



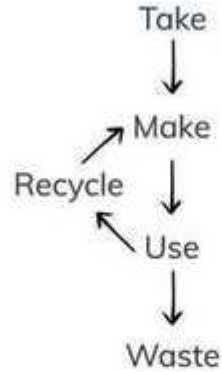
Biomass, a new raw material for the plastic packaging industry

D. MANTIS, AGMPM chairman

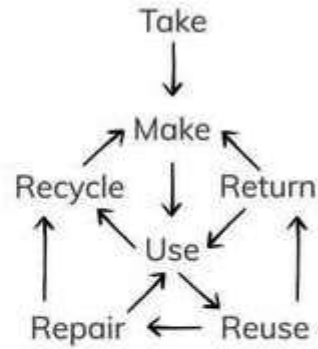
LINEAR ECONOMY



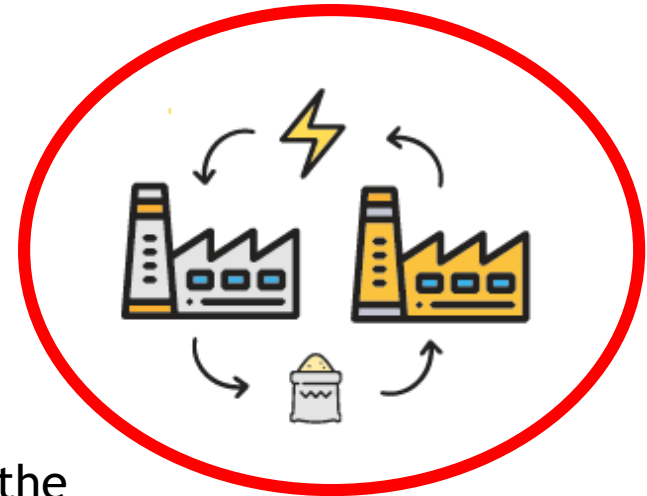
RECYCLING ECONOMY



CIRCULAR ECONOMY



THE MODEL

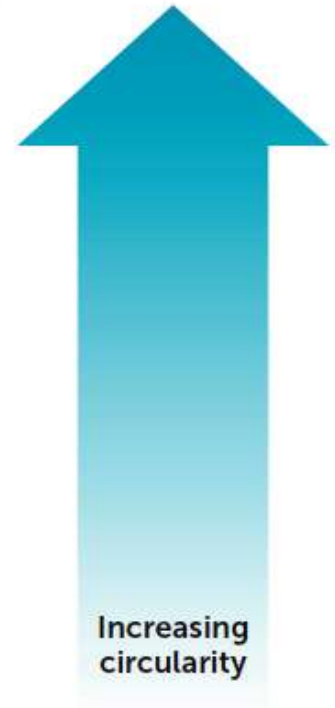


Industrial symbiosis

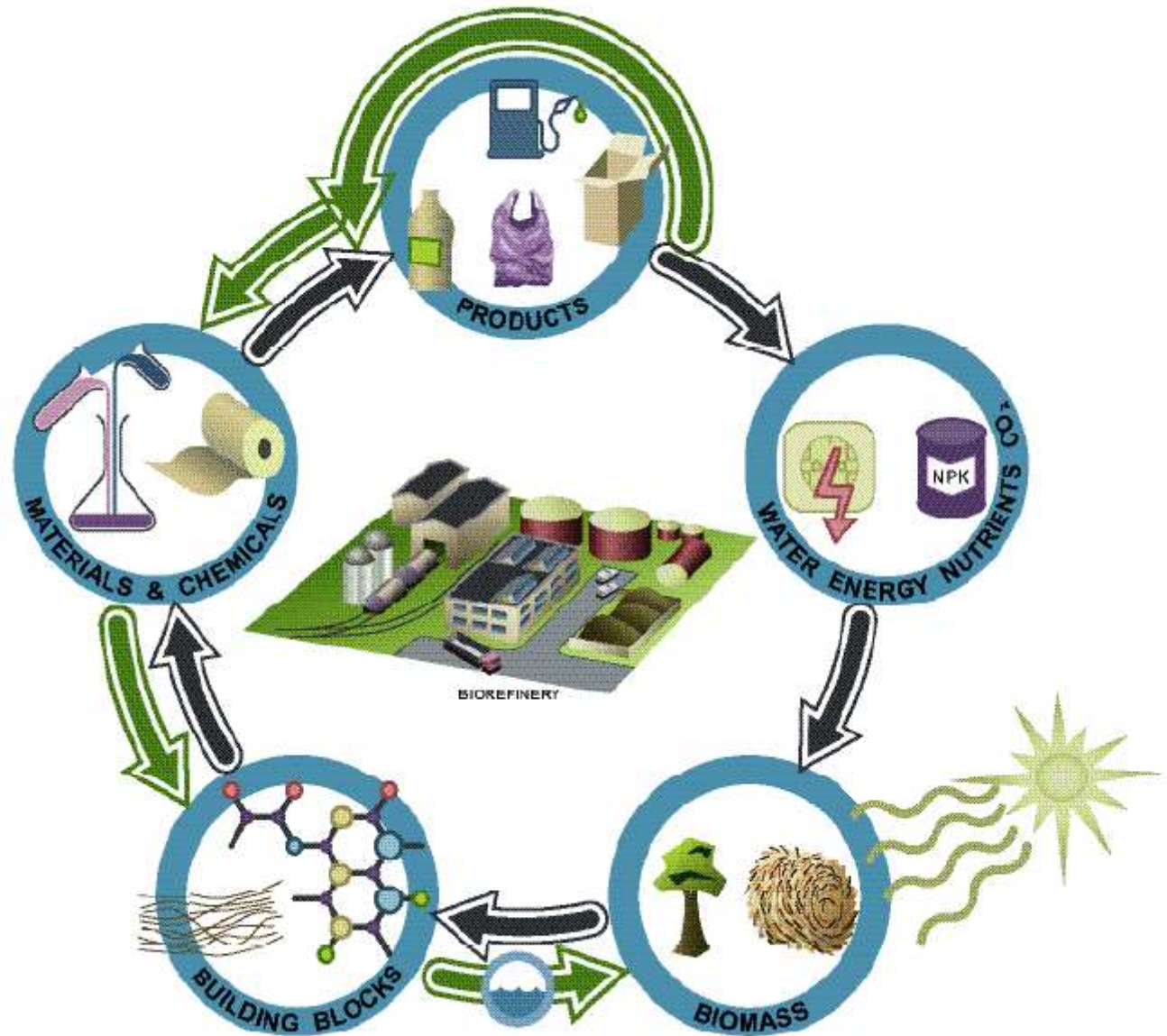
The industry is using as raw materials the waste of other industries

THE STRATEGY

STRATEGY	DESCRIPTION
Regenerate	Maintain and increase the delivery of ecosystem services (providing the benefits humans receive from ecosystems)
Reduce	Increase efficiency of product design or manufacturing by preventing or minimizing use of specific hazardous materials or any virgin materials, or make product use more intensive via such as product sharing
Reuse	Bring products back into the economy after initial use, or extend the lifespan of products and their parts (through repair, maintenance, secondhand markets, etc.)
Recycle	Process materials via such as shredding or melting to obtain materials of the same quality (upcycling) or lower quality (downcycling)
Recover	Incinerate residual flows and recover embodied energy

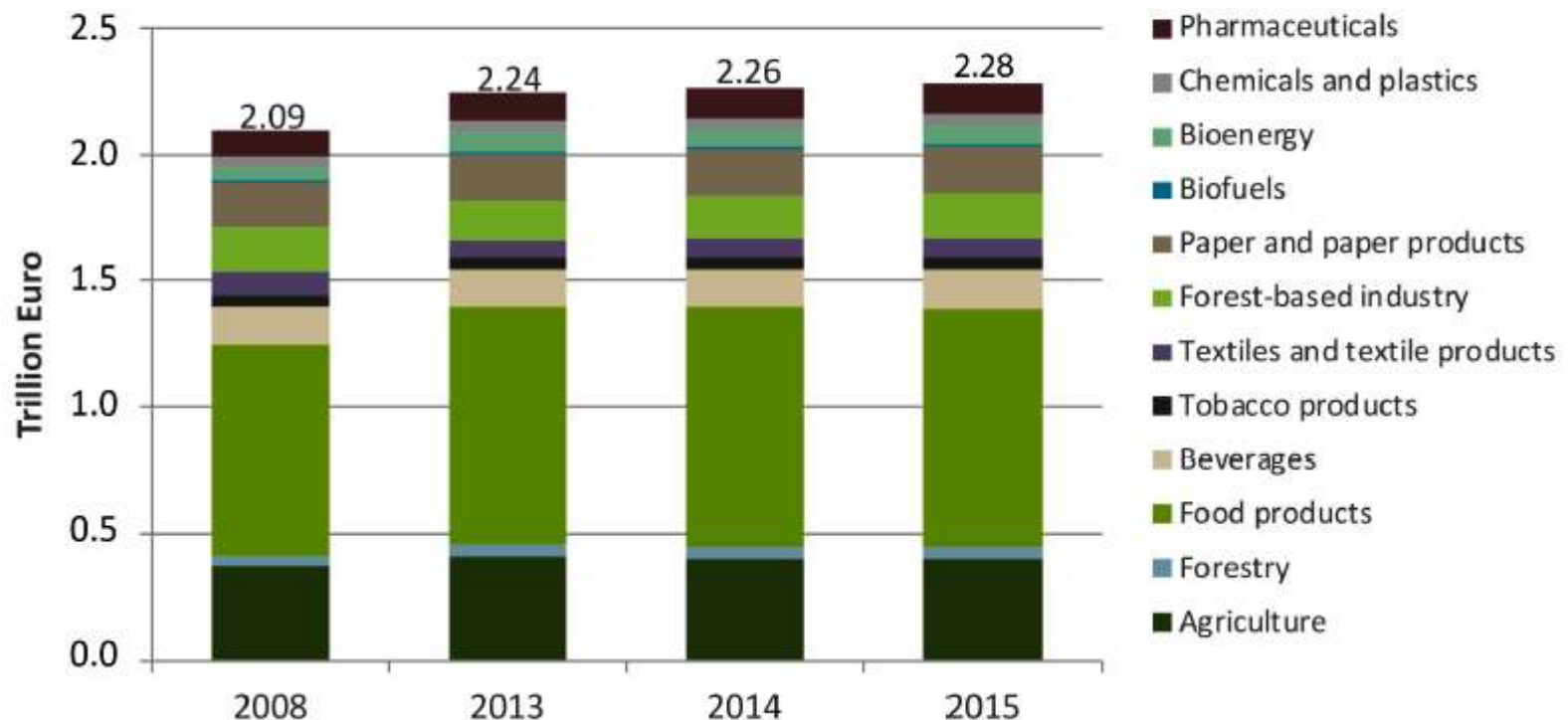


THE TOOLS



THE POWER

Turnover in the bioeconomy in the EU-28, 2008-2015





BIOREFINERY is the key to a post-petroleum society

RAW MATERIAL SOURCE

Biomass and organic waste

- Industrial side-streams:
 - Residues from the wood industry/saw mills and other bio-based processes
 - By-streams from biorefineries
 - Agro-industrial side-streams, partly now utilised as feed, other pre-consumer side-streams and waste streams
- Wood, recovered paper and side-streams from forestry, landscape, nature
- Agricultural residues, partly now being left on the land or burned
- Agricultural crops
- Dedicated ligno-cellulosic / fibre crops
- New promising biomass sources (e.g. aquatic biomass, such as algae)
- Process and waste water
- Municipal organic waste
- Agricultural surplus produced by the EU member states
- Animal manure

BIOREFINERIES

Bio-based products & markets

- Bio-based chemicals
- Bioplastics / biomaterials / packaging
- Advanced biofuels (incl. aviation)
- Specialties (eg. Biosurfactants, lubricants, pharmaceuticals)
- Food ingredients and feed
- Bioenergy

MAIN TARGETS

Developing **new value chains** for bio-based industries, from primary production to consumer markets

Using **innovative technologies** to turn biological residues and wastes into greener everyday products

Moving from fossil-based to biobased products: planting the seeds for the **European circular economy**

Supporting regional development by diversifying the **local economy**

Promoting the opening of new markets for bio-based products and applications **“Made in Europe”**.

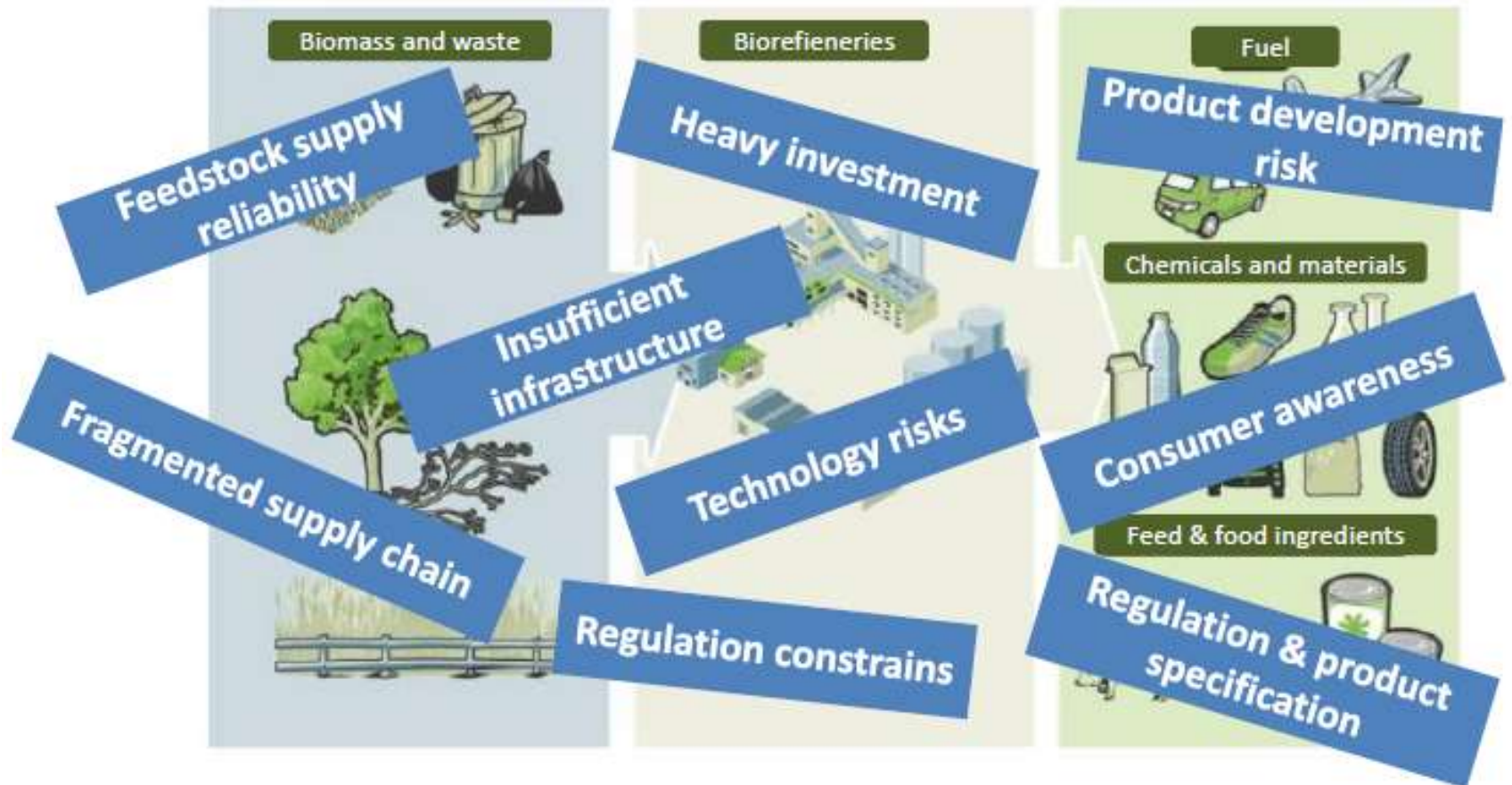
OBJECTIVE

400.000 skilled jobs by 2020
rising to 700.000 skilled jobs by 2030



80% of which will be in rural areas

CHALLENGES AND RISKS

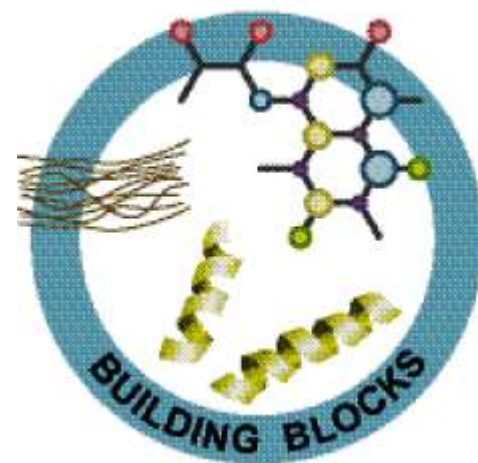


KEY ELEMENT: chemical building blocks

Developing routes for value extraction from components of lignocellulosic Biomass

Development of building blocks optimally utilizing the oxygen contained in the molecules

Synthesis of new monomers for bio-based polymers with new functionalities



Funding opportunities in Europe



Horizon 2020
European Union Funding
for Research & Innovation





Horizon 2020
European Union Funding
for Research & Innovation



HyperBioCoat

SOURCE: lignocellulosic biomass

PRODUCT: new functional bioORMOCER[®]s biobased
compostable coating

APPLICATION: flexible and rigid biopolymer substrates
for packaging applications for food, cosmetic and
medical devices.





SOURCE: whey proteins from cheese production and potato pulp from starch production

PRODUCT: biobased coating on multi-layer paper and board

APPLICATION: food and dairy packaging





BIO COPAC

SOURCE: tomato processing waste (peels), industrial by-products

PRODUCT: bio-based coating (using cutin)

APPLICATION: metal cans, replacement of BPA coatings





Horizon 2020
European Union Funding
for Research & Innovation



SOURCE: Lignocellulosic (LC) feedstock from spruce, poplar and wood waste

PRODUCT: ethanol, butanol, cellulosic sugars etc

APPLICATION: building blocks for biopolymers used in pulp, tissue and packaging





Horizon 2020
European Union Funding
for Research & Innovation

BIO
RESCUE

SOURCE: processing spent mushroom substrate (SMS),
more than 3 millions tones per year (industrial waste)

PRODUCT: Development of efficient biorefinery
technologies

APPLICATION: bioplastics, biofuels





SOURCE: waste products of bakery industry (expired bread, bread crust, sponge cake)

PRODUCT: poly-lactic acid (PLA) biopolymer

APPLICATION: 100% biodegradable package to be used in the packaging of bakery products





SOURCE: processing shell waste (Europe 750,000 tones/year) rich in chitin

PRODUCT: building blocks, monomers

APPLICATION: new bio-based polymers (polyamides)





SOURCE: paper mills pulp waste (handling recovered paper), 100,000 t/year only in one plant

PRODUCT: new plastic compounds

APPLICATION: plastic euro-pallets





SOURCE: sugar-enriched waste created by the Agri-food industry.

PRODUCT: compound PHA (poly hydroxyl alkananoates)

APPLICATION: biobased and compostable foam and monolayer film for food packaging





Horizon 2020
European Union Funding
for Research & Innovation



SOURCE: under-utilised crops (cardoon)

PRODUCT: biobased monomers (pelargonic and azelaic acids)

APPLICATION: bioplastics





Horizon 2020
European Union Funding
for Research & Innovation



SOURCE: poultry feather waste (EU-28 3.1 million tons per year)

PRODUCT: isolation of keratin

APPLICATION: biodegradable food packaging





OliPHA[®]

SOURCE: wastewater that the olive oil industry

PRODUCT: biodegradable polymer PHA
Polyhydroxyalkanoates

APPLICATION: compostable flexible and solid plastic
food packaging articles





SOURCE: fermentation of wastewater from juice processing industries

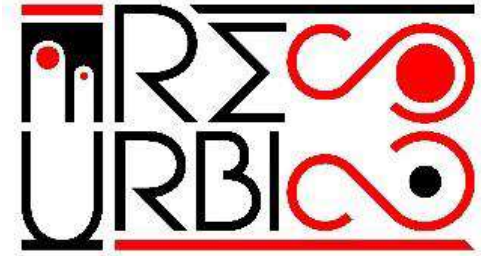
PRODUCT: PHB (polyhydroxybutyrate) polymer

APPLICATION: plastic bottle for juice packaging and non-food market (cosmetics)





Horizon 2020
European Union Funding
for Research & Innovation



SOURCE: urban organic waste

PRODUCT: PHA (poly hydroxyl alcanoates)

APPLICATION: Biodegradable commodity film, bio-solvent





SOURCE: cheese by-products

PRODUCT: whey protein barrier biopolymer

APPLICATION: replacement of EVOH and PVDC coatings on plastic films (PVC, PET)





ASSOCIATION OF THE GREEK MANUFACTURERS OF PACKAGING & MATERIALS

A photograph of a person's hand gently touching a stalk of wheat in a lush green field. The background is a soft-focus field of wheat under bright, natural light.

The Future is GREEN

THANK YOU