TRAINING ON SAFE & SUSTAINABLE BY DESIGN FRAMEWORK

SSbD IMPLEMENTATION IN THE PRESERVE PROJECT

30 APRIL 2024 / 10-11 AM CET

ORGANIZED BY ITENE AND EUROPEAN BIOPLASTICS
WITH THE COLLABORATION OF NTT AND KNEiA

PRESERVE

PRESERVE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952183.

PRESERVE

10:00 – 10:05	**Introduction to the European SSbD framework** *Arantxa Ballesteros, ITENE*
10:05 – 10:15	**The Preserve Project and contextualisation within the SSbD and circularity** *Teresa Calvo, ITENE*
10:15 – 10:25	**SSbD implementation I: product and process safety aspects** *Javier Alcodori, ITENE*
10:25 – 10:40	**SSbD implementation II: LCA, sLCA and LCC** *Daniele Spinelli, NTT*
10:40 – 10:45	**SSbD Implementation II: Circularity** *Carla Bartolomé, ITENE*
10:45 – 10:50	**SSbD implementation III: conclusions of integration of SSbD results** *Arantxa Ballesteros, ITENE*
	Q&A
10:50 – 11:00	

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

Introduction to the European SSbD framework

Arantxa Ballesteros, ITENE
arantxa.ballesteros@itene.com

ITENE RESEARCH CENTER

ITENE's facilities are located in the **Parque Tecnológico of Paterna** (Valencia), in Spain

ITENE is a Research Centre, which was set up as a private Spanish non-profit association.

Our mission is to generate scientific and technological knowledge that we transfer to companies through **R&D and innovation projects** and **consultancy, testing** and **training services**.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

ITENE develops its **own R&D projects** or **in collaboration with companies**.

+410

We develop our R&D activities **at regional, national and European level**.

We generate knowledge and technology to build together a safer and more sustainable future through four main areas of work.

Materials and technologies for the circular economy

Packaging safety, design and functionality

Safety and environmental monitoring technologies

Transport, logistics and mobility

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

Introduction to the European SSbD framework

European Green Deal: European Commission aims to transform the EU´s economy for a more sustainable future

CLIMATE | BIODIVERSITY | CIRCULARITY | HUMAN HEALTH | ENVIRONMENT

→ TOXIC FREE ENVIROMENT SUSTAINABILITY

To achieve these objectives, the Chemicals Strategy for Sustainability (CSS) calls for the **transition to a Safe and Sustainable by Design (SSbD)** approach for chemicals (substances, new materials…).

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

Introduction to the European SSbD framework

EC & JRC

Dec 2022

Dec 2023

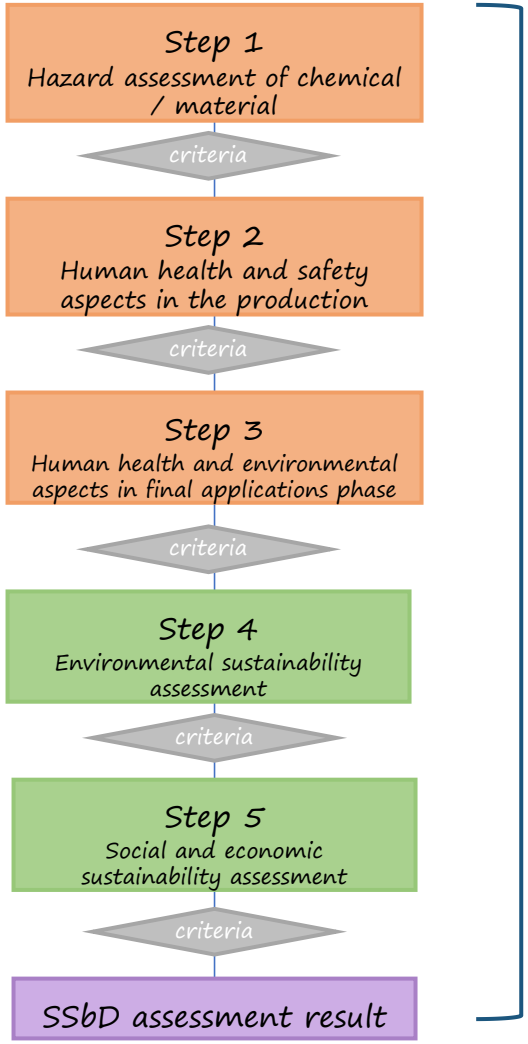
SSbD Framework aims to identifying and minimizing, at an **early phase** of the innovation process, the impacts concerning **human** and **environmental health.**

Addresses the **safety** and **sustainability** of the material/ chemical/ product and associated processes along the whole life cycle, including all the steps of the research and development (R&D) phase, production, use, recycling and disposal.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

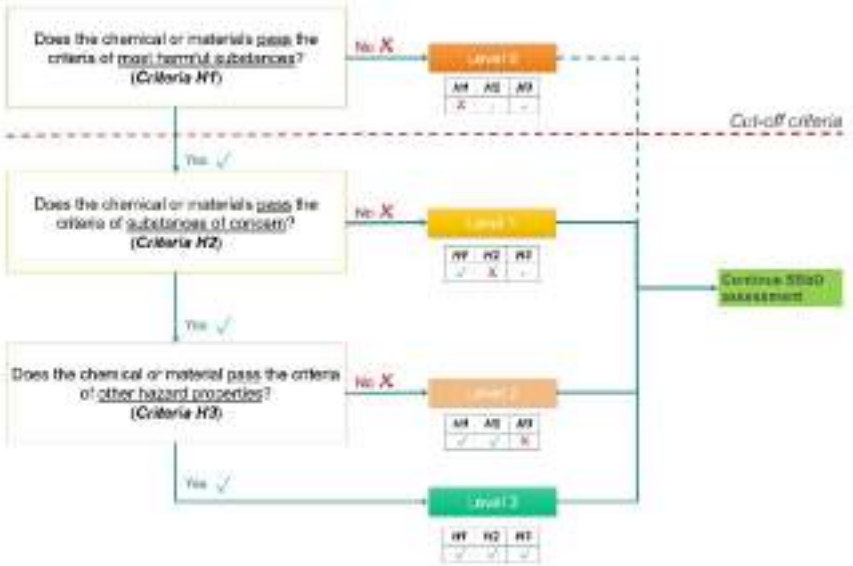
Introduction to the European SSbD framework

5-step methodology:



Scoring system for each step (following **decision trees** and **cut-off criteria**) which allow to determine if the materials/products under development could be safer and more sustainable than current alternatives

TRANSITION TO GREENER AND SAFER MATERIALS AND PRODUCTS



This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

Introduction to the European SSbD framework

SAFETY

- **Hazard assessment** of bio-coatings and materials developed for human and environmental health (raw materials and substances, coatings and materials, final demonstration products)
  - Methods based on IATAs, NAMs
  - Experimental: *in vitro* tests & bioassays
  - *In silico* methods
  - Bibliographic
- **Process** hazard assessment
  - Occupational exposure

SUSTAINABILITY

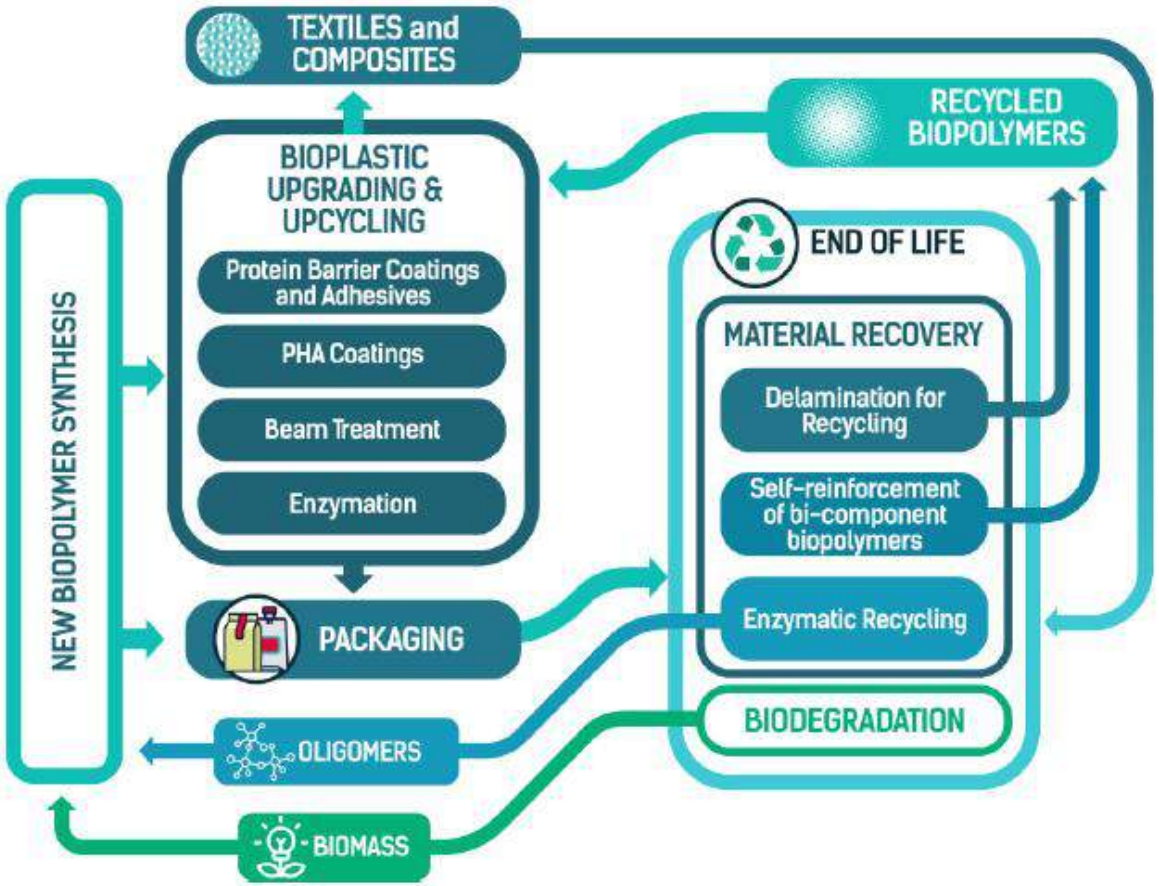
- Assessment of the **environmental impacts** generated by products and processes throughout their life cycle:
  - Pollutant emissions,
  - GHG
  - Contribution to climate change
  - Carbon footprint
  - LCA
  - Circularity
- **Socio-economic** impacts
  - LCC
  - sLCA

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

The Preserve Project and contextualisation within the SSbD and circularity

Teresa Calvo, ITENE
teresa.calvo@itene.com

The Preserve Project and contextualisation within the SSbD and circularity



Enhance bio-based packaging properties that currently limit the application of bioplastics

Develop upcycling technologies of plastics for food, personal care and transport packaging applications ensuring that microplastics are avoided.

Develop novel standards and certification schemes applicable to packaging materials made from recyclable and biodegradable bio-plastic.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

The Preserve Project and contextualisation within the SSbD and circularity

PRESERVE DEMONSTRATORS

Biobased & recyclable food packaging

- Flow pack
- Lid film
- Thermoformed tray
- Dairy pouch
- Briks

Recycled personal care and transport packaging

- Carrier box
- Shopping bag
- Injected jar
- Blow molded bottle

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

PRESERVE EU-Project partners

IRIS

ITENE RESEARCH CENTER

NEXT TECHNOLOGY TECNOTESSILE

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

CENTEXBEL

AIMPLAS PLASTICS TECHNOLOGY CENTRE

PLANET BIOPLASTICS srl

Fraunhofer

Bostik smart adhesives

CARBIOLICE

ISDIN

Graphic Packaging INTERNATIONAL

Inspired packaging. A world of difference.

SIBO group

Hochschule Albstadt-Sigmaringen Albstadt-Sigmaringen University

SÜDPACK

Normec OWS

Kneia

ROMEI REPLASTICS

Crowdhelix

DENIMX SMART UPCYCLING

europeanbioplastics

DANONE ONE PLANET. ONE HEALTH

FERRERO

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD implementation I: product and process safety aspects

Javier Alcodori, ITENE
javier.alcodori@itene.com

SSbD Implementation I: Product and Process Safety Aspects

Why, What, How?

The Safe- and Sustainability-by-Design (SSbD) concept emphasizes designing products, processes, and systems with safety and sustainability considerations, **mitigating toxicological effects and minimizing potential exposure throughout a product's lifecycle**, from initial design to end-of-life considerations

Release of potentially harmful substances from PRESERVE'S plastic products or during the manufacturing and processing phase

•Environmental impacts & possible adverse effects on health.

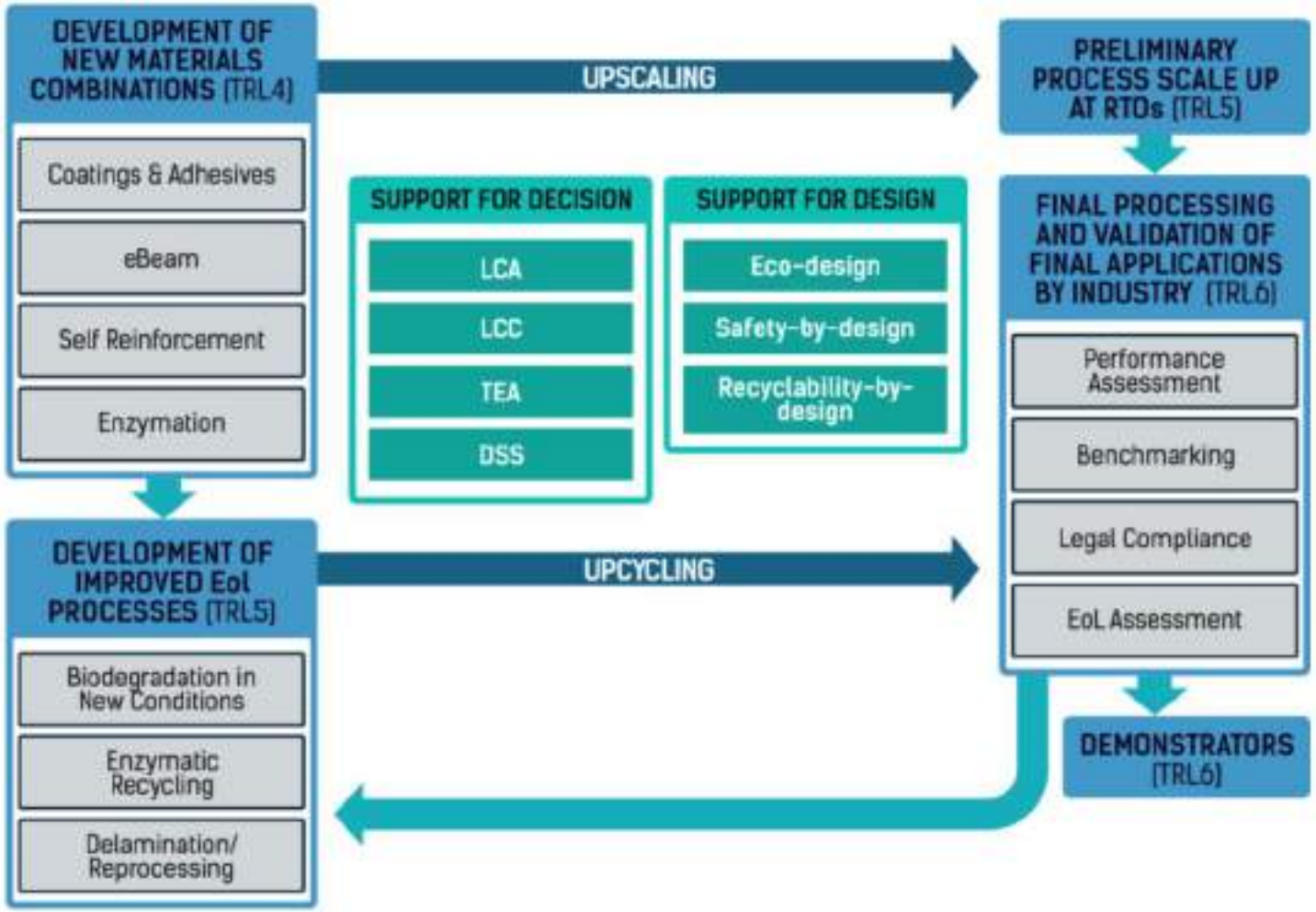
By the materials' toxicological profile or by high probability of exposure during industrial use or at the consumption stage by occupational users or the general public.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

SSbD Implementation I: Product and Process Safety Aspects

Process

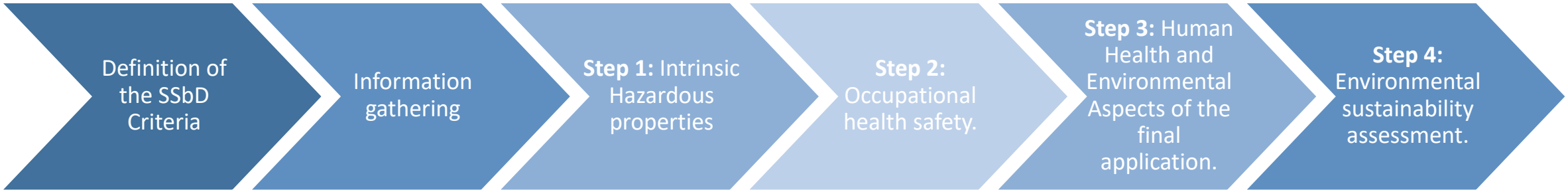
- Safe- and sustainability-by-design (SSbD) concept is being implemented throughout the project.
  - Development and choice of new materials (polymers, coatings and adhesives).
  - Industrial scale up, processing and production of final products.
  - Usage phase by final users.
  - End-of-Life.



This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

Process



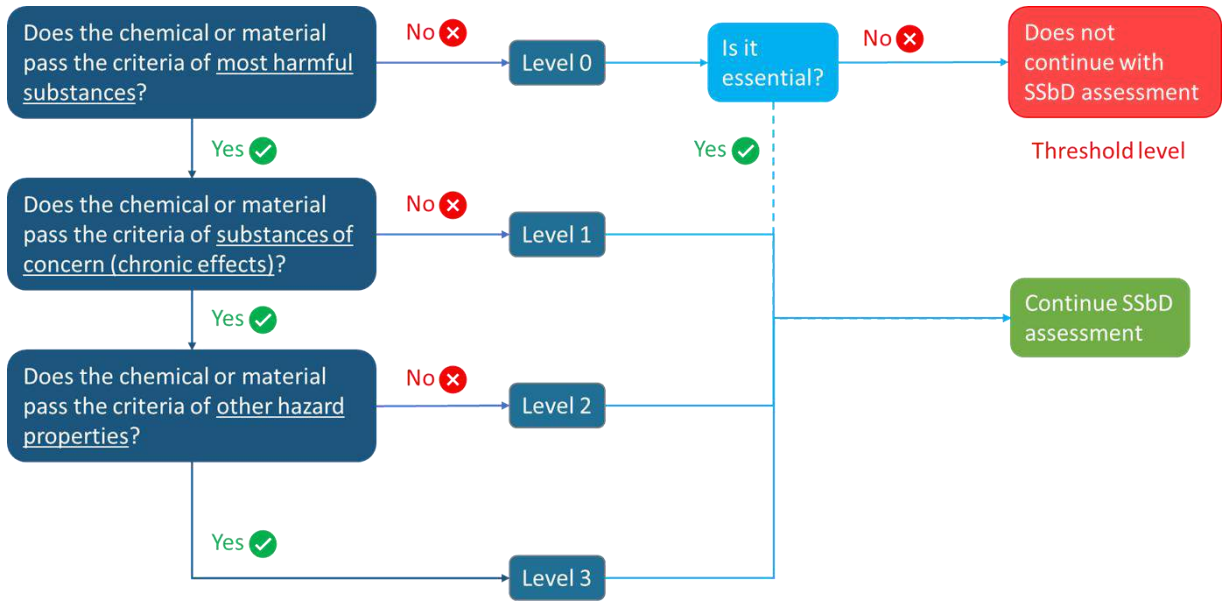
- Definition of the criteria for every step
- Information about the materials and chemicals used is being gathered by communication with partners.
- Assessment of the chemicals based on the ECHA, CLP and SDS.
- Estimation of the production and processing-related risks. Risk estimated as a combination of chemical and/or material hazards, exposure and risk management measures.
- Likelihood of exposure to the chemical or material, potential exposure routes and related toxicity impacts on human health and the environment.
- Environmental sustainability aspects of the chemical or material.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 1: Intrinsic hazardous properties

For **Step 1**, four levels are currently defined (*from 'Level 0' to 'Level 3'*) that will allow the assessor to rank a specific chemical based on these levels and further to integrate the results of the hazard-based evaluation to the overall SSbD assessment.



Level 0 – chemicals or materials considered most harmful substances (Group A) → **Prioritized for substitution**

Level 1 – chemicals or materials that induce chronic effects, part of the substances of concern (Group B) → **Substituted as far as possible**

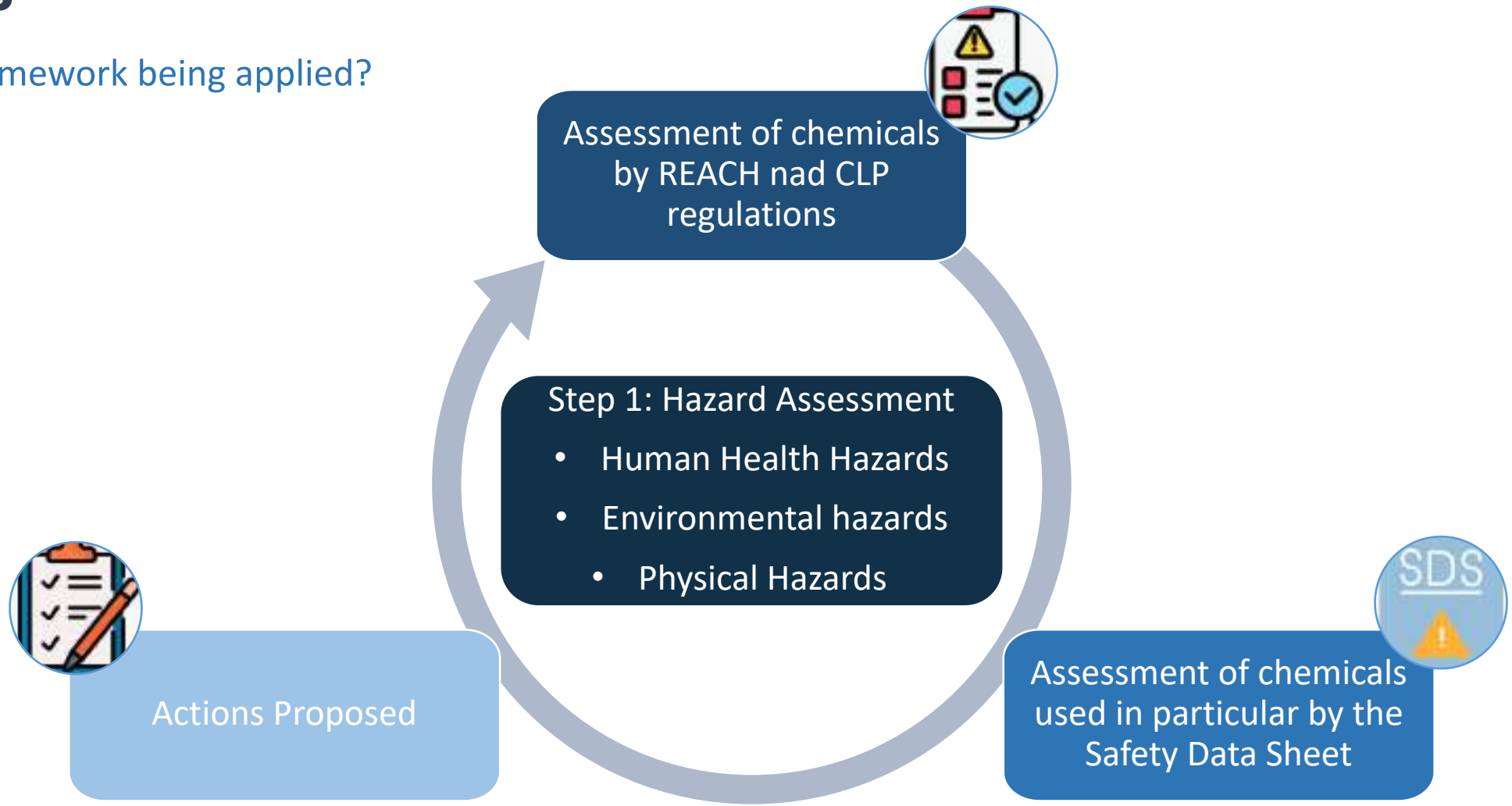
Level 2 – chemicals or materials with other hazardous properties (not included in Group A and B) → Flagged for review and eventually reduce toxic effects

Level 3 – chemicals or materials that pass all safety criteria in Step 1.

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

SSbD Implementation I: Product and Process Safety Aspects

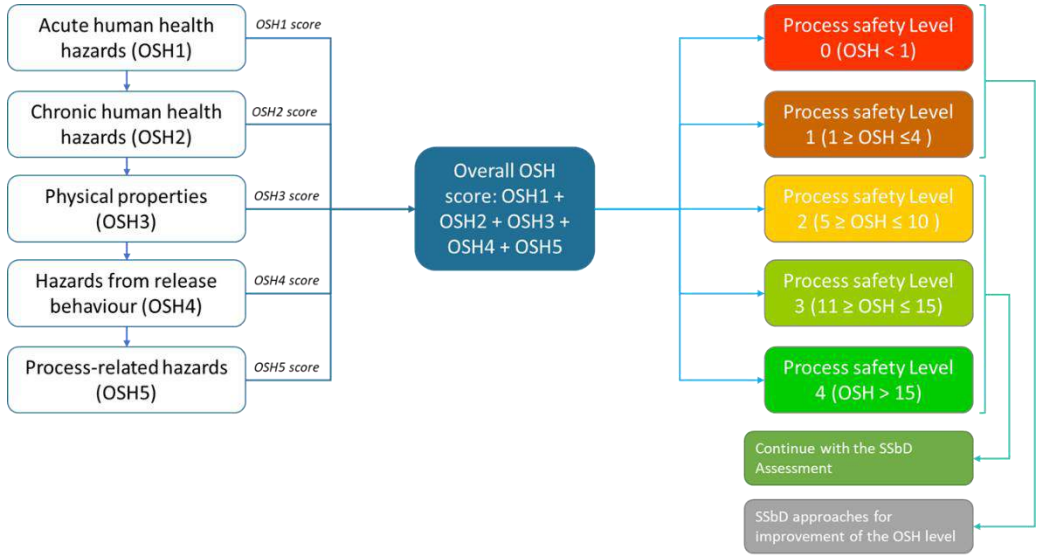
How is the framework being applied?



This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 2. Human Health and Safety aspects of Production and Processing



For **Step 2**, five levels are currently defined (*from 'Level 0' to 'Level 4'*) that will allow to rank the production and processing-related risks levels and further to integrate the results of the hazard-based evaluation to the overall SSbD assessment.

Level 0 – production and processing-related risks considered most dangerous → **Prioritized for modification/substitution**

Level 1 – **Prioritized for modification/substitution**

Level 2 – **Flagged for review and eventually reduce toxic effects**

Level 3 – **chemicals or materials that pass all safety criteria in Step 2.**

Level 4 – **chemicals or materials that pass all safety criteria in Step 2.**

Risk level	Acute human health hazards	Chronic human health hazards	Physical properties	Hazards from release behaviour	Process-realted hazards	Safety	
Very high-risk	0	0	0	0	0	0	Very high risk
High-risk	1	1	1	1	1	1-5	High risk
Medium-risk	2	2	2	2	2	6-10	Medium-risk
Low-risk	3	3	3	3	3	11-15	Low-risk
Neglible risk	4	4	4	4	4	16-20	Neglible risk

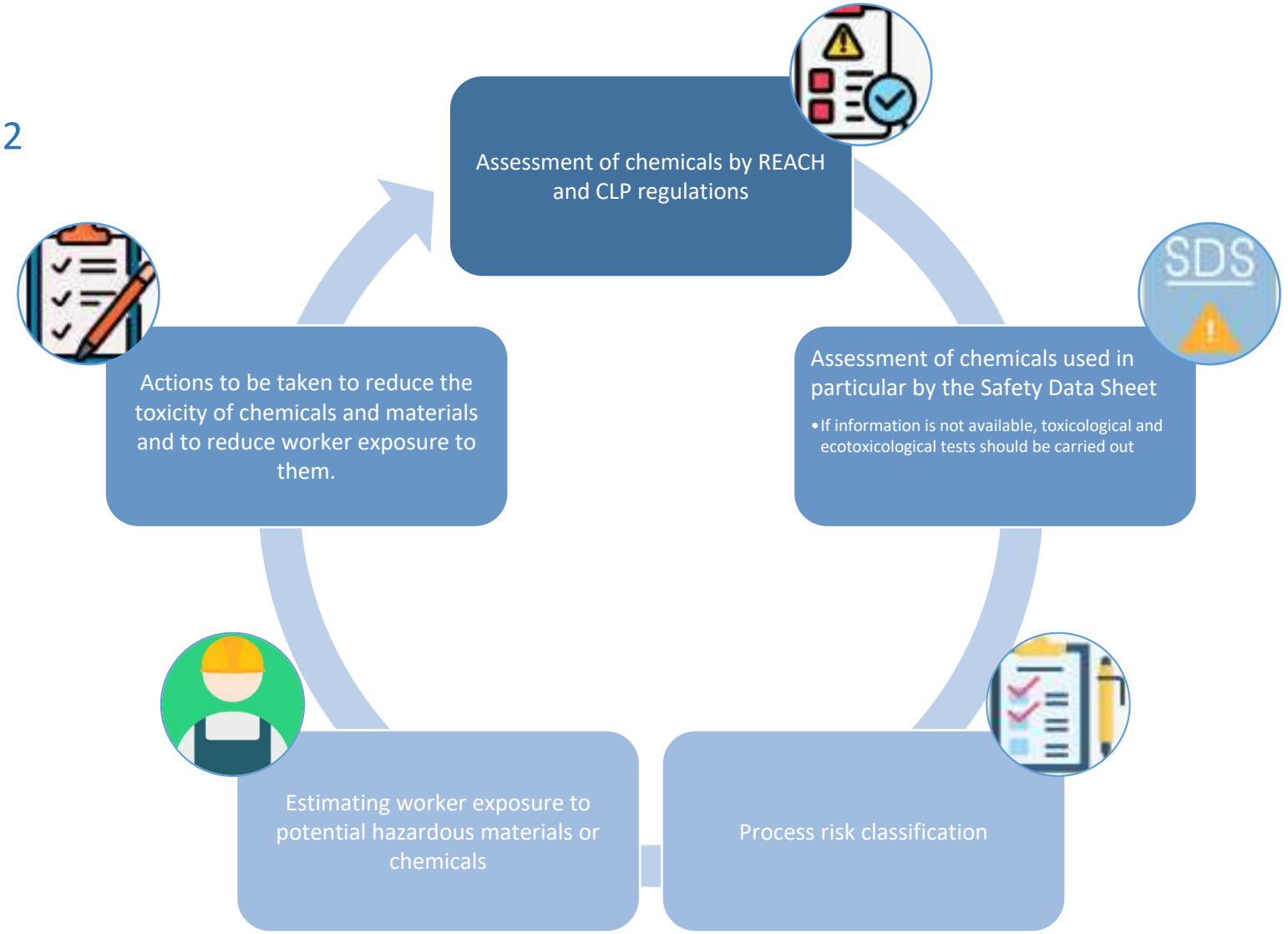
This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 2

Step 2: Human health and safety aspects of production and processing.

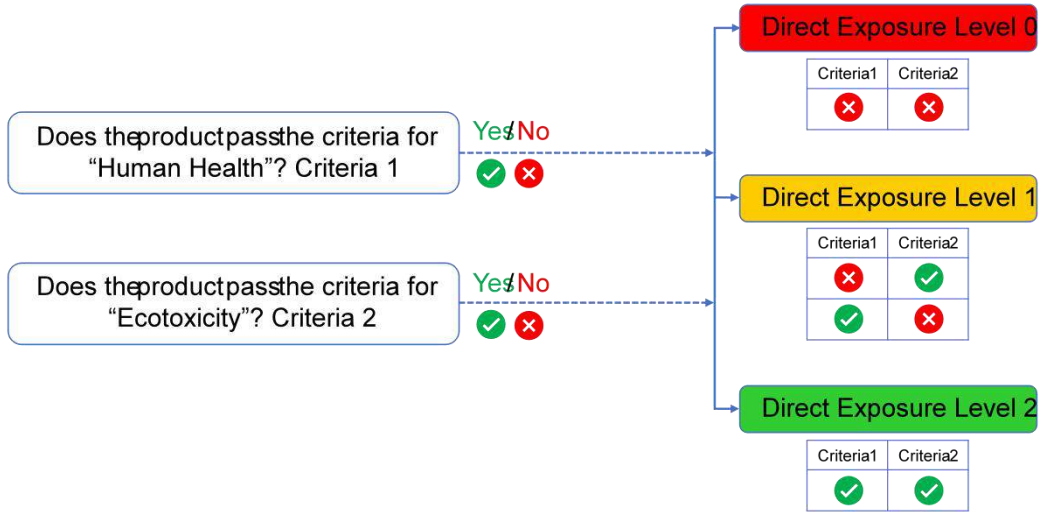
Occupational health and safety during production and processing of a chemical



This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number **952983**

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 3: Human health and environmental aspects of the final application



For **Step 3**, three levels are currently defined (*from 'Level 0' to 'Level 2'*) that will allow to rank the human health and environment impacts of the final application of the product and further to integrate the results of the hazard-based evaluation to the overall SSbD assessment.

Level 0 – The product generates a toxic exposure to humans or the environment above the tolerable limit → **Prioritized for modification/substitution**

Level 1 – **Flagged for review and eventually reduce toxic/ecotoxic effects**

Level 2 – **chemicals or materials that pass all safety criteria.**

Position to safe level	Score	Color code	Criteria evaluation
> Safe level + 50%	0		Fail the criteria
> Safe level; < Safe level + 50%	1		
> Safe level - 25%; < Safe level	2		Pass the criteria
> Safe level - 50%; < Safe level - 25%	3		
< Safe level - 50%	4		

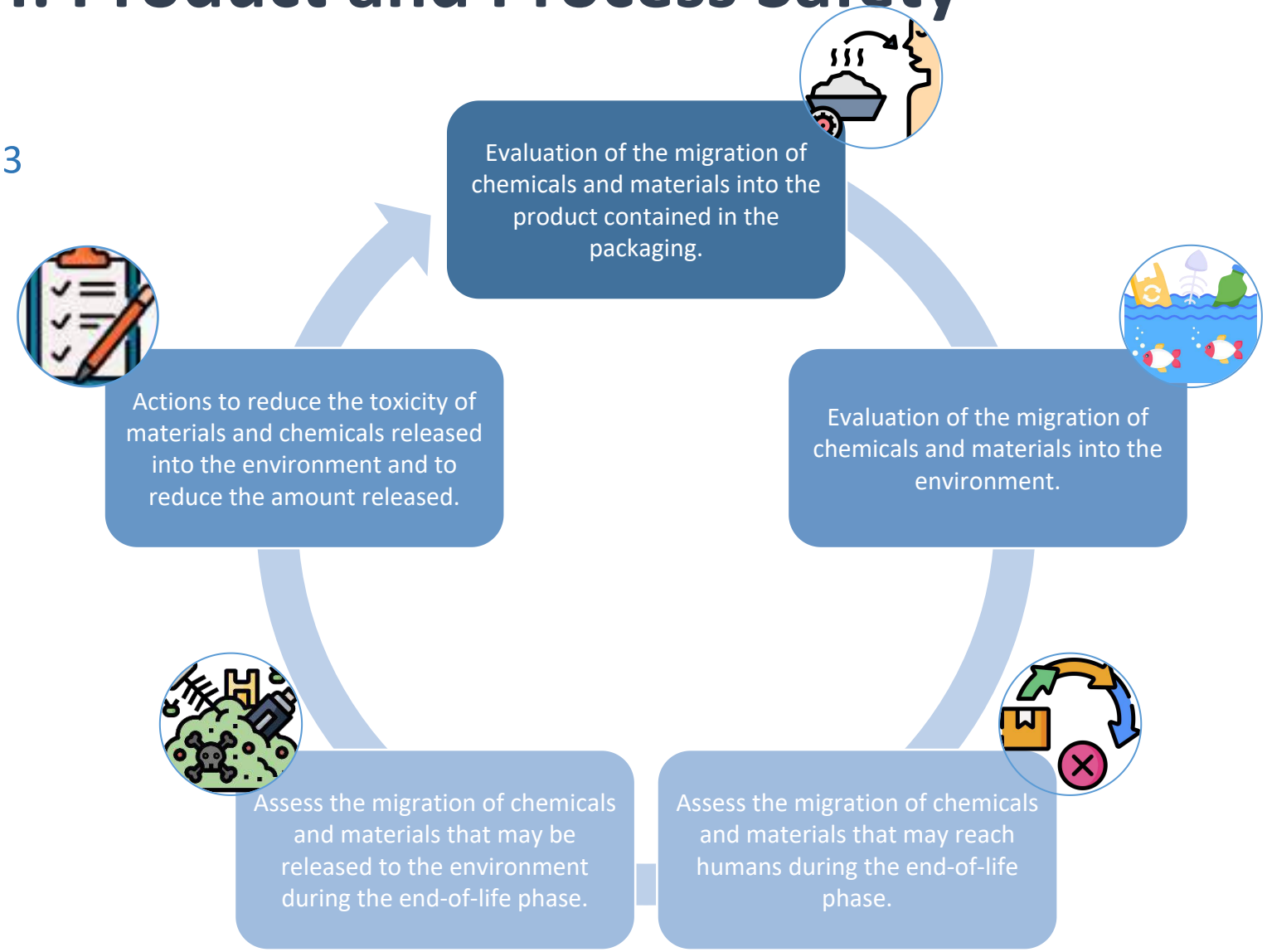
This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 3

Step 3: Human health and environmental aspects of the final application.

Exposure to the chemical or material as well as the potential exposure routes and related toxicity impacts on toxicity on human health and the environment



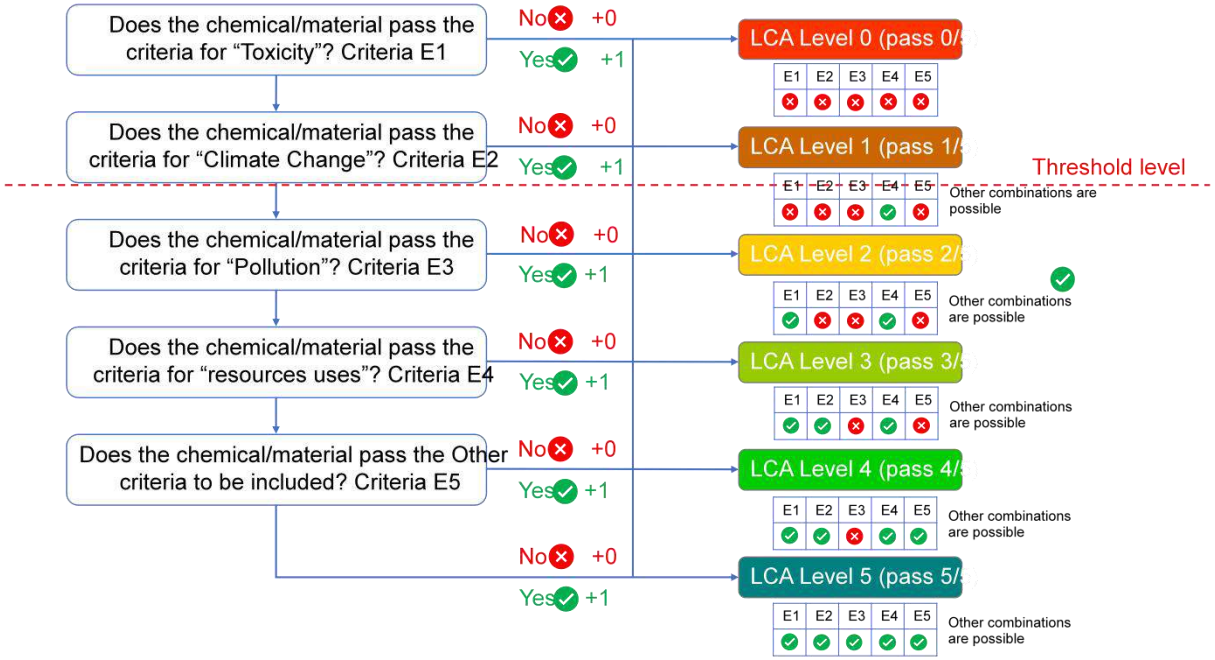
This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 4: Environmental Sustainability assessment

For **Step 4**, six levels are currently defined (*from 'Level 0' to 'Level 5'*) that will allow to rank the environmental sustainability aspects related to the chemical/material or process under consideration, with a particular emphasis on assessing its environmental impacts throughout the entire value chain, ensuring a thorough understanding of its sustainability performance.

LCA Assessment level	Aspect	Score
Toxicity	Human Toxicity cancer	0-4
	Human Toxicity no cancer	0-4
	Ecotoxicity	0-4
Climte change	Climate change	0-4
Pollution	Ozone Depletion	0-4
	Particulate matter/Respiratory inorganics	0-4
	Losing radiation, human health	0-4
	Photochemical ozone formation	0-4
	Acidification	0-4
	Eutrophication, terrestrial	0-4
	Eutrophication, aquatic freshwater	0-4
	Eutrophication, aquatic marine	0-4
Resources	Land use	0-4
	Water Use	0-4
	Resource use, minerals and metals	0-4
	Resource use, energy carriers	0-4



Level 0 – 1 – The product generates a toxic exposure to humans or the environment above the tolerable limit → **Prioritized for modification/substitution**

Level 2 – 3 – **Flagged for review and eventually reduce toxic/ecotoxic effects**

Level 4 – 5 – **chemicals or materials that pass almost all safety criteria.**

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983

SSbD Implementation I: Product and Process Safety Aspects

How is the framework being applied? Step 4

Step 4: Environmental sustainability assessment.

Assessment of the environmental sustainability aspects of the chemical or material in question, focusing on its environmental impacts throughout the value chain

LCA Assessment level	Aspect	Position to reference (improvement %)	Score	Level	
Toxicity	Human Toxicity, cancer	*10*	2	✓	9
	Human Toxicity non cancer	*25*	3		
	Ecotoxicity	*56*	4	✗	
Climate Change	Climate Change	*5*	1	✗	1
Pollution	Ozone depletion	*35.6*	3		16
	Particulate matter/Respiratory inorganics	*-10*	0		
	Ionising radiation, human health	*0*	0	✗	
	Photochemical ozone formation	*1*	1		
	Acidification	*20*	2		
	Eutrophication, terrestrial	*40*	3		
	Eutrophication, aquatic freshwater	*41*	4		
	Eutrophication, aquatic marine	*21*	3		
Resources	Land Use	*20*	2		12
	Water use	*33*	3		
	Resource use, minerals and metals	*89*	4		
	Resource use, energy carriers	*21*	3		
			38		

This project is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement Number 952983