ESA REACH Office activities: Introduction of the ESA REACH tool

Short title: REACH Tool for ISD 2026

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What is EU REACH in the Space Context?

EU REACH* was designed to protect human health and the environment

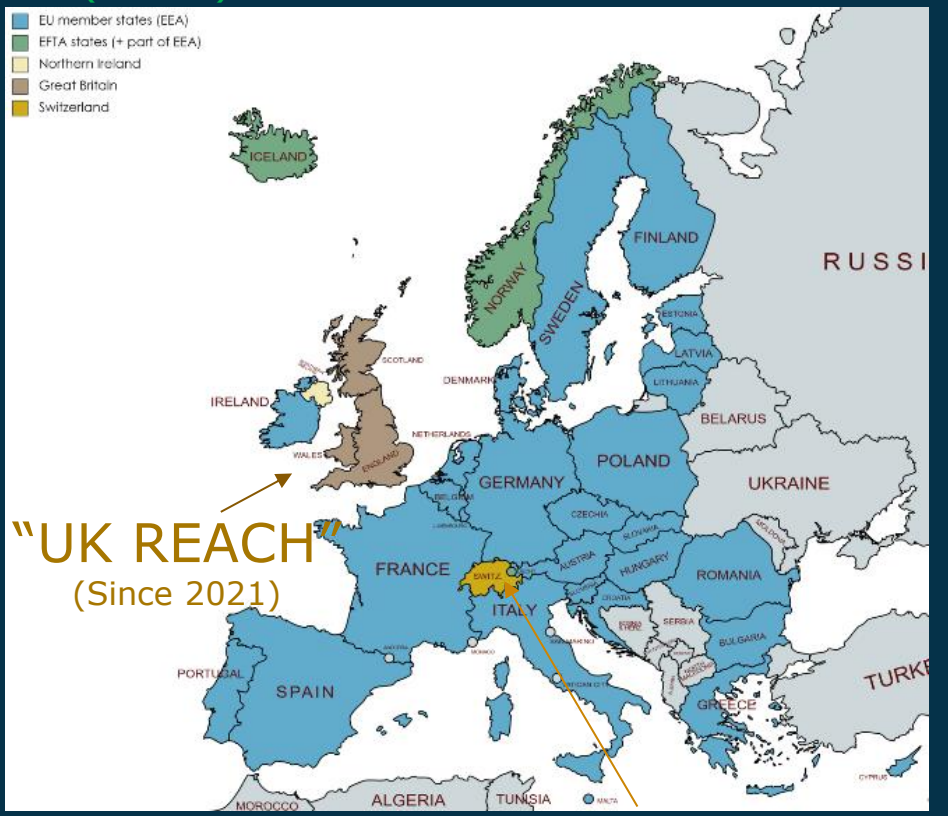
- ❑ Identification of hazardous substances
- ❑ Risk management across the supply chain
- ❑ Promotion of safer alternatives

For the space sector, REACH creates additional challenges

- ❑ Critical materials / chemicals face increasing regulatory pressure
- ❑ Substitution and requalification require significant engineering effort
- ❑ Long mission development cycles are often incompatible with regulatory timelines
- ❑ Multi-year space programmes depend on stable material availability

"EU REACH" territories

EU-27 + Iceland, Norway and Lichtenstein (= EEA) + Northern Ireland



Swiss chemicals regulation

* Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the **R**egistration, **E**valuation, **A**uthorisation and Restriction of **Ch**emicals (REACH)

ESA REACH Office

Mission:

- Safeguarding the availability of critical materials and technologies for European space programmes → From compliance to capability preservation.

What we do:

- Support ESA projects and programmes in regulatory compliance
- Monitor emerging regulations and anticipate risks
- Assess impacts on materials, technologies and supply chains
- Coordinate the European space sector response

Key Contributions:

- Network of agencies, primes and SMEs for REACH implementation and updates.
- Engaged in public consultations, contributed to guidelines, internal reporting.
- Development of the ESA REACH Tool and REACH awareness sessions.
- ESA REACH workshops for external stakeholders and internal sessions for ESA.

High priority substances - examples

Hydrazine (+ other energetic materials): essential substances in propulsion / attitude control

Chromates: chemical conversion coatings / corrosion protection of sensitive alloys

Lead metal: multiple applications, soldering, additives, alloying element…

Di-isocyanates: polyurethane chemistry, foams, coatings, paints, thermal insulation, batteries,…

Bisphenol A and its derivatives: epoxy resins, pre-pregs, composites, adhesives…

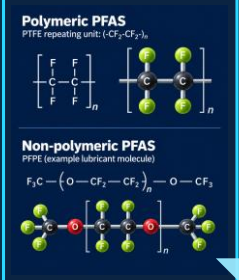
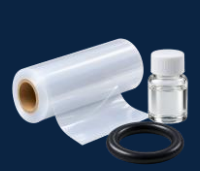
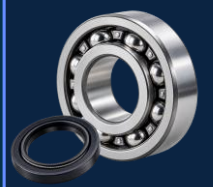
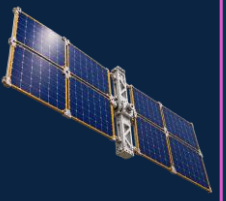
D4, D5 and D6 cyclic siloxanes: precursors for silicone elastomers, paints, conformal coatings,…

Per and Poly-Fluoro Alkyl Substances (PFASs): thousands of applications…

PFAS impact propagation in space systems

How a change at substance level can propagate through qualified hardware to an operational space service

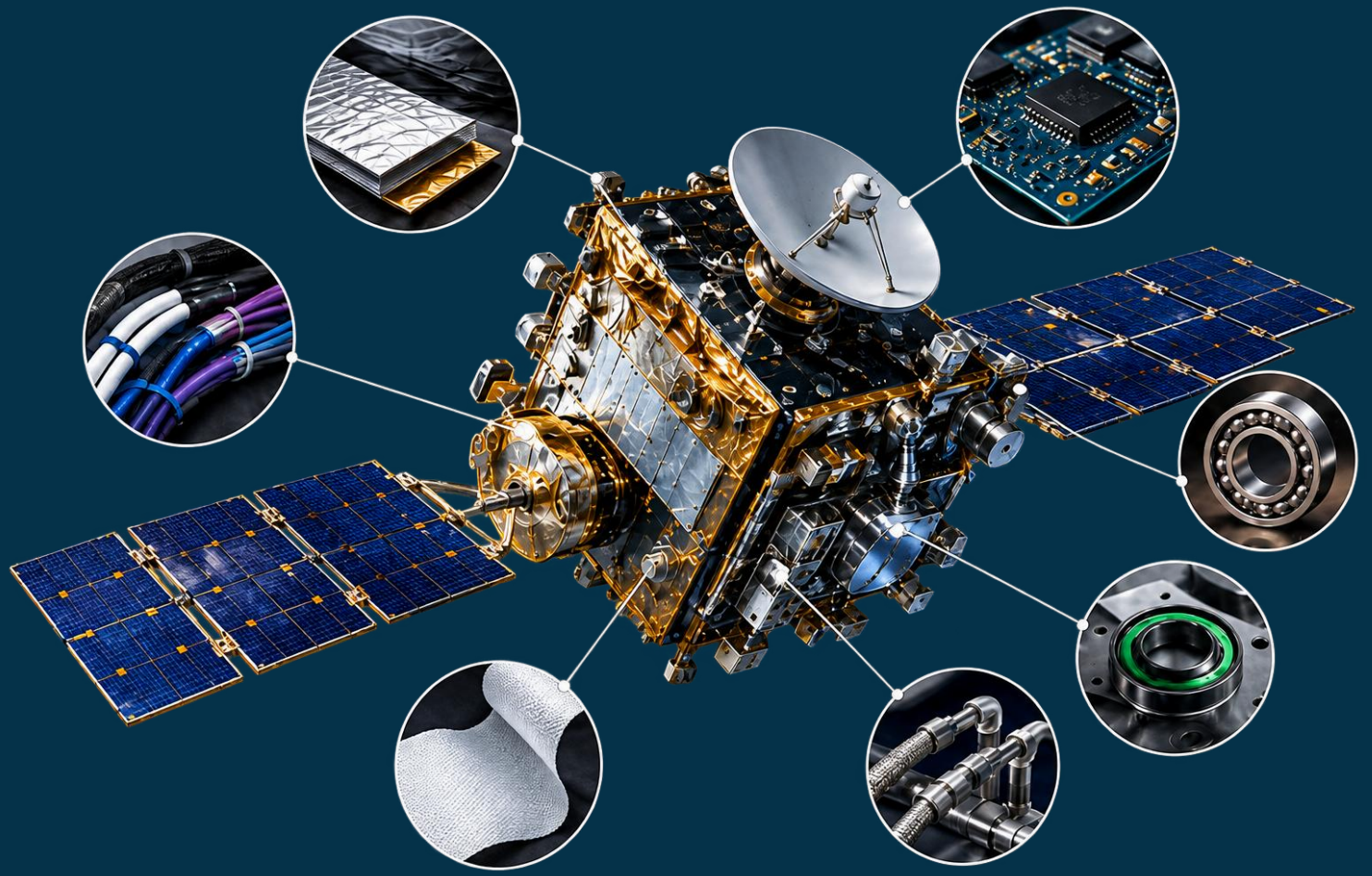
Example pathway: PFPE lubricant → bearing → rotary assembly → SADM → solar array → satellite → mission -> space data

1	2	3	4	5	6	7	8	9	10
Substance	**Material**	**Process**	**Part**	**Assembly**	**Sub-system**	**System**	**Integration**	**Complex object**	**Space data**
									
PFAS substance	**PFAS –based materials**	**PFAS-based processes**	**Mechanical, passive EEE parts**	**Rotary assembly**	**Functional sub-system**	**Solar array**	**Spacecraft AIT**	**Satellite, Launcher, Antennas**	**Operational service**
e.g. PTFE, ETFE, PVDF, PFA, PFPE / F-Gas, etc.	FEP films, PFPE oil / grease, cleaning fluids, PTFE polymeric sheets...	Coating, bonding, crimping, soldering, casting, curing,	Bearing, seals, MLI stack, cable, connector,	Slipring / hinge, Solar cell assembly, ...	Solar Array Drive Mechanism, power generator, harness,...	Power-generation system, propulsion, thermal control,...	Integration of sub-systems, routing, harnessing, alignments, testing	MTG, JUICE, VEGA, ARIANE, etc.	Space + ground segment -> data available to users
chemistry	material performance	process control	part function	assembly function	deployment / rotation	power generation	qualification	mission hardware	service continuity

LOWER upstream unavailability / change — **Increasing complexity • cost • qualification effort • policy relevance** — HIGHER system-level impact

Restriction, loss of supply or substitution of one substance can trigger requalification and impact all the way up to the spacecraft and the operational service.

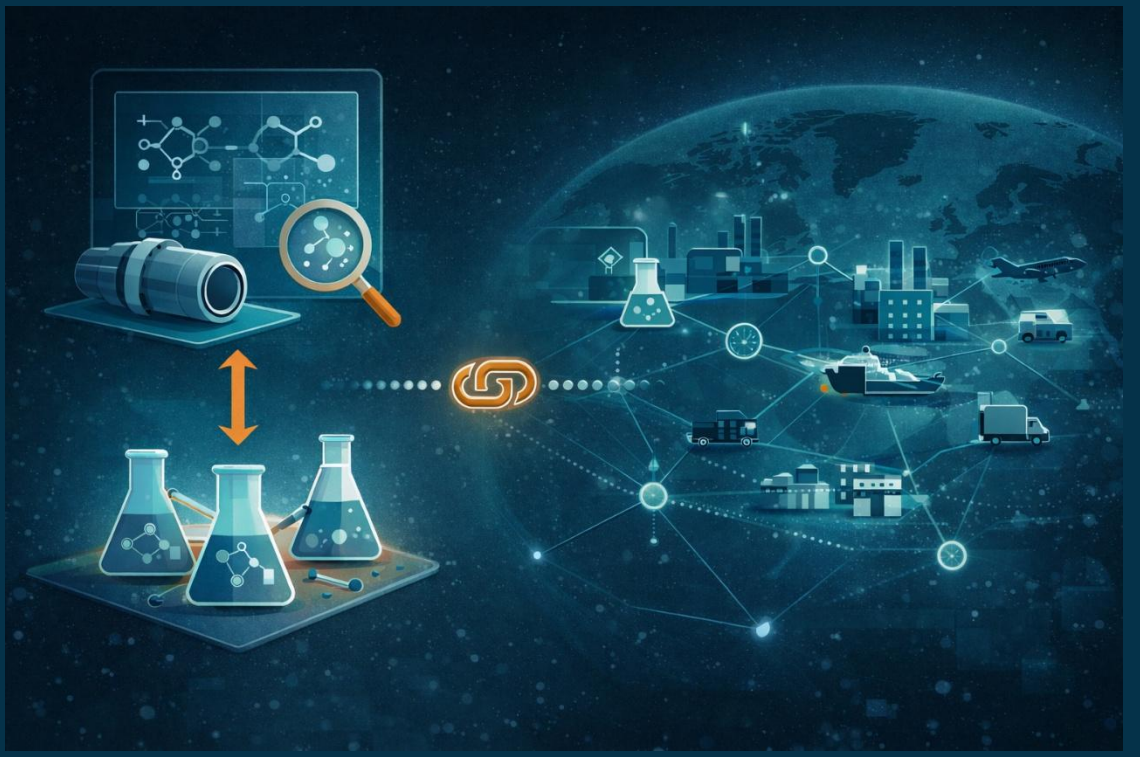
The chain is deliberately shown as one coherent example rather than a catalogue of unrelated PFAS uses.



Missing link between **essential chemicals**, **space-relevant materials** and **critical space infrastructure**

Supply chain → Supply Network → Supply System

- What does it* contain?
- Where did it* come from?
- How certain am I in getting the same stuff tomorrow?
- How well do I understand materials supply system?



*It = chemical, mixture, material, EEE component, article, finished product (e.g. component, sub-system, satellite, launcher, antenna)

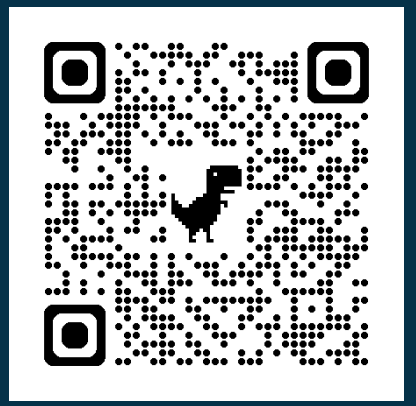
APS = **A**rticle**, **P**reparation or **S**ubstance

**Article (in REACH terminology) = an object which during production is given a special shape, surface, or design that determines its function to a greater degree than its chemical composition

ESA REACH TOOL

Why use it?

Motivation for development of the ESA REACH Tool



Increasing regulatory pressure on space materials:

- REACH and related chemical **regulations** are continuously **evolving**, restricting hazardous substances used in many legacy space materials
- ESA missions rely on highly **specialized materials** (-often without direct alternatives-)
- **Manual** compliance tracking across thousands of materials is **inefficient**, error-prone and inconsistent

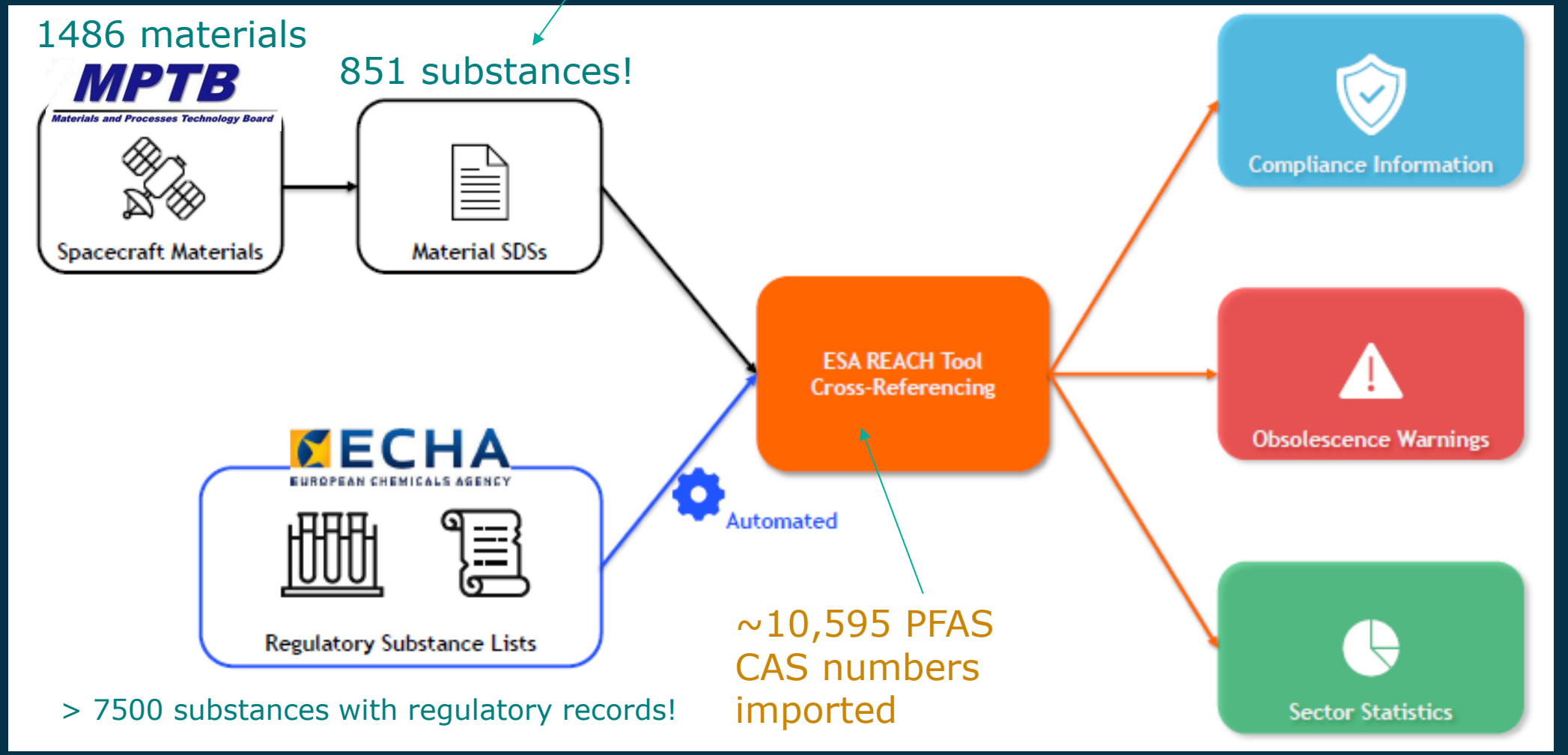
Supporting compliance and decision-making:

- Enables to **monitor compliance** across all known space-relevant materials
- Early warning system: **detect** where REACH will have an impact
- Can be used for substitution strategy, long-term planning, and technology road mapping
- Strengthens **traceability of materials and chemicals** relevant for European Space Sector

Benefits for space ecosystem:

- Supports ESA's sustainability and environmental compliance objectives
- Ensures ESA stays **ahead of regulatory changes** and maintains leadership in safe material use

Basic principle of the data flow

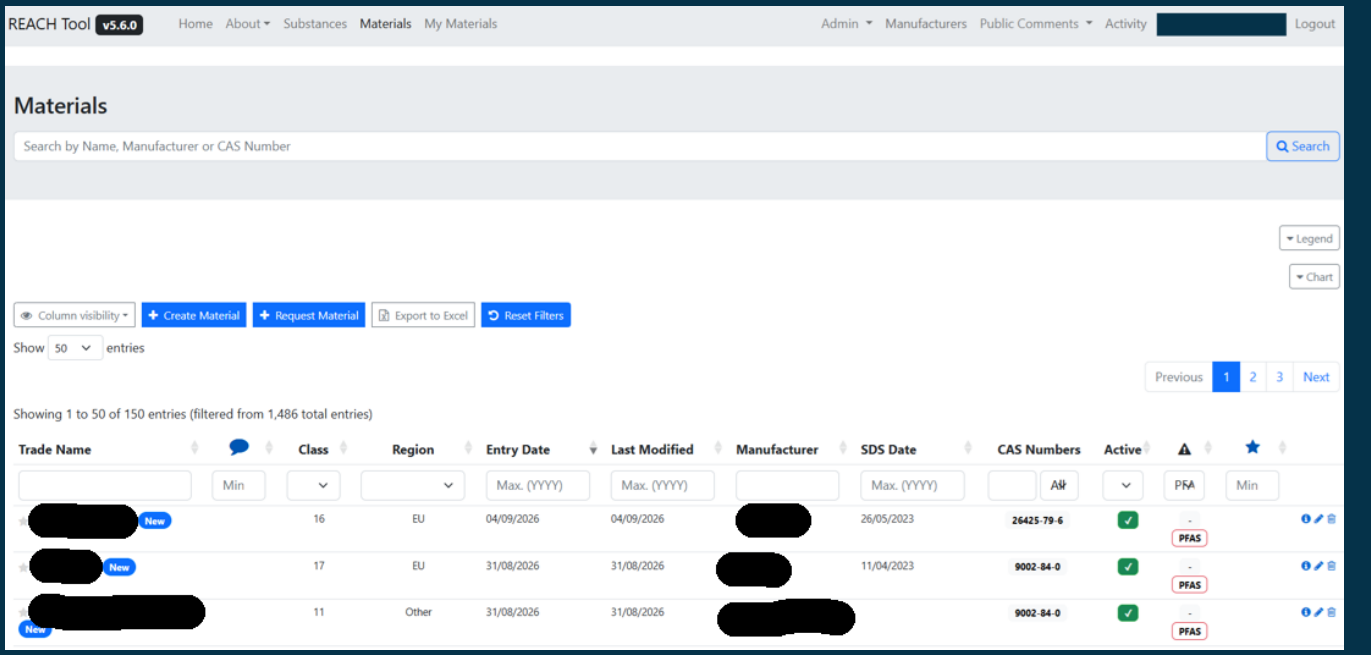


Identification of obsolescence risks: ESA REACH Tool

The **ESA REACH Tool** is a web-based materials obsolescence risk assessment tool developed for the European Space Sector, which can **automatically identify REACH impacted substances** in space-relevant materials

ESA REACH Tool functionalities include:

- ✓ Crude REACH obsolescence risk predictions
- ✓ Real-time substance content analysis of EU UK and Swiss regulatory lists
- ✓ REACH status compliance guidance + risk score (thermometer)
- ✓ “My materials” (personal BOM)
- ✓ PFAS indicator
- ✓ Request materials to be added & tracked



~18,000 reg. listed substances

Incl. >10,000 PFAS!

1486 Space-relevant Materials

851 Space-relevant Substances

No composition data = no reliable REACH risk assessment

REACH obsolescence risk tracked | tracked unknown risk | unknown risk!

Substances tracked in the ESA REACH Tool

REACH CoRAP List

REACH SVHC (Candidate List for Annex XIV)

REACH Annex XIV (Authorisation List)

REACH Annex XVII (Restriction List)

('Space-relevant') Materials tracked in the ESA REACH Tool

No regulatory issue

Materials of known composition
(SDS up to date, CAS indexed)

Materials of unknown composition
(material of interest without SDS up to date, no SVHC tracking)

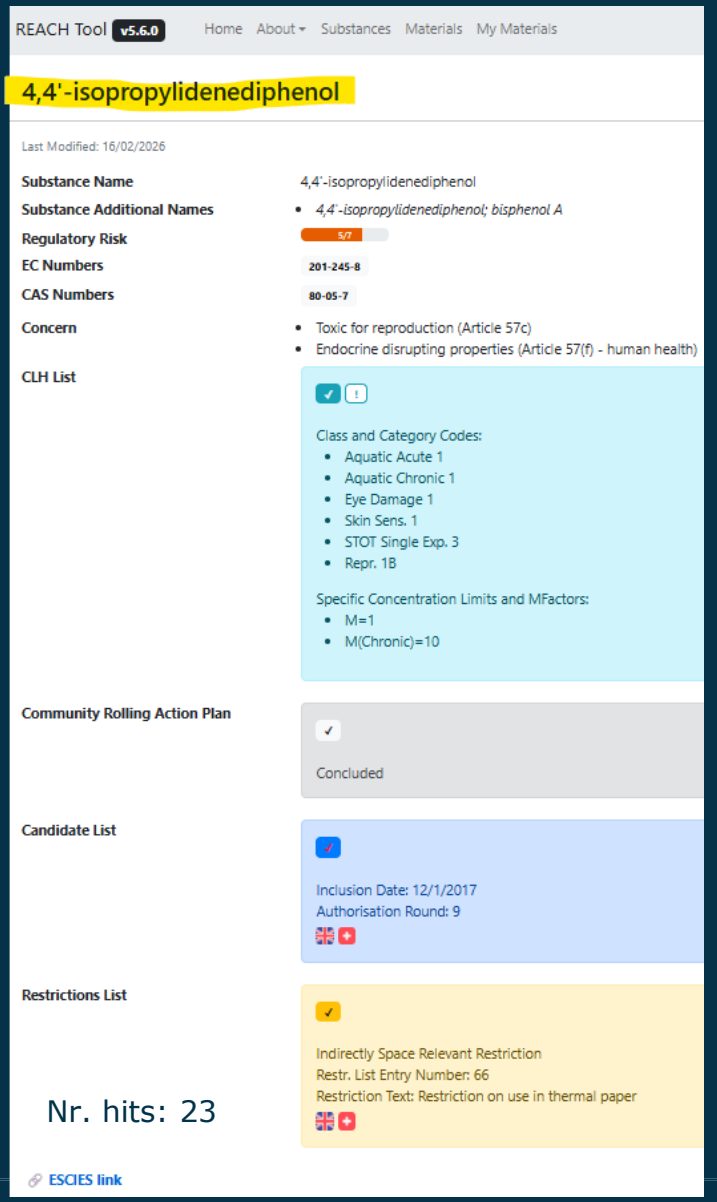
Materials used in space relevant processes, but **not declared to customer**, underspecified, wrong naming, incorrect codes...

GSE materials, cleaning solvents, conditioners, EEE, CFIs to customer

PFAS?

Note: It is impossible to perform any REACH cross-check/regulatory risk assessment if the substances present in materials & process are NOT traced/identified

EXAMPLE: 4,4'-isopropylidenediphenol, (BPA)



Nr. hits: 23

- ❑ Authorisation list? -> no
- ❑ SVHC? -> yes, recommended for Annex XIV?: yes
- ❑ Relevant restriction(s)? Yes and no, Entry 66 no (thermal paper), Entry 30, on group restriction entry for 1B class potentially relevant (public use, nevertheless derogations for space-relevant uses may be applicable!)

Short risk assessment of example: epoxy **Hardener: REACH Risk thermometer 5/7**

What does this mean?

Production of HARDENER [redacted] may now be **obsolete**

Regulatory Compliance

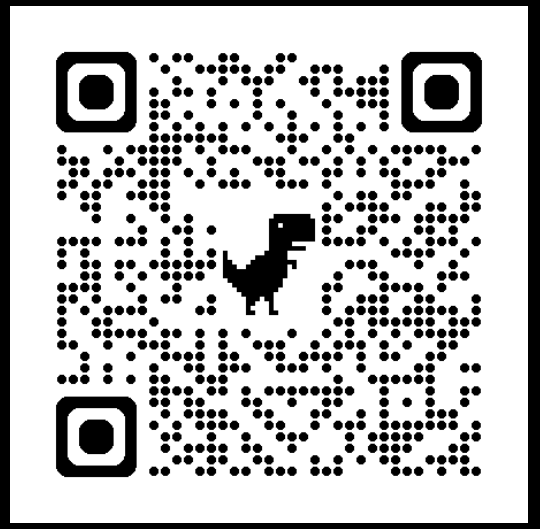
Based on the known composition, indexed from the SDS with the above revision date, the REACH Tool has identified that HARDENER [redacted] contains a SVHC.

HARDENER [redacted] contains a substance found in the **Restrictions List** (REACH Annex XVII), therefore **action may be required**. Restrictions may be any condition for or prohibition of the manufacture, use or placing on the EEA market. Please consult the ECHA website for further details on the specific entry that covers the substance(s) in question, the latest EU REACH Safety Data Sheet provided by the substance/mixture supplier and – if in doubt – regulatory experts.

HARDENER [redacted] contains a substance found in the **Candidate List** of Substances of Very High Concern for Authorisation*, therefore **action may be required.** If the material (qualifying as article as such or assembly of articles) containing this substance above 0.1 % weight by weight in the article is being supplied to another entity in the EEA, the EEA supplier is required to provide a REACH Article 33 Declaration. Furthermore, as from 5 January 2021 EU suppliers of such articles/assemblies (including EU importers) are required to submit a SCIP notification based on Article 9 of the EU Waste Framework Directive in association with the applicable national law.

*Note: In a worst-case scenario, the substance may enter the Authorisation List within about 2 years from the Candidate List inclusion date, banning its use within the EEA without authorisation after the specified sunset date.

BPA from formulation → new epoxy hardener introduced (new formulation → requalification)

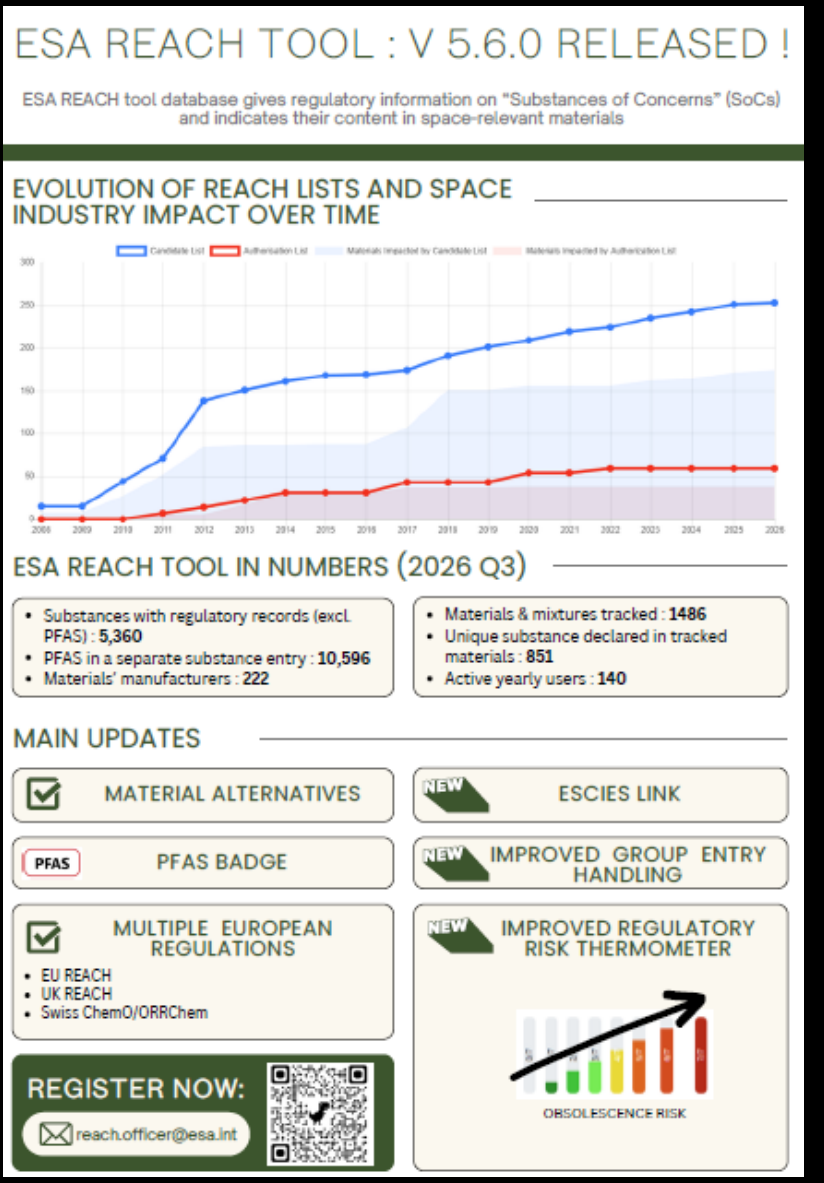


We need you!

The Tool can only be as good as the community behind it

reach.officer@esa.int

Enjoy your ISD 2026!



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MPTB REACH-related info, templates and guidelines

MPTB Website: https://escies.org/webdocument/showArticle?id=1049&groupid=6

Short title	Latest update	Reference number with hyperlink
Slides on the universal PFAS restriction proposal – sectorial update	8.12.2025 (v2)	MPTB-ES-HO-0214
Guidelines for users of Chromium Trioxide in Chemical Conversion Coatings for European Space Programmes	28.07.2025 (v8)	MPTB-RL-GD-0200
Best-Practice Guidance for the European Space Sector to Comply with SCIP Notification	03.03.2025 (v1.3)	MPTB-ES-GD-0158
Bisphenol A vs EU REACH: Brief note to ESA projects on regulatory status of BPA	14.10.2024 (v1.0)	MPTB-RL-MO-0164
Comparison between EU REACH Annex XIV (Authorisation) and Annex XVII (Restriction)	02.12.2024 (v2)	MPTB-RL-HO-0171
Template for REACH Article 33 Declaration on Substances in Articles – Incl. WFD/SCIP Data	08.10.2024 (v1.2)	MPTB-RL-TPL-0092
Lead Metal vs EU REACH: Brief Note to Projects	11.07.2024 (v1.2)	MPTB_RL_MO_0156

List of important presentations and sectoral positions

- **Eurospace (RTF) response submitted on 22 May 2026 to the ECHA public consultation on the SEAC Draft Opinion** (internal ref. # MPTB-ES-PO-0225) – The response will be published on the ECHA website here
- **Sectoral contribution and response to EU's Advanced Material's Act – Call for evidence**, 13th January 2026, (MPTB-ES-PO-0215, EU COM reference: F33364493), available online
- "European Space Sector comments of 17 September 2025 on the ECHA restriction proposal for certain chromium(VI) oxides, oxyacids and salts, ref. MPTB-ES-PO-0202, ECHA ID ref. 9662, (link)
- European Space Sector Feedback on Commission Call for Evidence: Simplification of Administrative Burdens in Environmental Legislation, Joint contribution by MPTB's WFD/SCIP Task force, 8th September 2025, MPTB-ES-PO-0204, link to consultation reference F3698765,
- 6th ESA REACH Workshop presentations and summary, ESA/ESTEC, Noordwijk, The Netherlands, 17th June 2025 (link)
- P. Janik, **Impact of environmental regulations on availability of space-relevant materials and manufacturing processes**, International Astronautical Congress, Milan, Italy, 14-18.10.2024 (link)
- T. Becker, **ESA REACH Office – Introduction and Space Sector-wide Initiatives**, 5th ESA REACH Workshop, ESA ESTEC, Noordwijk, the Netherlands, 19 June 2024, (link)
- MPTB views reflected in Eurospace response to **European Commission of a Transition Pathway for the Aerospace and Defence (ASD) ecosystem,** 2-11-2023 (here)
- **Environmental Regulations and Their Impact on European Space Sector**, 16-19 October 2023, CSID 2023, ESA/ESTEC, the Netherlands, (link)
- European Space Sector **comments on the Annex XV restriction report for per- and polyfluoroalkyl substances (PFAS)** of 22 September 2023 (here)
- European Space Sector **comments on the REACH restriction proposal for certain bisphenols**, 22-05-2023 (here)
- European Space Sector **feedback on New Product Priorities for Ecodesign for Sustainable Products**, 23-5-2023,(here)

A list of further contributions is available at https://eurospace.org/compliance/ . In addition, a number of contributions have been submitted by ASD, with the support of MPTB/its task forces and working groups.