

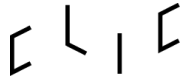


4R recycling ecosystem RDI roadmap

Functional bio-based packaging in grocery trade

30.3.2022 v1





SYSTEMIC CHALLENGE

that stems from diversified waste material streams

**FUNCTIONAL
BIO-BASED
PACKAGING IN
GROCERY TRADE**



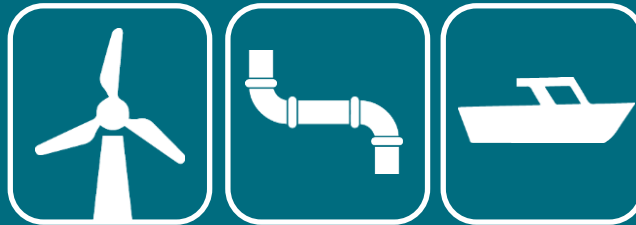
**RECYCLING
TECHNOLOGIES
FOR PACKAGING
IN GROCERY
TRADE**



**PLASTICS AND
COMPOSITES IN
CONSTRUCTION
INDUSTRY**



**RECYCLING OF
BULKY FIBRE-
REINFORCED
PLASTIC PRODUCTS
AND INDUSTRIAL
SIDE-STREAMS**





FUNCTIONAL BIO-BASED PACKAGING IN GROCERY TRADE

GOALS

2024

2027

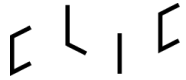
2030

85 % of biomaterials
Processing methods
Desired properties, barrier properties and recyclability
Recycling options for demanding packaging

90 % of biomaterials
Variety of bio-based plastic packaging available
Bio-based packaging and recycled biomaterials in demanding food packaging demonstrated

Several 100 % bio-based packaging available
Increased share of bio-based materials achieved
Future requirements tackled
Increase in recycling rate enabled





GOALS Now

State of the Art review to the types of packaging used in grocery trade at the moment, volumes of different types, and amount of bio-content per packaging type.

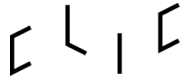
After that development roadmaps for each type.





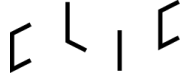
GOALS Milestone 2024

- ✓ Target level of around 85 % for biomaterials in grocery trade packaging is achieved
- ✓ Needs of brand owners for grocery trade packaging are mapped
- ✓ Processing methods are developed for a range of potential bio-based raw materials for grocery trade packaging
- ✓ New concepts are developed for grocery trade packaging with desired properties without fossil-based plastics
- ✓ Good barrier properties and recyclability are achieved for fibre-based packaging including food contact materials
- ✓ Understanding on the holistic sustainability of the bio-based packaging is achieved
- ✓ Recycling options are available for demanding bioplastic and multimaterial packaging



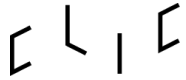
GOALS Milestone 2027

- ✓ Target level of over 90 % for biomaterials in grocery trade packaging is achieved
- ✓ Variety of bio-based plastic packaging materials with good recyclability are available with a target to achieving 95 % recyclability
- ✓ Industrial-scale demonstrations of bio-based packaging in demanding food packaging are performed
- ✓ Life cycle assessment of bio-based packaging is done with product environmental footprint (PEF)
- ✓ Use of recycled biomaterials in demanding food packaging is demonstrated



GOALS Milestone 2030

- ✓ Several 100 % bio-based packaging solutions are available with good recyclability options
- ✓ Increased share of bio-based materials achieved in all grocery trade packaging Bio-based packaging fulfills requirements of also the future sustainable packaging
- ✓ Increase in recycling rate of bio-based plastic and fibre-based packaging in grocery trade is enabled



Widening of biomaterial sources for the bio-based packaging

2024

- ✓ Ensuring **availability of new biomaterials** sources
- ✓ Development of **safe and efficient use of side streams** in production of bio-based packaging
- ✓ Increasing **sustainability of the processing** of new biomaterial sources
- ✓ Understanding how to use **recycled biomaterials in food packaging**
- ✓ Improving **safety of recycled materials** in food packaging



Widening of biomaterial sources for the bio-based packaging

2027

- ✓ Development of **safe and efficient use of waste streams** in production of packaging for grocery trade
- ✓ Demonstration of the use of **recycled materials in demanding food packaging**

2030

- ✓ Development of **new raw material alternatives** e.g. through carbon capture and utilization, Power-to -X technologies and biotechnology approaches
- ✓ Piloting of **new end-uses** (beyond the food contact applications) **for recycled materials** in grocery trade products



Development of production processes for bio-based packaging

2024

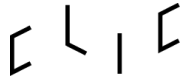
- ✓ Identification and development of the **interoperability of biomaterials with the existing value chains** and manufacturing systems for packaging
- ✓ Development of **more viable and cost-efficient production methods for bioplastics**
- ✓ Increase in resource efficiency through **sustainable chemistry** and circularity approaches

2027

- ✓ Development and **ramp-up of new** business and process **concepts**

2030

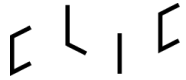
- ✓ Development of the bio-based packaging to meet the **future product requirements**



Development of bio-based plastics packaging in grocery trade

2024

- ✓ Development of the **material properties** (especially O₂ and moisture barrier properties) of bio-based plastics
- ✓ Development of **new bio-based plastic** materials fulfilling the food safety requirements
- ✓ Understanding of the optimal **end-uses for biodegradable plastic** packaging



Development of fibre-based packaging in grocery trade

2024

- ✓ Development of **improved characteristics** of fibre-based packaging including moisture tolerance, grease barrier properties, elongation, formability and shrinkage
- ✓ Development of **flexible films and coatings** for grocery trade packaging that are bio-based, recyclable and preferably biodegradable

2027

- ✓ Development of **novel hybrid materials** with complex structures and clarified end-of-life options for packaging enabling new functionalities
- ✓ **Demonstrations of new advanced functional properties** and performances in fibre-based packaging

2030

- ✓ Demonstration of **novel end use applications** for fibre-based packaging



Sustainability and safety of bio-based packaging in grocery trade

2024

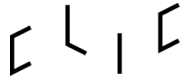
- ✓ Development of methods to **assess the holistic sustainability** of the bio-based packaging
- ✓ Development of **measuring the bio-based content** in products
- ✓ Development of **food safety** and understanding comprehensively the sustainability of prolonging food “life”

2027

- ✓ **Demonstrations of biomaterials performance** and sustainability to achieve the level set by legislation

2030

- ✓ **Scale-up**, broader adoption of the use of materials



Recycling of bio-based packaging

Now

- ✓ Mapping of collection and sorting of bio-based packaging

2024

- ✓ Development of **recyclability of fibre-based packaging** including food contact materials
- ✓ Development of **recycling options for demanding bioplastic and multimaterial packaging**
- ✓ Formulation of **design-for-recycling approaches** for bio-based packaging

2027

- ✓ Demonstration of **recycling of bio-based and biodegradable plastics**
- ✓ Development of the needed **collection and sorting methods** and other infrastructure for the recycling of bio-based packaging
- ✓ Formulation of the improved **design-for-recycling principles for hybrid and layered materials**