CSL

Critical IoT Connectivity **Experts**

EV TRANSITIONS FOR 2026: EXECUTIVE SUMMARY

The Electric Vehicle Transition: Connectivity, Safety & The Future of Transportation

An executive summary of EV telematics, charging infrastructure, commercial fleet electrification, autonomous vehicles, and the critical role of resilient connectivity in enabling the transport revolution

Executive Summary 2026: Consolidating and updating CSL's four-part technical series with 2025/2026 market data. Full technical documentation available in the original article series.

VERSION	DATE
1.25	March 2026

Contents

About This Executive Summary
This document provides a high-level overview of key themes from CSL's four-part "Transition to Electric Vehicles" technical market report series, updated with 2025/2026 market data. For detailed technical analysis, academic citations, and comprehensive data, refer to the original articles listed on page 18.

1. Executive Summary

The CSL Perspective: When connectivity fails, charging sessions can fail, payment processing can stall, safety systems lose visibility, and grid services lose coordination. The EV transition isn't just about vehicles; it's a real-time mobility and energy system where *connectivity is the critical infrastructure*. Designing for resilience at the connectivity layer is a strategic priority, not an afterthought.

The electric vehicle revolution has reached a defining moment. In 2025, global EV sales reached **20.7 million units**, representing approximately 20% year-on-year growth and accounting for roughly one in four new vehicles sold worldwide[1]. This comprehensive market report examines the convergence of electrification, connectivity, and autonomous technologies reshaping the transport sector.

The Scale of Transformation

The EV transition is no longer a future possibility; it is today's reality. China continues to dominate global EV sales with over 12 million units in 2025, while Europe and North America show continued growth. The UK achieved record EV sales with 473,348 BEVs registered (23.4% market share), supported by the new Electric Car Grant scheme[2].

Definitions & Methodology

EV sales: Global totals (Rho Motion) include BEV + PHEV; UK figures (SMMT) are BEV only unless stated. **Regions:** Europe = EU27 + EFTA + UK. Sources: Rho Motion, SMMT, Zapmap. See References.

The Safety Imperative: 88% of road collisions involve human error. EV telematics, ADAS, and autonomous technologies represent a transformative safety opportunity, but only with resilient connectivity[3].

Why Connectivity is Critical

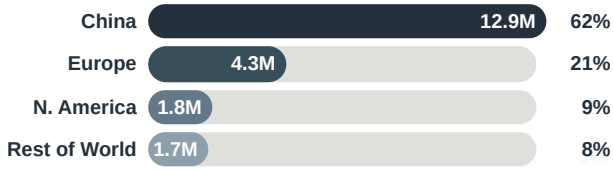
Every aspect of the EV ecosystem depends on reliable connectivity:

- **Telematics:** continuous data for fleet management and predictive maintenance
- **Charging:** real-time comms for payments, load balancing, grid integration
- **AVs:** ultra-low-latency V2X and safety-critical updates
- **V2G:** bidirectional communication for energy trading

Key Statistics 2025/2026

20.7M Global EV Sales 2025	**88,513** UK Public Charging Devices (Jan 2026)
473,348 UK BEV Registrations 2025	**88%** Collisions: Human Error[3]

2025 Global EV Sales by Region (share of 20.7M)



Executive Takeaways

Three Market Conclusions

1. EV adoption is now irreversible at scale, with 20.7M global sales in 2025, UK ZEV mandate requires 80% BEV share by 2030.

2. The bottleneck has shifted from vehicle supply to infrastructure reliability. Charger uptime, payments, and grid integration all depend on connectivity.

3. Every adjacent market (telematics, V2G, AVs, fleet management) compounds the connectivity dependency, creating systemic risk.

Three Key Risks

1. Connectivity downtime at charging hubs directly impacts revenue, user confidence, and regulatory compliance.

2. Single-network architectures create exposure to individual operator outages that multi-network/dual or multi-core designs can address.

3. WP.29 cybersecurity regulations now require board-level accountability for connected vehicle security, including the connectivity layer.

Three Actions for 2026

1. Audit connectivity architecture. Identify single points of failure across charging, fleet, and grid operations.

2. Evaluate multi-network resilience. Compare single-core vs dual-core architectures against uptime requirements.

3. Prepare for regulatory tightening. Ensure connectivity supports WP.29 compliance and ZEV mandate scaling.

2. The Global EV Transformation

2025 Global Sales Performance

Global electric vehicle sales reached 20.7 million units in 2025, representing approximately one in four new cars sold worldwide. This ~20% year-on-year increase demonstrates the resilience of EV demand despite economic headwinds and policy uncertainties in some markets.

Regional Performance

REGION	2025 SALES	YOY GROWTH	% OF GLOBAL
China	12.9M	+17%	62%
Europe	4.3M	+33%	~21%
North America	1.8M	-4%	~9%
Rest of World	1.7M	+48%	~8%

Source: Rho Motion Global EV Sales Data, February 2026[1].

Europe emerged as the fastest-growing major EV market in 2025, driven by new incentive programmes in France, Italy, and the UK. Germany (+48%) and the UK (+27%) led European growth. The Chinese market, while maintaining global dominance with 12.9 million sales, saw growth moderate to 17% as domestic competition intensified and manufacturers pivoted to exports: BYD more than doubled its overseas sales to over one million units.

UK Market Analysis

The UK new car market breached two million registrations for the first time since the pandemic, with 2,020,520 units sold in 2025. Battery electric vehicles captured **23.4% market share** with 473,348 registrations, the highest annual share on record.

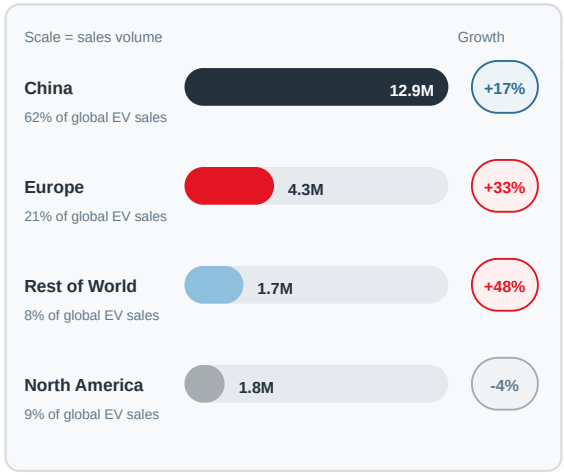
> **December 2025 Milestone:** BEVs were the most popular vehicle type in December 2025 with 47,139 units (32.2% market share), comfortably exceeding the ZEV mandate target of 28%.

UK EV Market by the Numbers

23.4% 2025 BEV Market Share	**1.75M+** BEVs on UK Roads
160+ BEV Models Available	**£3,750** Max Electric Car Grant

2025 Global EV Sales by Region

Ranked by sales volume; growth tags show year-on-year change



Europe is the fastest-growing major market
Rest of World grows fastest overall, but from a smaller base

Source: Rho Motion Global EV Sales Data, February 2026

Market shares rounded; global totals include BEV + PHEV per Rho Motion methodology

2. The Global EV Transformation (continued)

Regulatory Landscape

UK ZEV Mandate

The Zero Emission Vehicle mandate requires manufacturers to achieve specific BEV sales shares: 28% in 2025, 33% in 2026, rising to 80% by 2030 and 100% by 2035[5]. While the industry achieved 23.4% in 2025 (4.6pp below target), December's 32.2% demonstrated capability when incentives align.

Electric Car Grant (2025)

Introduced in July 2025, the scheme provides grants up to £3,750 for EVs meeting manufacturing and environmental criteria[4]. By late 2025, five additional models were added including the UK-built Nissan Leaf, Renault 5, and Alpine A290.

EU Developments

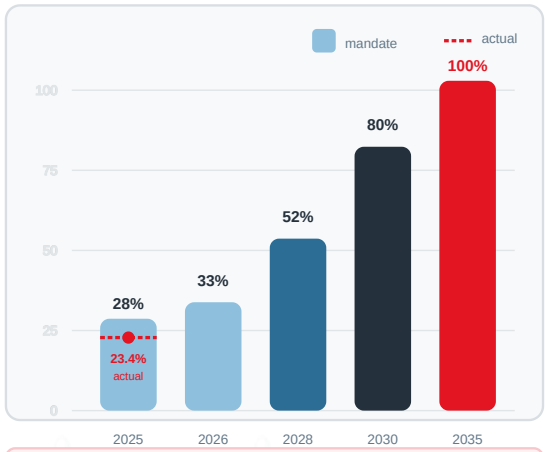
The European Commission adopted flexibilities in 2025, allowing OEMs to average CO2 targets across 2025–2027 rather than a single year. In December 2025, the Commission presented a broader Automotive Package addressing competitiveness and the regulatory pathway to 2035. The direction of travel remains toward full decarbonisation, with the broader 2035 regulatory framework still under review.

> **Policy Uncertainty Impact**
>
> North America demonstrated how policy shifts affect EV adoption. Following the expiration of US federal tax credits (September 2025) and CAFE standards relaxation, US EV growth slowed to just 1% in 2025, while Canada saw a 41% decline after subsidy removal.

Public and private charging rollout is accelerating ahead of the 2030 mandate.

UK ZEV Mandate Trajectory

Target shares versus the latest full-year actual



Dec 2025 milestone: 32.2% monthly share exceeded the mandate target

Source: UK ZEV Mandate and SMMT 2025 registration data

3. Telematics Systems & Road Safety

EV Telematics Market Overview

The global electric vehicle telematics market is experiencing explosive growth, valued at **US$13.5 billion in 2024** and projected to reach US$41.7 billion by 2030 at a compound annual growth rate (CAGR) of 20.6%. This expansion is driven by mandatory eCall (automatic emergency calling) compliance, 5G TCU (telematics control unit) cost reductions, and AI-based fleet optimisation[10].

Market Segmentation (2024)

SEGMENTATION AXIS	LEADING SEGMENT	SHARE OF AXIS	KEY DRIVER
By Application	Fleet Management	42.4%	Cost optimisation demand
By Installation	OEM-Fitted	72.5%	Factory integration
By Connectivity	Embedded (eSIM)	79.2%	eSIM provisioning
Emerging Category	V2X & OTA Updates	—	24.7% CAGR to 2030

Each row represents the dominant segment within a different classification axis; percentages are not additive.

Driver Behaviour Analytics

Modern EV telematics systems provide unprecedented insight into driver behaviour, enabling improvements in safety, efficiency, and insurance risk assessment. Key metrics monitored include:

- **Acceleration/deceleration patterns:** Harsh braking and rapid acceleration increase energy consumption by 20–30% and indicate higher collision risk
- **Cornering behaviour:** Lateral G-force monitoring identifies aggressive driving styles
- **Speed compliance:** Real-time comparison against posted limits and road conditions
- **Driver distraction detection:** In the SHRP2 naturalistic driving dataset, distraction was involved in approximately 68% of 905 injurious/property-damage crashes (Dingus et al., 2016)

Safety Impact: Research indicates that driver behaviour monitoring alone can reduce accident rates by 20–25% and improve fuel/energy efficiency by 10–15%.

Range Anxiety Research

Despite significant improvements in EV range (average 300+ miles in 2025), range anxiety remains a primary barrier to adoption. Research from University of Geneva, MIT, and Berkeley reveals important psychological dimensions:

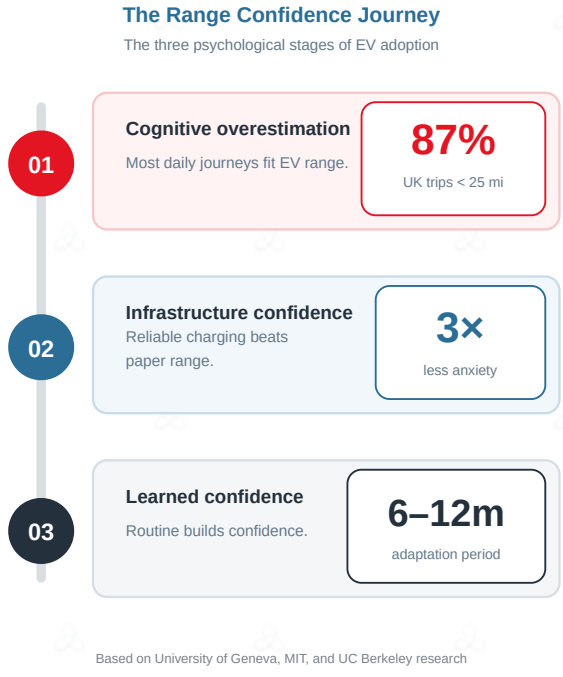
Key Findings

Cognitive factors: Range anxiety is often disproportionate to actual risk; most daily journeys are well within EV capability

Infrastructure confidence: Awareness of charging availability more strongly predicts anxiety than actual battery range

Learned behaviour: Anxiety typically diminishes significantly after 6–12 months of EV ownership

Telematics systems address range anxiety through real-time range prediction, route optimisation with charging stop integration, and predictive algorithms that learn individual driving patterns.



3. Telematics & Road Safety (continued)

While telematics systems ease driver anxiety and improve efficiency, the resulting surge in vehicle data transmission introduces new vulnerabilities that demand equally robust security architectures.

Cybersecurity Considerations

As vehicles become increasingly connected, cybersecurity is critical. UNECE WP.29 regulations already apply across EU type-approval regimes, while GB domestic implementation requires compliance for new complete and base vehicle types from July 2026 under VCA oversight.

Key Threat Vectors

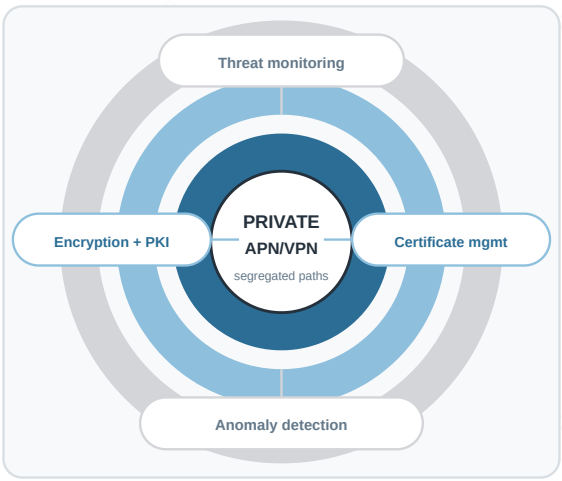
THREAT VECTOR	RISK
Telematics unit compromise	Remote vehicle control, tracking, data theft
OTA update manipulation	Malicious firmware injection
Charging infrastructure	Public charging point vulnerabilities
V2X communication	Message spoofing and DoS attacks

Resilient solutions require: private APNs (dedicated network access points, segregated from the public internet), end-to-end encryption, certificate management, and anomaly detection. Public internet may be insufficient for many safety-critical architectures without additional resilience controls.

Board-Level Accountability: WP.29 compliance isn't merely technical: connectivity failures that compromise vehicle safety create direct liability. Duty of care now extends to the connectivity layer.

Defence in Depth

UNECE R155 / R156 controls



1 CSMS
Cybersecurity management system certification

2 SUMS
Software update controls and release governance

3 Type approval
Vehicle-level security assessment required

4 Monitoring
Threat intelligence and incident response

CSL DUAL-CORE: Security by architecture
Private APNs + VPN tunnels + autonomous failover

4. Commercial Fleet Electrification

The Business Case for Electric Fleets

Commercial fleet electrification represents one of the largest opportunities for emissions reduction in the transport sector. Heavy goods vehicles alone account for nearly **20% of UK transport CO2 emissions** despite comprising only ~1% of vehicles on the road.

UK Commercial Vehicle Statistics

VEHICLE TYPE	UK FLEET SIZE	ELECTRIC SHARE
Light Commercial Vehicles	4.2 million	~3%
HGVs (all weights)	600,000+	<1%
Buses/Coaches	~35,000	~5%

Source: DfT Vehicle Licensing Statistics, Q3 2025[15].

Electrifying these fleets is not just a powertrain decision. Every electric commercial vehicle depends on reliable connectivity for charging management, route planning, and regulatory compliance. The operational demands vary significantly by vehicle class.

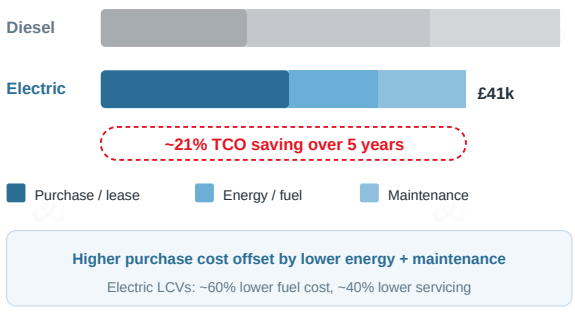
Last-Mile Connectivity: LCVs have the highest connectivity dependency in commercial fleets. Real-time route optimisation, dynamic delivery scheduling, proof-of-delivery, and charge point availability all require continuous data transmission, often in urban areas with congested networks[17].

The Mixed-Fleet Challenge

Most operators maintain mixed fleets of diesel and electric vehicles. Effective fleet management requires unified visibility: state of charge (SOC) for EVs alongside fuel levels for ICE vehicles, all in a single telematics dashboard. This demands connectivity infrastructure supporting both legacy and next-gen systems.

An illustrative LCV Total Cost of Ownership (5-Year)

Electric vs diesel light commercial vehicle comparison



Higher purchase cost offset by lower energy + maintenance

Electric LCVs: ~60% lower fuel cost, ~40% lower servicing

Heavy Goods Vehicle Technologies

Three primary technologies are competing to decarbonise heavy-duty freight:

Battery Electric Vehicles (BEV)

Most mature technology, with production models now available from Volvo, Mercedes-Benz, and DAF offering ranges from 200–500 km depending on configuration, with next-generation models targeting 600 km+. Rapid DC and megawatt charging systems are reducing charging times toward 30 minutes (20–80%), aligning with mandatory driver rest periods. Gross combination weights of 40–44 tonnes are achievable across current platforms.

Hydrogen Fuel Cell (FCEV)

Longer range potential (500+ miles) but limited refuelling infrastructure. Better suited for long-haul applications where weight constraints are critical.

Electric Road Systems (ERS)

Catenary/induction charging on motorways for continuous power supply. UK has not committed to ERS, unlike Germany and Sweden which are conducting trials.

UK eHGV Initiatives

ZEHID Programme

£200M Zero Emission HGV and Infrastructure Demonstrator: ~350 battery-electric and hydrogen fuel cell vehicles, 70+ public/depot charging installations by 2030.

Key Projects

- **Electric Freightway (GRIDSERVE):** First public eHGV hubs at Baldock/Exeter services
- **Amazon UK:** Largest UK eHGV order: 160 electric trucks entering service 2025/26
- **Royal Mail:** Eight DAF 42-tonne XD 350E eHGVs at Midlands/NW hubs
- **Tarmac eFREIGHT:** Five eHGVs launching early 2026 with dedicated charging

Plug-in Truck Grant (2026)

The UK government recently increased grants (announced January 2026):

WEIGHT CLASS	GRANT AMOUNT
4.25t – 12t	Up to £20,000
12t – 18t	Up to £60,000
18t – 26t	Up to £80,000
Over 26t	Up to £120,000

Grant levels as announced 6 January 2026; confirmed until March 2026 with continuation expected.

Regulatory Timeline: New non-zero-emission HGVs up to 26t banned from 2035. All new HGVs must be zero

5. Charging Infrastructure & Smart Grid

From Range Anxiety to Charger Anxiety: As EV range exceeds 300 miles, concern shifts to "Will the charger work?" A non-functional charger strands drivers and erodes public confidence. Mass EV adoption demands consistently high charger uptime, which multi-network connectivity architectures are designed to support.[18]

UK Public Charging Network

UK public charging reached **88,513 devices** at 45,242 locations (Jan 2026; note: Zapmap distinguishes chargers, devices, and locations; this figure uses the device count. DfT switched its primary metric from devices to chargers in early 2026), a 19.1% YoY increase[6]. Ultra-rapid (150kW+) grew 40% to 9,990 units.

Charge Points by Speed (Dec 2025)

Slow (<8kW) **~49,900** 57% **+14% YoY**	Fast (8–49kW) **~20,000** 23% **+18% YoY**
Rapid (50–149kW) **~8,000** 9% **+25% YoY**	Ultra-rapid (150kW+) **~9,900** 11% **+41% YoY**

Charging Economics

LOCATION	COST/KWH	COST/MILE
Home (off-peak)	~7.5p	~2p
Workplace	~15p	~5p
Public (slow/fast)	~54p	~16p
Public (rapid/ultra)	~79p	~23p

Indicative prices as at Q1 2026. Sources: Zapmap Price Index, RAC Charge Watch.

748 charging hubs (6+ rapid/ultra-rapid chargers, per Zapmap year-end 2025 report) along strategic road network (+39% YoY). London leads with 24,000+ charge points (301 per 100k pop). *See UK regional map on page 12.*

Vehicle-to-Grid (V2G) Technology

V2G: transformative opportunity.[10] Global market: US$6.3bn (2025) → US$16.9bn by 2030 (21.7% CAGR).

UK V2G Potential[7]

By 2030 with 11M UK EVs, 50% V2G-enabled could unlock: **22 TWh** flexible discharging/year, **~16 GW** daily flexible capacity, **£3.5bn** annual grid operator savings.

V2G Readiness

CHAdeMO vehicles (Nissan Leaf, e-NV200) support V2G in UK. CCS bidirectional via ISO 15118 expected 2025–26. 10–20% of new EVs may have V2G by 2030.

Smart Grid Integration

EV-grid convergence requires sophisticated management:

- **Demand response:** EVs charge during low-demand periods
- **Renewable integration:** V2G stores excess solar/wind
- **Frequency regulation:** Fast-responding batteries stabilise grid
- **Peak shaving:** V2G discharge reduces peaking plant needs

Connectivity Requirement: Smart charging and V2G demand 99.9%+ uptime for real-time price signals and charge/discharge coordination. Connectivity failure during peak demand removes megawatts of flexible capacity when the grid needs it most.

2. The Global EV Transformation (Visual Overview)

2025 Global EV Sales: 20.7 Million Units

China +17%

12.9M

62% of global EV sales

Exports rising as domestic growth normalises.

Europe +33%

4.3M

21% of global EV sales

Fastest major market in 2025.

North America -4%

1.8M

9% of global EV sales

Growth stalled after subsidy expiry.

Rest of World +48%

1.7M

8% of global EV sales

High growth, but infrastructure maturity varies.

30%+ growth | 10–29% growth | <10% growth

GLOBAL TOTAL 2025: 20.7 MILLION EVs

~20% YoY growth | ~1 in 4 new cars sold worldwide

Source: Rho Motion, Global EV Sales Data, February 2026. Includes BEV + PHEV.

Percentages = each region's share of 20.7M global EV sales (BEV + PHEV).

The Growth-Infrastructure Gap: The fastest-growing EV markets (Rest of World +48%, Europe +33%) are often those where charging connectivity infrastructure is least mature. As adoption accelerates ahead of infrastructure in these regions, the case for resilient, multi-network connectivity becomes most pressing.

European EV Adoption (Market Overview)

European EV Market Share by Country (2025 BEV % of New Sales)

Norway 89%	Sweden 58%	Denmark 46%	Finland 44%	Netherlands 33%
Belgium 28%	Switzerland 28%	France 26%	Ireland 24%	UK 23%
Austria 22%	Portugal 22%	Germany 21%	Slovenia 17%	Greece 16%
Spain 15%	Italy 14%			

CSL connectivity footprint

Multi-Network, Dual-Core, Private APN / VPN reach supports cross-border charging and fleet operations.

30%+ leaders | 23–29% | 16–22% | <=15%

EUROPE TOTAL 2025

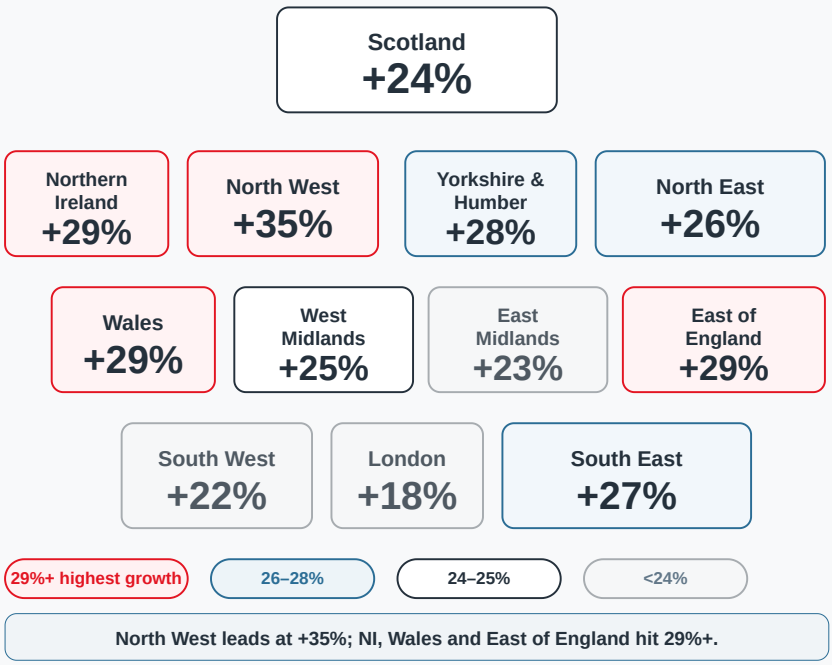
4.3 million EVs sold | 21% of global EV sales | +33% YoY growth

Source: Rho Motion, ACEA, national vehicle registration authorities. 2025 full-year data.

Country-level shares are BEV only where available; global/regional totals include BEV+PHEV per Rho Motion methodology.

5. Charging Infrastructure (Visual Summary)

UK Rapid Charger Growth by Region (Schematic Map, Year-on-Year %)



Source: Zapmap UK EV Charging Statistics, January 2026.
Rapid (50kW+) and ultra-rapid (150kW+) chargers; schematic regional map.

Infrastructure Investment Opportunity: The North West, Wales, East of England, and Northern Ireland represent the fastest-growing charging markets in the UK. Regional variation is driven by a combination of factors: LEVI (Local Electric Vehicle Infrastructure) funding allocations to local authorities, differing grid connection lead times from distribution network operators, strategic road network investment through the RAPID charging fund, and varying levels of local authority engagement with planning and land access for charging sites. Regions with shorter grid connection timelines and more proactive local authority partnerships have typically deployed faster. Early investment in connectivity infrastructure in these high-growth regions positions operators for long-term market share as EV adoption accelerates beyond 2030.

6. The Future: AVs, AI & Connected Mobility

The Road Safety Imperative

Globally, 1.19 million people die annually in road traffic accidents. In the UK, 1,624 fatalities occurred in 2023[3]. Autonomous and connected vehicle technologies offer transformative potential to reduce this toll.

UK Automated Vehicles Act 2024

The Automated Vehicles Act, which received Royal Assent in May 2024, establishes **one of the most comprehensive legal frameworks** for self-driving vehicles[8]:

- **Safety standards:** AVs must achieve safety "at least as high as careful and competent human drivers"
- **Liability framework:** Manufacturers, not users, are liable when vehicles operate in self-driving mode
- **Regulatory structure:** Creates authorisation requirements for vehicles, operators, and services
- **Marketing protection:** Prohibits misleading claims about self-driving capabilities

UK AV Pilots: Spring 2026

In June 2025, the UK government fast-tracked AV pilots to Spring 2026[9]. For the first time, companies will operate small-scale taxi- and bus-like services without safety drivers, available to the public via app booking.

UK AV Industry Projections[8]

38,000 jobs could be created across technology, manufacturing, and software development (Government projection)

£42 billion potential industry value by 2035 (Government projection)[8]

Full AVA implementation expected from second half of 2027

UK AV Pioneers

Wayve

Cambridge-founded AI company deploying end-to-end neural network driving systems. Secured $1+ billion investment from SoftBank, Nvidia, and Microsoft. Partnership with Uber for London robotaxi services targeting 2026 commercial launch.

Oxa

Oxford-based company supporting autonomous services in the US and deploying self-driving vehicles at Heathrow Airport for baggage handling. Advocated for expedited UK regulatory framework.

V2X Communication Technologies

Vehicle-to-Everything (V2X) enables real-time communication between vehicles, infrastructure, pedestrians, and networks. The automotive V2X market is projected to grow from $2.87B (2025) to $18.67B by 2030 (45.4% CAGR).

C-V2X Dominance: Cellular V2X captured 68.4% market share in 2024, benefiting from existing cellular infrastructure, 5G integration, and broader coverage than DSRC alternatives.

SAE Automation Levels

LEVEL	NAME	CONTROL	CONNECTIVITY
0	No Driving Automation	Human	—
1	Driver Assistance	Human	Optional
2	Partial Automation	Shared	**Required**
3	Conditional Automation	System*	**Required**
4	High Automation	System	**Critical**
5	Full Automation	System	**Critical**

*Human fallback required. Levels 2–5 benefit from resilient, multi-network connectivity for safety-critical operation.

SAE International, J3016 Taxonomy and Definitions (2021).

7. The Cost of Silence: Why Connectivity is Non-Negotiable

When Networks Fail, EVs Stop

Connectivity is the leading identified cause of no-charge events

In one U.S. charging-network dataset cited by NREL, station connectivity accounted for 55% of no-charge events in 2023, ahead of internal faults (38%)[14a]. Separately, J.D. Power reports that failed public charging visits fell from 19% (2024) to 14% (2025), with chargers out of service or not working properly as the most common cause and ease of payment and automatic payment processing remaining important experience factors[14b].

Reliable connectivity underpins virtually every function in the EV ecosystem. A single point of failure can disable safety systems, strand vehicles, interrupt charging, and compromise fleet operations. For safety-critical applications, undetected connectivity loss creates material risk.

Connectivity Requirements by Application

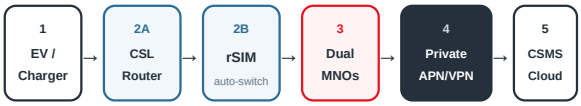
APPLICATION	LATENCY	RELIABILITY	CONNECTIVITY POSTURE
V2X Safety	<20ms	99.999%	Essential
OTA Updates	Tolerant	99.9%	N/A
Fleet Telematics	<1s	99.9%	Recommended
Charging Payment	<5s	99.99%	Essential
V2G Grid Services	<100ms	99.99%	Essential

Latency and reliability targets are illustrative, derived from 3GPP URLLC specifications, ETSI ITS standards, and UK Public Charge Point Regulations (2023). Classification reflects field deployment experiences across managed connections[13]. Actual requirements vary by deployment architecture and operational context.

Implications for Connectivity Architecture

With 3G shutdown and 2G retirement varying by operator, the EV ecosystem is consolidating on 4G LTE and 5G. This transition demands connectivity architectures that can span multiple network generations and operators simultaneously. CSL's DUAL-CORE/rSIM approach addresses this through discrete private network infrastructure and a choice of international roaming MNO profiles.

DUAL-CORE Failover Architecture



Failover at steps 2A or 2B – 4 happens before traffic enters private APN / VPN.
CSMS = Charge Station Management System

Multi-Network Resilience

Simultaneous connections to multiple MNOs ensure continuous connectivity even when individual networks fail. Automatic, seamless failover maintains critical services.

Private Network Infrastructure

CSL operates private network infrastructure with VPN (virtual private network) and private APN (access point name) connectivity across multiple endpoints, segregated from public internet traffic. This dedicated backbone provides consistent, low-latency performance for critical applications.

Architecture Comparison: Single-network connectivity accepts individual operator outages as inherent risk. Multi-network architectures treat them as addressable design constraints. Where greater safety, security and business continuity risks warrant greater vigilance and architectures that are designed to build in redundancy and automatic failover responses, such as 99.98%+ availability targets, the case for multi-network combined with dual-core resilience becomes significantly stronger.

7. Resilient Connectivity (continued)

Single-Network Vulnerabilities

Single MNO dependency creates addressable risk:

- **Network outages:** Major networks can experience difficult to predict as well as various types of regional/national outages multiple times annually
- **Coverage gaps:** Rural areas may lack coverage from specific operators
- **Congestion:** Urban peaks and events can sometimes saturate network capacity
- **Technology transitions:** i.e. 3G shutdown, 2G retirement, eCall modernisation[12]

Regulatory Reality: Reliability is Now Mandated
UK Public Charge Point Regulations require 99% reliability for rapid chargers; the first annual reliability reports for calendar year 2025 were due to OPSS by 14 January 2026[13].

UPTIME	DOWNTIME/YEAR	LEVEL
99.0%	3.65 days	Regulatory min
99.9%	8.76 hours	Standard SLA
99.99%	52.6 minutes	Mission-critical

For V2X and V2G applications, achieving the required reliability from a single-network architecture is significantly more challenging.

rSIM: Future-Proofed for 2030 and Beyond

Resilient SIM (rSIM) technology addresses the connectivity challenges specific to long-life, distributed IoT assets such as EV chargers and telematics units:

Dual Operator Profiles

Two MNO profiles on a single SIM with automatic switching. When one network experiences issues, rSIM seamlessly transitions to the backup operator without service interruption.

SGP.32 Compliance

SGP.32 is the GSMA specification for remote SIM provisioning on IoT devices[11]. Compliance ensures future-ready eSIM management, critical for OEMs planning 2030+ deployments. Remote SIM provisioning eliminates the need for physical SIM swaps across your entire fleet.

Lifetime Deployment

No physical SIM swaps required for network changes. As 2G retirement progresses across operators, rSIM's multi-network and managed dual-IMSI profile capability extends device lifespans by roaming to networks where coverage remains, while providing a seamless migration path to 4G/LTE and 5G without service visits or hardware replacement (device capability dependent).

Proven at Scale

3.5M+

Active CSL SIMs providing resilient connectivity across Europe

CSL's connectivity solutions are already deployed across critical infrastructure including transport, telecare, fire & security, healthcare, and vehicle applications where failure is not an option. CSL's connectivity infrastructure also supports emergency services and eCall systems, where comparable availability requirements apply.

European Coverage

With private APN and VPN infrastructure, CSL provides secure, reliable connectivity across borders, essential for international fleet operations and international charging networks.

For EV Stakeholders: Whether you're a charging operator, fleet manager, or V2G aggregator, resilient connectivity solutions can help ensure the transition to electric transport is not undermined by the communication failures that erode driver confidence and operator revenue.

Integration Ready

CSL solutions are designed to integrate with existing telematics platforms, charging management systems, and fleet software through standard APIs and documented deployment processes.

8. The Road to 2030: Your Next Step

2026–2030 Outlook

The next four years represent a critical inflection point for UK transport electrification. Those who build resilient connectivity foundations today will capture the market opportunities of tomorrow.

2026: Pilots & Preparation

UK AV pilots launch (Spring). ZEV Mandate requires 33% zero-emission sales. *Government target:* 300,000 public charge points over the next few years.

2027: Regulatory Maturity

Full Automated Vehicles Act implementation expected (H2). V2G aggregation projected to expand. Fleet electrification accelerates.

2028–2029: Scale-Up

Mass-market AVs projected on UK roads. V2X anticipated as standard for new fleets. Grid integration target: 5 GW capacity.

2030: The Deadline

End of new petrol/diesel car sales (policy). ZEV Mandate target: 80%. Industry projection: 400,000+ chargers. UK AV sector forecast: £42 billion by 2035[8].

Timeline reflects policy targets, government projections, and industry forecasts. Actual outcomes will vary with market conditions, regulatory implementation, and investment levels.

The Connectivity Imperative

Every milestone on the 2026–2030 timeline depends on resilient, always-on connectivity. From AV safety systems to V2G grid services, network reliability isn't optional; it's foundational.

Key Insight: Organisations that establish resilient connectivity infrastructure now will be positioned to capture market opportunities as the EV transition accelerates. Those relying on single-network solutions face increasing operational risk.

EV Ecosystem Market Growth 2025 → 2030

SEGMENT	2025	2030	GROWTH
Telematics	$13.5B	$41.7B	+209%
V2X	$2.9B	$18.7B	+545%
V2G	$6.3B	$16.9B	+168%
Fleet Mgmt	$9.1B	$32.3B	+255%

Sources: Mordor Intelligence, MarketsandMarkets (2024/2025 forecasts; latest available at publication)[10].

UK Policy Certainty

The Automated Vehicles Act 2024 and ZEV Mandate provide regulatory clarity through 2035. This long-term framework enables confident infrastructure investment decisions.

8. Your Next Step (continued)

Accelerating Your Transition

The Unified Connectivity Layer: Vehicle, charger, and grid are nodes in a single data ecosystem. Charging apps authenticate with vehicles. Fleet cards authorise payments at any charger. Grid operators coordinate with thousands of V2G-enabled EVs. A secure, resilient connectivity layer is fundamental to this ecosystem.

Whether deploying charging infrastructure, electrifying a commercial fleet, or developing connected vehicle services, resilient multi-network and/or dual-core connectivity deserves the same planning rigour as the hardware and software layers.

For Charge Point Operators

High payment processing uptime targets (often cited as 99.99%+) require eliminating single points of failure in the connectivity layer. Multi-network when combined with autonomous failover via dual-core architectures are designed to address this.

CSL deployments typically move from pilot to rollout within 4–12 weeks, depending on site complexity, specific requirements, and scale.

For Fleet Managers

Real-time telematics and driver safety monitoring require connectivity that minimises dropout risk[16]. rSIM provides continuous coverage by maintaining simultaneous profiles across multiple operators.

CSL's connectivity platform currently manages over 3.5 million IoT connections across European deployments, spanning transport, healthcare, and critical infrastructure.

Connectivity Risk Assessment

Quick self-assessment: check all that apply:

- ☐ Single MNO dependency for critical applications
- ☐ Devices in rural/coverage-challenged areas
- ☐ Legacy 2G/3G devices with limited network support
- ☐ No automatic network failover capability
- ☐ Payment/safety functions rely on public internet
- ☐ SIM management requires physical device access

Any of the items checked? A connectivity architecture review may be warranted. Visit **csl-group.com**

For OEMs & Integrators

SGP.32-compliant rSIM provides a future-proof connectivity path for connected vehicles, V2X, and autonomous systems, providing a single integration point designed for lifetime deployment across private network infrastructure.

For V2G Aggregators

Grid balancing benefits from low latency and high availability. Industry discussions typically reference sub-100ms latency and 99.99% availability as aspirational targets, though actual requirements vary by deployment. CSL's private network infrastructure is designed to support these demanding performance profiles.

Your 2026 Priorities

1. Audit connectivity resilience: identify single-network dependencies

2. Plan 2G/3G migration: legacy assets become liabilities

3. Prepare for 2027 eCall modernisation: proactive migration avoids scrambles

How CSL Supports Implementation

For organisations evaluating multi-network connectivity architectures for EV charging, fleet, or grid applications, CSL's transport sector team can provide deployment assessments and pilot scoping.

www.csl-group.com

9. Appendices

Glossary of Terms

ADAS	Advanced Driver Assistance Systems
AV	Autonomous Vehicle
BEV	Battery Electric Vehicle
C-V2X	Cellular Vehicle-to-Everything
CSMS	Charge Station Management System (also Cybersecurity Management System in WP.29 context)
DSRC	Dedicated Short-Range Communications
eHGV	Electric Heavy Goods Vehicle
FCEV	Fuel Cell Electric Vehicle
ODD	Operational Design Domain
OTA	Over-the-Air updates
PHEV	Plug-in Hybrid Electric Vehicle
SAE	Society of Automotive Engineers (J3016 automation levels)
SGP.32	GSMA IoT eSIM remote provisioning specification
SUMS	Software Update Management System (WP.29 requirement)
TCO	Total Cost of Ownership
TCU	Telematics Control Unit
V2G	Vehicle-to-Grid
V2X	Vehicle-to-Everything
ZEV	Zero Emission Vehicle
ZEHID	Zero Emission HGV and Infrastructure Demonstrator

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[4] GOV.UK, "Electric Vehicle Homecharge Scheme and Electric Car Grant," July 2025.

[5] UK Statutory Instruments, "The Zero Emission Vehicle Mandate Regulations," 2024-2035.

[6] Zapmap, "UK EV Charging Statistics," January 2026.

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[8] GOV.UK, "UK Connected and Automated Mobility Roadmap to 2030," Sept 2024.

[9] GOV.UK, "Driverless taxis and buses on UK roads by 2026," June 2025.

[10] Mordor Intelligence, "EV Telematics Market 2025–2030" ($13.5B→$41.7B, 20.6% CAGR); MarketsandMarkets, "V2X Communication Market 2024" ($2.87B→$18.67B, 45.4% CAGR). Fleet management and V2G figures from same sources.

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9. Appendices (continued)

About This Executive Summary

Strategic overview of CSL's "Transition to Electric Vehicles" market report series, updated with 2025/2026 data for executive audiences.

Original Technical Series: 1. Driving Behaviours & Safety (28pp) | 2. Commercial Fleet & HGV (40pp) | 3. Charging & Power (44pp) | 4. AVs, AI & ML (48pp)

Key Changes from Original Series

Updated: UK charging 73,699 → 88,513 (Jan 2026). Global EVs: 20.7M. UK BEVs: 473,348.

New: Electric Car Grant (July 2025), Plug-in Truck Grant (Jan 2026), AV pilot fast-track (June 2025).

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Contact: www.csl-group.com | **Technical Series:** csl-group.com/white-papers