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Enabling circularity through transparency: Introducing the EU Digital Product Passport

January 2023

Three DPP publications with different purposes

Focus of this publication

Enabling circularity through transparency: Introducing the EU Digital Product Passport

CONTENT

- Introduces EU DPP and objectives
- Summarizes EU DPP status as of December 2022
- Outlines options for open policy elements and discusses implications

PURPOSE

Informs about DPP and shapes regulatory discussions incl. corporate engagement

Navigating uncertainties of the EU Digital Product Passport: How to prepare now as a company

CONTENT

- Introduces EU DPP from a corporate lens
- Outlines why companies should act now and how they can prepare
- Highlights challenges and additional growth opportunities

PURPOSE

Prepares companies and motivates to participate in regulatory discussions

The EU Digital Product Passport shapes the future of value chains: What it is and how to prepare

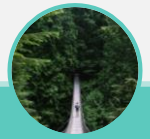
CONTENT

- Summarizes regulatory status
- Illustrates key implications along electronics value chain
- Highlights actions companies and the EC can take to prepare for the DPP

PURPOSE

Informs all readers and combines all publications

Executive summary



Introduction

- **A digital product passport (DPP) is a structured collection of product related data** across a product's lifecycle to advance the transition to a circular economy and thereby support economic growth
- A few examples of DPPs exist, but the **EU is the first regulatory mover at scale**
- **EC is currently drafting the DPP regulation**. A first passport for industrial batteries has been drafted
- **First product group expected to be affected by regulation in 2026/7**. DPPs are expected to be mandatory for most industries by 2030
- **EU DPP regulation is expected to impact global value chains**

EU DPP analysis

- **Many elements in EU DPP are still open with different levels of maturity,** the same applies to the battery passport regulation
- Several topics remain unclear and are expected to be answered by the EC:

SCOPE
- **Product groups:** Which industries/product groups should be prioritized and why?
- **Company size:** Should requirements differ by company size?
- **Application level:** What level should DPPs be applied at?

TECH
- **Data storage:** How and by whom should data be stored?
- **Data carrier:** What data carrier(s) should be used?
- **Access/security:** How should access to the data be allowed?

DATA
- **Data requirements:** What information/data will be included in the DPP at what degree of standardization?
- **Governance:** Who collects and updates the data? How is the DPP data verified?

Conclusion

- The **EU DPP is a first of its kind strong regulatory circularity tool**. However, **many questions remain unclear** and a long timeline to full implementation is expected
- In detailing the DPP regulation, **a balanced approach between quickest and optimal options** is relevant to enable companies to prepare for the DPP
- Despite the uncertainties and the long timeline, **companies benefit from preparing for the DPP implementation now**

More details can be found in our separate publication: "*Navigating uncertainties of the EU Digital Product Passport: How to prepare now as a company*"

Content

Introduction

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DPPs have several functionalities

- Collect **product information** across the product lifecycle
- **Digitally store** data (e.g., in the cloud)
- Provide **easy data access** to stakeholders (e.g., through scannable QR codes)

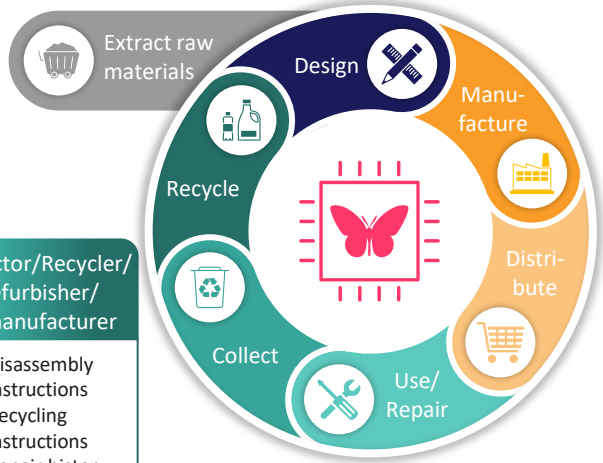
They share product information across the product lifecycle

Exemplary information shared in a DPP across the product lifecycle[1]

Raw material producer
- Deforestation
- Emissions
- Water/ground contamination

Brand/Designer
- Origin of raw materials
- Recycled vs. virgin
- Resource consumption

Manufacturer
- Water usage
- Emissions
- Waste
- Water/ground contamination



Distributor
- Transport. emissions
- Packaging
- (Eco-) labels
- Waste generation

Collector/Recycler/ Refurbisher/ Remanufacturer
- Disassembly instructions
- Recycling instructions
- Repair history

(Re-)User/Repairer
- Product impact
- User manual
- Repair instructions
- Disposal instructions

1. Non-exhaustive; this graph has the purpose of illustrating what information a DPP could collect across a product's lifecycle, final DPP information depends on further specification by the EC. Responsibility for data collection, DPP creation, etc. will be discussed later in this publication (see page 40)
Source: BCG analysis

DPP could be a key tool to improve circularity …

- Empowers informed, **more environmentally conscious decision-making** across the value chain (VC)
- Facilitates **effective management of waste flows and EoL[1] treatment**, thereby increasing recycling rates and access to recycled materials and products
- Enables **traceability of environmental impact and thus more accurate measurement** (e.g., scope 3 emissions)
- Provides **common foundation and clear requirements** for becoming circular
- Enables setting and digitally tracking **regulatory circular economy targets and verifying compliance** with them

… and thereby drive economic value

- Creates **corporate value through collaboration** (e.g., operational efficiency improvements and innovation of new materials/products, business models, and markets)
- Leads to **higher value retention** from waste, **longer material lifetime, job creation, and lower raw material dependency**, thus mitigating impacts of supply shocks and price volatilities
- Enables **more efficient energy and resource consumption** and thereby reduces associated costs for economy, society and env.
- Ensures an **equal level playing field**, enhances visibility and credibility of sustainable products, and decreases VC deficiencies
- Spurs digital **capability development** of authorities, thereby increasing the efficiency of regulatory processes and reducing resource spending

1. EoL: End of life

EC proposes DPPs as first regulatory mover at scale…

Several examples exist (e.g., Madaster, KEEP), but most of them are early stage and industry-specific, with no regulatory examples or broader implementation[1]

EC is the first large regulator aiming for mandatory DPPs to promote the transition to a circular economy, provide new business opportunities and support consumers

However, DPP implementation poses **significant challenges for EC** to implement given little learnings to build on the broad intended cross-industry scope and the complexity of DPP set-up

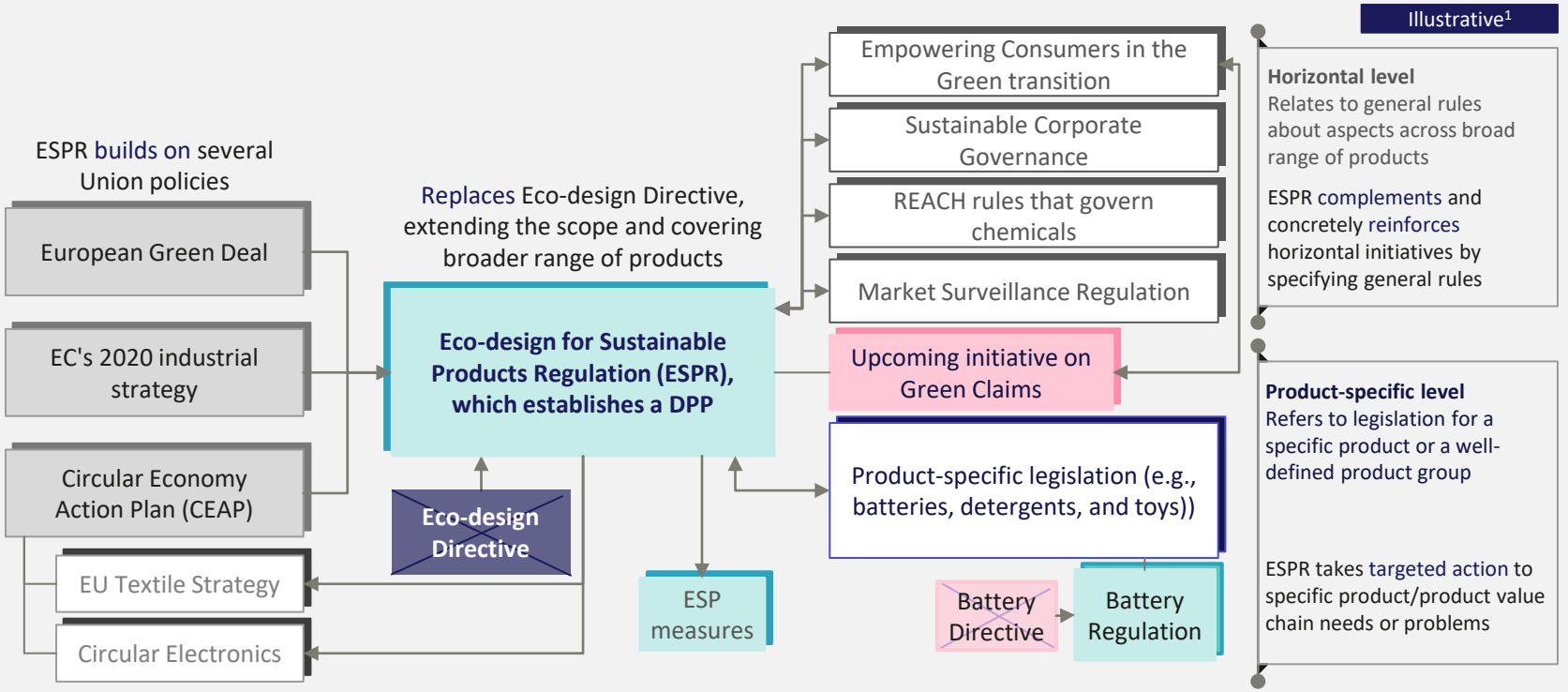
…but DPP draft remains vague with slow timeline

- Final approval of DPP regulation expected in 2023/4 with delegated act for first product group to come into force 2026/7[2]; a first product passport has been drafted for batteries[3]
- DPP regulation expected to be drafted for majority of industries by 2030 with exception of 7 product categories (e.g., food)[4]
- DPP regulation expected to have a global impact due to global nature of supply chains and as other regulators might follow the EU example
- Final DPP format and content remain unclear at this point

Scope: EU regulation to also include **eco-design & performance requirements** → DPP as tool to facilitate those and thus core focus of this publication

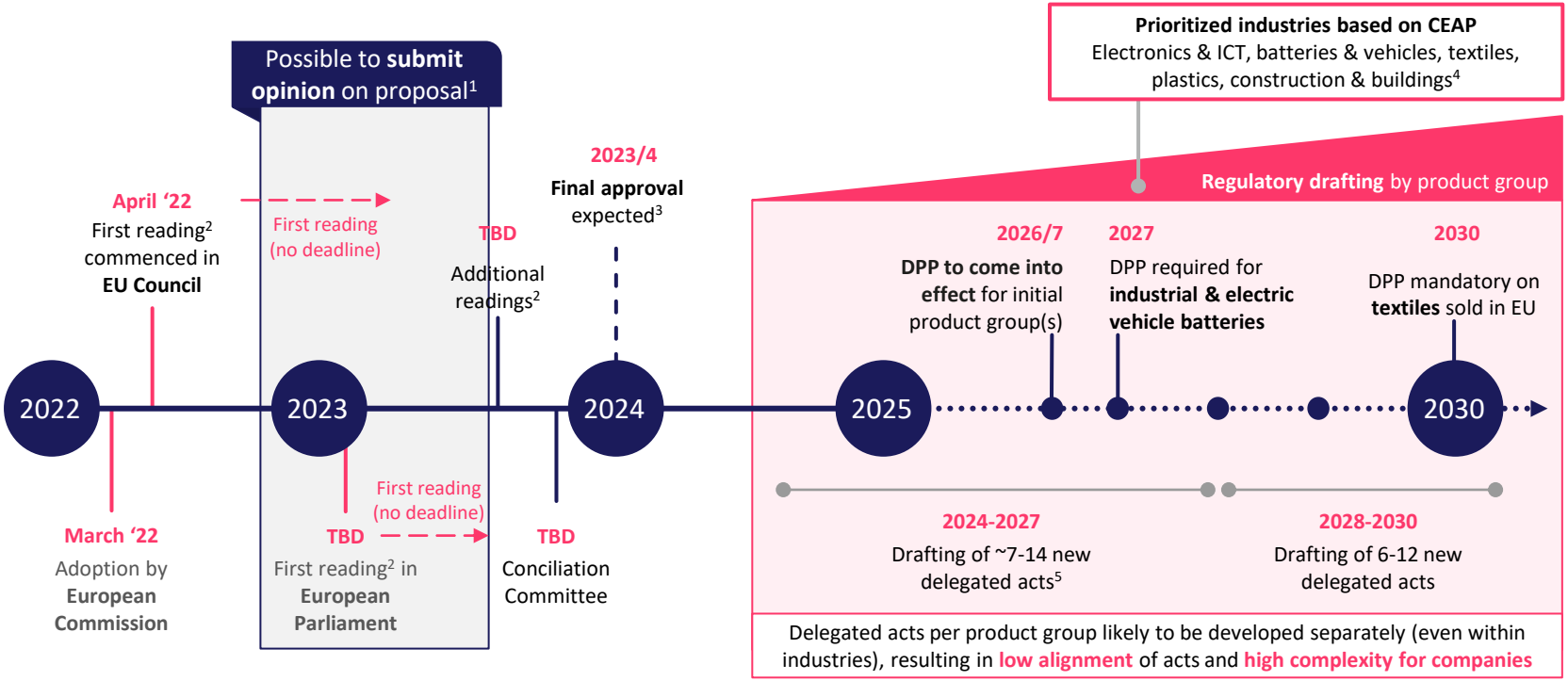
1. Based on analysis of 25 DPP examples 2. Most likely those highlighted in CEAP incl. electronics and ICT, batteries and vehicles, textiles, plastics, construction and buildings; despite mentioned in CEAP, packaging is not expected to have a separate delegated act 3. The battery passport will come into effect for industrial and electrical vehicle batteries first from early 2027 4. Full list of categories excluded from DPP regulation: Food, feed, medicinal products, veterinary medicinal products, living plants, animals and micro-organisms, products of human origin, products of plants and animals relating directly to their future reproduction; Source: Company/initiative websites; European Commission, ESPR proposal, BCG analysis

Eco-design for Sustainable Products Regulation (ESPR) establishes EU DPP and is key link between policies



1. The chart illustrates relationships between key policies and initiatives but is not exhaustive
Source: European Commission, European Union, ESPR proposal, BCG analysis

European Commission plans first product group regulation to come into force in 2026/7



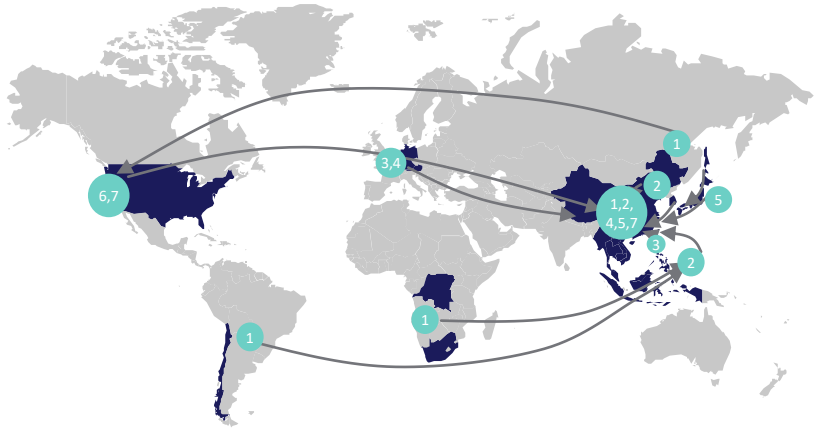
1. To rapporteurs, members of committee, any MEP or during public hearings 2. EC proposals can earliest be adopted after first reading by both EU Council and European Parliament 3. EC aims at reaching final approval latest before the 2024 European Parliament Elections 4. Packaging will not be regulated by a separate delegated act but covered as component of products across product groups 5. Initial ambition by EC were covering 3-4 delegated acts per year, but based on interview with the EC 2-3 acts seem more realistic; Source: European Commission, ESPR proposal , CEAP, BCG analysis

DPP has global impact beyond EU borders

Typical supply chain for consumer electronics

Illustrative

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



EU DPP with global impact as regulation will be applied to imported products, its components and intermediary products the same way and at the same time as to domestic ones

EU DPP may inspire additional regulation globally thus potentially applying to even broader scope of companies and value chains in the future

1. One country is specified as an example for each material/component, but the map shows more regions of materials/components origin

Many elements in EU DPP still open with different levels of maturity; similar picture for battery regulation

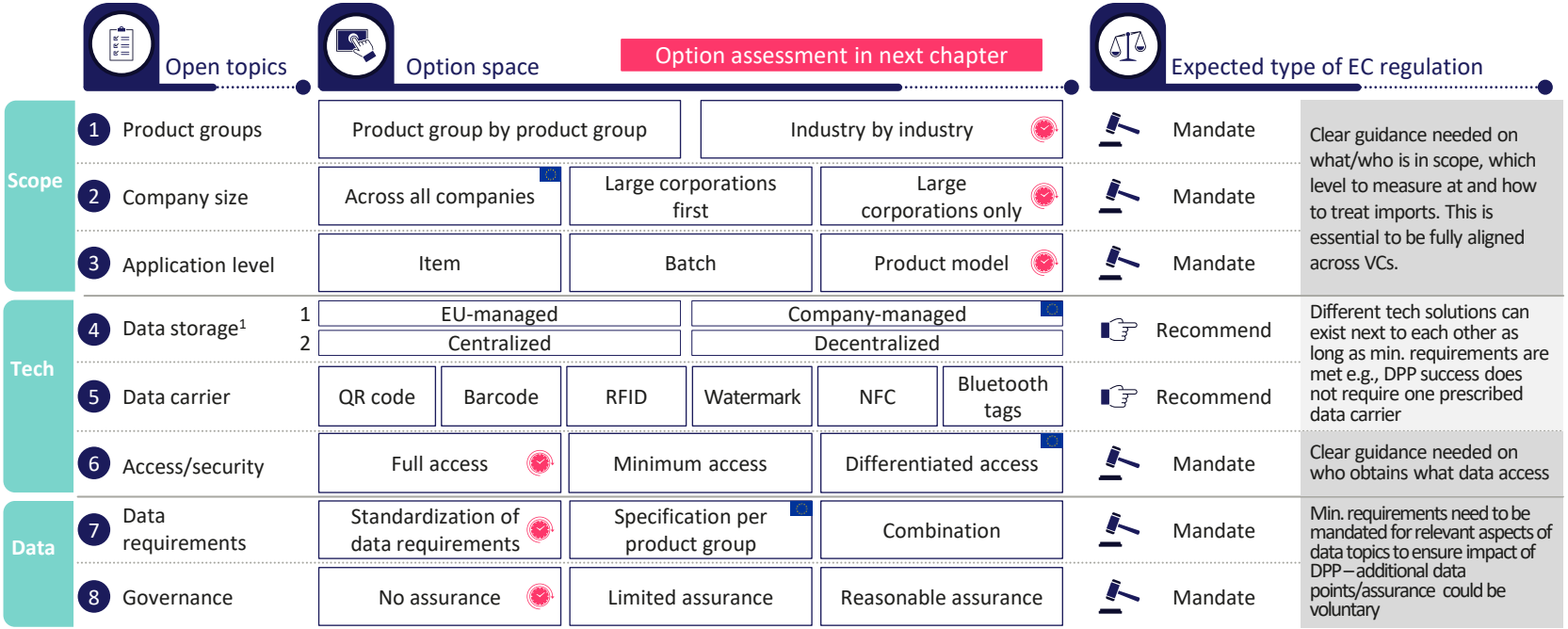
	Open topics	Key questions	Status of EU DPP regulation	Battery passport regulation (Battery regulation drafted as first product group act; likely to **inform further regulatory development**)
Scope	1 Product groups	Which industries/product groups should be prioritized and why?	• Some industries prioritized/excluded • Prioritization of product groups and remaining industries unclear	• All types of batteries on the market • Categories are revised and updated to reflect developments in market and use
	2 Company size	Should requirements differ by company size?	• Implementation across company sizes • Differentiation & SME support unclear	• Same requirements for all companies
	3 Application level	What level should DPPs be applied at?	• DPP level defined per product group • Preferred application level unclear	• Every battery shall have a battery passport
Tech	4 Data storage	How and by whom should data be stored and managed?	• DPP storage to be company-managed • Requirements for DPP storage unclear	• Rules for accessing, sharing, managing, etc. of data are yet to be established
	5 Data carrier	What data carrier(s) should be used?	• List of options tbd by product group • Standardization and format unclear	• QR code and/or physical smart label • Labels on packaging for too small devices
	6 Access/security	How should access to the data be allowed?	• Differentiated access per VC actor • Details on data access levels unclear	• Consumers, independent operators, etc. • Further details should be developed
Data	7 Data requirements	What information/data will be included in the DPP at what degree of standardization?	• Requirements to be specified by product group in delegated act • Clear definitions of data points missing and standardization unclear	• Carbon footprint, minimal recycled content of scarce raw materials, etc. • Details about information, KPIs and measurements developed in next 2 years
	8 Governance	Who collects and updates the data? How is the DPP data verified?	• Economic operator placing product on EU mkt.to collect & update DPP data • Data verification remains unclear	• Econ. operator placing battery on market • No information on verification or validation

Degree of maturity in EU DPP regulation[3]

Degree of maturity in EU battery regulation

1. Product model 2. Bluetooth 3. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

A range of options for EC to consider when mandating or recommending solutions in upcoming policy



Faster implementation is important due to the urgency of increasing circularity and the positive cost impact for companies– however a balance with other aspects is key (see next chapter)

Faster implementation[2] | Current EC proposal

1. Refers to data storage beyond a EU-managed DPP registry that will be established for compliance purposes; no judgement on speed of implementation of remaining data storage as company-managed may take longer than EU-managed, whereas early movers likely to be quicker than EU 2. Regulatory and/or corporate implementation
Source: European Commission, ESPR proposal, BCG analysis

EU DPP analysis

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Scope

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	Open topics	Key questions
Scope	1 Product groups	Which industries/product groups should be prioritized and why?
	2 Company size	Should requirements differ by company size?
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Degree of maturity in EU DPP regulation
- Fully grey: Fully undefined
- Fully blue: Fully defined

Product groups | DPPs implemented per product group with unclear approach

EC status

Priority industries defined; product group prioritization unclear

- DPP implementation per product group[1] (EC definition remains unclear, e.g., laptops vs. handhelds)
- Prioritized industries but no indication on how EC approaches DPP implementation within industries

Battery passport regulation

Categories and their prioritization are decided

- Encompasses all batteries and accumulators
- Larger batteries (e.g., industrial and electric vehicle ones) will have DPP, but implementation for smaller ones unclear
- Revisions and updates to follow

Timeline expectations
Product group prioritization until end of 2023; first regulation for products expected in 2026/7

Expected type of regulation
Mandate for clear guidance on what is in scope and full value chain alignment

Implications for other products

- The EC will implement delegated acts per product group, rather than industry level, similar to battery draft,
- Multi-year drafting process likely per product group

Open questions

- What product groups exist? How do industries break down into them?
- Which product groups are prioritized and why?
- How long will it take to develop and implement delegated acts per product group?

Options

No EC proposal yet

Product by product group
Product groups prioritized based on level of their environmental impact, regardless of the industry

Industry by industry
Product groups within a prioritized industry (e.g., electronics) covered first, followed by product groups in another industry

Key actors

- **European Commission** to prioritize product groups
- **NGOs** (e.g., WBCSD) to provide industry input and environmental implications

Standardization

- Existing international approaches and EC regulations related to product standards to be taken in the account for harmonization

Degree of maturity in EU DPP regulation[2]
Degree of maturity in EU battery reg.

Implications for companies

- **Varying DPP requirements** for companies covering multiple product groups
- High level of **uncertainty** about **prioritization**, implementation **timeline and definition of product groups**
- Companies in **prioritized industries** can **start preparations** despite uncertainties
- **Corporate involvement in regulatory discussions** can help shape EC mandate in line with preferences

1. The EC defines product groups as "a set of products that serve similar purposes and are similar in terms of use, or have similar functional properties, and are similar in terms of consumer perception"; how this definition will translate into the final breakdown of industries into product groups currently remains unclear 2. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

First prioritized industries are outlined

Prioritized industries[1]

- Electronics & ICT
- Batteries & vehicles
- Textiles
- Plastics
- Furniture
- Construction and buildings
- Chemicals[2]

Unmentioned industries

A number of industries (e.g., cosmetics) are **not mentioned** in the EC documents but nevertheless likely to be included in the DPP at a later stage

Packaging will not be regulated by a separate delegated act, but will be covered by regulation as component of a product placed on the market[3]

Excluded from DPP regulation

- Food and feed
- Medicinal products and veterinary medicinal products
- Living plants
- Animals and micro-organisms
- Products of human origin
- Products of plants and animals relating directly to their future reproduction

...but product group prioritization remains undefined

- Breakdown of industries into product groups remains unclear
- Draft framework for prioritizing product groups to be published by EC early 2023
- 123 Prioritization of product groups to be finalized by EC by end of 2023
- Delegated acts per product group likely to be developed separately (even within industries) resulting in low alignment and high complexity for companies

1. Based on industries prioritized in Circular Economy Action Plan 2. EC's impact assessment accompanying the ESPR proposal
3. Gwenole Cozigou, Director at the European Commission's internal market department
Source: European Commission, ESPR proposal

Going industry by industry allows for higher alignment and speed of regulatory development

No EC proposal yet

	Product by product group	Industry by industry
Description	Product groups prioritized based on level of their environmental impact, regardless of the industry	Product groups within a prioritized industry (e.g., electronics) covered first, followed by product groups in other industries
Advantages/Disadvantages		
Speed of regulatory development	⊖ Low speed, given the complexity of the regulatory drafting and differences between product groups, may take multiple years per group, especially if delegated acts are not aligned	⊕ Higher speed since delegated acts for product groups within one industry will overlap and could be 're-used' leading to higher alignment and predictability
Impact on companies	⊖ Companies active in several similar or different value chains cannot benefit from synergies of the implementation across product groups; potentially more costly due to larger timespans and low alignment among delegated acts	⊕ Better synergies for companies active in several product groups of one industry; no significant time delays between delegated acts; less costly
Environmental impact	⊕ High when environmental impact is the main driver for prioritization; total impact may be offset by slower implementation	÷ Potentially lower but prioritizing industries by environmental impact and speed of implementation with potential positive impact on environment
Key considerations	**High environmental impact, but low regulatory speed and alignment leading to limited synergies for companies**	**Faster implementation and higher alignment leads to corporate synergies at potential risk of lower impact**

⊖ Disadvantage ⊕ Advantage ÷ Combination

Source: BCG analysis

Company size | EC plans to implement DPP regulation across all companies

EC status

Limited company size angle on DPP implementation

- No specific details about whether EC plans different degrees of implementation depending on company size
- High-level measures to reduce regulatory burden for SMEs are outlined

Battery passport regulation

Regulation applies to all companies regardless of size

- Requirements are the same for all companies
- Assistance provided to SMEs where necessary to reduce regulatory burden

Timeline expectations

All companies of one product group expected to be covered by DPP regulation at the same time

Expected type of regulation

Mandate for clear guidance on who is in scope to align expectations

Implications for other products

- SMEs expected to be affected by regulation at the same time as large corporations

Open questions

- Will company size play a role in the DPP implementation?
- Should requirements differ by company size?
- How will implementation be facilitated for large corp. vs. SMEs?

Options

EC proposal

Implementation across **all companies**

Implementation for **large corporations first**, SMEs follow later

Implementation for **large corporations only**, SMEs excluded

Key actors

- **European Commission** to define scope for companies
- **Companies and industry associations** can advise on practicality and feasibility of DPP, specifically for SMEs

Standardization

- DPP regulation likely to be applicable across all companies regardless of size due to no further specification by EC and stance taken in battery regulation

Degree of maturity in EU DPP regulation[1]

Degree of maturity in EU battery reg.

Implications for companies

- Implementation across all companies raises question about **how the value chain will cover costs** and **who will pay these**
- Particularly for **SMEs, early preparation** for DPP implementation is important
- Leveraging the influence of **industry associations for advising the EC on feasibility** is key for SMEs
- **Corporate involvement in regulatory discussion** can shape how and when SMEs are covered in mandate

1. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined

Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

Implementing DPP across all companies enables transparency across the full value chain

EC proposal

	Implementation across all companies	Implementation for large corporations first	Implementation for large corporations only
Description	DPP regulation will apply to all companies regardless of size	DPP regulation will apply to large companies first, SMEs follow later	DPP regulation will apply to large companies only, SMEs excluded
Advantages/Disadvantages			
Speed of regulatory development	÷ Medium due to effort required from EC if support for SMEs specified; all companies covered by DPP earlier	÷ Medium as drafting is quicker for large corp. only, but additional regulation likely required for SMEs later on	+ Lower complexity for EC as fewer more homogeneous stakeholders involved, but complexity shifted to large corps
Impact on companies – Large corp.	+ Higher data availability and reporting efficiency as data can be obtained from all VC actors	÷ High initial investments for setting up DPP infrastructure but opportunity to shape the level playing field first	− Higher complexity and costs for large corp. due to need for additional resources to collect/estimate data
Impact on companies – SMEs	− Highly complex and costly as procuring resources and developing new capabilities is required	÷ Short-term avoidance of costs and learnings from large corp. but long-term investments needed	÷ No regulatory pressure but large corp. could make data provision a condition for doing business
Environmental impact[1]	+ High as full transparency and traceability enables circularity and cross-stakeholder collaboration	÷ Delayed environmental impact as DPP only covers larger VC actors at first; might slow down the process of transitioning to a circular economy	÷ High due to quicker implementation but low if SMEs are key to full DPP implementation across VC
Transparency and traceability	+ Higher transparency and traceability can be achieved across VC	÷ Partial transparency and traceability at first, increases at later stage	− Limited transparency and traceability as SME data is not collected fully
Key considerations	**Full transparency and data availability at high complexity for SMEs, thus likely requiring additional support**	**Fast implementation traded off for the opportunity to bring full transparency and impact of the DPP to the VC immediately**	**Fast implementation and unclear environmental impact at the cost of pressure in the VC, and lower transparency and traceability**

− Disadvantage + Advantage ÷ Combination

1. Will depend on stakeholder role and impact in respective VC
Source: BCG analysis

Application level | EC does not specify one preferred application level for DPPs

EC status

EC plans to apply DPP at item, batch or model level

- EC does not specify which level is preferable across product groups, but will decide for each group separately
- This will depend on the complexity of the VC, the size, nature or impacts of the respective products

Battery passport regulation

Regulation stipulates unique passport per battery

- Each individual battery[1] placed on the market or put into service shall have a unique battery passport
- However, certain data points (e.g., carbon footprint, % recovered materials) can be reported on batch level

Timeline expectations
No specification on timing of decision-making, likely in line with acts per product group

Expected type of regulation
Mandate for clear guidance on DPP level required for VC alignment

Implications for other products

- Item-level application of DPP as outlined in battery regulation not necessarily realistic for all other products (e.g., chemicals)

Open questions

- Which level will the DPP be applied at?
- What needs to be considered when implementing the decision for a certain DPP level?

Options

No EC proposal yet

Item
Each individual piece with unique identifier has a unique DPP

Batch
Items grouped together identified by unique batch number share DPP

Product model
Items sharing e.g., same GTIN[2] share DPP

Key actors

- **European Commission** to define application level
- **Corporates and industry associations** can give guidance on practicality and feasibility of options

Standardization

- DPP level expected to be specified for each product group separately
- Degree of standardization possible across product groups within one industry

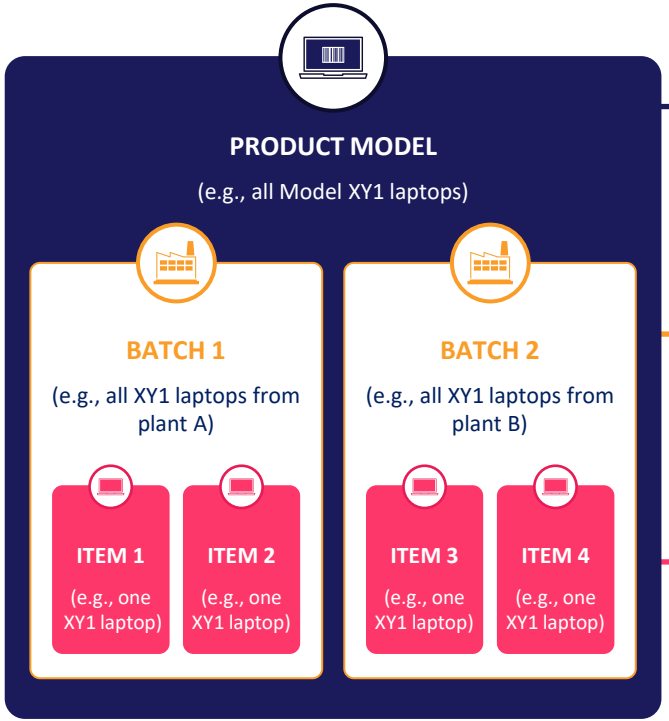
Degree of maturity in EU DPP regulation[3]
Degree of maturity in EU battery reg.

Implications for companies

- **Companies might need to prepare for implementing different DPP levels** per product group
- For **initial guidance**, companies could look at the battery passport regulation for an item-level DPP as this could serve as a **blueprint for future EC delegated acts**
- **Companies and industry associations** could **advise the EC on the practicality and feasibility** of DPP levels for industries/product groups

1. Industrial, EV & light means of transport batteries prioritized 2. Stands for Global Trade Item Number which can be used to identify types of products 3. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

Decision on application level will impact the way DPPs work across VCs



Product model

- One common identifier for all items of same model (e.g., each model XY1 laptop carries same ID number)
- Data carrier of each item links to same product info (e.g., avg. microplastic release)

Batch

- Common identifier for all items of one batch (e.g., each model XY1 laptop from plant A carries same ID)
- Data carriers of different batches link to different batch info

Item

- Unique identifier for each individual item (e.g., each XY1 laptop)
- Data carriers of different items link to different item information (e.g., repair history)

Key considerations

- The level at which the DPP will be applied has **significant implications** on the number of DPPs generated, the **granularity of data** made available in the DPP and the potential for **downstream traceability** of products
- The application level can significantly increase the **complexity** of DPP implementation for companies

DPPs can be applied at the level of an item, batch or product model

EC plans to define application level per product group[1]

	Item level	Batch level	Product model level
Description	DPP applies at item level An item can be an individual piece that has a unique identifier	DPP applies at batch level A batch includes a group of items that share a unique batch number	DPP applies at product model level Product model can be items that have the same GTIN
Advantages/Disadvantages			
Speed of regulatory development	⊖ Slow due to high complexity and need to implement DPP for each individual item across industries/product groups	÷ Moderate speed as batch likely easier to define and implement due to prevalent practices	⊕ Higher speed as DPPs per model can be created and defined based on existing standards (e.g., GTIN)
Impact on companies	⊖ High complexity and costs as unique identifiers need to be created per item and EoL operators would have to scan each individual item	÷ Moderate complexity and costs as less DPPs need to be created and batch documentation widely exists	⊕ Greater synergies as one DPP created for all items of one model which lowers complexity and costs
Environmental impact	⊕ High as detailed data is available that creates higher transparency on material value and potential circularity of products (e.g., item repair history)	÷ Limited if environmental impact of products occurs downstream, but high if impact occurs upstream, due to transparency and data availability	⊖ Low, as impact can only be unlocked if largest env. impact comes from design stages incl. material sourcing, as limited tracking possible beyond that
Transparency and traceability	⊕ High as data is specific and directly linked to each individual item; technically each item could be tracked individually but downstream traceability limited in EoL processes[1]	÷ Medium as data is aggregated per batch and thus less specific; tracing possible as long as batch is not taken apart (e.g., during upstream VC stages but not during use/EoL)	⊖ Low as data reported on model level is likely less accurate and no traceability possible, since models are typically produced over long time spans and could only be traced in batches
Key considerations	**Offers high level of transparency at lower speed of regulatory development and high complexity for corporates**	**Adds complexity at medium environmental value and transparency**	**Unlocks speed and synergies at cost of transparency, traceability and impact**

⊖ Disadvantage ⊕ Advantage ÷ Combination

1. Industry-wide standardization could ensure consistent DPP implementation, reduce complexity and increase user-friendliness, but could limit environmental value if harmonized at batch/model level 2. EoL operators (e.g., disassemblers, recyclers) process large amounts of waste bulk- or weight-based, so scanning each individual item does not seem realistic in the short-run due to need for significant investments and process redesigns
Source: BCG analysis

Tech

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	Open topics	Key questions
Scope	1 Product groups	Which industries/product groups should be prioritized and why?
	2 Company size	Should requirements differ by company size?
	3 Application level	What level should DPPs be applied at?
Tech	4 Data storage	How and by whom should data be stored?
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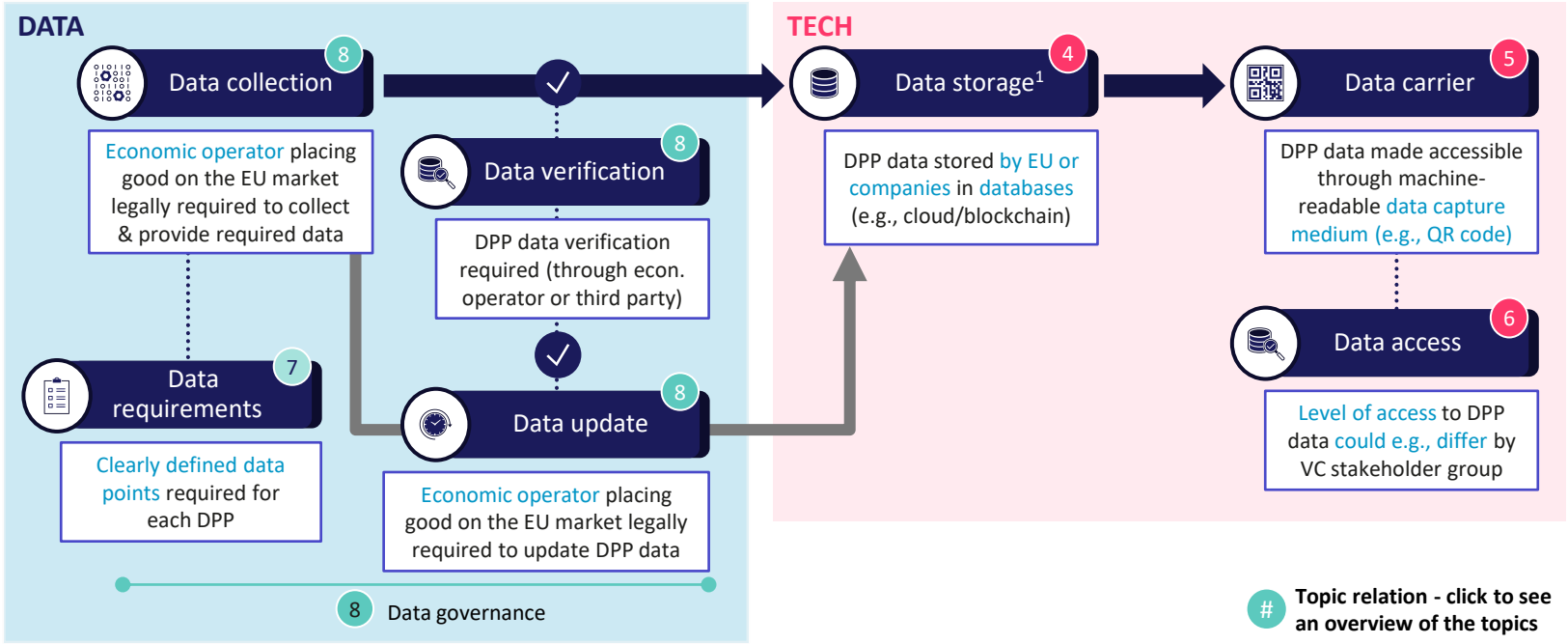
Degree of maturity in EU DPP regulation
- Fully grey: Fully undefined
- Fully blue: Fully defined

DPP data needs to be collected, stored and accessed by actors along the value chain



1. Data storage refers to DPP data required beyond the information provided in the EU-managed registry for compliance purposes. Thus, while unique IDs per product will be stored in the registry, additional product information incl. emissions and the like needs to be stored separately.
Source: European Commission, ESPR proposal, BCG analysis

Data storage | EC proposes company-managed solution for DPP data storage

EC status

EC plans to set up a registry, but leave storage to companies

- EC plans to set up and maintain a standardized DPP registry to store a list of unique identifiers at the minimum[1]
- Remaining DPP data to be stored by companies with no specification of preferred data storage yet

Battery passport regulation

Battery DPP info will be stored in an EU-owned system

- EC plans to set up the electronic exchange system for rechargeable industrial and electric vehicle batteries
- Future acts will establish system's architecture & "rules for accessing, sharing, managing, exploring, publishing"[2]

Timeline expectations
Design and testing of the registry throughout 2025 and implementation in 2026

Expected type of regulation
Recommendation incl. a list of storage option(s) with defined min. requirements

Implications for other products

- It is yet unclear if the electronic exchange system will be standardized across product groups. It only applies to specific batteries within the battery product group

Open questions

1. Who will set up, own and manage the platform for DPP data? How will responsibilities be divided?
2. What technologies shall be used for data storage?

Options[3]

		EC proposal
1	**EU-managed platform** for DPP data	**Company-managed solutions** for DPP data
2	**Centralized** storage (e.g., on cloud or on-premise)	**Decentralized** storage on multiple computers (e.g., blockchain)

No EC proposal yet

Key actors

- **European Union** to decide DPP systems and implementation
- **Specialized IT service providers**
- **Corporates & NGOs (e.g., WBCSD)** can provide inputs

Standardization

- EC aims to have a standardized registry for all products, including at least a list of unique identifiers
- Beyond the registry, the EC is planning limited standardization with leaving data storage to companies

Degree of maturity in EU DPP regulation[4]
Degree of maturity in EU battery reg.

Implications for companies

- **High uncertainty** regarding DPP systems and associated cost
- **Potential issues with data security and safety** in relation to IP protection, confidentiality, etc.
- **Investments** may be needed to set up and **integrate DPP systems with existing systems** (highly complicated if blockchain)
- Given EC is expected to recommend guidelines not to mandate a solution, **companies can start preparing now**

1. Final format of EU registry yet to be specified thus currently unclear whether data beyond unique IDs will be collected in this registry. 2. EC, Battery Regulation Proposal 2. Two sets of possible options are analyzed. Set 1 related to responsibility of platform set-up, ownership and mgmt., set 2 related to options for storage technologies 3. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined; Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

Company-managed solutions offer higher flexibility but require clear EC guidance to ensure interoperability

EC proposal

	EU-managed platform	Company-managed solutions
Description	EU sets up, owns and manages a unified platform for storing all DPP data, which companies provide and access data through	Companies determine themselves how to store and manage DPP data, following EC's overarching guidance and principles
Advantages/Disadvantages[1]		
Cost for… …the EU	⊖ Would require a one-off administrative cost by the EU for setting it up and continuous investments in maintenance	⊕ No cost for the EU, but (financial) might will be needed, especially for SMEs
Cost for… …companies	⊘ No cost for the setup, but investment will be needed for aligning and integrating existing IT infrastructure with the EU platform	⊖ Companies will have to invest; cost will vary depending on the chosen solution, collaboration with other stake-holders to create a system or usage of third-party platforms
Ease of implementation	⊕ Relatively easy to implement across product groups and VCs due to standardized platform across product groups, but companies will need to change their IT setup to ensure interoperability with EU platform	⊖ Although potential to leverage existing IT systems, there is high risk of creating multiple different solutions within value chains and product groups leading to significant complexity (for e.g., EoL operators needing to access multiple platforms)
Standardization potential	⊘ Easy to standardize across different product groups, industries and value chains but potential limits to adopting solution to product group, VC or industry needs	⊖ Difficult to standardize, as companies can choose different options; standardization only possible through voluntary collaboration across the VCs, product groups and industries
VC accessibility	⊕ Collecting all DPP data in one designated EU platform allows easy access for all VC stakeholders (once sufficient IT infrastructure is in place)	⊖ Large number of potential solutions requires suppliers and EoL operators to access multiple portals in order to utilize and provide DPP data, significantly increasing complexity
Key considerations	**A unified platform may take time to create and result in an inefficient system if not co-designed with companies to enable interoperability and automation**	**Adopting company-managed solutions requires clear EC guidance (e.g., based on a data exchange protocol[2]) to avoid development of multiple competing, costly and incompatible solutions**

⊖ Disadvantage ⊕ Advantage ⊘ Combination

1. Speed of regulatory development and environmental impact not analyzed here, as they are likely to differ only slightly between both options
2. For an example of a data exchange protocol please refer to the WBCSD-hosted Partnership for Carbon Transparency (PACT)
Source: BCG analysis

Regardless of who manages the solution, cloud and blockchain could be used for DPP data storage

Centralized system
all data is stored on **servers in-house or on cloud**

On-premises	On cloud
• More costly to maintain but more control over data • Data security at risk	• Cost savings ~30-50% • Data security improved due to frequent tech updates • Data loss potential

Given the high energy consumption of storing large data sets, **green clouds and data centers** should be considered to increase the sustainability

Given the similarity between cloud and on-premises as well as shift towards storage on cloud by enterprises, only cloud compared with blockchain in the following

Decentralized system
the data is stored on **multiple computers** (or nodes) connected through a decentralized storage network

Blockchain

Blockchain is an energy-intensive technology and energy consumption could increase exponentially if used for many products across multiple VCs, potentially impacting environment adversely in sum[1]

Cloud and Blockchain are not exactly mutually exclusive options and could be used in combination when the clear goals of the solutions are defined.
The crucial difference is in the availability of Blockchain protocols, i.e., rules that define interactions, maintain security and cannot be overwritten in the network.

1. Additional studies are required to assess the environmental impact of the blockchain technology
Source: BCG analysis

Cloud offers significant benefits due to ease of implementation and low cost

No EC proposal yet

	Cloud solutions[1]	Blockchain
Description	Centralized data storage on remote storage systems	Decentralized data storage across products' life cycle with consistent record shared in real time across all participants
Advantages/Disadvantages[2]		
Environmental impact	⊕ Currently lower energy consumption per transaction than blockchain, but overall impact depends on implementation	⊖ Currently higher energy consumption per transaction, but full impact depends on implementation
Transparency and traceability	⊖ More difficult to ensure high levels of transparency and traceability; governance required	⊕ Guaranteed transparency and traceability as data cannot be changed once added; real-time visibility
Cost	⊕ Lower cost as solutions are widely adopted and utilized by companies/regulators already	⊖ High implementation costs and expensive tracking at an individual product level (e.g., portable charger)
Ease & speed of implementation	⊕ Easier and faster as already widely used; requires some alignment between different actors to ensure interoperability; could easily be standardized across industries; but limited automation capabilities	⊖ Not used by companies at scale; integration with existing tech is unclear; all actors in one VC would need to agree to use one blockchain; different tech maturity across VC slows down adoption and increases potential resistance; but possibility to automate processes and eliminate errors
Data security	⊖ Higher risk of a data breach and network failure	⊕ Data cannot be altered; low chance of network failure
Permissioned access	⊕ Possible to create different permission levels for different stakeholders	⊕ Ability to maintain privacy where needed and control by whom, when and how data can be accessed
Key considerations	**Lower price and wider adoption of cloud solutions can speed up DPP implementation, however, requires governance of data security and transparency to mitigate risks**	**Although blockchain offers transparency and data security benefits, cost and complexity of implementation likely to outweigh them, making it a less realistic solution for DPPs**

⊖ Disadvantage ⊕ Advantage ÷ Combination

1. Similar advantages apply for on-premise data storage (see page 27)
2. Speed of regulatory development not analyzed here, as it is likely to differ only slightly between both options

Source: The Energy Consumption of Blockchain Technology: Beyond Myth (2020), Sedlmeir, Buhl, Fridgen, et al.; BCG analysis

Data carrier | EC plans to specify data carrier(s) per product group

EC status

General guidance on data carrier

- List of data carriers will be specified per product group
- Will be released in accordance with international standards
- Shall comply with the ISO/IEC standard 15459:2015[1]

Battery passport regulation

Battery regulation suggests use of QR codes

- The QR code will be printed or engraved on all batteries, providing access to a battery's passport
- It should respect the guidelines of ISO IEC Standard 18004[2] and Directive (EU) 2019/8823[3]

Timeline expectations

No specified timeline, likely in accordance with delegated acts per product group

Expected type of regulation

Recommendation incl. list of carrier options with defined min. requirements

Implications for other products

- Same identifier(s) could similarly be adopted for other product groups
- Exceptions will be in place for very small products

Open questions

- What data carrier(s) should be used?
- Will it be the same for all product groups?
- How will smaller products be identified?

Options

No EC proposal yet

QR code | Barcode | RFID | Watermark | NFC | Bluetooth tag

Key actors

- **European Union** to propose data carrier(s)
- **Corporates & NGOs (e.g., WBCSD)** can provide inputs
- **ISO** to provide guidance on standardization

Standardization

- EC will likely aim for some degree of standardization to limit number of accepted data carriers

Degree of maturity in EU DPP regulation[4]

Degree of maturity in EU battery reg.

Implications for companies

- Implementation is currently unclear as **highly dependent on list of carriers** per product group
- Lack of clarity on how new carriers will be **combined with/differentiated from current labels**
- **Potential to impact EC recommendation** by setting industry standards or engaging in regulatory discussions

NFC tags and Bluetooth tags have not been mentioned in the EC regulation but show a lot of potential in a number of industries in the future

1. Standards on Information technology, Automatic identification and data capture techniques, Unique identification 2. Defines the requirements for a QR Code 3. Accessibility requirements for products and services 4. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined; Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

QR code offers benefits but is not the single best option

Options mentioned by the EC

No EC proposal yet	QR code	Barcode	RFID	Digital watermark
Description	A machine-readable matrix code that links to information	A machine-readable code in the form of numbers and a pattern of parallel lines	A wireless communication system comprised of tags and readers	Imperceptible codes, the size of a postage stamp
Advantages/Disadvantages				
Cost	⊕ Slightly higher cost than of a barcode, but among most affordable and effective options on the market	⊕ Most affordable option	⊖ The typical tag is not expensive but has to be implemented together with scanners/readers, which increases the cost	÷ Cost may vary, shows a lot of potential for low value products
Ease & speed of implementation	⊕ Easy and quick to implement, already used by many players	⊕ Easy and quick to implement, already present on most products	⊖ Harder and slower to implement across the VC due to the reader tech, mostly used in warehouses	÷ Moderately easy & quick to implement, less widely used; useful for sorting of low value items
Data storage feature	⊕ Mainly used as trigger to a webpage but able to provide info on condition of the product	⊖ Able to tell only a product's number	⊕ Tags can store up to 128 kilobytes at increasing prices the more data is stored – enough to store basic DPP data	⊕ Able to carry wide range of attributes (e.g., manufacturer, SKU, type of plastics used & composition for multilayer objects)
Durability	⊕ Can sustain up to 30% of structural damage and still continue to function	⊖ Highly depends on the label material and print quality	⊕ Under normal conditions, most tags can function for 20 years or more	÷ Depends on the surface it is applied to, but details remain unclear
User-friendliness	⊕ Can be easily scanned by smartphones. Widely used by customers already	⊕ Can be easily scanned by smartphones	⊖ Only a couple of mobile phones can scan the tag, special scanner is needed	÷ A high-resolution camera is needed during sorting. Unclear how consumers can access data
Key considerations	**Currently seems to be the most effective option on the market**	**Less durable and lower data storage than other options but widely used across many VCs**	**Can bring a lot of value for the whole VC but ease of access needs to be solved**	**Can store much data, but durability and cost remains unclear**

⊖ Disadvantage ⊕ Advantage ÷ Combination

Source: BCG analysis

Although not mentioned by the EC, NFC and Bluetooth tags could have potential

Additional options to consider, not mentioned by the EC

No EC proposal yet

	NFC	Bluetooth tags
Description	A sticker with small microchips and antenna that can be read by mobile devices	'Microcomputers' the size of a postage stamp that power themselves by harvesting radio waves from nearby device
Advantages/Disadvantages		
Cost	⊖ Rather expensive at about twice the price of an RFID tag, but does not require extra reading equipment	⊖ The most expensive solution among all presented data carriers, but might get more affordable in the future
Ease & speed of implementation	⊕ Easy and quick to implement given their small size on a range of different products	⊖ Harder and slower to implement due to their novelty, at the moment only works paired with cloud solutions
Data storage feature	⊕ Every tag has a memory chip. Amount of info stored depends on the tag type, ranges from 48 bytes to 1 megabyte. Most commonly used as a trigger to a website	⊖ Do not store data. When there is no energy nearby, they will not transmit data. Highly dependent on the data transmission to the cloud
Durability	⊕ Has a lifespan of over 10 years	÷ Some tags last 4 years. Battery-free options may last longer but still unclear
User-friendliness	⊕ Can be read by most smartphones. A user needs to bring in their phone within the range of 0.1 m and will be presented with data	⊕ Captures data within 10 m range, can be read via any existing Bluetooth devices
Key considerations	**Potentially easier to use than other tag but limited to small distances; so far has been widely adopted for payments**	**Provides value for all stakeholders across value chain. Works best when combined with AI in the cloud and machine learning**

⊖ Disadvantage ⊕ Advantage ÷ Combination

Source: BCG analysis

Data access | Will differ by stakeholder group with details yet to be specified

EC status

Data access to be differentiated by VC stakeholder group

- Different access levels per stakeholder group (e.g., customers, manufacturers, governments, etc.)
- Still unclear which group should have access/no access to what data and how privacy is ensured

Battery passport regulation

Differentiated access proposed

- Key data points to be publicly accessible (incl. carbon footprint information, battery lifetime, etc.)
- Additional data points restrictively accessible to accredited economic operators, the EC or authorities

Timeline expectations

Timeline unclear, but likely in line with data requirements by product group act

Expected type of regulation

Mandate for clear guidance on which actor has access to what data

Implications for other products

- Product group properties are likely to be considered when providing access
- Different actors likely to have different levels of access

Open questions

- What stakeholder group should get access to what data?
- How are data security (e.g., IP) and stakeholder/user privacy ensured?

Options

Full access
for all stakeholders

Minimum access
(strictly on a need basis e.g., limited access for end users)

EC proposal

Differentiated access
based on stakeholder needs

Key actors

- **European Union** to draft regulation for data access
- **NGOs & consultancies (e.g., WBCSD)** can provide insights on what data is required by what stakeholder

Standardization

- EC plans to specify access rights at product group level, thus, limited standardization across product groups/industries and potentially VCs

Degree of maturity in EU DPP regulation[1]

Degree of maturity in EU battery reg.

Implications for companies

- Data access levels will have significant **impact on data security, privacy and IP Data transparency** across supply chain and can **optimize how players along the VC collaborate**
- EC plans restricted transparency for customer, thus limited **impact on demand** expected
- **Corporate involvement in regulatory discussions** can shape EC mandate on access level per VC actor

1. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

Differentiated access allows to ensure data and IP protection while ensuring DPP impact

EC proposal

	Full access	Minimum access	Differentiated access
Description	Allows full data access of information stored in DPPs to all stakeholders along the entire VC	Allows restricted access to minimum data needed to exclusively increase circularity (e.g., low/no transparency for users)	Grants differentiated levels of access to each stakeholder group based on their needs and decisions they need to make
Advantages/Disadvantages			
Speed of regulatory development	⊕ Speeds up implementation by requiring less regulation as access level is the same across VC	⊖ Slows down implementation as EC needs to specify data needs and access levels per product group	÷ Moderate speed of implementation due to differentiated access which can likely be standardized across product groups
Impact on companies	⊖ Risks for companies from loss of IP and potential revenue implications through increased transparency if high environmental impact	⊕ Highest degree of IP protection and low revenue implications from limited customer transparency	÷ Allows for IP protection, but potential implications on revenues from market tendencies towards less environmentally impactful products
Environmental impact	⊕ High environmental impact from full transparency across value chain enabling VC collaboration and circularity	⊖ Lower environmental impact, due to missing customer transparency and limited ability to promote circularity across the value chain	÷ High environmental impact by enabling transparency across supply chain with lower degree of VC collaboration possible
Data security/privacy	⊖ Full access could pose risk to security of sensitive data (e.g., IP protection, end user privacy, etc.)	⊕ Allows to protect data by making the minimum required data points available to each stakeholder	⊕ Protects highly sensitive information and associated security risk (e.g., by aggregating data points)
Key considerations	**High environmental impact at risk of data protection and security**	**High levels of data security at the cost of environmental impact**	**Ensures protection of sensitive data while unlocking environmental impact**

⊖ Disadvantage ⊕ Advantage ÷ Combination

Data aggregation currently not mentioned in EC's ESPR proposal but could be relevant to **balance data security, transparency and readability of DPPs** by combining multiple detailed data points into one aggregated data point

Source: BCG analysis

Data needs differ by VC stakeholder and decisions they need to make

BCG analysis based on Metabolic system data maps; not EC view

	STAKEHOLDERS	DPP PURPOSE	DECISIONS MADE (not exhaustive)	DATA NEEDS
Extract raw mat.	Raw mat. producers	Decisions on raw material extraction/production practices required that will impact demand of raw materials but does not lead to specific data needs from other VC actors		
Design	Brands Product designers	Circular design	• Product design (incl. longevity, circularity, recyclability, etc.) • Use of materials, parts & packaging • Choice of suppliers	Env. impact of raw materials, parts & components
Manu-facture	Manufacturers Assemblers	Sustainable production	• Choice of energy source/consumption • Decisions on water usage, emissions & waste management • Factory placement	Info on raw mat., parts & components Manufacturing info
Distri-bute	Importers/Distributors Retailers	Transparency	• Choice of transportation mode • Choice of products • Choice of packaging	Manufacturing info Product info
Use/ Repair	End users/Reusers Repairers	Transparency Material circularity	• Choice of products • Decision to repair/keep/update • Decision (on how) to dispose/whether to resell/recycle	Product info Use & repair
EoL	Collectors Recyclers/Remanuf.	Material circularity	• Decision on (degree of) disassembly • Decision to remanuf. • Degree of recycling vs. landfilling • Up- vs. downcycling	Disassembly Recycling
	Authorities	Transparency	• Actions on non-compliance	Compliance info

Source: Metabolic system data maps, BCG analysis

Data

wbcsd

BCG BOSTON CONSULTING GROUP

	Open topics	Key questions
Scope	1 Product groups	Which industries/product groups should be prioritized and why?
	2 Company size	Should requirements differ by company size?
	3 Application level	What level should DPPs be applied at?
Tech	4 Data storage	How and by whom should data be stored?
	5 Data carrier	What data carrier(s) should be used?
	6 Access/security	How should access to the data be allowed?
Data	7 Data requirements	What information/data will be included in the DPP at what degree of standardization?
	8 Governance	Who provides and updates the data? How is the DPP data verified?

Click to navigate through this document

Degree of maturity in EU DPP regulation
- Fully grey: Fully undefined
- Fully blue: Fully defined

Data requirements | Overarching areas suggested, but details remain undefined

EC status

First data topics suggested without clear definitions

- EC plans to implement different data points per product group[1] in specific delegated acts
- Data topics outlined without specifications on data presentation and definition

Battery passport regulation

Initial topics suggested with specific definitions still lacking

- General areas for data reporting proposed
- No specific guidelines or definitions on what and how to report

Timeline expectations
First regulated products with detailed data requirements expected by 2026/7

Expected type of regulation
Mandate incl. a list of min. required data points with voluntary additions

Implications for other products

- Similar areas likely to be covered for other products
- Specifics and degree of standardization remain unclear

Open questions

- What data will be included in the DPP at what degree of standardization?
- How will the data need to be presented?

Options

EC proposal

Standardization
Data requirements largely the same across product groups

Specification
Data requirements set independently per product group

Combination
Most data requirements standardized with product-specific additions/exemptions

Key actors

- **European Union** to define data requirements and degree of standardization
- **CIRPASS, UNECE[2], CENCENELEC[3], Corporates, NGOs (e.g., WBCSD),** etc. can provide inputs/recommendations

Standardization

- EC plans for low degree of standardization
- Data points to be specified per product group rather than across product groups and industries

Degree of maturity in EU DPP regulation[4]
Degree of maturity in EU battery reg.

Implications for companies

- **Limited ability to foresee & prepare** for data requirements, but EC mandate likely based on existing EU requirements and global standards
- Unclear degree of standardization across products could lead to **high complexity**, especially for companies producing across product groups
- **Uncertainty of required data might** add cost and reporting complexity as decisions made today might need to be revised

1. The EC defines product groups as "a set of products that serve similar purposes and are similar in terms of use, or have similar functional properties, and are similar in terms of consumer perception"; how this definition will translate into the final breakdown of industries into product groups currently remains unclear 3. European Committee for Standardization 4. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates topic is fully defined; Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

EC proposes long list of relevant data topics without providing clear data points or definitions

Proposed data topics[1]

- Durability and reliability
- Ease of repair, maintenance, upgrading, re-use, remanufacturing and refurbishment
- Ease and quality of recycling
- Avoidance of technical solutions detrimental to reuse, upgrading, repair, etc.
- Use of substances
- Consumption of energy, water & other resources
- Use or content of recycled materials
- Weight and volume of the product and its packaging (incl. product-to-packaging ratio)
- Incorporation of used components
- Quantity, characteristics & availability of consumables needed for use & maintenance
- Environmental footprint along entire lifecycle
- Microplastic release
- Emissions to air, water or soil
- Carbon footprint
- Amounts of waste generated incl. packaging waste (and ease of re-use) & hazardous waste
- Conditions for use

Link to battery passport

- Performance & durability parameters (incl. min. avg. duration, exp. lifetime)
- Level of recycling, recycling efficiencies & recovered materials
- Content & location of hazardous substances
- Consumption of (electric) energy
- Information regarding components & materials
- Total carbon footprint & intensity (kg & kg/kWh)
- Collection of waste batteries

- **No clear definitions** of data topics
- **No detailed data points specified** (even in EU battery passport)
- **No ambition to standardize** across product groups
- **Little insights into data requirements** for product groups beyond batteries

For a more detailed overview of data points that may become relevant for the EU DPP, please reach out to a BCG contact listed on page 46

1. A separate list of complementary data points connected to technology/identification has been proposed by the EC (incl. unique product identifier, etc.)
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

A mix of standardization and specification allows for impact and simplified implementation

EC proposal

	Standardization	Specification	Combination
Description	The data points required will largely be the same across all product groups	Different data requirements will be detailed separately for each product group	A list of general data requirements will be standardized across product groups/ industries with additions/exemptions per product group
Advantages/Disadvantages			
Speed of regulatory development	⊕ Speeds up process of drafting and updating regulation, but does not allow for tailored updates	÷ Slows down drafting process, but allows for tailored updates per product group	÷ Slows down drafting process, but allows for tailored updates per product group
Impact on companies	⊕ Allows for preparation and learnings across product groups, allows roll-out across multiple product groups at the same time thus reducing complexity	⊖ Limited ability to prepare and is highly complex, especially for companies operating across product groups, which may lead to inconsistencies within industries/VCs	÷ Allows for preparation, but some complexity remains as companies need to report a number of specific data requirements per product group
Environmental impact	÷ Earlier implementation across large number of product groups, but standardized data points may be of limited relevance for specific products	÷ Impact from tailored reporting on key material topics relevant for each specific product group, at a delay due to prolonged regulatory drafting	⊕ Optimized impact due to early implementation paired with overarching relevance and tailored reporting
Transparency	⊖ Limited transparency at high comparability of data points	÷ High transparency at limited comparability of data points	⊕ High transparency and comparability of key data points
Key considerations	**Process advantages that risk environmental impact & transparency**	**High impact from tailored regulation that complexify implementation**	**Balance between process optimization and environmental impact**

⊖ Disadvantage ⊕ Advantage ÷ Combination

Source: BCG analysis

EC can build definitions on existing global standards

Data point defined[1]	Standard/protocol	Level of definition
GHG emissions	GREENHOUSE GAS PROTOCOL	Corporate/VC/city level
Land-based emissions	SCIENCE BASED TARGETS	Corporate level
% recycled materials	Global Recycled Standard	Corporate level
Water use & contamination Biodiversity	CDP	Corporate level
% material circularity	CTI V3.0 wbcsd	Corporate/business unit/ factory level
Recyclability	RecyClass	Product level (for plastics & packaging only)

Non-exhaustive

What exists

Eco-design requirements for specific product groups, industry-led DPP examples as well as reporting standards (e.g., SBTI, CDP) and guidelines (e.g., EU guidelines on non-financial reporting) incl. **some data point definitions at a corporate level**

What is missing

Definitions for all data points required in DPP or, where corporate-level definitions already exist, **product-level definitions** informed by existing globally acknowledged standards

1. Examples, not recommendations
Source: Company websites, BCG analysis

Data governance | Collection of data defined but verification remains unclear

EC status

Responsibility for data collection outlined, but no data verification considerations in current EC proposal

- Economic operator placing product on EU market to collect and provide DPP data and register DPP in EU registry[1]
- Limited considerations on data verification

Battery passport regulation

Economic operator responsible for data quality

- No information on verification or validation
- Economic operator that places battery on the market ensures that the data included in the battery passport is accurate, complete and up-to-date

Timeline expectations
Unclear timeline, likely in line with delegated acts per product group

Expected type of regulation
Mandate for clear guidance to ensure data quality and availability

Implications for other products

- Data collection and provision likely in line with battery passport thus responsibility of economic operator

Open questions

- How is data verified?
- By whom is data verified (i.e., third-party auditor or not)?

Options

No EC proposal yet

No assurance	Limited assurance	Reasonable assurance
self-regulatory implementation with spot checks	for specific DPP data points	for all DPP data

Key actors

- **European Union** to provide guidance on data verification
- **Specialized consultancies & auditors** can provide insights on what level/cadence of data verification is realistic

Standardization

- High potential for standardization across product groups as validation of data quality is needed across product groups, industries and value chains

Degree of maturity in EU DPP regulation[2]
Degree of maturity in EU battery reg.

Implications for companies

- In case of assurance companies likely to face **higher costs and complexity**
- Assurance will ensure verification and quality of DPP data thus enabling **trust and collaboration across VCs**
- Assurance more **likely to be linked to data points with performance requirements** in the future
- EC mandate likely impacted by **assessment of feasibility** from companies and industry associations

1. The operator placing the product on the EU market is legally required to collect and provide DPP data and register the DPP, however, technically the DPP can be created earlier in the value chain to unlock synergies of data sharing and transparency 2. Fully grey Harvey ball indicates a topic is fully undefined, fully blue indicates a topic is fully defined
Source: European Commission, ESPR proposal, Battery Regulation proposal, BCG analysis

Assurance enables data quality at cost and complexity for companies

No EC proposal yet

	No assurance[1]	Limited assurance	Reasonable assurance
Description	Self-regulated DPP implementation where economic actors are trusted to provide accurate data	Assurance of a number of key data points specified by the EC to ensure the data quality of those	Assurance of all data provided by the economic actor to ensure data quality and validity of DPP data
Advantages/Disadvantages			
Speed of regulatory development	÷ Medium, as no assurance-related regulation needed, but self-regulatory framework should be implemented	÷ Medium speed, as regulation for limited insurance and definition of data points required	− Low speed, as detailed assurance regulation needed and significant support for companies required
Impact on companies	+ No additional cost and reduced complexity for companies, as no third party needs to be involved	÷ Additional cost, lower speed of data provision and moderate complexity from involving third party	− High additional cost, low speed of data provision and increases complexity due to involving a third party
Environmental impact	− Likelihood of data quality issues may limit transparency, product circularity and thus environmental impact	+ Unlocks environmental impact by ensuring quality of key data points while minor quality issues may remain	+ High data quality and accuracy ensures transparency and thus higher environmental impact from circularity
Data quality	− Data quality issues likely to occur due to limited auditing abilities of companies (esp. SMEs) and potential tempering of data	÷ Ensures high quality of key data points (important once DPP linked to perfor-mance requirements); potential quality issues with remaining data points	+ Enables high data quality across companies and VCs with low potential of data tempering (important once DPP linked to performance requirements)
VC collaboration	− Typically, low trust among VC actors thus limiting VC collaboration	÷ Trust in key data points will increase with VC collaboration to lesser degree than reasonable assurance	+ Enables high levels of trust among VC actors that will likely increase collaboration across VC
Key considerations	**Easy implementation for companies at risk of data quality, spot checks may counteract disadvantages in short-run**	**High quality of key data points at moderate cost and complexity; unlocks environmental impact**	**High data quality and environmental impact at increased cost and complexity for companies**

− Disadvantage + Advantage ÷ Combination

1. Likely not a feasible option in the long run and once the DPP is linked to performance requirements that companies will be held accountable to
Source: BCG analysis

Conclusion

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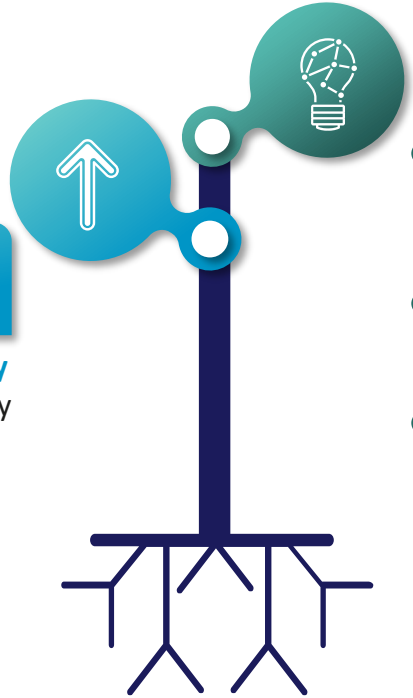
In sum, EU DPP is a first of its kind regulatory circularity tool, yet with many open questions and long timeline

EU DPP is on a good way to drive circularity …

- EU DPP is a **strong tool to drive circularity and economic value** through transparency
- EU is a **first mover** on implementing a large-scale regulatory DPP requirement
- **Initial elements outlined** in overarching regulation and first product group examples exist
- **Strong interest** from non-governmental players



… but requires further clarification and fast(er) implementation

- **Unclarity across many aspects** makes actions for early corporate adopters more difficult as future requirements are not predictable
- **Involvement of companies and industry representatives** will ease implementation and increase impact
- **Building on existing standards** and corporate practices is a key enabler

In detailing DPP regulation a balance between optimal set-up and easier and quicker to implement alternatives is important for the EC to consider

Illustrative

Implementation for all companies brings benefits (e.g., data availability) …	but	… focusing on large companies first creates significant impact quickly
Item level application enables highest transparency across VC …	but	… batch or product level application might be sufficient for many VCs and faster to implement
Definition of data points per product group enables focus on respective highest impact topics …	but	… standardizing key data points allows for earlier implementation and lower complexity
Requiring a long list of relevant data points maximizes transparency …	but	… a shorter list facilitates and speeds up implementation and impact on those most crucial topics
Setting clear targets and performance requirements based on DPP data will drive impact …	but	… collecting data and creating transparency are relevant starting points
Complex system of restricted data access and aggregation of data drives business security and trust …	but	… easier access to key data points enable transparency quickly

Despite uncertainties and long timeline, companies can prepare for DPP implementation now

Being an early adopter, even moving ahead of regulation creates **corporate value**

Despite uncertainties and given the ongoing regulatory process, a **range of actions are non regret moves**, e.g.,

- Engage in shaping the regulation through direct engagement with the EC or collaboration across the VC
- Assess data availability and fill in the gaps
- Enable own organization to take the right decisions and optimize processes in light of the upcoming requirements, e.g., ensuring synergies, engaging suppliers, …
- Plan for changes in technology ensuring interoperability of IT systems

See separate publication for more guidance for companies on how and why to act now

Driving insights through collaboration

The WBCSD and BCG want to thank the authors and contributors involved in the creation of this publication for their extensive contributions

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Disclaimer

This publication is the result of a collaboration by WBCSD stakeholders, BCG experts and external contributors. The intention of this set of publications is to educate about the upcoming EU DPP regulation, highlighting current uncertainties incl. what aspects can still be impacted and outlining key immediate actions for companies to prepare. A range of stakeholders was interviewed and reviewed drafts. Input and feedback from stakeholders listed above were incorporated in a balanced way. This does not mean, however, that every stakeholder agrees with every view. This is the best knowledge as of December 2022 but changes to DPP topics can occur quickly.

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