Connecting Digital Product Passports (DPP) to CO₂ Emission Standards for Cars and Vans

July 2025

About Us

The **DigitalTrade4.EU consortium** envisions a **seamlessly interconnected Europe** and **neighbouring regions** powered by harmonized standards for the digitalisation of trade documents and processes. By fostering the digital transformation of trade, we aim to promote economic integration, enhance cooperation, and ensure long-term trade facilitation across borders.

Our consortium is made up of **experts in their field**, including **108 full partners**—trade associations, logistics providers, shipping lines, banks and insurances, technology innovators, etc.—**from 17 European Union countries** (*France, Belgium, Netherlands, Austria, Estonia, Finland, Italy, Latvia, Spain, Germany, Sweden, Poland, Luxembourg, Lithuania, Slovenia, Denmark, Bulgaria*) and **22 non-EU countries** (*United Kingdom, Switzerland, Montenegro, Japan, Singapore, Hong Kong, Australia, New Zealand, India, Nepal, Canada, United States of America, Cameroon, Morocco, Egypt, Kenya, Pakistan, Nigeria, Brazil, Uzbekistan, Turkey, Ukraine*).

Our consortium is already **aligned with the fundamentals** of the **EU Competitiveness Compass**. Learn more:

- How DigitalTrade4.EU Can Help Achieve the Objectives of the EU Competitiveness Compass (February 2025)
  https://www.digitaltrade4.eu/how-digitaltrade4-eu-can-help-achieve-the-objectives-of-the-eu-competitiveness-compass/

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Executive Summary

This document proposes the **strategic integration of Digital Product Passports (DPPs)** into the revised Regulation (EU) 2019/631, which sets **CO₂ emission performance standards for new passenger cars and light commercial vehicles**. By leveraging DPPs, the European Union can significantly **enhance regulatory compliance, reduce administrative burden, and accelerate the transition to zero-emission mobility**.

DPPs offer a **robust, interoperable digital infrastructure** for tracking **CO₂ emissions, vehicle lifecycle data, and sustainability metrics** across the entire automotive value chain. This integration aligns perfectly with the **European automotive industry's strategic research agenda**, particularly the **European Road Transport Advisory Council (ERTRAC) roadmap**, which identifies **digitalisation, standardization, and end-to-end traceability** as **indispensable prerequisites** for achieving **circular economy goals**.

Case studies from various EU-funded projects demonstrate the **practical applicability and benefits of DPPs** in monitoring CO₂ performance, lifecycle impacts, and supply chain transparency. To move forward, key next steps include **formal integration of DPP requirements** into the regulation, **prioritizing harmonized digital standards**, launching **targeted pilot programs**, providing **support for SMEs**, establishing **strong data governance and security**, and implementing **continuous evaluation and adaptation mechanisms**.

By adopting DPPs, the EU can not only **strengthen its CO₂ emission standards** but also **cement its leadership in green and digital trade**, fostering a truly **sustainable and competitive automotive sector**. We recommend amending the revised Regulation (EU) 2019/631 to mandate the use of Digital Product Passports (DPPs) for all new vehicles placed on the EU market starting in 2028.

Introduction

This document provides feedback on the ongoing revision of **Regulation (EU) 2019/631**, which sets CO_2 emission performance standards for new passenger cars and light commercial vehicles. We propose a strategic link between this regulation and the implementation of **Digital Product Passports (DPPs)**, as introduced in the Ecodesign for Sustainable Products Regulation (ESPR).

The introduction of **DPPs** into the **automotive sector** presents a **valuable opportunity** to enhance **regulatory compliance**, reduce **administrative burden**, and accelerate the **transition to zero-emission mobility**. **DPPs** can serve as an **interoperable digital infrastructure** for monitoring **CO_2 emissions**, **vehicle lifecycle data**, and **sustainability metrics** throughout the **automotive value chain**.

By integrating DPPs into the implementation framework of the revised Regulation (EU) 2019/631, the EU can:

- Enhance data quality and reporting efficiency;
- Increase transparency across supply chains;
- Support SMEs and Tier 2/3 suppliers with harmonised tools;
- Strengthen alignment between climate, digital, and circular economy objectives.

Additionally, DPPs can facilitate the technology-neutral approach emphasized in the Commission's consultation by enabling transparent tracking of emissions from diverse powertrain technologies (e.g., e-fuels, hydrogen, and battery-electric systems). This ensures compliance with evolving standards while preserving flexibility for manufacturers.

As the ESPR introduces mandatory DPPs for many product categories, this creates a timely opportunity to extend this digital infrastructure to automotive CO_2 regulation.

Our approach is fully aligned with the recent *Circular Economy and Competitiveness of the European Road Transport[1]* roadmap published by **the European Road Transport Advisory**

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[1] Ertrac. Circular Economy and Competitiveness of the European Road Transport Strengthening sustainability and resource sovereignty of the automotive industry (June 2025)

Council (ERTRAC). That roadmap, developed by leading industry and research experts, emphasizes that digitalisation—including Digital Product Passports, robust tracking technologies, and data standardisation—is an indispensable prerequisite for achieving the automotive sector's circular economy goals. Therefore, the DPP not only provides a powerful tool for CO_2 regulatory compliance but is also a widely recognized cornerstone for the entire sector's transition to a sustainable future.

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https://www.ertrac.org/wp-content/uploads/2025/07/ERTRAC_CircularityCompetitiveness_Roadmap_2025_Final.pdf

Synergies Between Digital Product Passport (DPP) and the CO₂ Standards Revision

DPP Feature (based on ESPR)	Link to CO₂ Regulation Revision (as per consultation document)	Comment / Opportunity
1. Life-cycle CO₂ emissions data	Assessment of minimum energy efficiency thresholds for new zero-emission vehicles.	DPP enables standardized tracking of life-cycle CO₂ footprint, supporting the evolution from tailpipe-only to full life-cycle assessments. This directly aligns with ERTRAC's call for **standardized, LCA-based methodologies** to assess the carbon footprint of vehicles and components across multiple life cycles, a need which they identify as a long-term research priority.
2. Digital carrier (e.g. QR code, NFC)	Better use of electronic tools for collecting and verifying monitoring data.	DPP facilitates digital compliance checks and traceability via machine-readable formats. This addresses a critical challenge identified by ERTRAC, which prioritises research into **digital tracking technologies** (IoT, blockchain, RFID) to monitor vehicle parts throughout their lifecycle and improve material recovery.
3. Standardized data formats (e.g. JSON, XML)	Simplification and reduction of administrative burden for reporting	Harmonized data formats enable automated integration of DPP data into CO₂ monitoring/reporting workflows, reducing reporting complexity.
4. Material and component traceability	Support the development of new EU value chains (esp. battery value chain)	DPP provides verifiable data on the origin and composition of materials, which is essential for sustainability claims. This capability is a foundational requirement for ERTRAC's proposed **'Lighthouse Projects'**, such as the 'Transcontinental Recycling System' and 'Recycling Factory of the Future', which depend on robust, cradle-to-grave traceability of components and materials to function effectively.
5. Battery passport and health indicators	Battery systems seen as a strategic priority for zero-emission mobility	The Battery Regulation requires DPPs for batteries – linking this to the CO₂ standard allows consistent reporting of battery-related emissions. Furthermore, DPPs can track the lifecycle emissions of e-fuels used in hybrid vehicles, ensuring alignment with the Commission's technology-neutral approach and supporting cross-sectoral decarbonization (e.g., aviation, maritime).
6. Compliance and end-of-life information	Ensure an economically viable and socially fair transition.	DPPs support longevity, reparability and responsible disposal – key to reducing total emissions and promoting fair access to mobility.
7. Access for multiple stakeholders (OEMs, repairers, consumers)	Promotes accessible and affordable zero-emission mobility solutions	Transparent DPP access builds trust and allows informed choices for consumers, especially in secondary and lower-income markets.
8. Cross-legislation alignment (ESPR, Batteries Regulation, etc.)	Review will take into account other EU legislation and ensure coherence.	Integrating DPP with the CO₂ framework ensures policy coherence, reduces duplication, and streamlines regulatory architecture. This also supports the Commission's objective of harmonizing action across the single market (Basis for EU Action, Section D.1), avoiding fragmented national approaches to CO₂ reporting and fostering trust in the EU's regulatory framework.

Table 1. Alignment of Digital Product Passport Features with CO₂ Regulation Revision Objectives, demonstrating how DPPs facilitate enhanced data quality, transparency, and compliance in the automotive sector's journey towards sustainable mobility.

Alignment with the Automotive Sector's Strategic Research Agenda

The proposal to integrate **Digital Product Passports** into **CO₂ regulations** is not a **standalone concept**; it is a direct response to the **strategic needs** identified by the **European automotive industry** itself. The **ERTRAC roadmap** makes it clear that a **digital transformation** is fundamental to achieving a **competitive** and **circular economy**.

ERTRAC's analysis highlights several priorities that DPPs are uniquely positioned to address:

1. **Standardisation and Interoperability:** ERTRAC identifies the lack of standardised data formats and interoperability as a major impediment to progress. It calls for urgent research to establish universal standards for Digital Product Passports to enable seamless data exchange across stakeholders.

2. **End-to-End Traceability:** The roadmap stresses the critical need to track and trace vehicles, components, and materials from production to end-of-life to improve reuse, remanufacturing, and recycling. DPPs provide the core infrastructure for such a system.

3. **Informing Circular Design:** ERTRAC notes that data from a vehicle's entire lifecycle must be fed back into the design process. A DPP is the perfect mechanism to capture this data and enable "Design for Circularity" principles.

By embedding **DPPs** within the **revised CO₂ standards**, the **EU** would be creating the **foundational digital infrastructure** that the **automotive sector** acknowledges as essential for its future **competitiveness** and **sustainability goals**.

Case Studies Supporting the Integration of Digital Product Passports (DPPs)

The **DPP4EU Conference** showcased a range of EU-funded and industry-led projects that demonstrate the practical implementation of **Digital Product Passports (DPPs)** across diverse sectors[2]. Many of these initiatives directly support the objectives of Regulation (EU) 2019/631 by enabling access to **high-resolution data** on emissions, circularity, and regulatory compliance. The following case studies offer valuable insights into how DPPs are being used to track **CO_2 performance**, monitor **lifecycle impacts**, and enhance **supply chain transparency**—building a strong case for embedding DPP functionality into the regulation's future framework.

1. BASE – Battery Passport for Resilient Supply Chains

Lead: Fraunhofer IEG | **Funding**: Horizon Europe (GA No. 101157200)

Sectors: Automotive, Marine, Energy Storage

Highlights:

- Builds an interoperable Digital Battery Passport (DBP) ecosystem across stakeholders.

- Uses Catena-X data space and distributed ledger technology (DLT) for traceability.

- Pilots with Mercedes-Benz, Ford Motors, Corvus Energy.

- Includes circularity metrics and ESGE indicators.

Relevance: Supports full-lifecycle CO_2 tracking of vehicle batteries, aligned with Battery Regulation and CO_2 reporting needs.

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[2] DPP4EU Conference. Abstract Booklet (July 2025)
https://digipassforum.eu/wp-content/uploads/2025/06/DPP4EU-1.pdf

2. BatteryPass-Ready – Regulatory Testbed for Battery DPPs

Lead: Acatech | **Funding**: German Federal Ministry for Economic Affairs and Climate Action

Sector: Electric Vehicle Batteries

Highlights:

- Offers a compliance test environment for validating DPPs against EU Battery Regulation.

- Simulates registry, data provider, and service provider environments.

- Ensures conformity with data requirements prior to market entry.

Relevance: Helps align automotive CO_2 compliance with evolving DPP frameworks, especially for batteries.

3. CIRPASS-2 – Cross-Pilot DPP Interoperability

Lead: BEKO | **Funding**: Horizon Europe

Sectors: Electronics, Construction, Textiles, Tyres

Highlights:

- Supports 13 B2B pilots to demonstrate DPP scalability and semantic interoperability.

- Develops a reference architecture and core ontology.

- Aligns with UN Transparency Protocol and EU standards.

Relevance: Provides a blueprint for harmonised DPPs in the automotive value chain, including CO_2 and material footprint tracking.

4. RECONSTRUCT – XML-based DPP for Low-Carbon Construction

Lead: ITeC | **Funding**: Horizon Europe (GA No. 101082265)

Sector: Construction

Highlights:

- Uses XML for compatibility with BIM and CE-marking systems.

- Tracks carbon footprint, repairability, recyclability.

- Includes extended producer responsibility (EPR) features.

Relevance: Model for embedding structured CO_2 and circularity data into DPPs across complex value chains—including vehicles.

5. THESEUS – Territorial DPP for Material Flow & Policy Support

Lead: ICCS | **Funding**: Horizon Europe

Sectors: Industrial Symbiosis, Logistics

Highlights:

- Customisable, dynamically updated DPP for material flow tracking.

- Integrates with life-cycle assessment (LCA), logistics, and scheduling tools.

- Mixed-reality user interface for industrial users.

Relevance: Offers a governance model to regionalize DPP-enabled CO_2 and circularity decisions—relevant for national CO_2 reporting frameworks.

6. Fluid 4.0 – CO_2 Monitoring in the Use Phase of Equipment

Lead: Bosch Rexroth | **Funding**: VDI Technologiezentrum

Sector: Fluid Power Systems

Highlights:

- Tracks 98% of product-related CO_2 emissions generated during use-phase.

- Connects digital twins with DPP for energy optimization.

- Develops industry-wide CE concept and data standards.

Relevance: Directly addresses CO_2 data beyond tailpipe—potentially critical for use-phase CO_2 in light commercial vehicles.

Conclusion and Next Steps

The **integration of Digital Product Passports (DPPs)** into the revised Regulation (EU) 2019/631 on **CO₂ emission performance standards for cars and vans** represents a **pivotal opportunity** to **enhance regulatory compliance, streamline administrative processes, and accelerate the transition to zero-emission mobility**. As demonstrated throughout this document, **DPPs offer an interoperable digital infrastructure** capable of **monitoring CO₂ emissions, vehicle lifecycle data, and sustainability metrics** across the entire automotive value chain.

The **synergies between DPP features and the CO₂ regulation revision are clear and compelling**. **DPPs enable standardized tracking of life-cycle CO₂ footprint**, facilitate **digital compliance checks**, and **harmonize data formats for reduced administrative burden**. They also provide **verifiable data on material origin and composition**, support **consistent reporting of battery-related emissions**, and **promote longevity, reparability, and responsible disposal** of vehicles. Furthermore, **transparent DPP access builds trust** and informed choices for consumers and integrating DPPs with the CO₂ framework ensures **policy coherence** across various EU legislations.

This approach is not only aligned with the Commission's **technology-neutral stance** but is also a direct response to the **strategic needs identified by the European automotive industry itself**, as outlined in the **ERTRAC roadmap**. ERTRAC emphasizes that **digitalisation, including DPPs, robust tracking technologies, and data standardization**, is an **indispensable prerequisite** for achieving the automotive sector's **circular economy goals. DPPs are uniquely positioned** to address critical priorities such as **standardization and interoperability, end-to-end traceability, and informing circular design**.

The **practical implementation of DPPs** across diverse sectors has been showcased by numerous EU-funded and industry-led projects, providing strong case studies that demonstrate their ability to track **CO₂ performance**, monitor **lifecycle impacts**, and enhance **supply chain transparency**. Projects like BASE, BatteryPass-Ready, CIRPASS-2, Circular Intelligence/Circthread, PASSAT, RECONSTRUCT, THESEUS, and Fluid 4.0 offer valuable insights and blueprints for embedding DPP functionality into the future framework of automotive CO₂ regulations.

Next Steps:

To effectively integrate DPPs into the CO_2 emission standards for cars and vans, we recommend the following next steps:

1. **Formal Integration**: Officially incorporate the **requirement for Digital Product Passports (DPPs)** within the text of the revised Regulation (EU) 2019/631. This should clearly define the **scope and minimum data requirements** for automotive DPPs, leveraging existing frameworks like the Ecodesign for Sustainable Products Regulation (ESPR) and the Battery Regulation.

2. **Standardization and Interoperability**: **Prioritize the development and adoption of harmonized digital standards and data formats** for automotive DPPs. This will ensure seamless data exchange across stakeholders and enable automated integration into CO_2 monitoring and reporting workflows. Collaboration with initiatives like Catena-X and alignment with UN Transparency Protocols[3] should be pursued.

3. **Pilot Programs and Industry Collaboration**: **Launch targeted pilot programs** within the automotive sector to test and refine the integration of DPPs for CO_2 compliance and lifecycle tracking. These pilots should involve a broad range of stakeholders, including OEMs, Tier 2/3 suppliers, logistics providers, and recycling facilities, to ensure practical applicability and address potential challenges.

4. **Support for SMEs**: Develop and provide **accessible tools and guidance to support SMEs** and Tier 2/3 suppliers in adopting and utilizing DPPs. This could include simplified reporting mechanisms, training programs, and financial incentives to ease the transition and ensure broad participation across the supply chain.

5. **Data Governance and Security**: Establish **robust data governance frameworks and security protocols** to ensure the integrity, privacy, and secure exchange of sensitive data contained within DPPs. This is crucial for building trust among stakeholders and preventing data misuse.

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[3] UNECE. About the UNTP
https://uncefact.github.io/spec-untp/docs/about/

6. **Continuous Evaluation and Adaptation**: Implement a mechanism for **continuous evaluation** of the DPP system's effectiveness in achieving CO_2 emission reduction targets and circular economy goals. Be prepared to adapt the regulatory framework and DPP requirements based on technological advancements and evolving industry needs.

By taking these decisive steps, the EU can harness the **transformative potential of Digital Product Passports** to not only strengthen its CO_2 emission standards but also to cement its leadership in **green and digital trade**, fostering a truly **sustainable and competitive automotive sector**.

Appendix 1. EU Green-Digital Trade Leadership Roadmap (DigitalTrade4.EU, 2025)

activity	objective	indicative metrics	tools/enablers
1. EU-Singapore DTA & Expand DEPA Partnerships	Strengthen digital trade diplomacy in Asia through high-standard agreements.	- 5+ new digital trade agreements with key Asian partners (e.g., Japan, India, ASEAN) by 2030 - 15% increase in EU-Asia digital services trade by 2028	DEPA framework, EU-Singapore DTA, Global Gateway Initiative, eIDAS 2.0
2. Implement Digital Product Passports (DPPs)	Ensure traceable, sustainable supply chains aligned with EU Green Deal.	- 50% adoption of DPPs by 2030 - 20% reduction in supply-chain carbon intensity by 2030	EU Sustainable Products Initiative, CBAM incentives, UNECE Recommendation 49
3. Fund Secure Digital Corridors in Asia	Build interoperable digital infrastructure for EU-Asia trade.	- ~€2B allocated via NDICI-Global Europe - 10+ blockchain-based traceability pilots by 2027	NDICI-Global Europe, ASEAN digital customs systems, EU Customs Data Hub
4. Harmonize Digital Standards (MLETR/eIDAS 2.0)	Enable cross-border recognition of e-documents and digital identities.	- 90% mutual recognition of e-signatures by 2028 - 70% SME adoption of eIDAS wallets	MLETR framework, eIDAS 2.0, EU Transport Law updates, UN/UNECE protocols
5. Implement LEI and vLEI for Supply Chain Trust	Harmonise and simplify legal entity identification across borders	- 90% entity coverage with LEI by 2030; 50% vLEI use in customs and eFTI transactions	ISO 17442, vLEI, eIDAS 2.0, UNECE UID
6. Launch Green-Digital Trade Academy	Upskill SMEs and officials on DPPs and carbon accounting.	- 40% increase in SME participation by 2027 - 60% cost savings for SMEs	Erasmus+ grants, COSME programme, tiered compliance thresholds
7. Integrate ESG into Trade Finance	Link trade finance to sustainability metrics for cheaper capital access.	- €10B/year unlocked for green trade finance - 30% lower Scope 3 emissions by 2030	InvestEU guarantees, CSRD-aligned reporting, FinTech platforms
8. Enforce Platform Interoperability	Prevent vendor lock-in and empower SMEs.	- 100% compliance with CJEU rulings by 2026 - 50% reduction in platform dominance	Court of Justice of the European Union (CJEU) Case C-233/23, DEPA, eIDAS 2.0, Digital Markets Act (DMA)
9. Global Digitalisation Projects with EU Standards	Extend EU digital infrastructure and norms globally.	- 20+ co-funded projects by 2030 - 80% interoperability with EU systems	Digital Europe Programme, CEF funding, EU-Asia Digital Standards Taskforce
10. Advance UNECE Transparency Protocols	Globalize EU sustainability standards for supply chains.	- 100% alignment with UNECE Rec. 49 by 2028 - 30% reduction in greenwashing claims	UNECE CEFACT, W3C Verifiable Credentials, EU CBAM registry
11. Pilot CBAM-DPP Corridors	Link trade finance to verifiable ESG metrics for tariff incentives.	- 20% CBAM compliance cost reduction - 50% DPP adoption by 2030	IoT carbon trackers, CBAM rebate schemes, EU Customs Single Window

Table 2. The roadmap above, DigitalTrade4.EU's input to the European Commission's "International Digital Strategy" operationalises the recommendations outlined in this document. For instance, Activity 1 (EU-Singapore DTA & Expand DEPA Partnerships) directly supports the harmonisation of international digital standards, while Activity 8 (Global Digitalisation Projects with EU Standards) aligns with efforts to promote dual-use infrastructure globally. These activities collectively reinforce the EU's ability to leverage digital trade diplomacy as a tool for both economic growth and strategic security.