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Connection between SSbD and ESPR with a focus on opportunities to integrate SSbD criteria into future Ecodesign requirements for textiles and furniture

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Authors: Katja Hansen*, Douglas Mulhall*, Hein van Tuijl

*Also associate researchers with the School of Engineering and Design, Technical University Munich

Summary in Dutch

Inleiding

Dit rapport onderzoekt de relatie tussen Safe and Sustainable by Design (SSbD) en de Ecodesign for Sustainable Products Regulation (ESPR), met een specifieke focus op textiel en meubels — de eerste productgroepen waarvoor de ESPR wordt ingevoerd.

Doel van het rapport is het identificeren van synergieen tussen beide kaders, het optekenen van wat bedrijven in de praktijk al doen en welke lering daaruit getrokken kan worden, en welke beleidsaanbevelingen nodig zijn om SSbD effectief in toekomstige ESPR vereisten te integreren.

De kernvragen zijn:

- Welke principes en criteria van SSbD overlappen met potentiële prestatie- en informatievereisten onder ESPR en waar ondersteunen zij elkaar? (Hoofdstuk 2)
- Hoe kan een SSbD-benadering bij productontwerp helpen bij het vaststellen van productspecifieke ESPR vereisten voor meubels en textiel? (Hoofdstuk 3)
- Welke specifieke aanbevelingen voor ESPR vereisten voor textiel en meubilair kunnen worden gedaan op basis van een SSbD-analyse voor deze productgroepen? (Hoofdstuk 4)
- Wat zijn de aanbevelingen aan beleidsmakers om SSbD effectief te combineren met de formulering van ontwerpeisen in het kader van ESPR? (Hoofdstuk 5)

Deze samenvatting volgt de hoofdstukstructuur van het rapport met bijzondere nadruk op de beleidsadviezen. (Hoofdstukken 4 en 5)

Hoofdstuk 1 — Introductie en doelen

Het rapport werd geschreven aan de hand van literatuuronderzoek, interviews met koplopers en casestudies van C&A en IKEA. Daarnaast vond een workshop plaats met beleidsmakers en experts om de eerste conclusies te toetsen in November 2025.

Belangrijke uitgangspunten voor het rapport zijn:

- Een nauwere samenwerking tussen ESPR- en SSbD-experts is aanbevolen. Dit is vooral belangrijk bij het ontwikkelen van gezamenlijke standpunten voor de vele delegated acts die worden opgesteld om ESPR te implementeren;
- Verschillende opvattingen over terminologie leidt in de praktijk tot onnodige misverstanden. Het rapport benoemt drie belangrijke thema's:
    - *Zal ESPR via de delegated acts op zowel bestaande als nieuwe materialen van toepassing zijn?*

De ESPR en de delegated acts zijn van toepassing op alle nieuwe producten en materialen die onder de gedelegeerde wetten vallen. Dat betekent dat zij óók van toepassing zijn op sommige reeds bestaande materialen, bijvoorbeeld als zij gebruikt (gaan) worden als recycled content in nieuwe producten.

- *Zal ESPR zich richten op "productveiligheid" of op "veilige" materialen?* ESPR creëert geen eigen definities van wat "veilige materialen" zijn en "product veiligheid" is. Die definities vallen onder andere wetten die in de ESPR worden aangehaald. De belangrijkste zijn:
  a. Algemene productveiligheids-/sectorale veiligheidsvoorschriften;
  b. REACH en CLP (veiligheid van chemische stoffen).
- *Kunnen de delegated acts onder ESPR vereisen dat de productsamenstelling volledig wordt gekarakteriseerd? (en niet enkel SoC)*

  ESPR is hier niet eenduidig over, maar laat de mogelijkheid open dat de delegated acts dit wel gaan vereisen. De auteurs van dit rapport raden dit expliciet aan.

Hoofdstuk 2 — Overlappingen en synergieën tussen SSbD en ESPR

Hoewel SSbD een vrijwillig en ontwerpgericht innovatiekader is en ESPR een juridisch bindend raamwerk, bestaan er duidelijke synergieën.

Belangrijkste overlappingen zijn:

- Levenscyclusbenadering
- Vermijden van schadelijke stoffen en emissies
- Transparantie & traceerbaarheid
- Ontwerp voor demontage (DfD), hergebruik en recyclage
- Modulariteit en upgrademogelijkheden

Hoofdstuk 2 toont visueel hoe de SSbD-principes de ESPR-parameters ondersteunen.

Voorbeelden:

- SSbD's ontwerp voor end-of-life ↔ ESPR's recyclability, reparability, reusability
- SSbD's focus op materiaalgezondheid ↔ ESPR's Substances of Concern + informatie vereisten
- SSbD's modulariteitsfocus ↔ ESPR's prestaties rond upgradeability en reparatie

Hoofdstuk 3 — Hoe SSbD product-specifieke ESPR vereisten kan ondersteunen

SSbD maakt het mogelijk dat bedrijven:

- Sturen op gedefinieerde en niet-schadelijke materialen;
- Modulair en demontabel ontwerpen;
- Vermijden dat legacy chemicaliën recycling blokkeren (PFAS, antimoon, chroom VI, etc.);
- Via transparantie voldoen aan toekomstige Digital Product Passport (DPP) -eisen.

De bedrijfsinterviews geven enkele sprekende praktijkvoorbeelden:

- Ahrend verwijderde lijmen om refurbishing en hergebruik te faciliteren;
- Patagonia ontwikkelde alternatieven voor PFAS in kleding om gezondheid en recyclingpotentieel te verbeteren;
- Auping ontwikkelde circulaire matrassen door het ontwerp radicaal aan te passen en recyclebare materialen in te zetten;

De rode draad:

Een SSbD benadering stelt bedrijven in staat om vroeg in het proces en met leveranciers in de keten pro-actief te werken aan duurzame producten, die vervolgens voldoen aan vereisten onder ESPR.

Hoofdstuk 4 — Specifieke aanbevelingen voor ESPR vereisten in de textiel- en meubelindustrie

Hoofdstuk 4 vertaalt de bevindingen uit casestudies en interviews naar productgroep-specifieke lessen die relevant zijn voor toekomstige delegated acts onder ESPR. Hieronder volgt een beknopte weergave.

4.1 Casestudies en hun implicaties

De C&A-case laat zien dat textielcirculariteit haalbaar is wanneer bedrijven:

- Volledige ingrediëntentransparantie afdwingen (tot 100 ppm);
- Chemische ingrediënten optimaliseren voor circulariteit;
- Monomaterialen of compatibele blends gebruiken;
- AI inzetten om materiaalstromen en chemicaliën traceerbaar te maken.

Belangrijke knelpunten:

- Europese infrastructuur voor post-consumer textielsortering en –recycling is ontoereikend;
- Veel gebruikte chemische stoffen maken recycling op hoog niveau bijna onmogelijk;
- Bestaande recyclingnetwerken en processen moeten verbeteren om het aanbod aan hoogwaardig recycled materiaal te vergroten én om de recycling van nieuwe producten en materialen op hoog niveau te garanderen.

Relevantie voor ESPR-vereisten:

- ESPR-delegated acts zouden informatie-eisen moeten bevatten over volledige chemische samenstelling;
- Circulariteit moet meetbaar worden via materiaalcompatibiliteit met recyclingstromen, materiaalsamenstellingen en toxicologische profielen.

De IKEA-analyse toont de volgende zaken aan:

- Modulariteit is een belangrijke enabler voor reparatie, hergebruik, demontage en recycling;
- IKEA gebruikt AI om grote volumes data te harmoniseren en in te zetten voor duurzame product- en procesverbetering én aankomende wet- en regelgeving;
- Substances of Concern (SoC) blijven een groot obstakel, vooral in schuimen, lijmen, coatings en additieven;
- Recycled content introduceert risico's: recyclaat bevat vaak legacy chemicaliën met potentieel negatieve impacts op mens- en/of milieu.

Relevantie voor ESPR-vereisten:

- Er is behoefte aan duidelijke definities van terminologie, waaronder "recycleerbaar";
- Demontagevereisten (DfD) moeten volgens IKEA eenvoudig, gestandaardiseerd en consumer-proof zijn;
- AI zou moeten worden gezien als onderdeel van implementatiestrategieën van ESPR.

4.2 Interviews met bedrijven

Interviews met een reeks koplopende bedrijven leveren de volgende inzichten op:

- De markt kijkt vooral naar CO_2, terwijl circulariteit, materiaalgezondheid en SSbD minstens net zo belangrijk zijn;
- Innovatieve producten riskeren niet te worden erkend onder toekomstige delegated acts;
- Verschillende rapportagesystemen (REACH, ESPR, CSRD, CSDDD, EUDR) lopen door elkaar, zonder harmonisatie;
- Veel MKB's zijn niet betrokken bij beleidsoverleg en missen stem in de ESPR-technische comités.

Er is behoefte aan:

- Geharmoniseerde circulariteitsindicatoren;
- Eisen die verder gaan dan Substances of Concern als het gaat om materiaalsamenstellingen (richting full material disclosure);
- Ondersteuning bij implementatie onder meer dmv toepassing AI;
- Materiaalpooling om de markt voor en het aanbod van goede (recyclede) materialen te vergroten.

Hoofdstuk 4 concludeert dat:

- Voor zowel textiel als meubels is chemische transparantie cruciaal (enkel SoC is niet voldoende);
- Modulariteit en demontage zijn sleutelprincipes voor circulariteit in beide sectoren;
- Alle bedrijven, maar met name MKB's hebben moeite om materiaaldata te verkrijgen en te verwerken;
- Koplopers zien SSbD-achtige methoden als bedrijfsvoordeel, maar vrezen dat ESPR-eisen te laag worden om hun inspanningen te belonen;
- ESPR moet iterative verbeteringen toestaan — bedrijven kunnen niet alles tegelijk verbeteren;
- AI speelt een steeds grotere rol in haalbare implementatie van ESPR (data, traceerbaarheid, DPP, harmonisatie);
- Zonder upstream controle op chemische samenstelling blijft circulariteit onhaalbaar.

Hoofdstuk 5 – Beleidsaanbevelingen

Hoofdstuk 5 bestaat uit een reeks beleidsaanbevelingen, verdeeld over product & materiaalniveau en systeemniveau. Het doel is om SSbD en ESPR effectief met elkaar te verbinden.

Product- en materialenniveau

1. (Vroeg Prioritair) – Focus op materiaalsamenstelling

Stimuleer dat de delegated acts verder gaan dan alleen Substances of Concern en een volledige of uitgebreidere materiaaldeclaratie vereisen.

Beleidsreden:

Zonder kennis van volledige chemische samenstelling is veilige recycling onmogelijk.

Bedrijven kampen met legacy chemicaliën (bijv. PFAS), waardoor circulariteit wordt geblokkeerd.

Acties:

Nederland kan pleiten voor uitgebreidere materiaaldeclaratie onder ESPR.

Aanbestedingen kunnen hiervoor nu al "pluspunten" toekennen.

2. Design for Disassembly – DfD

Maak DfD onderdeel van ESPR vereisten door:

- Limieten op permanente verbindingen;
- Toegankelijke modulaire verbindingen;
- Maximale demontagetijd en -stappen.

Reden: DfD is een fundament van het SSbD principe 'designing for end-of-life' en maakt onderhoud, reparatie en hergebruik mogelijk.

3. Definitie van 'recycleerbaar' verduidelijken

Houdt de EU-ontwikkelingen inzake end-of-waste-criteria nauwlettend in de gaten.

Bedrijven investeren nu in materialen waarvan onzeker is of deze als 'recycleerbaar' worden geclassificeerd – wat investeringsrisico's creëert.

Systeemniveau

1. (Onmiddellijke Prioriteit) – Stel een nationaal SSbD/ESPR-beleidsteam samen.

Beleid kan versterkt worden door SSbD en ESPR experts meer en beter te laten samenwerken. Een structureel overlegplatform kan:

- Gedeelde standpunten ontwikkelen voor delegated acts;
- Een nationaal mandaat formuleren voor EU-onderhandelingen;
- Verschillen in interpretatie van definities oplossen.

2. (Vroege prioriteit) – Combineer regelgeving met incentives, vooral voor het MKB.

Rapportage- en data 'druk' zijn erg hoog voor met name het MKB.

Aanbevolen:

- Subsidies voor SSbD-toepassing;
- Toegang tot AI-tools;
- Vereenvoudigde rapportagestandaarden.
- Harmoniseer ESPR-vereisten met CSRD, EUDR, CSDDD, etc.

3. (Vroege prioriteit) – Versnel de inzet van AI, met prioriteit voor het MKB.

AI kan tot enorme tijdsbesparingen leiden bij:

- Dataverzameling automatiseren;
- Supply chains traceren;
- Chemicaliën identificeren en interpreteren;
- Genereren van materiaalpaspoorten (Digital Product Passports).

MKBers zouden versneld toegang moeten krijgen tot:

- AI sandbox-programma's;
- Service desks;
- Publieke data-API's en knowledge graphs.

4. Koppel certificeringsschema's aan overheidsinkoop

Certificeringen die al in de textiel – en meubelbranche worden gebruikt (Cradle to Cradle, Oekotex, etc.) bevatten al SSbD-elementen.

Overheden kunnen deze certificaten belonen in selectie- of bonuscriteria.

5. Harmoniseer de delegated acts voor textiel en meubels.

Voorkom dat sectoren tegenstrijdige eisen krijgen voor dezelfde materialen.

Introduceer stapsgewijze verbetering (iterative improvement) in delegated acts.

6. (Middellange termijn) – Dataharmonisatie

Richt een EU-structuur van datastandaarden in incl. orde van prioriteit.

Creëer een centrale database van best practices.

7. Lange termijn opties

- Material pooling: Geef MKBers eenvoudiger toegang tot veilige, gecertificeerde materiaalstromen;
- Reverse logistics stimuleren: terugkoop- en refurbishprogramma's belonen;
- SSbD gebruiken voor interactiemapping: parameters van ESPR beïnvloeden elkaar sterk — beleid moet systeemdenken stimuleren;
- Transparantie en openbaarmaking bevorderen: verplicht of gestimuleerd via aanbestedingen.
- Onderwijs & training: integratie van praktijkvoorbeelden in trainingsprogramma's. 'Preventie boven naleving' op het gebied van chemie en circulariteit in curricula.

Conclusie

Het rapport concludeert dat het integreren van SSbD in ESPR-beleid enorme kansen biedt om circulariteit en chemische veiligheid tegelijk te verbeteren. Belangrijkste voorwaarden hiervoor zijn:

- Harmonisatie van definities, data-eisen en procedures;
- Nauwere samenwerking tussen nationale en Europese beleidsmakers;
- Nauwere samenwerking tussen SSbD en ESPR experts;
- Inzet van AI en digitalisering;
- Prioretisering van transparantie over productsamenstellingen en karakterisering van de gebruikte chemie;

- Erkenning van frontrunners en stimulansen voor het MKB;
- Integraal systeemdenken in plaats van parameter-per-parameter benaderingen.

ESPR vereisten hebben een sterke upstream focus, SSbD biedt de principes en middelen om pro-actief aan product- en procesverbetering te werken in samenwerking met de leveranciersketen. De effectiviteit van toekomstige vereisten onder ESPR hangt sterk af van inzichten uit upstream keuzes — precies het domein van SSbD.

1 Introduction and Goals

The remit of this study is to determine to what extent and in what ways the Safe and Sustainable by Design (SSbD) framework and the Ecodesign for Sustainable Products Regulation (ESPR) complement and influence each other, as well as to provide a clear picture of the possibilities for integrating SSbD principles into concrete Ecodesign requirements for textiles/clothing and furniture. EPEA was also asked to identify how governments could support companies to use SSbD to meet or exceed parameters set by ESPR for upcoming product requirements.

This report addresses four research questions:

- Which overarching principles and criteria of SSbD and potential performance and information requirements of the Ecodesign Regulation overlap or show synergy?
  (NOTE: After feedback from participants, it was agreed that such overlaps only be identified at a high level, and that the report focus more on policy recommendations per bullet 4 below.)
- How can an SSbD approach to product design help set product-specific Ecodesign requirements?
- What specific recommendations for Ecodesign requirements for textiles and furniture can be provided based on an SSbD analysis for furniture and textiles?
- What recommendations can be made for policymakers to effectively combine SSbD frameworks with the formulation of design requirements under the Ecodesign Regulation?

Process leading to conclusions and policy suggestions

After consultations with the Steering Group created to accompany this study and extensive literature reviews (including studies by the OECD and EU on SME's), two case studies were conducted of large companies that have complex supply chains consisting of mainly SMEs. Also, interviews with six other companies from the textile and furniture industry were conducted. A workshop of the Steering Group and other participants was then held.

The workshop generated feedback on:

- Conclusions synthesized from the case studies, interviews, and literature reviews,
- Whether the suggested policy priorities are practicable.
- Policy suggestions of workshop participants based on their own experience.
- Whether the suggested priority tools for implementing those policies were practicable.

After the workshop additional interviews at EU level were conducted, and comments on the draft briefing and case studies were also received. Based on that, amendments were made and the outcome is presented here.

Pre-requisites for acting on conclusions and recommendations

While developing this report, it became apparent that in The Netherlands, a prerequisite for successfully addressing the issues outlined in the report is a closer working relationship between ESPR and SSbD experts. This is especially important in developing joint positions for the many delegated acts being created to enact ESPR. The more these experts agree on which specific aspects of this report to prioritize for the delegated acts and national policies, the easier it will be for The Netherlands to make a focused contribution to aligning SSbD and ESPR. It will be beneficial to talk with each other more often and develop short lists of positions to bring forward for the ESPR delegated acts and supportive national policies.

It also became apparent from comments to drafts of this report that varying interpretations of terminology may have led to perceptions of differences where none exist. To resolve this, the following items delineate key terminology which will aide in interpreting the actions recommended in the report:

1. Will ESPR through the delegated acts address both existing and new materials?
The answer is yes in certain cases, but the details of what is or isn't covered depends on how the term "existing" is defined under the regulation.

- ESPR applies to products placed on the EU market (or put into service) from the time the relevant delegated act starts to apply, regardless of whether they are "new" designs or existing models put onto the market after the delegated acts come into effect.
- However, ESPR is not retroactive to products or materials already placed on the market before those dates UNLESS those are included in for example remanufactured products.
- Remanufactured products containing old and new materials and components are considered new products subject to ESPR if they fall under one of the delegated acts.

In summary, some "existing" products and materials that end up in new products are covered by ESPR, while others that don't are not. ESPR and its delegated acts will apply to some existing materials but not others depending on what types of products they are found in, while ESPR will apply to all new products and materials that fall under the delegated acts.

2. Will ESPR address product safety or "safe" materials"?

There has been much discussion around the terms "safe products" and "product safety", especially whether ESPR and its delegated acts actually cover safety and safe/ non-toxic products.

The answer to this is that ESPR does partially address product safety and safe, non-toxic materials under aspects such as substances of concern, but ESPR does not create its own definitions of what "safe" and "safety" are. Those definitions fall under other acts which are cited in the ESPR. The regulation cross-references several product safety and chemicals laws. Among the key ones are:

a. **General product safety / sector safety rules.** ESPR is designed to sit alongside existing safety and sectoral product law, not replace it; guidance notes that ESPR "does not affect sector specific product safety legislation or the General Product Safety Regulation, which continue to govern product safety, while ESPR adds sustainability related requirements."

b. **REACH and CLP (chemicals safety).** Industry and legal commentary on ESPR underline that "chemicals are not taken out of REACH and CLP: the ESPR will work in addition to, and in coherence with, existing EU chemicals legislation such as REACH and CLP when addressing substances of concern in products."

3. Could ESPR delegated acts require that product composition is more completely characterized beyond substances of concern?

This is a topic of debate as shown by the studies cited in this report that are calling for the delegated acts to require full product characterization.

ESPR is not definite on this but does leave the door open for delegated acts to require it. For example, economic operators must provide information on the product parameters listed in Annex I of the Ecodesign Regulation, e.g. material composition, lifetime and upgradability indicators, durability, reparability, carbon and environmental footprint and substances of concern. This is grounded in Article 7 ESPR on information requirements, which empowers the Commission to require information on Annex I product parameters (including "material composition") for covered product groups.

This might not only be limited to "safe" materials but could also extend to materials that are appropriate for circular applications such as recycled materials. A material can be safe but still be a contaminant that interferes with recycling.

As a result, organizations such as the European Environmental Bureau (EEB) are calling for full characterization to be included.

However, the question of whether the delegated acts SHOULD do this is a matter of opinion rather than fact.

Based on EPEA's experience dealing with impacts of materials that are only partially defined, our view is that detailed product declarations be addressed in the delegated acts. There is sufficient independent study evidence to support this, and examples are cited in this report.

NOTE: Most of the remarks by companies and EU level experts highlighted in the indented blue sections of this report are abbreviated or paraphrased, and some are translated from Dutch. All interviewees were given the opportunity to review their remarks in the context they are presented here.

2 Which overarching principles and criteria of SSbD and potential performance and information requirements of the Ecodesign Regulation overlap or show synergy?

The key term in the question is, "potential performance and information requirements." The range of product aspects which can be targeted with performance requirements are set in Article 5 of the ESPR. The potential requirements that will apply to product groups like textiles and furniture will be set in future ESPR delegated acts. Those future acts will determine requirements through their interpretation of aspects described in framework regulations.

A. To avoid speculation about what future delegated acts might contain, this evaluation is restricted to known aspects shown in the ESPR framework regulation. Likewise, some companies have already integrated SSbD principles into their businesses, so these can be compared to known aspects of the framework regulation. Examples are in this report.

B. The one exception to describing what might be in future delegated acts is where the terms of reference ask, "How can an SSbD approach to product design help set product-specific Ecodesign requirements?" Several studies as well as DG Env. representatives have addressed this question and are covered in this report.

In order to establish the context for how SSbD and ESPR overlap or show synergy, a brief overview of SSbD and ESPR is provided here.

2.1 Brief introduction to SSbD and ESPR

2.1.1 Safe and Sustainable by Design

SSbD is an evolving systems approach and innovation driver that focuses on prevention by putting holistic design of safe and sustainable future-proof materials and products at the core. As such it requires global, multi-stakeholder engagement with a critical thinking perspective that seeks not one correct answer but responsible decisions.

There is no unified agreement yet on what SSbD means in concept and practice. Several organizations have described the approach to SSbD, including Cefic,[1] IRRIS[2] and the EU JRC[3], each with a slightly different focus. At the EU level, the JRC guidance documents are seen as the central guidance.

> *The JRC publication is the EC framework for SSbD, chemicals and materials. The Cefic guidance is the implementation or interpretation of the chemical industry about the framework. (Project Officer SSbD – JRC)*

Therefore, unless explicitly stated otherwise, EPEA uses the JRC guidance documents.[4]

The revised JRC framework *Safe and Sustainable by Design Chemicals and Materials* published in December 2025 (NOTE: EPEA worked with the consultation draft) proposes four principles (see Figure 1):

- Assessment considering the entire life cycle of the chemical/material
- Multidisciplinary engagement of the life cycle actors and company experts
- Safety and sustainability aspects with a holistic perspective throughout the innovation with a tiered approach to address uncertainties.
- Transparency of the assessment and traceability.

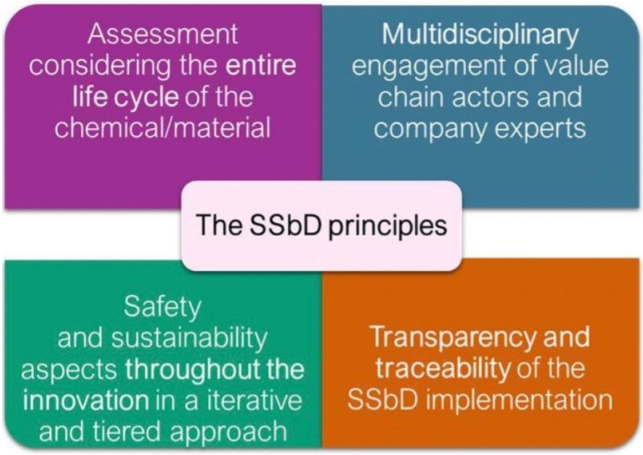

Figure 1: SSbD Framework Principles (JRC)

[1] https://cefic.org/resources/safe-and-sustainable-by-design-a-guidance-to-unleash-the-transformative-power-of-innovation/
[2] https://iriss-ssbd.eu/
[3] https://data.europa.eu/doi/10.2760/5103785
[4] Ibid. And: https://data.europa.eu/doi/10.2760/487955; https://data.europa.eu/doi/10.2760/28450

The revised framework focusses more on the definition of the approach by emphasizing the need for a scoping analysis and the definition of an SSbD scenario, before going into the assessment, evaluation and documentation. The process is iterative and applies at different TRL levels (Figure 2).

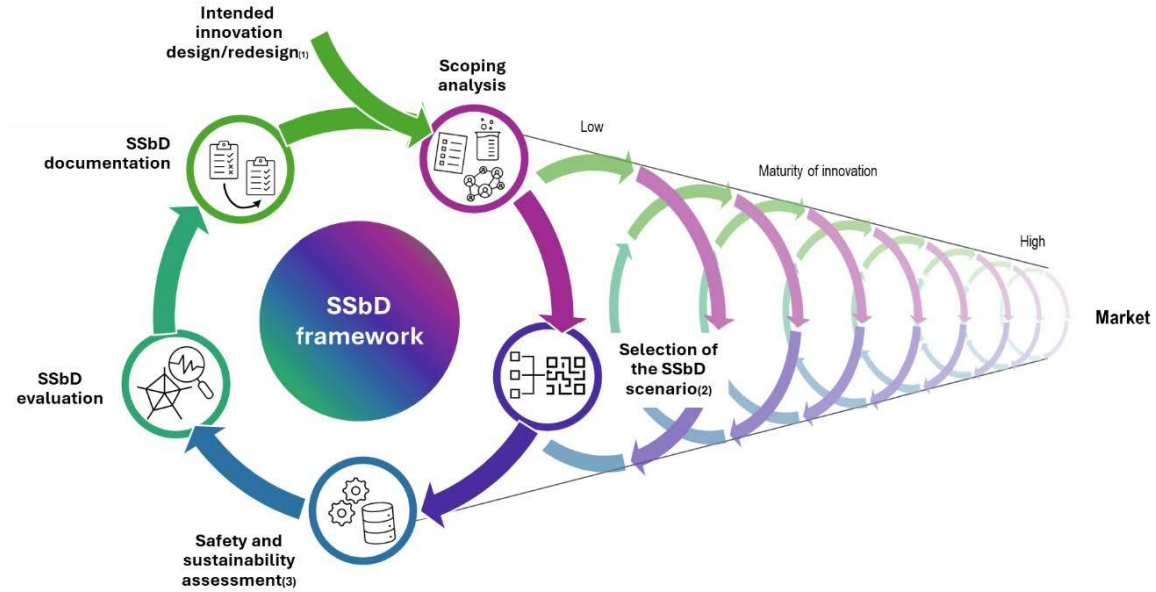

Figure 2: SSbD Framework (JRC)

JRC SSbD (re)design definition looks at 9 design principles (Figure 3). They can be adapted by the developers to suit their innovation purposes. These are further described in Annex 3 of the updated 2025 JRC SSbD framework.

The 2025 SSbD framework also includes guidance on transparently and consistently documenting the implementation of the approach which should prove useful for exchanging data with for example ESPR information requirements.

The updated SSbD framework is part of an ongoing, iterative EU level- workstream; there is no single fixed "final" document, but rather *a rolling set of updates and implementation -oriented next steps*. The EU Commission will use this to revise its 2022 Recommendation establishing a European assessment framework for 'safe and sustainable by design' chemicals and materials [5]. The revision is expected in early 2026[6].

[5] http://data.europa.eu/eli/reco/2022/2510/oj
[6] https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/chemicals-and-advanced-materials/safe-and-sustainable-design_en

SSbD principle (based on)	Definition
SSbD1 Material efficiency (GC2, CC2, GC8, GC9, GC5, CC5, GC1, SC2)	Pursuing the incorporation of all the chemicals/materials used in a process into the final product or full recovery inside the process, thereby reducing the use of raw materials and the generation of waste.
SSbD2 Minimise the use of hazardous chemicals/materials (GC3, SC1, GR1, GC4, GE1, GR3, GC5)	Preserve functionality of products while reducing or avoiding the use of hazardous chemicals/materials where possible.
SSbD3 Design for energy efficiency (GC6, CC4, GE4, GE5, CC8, GE8, GE10, GE3, GR7, GC8, GC9, CC10)	Minimise the overall energy used to produce a chemical/material in the manufacturing process and/or along the supply chain.
SSbD4 Use renewable sources (GC7, CC3, GE12, SC2)	Target resource conservation, either via resource closed loops or using renewable material / secondary material and energy sources.
SSbD5 Prevent and avoid hazardous emissions (GE11, GC11, CC6, SC2)	Apply technologies to minimise and/or to avoid emission of hazardous pollutants into the environment.
SSbD6 Reduce exposure to hazardous substances (GC12, GR4, SC1)	Reduce or eliminate exposure to chemical/material hazards from processes as much as possible. Chemicals/materials which require a high degree of risk management should be avoided where possible and the best technology should be used to avoid exposure along all the life cycle stages.
SSbD7 Design for end-of-life (GC10, CC1, CC7, GE11, CC9, GE9, GE6, GE7)	Design chemicals/materials in a way that, once they have fulfilled their function, they break down into products that do not pose any risk to the environment/humans. Design for preventing the hindrance of reuse, waste collection, sorting and recycling/upcycling. Design to promote circularity.
SSbD8 Consider the whole life cycle (GE6, GR2, SC3, GR6, GR8)	Apply the other design principles thinking through the entire life cycle, from supply chain of raw materials to the end-of-life in the final product
SSbD9 Ensure responsible sourcing and minimise social risks	Avoid that procurements are linked with severe human rights and labour rights abuses, as well as other unethical practices. Perform a suppliers' assessment based on social performance and risk. Include ESG performance as a criterion for suppliers' selection Scrutinise suppliers operating in conflict-affected and high-risk areas

GC: Green Chemistry Principle, GE: Green Engineering Principles, SC: Sustainability Chemistry Criteria, GR: UBA Golden Rule, CC: Circularity Chemistry Principles.

Figure 3: SSbD Design Principles (JRC)

2.1.2 Ecodesign for Sustainable Products Regulation (ESPR)

The Ecodesign for Sustainable Products Regulation (ESPR)[7] forms a key part of the European Green Deal, aiming for a clean, decarbonized, and resource-efficient EU Circular Economy.

Its predecessor, the EU Ecodesign Directive (2009/125/EC) established rules for energy-related products, focusing on energy efficiency and environmental criteria during design and manufacture. In June 2024, the EU adopted the ESPR (Regulation EU 2024/1781), which expanded previous rules to nearly all physical products, replacing the 2009/125/EC Directive.

[7] ESPR https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en

The ESPR distinguishes between requirements, parameters, and product aspects. Paragraph 1 of Article 5 of the regulation reads as follows:

> *"In order to address environmental impacts and based on the product parameters referred to in Annex I, the ecodesign requirements in the delegated acts adopted pursuant to Article 4 shall be such as to improve the following product aspects ('product aspects') where those product aspects are relevant to the product group concerned."*[8]

That section of Article 5 makes it clear that ESPR does not itself set requirements but rather addresses the parameters and product aspects relating to future requirements to be set in the delegated acts. The ESPR sets down the framework, while future delegated acts will set requirements. Due to this distinction, this report refers to activities that align with ESPR parameters and product aspects outlined in the framework regulation. It is not possible at this time to predict what the requirements will be in future delegated acts.

Figure 4 shows key product aspects under ESPR. Requirements to be specified may cover product performance (Article 6) (e.g. durability, availability of spare parts, minimum recycled content) and/or product information (Article 7) (e.g. key product features, its carbon/environmental footprint). Product information will mainly be made available via the Digital Product Passport or, for products with energy labels, via the European Product Registry for Energy Labelling (EPREL).[9]

Figure 4: Key product aspects under ESPR

[8] ESPR
[9] https://green-forum.ec.europa.eu/news/2025-2030-working-plan-2025-07-11_en, p. 3

The European Commission adopted the initial *Working Plan for ESPR for 2025–2030*[10] on April 16, 2025. This plan determines the product priorities and timelines for regulated sectors over the coming years. Textiles and furniture are the first product groups to be addressed. For this first working plan, the priorities were set in the Regulation (Article 18) itself:

Iron and steel; aluminum; textiles, in particular garments and footwear; furniture, including mattresses; tires; detergents; paints; lubricants; chemicals; energy-related products and ICT products and other electronics. However, the Regulation gives the Commission some discretion to omit some of these products or to add new products, if it provides justification. A mid-term review is planned after three years (in 2028).

2.2 Comparison between SSbD and ESPR

This comparison is largely theoretical because there is no experience yet with the delegated acts that will transform ESPR into a practical regime.

SSbD is a non-binding framework, while ESPR is a compulsory regulation.

SSbD offers a proactive framework focusing on chemical/material safety and sustainability embedded early in design and innovation, while ESPR establishes binding requirements via delegated acts that ensure sustainability aspects such as durability, substances of concern, transparency, and circularity for all products which are put on the European market.

SSbD is an early up-stream[11] innovation driver focusing on research and innovation anticipating regulatory trends, while ESPR focusses on finished products and companies do not yet know the ESPR requirements which will be set in upcoming delegated acts over the coming years. Thus, some companies already apply SSbD approaches in the design processes of their current product portfolio which may help them address ESPR aspects (see chapter 4).

In the past, due to its origin with nanomaterials, SSbD was sometimes seen as narrower than ESPR, but according to the updated JRC framework[12], its influence early in the supply chain is substantially greater than perceived earlier due to the crucial role of material health[13] in so many aspects of ESPR.

[10] https://green-forum.ec.europa.eu/news/2025-2030-working-plan-2025-07-11_en
[11] In the context of materials and products, "up-stream" refers to everything that happens before a product is manufactured or placed on the market.
[12] Cassee, Flemming R., et al. "Roadmap towards safe and sustainable advanced and innovative materials. (Outlook for 2024-2030)." *Computational and Structural Biotechnology Journal* 25 (2024): 105-126.
[13] In Cradle to Cradle, material health means that the chemicals and materials used in a product are identified, assessed, and optimized so they are as safe as possible for human health and the environment, while also supporting high-quality reuse and cycling in the future. Material health is also referenced by JRC in its description of SSbD, p.22
https://publications.jrc.ec.europa.eu/repository/bitstream/JRC127109/JRC127109_01.pdf

EPEA made a preliminary attempt to show where SSbD design principles and ESPR parameters intersect, based on the 16 ESPR aspects from Article 5[14] and the 9 design principles in the JRC SSbD guidance. These intersections could also vary depending on the product type being examined. Thus, the matrix shown here should be considered only an example to demonstrate that many overlaps do indeed occur.

SSbD principles / ESPR aspects	Material efficiency	Minimize the use of hazardous chemicals/ materials	Design for energy efficiency	Use renewable sources	Prevent and avoid hazardous emissions	Reduce exposure to hazardous substances	Design for end-of-life (circularity)	Consider the whole life cycle	Responsible sourcing & minimise social risks
Durability								X	
Reliability								X	
Reusability	X						X	X	
Upgradability	X						X	X	
Repairability	X						X	X	
Maintenance	X						X	X	
Refurbishability	X						X	X	
Remanufacturing Potential	X						X	X	
Recyclability	X	X		X	X	X	X	X	
Recovery of materials		X		X	X	X	X	X	
Substances of Concern		X			X	X	X	X	
Energy Use/ Efficiency	X		X	X				X	
Water/Resource Efficiency	X	X	X	X	X			X	
Recycled Content	X	X		X	X	X	X	X	
Environmental Footprint	X	X	X	X	X	X	X	X	
Waste Generation	X	X		X	X	X	X	X	

Figure 5: Intersection between ESPR aspects and SSbD Design principles (EPEA)

[14] ESPR

EPEA also developed a table showing how SSbD guidance can be used to meet specific ESPR aspects, as well as describing key differences. However, this is only a high level comparison since it will also depend on specific provisions of the upcoming delegated acts, and should be revisited at that time (Table 1).

ESPR Aspects	How SSbD Guidance Applies	Key Differences
Durability	SSbD supports long-lasting material choices, robust design, and preventive hazard minimization.	SSbD less prescriptive on minimum durability; ESPR can set threshold requirements in delegated acts.
Reliability	Reliability assessed as part of product safety/function in iterative SSbD evaluation; avoids failure risks.	SSbD lacks operational reliability benchmarks; ESPR sets clear product-level metrics.
Reusability	SSbD prioritizes design for reuse, modular structures, safe materials enabling repeated use cycles.	ESPR requires traceability via DPP; SSbD focuses on design principles, not always full DPP.
Upgradability	SSbD encourages modularity, safe interfaces for upgrades, reducing hazardous waste from obsolete parts.	No formal upgrade pathway in SSbD; ESPR mandates it for some product groups.
Repairability	Emphasizes design for safe, easy repair by minimizing toxic/hazardous components and enabling access.	SSbD guidance lacks details on repair procedures/ scores, while ESPR can require a minimum level of reparability (possibly combined with a reparability score)
Maintenance	Regular safe maintenance is supported by SSbD through material choices that avoid harmful exposure.	ESPR may set standards for documentation and replacement part supply.
Refurbishment	Advocates for materials/processes that allow safe refurbishment, minimizing hazardous chemical residues.	ESPR can set a requirement which ensures a product can be refurbished; SSbD focuses on design intent.
Remanufacturing	Promotes material/product re-use by verifying absence of hazardous legacies through iterative assessment.	ESPR requirements can mandate possibility to remanufacture; this is complemented by SSbD's circularity assessment.
Recycling	SSbD calls for avoidance of substances that hinder or contaminate recycling and for robust circular design.	SSbD guidance is principle-based, not always product specific; ESPR sets binding requirements.
Recovery of materials	SSbD promotes design choices that support circularity.	Recovery is best considered at design stage to make sure materials are designed for recovery and re-use; more challenging to define under ESPR for final product.
Substances of Concern	Core SSbD principle is elimination/minimization of	ESPR can specifically lists regulated substances and mandate reporting,

ESPR Aspects	How SSbD Guidance Applies	Key Differences
	hazardous substances at molecular, process, and product level.	as well as prohibit the use of certain substances of concern which hinder reuse or recycling of products.
Energy Use/Efficiency	SSbD supports energy-efficient solutions and process designs that minimize total energy lifecycle impact.	ESPR can enforce product-level energy performance requirements where applicable.
Resource Efficiency	Advancing circularity, LCA optimization, and minimum environmental pressure is central to SSbD guidance.	SSbD is typically voluntary; ESPR can specify resource consumption limits.
Recycled Content	SSbD requires evidence of safe recycled inputs—no contamination, traceable flows, fit-for-purpose testing.	SSbD does not mandate fixed recycled content; ESPR may require content minimums.
Environmental Footprint	LCA and environmental impact minimization are central to SSbD assessment tiers (Simplified—Full).	ESPR can mandate environmental footprint disclosure and thresholds by product group.
Generation of Waste	SSbD seeks to minimize hazardous and non-hazardous waste across product lifecycle, through design and process choices.	ESPR can require specific protocols for waste reduction and reporting.

Table 1: Where SSbD guidance can and cannot be applied to ESP

Interviews with JRC also revealed that JRC is working on a compliance document that will allow companies to determine how well they have been following SSbD. This warrants a watching brief as it could be an important adjunct to including SSbD parameters in ESPR delegated acts. This recommendation is included in chapter 5.2.7.3 under policy actions. (see also Chapter 14: Documentation of updated JRC guidance document).

2.3 SSbD-type principles are being used to address ESPR aspects

Many principles are already integrated into business models of some companies and are addressing ESPR aspects, but not on purpose. Terms like "SSbD" or "ESPR" aren't used by companies today because ESPR requirements haven't been specified yet in delegated acts, and most companies interviewed say they aren't familiar with SSbD or haven't heard of it.

As well, in cases where companies have developed types of Digital Product Passports, difficulty has been experienced in obtaining SSbD-oriented toxicological profiles of ingredients. The hope is that mandatory requirements under ESPR will push suppliers to make more information available. This is a significant development, because it reveals that frontrunner companies that assemble final products actually want mandatory regulations so that suppliers will provide the data.

> *We developed for our Cradle to Cradle Certified® HAVEP ReWork a Digital Product Passport [*mandatory under ESPR*] years ago based on the chemical composition of our products and their (eco)toxicological profiles. If this information is not included, any Digital Product Passport is incomplete from our perspective. However, it is extremely difficult to obtain that information in the supply chain without strong legislative pressure. (Kees Timmermans – HaveP)*

Companies use SSbD-type approaches as competitive value propositions

This approach is due to their work on voluntary certifications and internal company goals that treat those approaches as business opportunities. This finding aligns with JRC case studies[15] that show companies were implementing SSbD-related principles in pilot studies.

> *The driver for us was purely commercial. We wanted to obtain the highest possible level under the Cradle to Cradle Certified® program to show the world we are leading in our industry. (Wouter Dijkman – Auping)*

Case studies show that companies often align with ESPR parameters by implementing the JRC SSbD principle of 'design for end of life'. The term 'end-of-life' in this case refers

[15] CALDEIRA, Carla, et al. "Safe and Sustainable by Design chemicals and materials-Application of the SSbD framework to case studies." (2023).

to a systems approach that considers characteristics of products and their components throughout iterative cycles of design, production, use and end-of-use / re-use.

> *We have the largest repair center in the US in where we get all the stuff back. We can take that data and feed it back into design to engineer new products that are more repairable or circular... Eventually getting to the point where we have an end of life solution, not just for every product that we sell, but for everyone that we've sold. (Matt Dwyer – Patagonia)*

Crossover matrices developed for this study demonstrated than many ESPR parameters affect each other, and many SSbD principles affect multiple parameters. This suggests that using the SSbD whole systems approach could help to solve the siloing of individual ESPR parameters.

> *Foams are a critical issue for us. We removed them from some of the armpads in our chairs because of health and circularity, to create a homogenous component. However, in the old situation it was easier to replace only the most wear-and-tear prone layer or material during refurbishment. In the new situation we have to replace a complete component.*
>
> *(Lizzy Stuyfzand – Ahrend)*

3 How can an SSbD approach to product design help set product-specific Ecodesign requirements?

Potentially hazardous substances have enormous impacts on many aspects of product design and circularity. In practice, this means that by applying SSbD's approach early in the supply chain, it should become easier for product designs to comply with ESPR. A crucial scenario identified by DGE in an interview envisions delegated acts that treat virgin and recycled material equally.

> *It means that what you are allowing to go back from recycling to the new cycle should fulfil the same requirements as you put on virgin materials, so there should be no disparity between requirements on something produced from virgin materials and something that you reinject [*into*] the cycle. (Policy officer Sustainable Chemicals Unit DG Environment)*

This in turn implies that delegated acts will have to consider overall chemical composition beyond substances of concern.

However, companies face challenges in practically applying this in relation to various SSbD aspects, as described in the following more detailed analysis.

Durability and reliability

Durability per se is not part of SSbD, but it is implicit in 'consider the whole life cycle' and 'design for end of life' and is often emphasized by product designers. Selecting more durable materials and integrating durability early in the value chain allows component suppliers (for example, hinge or drawer-slide manufacturers) to offer parts that are less prone to wear and failure, which makes it easier for furniture brands to meet ESPR durability requirements. The same up-stream choices in high-quality materials and engineering directly improve reliability in real use, increase time between failures, and reduce maintenance needs for the finished furniture or textile products. The front runners show that this is already causing supply chain partners to revisit their business models, but it also conflicts sometimes with safe materials choices.

> *Since Ahrend's successful refurbishment program through our Circular Hub, our main supplier for furniture components has asked to join in on our refurbishment activities. They have to reconsider their business model as they see a rising market for refurbished office furniture. (Lizzy Stuyfzand – Ahrend)*

In textiles, durability is often achieved by mixing materials or introducing additives to fabrics like PFAS in outdoor clothing. This presents a huge challenge for design for end of life as decades of products containing PFAS now have no viable next use scenario.

> *We're looking at a legacy contamination of decades. We have actively recovered lots of our old garments which are now unfit for recycling because they still contain PFAS.*
>
> *The recyclers also don't want these materials because PFAS volatizes at high temperatures typically needed for recycling. Same is true for other chemicals like hexavalent chromium. For PFAS containing materials, unfortunately incineration is preferable over recycling with current technology. (Matt Dwyer – Patagonia)*

The tension between durability and safe materials is an ongoing challenge that carries one important lesson: If safe materials are sacrificed for durability, this can lead to serious downstream problems with recycled content and should be avoided, also in the delegated acts.

> *Using SSbD, the whole lifecycle is taken into consideration so undesired contaminations during recycling can be prevented. Getting rid of hazardous chemicals in the recycling process is not easy so this helps reach ESPR goals as it makes the recycling process easier, faster and less costly. (Project Officer SSbD – JRC)*

Reuse, upgrade and repair

By designing components for end-of-life and considering the full life cycle, SSbD encourages modular construction, standardized connectors and easy, non-destructive disassembly, which in turn makes it much easier to reuse parts or reconfigure furniture and textile products without damage. These same modular, standardized and easily detachable features support upgradability, because modules and spare parts can be swapped or added over time, and they also support repairability when combined with reversible fasteners and good access, lowering repair skill requirements and costs for manufacturers and users.

> *We work with disabled people from a social workshop in our Circular Hub. They can refurbish our Cradle to Cradle chairs largely by themselves with simple tools in a few minutes. The non-Cradle to Cradle products still have to be upholstered externally which drives up costs significantly. (Dionne Ewen – Ahrend)*

Maintenance, refurbishment and remanufacturing

SSbD-aligned material selection can lower maintenance needs by designing components that can be taken apart and reattached without damage, so maintenance tasks become simpler and less disruptive. The modular, disassemblable architecture promoted by SSbD also underpins refurbishment and remanufacturing, because components can be removed, restored or replaced, and then reassembled into products that meet quality requirements for second or subsequent life cycles.

> *We removed glues between the foam and the upholstery of our chairs for health and circularity reasons which led to a lot of internal discussion because the increased friction between the two layers negatively impacts product longevity. However, this design improvement is key for our refurbishment and next life program and allows us to keep chairs in use way longer over multiple use cycles. (Lizzy Stuyfzand – Ahrend)*

Recycling and material recovery

When products are composed using a limited number of well-characterized materials, designed for non-destructive disassembly and for recyclability, SSbD can help up-stream suppliers enable material pooling and efficient recycling that ESPR will probably require in delegated acts. These same features improve the possibility of recovering materials at end-of-life by making it easier to separate clean material streams and access recoverable fractions, so recyclers can work more efficiently and with better yields. However, frontrunners observe that big players need to get on board with this in order to scale the approach.

> *Due to the difference in our mattresses compared to conventional ones we have had to set up a separate logistics and recycling mechanism with dedicated partners. We want to make sure the materials are actually recycled in new mattresses and not in t-shirts that end up in incineration after use. To scale this approach, we need big players like IKEA to start using the same design and materials as we do in their mattrasses. (Wouter Dijkman – Auping)*

Substances of concern

Using SSbD to minimise or remove hazardous substances early in the supply chain reduces future liabilities, facilitates compliance with REACH and other chemicals legislation, and lowers the cost burden on furniture and textile manufacturers, especially when they can pool efforts around safer material choices. In practice, this can become part of both a compliance strategy and a market proposition, as shown by companies that phase out Substances of Concern as part of a "safe for intended use" narrative.

> *We know we still have health issues to solve because polyester contains a.o. antimony. This is not negatively impacting our consumers, but we do know it is being released during recycling and we want to work together with the polymer suppliers to solve this issue.* This is where we need bulk demand. *(Wouter Dijkman – Auping)*

The JRC suggest SSbD will help in these types of innovation journeys, so a marketplace is developed for the chemicals manufacturing industry to design healthier and improved alternative materials.

> *The SSBD is a change of mindset in the sense that this would be something that we integrate in our daily businesses and we shouldn't be waiting for whether we have connections with regulations or not. Because regulations in the end are very limited. They have to be very certain. They have to be science based, robust enough to give certainty about complying with the framework. This means there will be always some things not addressed in regulations. (Project Officer SSbD - JBC)*

The assumption being that voluntary frameworks such as SSbD have appeal to the market because industries will see the benefit in applying it.

> *SSbD could help anticipate regulatory requirements; ESPR but for instance also updates to REACH. We think that if a company follows the SSbD approach, it will be easier, faster and/or more cost efficient for them to achieve the requirements of the specific regulations such as ESPR. (Scientific officers – JRC)*

Through large (research) projects at the European level, for instance under Horizon, JRC expect that more and more companies will start using the SSbD framework.

> *The drag of success, if you have successful frontrunners, it's not to be underestimated I think. (Scientific officer – JRC)*

The view is challenged by the interviewed DG-Env members, who state that 'waiting for innovation to solve the problem' might not always deliver the best outcomes and regulatory pressure is a necessary tool in restricting harmful chemicals.

> *Once there is a regulatory requirement or a restriction or a ban for something, this is the element that creates the highest pressure for especially the chemical industry to move on something. (Policy officer Sustainable Chemicals Unit DG Environment)*
>
> *The objective of the measures (ESPR) is not to improve the health and safety of the products, but at the same time the requirements cannot have as a consequence a negative impact on the health and safety of the products. So we have to manage these trade-offs in the development phase of the measure and if we cannot address those trade-offs then we cannot proceed with the measure because in the end the health and safety related aspects of the products are more important than how durable, for instance, the quality is. (Policy Officer at EC – DG Env)*

It was also noted by DG-Env that ESPR has the legislative power to act on Substances of Concern where they are a barrier to recycling or circularity of products.

> *In those situations, ESPR complements the existing chemical safety framework by having an additional possibility of setting restrictions that REACH doesn't cater for. (Policy Officer EC – DG-Env)*

Energy, resources and recycled content

Incorporating energy efficiency and renewable energy considerations into the design and production of each component can make it easier for finished furniture and textile products to meet ESPR energy-use and efficiency parameters. SSbD also promotes resource efficiency by encouraging modularity, safe and recyclable materials, and repairable constructions, which together reduce the number of materials and components required and support the use of sustainably sourced or circular feedstocks,

including characterized recycled content that avoids downcycling and preserves material quality.

However, most (chemical) recycling is energy intensive and has a carbon footprint. The challenge companies face – especially before recycling is brought to scale – is how to match efficiency requirements with effective circularity goals and ambitions.

> *Why are we shipping discarded fishing nets around the world? Ocean freight is rather efficient and cheap, so that's actually not the math that we're worried about. But chemical recycling is not cheap and it is energy intensive. So we did a pretty exhaustive LCA [..] and found that it's more efficient in some cases than traditional post-industrial material and within striking distance from a cost perspective of that. But it took us seven years to do everything and we need big players like Interface and Toyota to bring the demand to scale. Patagonia are never the scaling partner; we're the activation energy partner. (Matt Dwyer – Patagonia)*

Environmental footprint and waste

Because SSbD uses a life-cycle perspective - it aims at restorative and regenerative outcomes, which in turn can lower the environmental footprint of furniture and textiles, for example by enabling safe biocompatible end-of-life routes such as composting. As an example; in the early 2000's, Rohner Textiles in Switzerland redesigned production to eliminate toxic chemicals, creating the biodegradable "Climatex" fabric, and turning fabric cuttings into compost for strawberry farms, transforming waste into nutrients.[16] By matching raw material choices to realistic waste-management capabilities and applying principles such as design for disassembly, characterized content and modular design, SSbD can help companies reduce the generation of waste during production, use and end-of-life stages in line with ESPR expectations.

Some interviewees called for a broadened perspective which goes beyond the focus on carbon emissions and climate impacts.

> *We see that our market is completely focused on Co2 emissions and climate impacts. This drives our internal sustainability strategy towards these two indicators. Ahrend wants to give similar priority to important topics like health, circularity and design for disassembly, but the market incentive is a lot smaller. (Lizzy Stuyfzand – Ahrend)*

[16] Gorman, Michael E. and Werhane, Patricia H. and Mehalik, Matthew M., Rohner Textil Ag (a). Darden Case No. UVA-E-0107, Available at SSRN: https://ssrn.com/abstract=908146 or http://dx.doi.org/10.2139/ssrn.908146

4 What specific recommendations for Ecodesign requirements for textiles and furniture can be provided based on an SSbD analysis for these product groups?

The major recommendations arise from conclusions drawn in the case studies as well as interviews with various companies. The conclusions are listed first, then followed by recommendations made by interviewees. Together these were assimilated into policy recommendations as described in the next chapter.

We analyzed studies on textiles and furniture materials composition issues, also drawing from EPEA's own experience with these materials. The findings from that analysis show clearly that toxic substances in furniture and textiles stretch far beyond Substances of Concern, thus supporting the case for ESPR delegated acts to address overall chemical composition of products according to SSbD principles.

4.1 Findings from case studies

Detailed case studies were produced and are available in the supplementary information to this study. Only the findings are summarized in the following. Readers interested in a more detailed analysis are referred to the actual case studies.

4.1.1 Textiles - C&A

The C&A case study found that C&A is a leading example of operationalizing circularity, ingredient transparency, and third-party certification for apparel. C&A used the Cradle-to-Cradle certification framework[17] to guide their product development toward safety and sustainability by design. C2C certification levels indicate specific sustainability and safety standards as defined by the Cradle-to-Cradle Certified Product Standard, a multi-attribute product certification that assesses products and materials for safety to human and ecological health, design for future (re-)use, and sustainable manufacturing.

The case study reveals that sector progress depends on practical, collaborative supply chain work, structured data sharing, and external audit. It also highlights the ongoing gaps in post-consumer infrastructure and holistic environmental impact measurement. The following conclusions can be drawn from C&A/Fashion for Good denim and t-shirt projects:

[17] https://c2ccertified.org/get-certified

Rigorous Ingredient Assessment and Transparency are Essential

Compiling and publicly sharing a complete Bill of Materials (including all chemical inputs down to a minimum 100ppm threshold) enables deeper supply chain visibility and lays the groundwork for third-party verification. This level of transparency is a requirement for a.o. Cradle to Cradle Certified® and is essential for material health screening and for enabling replication of best practices by others. AI and automation such as Haelixa used by C&A[18] are crucial tools to enable such assessments and make them cost-effective. ESPR delegated acts on textiles can set information requirements (DPP information) that would guarantee this level of transparency.

Circular Design is Feasible and Measurable

Garments can be designed for circularity - either via composting (for mono-material t-shirts) in the biosphere or through technical cycling for recyclable denim, if all components are selected and verified for compatibility with post-use recovery streams. The case shows that a measurably high level of safety and sustainability is achievable with careful supplier collaboration, material assessment, and process documentation.

Addressing Industry Barriers Requires Iterative Problem-Solving

The technical and operational challenges documented during the projects - such as thread strength, blend compatibility, dye and chemical selection, and production productivity - can only be solved through repeated cycles of R&D, supplier engagement, and transparent reporting of both successes and failures. These are all considerations of SSbD frameworks.

Certification can drive iterative supply chain improvement

Pursuit of Cradle to Cradle Certified® Gold certification prompted significant changes in material, chemical, and process choices, driving environmental and health improvements beyond compliance. Independent audits and verification were instrumental to these advances, and certification requirements actively shaped supplier behavior and output.

[18] https://haelixa.com/customer-story/ca-enhances-organic-cotton-traceablilty-with-haelixa/

Logistics and End-of-Use Pathways Remain Bottlenecks

While circular design and certified material health can be achieved at the product level, the C&A project acknowledged that broader infrastructure for large-scale post-consumer collection, sorting, and recycling is lacking. Pilot programs and instructions for product return are helpful, but sectoral and logistical barriers to universal textile recovery persist.

4.1.2 Furniture - IKEA

IKEA has such a broad range of products that it bears mentioning which product groups it is focusing on for sustainability[19]. This can provide context for the conclusions.

IKEA's sustainability work in furniture is organized around the main home-furnishing categories where it can reduce material use, increase recycled/renewable content, and enable circular use (repair, reuse, recycling). Within furniture, the key product group focuses are:

a. Wooden furniture and storage (e.g., beds, tables, wardrobes, cabinets, shelving), with a target for all wood to be from more sustainable sources (FSC-certified or recycled).
b. Seating and upholstered furniture (sofas, armchairs, mattresses) where covers, fillings, and textiles increasingly use recycled polyester and other recycled/renewable fibers, and where buy-back, resell, and mattress recycling programs extend product life.
c. Children's furniture (e.g., extendable kids' beds, storage and study furniture) designed for long life, adaptability, and use of renewable or recycled materials.

[19] Sources for this section include.
1. https://www.ikea.com/ca/en/files/pdf/72/bb/72bbd2c5/peopleandplanetpositive_a.pdf
2. https://www.ikeasocialentrepreneurship.org/sitecore/content/nl/aboutikea/home/sustainability/a-world-without-waste/why-the-future-of-furniture-is-circular?sc_lang=en
3. https://www.ikea.com/ca/en/this-is-ikea/sustainable-everyday/sustainable-materials/
4.https://www.ikea.com/ch/en/product-guides/ikea-guide-sustainable-furnishings-and-living-pubb93444f0/
5. https://www.hagainitiativet.se/en/inlagg/41-millions-of-ikea-furniture-are-given-a-new-life-by-a-circular-business-model/
6. https://www.ikea.com/es/en/ideas/muebles-y-productos-sostenibles-de-ikea-pub239fdf60/
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8. https://www.forbes.com/sites/christophermarquis/2025/01/14/ikeas-circular-economy-redefining-sustainability-in-the-furniture-industry
9. https://www.ikea.com/au/en/cat/sustainable-materials-700199/
10. https://www.ikea.com/ca/en/this-is-ikea/sustainable-everyday/
11. https://www.ikea.com/ca/en/this-is-ikea/climate-environment/the-ikea-sustainability-strategy-pubfea4c210/
12. https://www.ikea.com/ca/en/campaigns/sustainable-living-shop-pubffaf7120/
13. https://www.designorate.com/ikea-sustainable-design-strategy-part2/
14. https://www.weavabel.com/blog/is-ikea-sustainable-exploring-the-homeware-giants-practices
15. https://www.ikea.com/us/en/files/pdf/6c/5b/6c5b7acd/people-and-planet-positive-ikea-sustainability-strategy.pdf

d. Textiles and soft furnishings linked to furniture (sofa covers, cushions, curtains, bed textiles) using organic or recycled fibers and designed to be removable, replaceable and recyclable, which supports circularity of seating and bedroom ranges.
e. Furniture made from fast-growing or renewable materials such as bamboo and rattan (tables, chairs, storage, lighting shades), prioritized because they regenerate quickly and can replace slower-growing wood species.

These product categories sit under IKEA's broader People & Planet Positive strategy, which commits that by 2030 all home-furnishing products (across every furniture category) will be designed for circular use and made only from renewable or recycled materials.

While there are conflicting reports on its level of commitment to sustainability, and such reports vary depending on the IKEA business unit being studied, it appears as though IKEA is attempting to use SSbD principles and meet ESPR requirements without explicitly mentioning them. IKEA says it is using AI as a tool to accelerate progress. As well, IKEA transparently identifies problems and room for improvement.

ESPR parameters/ SSbD principles can drive a business case

IKEA has proven that commercial success is compatible with ESPR parameters and SSbD principles. The overall approach is part of the company's core offering to consumers to improve value.

Modularity is a universal enabler

A success of the IKEA approach has been designing for modularity. While modularity on its own is difficult to quantify across or within sectors, it is clearly facilitating measurable parameters such as maintenance, assembly, disassembly, reusability, and recyclability. The policy perspective on this is clear: modularity is a core driver for enabling ESPR and SSbD in furniture and textiles. Modularity in textiles refers to designing garments or fabrics as assemblies of interchangeable, detachable components that can be easily reconfigured, repaired, or upgraded without discarding the entire item. Example: removable and replaceable seat covers. Modularity can be made measurable by the different parameters that it affects. Many SMEs who supply IKEA also design for modularity to fit their components into flat-pack systems, standardized component groups, and products engineered for self-assembly and scalability.

SSbD & ESPR preparations are only starting at companies

IKEA has not yet published information explicitly on how it addresses SSbD or ESPR. This suggests that even large global companies with headquarters in Europe are not yet in a public dialogue or making claims. This is consistent with our findings from other cases and investigations, that many companies have not yet publicly positioned themselves on SSbD and ESPR. In turn this points to a need for an EC program to inform companies.

Adoption of SSbD & ESPR is coincidental rather than explicit

Despite this, IKEA is coincidentally addressing SSbD and ESPR through its established initiatives, and is vigorously communicating those publicly. Example: The IKEA Sustainability Report FY24,[20] published in early 2025, details progress on circularity, renewable materials, and waste reduction, with dedicated sections on enhancing in-store Sustainable Living Shops. These overlap with SSbD and ESPR without explicitly mentioning them. Independent evaluations seem to corroborate some IKEA claims. A reliable independent evaluation is the 2025 case study "IKEA Sustainability: A Case Study & Eco Guide" by Play It Green[21]. However, the level at which IKEA is explicitly addressing SSbD & ESPR (i.e. quantifiably) would require a far more detailed examination due to the thousands of products that it sells.

Data standardization is a challenge

Because IKEA is vertically integrated in many aspects, it has the advantage of being able to specify and verify its supply chain, from materials sourcing onwards. However, independent analysis and its own reports suggest that IKEA faces challenges with standardizing and harmonizing the mass of data that it receives from its supply chain actors, when it comes to aligning that data with e.g. Digital Product Passport requirements[22]. IKEA has communicated on the data issue since its 2022 sustainability report and is taking steps to address it, suggesting a sustained effort. The data alignment issue in EPEA's own experience over the years cuts across many companies and sectors and was mentioned again several times in the interviews, so we flag it here for special policy attention.

[20] https://www.ikea.com/global/en/images/IKEA_Sustainability_Report_FY_24_2025_01_27_2c35989733.pdf
[21] https://playitgreen.com/the-sustainability-success-of-ikea-a-case-study/
[22] (Friis, E., & Mac, A. (2025). *Driving Circularity: The Role of Digital Product Passport in the Swedish Furniture Industry*. Master's thesis, School of Business, Economics and Law, University of Gothenburg)

AI as a main driver to simplify complexity

IKEA has responded to those challenges by investing heavily in AI to manage core aspects relating to SSbD and ESPR, as described on pp. 19-20 of the IKEA case study section titled "IKEA deploying AI for Sustainability". This warrants major attention for policies that encourage companies to use AI to facilitate the use of SSbD in meeting ESPR requirements, and to meet ESPR requirements independently of SSbD. It is especially relevant for SMEs in the IKEA value chain, with the potential to resolve complexities in regulation and supply chain management.

Addressing Substance of Concern is a major challenge

It is no surprise that a global company such as IKEA faces challenges adapting to regional, national and local regulations that might impact how it meets SSbD principles and ESPR parameters relating to chemicals. This especially applies to Substance of Concern. The evidence suggests that IKEA does have a program to address Substances of Concern systematically. Adapting to regulations could become easier when harmonized Ecodesign requirements for furniture will apply across the EU and supersede local or national requirements. However, the challenge will remain for products produced outside the EU that then enter the EU.

Recycled content can be a barrier to recyclability

Technical challenges remain with common materials such as fiberboard used in many IKEA products. Recycled content does present a significant challenge by IKEA's own admission. However, it is also improving the amount of recycled content by improving the technology and participating in the Microfibre consortium. This points to the need for more R&D on recyclability in narrowly defined product categories.

IKEA is reconciling this conflict through a rigorous chemicals content program, where it has embraced the concept of safe materials to facilitate recyclability. Because the ESPR will look at both recycled content and recyclability requirements, this may help to solve the conflict, but the technical challenges in making recycled content recyclable will still remain, and take time for companies to resolve through R&D.

Materials pooling serves as an enabler

IKEA appears to address the conflict with vertical control over its supply chain, which facilitates deep knowledge of materials content, and enforceability of standards. This allows IKEA to serve as a "materials pool" for its suppliers by bulk purchasing component materials such as fibre for fibreboard. This points to a policy need to facilitate materials

pooling among SMEs by leveraging the purchasing power of the large companies that they sell to.

Reverse logistics can support reuse but has to be customer-centric

IKEA has led the way in its customer take-back and product "Second-Chance Market" resale program. Examples of barriers include:

- Customers having to bring back fully assembled products that they originally brought home in a flatpack system and assembled themselves. While the disassembly process is facilitated by IKEA designs, it is still time-consuming.
- Many products are excluded from the program due to sanitary and other concerns.
- To solve those barriers, a new part of IKEA's recommerce strategy is using AI to create a peer-to-peer platform[23] that allows IKEA customers to resell IKEA products to each other. This helps to overcome the problem of reselling products that might be excluded from IKEA's resale programme.

Assembly and disassembly require customer-centric instructions

IKEA has been working to improve its instructions for assembling products. This points to the priority for all companies of assuring that assembly instructions are easy and clear, using symbols wherever possible to facilitate multiple languages.

4.1.3 Overall findings

It is important to emphasize that C&A and IKEA are not yet explicitly linking SSbD to ESPR, due to the early stages of ESPR deployment, which in turn makes drawing conclusions about SSbD and ESPR linkages problematic. However, the case studies make it clear that these companies do regard SSbD-type approaches as viable business cases rather than only compliance obligations. They both see rigorous attention to product composition as a crucial part of that business case. They both see supply chain engagement as a central key to implementation. They both have shown that circularity based on SSbD-type approaches is measurable and quantifiable. Those factors seem to bode well for SSbD and ESPR adoption and linkage in future. However, data standardization, the availability of recyclable materials, and data volume & complexity remain significant barriers. Potential solutions being tried include using AI for data gathering and interpretation, R&D into making materials recyclable, modularity in design, high level certifications, and extensive supply chain engagement. Facilitating

[23] https://www.ikea.com/pt/en/second-hand/marketplace/

those solutions is worthy of attention by policymakers. These are addressed under Section 5 of this report.

4.2 Interviews - basic concerns by companies & how policymakers could address these

In addition to the individual quotes excerpted from interviews throughout this report, as well as conclusions from the case studies shown previously, a clear set of common concerns and recommendations came from many interviewees. These are distinct from but related to recommended policy actions in chapter 5.

The interviews revealed that some companies are already using certification schemes that reflect SSbD aspects. For example, one innovation journey resulted in Auping Evolve,[24] the world's first circular mattress which is completely based on polyesters instead of multiple layers of complex and hard to recycle materials.

> *Through our work on Cradle to Cradle, we found out that our products contain loads of chemicals that we ideally want to phase out. We understood that we needed to move away from some conventional materials, like PU foams in mattrasses, completely because optimizations were only going to get us so far. (Wouter Dijkman – Auping)*

However, Auping now fears that their efforts are not necessarily being recognized under upcoming and mandatory EU regulations such as ESPR:

> *We are afraid that under industry pressure, the ambitions in the various regulations will be low and non-transformative. Our circular mattrasses are a completely different product compared to conventional mattresses and as such evaluation methods for conventional mattresses fail to recognize some of the environmental gains.*
>
> *In anticipation of upcoming legislation, we are now **slowing down** our circularity activities. Instead, we feel forced to spend a lot of time and effort into lobbying for higher ambitions for our industry at the national and EU levels. (Wouter Dijkman – Auping)*

This concern is shared by several frontrunner companies – using SSbD to enhance or exceed ESPR compliance will not be recognized in the legislation and delegated acts.

[24] https://www.auping.com/nl-be/over-auping/duurzaamheid/opbouw-van-de-evolve-matras

The interviews also revealed that companies see several key SSbD/ESPR aspects that could be addressed by Dutch experts who have a seat in the Ecodesign Forum in discussions surrounding delegated acts.

- Manufacturers need economy of scale to convince suppliers to start improving their materials and components for health and circularity. Achieving this economy of scale depends on a favorable regulatory environment for widescale adoption. (Patagonia, Auping, Ahrend, Moooi, HaveP).
- Regulations that promote incremental improvements are often a barrier to circularity. Legislation is typically written on 'business as usual' with incremental improvements. However, major innovation in many cases is needed to go from linear to circular products and materials. Because legislation is mandatory, its incremental approach may threaten the development of new and truly circular products because time and financial budgets are spent on compliance. (Auping, Patagonia).
- Frontrunners adopting SSbD-styled approaches have expressed concerns that they might not see their efforts and investments recognized under future ESPR delegated act requirements. They fear that the delegated acts will be structured by large players to dilute the intentions of the ESPR framework, leading to requirements that do not recognise important SSbD-type innovations. (such as Auping Evolve)
- Frontrunners are hoping that SSbD can contribute to bringing material transparency and material health to the mainstream and into the dialogue between suppliers and manufacturers. At the same time, they are skeptical that anything voluntary like SSbD will work. Thus, it would be important to embed some SSbD aspects such as information requirements on full chemical composition into ESPR delegated acts.
- SMEs say they often aren't represented in the delegated act development process due to a.o. lack of resources. The Netherlands could remedy this by pressing for the delegated acts to include factors important for SMEs. Prime examples described in interviews include the following which are covered under policy recommendations in chapter 5:
- While recyclability is part of ESPR, 100% chemically characterized products that promote safe and highly effective recycling are not recognized in ESPR, which only requires data on Substances of Concern. Companies that invested in defining their products will thus not benefit unless the delegated acts address overall chemical composition.
- ESPR delegated acts need to offer transparent harmonized quantification methods and measurable indicators specifically for material health and circularity in order to make transparency measurable and comparable. Those are overlooked in current (carbon focused) metrics and reporting obligations.

As a result, manufacturers struggle to find metrics to do comparisons with peers on health and circularity of materials- and product level (Ahrend, Moooi, Patagonia). Harmonization is covered in chapter 5, and the concerns expressed here offer more detail as to what that harmonization should focus on.

- Likewise, systems need to be put in place that ask for - or process - data related to material composition and recycled content. Everyone downstream is currently using or developing their own way to ask the up-stream suppliers the same type of data/questions. ESPR does provide for some harmonization, and as part of that harmonization on composition and recycled content (at least) the European level would be beneficial. (Ahrend, HaveP, Moooi, Auping, Hunter Douglas)
- Clarify how SSbD could be used to e.g. restrict certain substances that hinder circularity, even if they are not Substances of Concern. As described in the terminology section of this report (p. 8), there does seem to be scope in ESPR for the delegated acts to go beyond Substances of Concern to address other composition issues,
- Resolve uncertainty over which types of materials might be deemed recyclable. Some companies have invested resources making materials in their products recyclable, but are concerned that the delegated acts might not recognize such materials as recyclable material. This uncertainty is hampering further investments.
- Make sure that carbon calculations reward keeping products in service. The carbon advantages of keeping a product in multiple loops for e.g. 25 years might not be recognized in carbon calculation methods. This is a disadvantage for furniture companies who invested in making their products refurbishable.

All of those items pose opportunities for policymakers to influence their development in the delegated acts.

5 What recommendations can be made for policymakers to effectively combine SSbD frameworks with the formulation of design requirements under the Ecodesign Regulation?

Structure of Recommendations

Based on literature reviews, company interviews, case studies, & Steering Group feedback, EPEA recommends actionable policies that could be used by Dutch and EU governments to incentivise companies to use SSbD principles in meeting ESPR parameters. Based on the Steering Group request to avoid being too prescriptive, we limited recommendations to a high level.

Product Level vs. Systems Level. Recommendations are organized into product & materials policies and systems level policies. Most recommendations are at the systems level, as this is where policymakers usually focus efforts.

Rationales. In many cases we included brief sections on the rationale for such recommendations so that policymakers could easily access those, instead of having to fish through other chapters of the report to see why we made the recommendation.

Priorities

The Steering Group also requested that EPEA provide its own analysis of which policies to prioritise. So EPEA marked these.

- Early priorities are based on our experience what might be achievable in the near future.
- Mid-term priorities might require more time-consuming institutional changes.
- Items not marked as priorities could be implemented if resources permit, or farther down the road.

Implementation levels

Most of these actions can be implemented at national and EC levels because national governments and the EC each procure products and services, support R&D, and enact related legislation.

NOTE: Refer to 6.1 Examples of Policy Tools Used by Governments to Incentivise Companies for examples of how governments are using policy tools to incentivise companies.

5.1 Product and Materials Policies

5.1.1 Early Priority - Support Up-stream Focus on Material Composition in the formulation of ESPR delegated acts and in government incentive programmes.

Rationale

This is especially important given that several companies interviewed said that true recycling and recyclability are only achievable if chemical composition is known and safe. Otherwise, companies end up with problematic content in their recycled materials and could face liabilities for resulting unintended impacts. Companies such as Patagonia face this problem directly and made it clear that in their view the circular economy will only scale up if the content of materials is known.

> *We need to recycle more, but have to consider chemical safety alongside increased recycling rates. And the presence of hazardous chemicals in recycled materials prevents the upscaling of the circular economy.*[25]

This position on the need to fully characterize materials for circularity is strongly supported by a range of studies over the past decade:

A) Schenten et al. [26]

- Argues that long-term EU chemicals and circular economy policy should move towards Full Material Declaration so companies "know the chemicals they are using" in all materials and can phase out problematic ones in loops, not only listed SoC.
- Emphasizes that partial SoC based schemes cannot guarantee safe secondary materials because unknown, currently unregulated substances may become problematic at recycling and reuse stages.

B) Ask REACH / ECHA-linked work on traceability of chemicals in products[27]

[25] Chemsec | PRESS RELEASE: Huge market potential in removing substances of concern from circular economy

[26] Schenten, J., Niebler, R., & Führ, M. (2023). *Traceability of Chemicals in Products for a Non-Toxic, Resource-Preserving and Climate Neutral Circular Economy: Policy Workshop for a Theory of Change – Workshop Report*. Darmstadt: Research group sofia, Darmstadt University of Applied Sciences, for the LIFE AskREACH project (LIFE16 GIE/DE/000738).

[27] "EU traceability of substances in articles: supply chain communication challenges and the perspective of full material declaration (FMD)" (elni Review, 2018)

- It concludes that full composition knowledge is necessary for robust risk assessment at product and material level and for futureproofing against new restrictions, going well beyond today's SVHC or SoC only duties.

C) ClientEarth, "Future-Proof and Prospering – How ESPR and chemicals rules should work together for a safe circular economy" (2024)[28]

- States that "only complete traceability of chemicals" (i.e., essentially full material declaration) can give legal certainty and protect circular business models when substances' status changes over time.
- Explicitly critiques SoC only approaches and recommends that ESPR and Digital Product Passports support near-total composition information for materials entering circular loops.
- Explicitly argues that the ESPR delegated acts can and should use their toolbox to address chemical content and safety in products, including by:
  - ensuring "complete traceability of chemicals" in materials placed on the market,
  - using delegated acts to require information on all "most harmful substances" and broader compositions,
  - treating chemical safety as integral to product sustainability, not something left only to REACH.

D) ECLASS / IDTA "Material declaration as the key to the circular economy" (2025)[29]

- Promotes "Total Material Declaration" for every product as "indispensable" information for circular economy, arguing that incomplete data blocks reuse while maintaining quality.

E) A 2021 study by ChemSec[30] addressed the issue and calculated the business opportunities of a circular economy without problematic chemicals in an effort to motivate industry.

The hidden costs of uncharacterized or harmful content are substantial. For example, recyclers may refuse to process certain material groups due to associated risks or in high disposal costs (see Patagonia example regarding PFAS).

[28] Baltic Environment Forum et al. (2024). *Future-Proof and Prospering: How ESPR and Chemicals Traceability Benefit Business and Support the Green Transition*. ClientEarth. Available at: https://www.clientearth.org/media/mkocymkn/espr_chem icals-traceability_2024-may-1-1.pdf
[29] ECLASS & IDTA. (2025). *Material declaration as the key to the circular economy*. ECLASS News. Available at: https://eclass.eu/en/news/news/material-declaration-as-the-key-to-the-circular-economy
[30] Chemsec | PRESS RELEASE: Huge market potential in removing Substances of Concern from circular economy

Despite or perhaps because of these many studies on the need for full product declarations, there are different views on which mechanisms to use, for example chemicals regulations or the ESPR itself.

ESPR policy makers at European level expressed during interviews their conviction that safety is sufficiently covered under other existing regulations such as REACH.

> *Every product (already) has to be safe, otherwise it's not allowed on the markets. (Policy Officer at EC – DG Environment)*

SSbD experts agreed that a lot is covered under other regulations, but that many chemicals in the market today are not assessed at all, or correctly assessed, or knowledge still lacks on how the chemicals are being used in the market. For example:

- ECHA has flagged thousands of substances with incomplete dossiers or major data gaps, not clearly identified as SVHCs or candidates for restriction[31]. Structural analogues of known hazardous substances, where some members are regulated but many close analogues remain on the market with little or no assessment[32]. This is especially true for textiles, where many substances used in production and finishes have not been fully assessed, as shown by recent EU work on PFAS[33] and circular textiles[34].
- REACH does not cover all ingredients that may negatively affect recycling.

When all of this is taken together, the main question becomes whether ESPR delegated acts should mandate full product declarations within the broad mandate provided by the legislation, or whether other chemicals legislation is adequate.

[31] European Chemicals Agency (ECHA). 2022**.** *Faster action on groups of harmful chemicals: Annual report 2021 – Integrated Regulatory Strategy.* Helsinki: ECHA.
[32] Natsch, A. (2023). "ECHA ARN documents: chemical grouping without a toxicological rationale?" *Archives of Toxicology***,** 97, 1071–1086.
[33] European Environment Agency (EEA). (2024). *PFAS in textiles in Europe's circular economy.* EEA Report, Zero Pollution Framework series, Report SR9. Luxembourg: Publications Office of the European Union
[34] Bour, A., et al. (2023). "Implications of circular textile policies for the future regulation of chemicals in textiles." *Science of The Total Environment*, 896, 164995.

Solutions:

Answering that would require a deeper dive into the legal mechanisms of ESPR and delegated acts. However, it seems that the mandate described in the legislation is quite broad in this respect, In particular, Article 5(1) states that ecodesign requirements *"shall relate to the product aspects referred to in Annex I,"* and Annex I lists, among others, *"durability, reusability, reparability, upgradability, recyclability, the possibility of remanufacturing and recycling, the use of substances of concern, energy and resource efficiency, the use of recycled content, and environmental impacts including climate impacts over the product life cycle."*[35] Many of those aspects could benefit from more complete declarations of product composition to make sure they meet those criteria. It seems that the delegated acts could mandate such requirements, but to be certain this is worthy for policymakers to explore.

Experience also suggests that ingredients already designated as "safe for their intended use" under rigorous certification requirements are easier and less expensive to use than trying to find hazards in the exponentially larger group of undefined and poorly characterized content. Over the years, a significant body of materials designated "safe for intended use" has emerged because of various high-level certifications. These are a benefit for manufacturers in validating product safety of finished products compared to the cost of evaluating uncharacterized or partially characterized materials. They can also reduce chemical complexity of products, which in turn supports other ESPR topics such as footprinting and Design for Disassembly (DfD).[36] [37]

Material health assessments facilitate alignment with several ESPR parameters. This proactive step goes beyond Substances of Concern. In the perspective of front runner companies, SSbD can - and should - help companies navigate through the process of continuous improvement.

[35] Ecodesign for Sustainable Products Regulation, https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en
[36] Cradle to Cradle Products Innovation Institute. (2024). *Guidance for the Cradle to Cradle Certified® Product Standard, Version 3.1.*
[37] Cikis Studio. (2023). *Cradle to Cradle Certified certification: what is it and why choose it?* Available at: https://www.cikis.studio/en/article/cradle-to-cradle-certified-certification-what-is-it-and-why-choose-it

Actions - EC and National levels

All actions in the following section can be taken at the national as well as EC level. This is because procurement occurs at both levels. Companies can also carry out some of these actions, but the request to EPEA was to focus on what policymakers could do. For example:

- Netherlands could push for chemical composition declarations in the delegated acts, to go beyond Substances of Concern. Use examples from market leaders (such as C&A & IKEA) to set policies for incentivising material health disclosures, by fully characterizing content including recycled content as an up-stream input. Investigate how SSbD could be used to restrict certain substances that hinder circularity, even if they are not Substances of Concern.
- Promote certifications that require knowledge of product composition at the chemical level and their review for environmental- and human impacts.
- Set policies for tendering criteria to award extra points for material health that goes beyond Substances of Concern. See Annex for examples of tendering tools that could be adapted for this.
- Set policies that enable targeted funding and technical assistance for material health assessments, including R&D for safe and recyclable material chemistry.
- Support R&D into processes that eliminate toxins from reclaimed materials. This is especially important for addressing the concern expressed by some workshop participants that 'we have to do something with all the materials that are already in use today'. [38]
- Delegated acts should avoid prioritizing product longevity over material health. The Patagonia PFAS example demonstrates how recycling is compromised when questionable substances are used to improve product longevity.

[38] Examples: The NONTOX project ("Removing hazardous substances to increase recycling rates of plastics") was funded under the EU's Horizon 2020 programme (managed by the European Commission's research executive structures) to develop technologies that remove hazardous additives from plastic waste streams so they can be safely recycled.

- More broadly, the call topic "Methods to remove hazardous substances and contaminants from secondary raw materials" (H2020_CE-SC5-01-2018) explicitly funded R&D to "develop innovative solutions for removing undesirable substances from secondary raw materials," with expected impacts including reduced risk of retaining hazardous substances in recycled materials and support for the Circular Economy Action Plan.

5.1.2 Support Design for Disassembly (DfD)

Disassembly is one of the factors considered when the Commission sets repairability requirements under the ESPR framework. Design for Disassembly (DfD) has been quantified in an ISO standard (ISO 20887ti2020) and can be used as a basis for comparing.

a. DfD is a core part of the SSbD principle of designing for end-of-life.

b. It is a valuable tool for meeting ESPR parameters such as durability, reusability, repair, recycling, and recycled content.

c. It is an important value proposition for companies wanting to design products that are easy for customers to assemble & disassemble.

d. Under SSbD, "design for end of life" means planning what should happen to every component and material after use, including reuse, repair, remanufacture, or high-quality- recycling. Disassembly is the physical gateway to these strategies: being able to open the product without destroying it facilitates selective reuse of modules, removal of hazardous parts, and separating clean material streams. SSbD therefore treats features like modular architecture, reversible fasteners, material compatibility, and accessible joints as primary design levers for controlling exposure, avoiding contamination, and keeping materials in safe loops at end of- life-.[39][40]

e. How DfD can be translated into ecodesign requirements

i. Design for disassembly can be turned into concrete ecodesign requirements and measurable criteria, for example:
ii. Maximum disassembly time or number of steps to access key components (e.g. battery, display, structural parts), using common tools.
iii. Limits on the use of permanent joints (e.g. welds, glues) versus reversible ones (screws, clips), especially where different materials or hazardous components meet.
iv. Requirements that critical modules (batteries, electronics, upholstery, coatings) be separately removable without damaging surrounding parts.

f. Material separation rules (e.g. plastics must be separable by type, no inseparable multimaterial laminates in main housings) to enable clean recycling streams.

[39] Dassault Systèmes. (2025). *Design for Disassembly in the Age of Circularity*. https://www.3ds.com/sustainability/circular-economy/design-for-disassembly
[40] NRC (National Research Council Canada). *Designing for disassembly to extend service life and improve end-of-life recovery*. https://nrc-publications.canada.ca/eng/view/supplement/?id=49c7996a-27aa-4c44-bcaa-5f6df2ea4f1b&dp=197

g. Such requirements operationalise SSbD by ensuring that, at end of life, products can be taken apart in a controlled way, so high value materials and "safe by design" components can be recovered while hazardous or problematic elements are isolated and managed appropriately.

Actions - EC and National levels

- Set or accelerate policies to incentivise DfD in product design and manufacturing.
- Make sure that any carbon calculations mandated in delegated acts reward keeping DfD products in service. The carbon advantages of keeping a product in multiple loops for e.g. 25 years might not be recognized in carbon calculation methods. This is a disadvantage for furniture companies who invested in making their products disassemblable for repair or refurbishment.
- Set policies wherever possible to reward designs for modularity as a key enabling point for DfD,

5.1.3 Start watching brief on definition of recyclable materials

Some companies have invested resources into making materials that go into their products I more recyclable, but are concerned that the delegated acts might not recognize such materials as recyclable material. This uncertainty is hampering further investments.

- Start a watching brief on DG-Env end-of waste criteria as described at the end of chapter 4.[41]

5.2 Systems-Level Policies

5.2.1 Immediate Priority - Consolidate and enhance the SSbD/ESPR policy group in The Netherlands and mandate that group to develop cohesive policies as recommended in this report.

Rationale

Based on the minutes of the November 4, 2025 workshop as well as comments submitted to the Briefing, case studies, and interviews with EU level policy advisors and

[41] "A watching brief will be maintained on this file, entailing ongoing monitoring of developments and periodic reporting, without assuming direct program delivery or regulatory responsibility. The responsible unit will observe, analyse and document emerging issues, and escalate matters requiring policy intervention or decision, but will not act as the lead implementing authority.

scientists, EPEA concluded that all participants in this SSbD / ESPR project could greatly benefit from closer communication and co-operation in developing joint positions on the delegated acts of ESPR and on the best policies for supporting companies to use SSbD for ESPR compliance. It was noted in the November 4 workshop that many participants had rarely met or exchanged views on this topic. It was also agreed that a more regular exchange of views among the participants would be a productive way of aligning positions on the upcoming delegated acts of the ESPR. Such exchanges are crucial to the success of any initiatives to align SSbD and ESPR more closely, especially in the future delegated acts where the Netherlands can play a formative role in crafting.

5.2.2 Early Priority - Focus on incentives as enabling mechanisms for regulations and standards, to positively engage companies, especially SMEs. This includes supporting SMEs to overcome barriers to adopting SSbD and performing ESPR reporting.

Rationale

EU bodies have acknowledged that Green Deal–related reporting requirements are complex and particularly challenging for SMEs. Two useful examples are:

- An EU level- briefing on SME sustainability reporting (hosted by EUKI and referencing the CSRD/ESRS process) notes that existing reporting frameworks involve "over 5000 KPIs" and "competing demands for data," making sustainability data gathering "extremely challenging and costly for SMEs with limited financial and human resources."[42]
- The European Commission's own communication on the voluntary sustainability reporting standard for SMEs (VSME) explicitly frames it as a tool to "reduce administrative burden on SMEs" and to make it easier for them to respond to sustainability information requests from large companies and financial institutions, thereby implicitly recognising that current reporting expectations are too complex for many SMEs.[43]

Companies have emphasized in case studies and interviews that they respond better to regulations when incentives are connected to those as business opportunities to improve competitiveness.

[42] Frank Bold. (2021). *SMEs and the Future of European Sustainability Reporting Rules – Small Businesses deserve to get Clarity to address the Sustainability Challenge*. European Climate Initiative (EUKI). Available at: https://www.euki.de/en/smes/

[43] European Commission / EFRAG. (2024). *Overview of the SMEs draft standards – Consultation document for the Voluntary SME Standard (VSME).* European Commission, Brussels. Available at: https://green-forum.ec.europa.eu/document/download/5bdcc13b-d00d-4c3a-a35d-a70012f2aec3_en?filename=Overview+of+the+SMEs+draft+standards.pdf

SMEs constitute most manufacturers but lack resources for reporting so are affected more than large companies, in Europe as well as in developing countries. Studies by the EU and OECD conclude that enabling tools need to focus on making sustainability reporting more practical for SMEs.[44]

Lack of harmonization is a major barrier. Several companies interviewed said they are frustrated by the lack of alignment of ESPR with initiatives such as certifications, quality protocols, national legislation, procurement requirements etc**.**

Examples:

- Reporting requirements are also being generated by CSRD, CSDDD, EUDR, and others. This complexity will accelerate as ESPR delegated acts and DPP requirements phase in. Companies could find themselves trying to conform with differing requirements from different standards and regulations that don't align with the delegated acts.
- Each delegated act is expected to consider and provide more granularity to the parameters provided in Annex 1 of ESPR. There is a risk that those interpretations will differ among delegated acts. This would complicate reporting for most products and materials that transit between sectors.

At the data level, the EU's Digital Product Passport, EU Data Act, customs data model and single window, EBSI projects (like TRACE4EU), sector-specific data spaces, and mandatory traceability regulations (like EUDR, CSDDD) are examples of initiatives driving data harmonization in supply chains. Applying all those data initiatives to ESPR would pose significant challenges of overlaps and potential conflicts. This risk has been identified by for example Ecommerce Europe[45].

[44] OECD Guidance Note on fostering convergence in SME sustainability reporting | OECD
[45] Ecommerce Europe. (2024). *A Digital Product Passport fit for e-commerce* (Position paper, 25 September 2024). Brussels: Ecommerce Europe.

Actions - EC and National levels

- Speed the adoption of SSbD by leveraging JRC and IRISS studies that identify elements of certifications, standards, and business models that already align with SSbD principles. Companies and especially SMEs can be incentivised to use SSbD by simply being made aware of those elements. SMEs especially seem unaware that such provisions already exist. Creating such awareness can save them time and costs of looking for those.
- Highlight best practices. The European Commission addressed part of this by introducing a voluntary reporting standard[46] that could be used to glean best practices.
- Initiatives such as the EU-funded CIRPASS under the Digital Europe Programme are attempting to align certain aspects of delegated acts such as Digital Product Passports. Careful attention to those results is warranted by policymakers.
- The Dutch government could request that minimizing conflicts with national legislations - especially on reporting requirements - be considered when drafting the delegated acts. This request is in line with the Lisbon Treaty that requires drafters of EU legislation to consider national legislation. NOTE: A review is underway in The Netherlands to harmonize national legislation with ESPR. [47]
- AI could be pivotal in applying such solutions and is already used to streamline reporting. See recommendation on AI.

See also Contracting and Payment incentives in Annex 6.1 *Examples of Policy Tools*.

[46] https://finance.ec.europa.eu/publications/commission-presents-voluntary-sustainability-reporting-standard-ease-burden-smes_en

[47] Warringa, G., de Vries, J., Duffhues, R., Backes, C., Boeve, M., de Waal, I. M., Dijcker, R., & Looijenga, R. (2025). *Circular instruments for EPR: More circular and effective* (Publication no. 25.240392.073). CE Delft, Utrecht University & Witteveen+Bos, commissioned by the Dutch Ministry of Infrastructure and Water Management. Available at: https://cedelft.eu/wp-content/uploads/sites/2/2025/12/CircularinstrumentsforEPRMorecircularandeffective.pdf

5.2.3 Early Priority - Accelerate the Use of AI, focusing on enabling SMEs.

A crucial example of incentives used by the Dutch government to support SMEs is information and training about **AI tools that are proven to cut costs and increase the speed and accuracy of reporting.** Experience shows that SMEs can benefit from AI tools that allow them to process masses of data requests and outputs. JRC mentions the potential use of AI for implementing SSbD. The Netherlands is a leader in AI initiatives and could use this advantage to facilitate SME involvement with it. Various reports suggest that the Netherlands is leading the way on making AI accessible to SMEs[48]. Together, those point to AI as a game-changer for ESPR reporting. Moreover, companies like IKEA are using AI internally to support their SME suppliers. The IKEA case demonstrates that AI is used for applications relating to materials sourcing, supply chain tracing, and peer- to-peer resale platforms.

Examples of how the Dutch government is currently enabling the use of AI are shown in Annex 6.1 and include:

Regulatory sandboxes and guidance

- The Dutch supervisory authorities offer an AI regulatory sandbox where providers can test AI systems and get feedback on how to comply with the EU AI Act's requirements in practice. 49
- The government has published an official "AI Act Guide" that gives a step-by-step- approach (identify risk level, check if it is AI under the Act, determine if you are provider/deployer, map obligations) and includes simplified technical documentation options for SMEs, directly helping companies structure AI compliance.50

[48] For more information on AI initiatives by The Netherlands, see AI Report Netherlands 2025 https://www.verdoold.com/wp-content/uploads/2025/03/RankmyAI-Dutch-AI-Landschape-2025.pdf An independent analysis of Dutch government leadership in this area comes from The Netherlands: artificial intelligence readiness assessment report by UNESCO https://unesdoc.unesco.org/ark:/48223/pf0000393240

[49] Netherlands Authority for Digital Infrastructure. *Rules for working with safe AI (AI Act implementation in the Netherlands).* Business.gov.nl. Available at: https://business.gov.nl/regulations/ai-act/

[50] Government of the Netherlands. (2025). *AI Act Guide*. Available at: https://www.government.nl/binaries/government/documenten/publications/2025/09/04/ai-act-guide/ai-act-guide.pdf

Service desks and coordinated supervision

- An "AI Act Service Desk" has been launched to assist organisations in applying the AI Act correctly, giving practical support on questions about lawful AI use and required safeguards.[51]
- The Dutch Data Protection Authority and other regulators coordinate AI supervision through platforms such as the Digital Regulation Cooperation Platform, aligning guidance on GDPR, AI, and other digital rules that companies must follow.[52]

Broader AI–sustainability and reporting context

- The Netherlands' Sustainable Digitalisation Action Plan links AI deployment to Green Deal goals and commissions research into the environmental footprint of AI systems, helping companies understand how to use AI in a way that supports, rather than undermines, climate and sustainability obligations.

[51] Netherlands Digital Government. (2025). *AI Act Service Desk to assist organisations with AI regulations*. Available at: https://www.nldigitalgovernment.nl/news/ai-act-service-desk-to-assist-organisations-with-ai-regulations/

[52] In October 2021, the Netherlands Authority for Consumers and Markets (ACM), the Dutch Authority for the Financial Markets (AFM), the Dutch Data Protection Authority (Autoriteit Persoonsgegevens, AP) and the Dutch Media Authority (CvdM) launched the Digital Regulation Cooperation Platform (Samenwerkingsplatform Digitale Toezichthouders, SDT) "to ensure that each member's regulatory activities dovetail with each other's activities in the digital sector," explicitly coordinating oversight and exchanging knowledge on topics such as "artificial intelligence, algorithms and data processing, online design, personalization, manipulation, and deception." https://www.acm.nl/en/about-acm/collaboration/national-cooperation/dutch-digital-regulation-cooperation-forum

Actions - EC and National levels

- The Netherlands and EU could set an AI policy that enables SMEs to more cost-effectively implement SSbD principles and align them with ESPR. A short-term win could be empowering SMEs to use AI to extract results of JRC/IRISS studies showing which elements of existing certifications, standards, and business models already align with SSbD principles, so SMEs could take advantage of those. Examples include:
- Dedicated EU or national grant schemes to fund AI tools that mine JRC/IRISS mappings of methods, criteria, certifications, and business models against SSbD principles, turning them into searchable "playbooks" for SMEs.[53]

Publicly funded, open APIs and knowledge graphs that encode the JRC SSbD framework and IRISS mappings so SMEs can plug simple AI assistants into them without building their own data infrastructure.[54]

- Set a policy supporting the use of AI to extract information from databases that highlight how SSbD practices can fulfill ESPR parameters and requirements of future delegated acts. A first step is to investigate cost-effective ways of extracting and re-compiling the information in existing databases on SSbD practices. EU databases such as IRISS and SURPASS[55] contain practical examples of how to implement SSbD. By using AI tools, those examples could be cross-referenced with each ESPR requirement, providing an instant database of practices. This could be an invaluable tool for accelerating the use of SSbD to facilitate meeting ESPR.
- Launch AI-assisted ESPR/SSbD communications campaigns and tools that keep SMEs well-informed. Link these with existing AI-focused help desks so companies benefit from a one-stop-shop.

[53] The IRISS PR1.5 report explains that WP1 "aims to obtain a complete overview of the SSbD methods and criteria," mapping recommended SSbD criteria against state-of-the-art approaches in different value chains and collecting tools and practices from EU projects. https://iriss-ssbd.eu/download/18.6fbb3d2d18a9318790b160d3/1695218150065/PR1_5_MappingOfSkills.pdf

[54] PR1.5 highlights that "training modules to be developed should be tailored to small and medium enterprises (SMEs) and should support a better understanding of the JRC framework and its implementation," with particular needs in "data collection and use of available tools." https://iriss-ssbd.eu/download/18.6fbb3d2d18a9318790b160d3/1695218150065/PR1_5_MappingOfSkills.pdf

[55] SURPASS ("Safe-, sustainable- and Recyclable-by-design Polymeric Systems") is a Horizon Europe project aiming to lead the transition to SSRbD polymeric materials in key sectors (building, transport, packaging)

5.2.4 Early Priority - Link Certification Schemes to Supply Chain Advancement.

Rewarding companies for meeting the requirements of specific certification schemes is an effective way to incentivize tender bidders and existing suppliers to integrate SSbD approaches.

Actions - EC and National levels

- As described earlier, some certification schemes already contain elements of SSbD principles. These can be leveraged to speed adoption of SSbD.
- Set policies that allow government tendering and supplier contracts to align with advanced certifications, using them to drive improvements in material selection, process safety, and supplier behaviors. "Advanced" in this case refers to certifications that focus on material health beyond Substances of Concern.

5.2.5 Early Priority – Harmonize Sections of ESPR delegated acts on Furniture & Textiles.

This especially applies to two areas: ESPR parameters for materials that transit across sectors, and delegated acts requirements that might force companies to meet all requirements at once.

Actions - EC and National levels

- The Netherlands could start a policy effort at the EU level to assure that the delegated acts on furniture and textiles contain consistent requirements for materials and components that transit across sectors[56]. Those lessons could then be applied to later delegated acts.
- Identify ways for the delegated acts to support iterative improvements. The case studies show that companies don't improve everything in a product at once; the process is iterative so that companies can allocate resources over time. However, iterative improvements are not part of the framework legislation; it only sets the parameters for requirements. Nonetheless, Annex II of the legislation does open the door by

[56] This was a topic of hot debate at the ISO when sector-specific vs. cross-sector transit of materials was integrated into the ISO standard on circular economy. The compromise reached was that certain types of materials and components do transit across many sectors, so the criteria for reporting on those need to be standardized across all sectors. However other types of materials and components are specific to sectors and merit more specifics to those sectors. It was concluded that both cross-sector and sector-specific criteria are required in order to have a workable standard, and this is reflected in ISO 59040-2025 PCDS.

alluding to delegated acts establishing "improvement levels" of "product performance". In practice and based on experience, it is likely that especially SMEs will adopt an incremental approach to reaching delegated deadlines set under the acts. Thus, while roadmaps and staggered improvements are not provided for in the legislation itself, there are references to levels of product performance, which could be similar to iterative improvement. The ESPR allows delegated acts to set *performance requirements* based on a list of product parameters in Annex I, including durability, reparability, reusability, recyclability, upgradability, environmental impacts and resource efficiency[57]. The Netherlands could support this by proposing that the delegated acts provide for graduated levels of product performance, and that this is consistent across the delegated acts.

5.2.6 Mid-Term Priority - Harmonize Data Standards and Requirements.

JRC explicitly refers to the need for **harmonizing data,** including input data, assumptions, methodologies, and reporting, for the operationalization and effectiveness of SSbD. Considering this, there is a need to clarify which of the many digital harmonization standards will be applied to ESPR implementation.

Actions - EC and National levels

- The Netherlands with its advanced approaches to AI and data management could lead the way by calling for EU policies within the ESPR framework that set a hierarchy of data harmonizations at the EU level. In section 5.2.2. several standards and regulations governing data are listed. If those are all imposed simultaneously without prioritizing, this could overwhelm companies. The Netherlands could push the EU to establish a hierarchy of which data regulations to apply first to DPPs for example. This requires a focused, dedicated effort that can only be achieved with support from AI.
- Highlight best harmonization practices - Harmonization lessons can be taken from vertical and horizontal supply chains in frontrunner companies, with a key focus on SME accessibility.

[57] "Products shall comply with performance requirements related to the product aspects, as laid down in the delegated acts adopted pursuant to Article 4. The performance requirements shall be based on the relevant product parameters referred to in Annex I and shall, as appropriate, include either or both of the following: (a) minimum or maximum levels in relation to a specific product parameter or a combination thereof; (b) non-quantitative requirements that aim to improve performance in relation to one or more of such product parameters." (Regulation (EU) 2024/1781, Article 6(1)–(2)).

This could be done simply by creating a database that aggregates such practices.

- The delegated acts should take account of Commission efforts to reduce and simplify the reporting burdens on SMEs. The Netherlands could alert delegated act developers to the EU voluntary reporting standard[58] that is designed to ease the burden on SMEs. While this might not be directly applicable for ESPR compliance, it does support SMEs to respond to requests for sustainability information from large companies and financial institutions which are subject to mandatory reporting under the Corporate Sustainability Reporting Directive (CSRD)[59].

5.2.7 Other potential policies that might take longer to implement

5.2.7.1 Support Materials Pooling Focused on Material Health

By pooling materials that are characterized as being safe, companies can proactively prepare for any requirements set down in future delegated acts. companies have a major problem affordably accessing consistent sources of well-defined materials. Larger companies such as C&A and IKEA solved this through a combination of bulk purchasing and strict composition requirements. However, smaller companies still face hurdles acquiring safe materials that conform with the need to declare Substances of Concern. Pooling that is focused on material health can protect companies from unwanted surprises and liabilities.

The EU Circuloos project is an example of policies that support this approach. It specifically matches SMEs across sectors (e.g., metal, plastics) for innovative circular supply chains involving refurbishing and repurposing[60]. The Netherlands Authority for Consumers and Markets (ACM) issues sustainability guidelines under Article 101 TFEU, allowing cooperative initiatives like material pooling without antitrust violations, provided they align with public policy goals like the Green Deal.[61]

[58] EU voluntary reporting standard
[59] Corporate Sustainability Reporting Directive (CSRD)
[60] https://circuloos.eu/the-manufacturing-smes-quick-guide-to-eu-circular-economy-policies/
[61] https://ecdpm.org/work/sustainable-value-chains-volume-4-issue-6-december-2015-january-2016/implementing-sustainable-business-through-eu-aid-and-trade-policies

Actions - EC and National levels

- Set policies to support programmes such as Circuloos that connect leveraging aggregated purchasing power of SMEs by improving access to safe, recycled materials. This, along with legislation such as TFEU that exempts SMEs from antitrust violations for materials pooling, will enable smaller manufacturers to meet recycled content requirements and improve material health together.
- Incentivize through procurement criteria programs in large companies that bulk-purchase safe materials for their suppliers to use in manufacturing products.

5.2.7.2 Support Reverse Logistics, Take-back Programs, and Peer Resale

SSbD emphasizes lifecycle thinking. The IKEA case study shows that take-back, second-hand resale, and peer-to-peer platforms (powered by AI) are important elements in extending the life of products, and that this needs to be considered when products are required by ESPR to assure continued repairability.

Actions - EC and National levels

- Set policies that reward companies who plan for product life extension through peer- to-peer and take-back programs such as those developed by IKEA**.** Prioritise cross-sector dialogue and knowledge sharing for reverse logistics innovations. While this is already provided for under durability provisions of ESPR, government procurement policies could accelerate adoption.

5.2.7.3 Use SSbD Approach to Map & Analyse Interactions between ESPR Parameters

In section 2.2 of this report, tables show which SSbD principles relate to which ESPR parameters, and how SSbD could be used to meet specific ESPR requirements. Those could be a start to such mapping. As well The European Commission's Joint Research Centre is updating its Methodological Guidance that explains how practitioners can apply and document the Safe and Sustainable by Design (SSbD) framework for chemicals and materials throughout the research and innovation process[62].This could be a valuable adjunct to those tables.

A focus on those interactions could be critical for the European Commission to improve implementation of ESPR parameters and delegated act requirements. This approach can help to solve the problem of ESPR parameters not being designed to

[62] European Commission, Joint Research Centre (2024). **Safe and Sustainable by Design chemicals and materials – Methodological Guidance on the SSbD framework**. Publications Office of the European Union, Luxembourg. JRC138035. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC138035

consider the impact of one on the other. It can also identify and prevent narrowly defined carbon footprinting from penalizing other beneficial product characteristics.

Actions - EC and National levels

- Set policies that reward companies in procurement tendering for demonstrably using whole system approaches to solve issues such as recycled content vs. recyclability. See also iterative innovation. The whole systems approach lets companies prioritise which improvements to focus on first by developing a roadmap.
- Set policies that incentivise systems impact reporting (energy, water, recyclability, and total product footprint). In this case, market incentives driven by purchasing criteria could be most effective. This is a type of hybrid between legally binding and voluntary is the sense that companies don't have to bid on a contract but if they choose to, they face certain requirements that they can be rewarded for adhering to. Whether a framework should be "legally binding" is often seen as regulatory in nature, but purchasing criteria can bridge the gap between regulatory and voluntary.
- Pay careful attention to the JRC upcoming documentation on assuring that users are following SSbD framework and approach.

5.2.7.4 Support Transparency and Public Disclosure

SSbD (JRC version) and ESPR each have provisions calling for data transparency. Disclosing material health declarations can be supported by third-party audits and best practice sharing. It could include digital Bill of Materials incentives and support for AI-driven supply chain mapping to improve compliance and replication of safe and sustainable practices.

Actions - EC and National levels

- Set policies that promote transparent material health disclosure and verification as an incentive for companies to gain extra points in tenders and other processes as specified under the policy levers slides.
- Set AI policies that are specifically aimed at reducing disclosure costs and complexity for SMEs. See suggested policies on AI.

6 Annexes

6.1 Examples of Policy Tools Used by Governments to Incentivise Companies

Governments use many policy tools to incentivise companies. These can be adapted to incentivising adoption of SSbD principles and alignment with ESPR parameters. EPEA has prioritised some of these. Early priorities focus on tendering and contracting.

EARLY PRIORITY - Procurement preference levers

- Award scoring bonuses for verifiable adoption of SSbD principles, including supply chain data sharing (e.g. traceability coverage, third-party assurance, beneficial ownership disclosure), consistent with EU procurement rules that allow qualitative, environmental, and social award criteria beyond price.
- Embed beneficial ownership transparency as a positive selection factor by awarding points or tie-breaker preference to bidders that publish structured supply chain data linked to SSbD. Beneficial ownership transparency in relation to sustainability means revealing the true, ultimate owners of companies and entities to enhance accountability for environmental, social, and governance impacts. It is especially important in ensuring chain of custody responsibility. Some companies use shell entities to hide the true origins and ownership of raw materials for example.

EARLY PRIORITY - Contracting and payment incentives

- Offer accelerated payment terms or reduced retention for suppliers that provide interoperable traceability data feeds and event-level documentation (e.g., EFTI, EPCIS), lowering working-capital costs as a "carrot" for transparency. Examples:
  - The eFTI (electronic Freight Transport Information) Regulation (EU 2020/1056) specifically enables and encourages digital data exchanges between suppliers and authorities, including interoperable event-level documentation. Article 12 and 13 set standards for certification of platforms, and companies benefit from reduced administrative costs and more efficient logistics when they provide electronic, interoperable documentation. This creates space for contractual incentives such as faster payment or reduced retention, as a reward for transparent, auditable data sharing.
  - The EU Data Act (2024) explicitly makes contractual restrictions on data interoperability illegal and instead promotes machine-readable, real-time data sharing among parties for business processes including compliance

and performance management. Contracts must clearly define rights to access and use data, and fairer terms - such as payment acceleration or retention reduction - are recommended to incentivise supplier compliance.

- In public procurement, the introduction of performance registers and interoperability standards allows EU-compliant contracts to incorporate measurable incentives: "systematic registers of contract performance can enhance … the ability of authorities to simply exclude unsuitable actors … and enhance reliable contract performance, whereas the effective interoperability and cross-border accessibility … is important to strengthen transparency …"
- Include dynamic contract extensions and volume increases tied to traceability milestones, to turn compliance into a predictable commercial reward for validated transparency.

EARLY PRIORITY - Market access and eligibility "gateways"

- Pre-qualification fast-track or vendor-of-record status to suppliers demonstrating robust due diligence and traceability, lowering bidding friction and offering visibility as a reward for transparency performance. Consider OECD guidance on public procurement.
- Allow simplified documentation and reduced audit frequency for suppliers that maintain certified traceability systems and publish machine-readable disclosures.

Regulatory sandboxes and facilitation

- Set up a supply-chain-data regulatory sandbox modeled on the EU AI sandbox approach[63] to provide supervised environments for real-world testing of traceability methods, with time-bound supervisory guidance and safe-harbor style flexibility that improves legal certainty and reduces adoption risk for SMEs.
- Use experimentation clauses to allow limited special permissions (derogations) or streamlined approvals when firms share high-quality chain-of-custody data, echoing EU policy practice on sandboxes as tools to support innovation-friendly regulation and evidence-based learning.

[63] https://artificialintelligenceact.eu/article/57/

Joint and strategic procurement signals

- Coordinate joint procurement across ministries or regions with tender frameworks that reward disclosure maturity, using scale to create a reputational market for transparent suppliers and to harmonize data expectations, consistent with analyses of joint procurement as a strategic industrial tool.
- Publish category playbooks that define preferred data standards and assurance levels, signaling long-term demand for transparent supply and reducing vendor uncertainty about the "goalposts" of expectations.

National R&D and innovation programmes

- As shown in the IKEA case study, R&D is needed in areas such as recycled fibres so that company can comply with recycled content requirements. Example of potential use: R&D and innovation programmes for recycling industry to get rid of legacy chemicals and enable high level recycling. Co-financing or grant financing are each possible.

Data infrastructure and recognition

- Provide priority onboarding to supplier & procurement portals for companies that share standardized supply chain data. Enact public recognition lists and leader rankings that grant reputational advantages in future tenders.
- Expand transparency and publication practices to value supply chain disclosures in notices and award reports, reinforcing market discipline through visibility and peer comparison rather than mandates alone.
- Encourage data sharing with FAIR principles: Transparent material and safety information flows support access to high-quality, interoperable data on materials and chemicals (following FAIR principles: Findable, Accessible, Interoperable, Reusable.
- Adopt AI as a tool to make ESPR & SSbD implementation affordable and convenient especially for SMEs. AI could be the missing link that breaks through current barriers to adoption. It could be especially effective in generating, organizing, and presenting data on ESPR conformity. This will be one of the largest costs for SMEs.

Supporting Education & Training programmes

- Front runner cases and best practices are invaluable for accelerating adoption when integrated into education & training programmes.

- Promote skills related to safety and sustainability of chemicals and materials. Train graduates in chemistry, (chemical) engineers, designers, and business in the mindset of prevention over compliance.

Capacity-building without grants

- Offer no-cost or low-cost conformity assessment pathways for traceability claims (e.g., template clauses, audit protocols, data schemes), reducing transaction costs and uncertainty for smaller suppliers while preserving full commercial choice of tools.
- Establish knowledge hubs and helpdesks that map standards, showcase procurement model clauses, and clarify cross-border data issues, helping suppliers meet expectations under EU procurement frameworks.

Tax-based incentives

- Introduce accelerated depreciation or immediate expensing for investments in traceability systems, data quality tooling, and audit/assurance interfaces, mirroring EU recommendations that endorse non-grant tax instruments to stimulate strategic industrial capabilities.
- Provide targeted, refundable tax credits or super-deductions for verified SSbD adoption supported by supply chain accounting, due diligence controls, and digital product data provisioning, framed within state-aid-comparable tax incentive design guidance from the Commission's Clean Industrial Deal package.

6.2 Chemical Safety in Textiles and Furniture

Overview

Much work has been published in the past showing that furniture and textiles contain numerous hazardous chemical groups, including PFAS, dyes, phthalates, flame retardants, volatile organic compounds (VOCs), metals and biocides.[64] These substances contribute negatively to indoor air quality and hinder safe circularity by contaminating recycled material streams and complicating reuse. This is confirmed by more recent Dutch and European publications which link chemical-safety concerns with emerging Ecodesign for Sustainable Products Regulation (ESPR) requirements, Digital Product Passports and group-based restrictions such as broad PFAS controls.

6.2.1 Recent evidence on textiles

Hazardous chemicals and circularity

A 2023 study on circular textile policies and chemical regulation assesses 715 substances used in textiles and concludes that a large majority have recognised or suspected hazardous properties, including carcinogenicity, mutagenicity, reproductive toxicity, endocrine disruption and strong sensitisation. The authors show that without up-stream substitution and design changes, many of these substances will persist in recirculated textiles, undermining circular-economy goals and necessitating strong integration of chemical criteria into ecodesign and ESPR instruments.[65]

A 2025 critical review of health risks from textile chemicals confirms dermal contact as the dominant exposure route, while also documenting inhalation of fibres and dust and ingestion—especially by infants—as relevant pathways. The review highlights vulnerable groups (infants, pregnant women, workers), emphasises mixture and low-dose chronic effects, and concludes that current EU legislation still allows many hazardous substances in textiles, particularly in imported products, despite progress under REACH and related instruments.[66]

[64] Examples of earlier studies: RIVM https://www.rivm.nl/bibliotheek/rapporten/2014-0155.html, https://www.rivm.nl/bibliotheek/rapporten/320104010.pdf; Greenpeace https://www.greenpeace.org/static/planet4-international-stateless/2012/11/a92bb31a-technicalreport-06-2012.pdf; ANES https://www.anses.fr/en/system/files/CONSO2014SA0237RaEN.pdf
[65] https://www.sciencedirect.com/science/article/abs/pii/S0048969723037762
[66] https://doi.org/10.32388/0GADTB

PFAS in textiles and circular economy

The European Environment Agency (EEA) publication on PFAS in textiles in Europe's circular economy[67] estimates that textiles account for a substantial share of EU PFAS use and are a major source of PFAS pollution. The underlying technical assessment[68] finds that most PFAS applications in textiles—such as water- and stain-repellent finishes on outdoor clothing and workwear—are not technically essential and that safe, sustainable alternatives exist for many functions. The report concludes that PFAS in textiles constitute a structural barrier to longer use, reuse and recycling and recommends broad PFAS group restrictions combined with substitution efforts and improved traceability to support safe circularity.

EEA Safety Gate (RAPEX) indicators published in early 2025 show that chemical-related alerts for textile products in the EU remain frequent, with most alerts linked to human health risks such as excess chromium VI, restricted phthalates and banned azo dyes. These data indicate that enforcement deficits and supply-chain complexity continue to allow regulated hazardous substances to reach EU consumers via textile products.[69]

6.2.2 Recent evidence on furniture and soft furnishings

Chemicals in furniture and ecodesign

A 2024 Dutch study on ecodesign for furniture[70] maps the main potentially hazardous chemicals in furniture, focusing on flame retardants and plasticisers in polyurethane foams and plastics, PFAS-based stain-repellent treatments on upholstery, formaldehyde and VOCs from wood-based panels and coatings, and biocidal treatments in coverings. The report links these substances to health concerns and to barriers for repair, reuse and recycling, and presents ecodesign recommendations such as chemical transparency and traceability per component, design for separation of chemically treated parts, and preferential use of lower-hazard alternatives that align with REACH, POP and waste legislation.

A 2025 follow-up report on ecodesign requirements for office furniture[71] translates these findings into concrete requirement types for future ESPR delegated acts. The

[67] https://www.eea.europa.eu/en/analysis/publications/pfas-in-textiles-in-europes-circular-economy
[68] An assessment on PFAS in textiles in Europe's circular economy
[69] https://www.eea.europa.eu/en/circularity/sectoral-modules/textiles/number-of-annual-chemical-risk-alerts-for-textile-products-in-the-eu
[70] https://www.government.nl/binaries/government/documenten/reports/2024/01/31/research-ecodesign-for-furniture/Research+Ecodesign+for+furniture.pdf
[71] https://www.government.nl/binaries/government/documenten/reports/2025/04/04/a-step-towards-ecodesign-requirements-for-office-furniture/A+step+towards+Ecodesign+requirements+for+office+furniture.pdf

study identifies key hazardous substances in office furniture, analyses their relationship to durability and repairability, and proposes specific measures such as restrictions on certain additives, disassembly and material-separation rules, and product-information obligations for chemical content.

ESPR and Substance of Concern

A 2024 Joint Research Centre (JRC) study on new information requirements and "Substance of Concern" under the ESPR[72] develops a cross-sector framework for tracking hazardous substances in products, with direct relevance for furniture and textiles. The report describes how Digital Product Passports can carry data on Substance of Concern throughout the value chain and how such information can support safe reuse, refurbishment and recycling while preventing legacy chemicals from undermining circularity. The study positions chemical-content transparency as a core pillar of ESPR implementation, particularly in material-intensive sectors such as furniture.

Flame retardants and fire safety

The European Environmental Bureau (EEB) together with other NGOs published a report[73] on flame retardants in furniture synthesising emerging evidence that many commonly used flame retardant additives in foams and textiles are persistent, bioaccumulative and toxic, while offering limited real-world fire-safety benefit compared with design-based solutions and non-toxic barriers. They call for phase-out of hazardous flame retardants in furniture and mattresses, integration of FR controls into fire-safety and ecodesign regulations, and promotion of safer alternatives that achieve required fire performance without introducing long-term chemical hazards.

6.2.3 Cross-sector themes and implications

Chemical groups and exposure patterns

The studies confirm that textiles and furniture share several high-concern chemical groups—PFAS for water and stain repellency, plasticisers and flame retardants in foams, formaldehyde and VOCs in boards and coatings, and a range of dyes, metals and biocides in surface materials. Exposure patterns differ by product type, with textiles mainly involving dermal exposure and some inhalation and ingestion, while furniture contributes more heavily to inhalation and dust ingestion of VOCs and semi-volatile

[72] https://circulareconomy.europa.eu/platform/sites/default/files/2024-12/JRC138903_01.pdf
[73] https://eeb.org/hr/library/avoid-toxic-flame-retardants-in-our-furniture/

organics, especially in indoor environments where people, and particularly children, spend prolonged periods.

Circularity and legacy substances

The recent literature converges on the conclusion that safe circularity is not achievable if hazardous legacy substances remain embedded in textile and furniture products that are reused, refurbished and recycled. Circular-economy policies that expand product lifetime and recycling can unintentionally prolong and spread problematic chemicals unless they are addressed at design stage through substitution, group-based restrictions and information requirements.

Integration into ESPR and SSbD

Policymakers and expert bodies emphasise that chemical safety objectives must be embedded alongside climate and resource-efficiency goals, with requirements on substance restrictions, information disclosure, and design for disassembly and clean material streams.

EPEA

PART OF DREES & SOMMER

EPEA Benelux

Bogert 16

5612 LZ

Eindhoven

The Netherlands

www.epea.nl