

Definitions of terms biomass and bioenergy

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Invitation to designing GLOBAL DEFINITIONS based on the laws of nature and scientific formulations. Chaotic definitions create confusion and hinders increase knowledge among citizens. Most of present definitions of terms biomass and bioenergy are written by actors usually with the aim of becoming adapted to powerful business needs. This is unsustainable as we search for knowledge-based society. Confusion created by the absence of definitions results in unnecessary losses, increased costs and risks to health.

The whole world should respect the laws of nature. Definitions are important for everyone to understand what is meant. There are already accepted definitions that should be used to raise knowledge levels, avoiding simplifications that rather lower public education than raise it. New definitions can be derived from existing ones. For example, use of word "bio":

- In biology, the term bio means "life" (biology = "study about life") that should be used with reverence to all living organisms. Biodiversity is the variety of life.
- In ecology biomass means "mass of living organisms" in an area or in a volume. The most accurate description of non-living material derived from plant and animal kingdom formed over the last 1000 years is the expression "renewable organic material" which differs from "fossil organic material" (coal, oil) and from "synthetically produced organic material" originating from either renewable, or fossil materials or blend of both types (different plastics). There are always a variety of living microorganisms in renewable organic materials that are fired or thermally gasified. Biodiversity is decreasing and emissions to air, water and soil causes negative impact on health and climate. Therefore, we have much more benefit from using renewable organic materials for biological conversion methods. By using technological improvements that serve biological processes, we can really protect our most important natural resources - plants, land, air and water, thus creating a healthy environment and preventing adverse effects on the climate.
- In physics is it clear that "energy can only be transformed" and therefore bioenergy is "energy of life" and must be defined as solar radiation energy transformed under photosynthesis in plants (primary producers according to ecology) using at least 16 chemical elements. The elements H, C, O, N, P, K, Ca, Mg, S, Cl, Fe, B, Mn, Zn, Cu, Mo are considered essential (<http://aktionskanemiljo.se/wp-content/uploads/16-essentiella-grund%C3%A4mnen-v%C3%A4xtn%C3%A4ring.pdf>) to the growth and development of the plants. In addition to the above-mentioned essential chemical elements are considered several stimulating chemical elements (Co, Cr, Ni, V, Sn, Li, F, Se, Si). Bioenergy is always bound to above mentioned chemical elements. Most of them are called plant nutrients. Therefore, in each use of bioenergy, we must consider both energy and material flows.

Bioenergy from plant biomass is used as biofuel in food to humans, feed to animals and in the wood as substrate to different microorganisms. Then during the food chains appear bioenergy in residues and in all waste, that comes from the plant and animal kingdom. By efficiently / smarter exploit bioenergy and nutrients throughout society, we can contribute to more solar radiation energy captured in plantations and faster compete out fossil energy sources.

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Wasting plant nutrients is accompanied by mismanagement of bioenergy. All unsustainable practices and systems that create losses of plant nutrients contribute to pollutions of air and water as well as increased losses of bioenergy that could instead be used to phase out a large proportion of fossil energy sources. Green biotechnology enables both more efficient utilization of bioenergy and more efficient recycling of essential chemical elements for production of biomass, thereby ensuring sufficient supply of raw materials and energy for society without the dependence on fossil fuels.

Example:

All people are dependent on food - even those living in smart, sustainable cities. Food is coming from rural areas and are becoming “food waste” or after people have eaten food, it becomes “human waste”. Both contain bioenergy and all above mentioned chemical elements.

Vision: With hygienic and user-friendly devices, collect food waste and human waste (without dilution in water) and transport them to local high-tech biogas plants. There they will be mixed with different plant and animal residues to create optimal substrate for biological transformation to biogas and biofertilizers. Biogas should be transformed locally to electricity and heat / cooling. Biofertilizers contain bioenergy in microorganisms and in poorly transformed renewable organic materials. Biofertilizers increase soil fertility and can heal our damaged soils.

Objectives: Improve the conversion of bioenergy and prevent losses of plant nutrients, which with the current systems pollute the air and water. All the essential chemical elements for plants are replaced with a few energy-consuming synthetic fertilizers, which causes continued depletion of cultivated soils. This is illustrated in the film on <https://www.svtplay.se/video/13357996/sista-skorden/sista-skorden-1>.

Effect on Sustainable Development Goals (SDG)

Innovative management through biological conversion of food waste, human waste and all plant and animal residues and waste will directly affect positively nine of the 17 SDGs:
No 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

No 3. Ensure healthy lives and promote well-being for all at all ages.

No 6. Ensure availability and sustainable management of water and sanitation for all.

No 7. Ensure access to affordable, reliable, sustainable and modern energy for all.

No 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

No 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

No 11. Make cities and human settlements inclusive, safe, resilient and sustainable.

No 12. Ensure sustainable consumption and production patterns.

No 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

All other SDG will be positively affected indirectly.

Back to basic definitions and forwards to knowledge-based society.