

SAFE AND SUSTAINABLE BY DESIGN POLICY NEEDS

First reflections on SSbD in the light
of current policy developments

SSbD is the EU’s strategic approach to embedding safety, sustainability and functionality into the earliest stages of chemical, material and product innovation. By shifting assessment upstream, it reduces costly late-stage redesigns, accelerates substitution of substances of concern, and supports the EU’s competitiveness and resilience objectives. SSbD is not a new regulatory layer but an enabling framework for smarter, earlier design choices.

Three structural gaps limit impact today: (i) insufficient integration of SSbD into innovation support instruments; (ii) fragmented data requirements across regulatory frameworks; and (iii) limited scientific tools and data for early-stage decision-making under uncertainty. The Chemical Industry Action Plan (CIAP) and the rollout of voluntary EU Chemicals Substitution and Innovation Hubs in 2026 open a timely window to embed SSbD in industrial innovation support and translate political ambition towards enhanced sustainable competitiveness into practice.

Critical success factors

- **Instruments and tools** — integrated, user-oriented tools for early hazard, exposure and sustainability screening.
- **Training and education** — dedicated capacity-building for SSbD practitioners in industry and public bodies.
- **Case studies and practical experience** — learning-by-doing in real innovation contexts.
- **Scientific and methodological development** — NAMs, exposure models, life-cycle methods, and AI/ML tailored to low-data situations.
- **Lifecycle and value-chain integration** — mechanisms for data exchange and cooperation across value chains.

WHAT PARC DELIVERS AGAINST THESE FACTORS

PARC’s SSbD work covers all five success factors delivering the following:

1. **Toolbox:** an integrated SSbD Umbrella Toolbox (alpha version already available) aligned with the revised EU framework — scoping and scenario module; integrated risk-assessment engine; Environmental Footprint 3.0 with screening LCA for early Technology Readiness Levels and benchmarking against the framework’s virtual average-impact chemical; socio-economic assessment; data-quality schema with uncertainty flags and propagation; scoping and evaluation dashboards with side-by-side alternatives, hot-spot call-outs and MCDA for weighted trade-offs; and an SSbD dossier generator for reporting.
2. **Use cases:** real-world applications including a BPA substitution case study, with further sectoral cases in development to test and refine the toolbox.
3. **Knowledge sharing:** an SSbD Knowledge Sharing Portal (KSP) hosting data, tools, guidance and educational material for the SSbD community.
4. **Training:** practitioner SSbD Bootcamps (Thessaloniki 2024, Athens 2026).
5. **Science:** Next-Generation Risk Assessment and NAMs development.
6. **Network:** ~200 partners across national agencies, research institutes and EU bodies enabling broad stakeholder engagement.

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KEY MESSAGES

1

SSbD integrates safety, sustainability and functionality early in the development of chemicals, materials and products — cutting redesign costs and supporting EU competitiveness and resilience.

2

Despite strong political commitment, uptake remains uneven due to fragmented innovation support, incoherent data requirements, and limited tools for early-stage decision-making.

3

Targeted actions can anchor SSbD within existing EU initiatives, reduce burden on SMEs, and accelerate substitution of substances of concern.

4

PARC delivers operational resources — toolbox, case studies, training, knowledge platform, ~200-partner network — that can be rapidly linked to policy implementation.

REGULATORY AND POLICY ANCHORS FOR SSbD

SSbD is currently a non-regulatory framework but connects strongly to four pieces of legislation: REACH and the Chemicals Strategy for Sustainability (CSS) — data, test methods, exposure scenarios, value-chain communication; ESPR — sustainability requirements, data, Digital Product Passport; CSRD — auditable sustainability reporting; and the Critical Raw Materials Act — circular design and conditional SSbD application.

The CIAP foresees Innovation Hubs (Q1 2026), an Advanced Materials Act, a Common Data Platform on Chemicals (One Substance, One Assessment), and a roadmap to phase out animal testing — all directly intersecting with SSbD tools, data and training needs.

CONCLUSION AND CALL FOR ACTION

SSbD has reached a critical transition point: the conceptual framework is mature, political support is explicit, and enabling policy instruments are emerging. The principal risk is fragmentation — of data requirements, support structures, and methodological development. By embedding SSbD within Substitution and Innovation Hubs, aligning data flows across regulatory frameworks, and enabling early-stage use of NAMs and AI/ML, the EU can turn SSbD into a practical engine for safer, more sustainable and more competitive innovation during the 2025—2027 policy window.

The European Commission can lead by operationalising the Substitution and Innovation Hubs and/or creating a European Technology Infrastructure as primary SSbD delivery channels (A1), aligning ESPR/DPP and CSRD/ESRS data requirements through coordinated secondary acts and EFRAG guidance (A2), embedding an SSbD schema in the Common Data Platform for Chemicals (A3), and convening a JRC—ECHA pre-regulatory sandbox for NAMs and AI/ML (A4). Member State governments can co-invest in regional Substitution and Innovation Hubs serving SMEs, fund value-chain data-sharing pilots under ESPR/DPP (A5), and prioritise open, FAIR SSbD science in national R&I programmes (A6). PARC stands ready to support all seven actions.

Proposed policy actions (2025-2028)		
ACTION	EU LEVER/ OWNER(S)	OUTCOME ON THE GROUND
A1 Anchor SSbD as a core service (scoping, tooling, training, case support) in national/regional Innovation Hubs.	CIAP implementation - DG GROW, Member States	SMEs gain hands-on SSbD support; faster substitution and design trade-offs.
A2 Define a coherent SSbD data profile aligned with ESPR/Digital Product Passport and CSRD/ESRS ("report once, use many").	ESPR secondary acts: EFRAG guidance - DG GROW, DG ENV, EFRAG	One coherent dataset for SSbD and compliance; fewer duplicative reports.
A3 Add an SSbD schema and open APIs to the Common Data Platform for Chemicals (One Substance, One Assessment).	CIAP/OSOA - JCR, DG ENV	Model-ready hazard and sustainability data feeding tools and AI/ML.
A4 Establish a pre-regulatory "SSbD sandbox" for NAMs and AI/ML, co-run by JRC and ECHA, to test methods for early decisions.	NAMs roadmap, agency mandates - JCR, ECHA	Faster, credible uptake of non-animal methods in early stage screening.
A5 Fund three sector pilots on value-chain data sharing via ESPR/DPP to support substitution decisions.	ESPR pilots - DG GROW, DG ENV, Member States	Practical playbooks for cross-company data exchange.
A6 Prioritise SSbD science (NAMs, exposure models, LCA integration, AI/ML) in EU and national R&I programmes; require open, FAIR datasets.	Horizon Europe calls, MS R&I - DG RTD, Member States	Predictive capability under data scarcity; better early go/ no-go decisions.
A7 Explore regulatory, incentives for "SSbD-developed" products (e.g. data re-use, fast-track substitutions) while maintaining protection.	Cross-acquis assessment - SG, DG ENV, DG GROW	Tangible pull for firms to adopt SSbD.

How parc supports delivery of the proposed actions			
CRITICAL SUCCESS FACTOR	PARC CURRENT WORK	EVIDENCE (TOOLS, CASES, PLATFORM)	LINKED ACTIONS
Instruments and tools	Integrated SSbD Umbrella Toolbox aligned with EU framework	Alpha toolbox: scoping, risk, EF 3.0/LCA, socio-economic, MCDA modules	A1, A4
Training and education	Practitioner-focused SSbD training and bootcamps	SSbD Bootcamps (Thessaloniki 2024, Athens 2026)	A1
Case studies and practice	Real-world SSbD applications across sectors	Bisphenol A substitution case; further sectoral cases in development	A1, A5
Scientific and methodological development	NAMs, computational toxicology, exposure and risk modelling	PARC WP8 research outputs; NAMs publications; NGRA development	A3, A4, A6
Lifecycle and value-chain integration	Knowledge sharing and stakeholder engagement	SSbD Knowledge Sharing Portal (KSP); industry workshops	A2, A5
Network and governance	EU-wide partnership of agencies, institutes and EU bodies	PARC consortium (over 200 partners across Member States)	All

Abbreviations:

AI/ML

Artificial Intelligence/Machine Learning;

CIAP

Chemical Industry Action Plan;

CSRD

Corporate Sustainability Reporting Directive;

CSS

Chemicals Strategy for Sustainability;

DPP

Digital Product Passport;

EFRAG

European Financial Reporting Advisory Group;

ESPR

Ecodesign for Sustainable Products Regulation;

ESRS

European Sustainability Reporting Standards;

LCA

Life Cycle Assessment;

MCDA

Multi-Criteria Decision Analysis;

NAMs

New Approach Methodologies;

NGRA

Next-Generation Risk Assessment;

OSOA

One Substance, One Assessment;

PARC

Partnership for the Assessment of Risks from Chemicals;

SMEs

Small and Medium Enterprises;

SSbD

Safe and Sustainable by Design;

TRL

Technology Readiness Level.