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IO 01 - BBE COMPETENCES NAVIGATOR

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Bio-based economy and circular economy

The word “Bio-economy” is used, to describe a sustainable strategy for the entire chain of biomass. In the Europe 2020-strategy is a plea for bio-economy as a corner stone for a clever and green, sustainable growth in Europe. The bio-economy pays attention to all topics are related to bio mass, such as life sciences, ecology, fishery, agriculture, forestry, food, biotechnology, biochemistry and bio-energy.

Source:

- Europe strategy 2020

Bio-based economy

The worldwide economy is mainly oil-based. Fossil energy sources are used for fuel, for heating, for the production of a wide range of products like plastics, medicines, food additives, etc. This oil-based economy, however, has many consequences like global warming due to a growing production of carbon dioxide and the dependency on unstable countries.

These consequences have led to the search for alternatives to oil in many sectors, leading to a bio-based economy:

- ✓ renewable energy, like wind and solar energy,
- ✓ bio-fuel, like bio-diesel, bio-gas,
- ✓ production of raw materials for further processing, like fibers, dyes, medicines, food additives, etc.

The word “bio-based economy” (BBE) is used in discussions about the transition from the classical, oil-based, economy towards a bio-based economy. In the bio-based economy, biomass is used for food as well as non-food products.

Some of these developments, you can find in this Navigator.

Circular economy

A circular economy is a regenerative system in which resource use and waste production, emissions and energy wastage are minimized by slowing, reducing and closing energy and material cycles; this can be achieved through durable design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling [1] Recycling is usually the means of last choice.

The opposite of the circular economy is usually called linear economy (also "throw-away economy"); it is the currently predominant principle of industrial production. In this process, a large proportion of the raw materials used are landfilled or incinerated after the respective useful life of the products; only a small proportion is reused. Think about the plastic soup in the oceans.

Bio-economy and education

As companies move ahead in this field of Bio Based Economy, education got behind. At EU policy and research level, there is a lot of attention for the BBE topic, but not (yet) on educational level! The project BioComp aims to develop attractive learning and training materials to fill this gap.

Our BBE competence navigator is designed to help all you as teachers and learners to find and use the appropriate learning materials based on the competences they need to improve your knowledge. All learning materials (EQF3-4) are in English, but they can translate quickly and easily by the translator.

My proposal for the following parts: to use it for the Wiki...

More about the basic principles of a bio-based economy

The European Commission describes a bio-based economy as an economy that integrates the full range of natural and renewable biological resources – land and sea resources and biological materials (plant, animal and microbial) – and the processing and consumption of these bio-resources. The bio-based economy encompasses agriculture, forestry, fisheries, food and biotechnology and industrial sectors, ranging from the production of energy carriers and chemicals to buildings and transport. In this respect, a bio-based economy is nothing new. Before the industrial revolution economies were mainly bio-based. New developments comprise a broad range of technological solutions which could be applied in these sectors to enable growth and sustainable development. A bio-based economy, therefore, makes more widespread use of biomass to replace fossil-based resources.

To ensure that a bio-based economy is also a sustainable development, 3 basic principles for a sustainable bio-based economy are formulated.

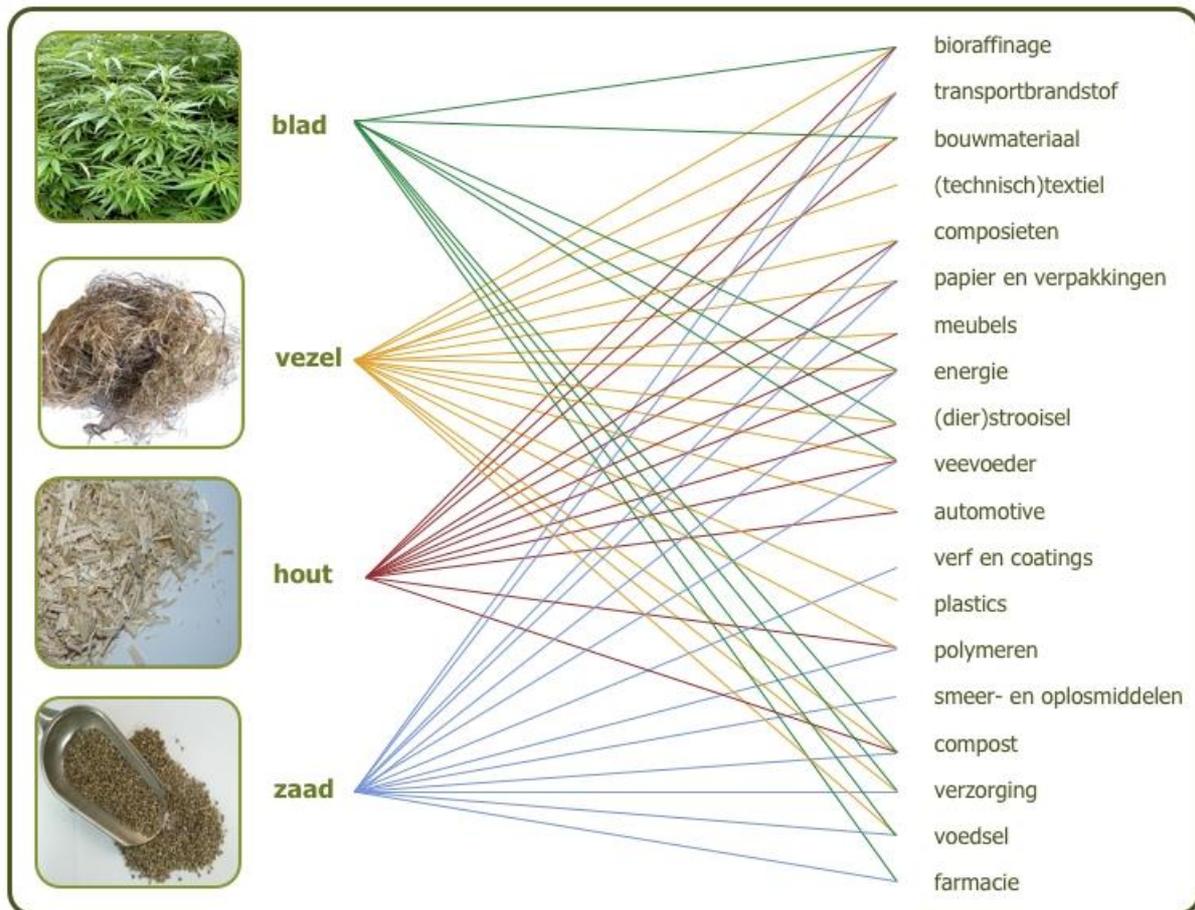
The three principles

Principle 1: Use renewable resources which are available today for the needs of today

In the next chapter attention will be paid to the production of renewable resources (biomass) and it will be illustrated that the production of biomass has its limitations in terms of required inputs (for example nitrogen and phosphorus). Moreover, biomass annually averaged efficiency using photosynthesis to form biomass is restricted to 3-6 % of the incoming radiation. So, when the production of renewable resources knows a certain maximum, the rate of the consumption of biomass should not exceed this maximum. In other words: the production of biomass has to be in pace with the consumption of bioproducts.

Principle 2: Use every part of the biomass

Many cultivated plants are grown for one specific purpose or prime ingredient. For example, soy or grass is produced because of the protein it contains, sun flowers and rape seed because of the oil, and maize (corn) and sugar cane because of the sugars. In the figure below an illustration is given off the utilization of all different parts of the plant, in this case hemp.

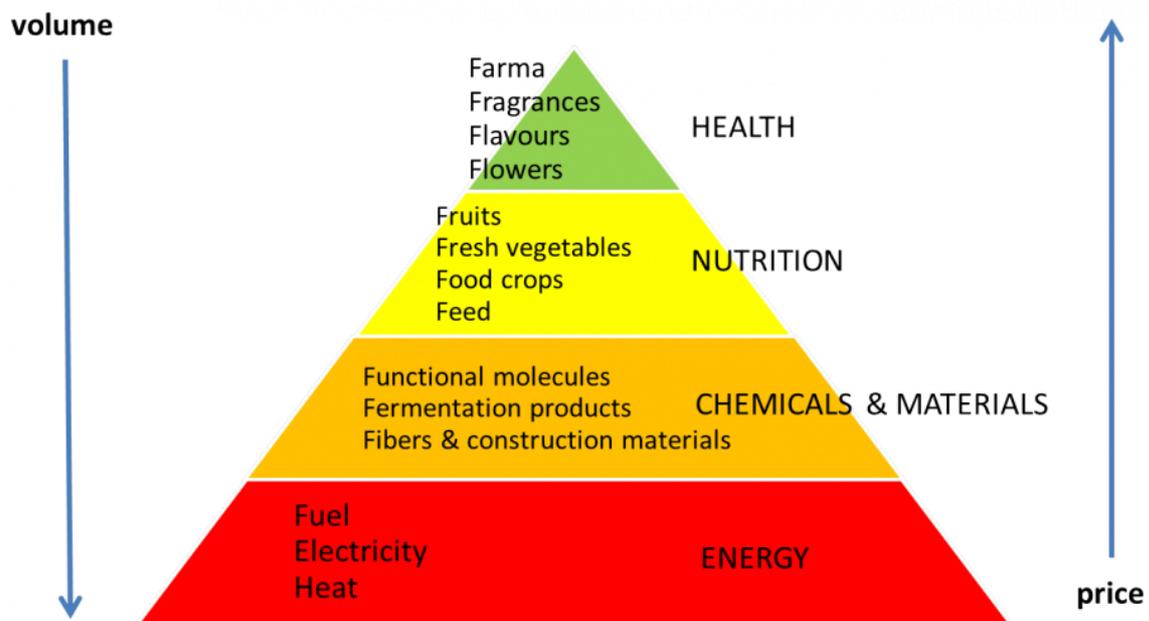


Possible applications of different parts of the hemp plant: Hemp production and valorization: which products can be made from hemp?

Is it possible to translate it?

Principle 3: If possible, use the most valuable parts of the biomass for the most added value products

The easiest way to convert biomass into a product is to combust it and produce energy. Burning wood is world-wide the most common method to produce heat. Think of the use of dead wood in developing countries. Although this is a good example of a bio-based practice it can be questioned whether this is the most ecologically desirable and economically profitable way.



The bio-based economy's value pyramid indicates that biomass value is determined by its applications and end uses.

Converting biomass to energy is depicted at the bottom of the Value Pyramid. The market for energy is large (everyone needs energy), but the market price is low. The market for fine chemicals or pharmaceuticals is small but the price of these products is high. The intention is to convert the most valuable parts of a plant to a product with a high added value. The principle entails optimal value utilization meaning that those substances or materials that can be used in high quality products are isolated first. So, a medicinal plant rich in special plant compounds is in the first instance used to produce pharma. In second instance, applications of remaining components of the plant are being sought in the lower regions of the pyramid. Taking manure as biomass stream, two high value applications are (1) the production of a mineral concentrate as a replacement for an artificial fertilizer or (2) the production of cardboard from the fibers. Low value applications are converting the biomass to energy, in the case of manure, to biogas.

The sum of the highest possible economic values of all the various components of biomass, makes that biomass as a product can have a higher value for the producers than if the entire product is used only for production of electricity or heat.