



ecomatters

Biopolymers and biodegradability in a circular economy

A regulatory perspective





Topics

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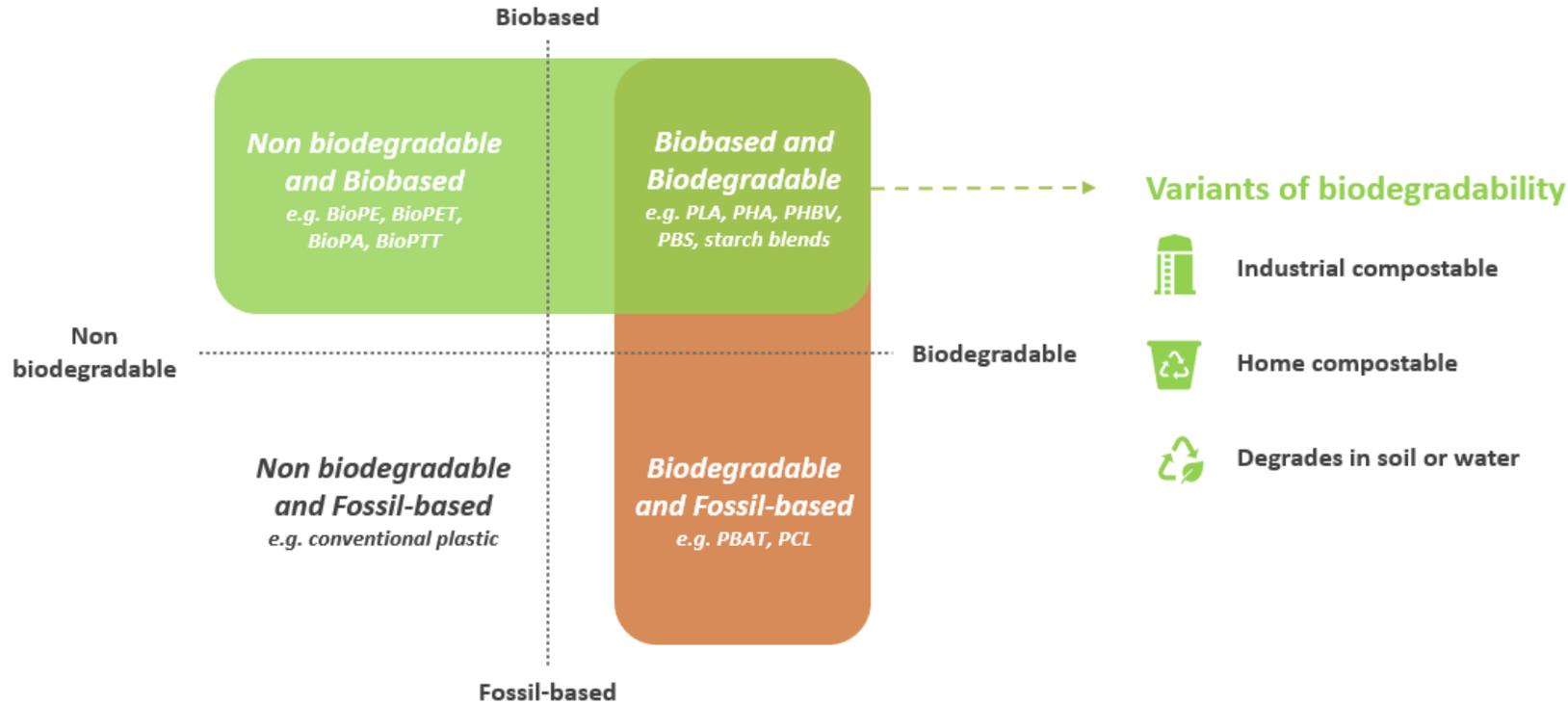
EU perspective

Biopolymers (under right conditions) fit with the policy focus to support a future that is:

- non-toxic
- non-fossil
- non-polluting
- carbon neutral
- circular economy

EU policy framework





Source: ETC/WMGE and EEA

Biodegradability claims should be based on recognized standards or regulatory definitions.





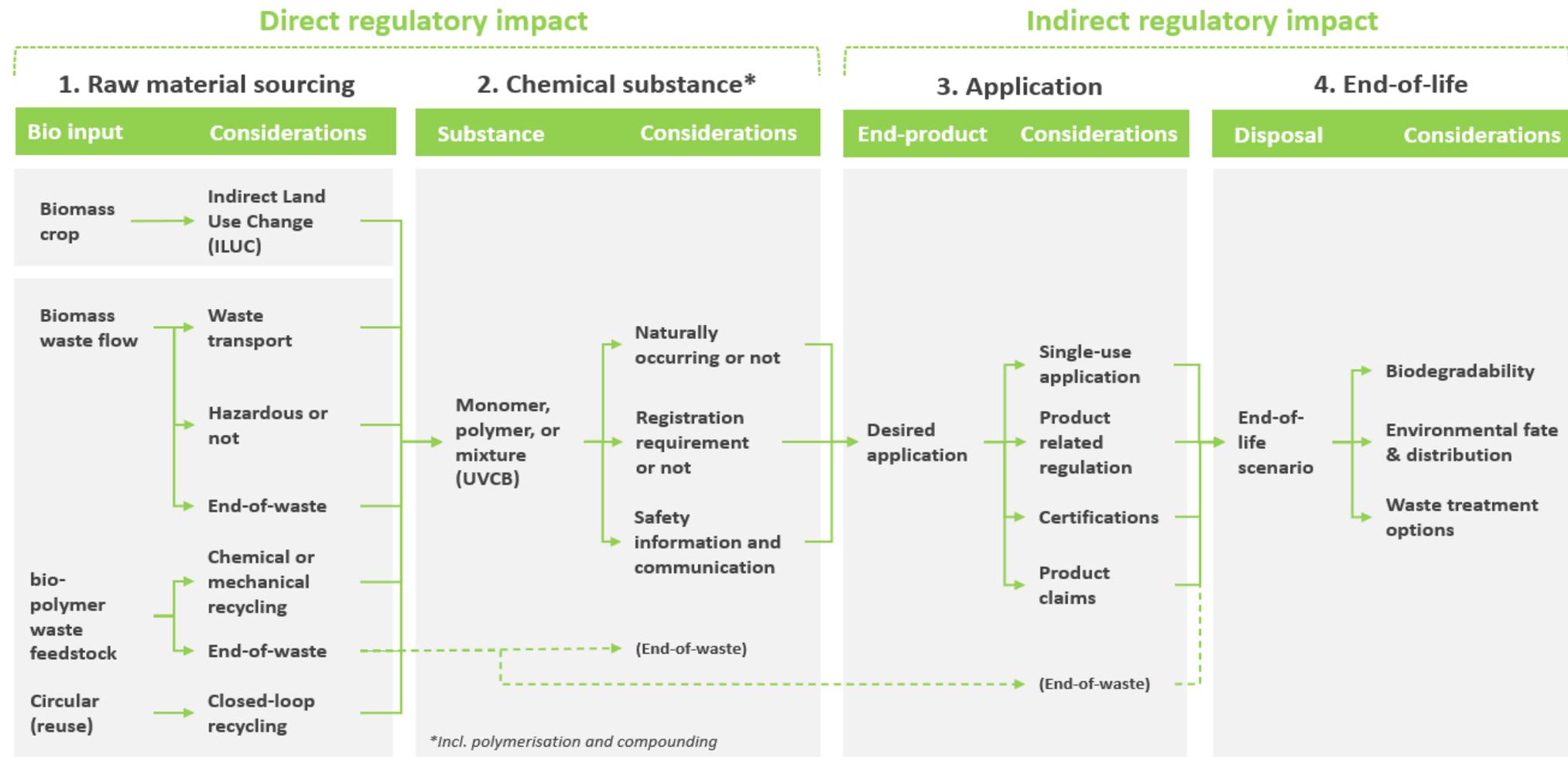
Rules and standards for biodegradability claims

Biodegradability means nothing in itself:

Conditions and timeframe need to be defined (considering either Industrial composting, home composting or marine & soil degradability)

- Biodegradability is assessed on application level (i.e. article) with therein **included additions**:
 - Assessment focuses on associated degradation products and (toxic) residues
 - Crosslinkers, fillers, anti-oxidants can majorly influence degradability.
- For polymer-based products there are testing standards available
 - For industrial composting: EN 13432 packaging & EN 14995 non-packaging items
 - For home compostable: AS 5810 (Austria), OK compost (Belgium), NF T 51-800 (France)
 - Agricultural use (NEN-EN 17033)
 - **Not readily available for natural soil & marine degradability**
- Currently, relevant regulations such as the Single Use Plastic Directive and proposed microplastic restrictions follow the definitions used by **REACH** on **Natural Polymers**

2. Condensed overview



3. Relevant regulation

Direct regulatory impact

| Life cycle Stage | Regulation | Relevance | Most important Impact |
|-----------------------|--|-----------|--|
| Raw material sourcing | Renewable Energy Directive | Limited | Sustainability criteria for biofuels may be used as blueprint for bio-materials. |
| Raw material sourcing | Waste Framework Directive | High | Defines when something is a waste and defines End-of-waste options. |
| Raw material sourcing | Waste shipment regulation | Limited | Different procedures for shipping non-hazardous waste (green list) or hazardous waste (orange list). |
| Chemical substance | REACH | High | Data requirements proving safe use. |
| Chemical substance | Classification, labelling and packaging (CLP) regulation | Medium | Defines hazard classes with corresponding communication and labelling requirements. |
| Chemical substance | Persistent organic pollutants (POP) regulation | Limited | Defines a list of POPs that are not allowed in biopolymers. |
| Chemical substance | Minamata Convention | Limited | Biopolymers should not be contaminated with mercury. |
| Chemical substance | Montreal Protocol | Limited | Biopolymers should not be contaminated with ozone depleting substances. |

3. Relevant regulation

Indirect regulatory impact

| Life cycle Stage | Regulation | Relevance | Most important Impact |
|-------------------------------------|---|-----------|---|
| Application (article) & End-of-life | Packaging regulation | Medium | Define rules for packaging design and packaging waste management. No specifics on bio-based packaging. EU targets for reusability/recycling of plastics are relevant. |
| Application (article) | Food contact material | High | Defines requirements for materials that are intended to come in contact with food. For Bio-based plastics the same rules apply as for conventional plastics. A declaration of compliance is mandatory plastics. |
| Application (article) | Bio-stimulant and fertilizer regulation | High | Biopolymers are only allowed in fertilizing products if the polymer has a certain purpose (as identified in regulation) and passes tests regarding negative effects on environment. |
| Application (article) | Single Use Plastics Directive (SUP) | High | Bio-based polymers and polymers with biodegradability claims do not get exempted from the imposed restriction on single use articles. |
| Application (article) | Construction products regulation | Limited | Defines basic standards for any construction products, including those produced with biopolymers. |
| Application (article) & End-of-life | Microplastics restriction | High | Adding polymers other than naturally occurring polymers as microplastics might become prohibited depending on the outcome of a restriction proposal by ECHA. |

Summary of REACH requirements for (natural)polymers

- Polymers are excluded from registration. However, the monomers do need to be registered.
- Registering a monomer most often means joining an existing registration. Compiling a new dossier is only necessary if the monomers have not been registered before by other actors.
- In case of recovery or recycling operations, registration of the monomers can be exempted if sameness of substance with the already registered monomeric substance can be proven. All other REACH obligations do need to be fulfilled.

REACH is not only about registration of chemicals

- The REACH definition for natural polymer and naturally occurring substance are applied for in- or exclusion in the scope of other regulatory programs (SUP, proposed micro-plastics restriction)
- A main obligation for (recycled) polymers under REACH (as well as for the WFD and End-of-Life rulings) is the **Substance of Very High Concern (SVHC) assessment**.
Especially relevant when waste streams are used as input materials

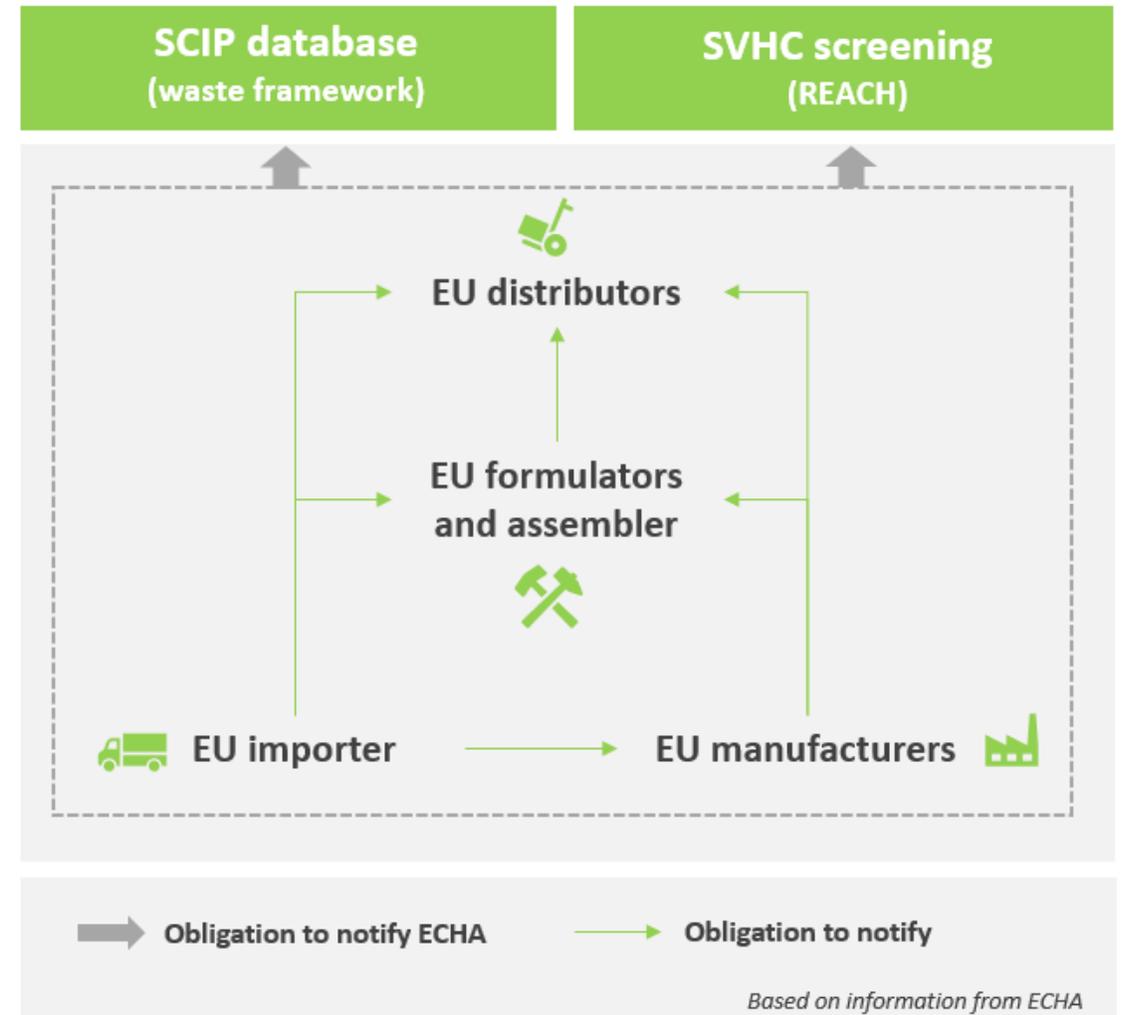


4. EU waste framework and REACH

Biopolymers and substances of Concern (SoC)

Obligations related to SVHC

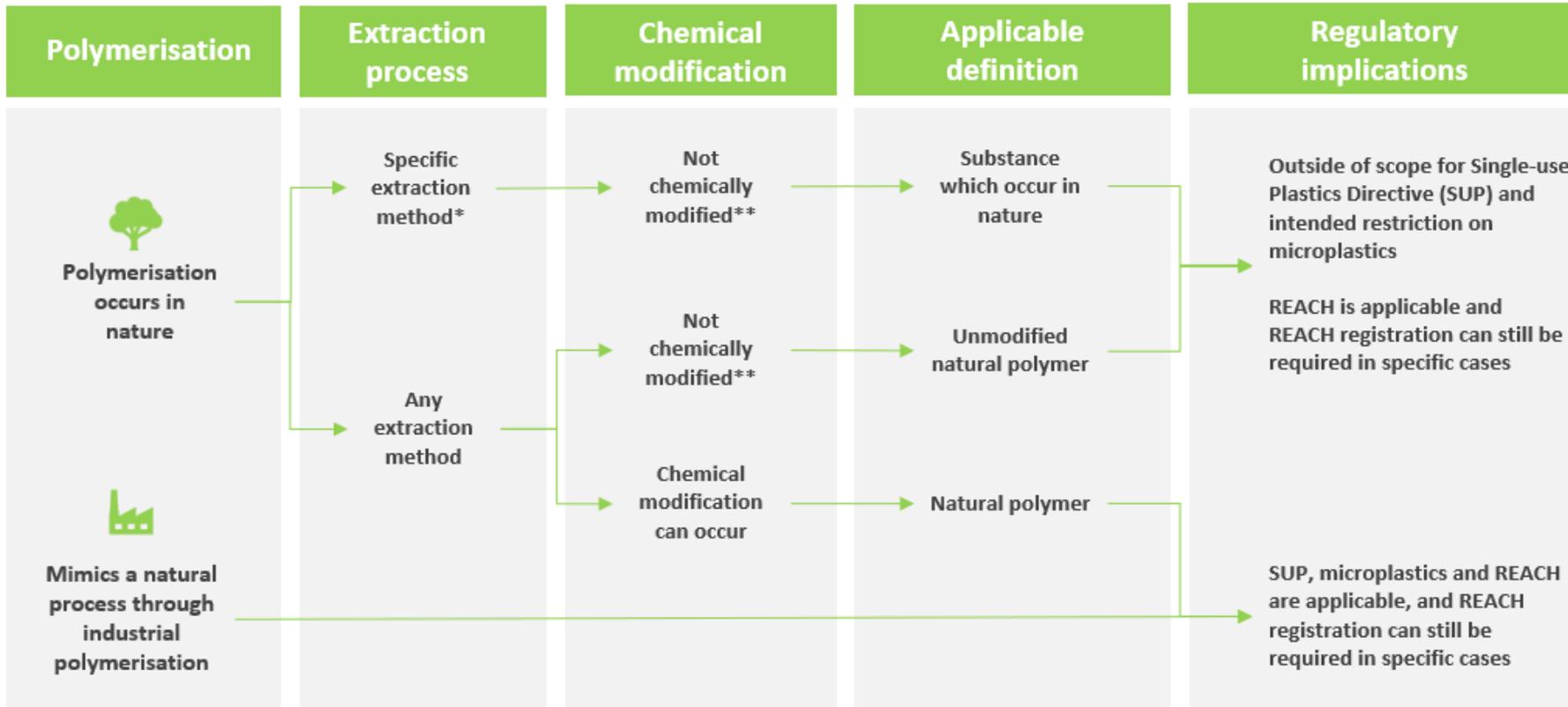
- Obligation for (recycled) polymers under REACH*:
 - Substance of Concern assessment. Substances of Very High Concern (SVHC) testing provides assurance that tested products and materials do not contain a detrimental amount of chemicals that are hazardous to human health and the environment.
- The whole value chain is responsible for SVHCs, but it starts with the manufacturers
- **The relevant REACH concerns on SVHC are covered in the waste framework (end-of-waste assessment) too**



4. The Single Use Plastics Directive

Naturally occurring substance vs Natural polymer

The in or exclusion into the scope of the SUP is not directly linked to degradability performance



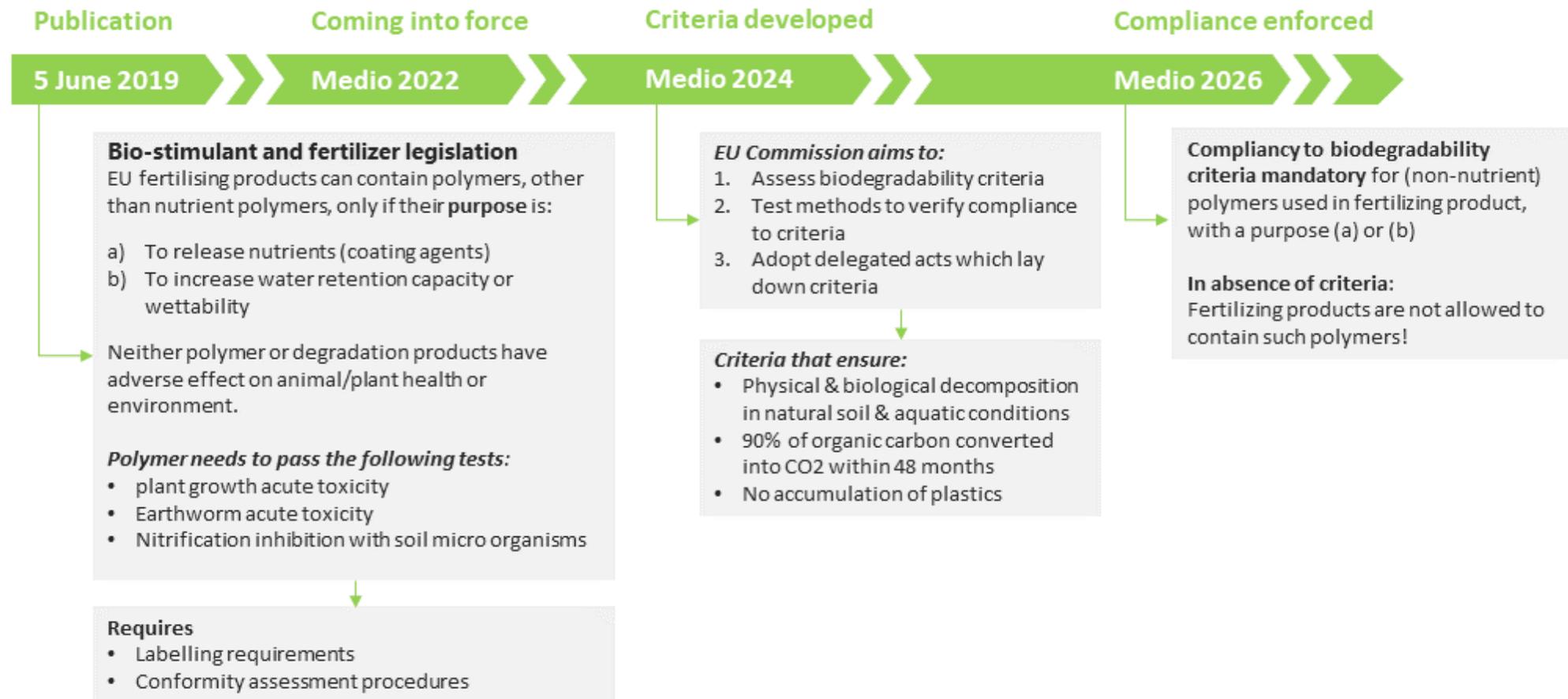
The proposed review of the Directive in 2027 is planned to include an assessment of the scientific progress concerning criteria for biodegradability in the marine environment

In the context of the new Circular Economy Action Plan, the Commission plans to develop in 2022 a framework on the use of biodegradable, based on an assessment of the applications where such use can be beneficial to the environment, and of the criteria for such applications.

* By manual, mechanical or gravitational means, by dissolution in water, by flotation, by extraction with water, by steam distillation or by heating solely to remove water, or which is extracted from air by other means.

** Even after it has undergone a chemical process or treatment, or a physical mineralogical transformation, for instance to remove impurities.

Based on material from ECHA and the European Commission



Timeline regulatory considerations regulation (EU) 2019/1009



4. Waste hierarchy considerations

As implemented in the Waste Framework Directive

Considerations

- The loss of (useful) materials should be prevented, regardless of the material origin and/ or biodegradability profile
- Prevention, minimization and reuse are still preferred waste handling options, even for bioplastics
- Compositing is considered recycling, but note:
 - Most biopolymers degrade into +/- 90% CO₂ instead into reusable biomass. Therefore, don't deliver on the promise during their end-of-life



Based on Lansink's Ladder

Challenges

- The (regulatory) **biodegradability claim** might be difficult to substantiate based on REACH definition of natural polymers.
- The **impurity of input materials** that are used in the recycling process impacts the regulatory applicability of final product (e.g. agriculture fertiliser, food contact etc.)
- Lack of **standards** for soil and marine degradation makes uncontrolled disposal for compostable materials undesired, instead focus on designing with reuse, minimization or closed-loop mechanical recycling in mind

Perspective

- EU transition drives toward a focus on 100% recyclability of conventional plastics. However, this is practically **unfeasible**. Therefore, making it more likely that regulatory frameworks will be more **supportive** of bioplastics in the mid-term future.