Forthcoming at **Review of European, Comparative and International Environmental Law (RECIEL) 2025**

Addressing conflict of laws and facilitating Digital Product Passports for critical raw materials value chains: from centralisation to mutual recognition

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Abstract

The value chains for critical raw materials (CRM) used in electric vehicle (EV) batteries often involve mining in the Global South, Australia and Canada, production in Asia, and consumption in the Global North. Starting in 2027, EU law will require a 'digital product passport' (DPP) for market entry. These passports will provide EU consumers, investors, regulators and others with products and sustainability data throughout the entire value chains. The EU DPP aims to improve ESG (Environmental, Social and Governance) compliance by ensuring high transparency and verifiable data from miners, producers, and recyclers. However, legal, geopolitical, commercial and technological factors suggest that major economies in the up-and mid-stream of the value chains, such as Australia, China, and Japan, may maintain or develop their own traceability laws, which might only partially overlap with the EU's system. These laws could potentially be linked through mutual recognition agreements with the EU. Our paper explores how such a system could function, with varying degrees of decentralization, inspired partly from private international law mechanisms that have evolved to handle cross-border traceability of documents. Examples include systems for recognizing marriage and other personal or commercial certificates, arbitral awards and foreign judgments.

1 INTRODUCTION

A Digital Product Passport (DPP) is an electronic record containing critical information about a product's lifecycle—from raw material extraction to manufacturing, first consumption, recycling and further consumption. A DPP is an advance digitalised tool to provide traceability, ensuring that materials are sourced responsibly and sustainable practices are followed throughout the value chains.[1] DPPs are to be implemented in the three priority sectors in the European Union (EU) from February 2027: batteries, electronics, and textiles.[2] Proactive

[1] See generally United Nations Global Compact Office, *A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains* (New York, 2014); International Organization for Standardization, *Quality Management Systems – Requirements* ISO 9001:2015 (2015); Organisation for Economic Co-operation and Development (OECD), *Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector* (Paris, 2018). For this article, 'data' and 'information' are used interchangeably. 'Recycling' is used as a general term referring to all possibilities in a circular economy including reuse, repurposing, refurbishing, etc.

[2] This is triggering widespread discussions and research among business groups and policymakers, well beyond the EU. Eg Gabriella M Hastig and Manmohan S Sodhi, 'Blockchain for Supply Chain Traceability: Business Requirements and Critical Success Factors' (2020) 29(4) *Production and Operations Management* 935; Joerg Walden, Angelika Steinbrecher and Maroye Marinkovic, 'Digital Product Passports as Enabler of the Circular Economy' (2021) 93(11) *Chemie Ingenieur Technik* 1717; Peter Buchholz, Arne Schumacher and Siyamend Al Barazi, 'Big Data Analyses for Real-Time Tracking of Risks in the Mineral Raw Material Markets: Implications for Improved Supply Chain Risk Management' (2022) 35(3) *Mineral Economics* 701; Marissa Ooms, 'Risk-Based Due Diligence Reporting in Global Mineral Supply Chains and the Rule Through Transparency' (2022) 10(1) *Theory and Practice of Legislation* 48; Abraham Zhang and Stefan Seuring, 'Digital Product Passport for Sustainable and Circular Supply Chain Management: A Structured Review of Use Cases' (2024) *International Journal of Logistics Research and Applications* 1; Adrien Jousse, 'DPP System Roadmap' (2024) *CIRPASS*

adoption has been experimented by some brands.[3] By enabling access to key data, DPPs aim to empower regulators, businesses, investors and consumers to make informed decisions that prioritise environmental, social and governance (ESG) factors, and to support the transition to a circular economy—aiming to minimize waste and make the most of resources by recycling materials.

The EU Ecodesign for Sustainable Development Regulation establishes a conceptual framework for DPPs,[4] and the EU Battery Regulation functions as their first product-specific application. Accordingly, products can be placed on the EU market or put into service only if a DPP is available according to relevant laws.[5] Similar initiatives are also emerging at the global level. These include DPPs from the United Nations (UN) proposed by the UN Transparency Protocol, world-battery-alliance DPPs proposed by the World Economic Forum, and DPPs adopted by the London Metal Exchange.[6] Although the UN Panel on Critical Energy Transition Minerals does not stipulate a specific traceability tool, it shares a similar goal with the DPPs as it calls for a global traceability, transparency and accountability framework along the entire minerals value chain.[7]

Consortium; Anne-Christin Mittwoch, 'The Digital Product Passport of the Ecodesign Regulation – Passport to a Successful Twin Transformation in Product Law?' (2024) *BULA* 62; Carolynn Bernier and Fatima Danash, 'Digital Product Passport (DPP) Prototypes' (2024) *CIRPASS Consortium*; Charlotte Ducuing and René Herbert Reich, 'Data Governance: Digital Product Passports as a Case Study' (2023) *Competition and Regulation in Network Industries* 1; Eduard Wagner, Andreas Schneider and Konrad Bendzuck, 'Stakeholder Consultation on Key Data' (2024) *CIRPASS Consortium*; Ismael Illán García and others, 'Digital Product Passport Management with Decentralised Identifiers and Verifiable Credentials – Extended Version' (2024); Maximilian Greiner and others, 'The Digital Product Passport: Enabling Interoperable Information Flows Through Blockchain Consortia for Sustainability' (2024) *Springer Handbook of Sustainability* 233; Melanie King, Paul Timms and Sara Mountney, 'A Proposed Universal Definition of a Digital Product Passport Ecosystem (DPPE): Worldviews, Discrete Capabilities, Stakeholder Requirements and Concerns' (2023) 384(1) *Journal of Cleaner Production* 135538; Svenja Schöneich, Christina Saulich and Melanie Müller, 'Traceability and Foreign Corporate Accountability in Mineral Supply Chains' (2023) 17(4) *Regulation and Governance* 954.

[3] Eg CIRPASS, 'CIRPASS Digital Product Passport project' <https://cirpassproject.eu/> accessed 15 October 2025.

[4] Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC [2024] OJ L 1781/1 (the EU Ecodesign Regulation).

[5] Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC [2023] OJ L 191/1 (the EU Battery Regulation).

[6] United Nations Transparency Protocol (UNTP), 'Digital Product Passport' <https://spec-untp-fbb45f.opensource.unicc.org/docs/specification/DigitalProductPassport> accessed 15 October 2025; The World Economic Forum, 'Global Battery Alliance' (January 2019) https://www3.weforum.org/docs/WEF_GBA_Overview_2019.pdf accessed 15 October 2025; London Metal Exchange, 'LME passport' <https://www.lme.com/en/trading/initiatives/lmepassport> accessed 15 October 2025.

[7] United Nations, 'The UN Secretary-General's Panel on Critical Energy Transition Minerals' <https://www.un.org/en/climatechange/critical-minerals> accessed 15 October 2025. 'Value chain' refers to 'all activities and processes that are part of the life cycle of a product, as well as its possible remanufacturing.' 'Supply chain' is defined as 'all upstream activities and processes of the product's value chain, up to the point where the product reaches the customer': the EU Ecodesign Regulation (n 4) articles 2(10), (11).The paper uses 'value chain' instead of 'supply chain' for three reasons. Firstly, DPPs are traceability tools; the relevant traceability events are activities and processes that 'value chain' emphasizes. Secondly, 'value chain' fits the circular economy better compared with 'supply chain' which typically addresses the upstream to the first consumption. Thirdly, 'value chain' also focuses on financial transactions and the creation of financial value, whereas 'supply chain' concentrates on physical transactions, as well as the actual movement of resources, energy, and so on.

This article uses critical raw materials (CRM, such as lithium) in the electric vehicle (EV) batteries value chains as a representative case study. The CRM-Battery value chains are chosen because they are confronted with urgent legal conflicts in achieving policy interoperability needed to implement DPPs effectively across borders.[8] The conflicts arise from the fact that the CRM-Battery value chains typically involve mining in the Global South, Australia and Canada, processed and manufactured in Asia (eg China and Japan), and consumption of final products in the Global North (eg EU). Each such jurisdiction has its own regulatory requirements regarding cross-border transfer of data and ESG standards, constituting critical legal conflicts in adopting DPPs. For example, the transparency of data required by the DPPs in the downstream value chains may conflict with the data security, privacy, and business confidentiality requirements in the up- and mid-stream value chains, where the value chain participants may not be able to provide data access required by the DPPs. Another example arising as global warming is an international issue, but energy transition is often a domestic policy decision. Labor and environmental protection are often local mandatory laws, which has yet to be harmonised throughout the CRM-Battery value chains. This article proposes mutual recognition mechanisms to achieve policy interoperability and legal coordination critical to addressing such legal conflicts.

The rest of this article proceeds as follows. Part 2 elaborates on EU DDPs, soon compulsory for the European market entry and already influential. EU DPPs embody a centralised applicable law approach, essentially requiring the cross-border and cross-industry CRM-Battery value chains to comply with EU law.

Part 3 highlights challenges from this centralised applicable law approach. (1) Although it may enhance ESG protection levels in the Global South, its implementation in the upstream value chains may create issues including a new type of perceived 'colonisation' and anti-competitive effects. (2) The centralised approach also invites doubts about why the law of the first consumption market (the EU) should be applied particularly to recycling and even secondary consumption markets. This issue is under-explored because the global linear economy is still only starting to transition into a circular economy to fulfil UN sustainability goals. (3) The centralised approach may also lead to conflicts with the law of up- and mid-stream countries, which may have strong interests in ensuring value chains in their countries to comply instead with their own laws to protect the environment and labour, indigenous peoples, intellectual property and trade secrets. (4) DPPs require data to be accessible across borders, but every country has different requirements for the cross-border flow of data. In addition to 'conflict of law' issues, the implementation of DPPs also raises serious technical and commercial challenges.

Part 4 notes that free trade agreements (FTAs) and other international agreements increasingly promote interoperability of data and mutual recognition of regulatory outcomes, and the development of international rather than national standards. These international agreements lay down a foundation for the first consumption market (like the EU) to recognise the laws for ESG and related value chain management in the upstream value chain sand their regulatory outcomes, as well as the downstream places of recycling and further consumption.

Importantly, Part 5 suggests three legal models to promote a mutual recognition approach to facilitate the implementation of the DPPs instead of the EU's highly centralised applicable law approach. It surveys the existing private international law legal architectures for

[8] Interoperability may be achieved in five respects: transport (how is information exchanged), syntactic (how is information formatted), semantic (what is the meaning of the information), behavioural (what is the purpose and expected outcome of an exchange of information) and policy (what rules govern an exchange): ISO/IEC 19941:2017 art 3 <https://www.iso.org/obp/ui/#iso:std:iso-iec:19941:ed-1:v1:en> accessed 15 October 2025. This article focuses on the policy interoperability.

traceability of documents, and argues that a more decentralised approach can better achieve sustainable and circular global CRM-Battery value chains.

Part 6 concludes by reiterating the need for moving from centralisation to varieties of mutual recognition to facilitate realistic and timely global adoption of DPPs.

2. DIGITAL PRODUCT PASSPORTS

A DPP is 'an important tool for making information available to actors along the entire value chain'.[9] This definition contains three key components: traceability, life cycle, and digitalization.

2.1. Traceability

A DPP is a traceability tool. GS1 defines traceability as 'the ability to trace the history, application, or location of object.'[10] Relevant laws can be divided into three categories below based on the subject matter to be traced: provenance, processing, and production.[11] This classification is not grounded on the life-cycle stages of traceable assets,[12] the functional legal roles of value chain actors,[13] data architecture,[14] or responsibility allocation.[15] It is made instead in the context of developing international sales law for consumer markets. These markets impose product quality requirements for the up- and mid-stream value chain participants to comply with, ranging from (1) the most widely adopted country of origin labels to (2) recording the locations and stages of processing, and (3) the more demanding requirement of proving how a product is made or recycled from raw materials to first consumption, recycling, and second consumption.

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[9] Preamble para 32, the EU Ecodesign Regulation. Article 2(28) defines DPP as 'a set of data specific to a product that includes the information specified in the applicable delegated act adopted pursuant to Article 4 and that is accessible via electronic means through a data carrier in accordance with Chapter III.' DPP can also be defined as 'a structured collection of product related data with pre-defined scope and agreed data management and access rights conveyed through a unique identifier and that is accessible via electronic means through a data carrier.' <https://cirpassproject.eu/dpp-in-a-nutshell/> accessed 15 October 2025.

[10] *GS1 Global Traceability Standard: GS1's framework for the design of interoperable traceability systems for supply chains* (August 2017), 6 <https://cirpassproject.eu/dpp-in-a-nutshell/> accessed 15 October 2025.

[11] UN/CEFACT, *White Paper on Digital Product Passports and Critical Raw Materials for Batteries: Legal Conflicts and Principles for Cross-Border Cooperation* (UN/CEFACT Conflict of Laws and DPPs White Paper) 7, <https://unece.org/trade/documents/2025/09/white-paper-digital-product-passports-and-critical-raw-materials-batteries> accessed 15 October 2025. Dr. Jie (Jeanne) Huang is the lead author and Professor Luke Nottage is one of the authors of the White Paper.

[12] UNECE, *Recommendation No. 46: Enhancing traceability and transparency of sustainable value chains in the garment and footwear sector*, 9, <https://unece.org/sites/default/files/2022-01/ECE-TRADE-463E.pdf> accessed 15 October 2025 (stating '[t]raceability is an essential requirement for creating transparency. It allows to identify where 'assets' have been as they move through a value chain.').

[13] Data controllers, data processors, data subjects, data holder, etc provide different functional legal roles in the digital traceability process. These concepts are often defined in regulations related to personal data protection and data security, eg Art. 4 of GDPR, Art. 2 of the EU Data Act, and Art 73 of the China Personal Information Protection Law.

[14] ISO has launched several standards for data architecture to enable traceability, eg ISO *22005:2007-Traceability in the feed and food chain*.

[15] Responsibility allocation can be made based on contracts between value chain participants or the design of data governance framework. For the former, see eg UN/CEFACT Conflict of Laws and DPPs White Paper (n 11) 20. For the latter see UN/CEFACT White Paper on 'Data Governance for Trade Facilitation' (stating 'the United States emphasizes private sector control, China focuses on government control, and the European Union prioritizes individual control based on fundamental rights') 10, <https://unece.org/sites/default/files/2024-07/ECE-TRADE-C-CEFACT-2024-INF-06E.pdf> accessed 15 October 2025.

- Provenance: Origin of materials and parts

Tracing the origin of materials and parts is widely adopted in international trade. This is largely because the World Trade Organization (WTO) Agreements or FTAs use country-of-origin to determine tariffs. Besides country of origin, some countries may use traceability to verify the usage of minimum domestic contents. For example, in 2009 Ontario in Canada imposed a Feed-in Tariff (FIT) program, which paid a guaranteed price to generators of electricity manufactured by using certain forms of renewable energy by using equipment that is domestically manufactured or sourced.[16]

- Processing: Distribution, location, consumption, disposal, or recycling of the product or service

Unlike tracing origin, there is no general international agreement on tracing the distribution, location, consumption, disposal, or recycling of products or services. The existing conventions typically focus on a certain industrial sector. For example, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal monitors the transboundary movements of hazardous wastes and their environmental friendly disposal.[17] The Kimberley Process Certification Scheme establishes a traceability system for conflict diamonds to prevent rough diamonds from mining in conflict zones and being traded to fund conflict.[18] The Intergovernmental Negotiating Committee on Plastic Pollution requires traceability of chemicals used in plastic products from production to disposal.[19] At the domestic law levels, the Inflation Reduction Act (IRA) of the United States offered up to a US$7,500 tax credit to purchasers of a 'new clean vehicle' at the time of purchase,[20] being a motor vehicle finally assembled within North America. Alternatively, the batteries must meet critical mineral requirements, meaning they should be extracted, processed in the U.S. or a free-trade-agreement partner country, or recycled in North

[16] Canada — Measures Relating to the Feed-in Tariff Program (WT/DS412/19 WT/DS426/19, 6 June 2014) paras 1.2-1.5. The WTO Appellate Body found that the FIT Program violated the WTO Subsidies and Countervailing Measures Agreement and GATT 1994.

[17] *The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal*, adopted on 22 March 1989 and effective on 5 May 1992. The Convention was amended over the years. The major amendment includes the 'Ban Amendment' adopted in 1995 prohibiting exports of all 'hazardous wastes covered by the Convention that are intended for final disposal, reuse, recycling and recovery from countries listed in Annex VII of the Convention', effective in 2019. Plastic waste was inserted to Annexes II, VIII and IX of the Convention in 2019 and effective in 2021. The Basel Protocol on Liability and Compensation for Damage resulting from Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1999 and has yet to enter into force. See *Basel Convention: Texts and Annexes, Secretariat of the Basel Convention* (April 2020), 3.

[18] The Kimberley Process Certification Scheme was established in 2003 which tracks diamonds from the mine to the market and regulates the policing surrounding the export, manufacture and sale of the products. Conflict diamonds, also known as blood diamonds, refer to 'rough diamonds that are mined in war zones and sold to finance armed conflict against governments, terrorism, or organized crime group, particularly in African nations.' It also traces the origin of diamonds.

[19] Article 3, 8bis, and 8 quinquies, Chair's Text, 20 <https://wedocs.unep.org/bitstream/handle/20.500.11822/47162/INC_5_1_Report.pdf> accessed 15 October 2025.

[20] *Inflation Reduction Act 2022* (IRA) § 30D. As of June 2025, the IRA is undergoing significant legislative revisions under the current U.S. administration. The House of Representatives passed the 'One Big, Beautiful Bill' in May 2025, proposing substantial changes to the IRA's clean energy provisions, <https://www.congress.gov/bill/119th-congress/house-bill/1/text> accessed 15 October 2025.

America.[21] In 2024, China enacted the Administrative Regulation for Rare Earth, which establishes an information system to trace the entire process of rare earth products and promote data sharing among relevant government departments.[22] Chinese enterprises shall submit the data about the flow of rare earth products into the traceability information system.[23] The traceability system established under the China Administrative Regulation for Rare Earth aims to combat illegal trafficking of rare earth, promote the development of the rare earth industry, and ensure the security of ecology, national resource and industry.[24]

- Production: How is the product made or recycled?

Production refers to the transformation of raw materials, ingredients, intermediate products, and component(s) into the product. Tracing the processing of a product goes beyond 'where is the product' and instead, it asks 'how is the product made'. For example, the U.S. Dolphin Protection Consumer Information Act imposes the Tuna Tracking and Verification Program and uses 'dolphin-safe' labelling to ensure that tuna products are caught in a manner that minimize harm to dolphins.[25] Another example is the U.S. Marine Mammal Protection Act and the Endangered Species Act, banning shrimp imports from countries that do not use turtle-excluder devices to allow sea turtles to escape from trawling shrimp.[26] In the EU, the Renewable Energy Directive II limits the use of palm oil because of its high risk of indirect land-use change leading to increased greenhouse gas emission, and establishes a risk certification system to trace production of palm oil.[27] Additionally, traceability of processing history is endorsed by the German Supply Chain Act, which requires processing of products to comply with the United Nations Guiding Principles on Business and Human Rights and the OECD Guidelines for Multinational Enterprises.[28]

Overall, there are no existing international conventions regulating all three aspects of traceability in CRM-Battery value chains.

2.2. Lifecycle

[21] ibid § 30D(e)(1)(A). The applicable percentage for the critical mineral requirements is 50 per cent in 2024. After 2024, this percentage is supposed to increase by 10 per cent annually up to 80 per cent after 2026. Cobalt, lithium, and nickel are considered as 'applicable critical minerals' for the purpose of § 45X(c)(6). Notably, recycling is one of alternative requirements in the Inflation Reduction Act but not in Ontario's Feed-in Tariff Program. Therefore, the former is a system tracing the traffic of trade while the latter is a system tracing country of origin.

[22] The relevant government department refers to the Ministry of Industry and Information Technology, in conjunction with the Ministry of Natural Resources, the Ministry of Commerce, the General Administration of Customs, and the State Administration of Taxation. Article 14 of the China Administrative Regulation for Rare Earth, enacted on 26 April 2024 and effective on 22 June 2024.

[23] ibid.

[24] ibid art 1.

[25] NOAA Fisheries, 'Dolphin-Safe' <https://www.fisheries.noaa.gov/national/marine-mammal-protection/dolphin-safe> accessed 15 October 2025. See United States – Measures Concerning the Importation, Marketing, and Sale of Tuna and Tuna Products (WT/DS381/AB/R, 16 May 2012).

[26] NOAA Fisheries, 'Seafood Import Restrictions' <https://www.fisheries.noaa.gov/foreign/marine-mammal-protection/seafood-import-restrictions> accessed 15 October 2025. See Canada — Measures Relating to the Feed-in Tariff Program (WT/DS412/19 WT/DS426/19, 6 June 2014).

[27] EU and Certain Member States — Certain Measures Concerning Palm Oil and Oil Palm Crop-Based Biofuels (DS600, 5 March 2024).

[28] Igor Konstantinov, 'German Supply Chain Act: Due Diligence Obligations Explained' <https://www.circularise.com/blogs/german-supply-chain-act-lksg-due-diligence-obligations-explained> accessed 15 October 2025.

DPPs aim to trace a product's lifecycle.[29] Therefore, it can provide data access to the actors along the entire value chain from raw material sourcing, first manufacturing, first consumption, to recycling, repurpose, and reuse. The actors in the product's lifecycle include economic operators and other value chain actors.[30] Therefore, a DPP is not only a business-to-business or business-to-government traceability tool, but also contains business-to-consumer functionality enabling consumers to trace the environmental, materials and carbon footprints of EV batteries.[31]

Unlike traditional traceability tools focusing on sourcing, production or first consumption, the DPP includes data on the product life cycle of batteries, to advance the transition to a circular economy and support environmental sustainability.[32]

2.3. Data

Unlike traditional paper-based traceability tools such as labels, a DPP is a digitalized traceability tool and requires data to be 'accurate, complete and up to date'.[33] According to the EU Battery Regulation's Annex XIII, a DPP should carry extensive data and provide differentiated access to different participants in the value chains.[34] Data contained in a DPP is maintained by economic operators. Technical requirements should comply with the EU Ecodesign Regulation, while protecting security and privacy of data.[35]

Placing batteries on the market, the economic operator should ensure the data in their DPPs is accurate, complete and current.[36] It can authorise other operators in the value chains, such as vehicle manufacturers, to update information in the DPPs.[37] A DPP shall expire when the battery has been recycled.[38] A recycled battery should have a new DPP linked to the DPP of the original battery, and the economic operator who places the recycled battery on the market or into service should bear the compliance obligations.[39]

In summary, the DPP is distinguished from traditional paper-based traceability tools in four important ways. Firstly, unlike bar codes on products and many other traceability tools that enable business-to-business or business-to-government traceability, DPPs enable business-to-consumers traceability so that consumers can use their smart devices to scan a DPP (like a QR code) to verify the product and its production data. Secondly, traditional labels on products are hard to revise after the products are launched to the market if product

[29] 'Life cycle' refers to 'the consecutive and interlinked stages of a product's life, consisting of raw material acquisition or generation from natural resources, pre-processing, manufacturing, storage, distribution, installation, use, maintenance, repair, upgrading, refurbishment and reuse, and end-of-life' Art 2(12) of the EU Ecodesign Regulation.
[30] Preamble para 32 of the EU Ecodesign Regulation ('other value chain actors' include 'customers, professional repairers, independent operators, refurbishers, remanufacturers, recyclers, market surveillance and customs authorities, civil society organisations, researchers, trade unions and the Commission', etc).
[31] For definitions of 'environmental footprint', 'carbon footprint', and 'material footprint', see Art 2(24)-(26) of the EU Eco- Design Regulation.
[32] Preamble para 28 of the EU Ecodesign Regulation.
[33] ibid preamble para 32.
[34] Arts 1-4 of Annex XIII of the EU Battery Regulation.
[35] ibid Preamble para 126 and art 78.
[36] ibid art 77.4.
[37] ibid Preamble para 125.
[38] ibid art 77.8. The scope of these persons and the data that they are allowed to access are unclear yet and will be published by the European Commission by 18 August 2026. Nevertheless, the EU Battery Regulation provides three criteria for specifying such persons: the necessity of having such information to evaluate the status and residual value of the battery and its capability for further use, the necessity to prepare for recycling, or the need to minimise the access to commercially sensitive information.
[39] ibid art 77.7.

information needs to be updated. DPPs address this problem by obligating economic operators to ensure data contained by the DPPs are kept up to date throughout the DPP life cycle. Thirdly, existing traceability tools for minerals typically focus on track and trace the provenance of minerals.[40] In contrast, DPPs not only contain data on the provenance of minerals but also include other data from the battery's lifecycle. The established cross-border traceability legal systems for minerals, such as those from war zones, do not cover recycling, while DPPs hold great potential in supporting the global transition to a circular economy. Lastly, the transparency created by DPPs can also enable 'friendshoring', avoid sanction risks, and achieve geopolitical compliance requirements.[41]

2.4. Applicable law

DPP pilot implementations have suggested that DPPs can enhance the transition from a linear economy to a circular economy by reducing information asymmetry, fostering trust in second-hand markets and life-extension applications, and increasing the recovery rate of valuable materials and products at their first-life.[42] However, such DPPs will result in the extra-territorial application of the Ecodesign and Battery Regulations over the entire CRM-Battery value chain. Namely, the upstream value chain (eg mining companies in Australia and manufacturers in China and Japan) will have to comply with the EU laws, and so will the recycling and the second-consumption markets. This is because value chain participants must comply with the high-level transparency required by the DPPs and the extent of transparency is determined by the Ecodesign and Battery Regulations. This is somewhat different from another ambitious initiative, the EU Deforestation Regulation enacted in 2023, which recognizes the regulatory results of the local laws at the place of production.[43]

Further, the extra-territorial application of the law of the consumer market to the upstream value chains is limited typically to country-of-origin and product quality requirements.[44] There is a limited and controversial trend that the production activities of the upstream value chain (in another country) must comply with the law of the consumer market (in the country importing consumer products).[45] The upstream value chain and foreign

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[40] Eg the International Association of Tin established a conflict mineral traceability scheme.

[41] Friendshoring (or ally shoring) is the practice of managing value chains among like-minded suppliers in countries which are often political or economic allies.

[42] See CIRPASS-1 and CIRPASS-2 pilots, <https://cirpass2.eu/> accessed 15 October 2025.

[43] Regulation (EU) 2023/1115 of the European Parliament and of the Council of 31 May 2023 on the making available on the Union market and export from the Union of certain commodities and products associated with deforestation and forest degradation and repealing Regulation (EU) No 995/2010 [2023] OJ L150/206. Articles 2 and 3 require that relevant commodities and products must not be placed on or exported from the market unless they are deforestation-free, produced in compliance with the relevant legislation of the country of production and accompanied by a due diligence statement.

[44] Even in private law, the general rule is that products should comply with the law of the importing country, otherwise foreign manufacturers could be subject to tort liability. See eg the (settled) class action in the Victorian Supreme Court involving Bonsoy soy milk manufactured formulated within Japanese recommended health limits but exceeding those then in Australia: *Downie v Spiral Foods Pty Ltd & Ors* [2015] VSC 190. By contrast, the 1980 UN Convention on Contracts for the International Sale of Goods sets a default rule the goods should confirm with the law of the exporter. See eg *RJ & AM Smallmon v Transport Sales Limited & Anor* [2011] NZCA 340. Under this regime, it is envisaged that such goods could be imported into diverse states and the direct contact between exporter and importers allow this default rule to be easily varied by party agreement.

[45] See eg *United States – Import Prohibition of Certain Shrimp and Shrimp Products* (Appellate Body Report, WT/DS58/AB/R, 12 October 1998); *United States – Measures Concerning the Importation, Marketing, and Sale of Tuna and Tuna Products* (Appellate Body Report, WT/DS381/AB/R, 16 May 2012); *Canada — Measures Relating to the Feed-in Tariff Program* (Appellate Report, WT/DS412/19 WT/DS426/19, 6 June

recyclers have seldom been required to offer large-scale transparency to regulators (and others) in a downstream consumer market, contrary to the traditional model depicted below.

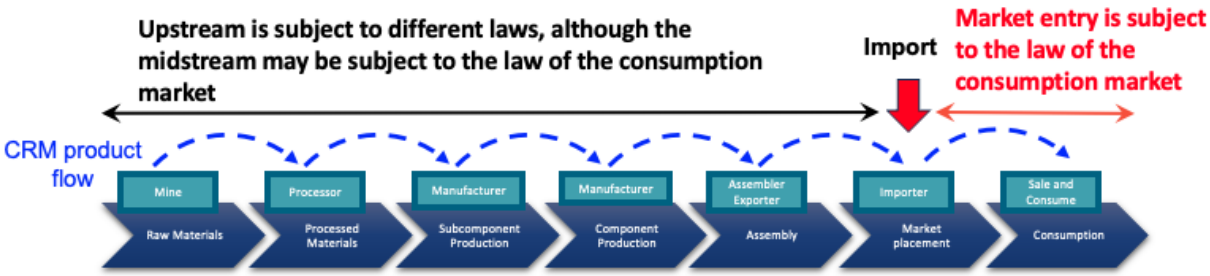

FIGURE 1 Traditional Model - Diversified Applicable Law in the Existing CRM-Battery Value Chains.

The blue lines in this figure refer to party autonomy on applicable laws between value chain participants. This is a decentralised applicable law approach because different laws can be applied to a cross-border value chain.[46]

Traditionally, although consumer products should be made according to the requirements of an importer's country, the upstream value chain and the consumer market are typically subject to different laws. This is because importers are generally only familiar with their first-tier suppliers (i.e. exporters) and the data of the second, third, or further tier suppliers (eg manufacturer, processor and mine) may be considered by the exporters as trade secrets not accessible to the importers. Moreover, traditional international trade law focuses on the quality of the products complying with the consumer (end-use) markets rather than the environmental impacts of production in countries of the upstream value chains. Therefore, as long as the final products conform to the law of the consumer markets, the importers typically have no incentive to ensure the production in the whole upstream value chain complies with the law of the consumer market. Furthermore, whether the law of the consumer country (first consumption) should be applied to (usually offshore) recycling and even the second consumption remains unclear.

The large-scale data that DPPs require will fundamentally enhance the transparency of the CRM-Battery value chains. Firstly, DPPs will include both product and production data. The scope of data needed by an economic operator is more comprehensive than that of a traditional importer who does not use DPPs. Secondly, data contained in DPPs must be authentic, correct, and constantly updated, which means the participants in the upstream value chains should best submit their data directly to the economic operator to avoid data mistakes or transfer discrepancies. Similarly, as DPPs apply to recycling, the recyclers also need to surrender their data to the DPPs. Thirdly, because the DPPs contain product and production data concerning the entire CRM-Battery value chains, it enables the regulator of the consumer market to trace batteries and their production from the mine through to recycling. For example, not only carbon intensity but also labour use, water consumption, soil erosion, pollution addressment, etc in mines in Australia as well as production factories in

2014); *EU and Certain Member States — Certain Measures Concerning Palm Oil and Oil Palm Crop-Based Biofuels* (Panel Report, DS600, 5 March 2024).

[46] See UN/CEFACT Conflict of Laws and DPPs White Paper (n 11), 19.

Asian countries such as China or Japan must be transparent to the EU regulator because these data are used to calculate the carbon intensity and other product-related ESG requirements. Accordingly, the information of the second, third and further tiers of suppliers of Australian mines and Chinese or Japanese manufacturing facilities will likely be released.

This essentially brings about a centralised applicable law consequence, depicted in Figure 2 below. DPPs become the centre of the CRM-battery value chains because they collect data from all the participants in the value chains from mining to recycling. Because DPPs are subject to EU law, the whole value chain in practice will be subject to EU law as well. Party autonomy becomes limited regarding law applicable between mines to processors to manufacturers (as the Figure's blue lines indicate),. The mining and the production process in the facilities of the value chain participants, and the transportation between them must comply with EU requirements on carbon emission and provenance regulations (as shown by the red lines), otherwise for example they could be sanctioned by EU regulators directly or (via contractual indemnity clauses) indirectly. This will make DPPs a powerful central tool enabling the EU regulators to supervise the whole cross-border and cross-industry value chain.

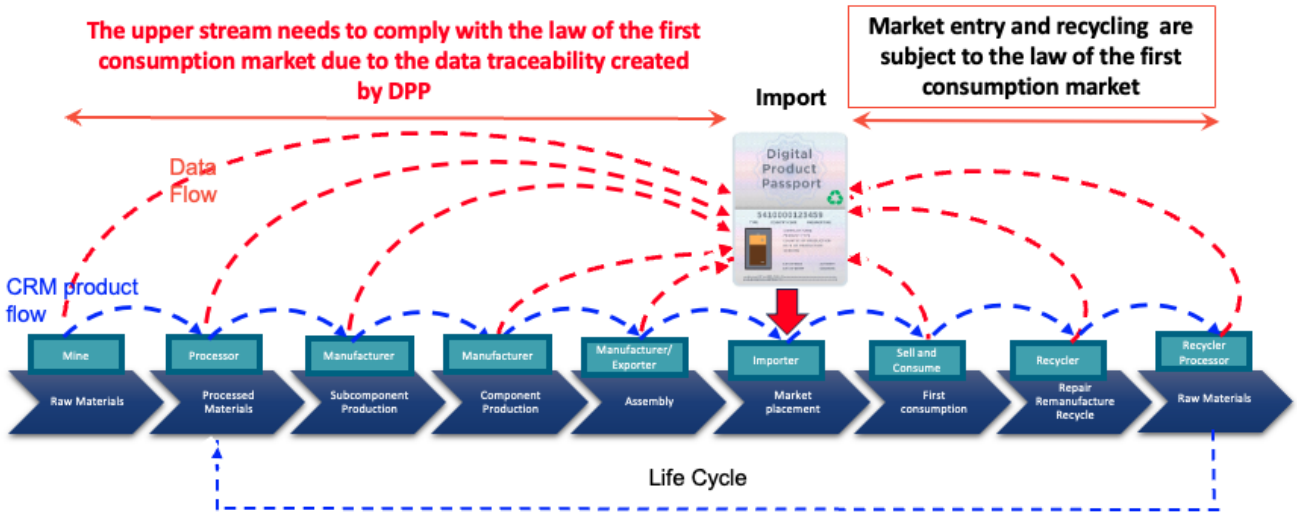

FIGURE 2 DPP Model - Centralised Applicable Law to the CRM-Battery Value Chain.
The blue lines in this figure refer to party autonomy about applicable laws between value chain participants. Red lines mean all value chain participants have to submit their production and product data to the DPP, which essentially requires them to comply with the EU Battery Regulation and other supply chain and carbon emission laws – a centralised applicable law approach. Notably, due to the existence of data submission to the DPPs (red lines), party autonomy between value chain participants (blue line) will be much limited compared with that in Figure 1).[47]

The EU's centralised or unitary approach might be justified by arguing that exporters and others dealing with products into a domestic market should either comply with its evolving domestic law requirements, or go elsewhere. Another broad rationale could be that existing multilateral agreements to address climate change seem to be struggling, necessitating large economies to develop unilateral measures. However such views downplay

[47] See UN/CEFACT Conflict of Laws and DPPs White Paper (n 11), 21.

the need to expand EV penetration in the EU to reduce carbon emissions, and that the new EU regime imposes requirements not just upstream but even downstream that go far beyond typical requirements for cross-border commerce. International trade law also imposes disciplines to prevent disguised trade barriers and promote multilateral solutions, which are also being explored now through the UN.[48] Such issues are elaborated next, to suggest that the EU should temper its ambitions, even if well-intentioned.

3. CHALLENGES FOR THE CENTRALISED APPLICABLE LAW APPROACH

The EU DPP regime – beginning with the Battery Regulation - raises many more complexities in reality than the original concept and EU framework legislation may anticipate. The application of the EU's high-standard rules on transparency, carbon emissions and many other responsible sourcing matters to the entire CRM-Battery value chains may indeed enhance the ESG protection levels in the Global South. However, our ongoing literature and empirical research is uncovering various issues related to the conflict of laws (Part 3.1 below) as well as geo-political, technological and commercial challenges (Part 3.2).

There is a danger that, in the name of reducing global carbon emissions and other goals, however laudable, valuable CRM resources and their upstream production industries in Global South will be continuously and even further subject to an imbalanced North-South relationship. The centralised applicable law approach, focusing on imposing the law of the consumer market on the entire value chain regardless of the local indigenous needs of the Global South, might even represent a type of neo-colonialism associated with anti-competitive effects.[49] This is particularly because small- and medium-sized enterprises (SMEs) locally in the Global South have limited resources to comply with the high-standard EU law and may be driven out of the market. It also casts doubt on the application of the law of the first consumption market (i.e. EU law) to the recycling and even the second consumption market. It is further inconsistent with firmly established mandatory law regimes such as protection of the environment, labour and intellectual property rights – typically subject to the local rather than foreign law. Finally, DPPs require data of the battery and their production to be accessible across borders, but this could undermine business confidentiality. In addition, every country has different requirements for the cross-border flow of data – sometimes reinforced through treaties – which cannot simply be subject to the EU law.

3.1. Conflict of laws

The extra-territorial application of the EU laws is achieved by two major means. The first is through the broad definition of economic operators. For example, Preamble of the EU Ecodesign Regulation provides that 'economic operators' includes 'manufacturers, authorised representatives, importers, distributors, dealers and fulfilment service providers'.[50] Therefore, economic operators may be value chain participants in countries outside of the EU. Secondly, multinational enterprises aiming at the EU markets may use contracts to expand the application of the EU law outside of the EU. Nevertheless, the states where mines and

[48] ibid.
[49] See generally eg Sundhya Pahuja, *Decolonising International Law: Development, Economic Growth and the Politics of Universality* (Cambridge University Press 2011); Roza Nurgozhayeva and Dan Puchniak, 'Corporate Purpose Beyond Borders: A Key to Saving Our Planet or Colonialism Repackaged?' Vanderbilt Journal of Transnational Law (forthcoming 2025) <https://ssrn.com/abstract=4652012> accessed 15 October 2025 (outlining in Part II.B 'The EU's Colossal Legislative Push to Drive Sustainable Corporate Governance Extraterritorially', which the Global South may perceive as neo-colonialist).
[50] Preamble para 32 of the EU Ecodesign Regulation.

processing facilities are located may legislate different data, labor, environmental and other ESG-related laws according to their local indigenous needs.[51] The centralized applicable law approach may lead to the following issues.

Firstly, because of the growing reputation risks (especially perhaps among large Japanese firms), DPP requirements may result in manufacturers reducing SMEs in their upstream value chains, favouring instead larger suppliers with better compliance mechanisms around labour and human rights issues (such as modern slavery). That will also be intensified by the EU Corporate Sustainability Due Diligence Directive (CSDDD).[52] Yet the promotion of SMEs is directly referenced in the UN's Sustainable Development Goals, as well as indirectly via advocacy for gender equality.[53] SMEs play a significant role in the Australian mining industry because many of the key CRM exploration companies are junior miners (not the traditional big resource companies).[54] Additionally, the Global South is also concerned that DPPs will promote recycling of CRM in the EU because recyclers outside of the EU may not be able to satisfy the transparency requirements of the DPPs, reinforcing a 'Fortress Europe' economic bloc.[55] They worry that the EU eventually will establish a self-sustained CRM production, consumption and recycling market, significantly reducing importation from the Global South and harming their economies.[56]

Secondly, there are questions about the extent to which the EU regime will require traceability for second consumption and/or recycling which may occur outside of the EU, and how firms can then realistically comply with data collection and disclosure. This is particularly acute for CRMs (as opposed to textiles as another DPP pilot), as some rare and expensive minerals may be recycled multiple times.[57] Although the EU Battery Regulation provides that a new DPP should be created once the CRM recycled from used batteries is put into use in a new product, it is unclear what data contained in the old DPP should be transplanted into the new one. If the recycled CRM is used to produce electronic products

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[51] Eg in *Gabriel Resources Ltd and Gabriel Resources (Jersey) Ltd v Romania (Award, 8 March 2024) ICSID Case No ARB/15/31 [18],* Romanian residents near the mines worried about the environmental pollution caused by mining conducted by a Canadian company. The main issue in this investment arbitration case concerns the 'Environmental Permit' for the mining, the conditions for such Permit, and whether the Environmental Permit was or should have been issued. Award on 8 March 2024, ICSID Case No. ARB/15/31, 18.

[52] European Commission, 'Corporate sustainability due diligence' <https://commission.europa.eu/business-economy-euro/doing-business-eu/sustainability-due-diligence-responsible-business/corporate-sustainability-due-diligence_en > accessed 15 October 2025.

[53] Conversation with Professor Tomoko Ishikawa, Professor, Graduate School of International Development, Department of International Development and Cooperation, Nagoya University (Luke Nottage, Sydney Law School, The University of Sydney, 18 November 2024). See eg Goal 8.3 within 'Goals 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all', *United Nations Department of Economic and Social Affairs Sustainable Development* <https://sdgs.un.org/goals/goal8> accessed 15 October 2025; Yu-Xia Tu and others, 'Economic, Institutional and Environmental Drivers of SMEs' Development in the EU: Sustainable Development Goals Perspective' (2024) Environment, Development and Sustainability <https://doi.org/10.1007/s10668-024-05686-z>.

[54] Department of Industry, Sciences and Resources, *Australian Government, Resources Technology and Critical Minerals Processing: National Manufacturing Priority Road Map* (2021) 4.

[55] Pascal König, 'Fortress Europe 4.0? An Analysis of EU Data Governance through the Lens of the Resource Regime Concept' (2022) 8 *European Policy Analysis* 484, 488, 499; Matteo Gabellini and others, 'Data Spaces in Manufacturing and Supply Chains: A Review and Insights from European Initiatives' (2025) 15 *Applied Sciences* 5802:1-22, 2.

[56] Cf eg Martina Ferracane, Simón González Ugarte and Erik van der Marel, 'The Brussels Effect in Africa: Is It Beneficial for Intra-Regional Trade in Digital Services?' (2025) 28 Journal of International Economic Law 1, 19 (finding that the adoption of a comprehensive data protection law modelled after the EU's GDPR correlates negatively with trade, particularly for lower-income countries in Africa, potentially due to the cost burden of compliance).

[57] Interview with a respondent (Associate Professor) at the Department of Materials Engineering, The University of Tokyo (Luke Nottage, Sydney Law School, The University of Sydney, 15 November 2024).

(another DPP pilot), the EU Battery Regulation should stop being applicable to the new production process. However, if some data in the old DPP (a battery product) regulated by the EU Battery Regulation is exported to the new DPP (say for an electronic product) likely subject to different law, it is unclear how to address the discrepancies between the EU Battery Regulation and laws for other products. Furthermore, if the consequence of the recycling is to use retrieved CRM to manufacture products not subject to any DPPs, there seems to be no good justification for recyclers having to submit their data to the DPPs complying with the EU laws. Therefore, subjecting recyclers and second consumption outside of the EU to the law of the first consumption market needs more thought.

Thirdly, the centralised approach may also lead to conflicts with the laws where mines and processing facilities are located. This is, firstly, because environment and labour protection are typically mandatory local laws. For example, Chinese law for the protection of workers' rights and environmental safety should not be contracted out by the parties in cases involving the social public interests of China.[58] Secondly, although the United Nations Guiding Principles on Business and Human Rights are increasingly codified by states' domestic legislation, states retain sovereign power to implement relevant legislation. For example, in the EU the application of CSDDD is delayed by the 'Stop the Clock Directive' passed in April 2025 and the Omnibus Package (February 2025) proposes amendments to simplify due diligence and reduce administrative burdens. Thirdly, states typically legislate according to their domestic needs rather than blindly following foreign law. For example, Japan publishes Respecting Human Rights in Responsible Supply Chain Guidelines without enacting them into a binding legislation as Japan commonly uses soft law guidance to influence enterprise management.[59] China has not legislated any value chain due diligence legislations because it prioritizes economic development. Thailand is instead recently drafting human rights and environmental due diligence legislation, which is expected to apply to the entity's operations and value chains.[60] Although, potentially, the different environmental, labour and other ESG laws adopted by states throughout the CRM-Battery value chains may not be fundamentally irreconcilable, they are still not the same. The conflicts and gaps between these laws would be better coordinated by mutual recognition mechanisms discussed later in this article.[61]

Fourthly, DPPs rely on data collected from CRM-Battery value chain participants in different jurisdictions, but jurisdictions have divergent requirements for the cross-border flow of data which cannot be waived by the application of foreign law. The data in DPPs include non-personal and personal data. For the former, national security assessment will likely be a significant concern for cross-border flows, for example in China.[62] As for personal information, for example the European Commission has the power to determine, based on

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[58] Art 8 of the Interpretation (I) of the Supreme People's Court on Several Issues Concerning the Application of the 'Law of the People's Republic of China on the Application of Laws to Foreign-Related Civil Relations', adopted at the 1563rd meeting of the Judicial Committee of the Supreme People's Court on 10 December 2012, and amended on 23 December 2020.

[59] Ministry of Economy, Trade and Industry, Human Rights in Responsible Supply Chain Guidelines (September 2022) and case study materials (April 2023), <https://www.meti.go.jp/policy/economy/business-jinken/guidelines/provisionalenglishtranslation.pdf> accessed 15 October 2025.

[60] Thailand: Govt. to introduce mandatory human rights and environmental due diligence legislation aiming to push for responsible business practices, <https://www.business-humanrights.org/en/latest-news/thailand-govt-to-mandatory-human-rights-and-environmental-due-diligence-legislation-aiming-to-push-for-responsible-business-practices/> accessed 15 October 2025.

[61] See below Part 5.

[62] *Personal Information Protection Law* arts 38, 40; *Measures for the Security Assessment of Outbound Data Transfer*, issued on July 7 2022, and effective on 1 September 2022, by Cyberspace Administration of China, Order No 11 of the Cyberspace Administration of China, arts 2, 4 and 19.

Article 45 of the EU's General Data Protection Regulation (GDPR) whether a country outside the EU offers an adequate level of personal data protection.[63] In countries involved in the CRM-Battery value chain, only Japan and South Korea have received such adequacy decisions.[64] This creates questions for all other countries when their suppliers need to provide personal data to DPPs. A recent positive development comes from Australia. The Privacy Act 1988 (Cth) amendment in December 2024 includes a white list of countries which will allow entities to disclose personal information to overseas recipients without complying with the requirements of Australian Privacy Principle 8 (Cross border disclosure of personal information).[65] If the white list could ultimately include major countries in the CRM-battery value chain such as the EU, Japan, South Korea, Indonesia and Malaysia, it would significantly help Australian mining industries to comply with the DPP transparency requirements. However, in the short term, due to geo-political tensions, China may not be included in the whitelist.

Last but not least, much data contained in DPPs may be the subject of intellectual property rights or trade secrets. The protection of intellectual property is territory-based, and the applicable law is typically local law rather than foreign law. Accordingly, it is doubtful that the EU's centralised law approach can accommodate every diversified local public policy across the different jurisdictions over the entire CRM-Battery value chains.

Overall, participants in the value chains may be confronted with conflicting compliance requirements under DPPs and their national laws: the former requiring them to provide access to their data while the latter prohibits at least some disclosures.

3.2 Commercial and technical challenges

Manufacturers (eg in Japan) have become increasingly conscious of potential bottlenecks in often growing numbers of upstream suppliers and so are starting to collect and manage data on risks from natural disasters, public health crises or wars. Yet such information can be highly commercially sensitive, so manufacturers and their associations are very cautious about possible leakage to competing manufacturers (including abroad). Data on multiple suppliers incorporated into a DPP might also allow a manufacturer to cut out intermediate suppliers and deal directly with those further upstream. Consumers or at least their associations might even be able to work out that upstream supply chains are too complex and inefficient, or involve large mark-ups in price in final products, thus putting pressure on manufacturers and their downstream suppliers to cut prices for end-users.[66]

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[63] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation) [2016] OJ L119/1.

[64] For Japan, see Commission Implementing Decision (EU) 2019/419 of 23 January 2019 pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council on the adequate protection of personal data by Japan under the *Act on the Protection of Personal Information* [2019] C/2019/304/ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.076.01.0001.01.ENG&toc=OJ:L:2019:076:TOC> accessed 15 October 2025. For South Korea, see Commission Implementing Decision (EU) 2022/254 of 17 December 2021 pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council on the adequate protection of personal data by the Republic of Korea under the Personal Information Protection Act (notified under document C(2021) 9316) [2022] C/2021/9316 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022D0254> accessed 15 October 2025.

[65] *Privacy and Other Legislation Amendment Bill 2024* (Cth). No country has been added to the list.

[66] Interview with a respondent (associate professor) at Department of Materials Engineering, The University of Tokyo (Luke Nottage, Sydney Law School, The University of Sydney, 15 November 2024). However, the possible influence from consumers depends on competitive pressures in the market (and related anti-monopoly law and enforcement), keeping prices down anyway. EU policymakers also tend to assume that consumers will

Governments outside the EU are therefore struggling to work with their firms and industry associations to anticipate how expansive the EU Battery Regulation (and potentially other DPP regimes) will be and how realistically it can be complied with. Particularly problematic is the fast pace at which the EU is moving, especially in countries (like China and Japan) that rely on extensive government-industry dialogue in addressing socio-economic changes.[67] They may also be concerned, from a wider political economy perspective, that the EU approach is designed not just to help save the planet and protect human rights, but also to advance the EU as a trading bloc through intra-regional trade and investment (eg around recycling) in an increasingly fraught economic environment globally. Governments outside the EU may also be concerned that their firms having to disclose information in DPPs to keep trading into EU markets may have implications for their national security, which is increasingly viewed more expansively nowadays (as mentioned above regarding China).

In addition, from an engineering perspective, 'responsible sourcing' data required by the Battery Regulation could (under implementing laws still being developed) perhaps should go beyond assessment of carbon intensity to use a 'total materials requirement' approach for lifecycle assessment for CRM and other mining activities. This would extend to environmental disruption to soil and water resources. Yet there are serious data availability problems at the firm and even sectoral levels.[68]

Given such complexities, it seems likely that at least the major economies outside the EU will seek to develop national laws and related institutions that partly overlap but are not necessarily identical to the EU regimes. Already this is happening for example, albeit slowly, in Japan. Its government recently signed a Memorandum of Understanding with the EU.[69]

4. DEVELOPING A DECENTRALISED MUTUAL RECOGNITION MODEL TO IMPLEMENT DPPS IN ASIA PACIFIC

Instead of imposing its law on the entire global value chains from lithium mining to production of li-ion batteries and their recycling, the first consumption market should recognise more the laws for ESG and related value chain management and their regulatory outcomes in the places of mining, production and recycling. In tandem, states and industries involved in the CRM-battery value chains should aim to develop international industrial standards and other soft laws through reputable international organizations (Part 4.1). However, this will take time, not least due to differing regimes already among major

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generally be prepared to pay a premium for products that are supplied more sustainably. Interview with a respondent (professor) at the Graduate Schools for Law and Politics, The University of Tokyo (Luke Nottage, Sydney Law School, The University of Sydney, 18 November 2024). Yet there does not seem to be strong empirical evidence so far for such consumer behaviour. All the interviews referred to in this article were conducted under the UN/CEFACT code of conducts, <https://unece.org/trade/documents/2010/12/session-documents/revised-code-conduct> accessed 15 October 2025.

[67] ibid. For regulation and promotion of Artificial Intelligence and the Metaverse as another recent example, and further general references on government-industry dialogue, see Souichirou Kozuka, 'Japan's Initiatives in Exploring the Law of the Digital and Virtual World', 58 *Journal of Japanese Law* 155 (2024).

[68] Interview with a respondent (professor) at the Graduate School of Environmental Studies, Tohoku University (Luke Nottage, Sydney Law School, The University of Sydney, 18 November 2024). See also generally eg Clemens Mostert and Stefan Bringezu, 'Measuring Product Material Footprint as New Life Cycle Impact Assessment Method: Indicators and Abiotic Characterization Factors' (2019) 8 Resources 61; United Nations Department of Economic and Social Affairs 'Total Material Requirement' <https://www.un.org/esa/sustdev/sdissues/consumption/cpp1224m9.htm> accessed 15 October 2025.

[69] For the Ouranos Initiative, see <https://www.japanindustrynews.com/2023/05/japan-launches-ouranos-initiative-for-cross-border-data-sharing-and-collaboration/> accessed 15 October 2025.

economies. Meanwhile, accordingly, individual states can sign mutual recognition agreements with the EU (Part 4.2). This could risk discriminatory treatment vis-à-vis various counterparties. However, the EU will press for them to adjust local laws as much as possible to EU standards, and anyway a suite of mutual recognition agreements is less parochial than a unilaterally imposed regime (as in the current centralised approach) and could more conceivably contribute to the emergence of a plurilateral regime.[70]

4.1. Developing international standards

The WTO's Technical Barriers to Trade (TBT) Agreement provides fundamental principles for implementing traceability tools such as DPPs in global value chains. Firstly, establishing digital connections between ESG certificates and corresponding physical products in global value chains should be designed without creating unnecessary obstacles to international trade.[71] Accordingly, the costs, technical requirements, etc to establish digital connections should facilitate rather than impeding trade.[72] Secondly, when enhancing the traceability of data in the global value chains, the business confidentiality of product and production data originating in a foreign country should be respected as for domestic products and to protect legitimate commercial interests.[73] Thirdly, enhancing traceability of product and production data in value chains should not impose unnecessary costs on businesses, especially SMEs.

These principles should guide any measures to enhance the data traceability in global value chains because traceability should help reduce technical barriers to trade rather than increasing them. Developing binding international treaties to implement these principles can start from fostering international industrial standards for three reasons.

Firstly, comprehensive traceability of CRM from mining to recycling is a new demand in international trade law and lack of widely agreed regulatory consensus. International industrial standards as soft law can serve as a testing ground to develop hard-law international treaties on traceability.

Secondly, international law making to regulate the full CRM-Battery value chains may be hard to achieve due to geo-political tensions between the EU and US on one hand, and China and Russia on the other. For example, the EU and the US have concluded a number of CRM related agreements in recent years but none is with China and Russia.[74] Reputable international standardization organizations, such as the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), International Organization for Standardization (ISO), and GS1, focus on building consensus between private parties in

[70] Gregory Messenger, 'Mitigating the Rise of Unilateralism: Lessons from Forestry Management' (2024) 27 *Journal of International Economic Law* 223, 223–240; Saori N Katada, 'The Rise of Plurilateral Trade Agreements and the Future of Trade in the Indo-Pacific' (2025) 20 Asia Policy 61, 61–76.
[71] WTO, *Technical Barriers to Trade Agreement* art 5.1.2.
[72] ibid art 5.1.2.
[73] ibid art 5.2.4.
[74] European Commission, 'Raw Materials Diplomacy' <https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/raw-materials-diplomacy_en> accessed 15 October 2025; US Department of State, Minerals Security Partnership, <https://www.state.gov/minerals-security-partnership> accessed 15 October 2025.

cross-border value chains.[75] International standards are not treaties and do not require ratification by states. They can help bridge the needs of private parties from states who may not sign treaties.

Last but not least, unlike ISO and GS1, UN/CEFACT is an intergovernmental body within the United Nations, serving as a focal point for trade facilitation recommendations and electronic business standards; besides private entities, UN/CEFACT membership is more inclusive, covering intergovernmental organizations and individual countries' authorities.[76] The UN/CEFACT has tested the United Nations Transparency Protocol (UNTP) since 2024, which provides an open and free standard for data exchange to support traceability and transparency in global value chains.[77] The open standard is typically developed and maintained through a collaborative and transparent process sponsored by the UN, and is publicly available and designed to ensure compatibility, interoperability and innovation across systems, platforms, or industries. The UN/CEFACT launched the Recommendation 49 'Transparency at Scale' and the Sustainable Development and Circular Economy Reference Data Model in 2025. These documents give states and businesses policy guidance on traceability in international trade by enhancing the integrity of product sustainability claims and the transparency of corporate sustainability disclosures.[78]

Notably, industrial standards are optional in nature and do not have compulsory enforcement power, unless they are adopted by private contracts, state legislations, or international treaties. Therefore, industrial standards may be the first step to avoid DPPs becoming a green trade barrier when they are developed from consensus of stakeholders in the CRM-Battery value chains; however, effectively achieving this goal still require making international treaties.

4.2. Concluding mutual recognition agreements and domestic law reform

Reinforced by such international collaboration initiatives, and due to the challenges with the centralised approach identified in Part 3 above, it is indeed desirable that at least major economies in the CRM-Battery value chains will negotiate and conclude specific mutual recognition arrangements with the EU. It is not feasible to have EU law requirements, as interpreted ultimately just by EU regulators, simply being imposed eg on intermediate

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[75] ISO is an independent, non-governmental organization made up of members from the national standards bodies of 172 countries. GS1 is a not-for-profit, global data standards organization that helps companies and their trading partners identify, capture, and share data electronically. Several laws refer to UN standards for data exchange. Although CEN/CENELEC develops standards due to regulations, these standards can refer to UN/CEFACT standards: see <eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0316>; <https://unece.org/trade/uncefact/unflux> accessed 15 October 2025.

[76] See UNECE, 'Trade Facilitation and E-business (UN/CEFACT)' <https://unece.org/trade/uncefact> accessed 15 October 2025.

[77] See UNECE, 'UN Transparency Protocol' <https://spec-untp-fbb45f.opensource.unicc.org/> accessed 15 October 2025.

[78] UN/CEFACT, *Recommendation No. 49: Transparency at Scale*, <https://unece.org/trade/documents/2025/07/session-documents/revised-recommendation-no-49-transparency-scale-fostering> accessed 15 October 2025; Sustainable Development and Circular Economy Reference Data Model, <https://uncefact.unece.org/display/uncefactpublic/Sustainable+Development+and+Circular+Economy+Reference+Data+Model> accessed 15 October 2025.

processors in Japan or China as well as miners eg in the Global South or Australia (depicted as ‘uniformity’ in the second column of Table 1 below).

TABLE 1 Uniformity vs Diversity in DPP Traceability Regimes

(Jurisdiction)	*Uniformity*	*Minimal Diversity*	*Greater Diversity*
Australia	EU law	EU law, but local checks	(EU-like) Australian law, with local checks
Japan or China	EU law	EU law, but local checks	(EU-like) Japanese or Chinese law, with local checks
EU	EU law	EU law, double-checked by EU regulator	Deference by EU regulator; EU law only for EU firms

An alternative intermediate possibility (depicted as 'minimal diversity' in the third column) is that the EU law is copied out in those up- and mid-stream jurisdictions. However, the EU regulators agree that say a Japanese regulator (or eg their list of approved third-party certifiers in Japan) can review compatibility of data provided by the Japanese processor for the ultimate DPPs. This arrangement could be negotiated so that the EU regulator shares some of the compliance and investigatory burden with trusted overseas counterparts. Yet it is arguably even more intrusive for those overseas states, and the replication of EU law substantive requirements in those states runs up against the problems highlighted in Part 3 above.

The most plausible possibility, therefore, is that the trusted overseas jurisdictions develop their own laws specifying data requirements broadly similar but not identical to the EU law, but which the EU accepts as broadly similar. An analogue is the mutual recognition agreements (i.e. adequacy decisions) that the EU negotiated regarding its GDPR, acknowledging that the counterpart state has protections for personal information that are essentially equivalent to those under EU law.[79] This then allows the flow of such data between the EU and the counterparty, eg Japan as agreed in 2018, consistently also with EU-Japan FTA principles.[80] Such agreements take into account not only the substantive requirements set by the foreign law, but the foreign legal system's capacity to enforce it (more likely to be greater in developed economies).

Extending this approach to the DPP traceability regime, we can therefore quite readily anticipate a system (shaded as 'greater diversity' in the fourth column of Table 1) whereby EU law requirements apply to EU-based firms, but Japanese or Chinese law applies to their firms, and Australian law applies to Australian firms, with each foreign law recognised by the EU as sufficiently similar or adequate. The extent to which the foreign law regime differs will depend on respective negotiating power and the EU counterpart's strong national interests say concerning some mandatory local laws or business competitiveness. Initially there may remain some significant divergences, but over time the EU counterpart's substantive law may become even closer to the EU law. Further, decisions of foreign regulators or their nominees (like approved third party certifiers), applying such foreign laws, will be given considerable but not necessarily total deference by the EU regulator.

There could be concern that signing mutual recognition agreements to facilitate digital traceability of CRMs from mining to recycling may give rise to 'ally-shoring' or similar trade practices: how could that be reconciled with the existing regulatory framework of the

[79] Takayuki Kato, 'Reflections on the GDPR Adequacy Assessment and Strategy of Japan: For the Enhancement of Transborder Data Flows' (2020) 1 Global Privacy Law Review 156.
[80] See generally European Commission, 'The European Union and Japan agreed to create the world's largest area of safe data flows' (press release, July 17 2018) <https://ec.europa.eu/commission/presscorner/detail/en/ip_18_4501> accessed 15 October 2025.

multilateral trading system, as well as with other relevant obligations under FTAs? Although this concern has value, it is misplaced in three major aspects. Firstly, there is no multilateral trading system connecting the major downstream states and those in the up-and-midstream segments for cross-border flow of data required for DPPs.[81] Secondly, ally-shoring (or 'friendshoring') has pros and cons, and such preferences are typically limited to manufacturing and sourcing from countries that are close geopolitically or have military alliances.[82] In contrast, this article suggests mutual recognition mechanisms to be built among jurisdictions along the CRM-Battery value chains such as Australia, China, Japan and the EU. Last but not least, developing international standards at international organisations, rather than by a powerful state (i.e. the centralized approach), can build consensus progressively for a bilateral, regional, mega-regional, plurilateral, or international mutual recognition system. How exactly this mutual recognition system will work can draw inspiration from various private international law regimes for traceability of other types of documented information, as explored next in Part 5.

5. MODELS FOR IMPLEMENTING MUTUAL RECOGNITION

These often-longstanding regimes, which allow for mutual recognition to varying extents, highlight specific issues that could also arise when implementing DPPs in a more realistic way through the EU negotiating arrangements with counterpart states at different stages of global value chains. In particular, although these regimes involve one state accepting certain documentation from another even if it turns out to be substantively incorrect (misapplying the applicable law), the recognising state nonetheless can refuse to accept it if some serious procedural irregularity (such as fraud or corruption) can be sufficiently proven in the other state. The regimes also are suggestive as some involve what has become a widely-adopted treaty globally (as might emerge regionally or globally once the EU, for example, starts negotiating mutual recognition agreements for DPPs with major economies like China, Japan or Australia), with or without a local 'Central Authority' in the other state abroad (to enhance reliability of data fed into DPPs). All these regimes involve recognising data contained in foreign certificates, so the issues arising from them provide insights for implementing DPPs if the EU indeed compromises on its current centralised approach.

Besides the centralization model, there are three potentially better, major models to achieve mutual recognition and facilitate global traceability in the CRM-Battery value chains.

[81] The WTO Joint Statement Initiative on Electronic Commerce lacks provisions on cross-border data flow, although it requires its member states to allow industrial users and consumers to connect devices of their choice (including digital traceability tools such as DPPs) to the Internet. See UN/CEFACT *Conflict of Laws and DPPs White Paper* (n 11), 15-16, <https://unece.org/trade/documents/2025/09/white-paper-digital-product-passports-and-critical-raw-materials-batteries> accessed 15 October 2025.

[82] Remarks by Secretary of the Treasury Janet L. Yellen on Way Forward for the Global Economy on 13 April 2022 (stating that favouring 'the 'friend-shoring' of supply chains to a large number of trusted countries, so we can continue to securely extend market access, will lower the risks to our economy, as well as to our trusted trade partners'), <https://home.treasury.gov/news/press-releases/jy0714> accessed 15 October 2025.

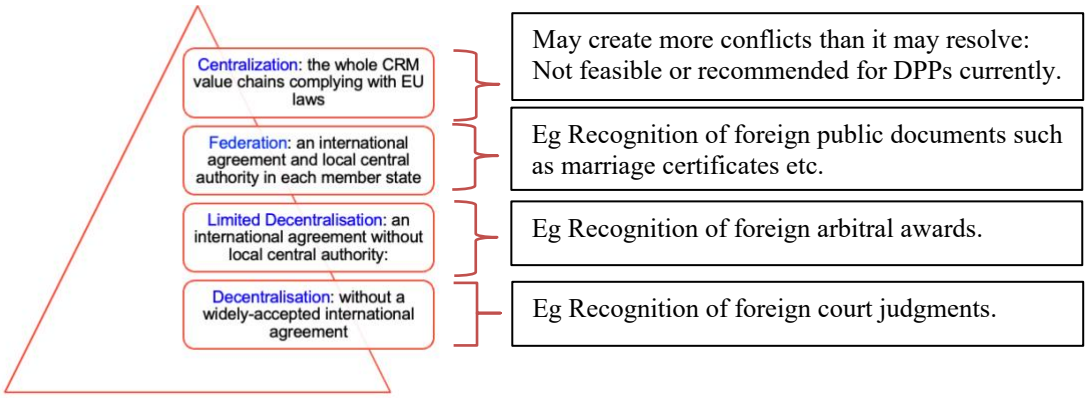

FIGURE 3 Four potential models to facilitate global traceability and mutual recognition in CRM value chains.
The figure illustrates a spectrum of mutual recognition models from full decentralization, where coordination occurs without a widely accepted international agreement—to full centralization, where the entire CRM value chains complies with a unified regulatory framework. Each model is associated with differing levels of legal coherence and flexibility, exemplified respectively by mechanisms for the recognition of foreign public documents, arbitral awards, and court judgments.

The mutual recognition mechanism can start with the 'Decentralisation' model in Figure 3 above. It is a regime lacking a widely accepted international agreement (namely, for recognising foreign judgments), which is discussed in Part 5.1. In the 'Decentralisation' model, states can decide to unilaterally recognize one another's ESG certificates, or conduct recognition based on reciprocity requirement. With the practice of more states, they may develop an international treaty, and move to either the model of 'Limited Decentralisation' or 'Federation'.

Part 5.2 compares an international agreement but that does not create any local Central Authority abroad (for recognising arbitral awards), constituting 'Limited Decentralisation'. Both these regimes typically do not allow the enforcing courts to refuse recognition due to the decision-maker mistakenly applying the applicable (often local) substantive law, but they do allow refusal not only for fraud or corruption but also if the outcome reached in the other state offends fundamental public policy. If and when the EU negotiates DPP-related agreements with one or more states to recognise foreign ESG data certification, eg from third party certifiers in the foreign state, it should consider how to deal with such issues and reflect them in the contents of those agreements.

Part 5.3 identifies regimes with an international agreement but also one or more local Central Authority established in the foreign state (such as the Apostille Convention, recognising birth and other certifications across borders), generating a 'Federation' model. This could also cover the situation where a DPP-related international agreement premised on the foreign state adopting product data disclosure requirements that get closer to the EU substantive law requirements, but again leaving some room for adaptation to local interests which is accepted by the EU. In this scenario, however, the agreement could specify one or more local Central Authorities that directly or indirectly issues the ESG data certification, before having to be accepted in the EU. The Apostille Convention addresses problems with authentication from the overseas issuer, but the EU's DPP-related agreements will likely go further and be premised on the foreign law being close (though not identical) to the EU law requirements.

All three types of private international law regimes differ from the 'Centralisation' approach, at the top of the pyramid in Figure 3 above, which is the regime currently envisaged by the EU to extend its own law throughout the global value chains (as explained in Part 2 above). Yet our analysis identifies how they raise issues relevant for the negotiation,

drafting and implementation of EU DPP-related agreements with overseas states in the CRM-Battery value chains globally.

5.1. Decentralisation: traceability without a widely-accepted international agreement

Currently, one possible model for facilitating traceability certificates across borders is that for recognition and enforcement of foreign civil and commercial judgments. Foreign judgments are certificates, like arbitral awards (discussed next in Part 5.2), driver licences (as discussed in Part 5.3) and ESG certificates required by DPPs. The regime to recognise and enforce foreign judgments is highly decentralised as there is no international treaty widely adopted globally. Generally, for a foreign judgment to be recognised and enforced aboard, the judgment creditor must prove that the judgment-rendering court has jurisdiction; the judgment is final, conclusive and effective; and the parties in the judgment-enforcement court are identical to the parties in the judgment-issuing court.

A judgment debtor can refuse the recognition and enforcement of the foreign judgment on grounds such as fraud, lack of due process, inconsistent judgments, exemplary or punitive damages and public policy.[83] Addressing fraud in the judgment-rendering process is also an important concern for the decentralised judgment recognition and enforcement model. There are significant inconsistency between national laws and even between *the Hague Convention of 30 June 2005 on Choice of Court Agreements* (Choice of Court Convention) and *the Convention of 2 July 2019 on the Recognition and Enforcement of Foreign Judgments in Civil or Commercial Matters* (Judgments Convention). For example, the Choice of Court Convention limits fraud to procedural issues while the Judgments Convention does not.[84] Fraud in the judgment-rendering proceeding typically involves deceptive or unlawful actions that undermine the integrity of the judicial process. Circumstances constituting fraud may include submission of fabricated, falsified, or intentionally misleading evidence to the court; witnesses or parties knowingly providing false testimony under oath during the proceedings, failure to disclose critical facts or evidence that would significantly impact the court's decision, secret agreements between parties, or between a party and a third party, to manipulate the outcome of the case. A judgment recognition and enforcement court can address fraud in two ways. It may allow a judgment debtor to argue fraud regardless that it has been raised, considered, or determined at the judgment-rendering court.[85] Alternatively, it may follow the so-called new evidence rule and allow the debtor to argue fraud only when the fraud is discovered after the foreign judgment was entered.[86]

In sum, there is no review of the merits of the decisions made by the adjudicators abroad; instead, the grounds for enforcement courts to refuse enforcement concern fundamental procedural flaws in the overseas process, and so on. Such grounds may need to be reflected in mutual recognition or similar arrangements if the EU does not succeed in its ambition to create a highly centralised regime based on its own DPP traceability law that permeates seamlessly throughout the value chains for batteries and eventually other products.

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[83] Art 7.1(a)-(c) of the Judgments Convention and art 9(c)-(e) of the Choice of Court Convention.
[84] See Francisco Garcimartín & Geneviève Saumier, *Explanatory Report on the Convention of 2 July 2019 on the Recognition and Enforcement of Foreign Judgments in Civil or Commercial Matters* (The Hague Conference on Private International Law, 2020), art 9 <https://assets.hcch.net/docs/a1b0b0fc-95b1-4544-935b-b842534a120f.pdf> accessed 15 October 2025; The Judgments Convention art 7.
[85] See eg *Abouloff v Oppenheimer & Co* (1882) 10 QBD 295, 302-03; *see also Yoon v Song* (2000) 158 FLR 295, 296-97, 300.
[86] See eg *Keele v Findley* (1990) 21 NSWLR 444, 458; see also *Jacobs v Beaver* [1908] 17 O.L.R. 496, 507-08.

However, there are potentially two significant differences between the traceability (recognition and enforcement) of foreign judgments and the traceability of DPPs.

Firstly, compared to the EU regime as currently envisaged, the model for international recognition and enforcement of foreign judgments is highly decentralised. Although there are bilateral treaties and international conventions, they are far less pervasive than those for foreign arbitral awards and the Apostille Convention for foreign documents (both of which will be discussed below). Accordingly, cross-border recognition and enforcement of foreign civil and commercial judgments largely depends on national laws, for example in China and Australia.[87]

The Choice of Court Convention helps member states to recognise and enforce judgments based on an exclusive choice of court agreement.[88] The Judgments Convention, covering judgments made without a choice of court agreement, has a broader scope.[89] Neither of them has been widely adopted - including by Australia, Japan, China and all Southeast Asian countries. Most of these two Conventions' member states are in Europe.[90]

Secondly, the recognition and enforcement of foreign judgments does not require a foreign judgment-rendering court to issue a judgment according to the law of the enforcement courts. Instead, no review of the merits of the judgment is a widely accepted principle in the judgment recognition and enforcement proceedings. No jurisdiction, undue service, fraud, public policy, etc are internationally accepted limited grounds to refuse recognition and enforcement of judgments, which share similarity to the limited grounds for not enforcing foreign arbitral awards (as discussed next).

5.2. Limited decentralisation: traceability based on an international agreement without local Central Authorities

Arbitral awards (like court judgments) are also types of certificates. The recognition and enforcement of foreign arbitral awards is similarly a traceability process: tracking the origin of the foreign awards to the arbitral tribunals that rendered the awards abroad and checking core features. The enforcement courts must first verify that the information in a foreign award is authentic. For example, the identities of the parties in the foreign award must match those of the parties appearing in the enforcement courts; the foreign award must be real, final and effective where rendered; and the foreign tribunal rendering such a decision followed some minimal due process of law. Similarly, under the DPPs subject to the EU law, importers need to review foreign ESG certificates and product information certificates before launching the batteries to the consumer market, with regulators and others then also scrutinising such information. They need to ensure that the certificates are for these particular batteries, that information on the certificates are real, final and effective, and has been no fraud or other fundamental procedural irregularity in the certificate-issuing process.

The global legal framework for recognition and enforcement of foreign arbitral award has adopted the model of limited decentralisation, namely traceability based on an

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[87] For details, see the longer version of this article.

[88] *Convention on Choice of Court Agreements* (1 October 2015) <https://www.hcch.net/en/instruments/conventions/full-text/?cid=98> accessed 15 October 2025.

[89] *Convention on the Recognition and Enforcement of Foreign Judgments in Civil or Commercial Matters* (2 July 2019, not yet in force) <https://www.hcch.net/en/instruments/conventions/full-text/?cid=137> accessed 15 October 2025.

[90] For the Status Table of the Choice of Court Convention, see <https://www.hcch.net/en/instruments/conventions/status-table/?cid=98> accessed 15 October 2025. For the Status Table of the Judgments Convention, see <https://www.hcch.net/en/instruments/conventions/status-table/?cid=137> accessed 15 October 2025.

international agreement, but the agreement does not require its member states to establish local Central Authorities for implementation purposes. The primary mechanism for transplanting foreign arbitral awards is the *UN's 1958 New York Convention for the Recognition and Enforcement of Foreign Arbitral Awards* (NYC). It has become one of the most successful multilateral conventions in commercial affairs, comprising now 172 member states.[91] This success has been facilitated by the UN Commission on International Trade Law (UNCITRAL, created in 1966) publishing multi-lingual summaries and digests of case law from member state courts applying UN instruments like the NYC.[92] However, the NYC does not require its member states to establish local Central Authorities for its implementation.

Part of the reason for the success lies in a key feature of the NYC. Unlike *the 1927 Geneva Convention on the Execution of Foreign Arbitral Awards*, it does not require first recognition and enforcement of the award from a court in the country where the award is rendered. Instead, the award creditor can simply take the award to the enforcement court in any NYC member state abroad where it can locate the award debtor's assets to satisfy the award. In this sense, there is no local Central Authority that needs first to be approached, unlike the regime outlined in Part 5.3 below. However, the NYC does envisage some role for courts applying the law at the foreign seat, as will be discussed towards the end of this Part 5.2.

In the usual scenario, where the award creditor directly seeks recognition or enforcement of its award abroad in the NYC member state's courts, the award debtor can only raise very limited grounds for refusing recognition or enforcement under NYC Article V. Crucially, there is no ground for refusal based on the merits, namely error of fact or even law by the arbitral tribunal as decision maker. A starting point therefore for the EU in a mutual recognition agreement with a foreign state could be that the EU regulator will not review the merits of the application of the foreign law by a third-party certifier to issue a certificate to a CRM value chain participant. Instead, the review should focus on the procedure used by the certifier to issue the certificate. The grounds to refuse the recognition and enforcement of a foreign arbitral award are limited.

The first ground is lack of subject matter arbitrability and (sometimes overlapping) contravention of the substantive 'public policy' interests of the enforcement court's state.[93] The scope of this exception has been gradually reduced in many NYC member states, as they have become more comfortable with arbitrators ruling on various types of disputes traditionally adjudicated only by courts, notably by requiring the assessment of their state's core public interests to be viewed through an internationalist lens.[94]

Nonetheless, there remain some areas where these exemptions can be applied in arbitration settings, and some are conceivably relevant to cross-border traceability systems. One example is international sanctions, for example pursuant to UN resolutions binding on

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[91] See United Nations Commission on International Trade Law (UNCITRAL), 'Status: Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York, 1958)' (NYC 1958) <https://uncitral.un.org/en/texts/arbitration/conventions/foreign_arbitral_awards/status2> accessed 15 October 2025.

[92] See UNCITRAL, 'Case Law on UNCITRAL Texts (CLOUT)' <https://uncitral.un.org/en/case_law> accessed 15 October 2025.

[93] NYC 1958 (n 91) art V(2).

[94] See eg International Law Association, *Final Report on Public Policy as a Bar to Enforcement of International Arbitral Awards* (2002) <https://www.ila-hq.org/en_GB/documents/conference-report-new-delhi-2002-3 and GCordero-Moss> accessed 15 October 2025; Franco Ferrari and Friedrich Rosenfeld, 'Deference from National Courts to Tribunals on Issues of Public Policy at the Post-award Stage' in Franco Ferrari and Friedrich Rosenfeld (eds), *Deference in International Commercial Arbitration* (Wolters Kluwer 2023) 125.

the enforcement state.[95] Another example is corruption or fraud tainting the underlying contracts or related transactions that the arbitrators had to decide upon.[96] Such issues could allow states, eg in the EU end-user market, to refuse recognition of product-related traceability information collected in the foreign state(s), even potentially if the foreign state has certified that information under its own domestic law(s).

In addition, the EU might declare that such domestic law regimes – if not identical with the EU DPP passport regimes as for batteries – do not contain and disclose sufficient information, and therefore refuse 'recognition' as offensive to the EU's core public policy interests. To avoid or at least minimise this possibility, it would be advisable for the EU to conclude mutual recognition agreements with foreign states that clarify what information is acceptable by EU standards.

Secondly, under the NYC regime, recognition or enforcement of arbitral awards can be refused if there is a fundamental flaw in the procedures that generated the awards. One manifestation is where the award debtor was not given proper notice of appointment of the arbitrators. Another, raised more often in practice, is where the award debtor was unable reasonably to present its case.[97] A related objection is that the arbitrator was not appointed or the procedure was not followed as had been agreed by the parties, or otherwise under the foreign law where the arbitration took place.[98] More broadly, the award debtor may object that recognition or enforcement would contravene procedural public policy interests of the enforcing state[99], although here too the trend has been for this exception to be restricted to the state's fundamental notions of due process viewed through an internationalist lens.[100]

Transposing such contexts into cross-border traceability systems, including any mutual recognition regimes allowing for exceptions, this might legitimately allow say the EU regulator to refuse recognition of digital passport information generated in upstream foreign markets if that is associated with serious procedural flaws. An example might be where the national law requires or allows certification of product-related information but the foreign officials were not properly authorised or even corrupted, resulting in the flawed information.

A more complex example is where the party could not present information to receive such certification in the foreign market, for example if the relevant officials were bribed by a competitor firm or (perhaps more likely) they mismanaged the procedure in a highly inefficient way. Could the affected supplier nonetheless ask the EU, for example, to recognise the information not accepted for such dubious reasons in the supplier's home state? This scenario raises an opposite situation from that envisaged by the NYC regime, where the enforcement state is seeking to refuse recognition or enforcement of an award. Yet inspiration can also be taken from a situation that has arisen involving arbitral awards: can or

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[95] See generally eg 'Sanctions and International Arbitration: Impact on Substantive and Procedural Issues' (2024) 2 *Transnational Dispute Management* <https://www.transnational-dispute-management.com/journal-browse-issues-toc.asp?key=116>.

[96] See generally eg Judith Levine, 'Corruption and International Arbitration - Toils and Tools for Tribunals' (2021) 3 *Transnational Dispute Management* <www.transnational-dispute-management.com/article.asp?key=2820> accessed 15 October 2025; and (focusing on foreign investment disputes) Nobumichi Teramura, Luke Nottage and Bruno Jetin, 'Bribery and Other Serious Investor Misconduct in Asian International Arbitration' in Nobumichi Teramura, Luke Nottage and Bruno Jetin (eds), *Corruption and Illegality in Asian Investment Arbitration*, Asia in Transition, vol 22 (Springer 2024) 1 <https://link.springer.com/chapter/10.1007/978-981-99-9303-1_1> accessed 15 October 2025.

[97] NYC 1958 (n 91) art V(1)b.

[98] ibid art V(1)(d).

[99] ibid art V(2).

[100] See Luke Nottage, 'Deference from National Courts to Tribunals on Issues of Procedure at the Post-award Stage' in Franco Ferrari and Friedrich Rosenfeld (eds), *Deference in International Commercial Arbitration* (Wolters Kluwer 2023) 141.

should a NYC enforcement court enforce an arbitral award even though it has been set aside at the foreign seat? French courts essentially will, for example. US case law is mixed but has shifted to allowing enforcement only if there is a fundamental procedural injustice in the foreign seat jurisdiction and process (eg corruption, or retrospective legislation undermining the arbitral award). Several other jurisdictions (like England and the Netherlands) are trending this way too.[101] This is consistent with enforcement courts giving growing deference to foreign courts, and indeed arbitrators, in matters of general procedure – but setting limits (and thus allowing enforcement) if the foreign courts or procedures are fundamentally flawed.

Arguably, especially if say the EU enters into a mutual recognition agreement with the foreign state acknowledging the latter's (assumedly somewhat different) traceability law, the EU should include an exception along these lines as well. It might be tempted simply to defer always to the decision of any foreign state's certification body, and simply never recognise the inadequate information provided by the foreign supplier even under the foreign law. However, as the EU is also committed to the international rule of law reflected in the NYC and other regimes,[102] in exceptional situations of fundamental procedural injustice it could look beyond the foreign state's decisions around the information provided by the foreign supplier.

More generally, although the NYC model is characterised by 'limited decentralisation', it has had some harmonising influence on the domestic arbitration laws in foreign seats. Its core concepts of not reviewing decisions on merits, allowing extensive party and arbitrator discretion, but insisting on a few fundamental substantive and especially procedural public policy limitations, heavily influenced the drafting of the 1985 UNCITRAL Model Law on International Commercial Arbitration and its subsequent global diffusion as a popular template for national laws.[103] Especially if the EU were to enter into mutual recognition agreements, setting out some exceptions based on the NYC regime as suggested above, we might similarly expect such concepts to inform the development of national laws on traceability – not only in those jurisdictions but also others without yet such mutual recognition agreements.

5.3. Federation: traceability based on an international agreement and local Central Authorities

The model of federation differs from the models of decentralisation and limited decentralisation. This is because cross-border traceability is achieved based on an international agreement which requires its Member States to establish local Central Authority to implement it and a federation is established among these local Central Authorities. A typical example is the convention for the global traceability and mutual recognition of birth, marriage and death certificates and other public documents: the *Convention of 5 October 1961 Abolishing the Requirement of Legalisation for Foreign Public Documents* (Apostille

[101] See eg Matthew Barry, 'The Role of the Seat in International Arbitration: Theory, Practice, and Implications for Australian Courts' (2015) 32(3) Journal of International Arbitration 289; Richard Garnett, 'Estoppel and Enforcement of International Arbitration Awards' (2021) 95 Australian Law Journal 337.

[102] See also Yueming Yan, 'Anti-Corruption Provisions in International Investment Agreements: Investor Obligations, Sustainability Considerations, and Symmetric Balance' (2020) 23(4) Journal of International Economic Law 989; EU's incorporation of anti-corruption clauses in its investment treaties or chapters: Teramura and others (2024).

[103] Currently adopted in 93 states, see UNCITRAL, 'Status: UNCITRAL Model Law on International Commercial Arbitration (1985), with amendments as adopted in 2006' <https://uncitral.un.org/en/texts/arbitration/modellaw/commercial_arbitration/status> accessed 15 October 2025.

Convention).[104] The Apostille Convention currently has 127 member states including Australia, Japan, South Korea, China and many South East Asian countries, constituting the most popular and most used of the Conventions for traceability of foreign certificates.[105]

The Convention applies to 'public documents which have been executed in the territory of one Member State and which have to be produced in the territory of another Member State'.[106] It establishes a system to trace Apostille certificates so as to verify the authenticity of related foreign public documents.[107] Any foreign public documents with an Apostille certificate issued by a competent authority should be acceptable for other Member States. Namely, Member States trust one another's authenticity of the signature, the capacity in which the person signing the document has acted and, where appropriate, the identity of the seal or stamp which the foreign document bears as long as the document is certified with an Apostille certificate.[108] The Apostille Convention thereby eliminates a lengthy and often expensive legalisation procedure. By creating an international chain of authentications, it requires a Member State to recognise the authentication of public documents issued by another Member State. Each Member State must appoint a Competent Authority to authenticate a document. This authority is typically a government ministry or embassy.[109] For example, the Australian authority is the Secretary to the Department of Foreign Affairs and Trade of the Commonwealth of Australia.[110]

Although both Apostille certificates and DPPs aim to increase efficiency, reduce costs, enhance transparency and improve traceability, there are four important differences between them.

Firstly, Apostille Certificates are issued according to the law of the country of origin. They are not subject to the law of the country of recognition. The country of recognition instead should recognise the Certificates according to the Convention. Therefore, an Apostille Certificate enables the traceability to the provenance of a foreign public document, partly resembling DPPs. Notably, an Apostille Certificate cannot certify the truth or accuracy of information contained in the document to which it relates.[111] However, DPPs can verify the truth or accuracy of such data.

Secondly, unlike the DPPs which allows various participants in a value chain to contribute to the data it carries, the data carried by Apostille Certificates depends on local Central Authorities. Under the Apostille Convention, local Central Authorities in Member States shall keep a register or card index recording the certificates issued, specifying 'a) the number and date of the certificates, b) the name of the person signing the public documents

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[104] Convention of 5 October 1961 Abolishing the Requirement of Legalisation for Foreign Public Documents (Apostille Convention).

[105] For the status of the Apostille Convention, see <https://www.hcch.net/en/instruments/conventions/status-table/?cid=41> accessed 15 October 2025; The Hague Conference on Private International Law, *Apostille Handbook: Practical Handbook on the Operation of the Apostille Convention* (2nd edition, The Hague Conference on Private International Law 2023) 11.

[106] Apostille Convention (n 104) art 1 (providing that 'public documents' under the Convention includes documents issued by courts, tribunals, public prosecutors etc; administrative documents; notarial acts; 'official certificates which are placed on documents signed by persons in their private capacity, such as official certificates recording the registration of a document or the fact that it was in existence on a certain date and official and notarial authentications of signatures').

[107] ibid art 3.

[108] ibid art 2. An Apostille Certificate does not in any way certify the truth or accuracy of information contained in a document to which it relates.

[109] ibid art 6.

[110] For Australian Competent Authority (art 6), see <https://www.hcch.net/en/states/authorities/details3/?aid=307> accessed 15 October 2025.

[111] Apostille Convention (n 104) art 7.

certified by the certificates, and the capacity in which he has acted, or for unsigned documents, the name of the authority which has affixed the seal or stamp'.[112]

Thirdly, unlike the DPPs which are always digitalized, Apostille Certificates can be paper based, eg using a standard form attached to a document that needs to be authenticated. In 2007, e-Apostilles as PDF documents were created, with each Member State creating an online e-register.[113] Recipients of e-Apostilles can thereby verify and check the status of Apostille online, quite effectively addressing fraud related to paper-based Apostilles. However, when a global value chain involves multiple e-Apostilles issued in different Member States, the users must verify the status of these certificates in the databases of these States separately. DPPs instead require economic operators to ensure that data in DPPs are accurate and updated. The benefit is that all the participants in the value chain can verify the data (eg ESG certificates) at one focal point – the DPPs. Nevertheless, the DPP model essentially requires all participants to comply with EU law.

Fourthly, e-Apostilles do not support selective reduction of data to different recipients. All the recipients of e-Apostilles have the same access to all the information contained in the certificates. By contrast, DPPs enable different recipients to access different information contained in the DPPs. For example, the market regulator can access more comprehensive information in the DPPs than average consumers. DPPs are also more inclusive in terms of technology than pdf-based e-Apostilles to enable their broad application.

Lastly, this federation model provides possibilities for local Central Authorities to share information about traceability. This is important to incentivise states outside of the EU to accept DPPs. Currently, only the EU regulatory authority, rather than all the regulatory authorities along the CRM-battery value chain, can access data collected by DPPs. If the data in the DPPs can be shared and reused by other states in the custom clearance, market regulation and environment supervision along the value chains, it can enhance data accuracy and efficiency of those states.[114]

6. CONCLUSIONS

DPPs launched by the EU are an important step towards traceability of product and production data throughout the international CRM-Battery value chains to combat greenwashing and enable the transition to a circular economy. However, the high requirements of transparency and data sharing essentially require the entire CRM-Battery value chains to comply with EU law. Although this centralised applicable law approach may enhance ESG compliance in the value chains, it may create serious issues. For example, it may be confronted with criticisms of neo-colonisation, weakening a healthy South-North relationship. It may generate anti-competitive effects disproportionately impacting SMEs particularly in the Global South, contrary to the UN Sustainable Development Goals. It may conflict with mandatory local laws currently protecting the environment, workers and indigenous peoples, and contravene local law and treaty-based requirements for cross-border data transfer. The EU's centralisation approach may also bring technical, commercial and geopolitical issues.

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[112] ibid.

[113] The Hague Conference on Private International Law, 'Background Notes on the e-APP' <https://assets.hcch.net/docs/764f82b4-a8d6-4073-8e1b-4db0f12c880e.pdf> accessed 15 October 2025.

[114] The local central authorities may be the national trade facilitation bodies of these states. See National Trade Facilitation Bodies, Recommendation No. 4, UN/CEFACT, <https://unece.org/fileadmin/DAM/cefact/recommendations/rec04/ECE_TRADE_425_CFRec4.pdf> accessed 15 October 2025.

Instead, regulating the CRM-Battery value chains should adopt a mutual recognition model with three features. Firstly, its legal foundation should be mutual recognition agreements acknowledging some diversified local data protection and ESG laws, promoting interoperability and mutual recognition of regulatory outcomes.

Secondly, it should allow greater application of laws in the places of mining, production, or recycling. If these activities comply with the local laws for ESG and value chain management, and they are broadly similar to EU requirements, the local regulatory outcomes should be recognised as 'adequate' by EU DPPs. The major jurisdictions involving in the CRM-Battery value chains should agree on such mutual recognition while collaborating on developing international standards.

Thirdly, under this less centralised approach, insights should be drawn from major private international law quasi-traceability conventions for foreign public documents, arbitration awards, and foreign judgments. These generally recognise the foreign documentation even if the foreign decision-maker has mistakenly applied its law, limiting refusal to situations where there was sufficient proof of corruption, fraud or other serious procedural flaws abroad, or where recognition from abroad would offend fundamental values viewed through an internationalist rather than purely domestic lens. Some of these instruments also require channelling through a local Central Authority abroad. Such issues and design features should be considered when the EU negotiates mutual recognition agreements to ensure that traceability data can flow freely between states and industries, while also fully appreciating the local needs in the Global South and others in the CRM-Battery value chains.

Last but not least, the substantive analysis of this article primarily focuses on the major middle- and high-income economies in the CRM-Battery value chains—such as China, Japan, Australia and the EU. More research needs to be done to reflect a diverse set of economies in the value chains including Indonesia, the Democratic Republic of Congo, and Peru which are major players in the upstream of the value chains but with weaker legal systems or limited data capacity.

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