TECHNOVATIVE SOLUTIONS

DPP

By TVS

Need for change

Moving towards a linear economy

Resource consumption has tripled driven by virgin and non-renewable resources

We are consuming 1.8 earths per year projected to rise to 2.3 time by 2040

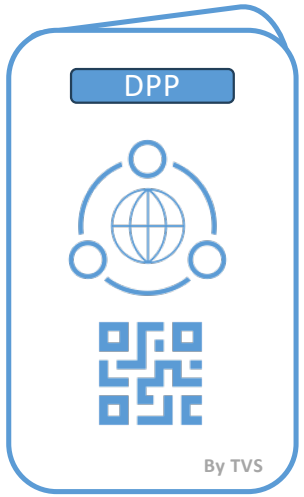
We are extracting 90 B tons of resources from the earth – only 25% renewable

Linear consumption contributing towards half of global climate change, biodiversity & water loss

We only have one earth

- ✓ European Union wants to progressively de-couple resource consumption from economic growth, therefore potentially reducing the EU's dependence on imported and virgin raw materials, and its vulnerability to resource price volatility, while providing new business opportunities.
- ✓ There are a number of regulations being considered by EU to address circular economy and sustainability, one of the the key aspects of the regulations is making supply chain data visible and traceable.
- ✓ European Commission proposes Digital Product Passport as the first regulatory mover at scale.

Digital Product Passport



What?

A framework/tool that tracks a product's lifecycle to facilitate a circular economy and foster economic growth.

It's a collection of product data that covers general information, labels & certification, carbon footprint, supply chain due diligence, materials & composition, circularity & resource efficiency, performance & durability.

Why?

DPP solves the longstanding issue of transparency and traceability in the production industry helping decision making across the value chain

Promotes Circular Economy and Sustainability through effective management of waste flows and end of life treatment

Legislative Backing and Industry Focus - broader Circular Economy Action Plan (CEAP)

When?

The initiative sets a clear timeline for adoption, with batteries expected to be the first industry to implement DPPs by 2026/7, and other sectors to follow by 2030, demonstrating the EU's commitment to enforcing sustainability practices.

Who?

- **Material Supplier**
- **Manufacturer**
- **Repairer**
- **Recycler**
- **Governments & Public Authorities**
- **Consumer**

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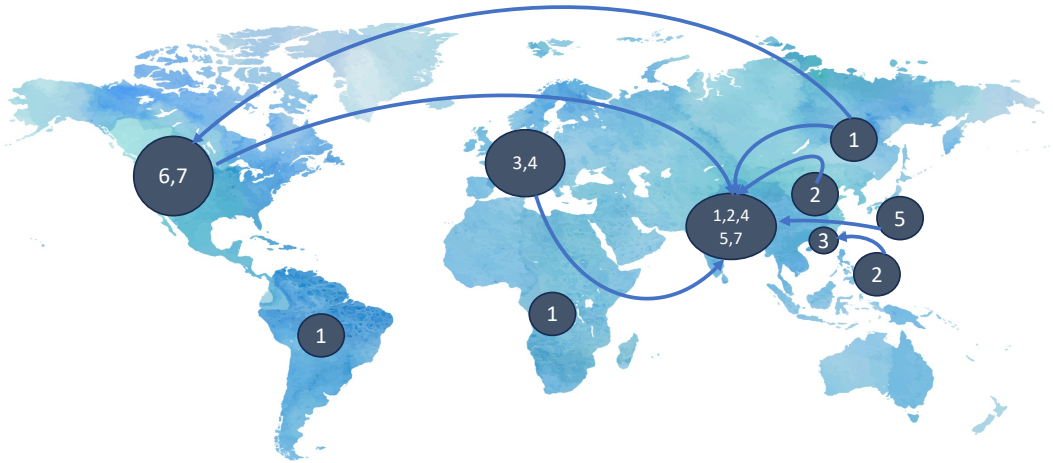
Implications

DPP goes beyond EU borders

- The EU DPP has global impact, as regulation will be applied to imported products, their components and intermediary products in the same way and at the same time as the domestic products.
- The EU could spark more regulation worldwide, potentially affecting even more companies and value chains in the future



1. Metals imported and rare earth metals mined in China
2. Screen, flash memory from South Korea
3. Accelerometer imported from Germany
4. Near field communications controller from the Netherlands
5. Camera, Compass, LCD screen imported from Japan
6. Wi-Fi chip, Audio Chips imported from USA
7. Final assembly and testing in Shenzhen, China

How can your business prepare ?

- ❑Industries should start DPP preparations, especially those in priority sectors.
- ❑Corporations must act quickly and engage in collaborative efforts for DPP readiness.
- ❑Assess corporate data security and privacy to prepare for mandatory DPP disclosures.
- ❑Use existing standards as a guide for data collection but stay adaptable in reporting scope.
- ❑Evaluate IT infrastructure, data availability, and data quality thoroughly.

Source: Boston Consulting Group

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TVS & Digital Product Passport

At TVS, we pride ourselves on being at the forefront of the technological aspects of DPP. We have successfully won multiple EU projects that fund the Digital Product Passport initiative.

- Cutting edge of DPP technology
- Highly skilled team dedicated to solve your problem
- Leading the charge in crafting bespoke DPP platforms
- Post launch - ongoing, expert support to ensure sustained success
- Digital Battery Passport PoC & other live material passports
- Absolute focus on regulatory compliance
- Custom DPP solutions – no one size fits all approach
- Data management through Blockchain and AI expertise

DPP, Circularity & Environmental Analysis in Key EU Projects

Name of the Project	Project Full Name	Budget	Industry Partners	Use Cases
ALBATROSS	Advanced Light-weight Battery systems optimized for fast charging, safety, and second-life applications.	€9,993,817.89 (€10M)	INND Batteries, MARCEDES-BENZ, FIAT, FORD Motors, European Federation for Welding, Joining, and Cutting (EFW), TWI,	1. Automotive
JIDEP	Joint Industrial data exchange Platform	€3,995,194 (€ 4M)	FIAT ZORLU Energi TPI Composites Precision Veronic Intl	1. Automotive 2. Wind Turbine 3. E-Waste
RESTORE	Sustainable remanufacturing solution with increased automation and recycled content in laser and plasma-based process	€6,921,846.25 (€7M)	European Federation for Welding, Joining, and Cutting (EFW), FIAT, EIT Manufacturing, Welding Alloys, Naval Technologies, Lucchini Unipart Rail, AB Dalforsån	1. Remanufacturing of the Rail Axe, 2. Remanufacturing of the steel rollers. 3. Ship propellers - Remanufacturing of the propeller's blades 4. Remanufacturing of automotive component.
ALABAMA	Adaptive laser beam for additive manufacturing	€6,000,000 (€6M)	SINTEF Manufacturing, AEROBASE, FIAT, GKN Aerospace, Nordic Additive Manufacturing	1. Aviation: high-pressure compressor casing (HPC-case) for aero engine 2. Maritime: Super duplex steel propeller 3. Automotive: high-pressure die-cast part
BASE	Battery passport for resilient supply chain and implementation of circular economy	€7,686,437 (€7.7 M)	MARCEDES-BENZ, Ford Motors, Beeplanet Factory, Parakeet, INND Batteries, European Lithium Institute, ROK Metals, Navtek, Corvus	1. Automotive: frugal EV platform production pilot for MARCEDES-BENZ 2. Automotive: frugal EV platform production pilot for FORD Motors 3. Marine: electric tugboat production pilot 4. Stationary: 2nd-life electric energy storage production pilot

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Data Management

Data Collection

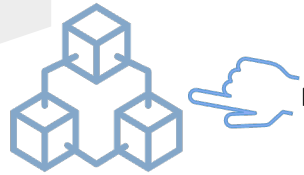
- Product Identification and Provenance
- Materials and Sustainability Information
- Environmental Impact & Resource Consumption
- Ownership History & Audit Trail
- Repair History & Serviceability
- Warranty & Service Documentation
- End-of-Life Management & Circularity Instructions

TVS Implementation Model

Centralised Repository

- Centralised control of data stored on premise, or on cloud
- More predictable performance with dedicated resources
- If stored on-premise, there is more control over the data, however it is a costly system.
- Lower cost and high security for cloud.

Decentralised Repository



Recommended for DPP

- Decentralised & Immutable
- Transparent and great for audit
- Secure and Smart Contract execution
- Consensus Algorithm and no single point of data loss

TVS has ensured that data security and privacy is at the heart of DPP design.

- **The European commission (EC) proposes a company-managed solution for DPP data storage with a standardized DPP registry to store a list of unique identifiers as a minimum[1]**
- **It is expected that the design and testing of the registry will be carried out throughout 2025, and subsequently implemented in 2026**
- **The key stakeholder groups involved in data storage include:**
  - **European Union, key players in decision making process for DPP systems and implementation**
  - **Specialized IT service providers who will implement the systems supporting DPP**
  - **Corporates & NGOs who can provide input**

1.Final format of EU registry yet to be specified, it is currently unclear whether data beyond unique IDs will be collected in this registry

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TVS – Brief Overview

28+ European and UKRI projects

12 years of experience

70+ Experienced scientists, engineers and developers

200 M Euro Project size in Total

Domains

- Renewables
- Manufacturing
- Recycling
- Robotics and Automation
- Thermal Storage
- Cyber Security
- Deep Drilling
- Waste Heat Recovery
- Battery
- Energy Efficient Buildings
- Materials Discovery
- Healthcare
- Carbon Capture and Utilisation
- Disaster Resilience
- Climate Change
- Societal Resilience

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EU Funded Projects

Smartrec, GEO-COAT, WELD GALAXY, GEODRILL, GEOSMART, GEOHEX, GEOPRO, PharmaLedger, VOJEXT, FORGE, optiDrill, ALBATROSS, IMPHORAA, ComBioTES, COCACO2LA, JIDEP, TRUMPET, C2IMPRESS, COMPASS, CLIMAS, flute, SEHRENE, ALABAMA, RESTORE, RECOMP, POWERPATH, NGEL, BASE

Partners

Topics we are exploring for future Horizon Europe Projects

- ❑ Digital information systems for bio-based products
- ❑ Circular solutions for textile value chains through innovative sorting, recycling, and design for recycling
- ❑ Increasing the circularity in electronics value chains
- ❑ Increasing the circularity in plastics value chains
- ❑ Innovative circular solutions for furniture
- ❑ Technologies/solutions to support circularity for manufacturing (Made in Europe Partnership) (RIA)
- ❑ Manufacturing as a Service: Technologies for customised, flexible, and decentralised production on demand (Made in Europe Partnership) (RIA)
- ❑ Exploration of critical raw materials in deep land deposits (RIA)

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