

PATENTING PROCEDURES RELATING TO GREEN TECHNOLOGIES

NOVAMONT: A LEADER IN BIOPLASTICS AND BIOCHEMICALS

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INTELLECTUAL PROPERTY

Profile of NOVAMONT

Novamont is an international leader in the field of bioplastics and of biochemicals

About 600 people

Turnover ~ 238 million €

R&D Investments: ~ 5% of turnover

People dedicated to R&D and innovation > 20%

Patent portfolio of about 1,800 patents / patents applications

4 production sites, 2 R&D centres, sales offices in Germany, France, USA and a representative office in Belgium. Network of suppliers in over 25 countries.



Mission & Products

Mission:

Design products and technologies to protect and restore the environment.
Promote and implement a circular economy.

Compostable bioplastics help to divert organic waste from landfills, allowing its transformation into compost, a soil improver and tool to arrest soil degradation. Bioplastics biodegradable in soil are suitable for those applications with a high risk of dispersion in the environment.

Biodegradable **cosmetic ingredients**, **biolubricants** and **bioherbicides** designed for those applications where dispersion in the environment is almost certain.

In all these sectors biodegradability represents a possible solution to drastically reduce soil and water pollution.



Technologies

Materials of Novamont are obtained by means of proprietary technologies using feedstocks of vegetable origin such as starches, biomass, vegetable oils and their combinations, made by an integrated industry representing a **bioeconomy model** which uses chemical facilities converted into innovative industrial plants.

Technologies employed vary from agricultural methods, selection of plant varieties, processing of vegetable oils, biomass and starches, production of monomers such as carboxylic diacids and diols and their polymerization to produce polyesters, new use and economic enhancement of byproducts, formulation and application of products.



KEY PRODUCTS

One of the most successful and known product is **MATER-BI**, a family of bioplastics whose properties and characteristics of use are very similar to those of traditional plastics, but at the same time, it is biodegradable and compostable.

MATER-BI is widely used for manufacturing shoppers and bags for organic waste fraction, but also for mulch films and a wide variety of items by injection moulding, blow-moulding, extrusion, etc.

One of the components used to make MATER-BI is the ORIGO-BI range of biopolyesters obtained from raw materials of renewable origin.



Intellectual Property

Novamont has a large portfolio of patents on bioplastics, biochemicals and related technologies, up to 1,800 patents and patent applications.

Dr. Catia Bastioli, founder, CEO and main inventor in the Novamont's patents was named with her team as European Inventor of the Year by the EPO in 2007.

The wide range of technologies used by Novamont is reflected in the multifaceted patent portfolio, which includes patents on products, blends of products, manufacturing processes, including polymerization but also separation and extraction processes, and patents on downstream applications of products, or use of products.

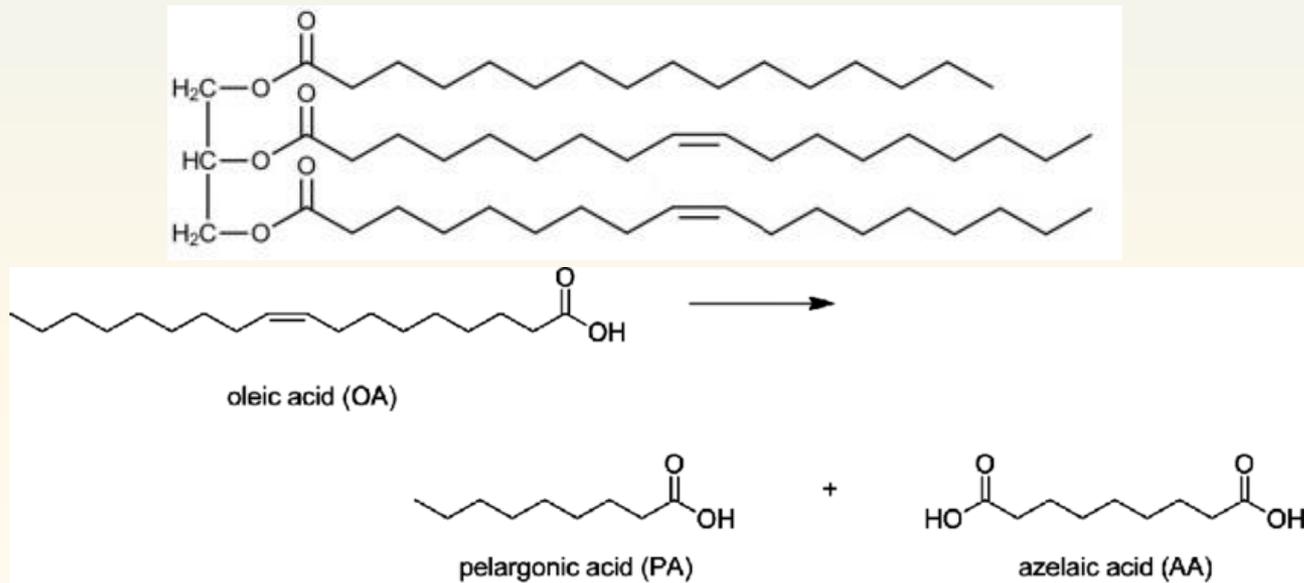
The upstream integration with agriculture generates patents also on biotech aspects of use of microorganisms for fermentation processes, and protection of new plant varieties via the UPOV Convention.



Examples of strategic patenting in Green Chemistry

Improvement of a known process with upgrading of byproducts:

Catalytic cleavage of vegetable oils (triglycerides) rich in oleic acid produce mainly azelaic acid and pelargonic acid

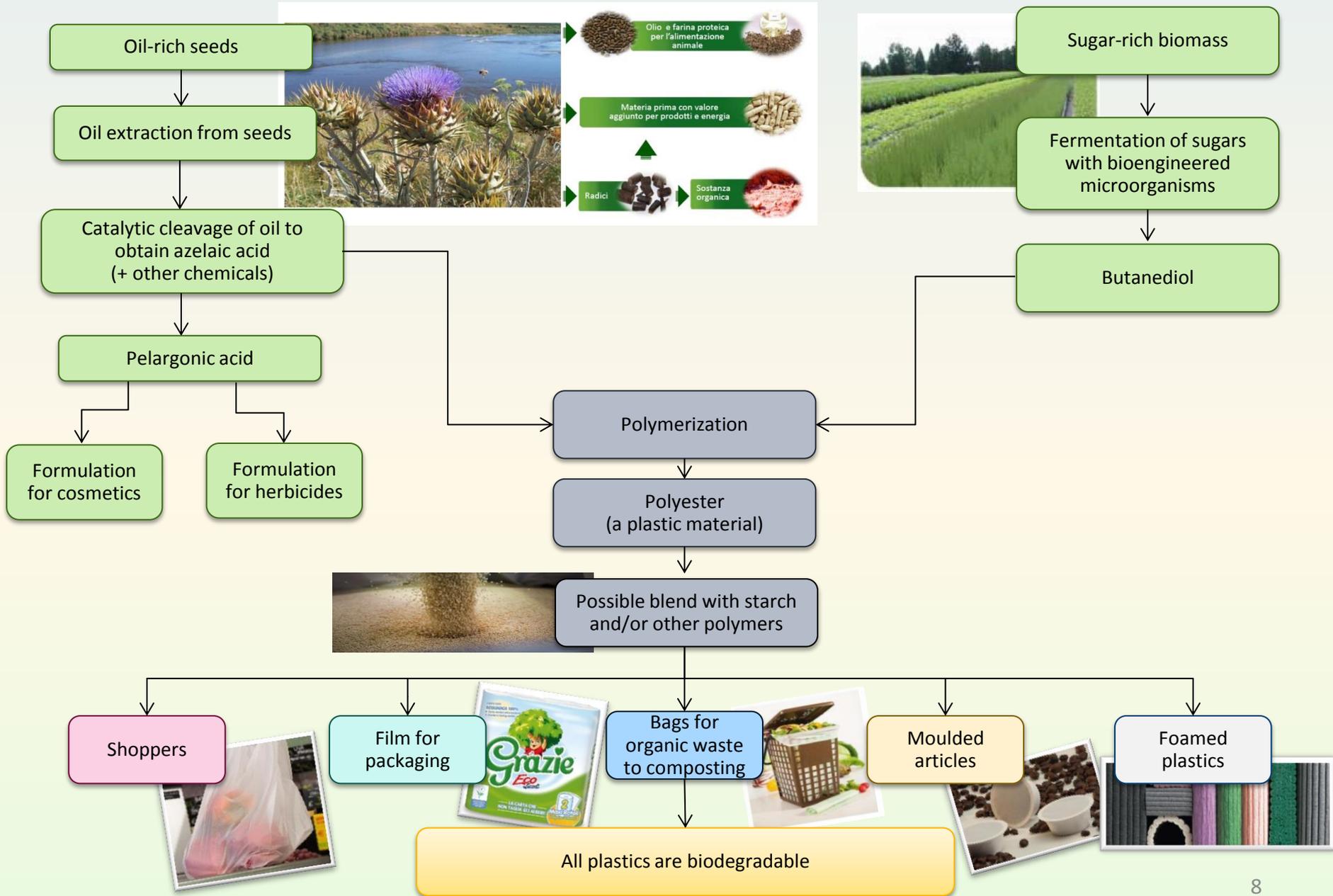


Use of azelaic acid: building block for biopolyesters

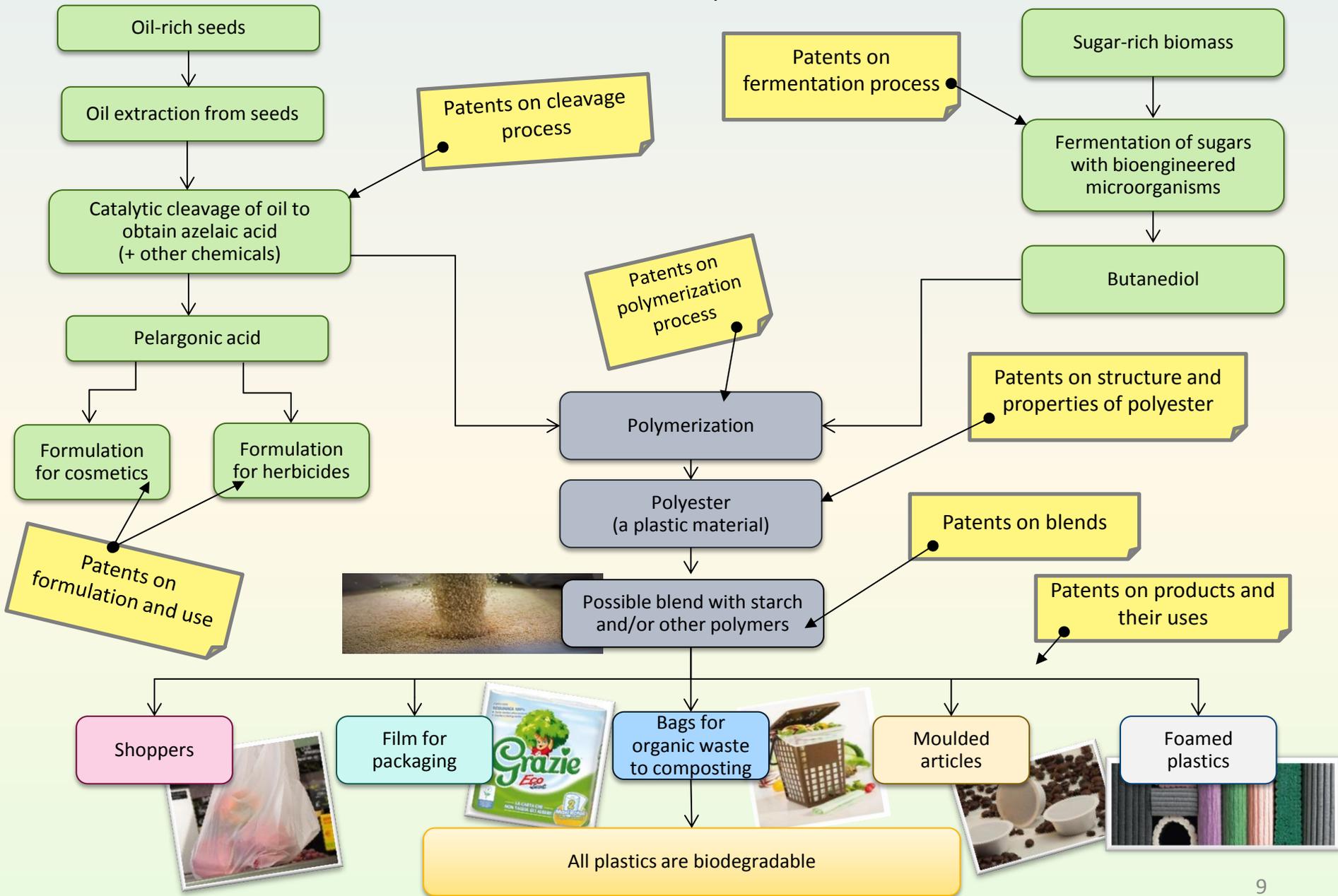
Use of pelargonic acid: biocosmetics; bioherbicides



A biorefinery integrated in the territory



Each step of the production process led to innovative solutions of technical problems and to filing/obtaining of international patents.



Renewable vs fossil: a patent difference?

Certain compounds obtained from renewable sources can be obtained also from non-renewable sources, e.g. from fossil sources.

Materials of fossil origin can be distinguished from materials of renewable origin by the ^{14}C isotope content, detectable by analysis of radiocarbon dating.

When a biological material, such as a plant, is alive, it absorbs carbon from CO_2 via photosynthesis during the day and emits it via respiration. The ratio of the isotopes $^{14}\text{C} : ^{12}\text{C}$ achieves a steady state as in the atmosphere. ^{14}C has a half-life of 5,730 years, therefore this ratio does not change for carbon derived from plants.

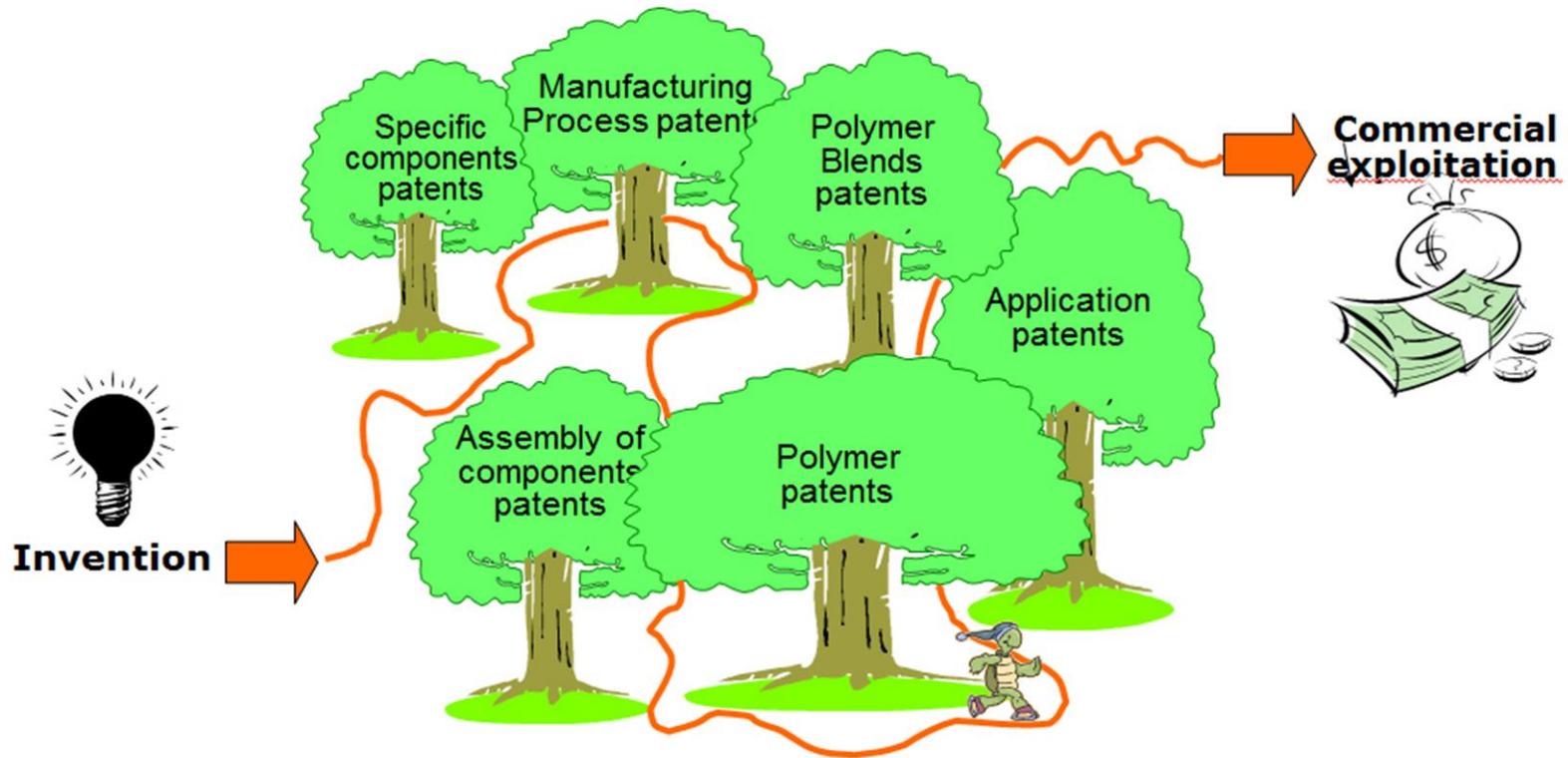
When carbon derives from fossil materials such as oil, however, the ratio $^{14}\text{C} : ^{12}\text{C}$ varies since ^{14}C has continued to decay into ^{14}N during the time of formation of the oil field, until about 0.

Radiocarbon dating is a known technique to distinguish C resulting from contemporary carbon input and C derived from fossil-based input. ASTM D6866 and EN 16640 are standard test methods suitable for such measurements.

Thus, it is possible to distinguish compounds of renewable origin from compounds of fossil origin at least for a different $^{14}\text{C} : ^{12}\text{C}$ ratio.



Finding a free path in the forest of the competitors' patents



GRAZIE PER L'ATTENZIONE!

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