

# A CASE STUDY OF BIOECONOMY FOR NATURAL CAPITAL REGENERATION AND JOB CREATION

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BOLOGNA



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Novamont



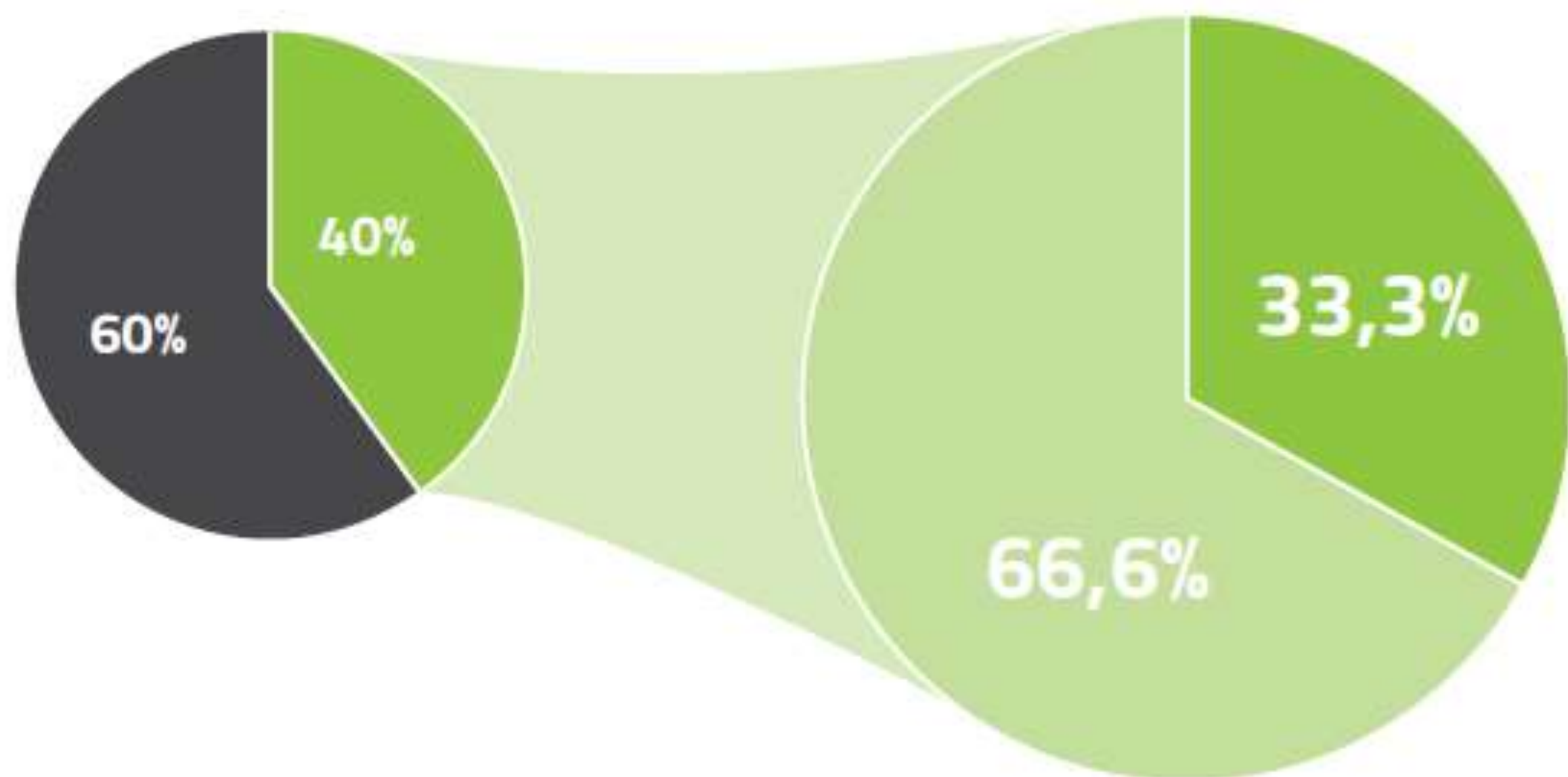


# BIOWASTE GENERATES JOBS


ECN (EUROPEAN COMPOSTING NETWORK) FACTSHEET

### TOTAL WASTE


### TOTAL BIOWASTE



 potential biowaste in MSW EU28 96 Mt pa

 regular waste

 utilized potential biowaste

 non-utilized potential biowaste

## POTENTIAL DIRECT JOBS IN THE BIOWASTE SECTOR

 **RURAL AREAS**  
1 JOB / 1380t biowaste

 **URBAN AREAS**  
1 JOB / 4500t biowaste





# CARBON STOCK IN SOIL IN THE PLANET TOPSOIL

SOIL ORGANIC MATTER (SOM) PIVOTAL TO MANY SDGS (LAND, WATER, HEALTHY SOILS, CLIMATE AND GLOBAL WARMING)

62

B. Minasny et al. / Geoderma 292 (2017) 59–86

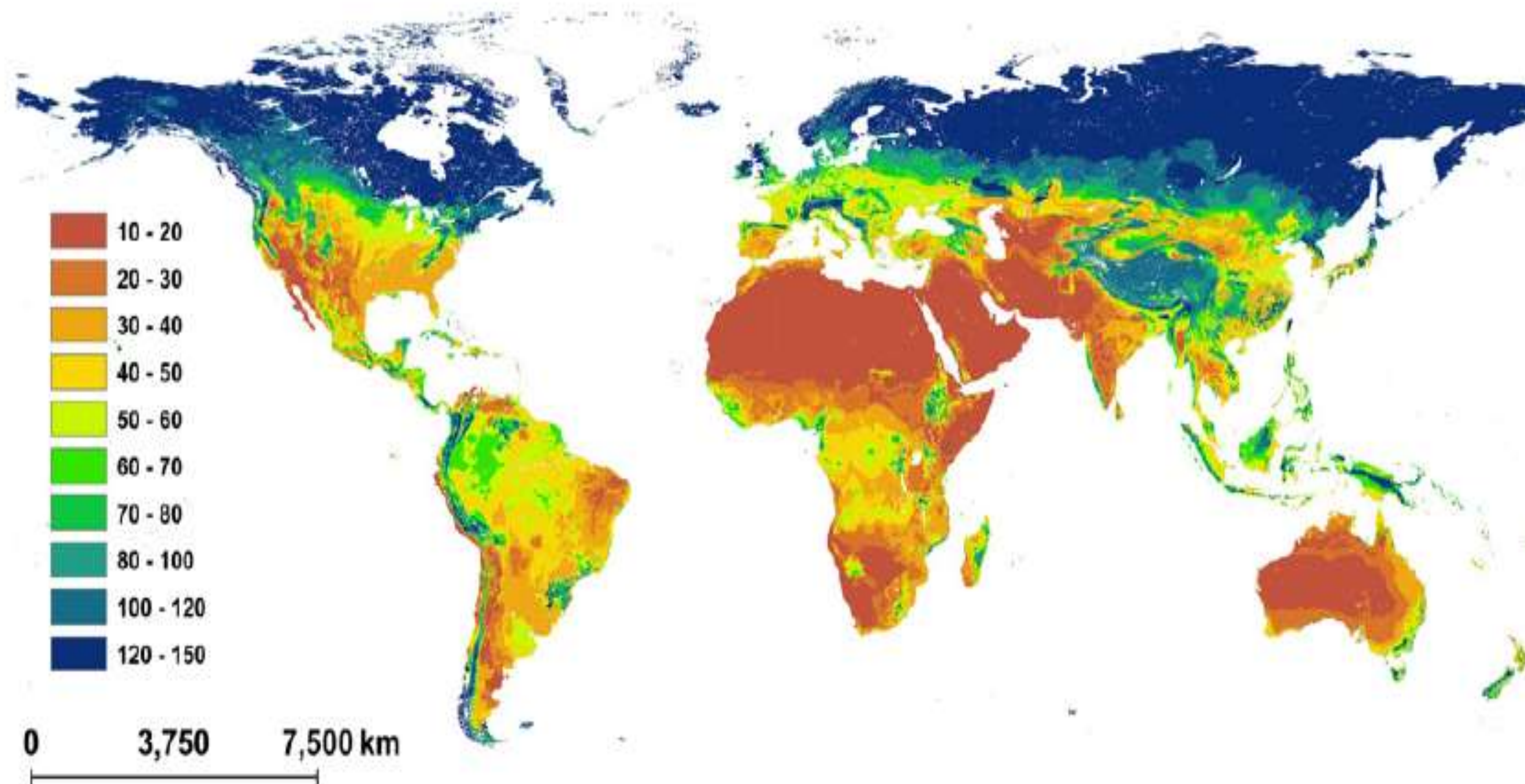


Fig. 2. Soil C stocks of the world's topsoil (0–0.3 m) in tonne C per hectare. The map was generated based on global datasets of C stock from the study of Stockmann et al. (2015).

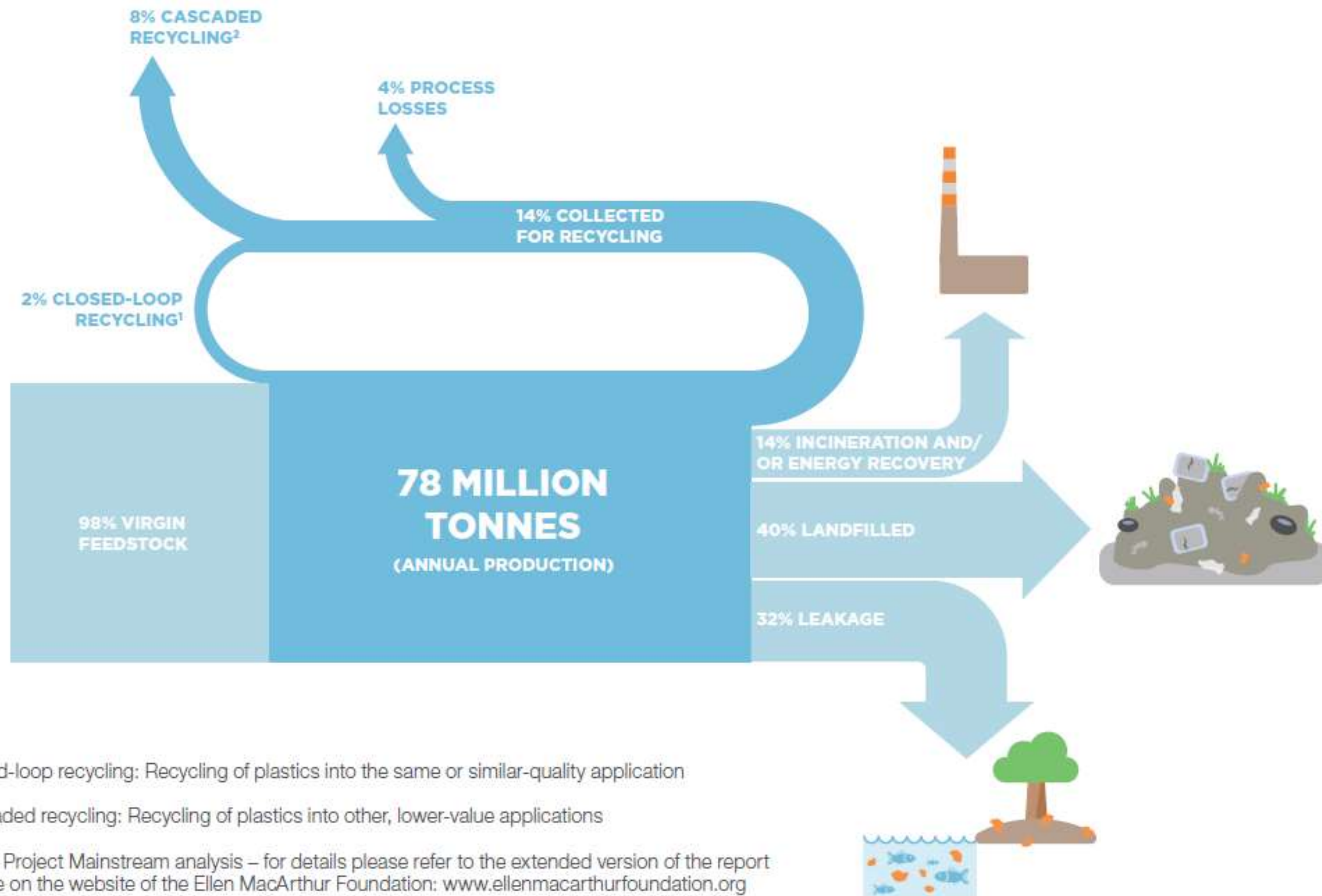
**THE 4 PER MILLE SOILS FOR FOOD SECURITY AND CLIMATE WAS LAUNCHED AT THE COP21 WITH AN ASPIRATION TO INCREASE GLOBAL SOIL ORGANIC MATTER STOCKS BY 4 PER 1000 (OR 4% ) PER YEAR AS A COMPENSATION FOR THE GLOBAL EMISSIONS OF GREENHOUSE GASES BY ANTROPHOGENIC SOURCES**





# GLOBAL FLOWS OF PLASTIC PACKAGING MATERIALS

ELLEN MACARTHUR FOUNDATION 2016 (2013 DATA)







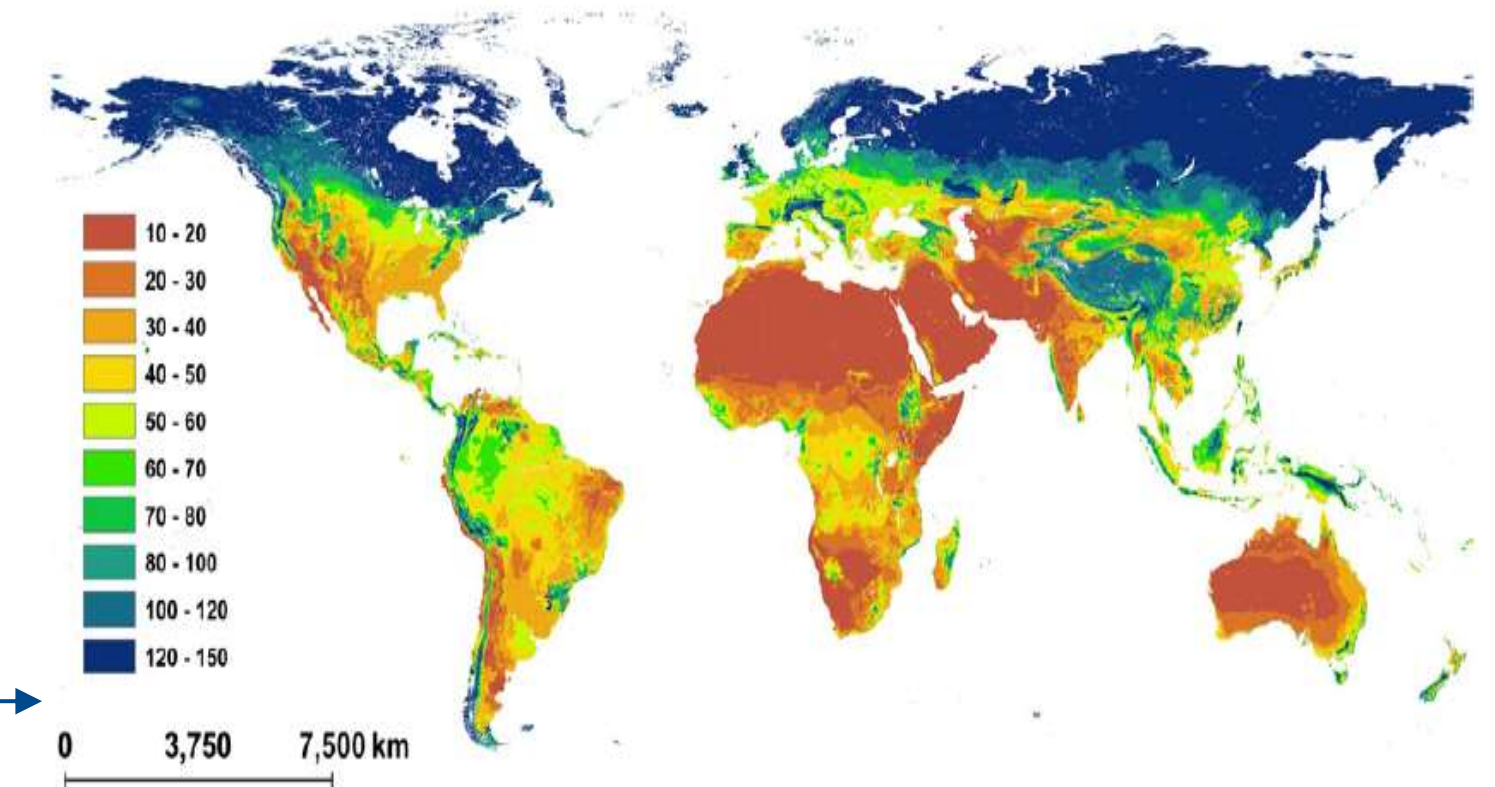
## ORGANIC WASTE IN LANDFILL



## DEVELOPMENT OF ORGANIC WASTE SEPARATE COLLECTION SYSTEMS THROUGH BIOPLASTICS



## COMPOST AS DRIVER FOR SOILS FERTILITY



SOIL C STOCKS OF THE WORLD'S TOPSOIL (0-0.3 m) IN TONNE C PER HECTARE (source: Budiman Minasny *et al.*, "Soil carbon 4 per mille", *Geoderma*, Volume 292, 15 April 2017, Pages 59-86)





# BIOECONOMY AS TERRITORIAL REGENERATION

THE PILLARS OF NOVAMONT'S STRATEGY AIMED AT RECONNECTING ECONOMY AND SOCIETY



- TRANSFORMING WORLD-FIRST TECHNOLOGIES INTO FLAGSHIPS.
- BIOREFINERIES INTENDED AS BIOECONOMY INFRASTRUCTURES, INTERCONNECTED AMONG THEM AND CONNECTED WITH THE LOCAL AREAS.

- THROUGH THE VALORISATION OF MARGINAL LAND AND NOT IN COMPETITION WITH FOOD PRODUCTION
- INTEGRATED IN THE LOCAL AREAS AND CONNECTED WITH THE BIOECONOMY INFRASTRUCTURES.

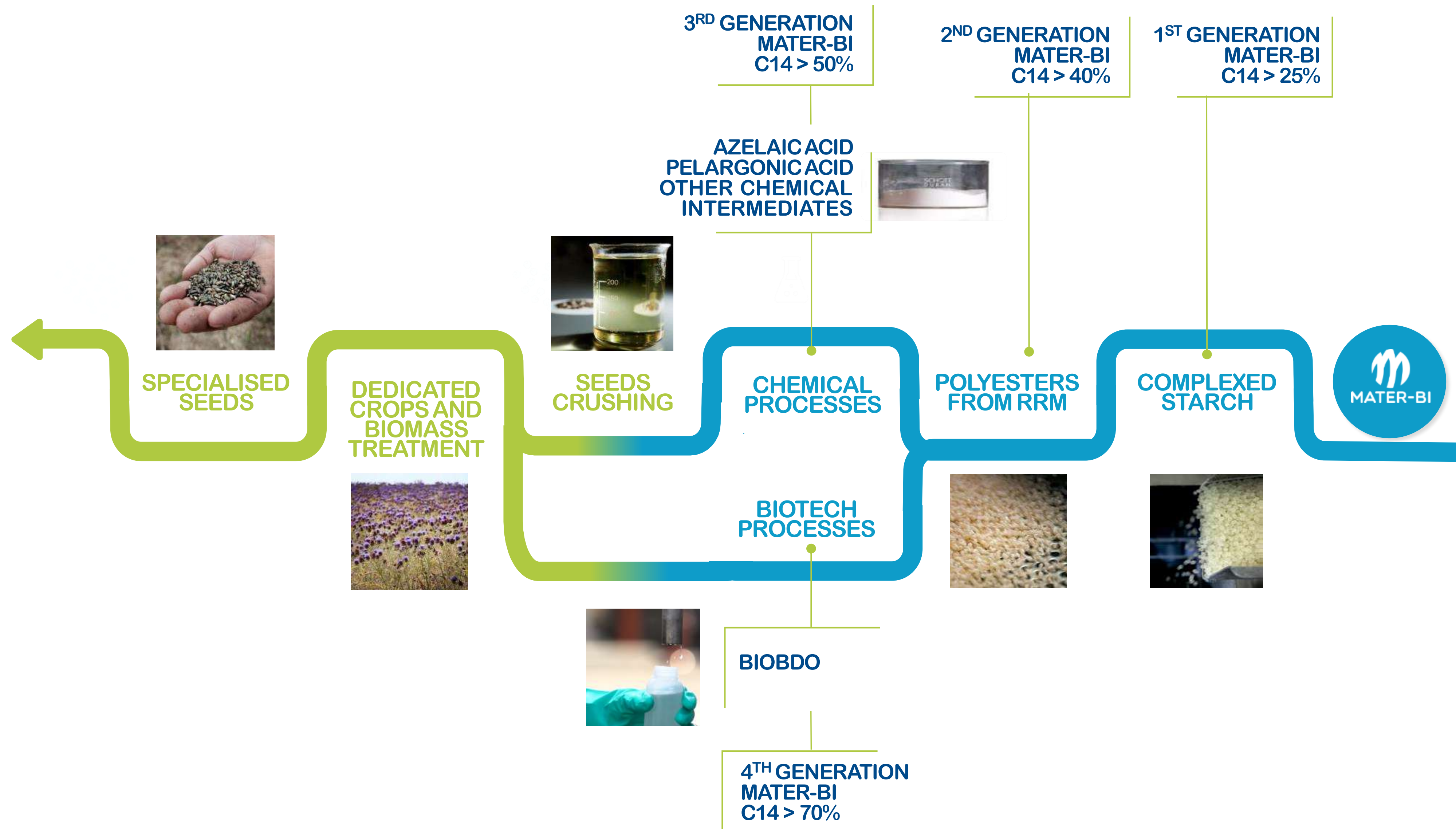
- DESIGNED TO TACKLE REAL SOCIETAL CHALLENGES.
- ELEMENTS OF A SYSTEM WHICH PROVIDE CONCRETE SOLUTIONS TO PROBLEMS GOING FAR BEYOND THE PRODUCT ITSELF.





# NOVAMONT'S PROPRIETARY TECHNOLOGIES

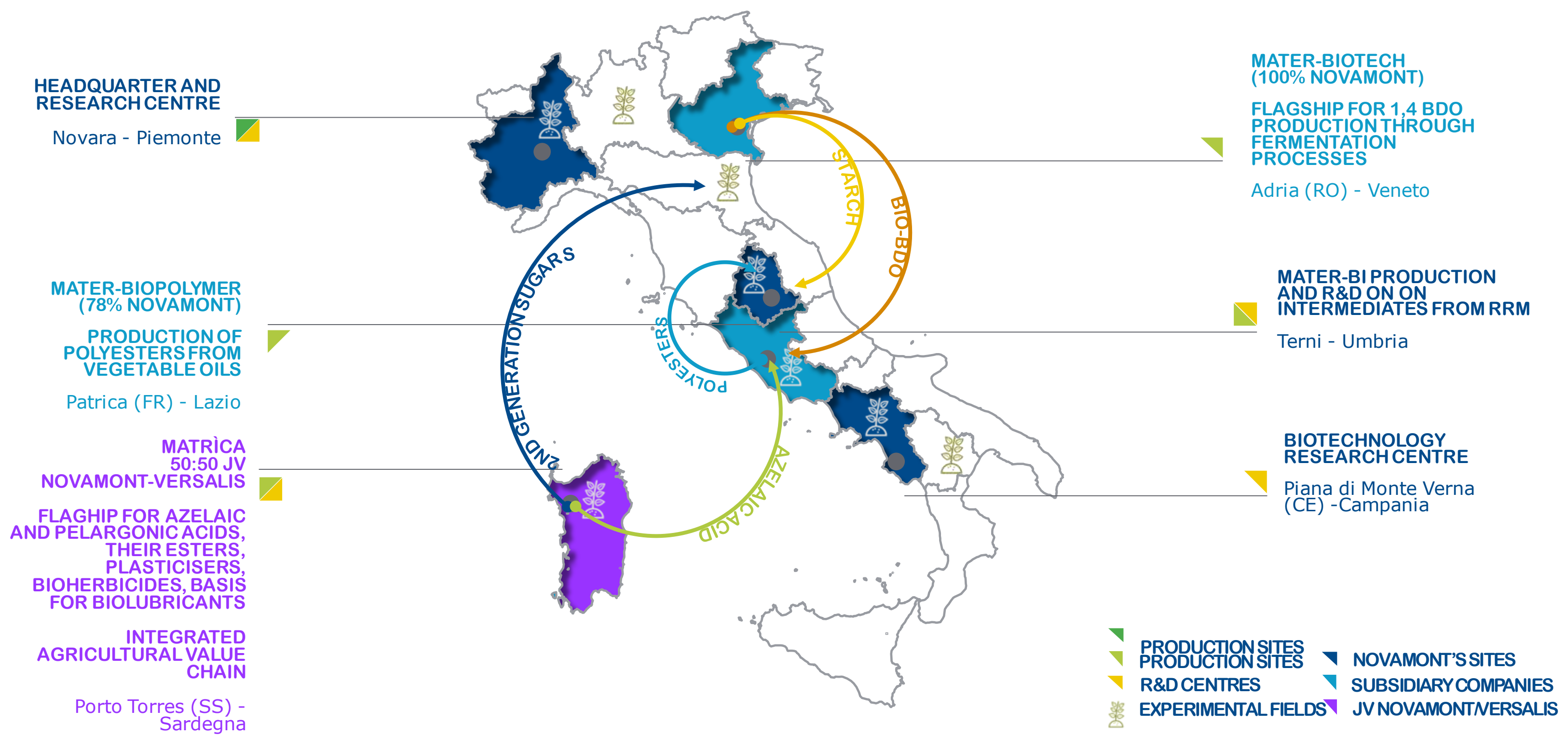
UPSTREAM INTEGRATION 1989-2016: INTEGRATED VALUE CHAIN OF MATER-BI BIOPLASTICS AND CHEMICALS





# NEW PRODUCTS NOW AVAILABLE

THE TANGIBLE RESULTS OF THE BIOECONOMY INFRASTRUCTURE DEDICATED TO BIOPLASTICS AND CHEMICALS NOW UP AND RUNNING IN ITALY



- WFROM A RESEARCH CENTER IN 1996 UP TO....**
- Pioneer and world leader in the development of bioplastics and bioproducts
  - Turnover (2016): 170M€
  - 600 people
  - 3 R&D centers
  - 20% of people in R&D activities
  - >6% of turnover in R&D activities
  - About 1.000 patent cases filed
  - 4 production sites
  - 4 technologies up and running



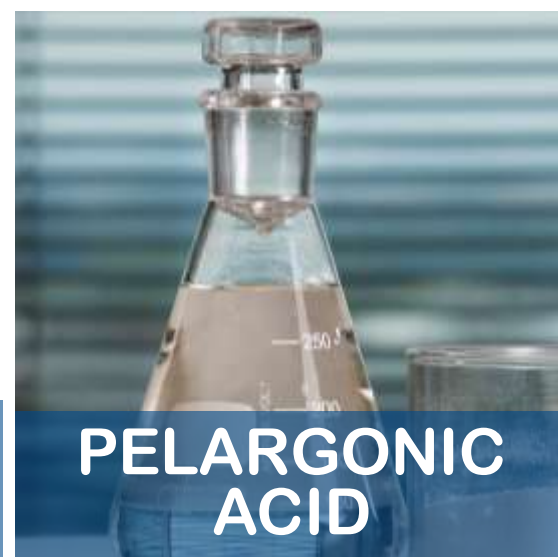


# NEW PRODUCTS NOW AVAILABLE

THE TANGIBLE RESULTS OF THE BIOECONOMY INFRASTRUCTURES NOW UP AND RUNNING IN ITALY



AZELAIC ACID



PELARGONIC ACID



C5-C9 ACIDS



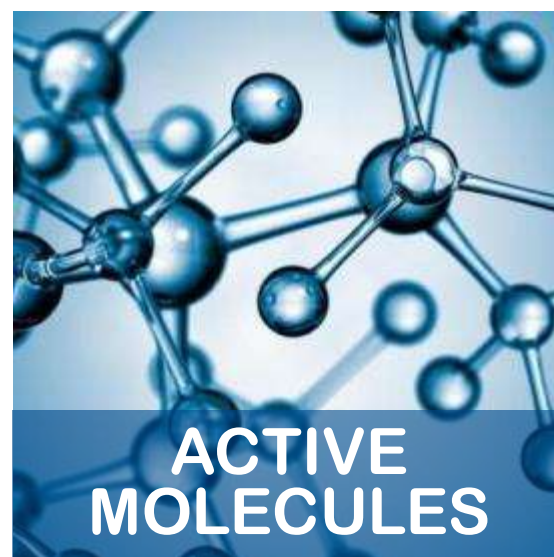
POLYMERIC PLASTICISERS



CARDOON OIL



PROTEINS FOR ANIMAL FEED

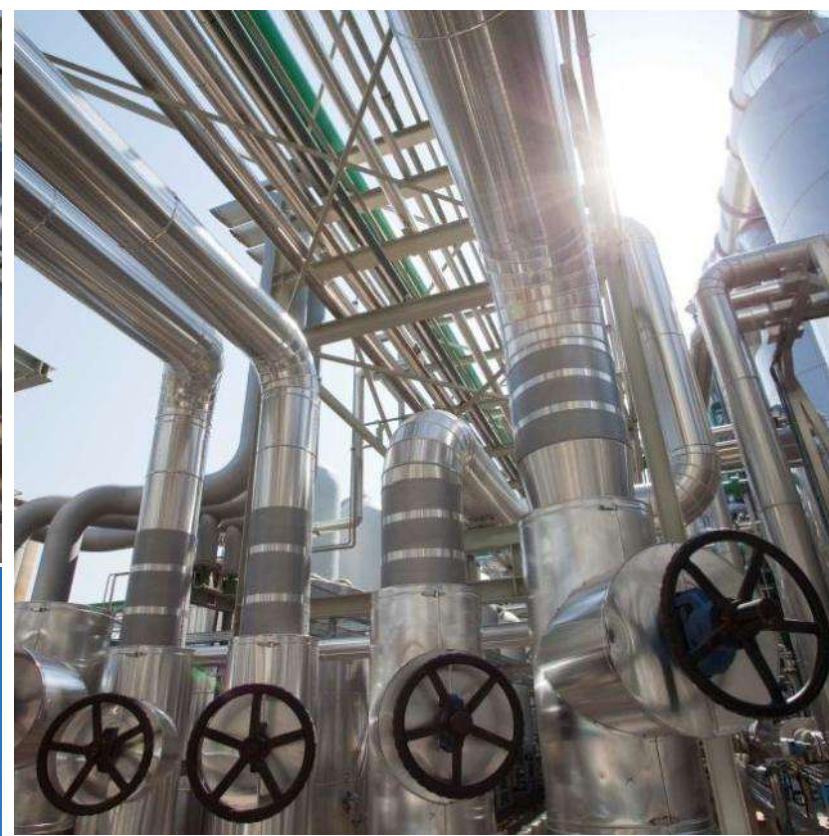


ACTIVE MOLECULES



BIO-BDO

BIODEGRADABLE BIOPLASTICS



## MATER-BIOTECH

- Regeneration of an abandoned industrial site in North-East Italy, after the shut-down of the fermentation plant in 2006
- World-first dedicated industrial production of 1.4 BDO directly from sugars
- Investment > 100 million €
- Productive capacity: 30.000 ton/y
- 75 people + 150 in satellite activities (180-200 since 2017)
- 300 people, 100 companies working on the conversion of the plant (2014-2016)





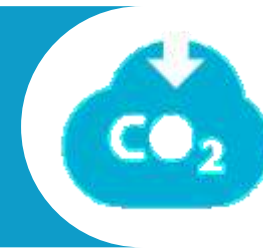
# MATER-BI OF IV GENERATION

PRODUCTS WITH IMPROVED PERFORMANCES, TO BE USED TO MAXIMIZE VIRTUOUS EFFECTS ALONG THE CHAIN

CONTROLLED ORIGIN OF RAW MATERIALS



CARBON FOOTPRINT REDUCED OF 2.5-3 TIMES VS NON RRM COMPOSTABLE PLASTICS



RE-INDUSTRIALIZATION PROCESS WITH RECOVERY OF OLD INDUSTRIAL SITES



JOBS CREATION



ORGANIC RECYCLING / ENERGY RECOVERY / PLASTIC RECYCLING



CONTENT OR RENEWABLE RAW MATERIALS IN SIGNIFICANT GROWTH VS MATERIALS TODAY AVAILABLE IN THE MARKET FOR THE SAME PURPOSE (GENERALLY  $\geq 50\%$  RRM , IN SPECIFIC CASES EVEN 100%RRM)



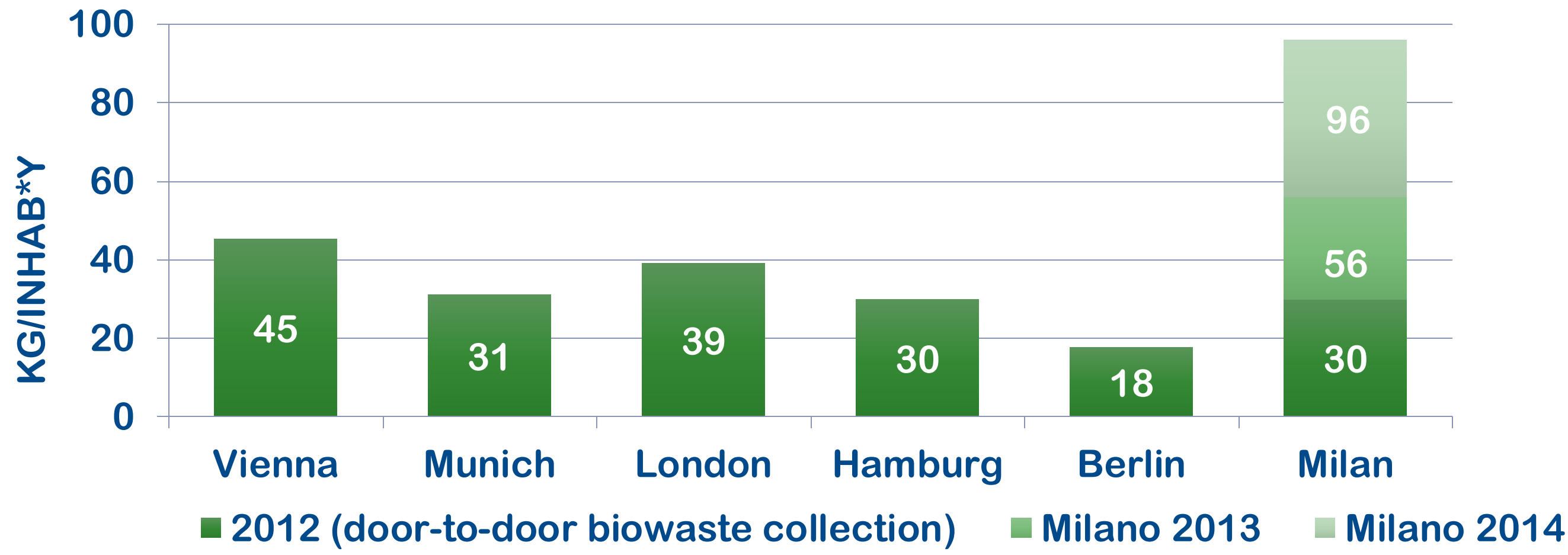
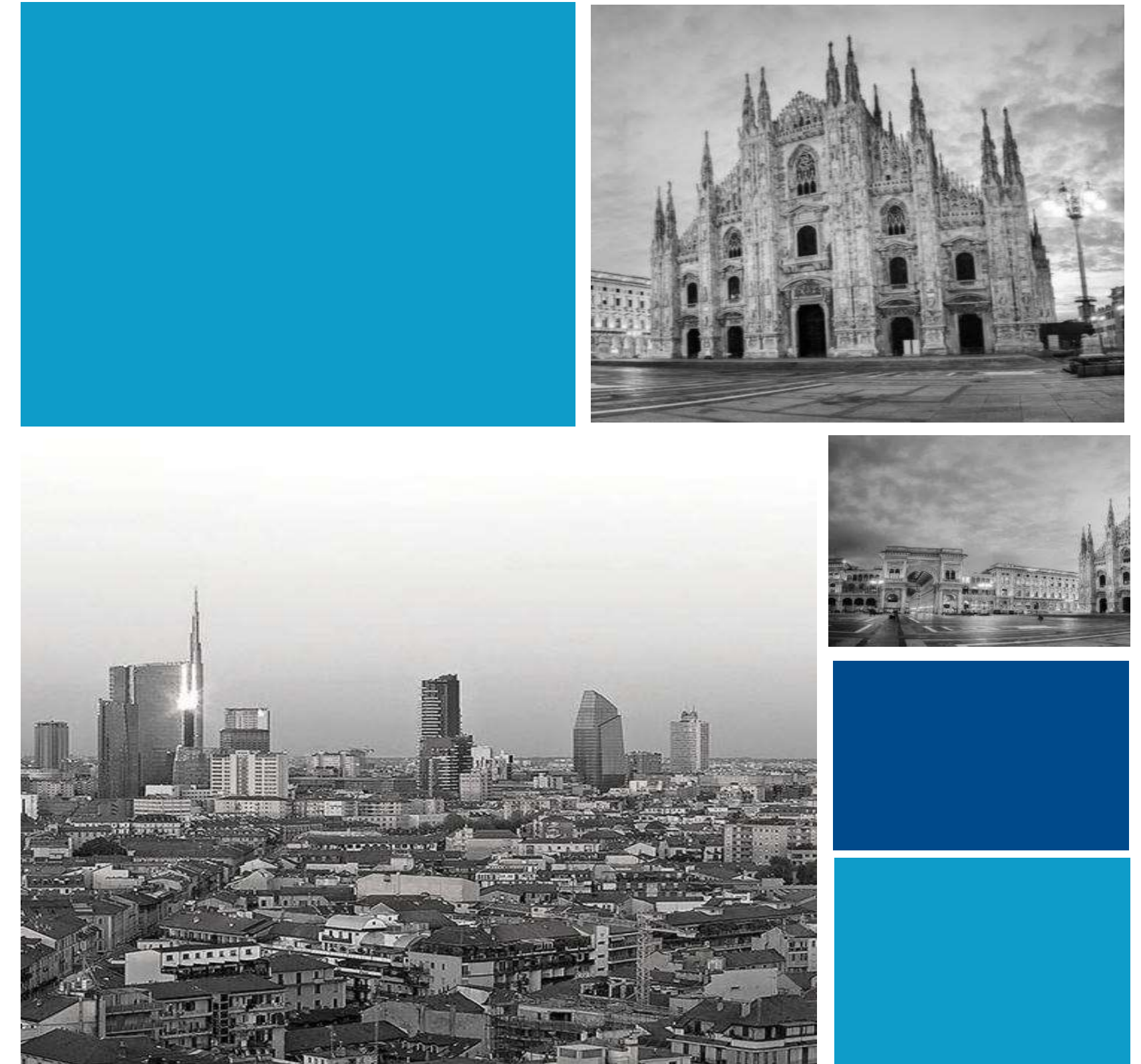
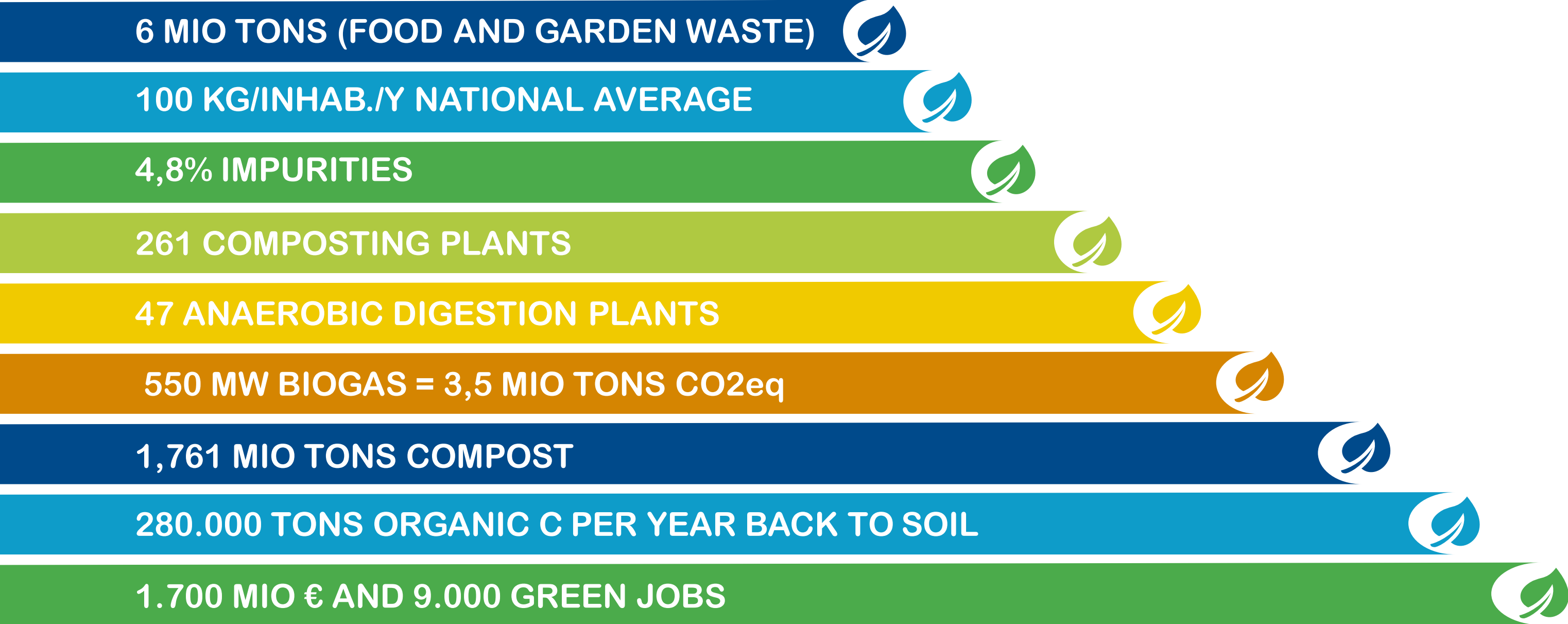
**NOVAMONT ON A VOLUNTARY BASIS HAS DECIDED TO FIX THE MINIMUM RENEWABLE CARBON CONTENT IN ALL MATER-BI GRADES AT 40% BEFORE THE END OF 2017 ANTICIPATING THE LEGISLATION OF FRANCE AND ITALY JUST FOR FRUITS & VEGETABLES (ESTIMATED CO<sub>2</sub> eq REDUCTION POTENTIAL OF ABOUT 150000TON/YEAR VERSUS STANDARD COMPOSTABLE BIOPLASTICS)**





# ORGANIC WASTE SEPARATELY COLLECTED IN ITALY 2016

CIC DATA 2016 AND THE CASE STUDY OF MILAN



**FOOD WASTE COLLECTIONS:**  
 100 KG/INHAB\*Y  
 OVERALL SOURCE SEPARATION RATE: 54%  
 NR. 1 IN EUROPE





# 80% OF MARINE LITTER COMES FROM LAND-BASED SOURCES

THE IMPORTANCE OF A PROPER AND INTEGRATED MANAGEMENT PLASTICS AND BIOPLASTICS

## CIRCULAR ECONOMY PRINCIPLES

### 1

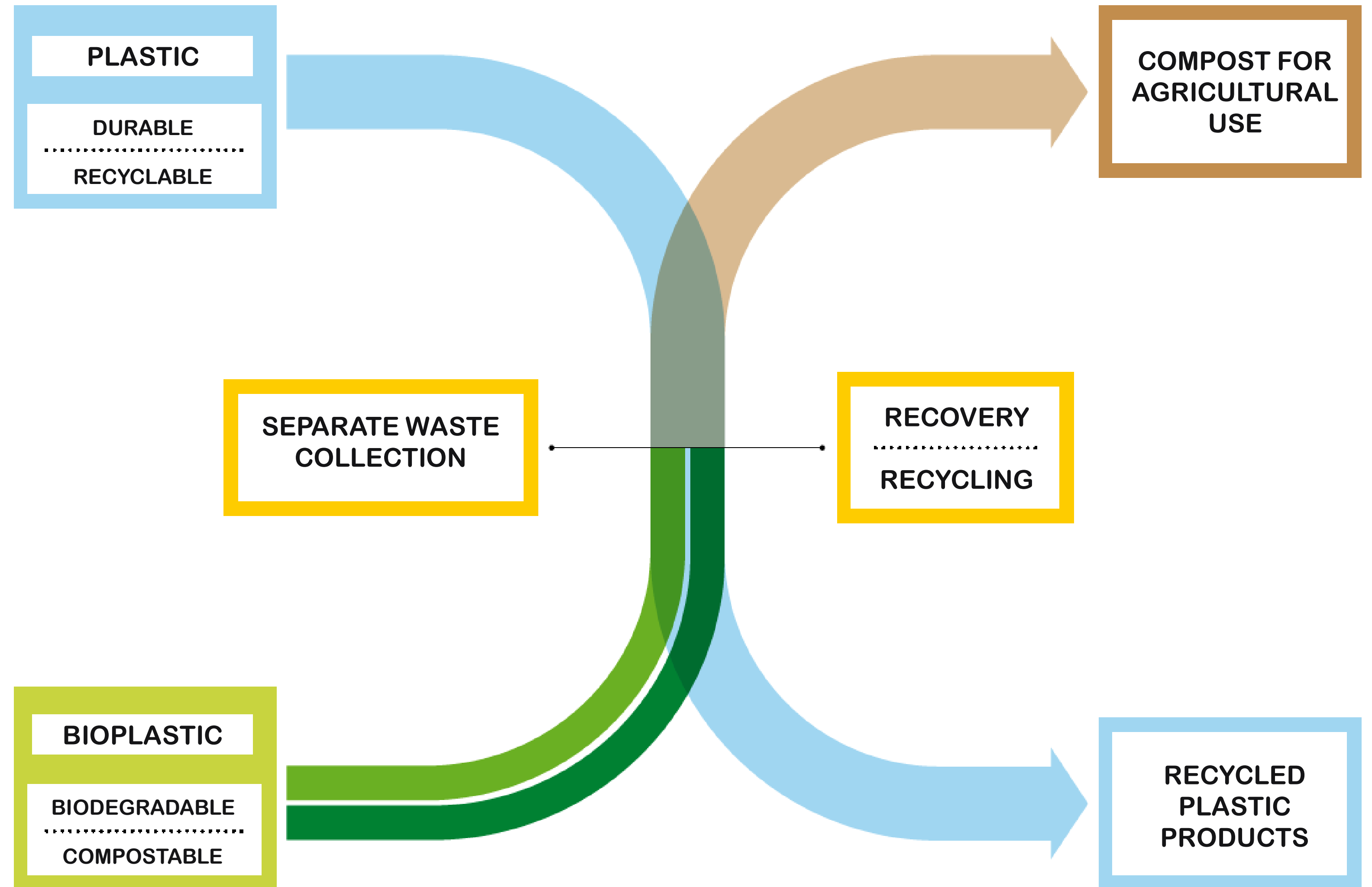
Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows  
ReSOLVE levers: regenerate, virtualise, exchange

### 2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles  
ReSOLVE levers: regenerate, share, optimise, loop

### 3

Foster system effectiveness by revealing and designing out negative externalities  
All ReSOLVE levers







# ITALY TOWARDS ZERO ORGANIC WASTE IN LANDFILL

A 5 YEAR PROGRAMME FOR ITALY TO ACHIEVE LEVELS OF EXCELLENCE AND ZERO ORGANIC WASTE IN LANDFILL



## Italy towards zero organic waste in landfill

EU strategies, funds for infrastructure and increasing spending efficiency in municipal solid waste management (OFMSW): a 5 year programme for Italy to achieve levels of excellence and zero organic waste in landfill

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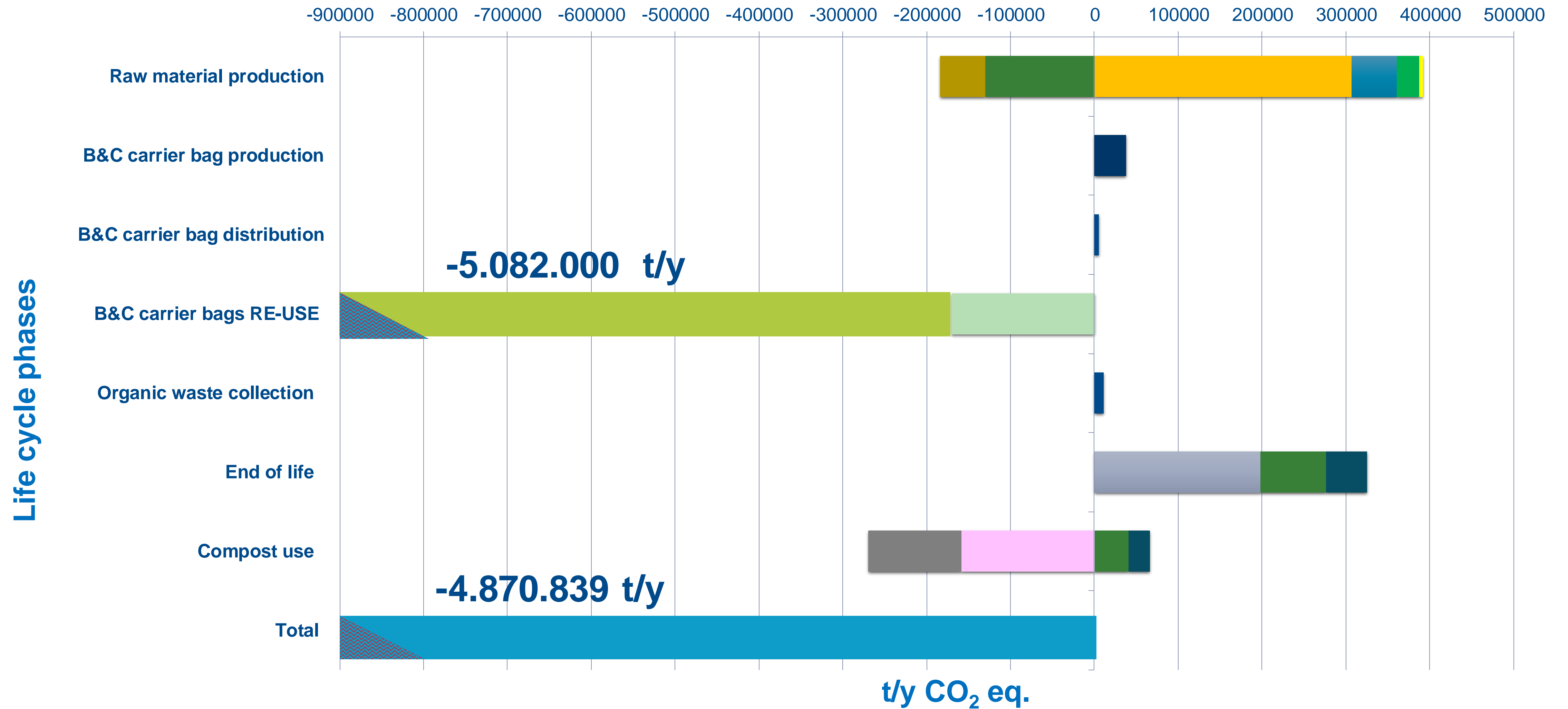






# ZERO ORGANIC WASTE IN LANDFILL: AN EFFECTIVE CONTRIBUTION TO DECARBONISATION...

## GHG EMISSION BALANCE IN CASE OF ZERO ORGANIC WASTE IN LANDFILL IN ITALY WITH 100 KTY OF MATER-BI IV BAGS



- Monomers
- Biogenic CO<sub>2</sub> uptake
- B&C bin liners for organic waste collection
- C-sink (compost used in agriculture)
- Others raw material
- By-products recovery
- Composting
- Chemical fertilizer replacement
- Origo-Bi (polyester) production
- Electricity
- Biogenic CO<sub>2</sub> (Mater-Bi)
- Mater-Bi production
- Trasports
- Fossil CO<sub>2</sub> (Mater-Bi)

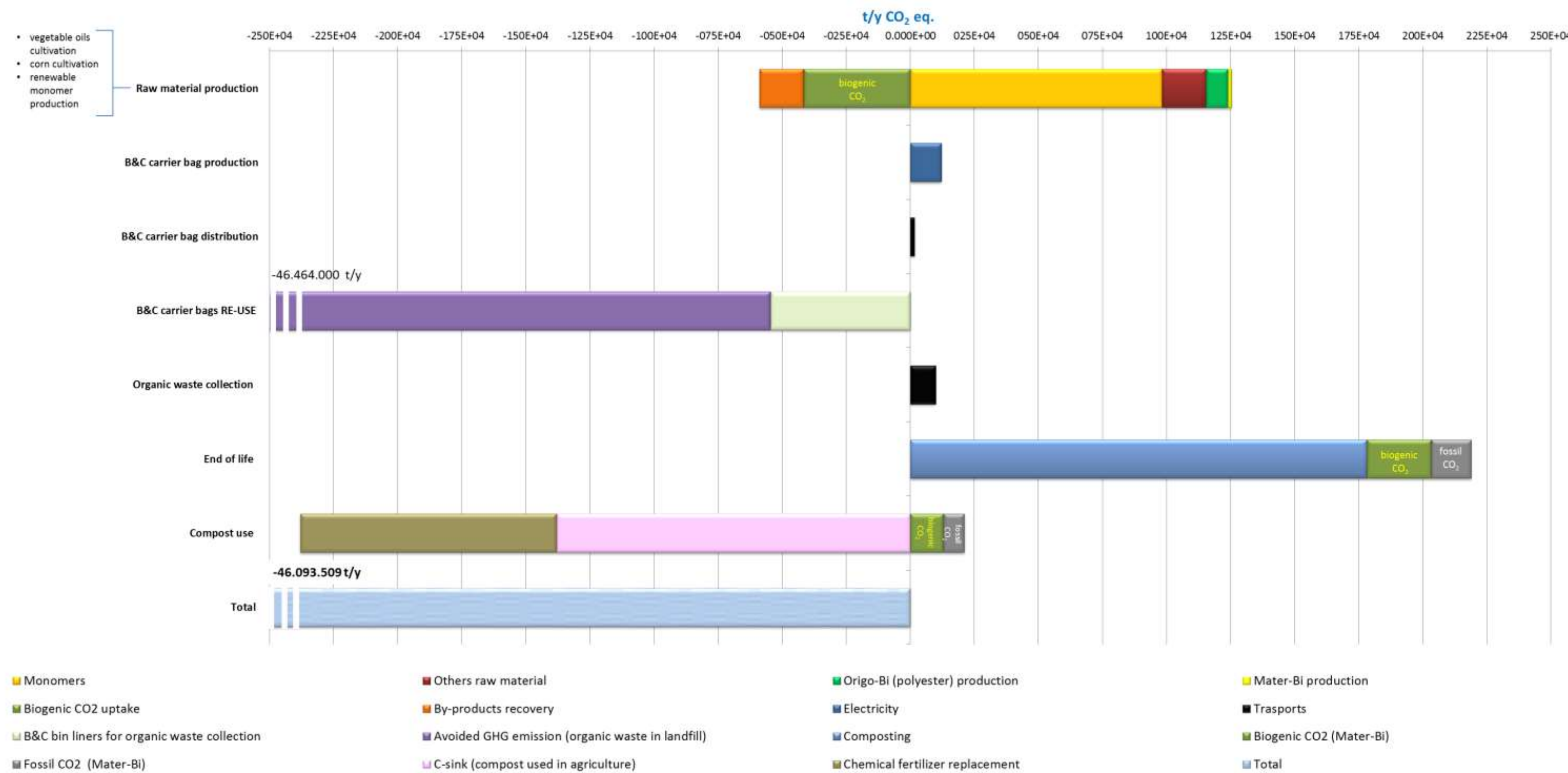




# ZERO ORGANIC WASTE IN LANDFILL: AN EFFECTIVE CONTRIBUTION TO DECARBONISATION...

## GHG EMISSION BALANCE FOR 320 KT/Y OF B&C CARRIER BAGS AND 39 Mt OF ORGANIC WASTE (ONLY FOOD WASTE)

Life cycle phases

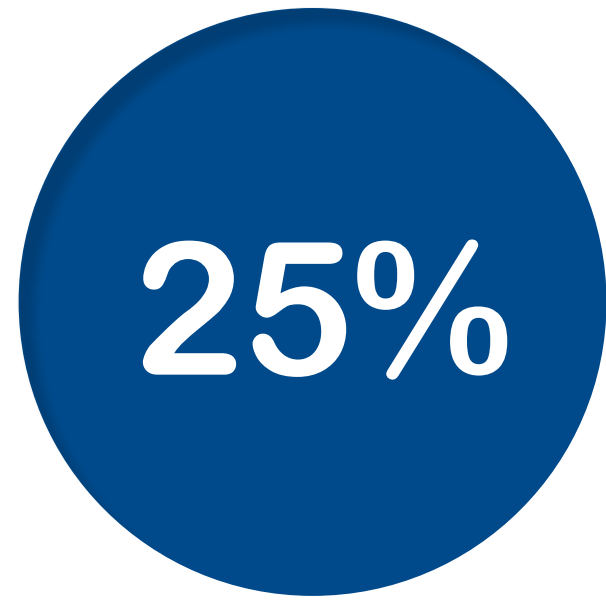


- +39 million tonnes of organic waste (only food waste\*) per year
- 320.000 t/y biodegradable bags
- Project objective: «zero organic waste»

# - 46.093.508,68 ton/y

\*estimation based on CIC annual report (2015) where food waste represents about 65%\*\* of organic waste collected in Italy

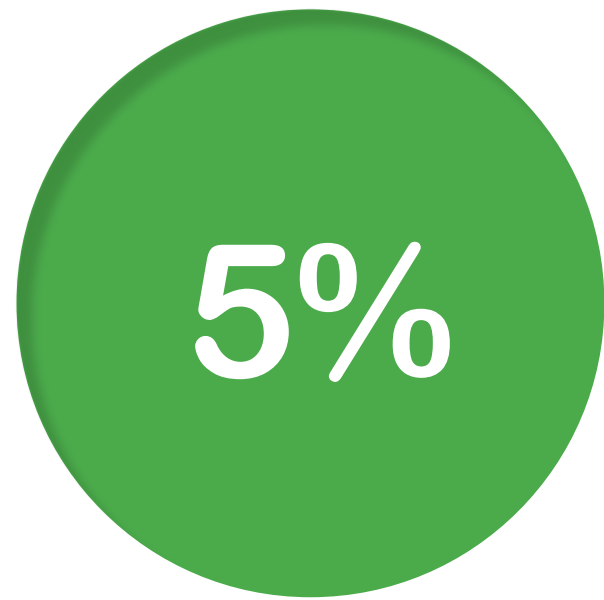




AGRICULTURE & RELATED ACTIVITIES



PRODUCTION OF BUILDING BLOCKS FOR THE INDUSTRY



RESEARCH, DEVELOPMENT AND INNOVATION

**1.000 tons**  
of bioplastics = creation of  
**60 new jobs**  
which means 100.000 potential jobs in the European Union

COMPOSTING AND ANAEROBIC DIGESTION PLANTS



BIOPLASTICS TRANSFORMATION INDUSTRY



*"The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them"*

UMBERTO COLOMBO

THANKS FOR YOUR ATTENTION

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