure deployment with multi modal benefits.
- Outlining vision for 2030 but setting shorter term milestones/objectives.

4. Analysis & User Profiles

4.1 SWOT Analysis

As part of the discovery process, the Pathway Working Group identified the following themes as part of an analysis of the HDV electrification of Ireland.

Strengths	Weaknesses
Cost and Efficiency • Lower maintenance and operating costs c. 30% of fossil • Most energy efficient solution for HDVs **Environmental benefits** • Significant Carbon footprint reduction • Improved air quality and noise reduction **Strategic Alignment** • Supports CAP targets and EU Green Deal objectives • Enhances corporate ESG/CSR performance and reputation **Geographical Advantages** • Irelands size and relative short distances suits EV ranges **Energy and Technology** • Potential for renewable energy integration for sustainable charging • Opportunities for V2G and energy recovery **Operational Benefits** • Suitable for many operators, especially predictable routes • Positive impact on driver / passenger welfare	**High Upfront Cost** • Vehicle and infrastructure require significant capital investment **Infrastructure Gaps** • Limited public charging infrastructure • Long planning and delivery timelines for depot upgrades **Vehicle Availability** • Limited vehicle availability and long lead times for delivery **Knowledge Gaps** • Lack of operator awareness and EV operational experience. • Workforce readiness - education, training and upskilling courses and development of standards **Regulatory and Planning** • Road weight restrictions and infrastructure planning challenges **Supports** • Insufficient grant support for small to medium operators

Opportunity	Threat
Regulatory Compliance and Image • Improved positive image and compliance advantages /reputation • Entry in CAZs **Innovation and Technology** • Adoption of V2G capabilities • Collaborative pilot programmes and technology trials • Utilisation of chargers – charge sharing etc **Market Positioning** • Ability to shape industry narrative and standards • Supply chain – customer demand, especially within the ecommerce sector • Commercial procurement requesting 3pl to undertake zero emission journeys **Education and Workforce Development** • Training programmes for drivers and technicians • Public education on benefits and operations	**Financial Risk** • Transition may not be cost effective without grants • Uncertain residual values of electric HDVs **Infrastructure challenges** • Grid stability and energy mix concerns • Grid capacity - depot • High costs and slow pace or public charging rollout **Market and Technology Risks** • Rapid technology changes creating obsolescence risks **External factors** • Price volatility of energy and charging • Mineral supply chain and geopolitical constraints • GDPR and data management issues for telematics **Small Business Impact** • High upfront costs affect SMEs

4.2 User Profiles

Understanding user profiles is key to designing effective infrastructure and policy interventions. The following are HDV personas identified by the Pathway Working Group and their charging requirements, preferred infrastructure and context in relation to the HDV Pathway.

Persona / Ave. Daily Range	Charging Patterns	Preferred Infrastructure	Insights/Learning
Long haul trucker *Ave. Daily Range: 500-700km*	Fast charging during breaks, top ups at depots	En-route ultra-fast charging hubs, depot charging	There is a requirement for increasing the volume of high-powered en-route charging points. En-route charging needs to be more affordable as the TCO will not make it an attractive prospect.
Regional delivery driver *Ave. Daily Range: 50-300km*	Overnight depot charging	Depot AC/DC chargers	There is limited demand for charging during the day as routes are short and predictable making overnight slow charging a more attractive option.
Urban Transit *Ave. Daily Range: 100-200km*	Overnight depot charging	High-capacity depot chargers, smart energy management	Overnight depot charging would be viable given the distance travelled, however substantial depot charging infrastructure would be required to transition large fleets.
Long distance coach driver *Ave. Daily Range: 200-400km*	Depot and destination charging	En-route fast charging at hubs, destination charging	Similar to the long-haul truck driver, the long distance coach driver may be doing substantial journeys each day. Fast Charging may be required, or an increase to range.
School Bus driver *Ave. Daily Range: 50-100km*	Depot or school charging	Depot AC/DC chargers	Depot charging would be predominantly used.
Construction vehicle operator *Varies, low daily travel*	Overnight charging	Site based chargers, Depot chargers	Overnight charging would be predominantly used
Bin Truck Driver *Ave. Daily Range: 80-150km predictable routes, not long range*	Overnight depot charging	DC depot chargers	Depot charging would be predominantly used.

4.3 Charging Considerations

Long Haul Truck

En-route Fast charger

Urban Transit Bus

Depot mainly with some en-route average speed charger

Regional Delivery

Depot mainly with some en-route average speed charger

Long Distance Coach

En-route Fast charger

Construction

Depot charging with slow to medium speeds

School Bus

Depot charging with slow to medium speeds

Bin Truck

Depot charging with slow to medium speeds

5. Case Studies

Global best practice offers valuable insights into electrifying HDV fleets. The table below provides a high-level overview of select case studies which propose insights and learnings applicable for Ireland.

Case Study	Company	Pathway Insight
High power public charging station • *2x300 kW ultra-fast chargers for HDVs and LDVs*	Allego & Sogaris, France	Strategic location and shared access can drive high utilisation rates
Megawatt charging system (MCS) demonstration • *700kW @1000 A; 10-80% charge in under 30 minutes*	ABB E-Mobility & Man, Germany	MCS is critical for long haul routes; plan for integration in ports and motorways
Depot fast charging – smart management • *124 chargers; supports 100+ electric buses*	Kempower & GodEnergi, Denmark	Smart charging systems optimise depot operations and grid stability
Corridor based HDV charging • *Multiple CSS now; MCS upgrade planned; 70 hubs by 2025*	Milence JV, Netherlands & EU Corridors	Corridor hubs essential for freight links and international routes
Wireless depot and loading dock charging • *Supports overnight and load time charging*	Electron Last Mile Project, Sweden	Wireless depot charging improves uptime and eliminates manual processes
Heavy battery-electric and hydrogen fuel cell vehicles and public and depot-based infrastructure • *350 vehicles and 70 infrastructure installations*	Department for Transport & Innovate, United Kingdom	Targeted charging for the HDV industry is critical and the value of a demonstrator approach

5.1 Allego and Sogaris, France

Fast charging station for HDVs and LDVs

On October 12, 2023, Allego, a leading provider of public fast and ultra-fast electric vehicle charging networks in Europe and Sogaris, a key player in urban logistics real estate in France, launched the first high-power charging station for electric trucks and light-duty vehicles (LDVs) at Sogaris' urban logistics hub in Rungis, just outside Paris.

Allego's proprietary Alamo tool played a crucial role in selecting the site. This cutting-edge station offers rapid charging capabilities, delivering a full charge in about 30 minutes for LDVs and around one hour for heavy-duty vehicles (HDVs).

In its first five weeks of operation, the station achieved an impressive 22% utilisation rate, significantly higher than Allego's average mature site utilisation rate of 15% in Q3 2023. The site features two 300 kW ultra-fast charging points specifically designed for trucks and LDVs.

The strong performance of this pilot project confirms the viability of Allego's concept for dedicated high-power charging stations, paving the way for the commercial rollout of ultra-fast truck charging stations across Europe.

KEY TAKEAWAY
Strategic locations and sharing access to ultra-fast charging can accelerate utilisation and commercial viability.

5.2 Abb E-Mobility and Man, Germany

Megawatt charging system demonstration on eTrucks

On March 21, 2024, ABB E-mobility, (a German company specialising in electrification solutions for transportation, including home EV chargers, fleet depot systems, and high-power charging for electric buses and trucks) and MAN Truck & Bus, one of Europe's leading commercial vehicle manufacturers, successfully demonstrated megawatt charging on the MAN eTruck for the first time. During the demonstration, the eTruck was charged with over 700 kW and 1,000 amps using a Megawatt Charging System (MCS) developed by ABB E-mobility.

This marked the first public demonstration of an electric truck being charged at more than 700 kW and 1,000 A. The joint testing took place at MAN's development centre in Munich and the battery was charged from 10% to 80% in approximately 30 minutes. MCS charging enables an extended driving range of 300 to 400 km during a standard driver rest break.

The new MCS standard is engineered to support charging capacities of up to 3.75 MW at 3,000 A. While the current prototype demonstrated over 700 kW, the finalised MCS standard will allow for charging well above one megawatt, significantly reducing charging times. In comparison, today's CCS (Combined Charging System) chargers, used by both passenger and commercial vehicles, offer a maximum of 400 kW at 500A.

KEY TAKEAWAY
MCS will be critical for long haul routes and should be integrated into future planning for Ireland's ports and motorways.

5.3 Kempower and Godenergi, Denmark

Fast Charging and charging management software at bus depot

Since 2023, the largest electric bus depot in the Nordic region has been fully operational in Aalborg, Denmark. Kempower (a leading provider of rapid EV charging solutions), has delivered its DC fast charging technology to GodEnergi A/S (a specialist in electric charging infrastructure), to power the facility, which is capable of charging over 100 electric buses simultaneously.

GodEnergi A/S has installed 124 Kempower Satellite chargers at the site, all connected to 18 Kempower Power Units. To support the system, six transformers have been installed in the surrounding area, and more than 20 kilometres of cabling has been laid throughout the depot.

The facility is also equipped with Kempower ChargEye, a cloud-based charging management platform. This system enables GodEnergi A/S to monitor and manage daily operations efficiently, optimising charging performance and ensuring that buses are consistently charged and ready to meet their scheduled routes.

KEY TAKEAWAY
Ireland's depot dependent fleets (buses, refuse trucks) can adopt similar smart systems to optimise overnight charging and grid stability.

5.4 "Milence" – A Daimler/Traton/Volvo Joint Venture

Charging hub along a transport corridor

Established in 2022 as a joint venture between Daimler, Traton, and Volvo, Milence has been rapidly expanding its HDV charging network across Europe. In late 2023, the company launched its first charging hub in Venlo, the Netherlands. By April 2024, Milence had opened a second hub in Heudebouville, located about 40 km south of Rouen. Strategically positioned along a key transport corridor connecting Paris with major logistics centres in Normandy, such as Le Havre, Caen, Dieppe, and Rouen, the new hub serves as a vital charging point for HDVs.

The Heudebouville site currently includes four CCS chargers across four charging bays. Milence plans to upgrade the site with MCS technology as soon as it becomes commercially available. The second phase of development will expand the hub with additional MCS-equipped bays and driver amenities such as restrooms and showers.

All Milence charging hubs are vendor neutral and accessible to all electric trucks. To ensure broad compatibility, Milence has signed agreements with multiple European e-Mobility Service Providers (eMSPs) and accepts their payment cards, charging a default tariff of approx. 40c per Kwh EXC vat.

In late 2024, Milence opened the first phase of a charging hub along the TEN-T Scandinavia-Mediterranean corridor between Gothenburg and Malmö, in Varberg. The first phase includes four 400-kW chargers with two charging points each. For the second phase, set to launch in 2025, the CPO will add more CCS and MCS chargers. Milence currently plans to have 70 HDV charging hubs in place across Europe by the end of 2025.

KEY TAKEAWAY
Corridor based hubs will be essential for Ireland's international freight links via Rosslare, Dublin Port and key motorway junctions.

5.5 Last Mile Delivery and Logistics, Sweden

In November 2023, BDX (a Swedish logistics enterprise headquartered in the Stockholm region, serving as the designated transport operator for Ahlsell AB, a leading distributor across the Nordic countries) and Electreon (a leading provider of wireless charging solutions for EV), announced a project to support last mile delivery, installing wireless charging solutions at the loading dock and overnight depot station at an Ahlsell facility.

This project seeks to demonstrate the enhanced operational efficiency and increased vehicle uptime enabled by wireless charging technology. It will feature a practical, real world use case scenario, in which an electric light truck is wirelessly charged both at the loading dock during goods handling and while parked overnight at a depot facility in southwest Stockholm.

The initiative objectives include highlighting key advantages of wireless depot charging, such as the elimination of manual driver involvement in the charging process and the seamless integration of charging into routine logistics operations.

KEY TAKEAWAY
Prioritise depot charging for predictable routes. Plan shared hubs at ports and logistic nodes. Prepare for MCS adoption for long haul HDVs. Consider smart charging and energy management to minimise grid stress.

5.6 HGV Demonstrator Programme UK

Heavy goods vehicles (HGVs) are the backbone of the UK's supply chain, but they also account for a significant 20% of domestic UK transport CO2 emissions.

The Zero Emission HGV and Infrastructure Demonstrator (ZEHID) programme is backed by circa £200m in funding from the Department for Transport and delivered in partnership with Innovate UK.

With a bold vision to deploy around 350 of the heaviest battery-electric and hydrogen fuel cell vehicles on UK roads, the programme will also fund and support over 70 public and depot-based infrastructure installations by 2030.

Every zero-emission HGV deployed has the potential to reduce CO2 emissions equivalent to replacing dozens of passenger cars.

The ZEHID programme unfolds in two key phases:

- **Procurement and Infrastructure Development (2024–2026):** Building the foundation with critical charging and refuelling infrastructure.
- **On-Road Demonstration (2026–2031):** Real-world trials of zero-emission HGVs, testing their capabilities in various duty cycles and operational scenarios.

Programme objectives include:

1. **Deploy zero-emission HGVs:** Demonstrate the feasibility of battery-electric and hydrogen-powered trucks in real-world applications.
2. **Build confidence:** Provide operators and policymakers with critical insights into the performance, infrastructure needs, and cost-effectiveness of these technologies.
3. **Stimulate innovation:** Encourage the development of supply chain technologies and scalable solutions for the logistics sector.
4. **Lay the foundation:** Establish the fuelling and charging infrastructure needed to support widespread adoption across the UK.

KEY TAKEAWAY

A coordinated national demonstrator programme could support Ireland in validating zero-emission HGV technologies, guiding infrastructure planning and builder operational confidence.

6. How Ireland Can Transition to Heavy-Duty Electrification

Ireland's transition to heavy-duty electrification will require coordinated action across government, fleet operators, energy providers, vehicle manufacturers, charge point operators, and the wider logistics system.

The following chapter outlines a clear, practical and phased approach for how Ireland can move from early adoption toward full-scale deployment, reflecting the insights of the Working Group.

The transition should begin where electrification is already viable and predictable such as return-to-base fleets and expand towards long-haul and more complex cycles as technology, infrastructure and grid capacity mature.

6.1 First to Transition Groups

The Working Group identified several HDV sectors that are best placed to transition first due to their operational profiles.

These include:

- Urban Transit
- Regional Delivery
- Construction Fleets
- Refuse Collection

and are based on:

- predictable, repetitive routes,
- manageable daily ranges, and
- return-to-base operations that allow for depot-centric charging.

Early progress in these sectors can deliver essential real-world insights, stimulate supply chain growth, and build operator confidence, creating a foundation for broader electrification.

By starting with depot charging, operators can avail of:

- lower cost and higher control than public charging,
- minimal grid impact when designed with demand management,
- reduced operational disruption, and
- the ability to scale gradually as fleets expand.

This would mirror the successful trend reflected in passenger EV adoption, where home and workplace charging enabled market growth long in advance of the rollout of public charging.

Long-distance freight will require additional solutions over time, including ultra-fast en-route charging and Megawatt Charging Systems (MCS), but the immediate opportunity is likely to be found in supporting early adopter fleets and building depot infrastructure nationwide.

6.2 How to Transition Your Fleet: A Step-by-Step Approach

To support organisations, in making informed, practical decisions, the transition pathway can be organised into the following key stages:

6.2.1. Fleet Assessment

Vehicle Assessment

Site assessments will be supported to evaluate current electrical capacity, identify potential upgrades to transformers and substations, and plan for smart energy management systems to avoid excessive demand charges and grid constraints.

The EV Fleet Assessment Grant is a government-funded support scheme that helps businesses explore the transition to electric vehicles (EVs). The scheme offers financial support for an independent fleet assessment carried out by a qualified energy advisor.

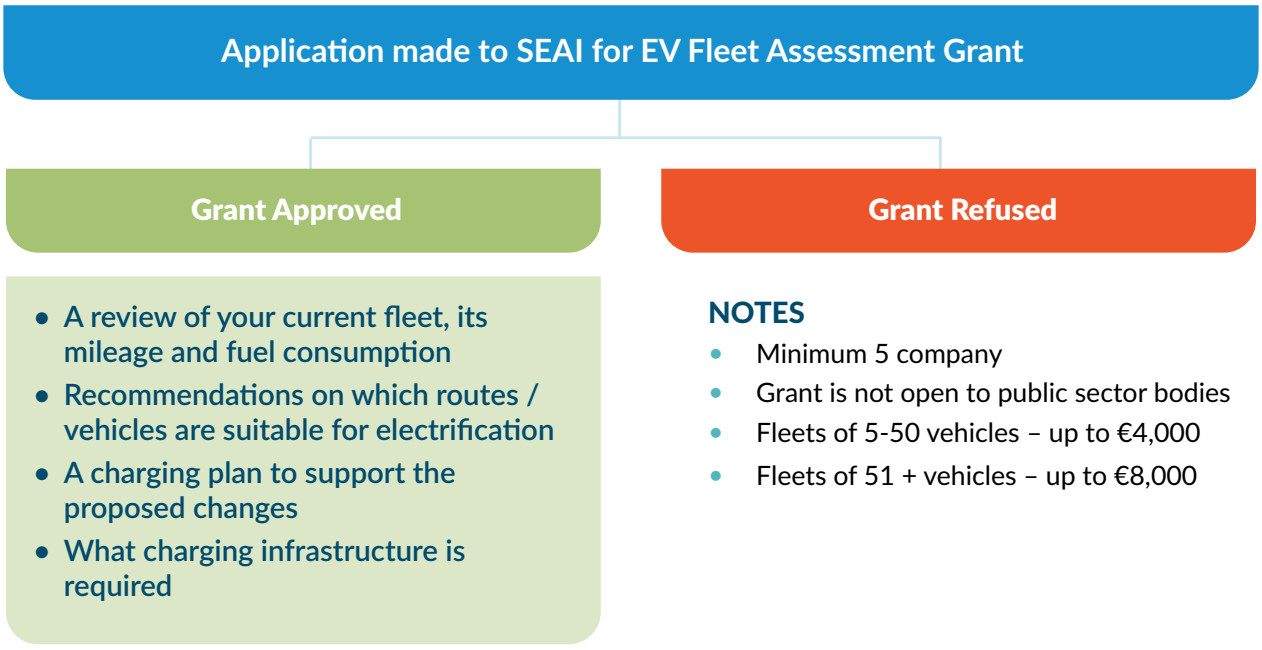
The assessment provides:

- A detailed review of your existing fleet, including mileage and fuel consumption
- Identification of routes and vehicles suitable for electrification
- A tailored EV charging plan to support your transition
- Guidance on the type and scale of charging infrastructure required

This support is available to large enterprises, SMEs, and semi-state bodies seeking to decarbonise their fleet but unsure where to begin.

Eligible businesses can receive up to €4,000 for fleets of 5–50 vehicles or up to €8,000 for fleets of 51+ vehicles.

Fleet Assessment



Infrastructure Assessment

Site assessments will be supported to evaluate current electrical capacity, identify potential upgrades to transformers and substations, and plan for smart energy management systems to avoid excessive demand charges and grid constraints.

FIND OUT MORE

https://www.seai.ie/plan-your-energy-journey/for-your-business/ev-for-business/grants-and-supports/ev-fleet-assessment-grant

6.2.2. Vehicles

The next step is ensuring timely access to suitable electric vehicle models and preparing fleets for operational integration.

Vehicle Procurement

Fleet operators must engage proactively with vehicle manufacturers to secure electric HDVs that meet specific requirements. Given limited early production volumes, advance ordering and long-term procurement planning are essential.

ZEHDV

The Zero-Emission Heavy Duty Vehicle Purchase Grant Scheme (ZEHDV) opened in February 2024. The Scheme awards grants to assist companies and enterprises who wish to buy zero-emission heavy duty vehicles (ZEHDV) which are supported by the Scheme instead of buying the diesel equivalent. The Zero-Emission Heavy Duty Vehicle (ZEHDV) Purchase Grant Scheme is funded by the Department of Transport and administered by Transport Infrastructure Ireland.

FIND OUT MORE

https://www.tii.ie/en/roads-tolling/alt-fuel-projects-unit/zero-emission-heavy-duty/

Planning Consent

Is the proposed development part of an existing depot?

YES	NO
• Proposed Charging Infrastructure may be exempt from planning • Refer to Exempt Development Regulations for further details • Certificate of Exempt Development if required.	• Full planning permission required for depot and charging infrastructure • Depot layout for charging infrastructure should be designed in accordance with type of vehicles identified for electrification and the type of charging required.
Make application to relevant authority	Make application to relevant authority

NOTES

- Where the proposed development is contained within an Environmentally Sensitive Area, or an area of Architectural Heritage (listed buildings) planning permission may be required.
- The relevant planning authority should be contacted at the beginning of this process to establish if planning permission is required. The developer may choose to seek a certificate of exemption for the proposed development from the relevant planning authority.
- The Universal Design Guidelines for EV Charging Infrastructure should be referenced as best practice for the provision of EV Charging Infrastructure for smaller vehicles.
- Sufficient time should be allocated in the programme for when planning consent is required.

Planning Consent

Apply for Zero-Emission Heavy Duty Vehicle Purchase Grant before purchasing vehicle

YES	NO
Purchase vehicle	Not eligible

Charging Plan and Grid Connection

Electrical Assessment

- Assess Current MIC and Identify total capacity required to support proposed changes
- Assess type of charging required (AC/DC)
- Consider renewable sources and/or use of demand management systems

Financial Assessment

- The costs of installation of or upgrades to electrical or other components including chargers
- The costs of civil works associated with the installation
- Design costs including consent if required – contact relevant authority

Is there a new connection required or an increase in MIC required

YES

- New or increased connection less than 200kVA is required.

Apply to ESBN

- New or increased connection greater than 200kVA is required.
- Substation may be required - planning permission implications

Apply to ESBN

NO

- There is no new or increased connection required
- Planning permission is not required for a grid connection

Apply for Zero-Emission Heavy Duty Vehicle – Recharging Infrastructure Grant from TII

NOTES

- DC Fast charging - consider the use of pull through charging where vehicles and drive in and drive out with the charging infrastructure located between bays. This allows for ease of access to charging ports on either side of the vehicle.
- DC Fast charging for smaller ZHDV maybe provided in a perpendicular arrangement allowing sufficient buffer areas between charging bays for ease of access for charging cables. Consideration should be always given to the movement of vehicles within the depot.
- AC charging can be provided in a perpendicular arrangement allowing sufficient buffer areas between charging bays for ease of access for charging cables.

6.2.4. Operational

Transitioning to electric HDVs will need significant changes in day-to-day operations, requiring both staff training and digital infrastructure.

Driver and Technician Training

Drivers must be trained in electric vehicle handling, particularly techniques for energy-efficient driving and maximising regenerative braking. Maintenance staff will need training on electric systems and diagnostic tools.

Route Optimisation and Telematics

Fleet operators should adopt route planning and telematics software that accounts for range limitations, charging locations, and energy consumption patterns to maximise vehicle uptime and reliability.

Maintenance Facility Readiness

Facilities must be equipped for the specific needs of electric HDVs, including safety equipment for high-voltage systems and digital maintenance platforms. In addition, new skill sets are required for electric HDV mechanics and technicians, supported with new procedures and risk assessments for undertaking routine maintenance work to ensure safe systems of work are adhered to.

Total Cost of Ownership (TCO) - Calculator

A robust financial analysis calculator should be developed to compare lifetime costs between electric and fossil fuel equivalent, factoring in fuel savings, maintenance reductions, and incentives and supports. This stage ensures that electrification improves operational efficiency rather than disrupting it.

6.2.5. Policy Alignment

Financial planning and policy engagement will play a pivotal role in reducing upfront costs and accelerating adoption.

Incentives

Early adopters should actively pursue available incentives, including vehicle purchases supports such as ZEHDV, infrastructure grants including ZEHDV-I that reduce the cost of site preparation for chargers.

While purchase subsidies are essential for enabling early adoption, long-term effectiveness will also depend on operational incentives. These could be linked to actual usage, such as mileage or tonne-kilometres, offering sustained support and ensuring that funding directly rewards emissions reductions.

Compliance

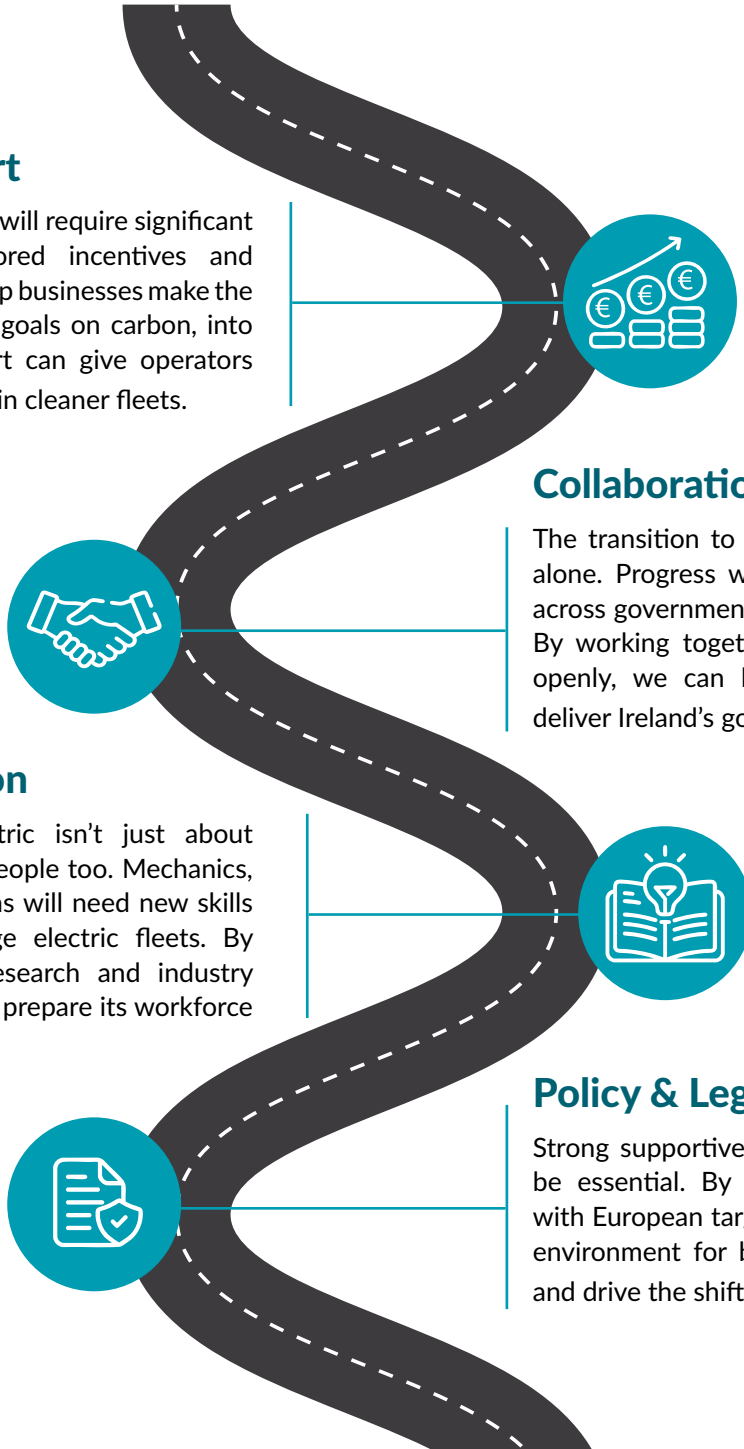
Operators must prepare for compliance with emerging zero-emission fleet regulations, including the Alternative Fuel Infrastructure Regulation.

7. Delivering Ireland's Pathway to Heavy-Duty Electrification

7.1 Working Group Pathway

The electrification of Ireland's heavy-duty vehicle (HDV) sector represents both a significant challenge and unique opportunity. Achieving meaningful emissions reductions will require a whole-system approach and one that integrates vehicle technology, charging infrastructure, energy networks, policy alignment, and workforce readiness and capability.

A pathway has been proposed by the Working Group to offer a clear, insight-led approach, focused on four strategic requirements.



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.

Collaboration & Partnership

The transition to electric cannot be achieved alone. Progress will depend on collaboration across government, industry and communities. By working together and sharing knowledge openly, we can build practical solutions to deliver Ireland's goal.

Skills & Education

The transition to electric isn't just about vehicles. It will require people too. Mechanics, engineers and technicians will need new skills to maintain and manage electric fleets. By investing in training, research and industry partnerships, Ireland can prepare its workforce for the future.

Policy & Legislation

Strong supportive regulation and policies will be essential. By aligning Irelands legislation with European targets, we can create the right environment for business to invest, innovate and drive the shift to electric.

The Working Group believe these requirements are key in facilitating a transition that is practical, phased, and targeted at sectors where electrification can have immediate impact.

Early transition should focus on the sectors best positioned to electrify today. These include urban transit, regional delivery, refuse collection, and elements of the construction sector.

These vehicles typically operate on predictable routes, have manageable daily ranges, and return to base, making them ideal candidates for depot charging.

A depot-first approach delivers the greatest operational certainty, minimises infrastructure risks, and mirrors the successful adoption curve experienced in the passenger EV market.

It also avoids early investment in public HDV charging infrastructure that may initially see low utilisation and undermine confidence in the transition.

This focused, data-driven approach ensures real-world demonstrations, reduces risk, and builds industry confidence, laying the foundation for wider uptake across the HDV sector.

7.2 Pathway Enablers:

7.2.1 Financial Support

A key barrier to HDV electrification is the high upfront capital cost of vehicles and depot infrastructure. To reduce this barrier and improve the total cost of ownership (TCO) we would propose to:

- Maintain and expand capital-focused grant schemes such as the ZEHDV Vehicle Purchase Grant, ZEHDV-I Infrastructure Grant, and Fleet Assessment Grant, ensuring multi-year funding certainty.
- Explore operational supports that keep electric HDV running costs competitive, for example, a public-charging rebate mechanism similar to the Diesel Rebate Scheme, ensuring fair cost treatment between fossil and zero-emission vehicles.
- Target financial supports towards early-adopter sectors where rapid uptake can deliver immediate emission reductions and operational learnings.

These measures could help reduce investment risks for operators, stimulate supply chain confidence, and accelerate market development.

7.2.2 Collaboration & Partnership

A successful transition depends on coordinated and long-term collaboration between government, fleet operators, energy providers, infrastructure developers, OEMs, and local authorities.

To achieve this:

- Support ongoing coordination, data sharing, and operational learning through engagement such as a National HDV Electrification Implementation Forum.
- Expand real-world demonstrator programmes to gather evidence on charging patterns, vehicle performance, and grid impacts, ensuring lessons are shared across industry.
- Strengthen collaboration between utilities and fleet operators to forecast future depot demand and accelerate grid readiness.

7.2.3 Skills & Education

Workforce readiness is essential to ensuring the safe, efficient, and sustainable operation of electric HDVs. The transition must support the development of new technical and operational competencies:

- Develop nationally accredited training programmes for drivers, mechanics, technicians, depot managers, engineers and emergency responders.
- Collaborate with industry and training bodies to ensure curriculum content reflects vehicle technology, energy management, safety procedures and digital diagnostics.
- Support fleet operators in upskilling staff through targeted funding or incentives for training participation.

Investing in workforce capability will strengthen Ireland's long-term competitiveness and ensure the transition is safe and well managed.

7.2.4 Policy & Legislation

Regulatory certainty and planning clarity are critical for industry confidence. Key policy measures could include:

- Streamlining planning requirements for HDV charging infrastructure, including the introduction of a new Compact Substation Class and expanding existing exemptions to support timely grid connections.
- Ensuring national alignment with EU requirements under the Alternative Fuels Infrastructure Regulation (AFIR) and new Zero-Emission HDV standards.
- Integrating HDV electrification into broader transport, land-use, and energy planning, particularly in relation to ports, TEN-T corridors, logistics hubs, and zoning for depot expansion.

These actions should provide clarity for investors, reduce administrative challenges, and accelerate infrastructure deployment.

7.3 Pathway Timeline

To ensure a coordinated and efficient transition, actions should be sequenced over the short, medium and long term.

This could include:

Short Term (2026–2028)

- Electrify early-adopter HDV segments: transit buses, refuse trucks, regional delivery fleets, and construction vehicles.
- Accelerate nationwide depot assessments and enable rapid deployment of onsite charging.
- Expand pilot programmes and demonstrator projects to collect real-world operational data.
- Strengthen collaboration between utilities and depot operators to plan for future grid needs.

Medium Term (2028–2030)

- Scale depot charging across Ireland's logistics and transport hubs.
- Begin development of strategic public charging hubs at motorway junctions, ports, and key TEN-T nodes, ensuring facilities include essential driver amenities.
- Destination HDV Charging at Hotels, Visitor Centres, OPW Sites and Overnight Parking Locations including dedicated public chargers for coach parking in both town and city development plans.
- Prepare for the integration of Megawatt Charging Systems (MCS) to support emerging long-haul use cases, following European best practice.

Long Term (2030–2040)

- Expand corridor and hub infrastructure to support long-haul, high-mileage HDV routes, including cross-border and Europe.
- Integrate HDV electrification with smart grid, renewable energy optimisation, and advanced fleet management systems.
- Work towards achieving full compliance with EU 2040 zero-emission HDV targets, while supporting Irish enterprises in remaining competitive through modern, efficient fleets.

7.4 Pathway Coordination

Ireland's pathway to HDV electrification is challenging but achievable. The transition can deliver far-reaching benefits such as lower emissions, improved air quality, reduced noise, energy security, as well as long-term operational savings for fleet operators.

However, success will depend on continued engagement, trust, and shared commitment between government, industry, and wider society. Clear, consistent communication, supported by case studies, peer learning, and demonstrator programmes, will be essential in building confidence and accelerating adoption.

To facilitate this, a progress group to oversee the delivery and monitor the pathway is recommended with representatives from groups including the road transport and logistics sector, charge point operators, vehicle manufacturers, motor industry representatives, academia and public policy officials.

Electrification of heavy-duty transport is a cornerstone of Ireland's climate ambitions. By acting decisively, collaboratively, and strategically, Ireland can build a cleaner, more resilient, and more competitive transport system.

Department of Transport
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