Biorefineries – the ‘factories’ where biomass, including crops, wood, forest and agricultural residues are converted into everyday materials – are critical to using renewable resources more efficiently. New biobased products, including chemicals, bioplastics, fuels, food and feed are already enabling the EU to move away from fossil carbon imports and towards a home-grown renewable future.

In this way biorefineries will also play a critical role in creating the circular economy as this model also relies upon finding new ways to extract value from available materials, including wastes and residues. Biorefineries are increasingly offering new ways to use renewable resources and add value to them, creating jobs and growth in rural, coastal and de-industrialised areas in the process.

Over the last 150 years fossil carbon based refining has become more sophisticated and efficient, producing a broad range of products. The same will increasingly be true for the biorefineries being developed around the world. But building a biorefinery requires considerable financial investment, so a long-term and coherent policy framework is needed in order for Europe to attract the levels of investment necessary to lead the development of a biorefining future.

4 facts about biorefineries

Biorefineries use enzymes, chemical catalysts and micro-organisms as well as mechanical and physical processes, such as pressure and heat, to efficiently convert renewable raw materials into the valuable components that go into every day products, from cosmetics, to fuels, to plastics and pharmaceuticals.

Biorefineries are designed to make the most efficient use of the available biomass and are capable of producing multiple products from one single feedstock.

Biorefineries are often located in rural areas, close to a source of renewable raw materials to be used as feedstock; this provides jobs and growth for rural communities and adds value for farmers, forest owners or for those living in rural, coastal and de-industrialised areas.

Almost all of the 100,000 fossil-carbon based chemicals that are currently derived from crude oil, coal and gas could, theoretically, be replaced by alternatives developed from plant based materials. In plant based materials the carbon used is atmospheric CO₂, meaning this development would help to mitigate the impacts of climate change.

References:
BIOREFINERIES

RESOURCE EFFICIENCY EXEMPLIFIED

BIOMASS
- Grains, legumes and starch crops (e.g. peas or maize)
- Sugar crops (e.g. sugar beet)
- Agricultural residues (e.g. wheat straw)
- Food waste (e.g. food processing waste)
- Forestry materials (e.g. forest thinnings)
- Animal by-products (e.g. manure)
- Energy crops (e.g. vegetable oils)
- Urban and suburban wastes (e.g. Municipal Solid Wastes)

PROCESSING
- Bio chemical Transformation
  - Anaerobic Digestion
  - Fermentation
- Biomass Pre-processing Technologies
  - Mechanical, Physical, Chemical and Enzymatic Treatment
- Thermochemical Transformation
  - Pyrolysis, Gasification

BIO PRODUCTS MARKETS
- Energy
- Transportation
- Health Care
- Environment
- Materials Manufacturing
- Chemicals

A BIOREFINERY USING
270,000 TONNES OF AGRICULTURAL WASTE PER YEAR CAN PRODUCE

75,000,000 liters of ethanol
13 MW electricity, making it entirely self-sufficient
The ethanol produced can reduce greenhouse gas emissions by up to 90% compared to petroleum-based fuel

THE LARGEST BIOREFINERIES IN EUROPE CAN PRODUCE OVER
700 DIFFERENT PRODUCTS

302,000 MAN YEARS EMPLOYMENT THAT EU BIOREFINERIES BRING TO RURAL AREAS

"The vision of a more competitive, cleaner, renewable, circular bioeconomy has biorefineries at its heart. For many sectors, from farmers to foresters right through to consumer brand manufacturers, biorefineries already represent the 'factories' that are helping provide a wide range of everyday products - including food, feed, fuels and materials - made from bio-renewable, rather than finite fossil resources. Increasingly, they will play a vital role in providing solutions to the grand challenges that face us and generations to come, including creating jobs and growth, reducing CO2 emission, using resources more efficiently and improving food and energy security."

Stephen Tanda, Board member, DSM and Chairman Industrial Biotech Section, EuropaBio

References:
2. Europabio, 2014