VB: BIOENERGY - definition

Ruzena Svedelius
Fre 2022-02-25 03:18
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Hemlig kopia:

Från: Ruzena Svedelius <rsvedelius@hotmail.com>
Skickat: den 24 februari 2022 18:02
Till: Andrea Monti <a.monti@unibo.it>; secretariat@eera-set.eu <secretariat@eera-set.eu>;
Ämne: Sv: BIOENERGY - definition

Dear Andrea,

Lack of scientific definitions creates a lack of clarity, cause confusion and entails the risk of wrong decisions. It seems ridiculous that the following sentence can be scientific definition of bioenergy:
"Bioenergy is the conversion of biomass - such as agricultural and forest by-products and residues, organic municipal waste, energy crops, algae, biological CO_2 - into useful energy carriers including heat, electricity and transport fuels."
To define bioenergy on a scientific basis, the following facts from different scientific fields must be used:
Bio- means life
Bioenergy means "the energy of life".
The law of Conservation of Energy states that energy cannot be created or destroyed - it can only be transferred from one type to another.
Therefore, as a responsible citizen, I urge everyone who handles the term bioenergy in different ways to contribute to the improvement of the proposal presented below for a scientifically based definition of the term bioenergy:

Bioenergy is "energy of life" and must be defined as **solar radiation energy converted under**
photosynthesis and biochemically stored in plants (primary producers according to ecology) with at least 16 chemical elements. The following elements H, C, O, N, P, K, Ca, Mg, S, Cl, Fe, B, Mn, Zn, Cu, Mo are essential for growth and plant development (http://biotransform.eu/wp-content/uploads/2021/12/Essential-elements-for-all-living-things-RS.pdf). In addition to the above-mentioned essential chemical elements, there are several chemical elements that stimulate the growth and development of plants (Co, Cr, Ni, V, Sn, Li, F, Se, Si).

Carbon (C), oxygen (O) and hydrogen (H) receive plants from carbon dioxide and water, others are called plant nutrients and are found in soil. Bioenergy is always bound to the above-mentioned chemical elements. Therefore, when using bioenergy, we must consider both energy and material flows.

Bioenergy from plant biomass is used as biofuel in human food, animal feed and in wood as a substrate for various microorganisms. Then, during the food chains, bioenergy is generated in residues and in all waste, which comes from the plant and animal kingdom.

By using bioenergy and the essential chemical elements more efficiently / smarter throughout society, we can contribute to more solar radiation energy and carbon dioxide being captured in plantations and can more quickly compete with fossil energy sources.

How much bioenergy per year is available to use worldwide depends on how much solar radiation energy is converted during photosynthesis and biochemically stored in total in terrestrial and aquatic plants.
Unfortunately, sustainable cultivation systems are lacking because mostly unsustainable methods are used to utilize bioenergy from Renewable Organic Materials such as combustion, thermal gasification, pyrolysis, esterification, etc. These methods cause pollution in air, water, and soil instead of returning the vital chemical elements to cultivated land. Organisms that live in and on Renewable Organic Material are killed, which negatively affects the ability to increase the soil's biological diversity. Organic carbon that is important for increasing carbon sequestration is lost as carbon dioxide.
Although the biological method that uses methane fermentation (Anaerobic Digestion) is sustainable, it is still mostly used as a 100-year-old method where the water content in bioreactors is over 90% and which makes the process unnecessarily costly. Research on High Solid's Anaerobic Digestion (HSAD) was conducted at NREL in the USA in the 1980s. The results showed that with a water content of around 70%, smaller and thus cheaper bioreactors can be built and biogas production per bioreactor volume can be increased 4 to 6 times.
To maximize the yield of biogas and biofertilizer, it is necessary to create substrates at each local biogas plant according to the availability of different types of raw materials. The conversion method should be called Optimum Solids Anaerobic Digestion (OSAD), as the water content should be optimal for microorganisms that are to process the specific substrate created from local renewable organic materials.
The cities' central waste and sewage systems are costly, polluting air, water and soil and causing losses of plant nutrients, biodiversity, and carbon sequestration. Therefore, conversion to local biological systems which, with the help of digitization, innovations, and increased precision, should have the highest priority to reduce pollution and increase the production of electricity, heating, cooling and biofertilizer.

A project with ambitions to use biological transformation processes using modern technology is outlined as the SBRS concept and stands for "Sustainable Biological Recycling System". Presentation of the SBRS concept with some pictures is on http://biotransform.eu/wp-content/uploads/2021/10/From-Photosynthesis-to-Photosynthesis-according-to-SBRS-concept-2021-05-RS.pdf.

Best regards
Růžena

PS

1 000 pers					
Human excreta (HE)	ton/d	days	ton/year	DM	ton DM
	1,20	365	438,00	0,07	30,66
Food waste (FW)	0,27		97,00	0,30	29,10
Totaly FW and HE	**1,47**		**535,00**	**0,11**	**59,76**
Different pellet types	0,46		166,60	0,91	151,61
Mixture	**1,92**		**701,60**	**0,30**	**210,48**

Mixture contains ca 3 000 kWh bioenergy per tonne.

I can contribute some facts based on available data regarding nitrogen and phosphorus.
Between 100 and 300 kg of nitrogen and between 15 and 40 kg of phosphorus as mineral fertilizer are used per hectare for different crops.
NITROGEN
From 1,000 inhabitants in food and toilet waste mixed with organic household waste, there are 7,200 kg of nitrogen per year.
In sewage treatment plants from 1,000 inhabitants, about 1,600 kg of nitrogen (about 12%) flows on to watercourses and the sea. There is no information on how much nitrogen undergoes denitrification during the biological purification step because the nitrogen content in the sludge is not reported.
If we were to assume that it is 3,000 kg and use the information from the United States that says that every pound of nitrogen sent into the air costs 140 US dollars, the cost will be 924,000 US dollars per year.
If the sludge is burned - which is now said to be plans at many wastewater treatment plants - nitrogen becomes NOx and pollutes the air and contributes to ill health and environmental problems.
PHOSPHORUS
From 1,000 inhabitants in food and toilet waste mixed with organic household waste, there is 830 kg of phosphorus per year.
About 9% phosphorus corresponding to 75 kg is released to watercourses and the sea. The cost is about 1,500 SEK (161.43 US dollars).
Remaining in the sludge is 755 kg of phosphorus of value for mineral fertilizer 15 106 SEK (1,625.75 US dollars).
It is now planned that the sludge will be incinerated, which means very large costs, pollution is increasing, and the company does not answer the question of what will cost one kilo of phosphorus. https://www.easymining.se/globalassets/easymining/dokument/220309_handout_ash2phos_v3.pdf

The difference between different methods of using bioenergy is described in Microsoft Word - Compare three methods (biotransform.eu).

Assume that both nitrogen and phosphorus never reach cultivated land, direct losses are SEK 89,500 ($ 9,632.25) per year. On the other hand, the total costs of using unsustainable methods are so great that it is hardly possible to get an overview.

SBRS concept

All future costs, losses and contaminants can be reduced when food and toilet waste is encapsulated at the source in plastic-like materials produced from starch with various admixtures and adapted for both hygienic handling in the kitchen and toilet without adding water, no losses of bioenergy and the essential elements for life during transport and pre-treatment in the biogas plant. Packaging of starch becomes part of the substrate for bacteria that convert substrates into biogas and biofertilizer. Bioplastics of different quality are already being developed and we have contact with a company that already sells various products https://gaiabiomaterials.com/.

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Collecting Closet BAS - **CC instead of WC**

What we are doing wrong in the handling of waste, we and our children will find sooner or later in the food and water and breathe in the polluted air.

Från: Andrea Monti <a.monti@unibo.it>
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Ämne: R: BIOENERGY - definition

Dear Ruzena,

I think at the following link you can find a clear definition
Bioenergy | European Commission (europa.eu)

Kind regards,
Andrea

Da: Ruzena Svedelius
Inviato: Monday, February 21, 2022 4:01 PM
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Oggetto: BIOENERGY - definition

Hello,

Where can one find scientific definition of the term BIOENERGY?

Best regards
Růžena

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