

# Validation of a mechanical recycling process for food contact polyolefins

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## Introduction

Plastic recycling is becoming more important in order to achieve regulative goals. One of the main obstacles is the recycling of food contact materials. Since single-use food packaging has a high turnover rate, it contributes to a large part of the volume of plastic waste. Therefore, a considerable improvement could be achieved by enabling the reprocessing of plastic waste to new food contact materials (FCM). But recycled FCM have to overcome massive technical and legislative obstacles.

## Legislative aspects

There are a lot legislative changes ongoing and in the EU is the *REGULATION (EC) No 282/2008* that sets the legislative

rules for recycling FCM until now. According to this regulation a recycling process must be authorized by the European Commission after the European Food safety authority (EFSA) published an positive opinion about the recycling process. Until now, the Commission has not authorized any of the submitted recycling process for FCM. However, there are recycled materials on the market –they all have been authorized on national levels. To standardize the authorisation for recycling processes in the EU a new Regulation will come into force by end of 2022. The process of applying for a novel technology can be seen in Figure 1.

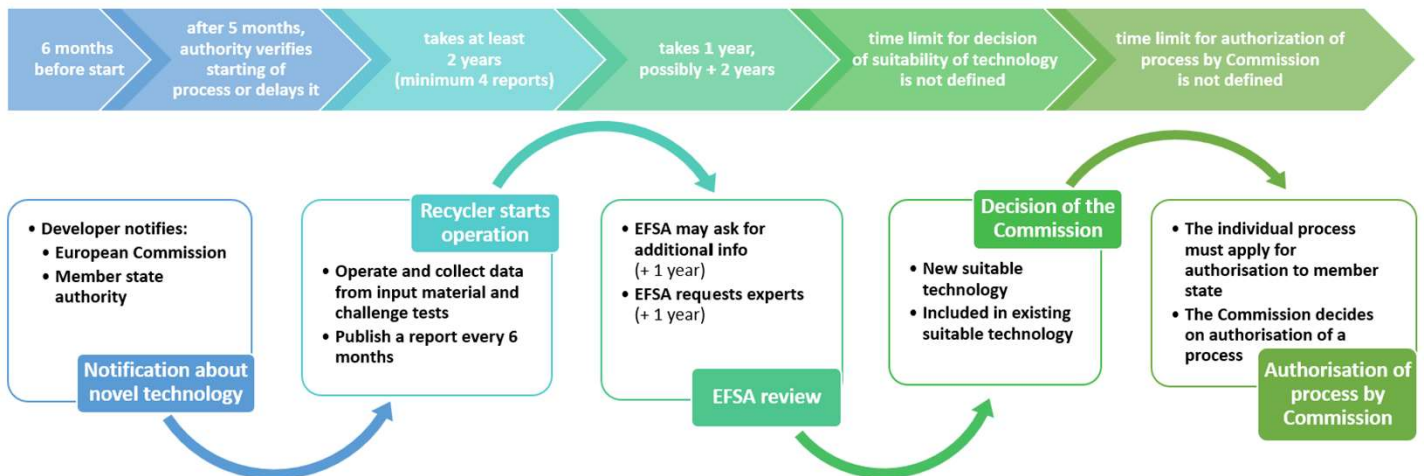


Figure 1: Visualisation of the process of applying for a novel technology under the new regulation on recycled plastic materials and articles intended to come into contact with foods that will probably come into force by end of 2022 in the EU. The application and authorisation process takes minimum 3.5 years but probably more.

## Challenge Test

To determine the decontamination efficiency of a recycling process often so called *Challenge tests* (EU) or *Surrogate contaminant testing* (US) are done. Therefore, the input material is spiked with a cocktail of different surrogates (see Figure 2) and afterwards washed and analysed to determine the cleaning efficiency.

## Conclusion

Overall it can be said that there is still a long way to go before polyolefin recycling for food contact materials can be done in a large scale. Main hurdles are the collection and separation of the plastic waste to determine the input material for the recycling processes. To achieve this, there also needs to be a big focus on design for recycling.

Surrogate	Properties	a)	b)
Chloroform			
Chlorobenzene			
1,1,1-Trichloroethane	Volatile, polar		
Diethylketone			
Toluene	Volatile, non-polar		
Benzophenone			
Methylstearat	Non volatile, polar		
Phenylcyclohexane	Non volatile, non polar		
Copper(II) 2-ethylhexanoate	Heavy metal		

Figure 2: a) List of contaminants that are used for a challenge test in laboratory scale. b) PP flakes that were contaminated with a cocktail of surrogates for 7 days at 50 °C.

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The Competence Center CHASE GmbH

is a COMET Centre within the COMET – Competence Centers for Excellent Technologies Program and funded by BMK, BMDW, the federal states Vienna and Upper Austria and its scientific partners.

The COMET Program is managed by the FFG.

