SBRS concept is looking for partners for collaboration

to jointly apply for funding for projects 2022-07-07

The SBRS concept shows how Circular Bioeconomy is to be applied in practice.

SBRS stands for "Sustainable Biological Recycling System" which will accelerate the transition to locally produced sustainable electricity, heating / cooling and organic fertilizer from Renewable Organic Material, i.e. from everything originating in current photosynthesis, which today ends up in waste and wastewater. At the same time, pollutions that threaten the environment, health and climate are radically reduced and thus many costs are avoided. The technology used must support biological processes that are important for human existence.

People who launch the SBRS concept are of retirement age and want to impart knowledge to younger people who have ambitions to take advantage of the results of the projects to start and run new companies that contribute to a sustainable transition worldwide.

SBRS concept is suitable for all villages and districts in cities in all countries. It consists of:

- hygienic collection of toilet and food waste completely closed in folie of starch
- digitized logistics to transport renewable organic material in sustainable way
- local high-tech biogas plant with hygienic working environment
- local facilities for biological treatment of greywater, when it is free from food and toilet waste, which comes from households and the like to be able to use water locally.

Municipalities do not need to buy drinking water for these purposes. Instead of sending treated wastewater, still containing plant nutrients and lots of synthetic chemicals, to watercourses and the sea, purified greywater can be used for irrigation, fountains, etc.
http://biotransform.eu/wp-content/uploads/2022/05/From-Photosynthesis-to-Photosynthesis-SBRS-concept-RS-BS.pdf

Pros: **Energy efficiency, reduced emissions, and cost savings for citizens.**
Large societal savings are possible by hygienically and sustainably handling all Renewable Organic Material in residual products and in waste. This means:

- Sustainable use of **bioenergy that is the sun's radiant energy which is converted and stored during photosynthesis in the plants' biomass.** Bioenergy is the most important energy for most living organisms, including humans.
- Sustainable recycling of **essential chemical elements for life**, at least the following 16 that must be present in the fields for photosynthesis to work: H, C, O, N, P, K, Ca, Mg, S, Cl, Fe, B, Mn, Zn, Cu and Mo.
- Direct **positive impact on 10 of the UN's 17 SDGs** in Agenda 2030:
  2, 3, 6, 7, 8, 9, 11, 12, 13 and 15. The other sustainability goals are positively affected indirectly.

SBRS can be modified to all activities where residual products and waste from plants, animals and microorganisms arise, for example from animal husbandry, the food industry, the wood products industry, etc. Of course, the cascade use of Renewable Organic Material takes precedence. The SBRS concept will gradually be improved when partners contribute with new ideas.

Background and motivation of urgent need to carry out the project.
Residents pay a lot for losses of **biodiversity**, unsustainable handling of **bioenergy** and **nitrogen** with present waste and wastewater management.
Two typical examples “municipal solid waste” and “sewage sludge” in brief: What happens in management of waste and wastewater to biodiversity, organic bound carbon (C org) and nitrogen

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(N)?

Municipal solid waste. In Sweden was 49.5% (2018) incinerated, despite the fact that a sample analysis in the Reforsk report from 1998 showed that 76% is renewable organic material and can be treated with biological methods. In 1998, 50% was incinerated. For 20 years, those responsible for incineration have shown no ambition to reduce emissions using biological conversion methods and reduce pollution and costs for citizens. More plants with waste incineration, which do not have to pay for environmental pollution, have been built all over the world.

The proportion of renewable organic material is over 70% in most countries. During incineration and during all thermal and chemical processes, where the raw material is Renewable Organic Material, all living things are killed, which means that biodiversity is negatively affected. Losses of biodiversity have already crossed Planetary boundaries.

Rarely is it reported what happens during residents' costly, polluting, and loss-making thermal and chemical processes with all the plant nutrients, organic carbon (C org) and water vapor, which is also a greenhouse gas. Citizens pay both for treatment and for health care.

Even when 310,000 tonnes of pine wood pellets are burned per year (instead of bark, cave, wood chips and sawdust that is incinerated in Örtofta, Sweden), about 500 tonnes of nitrogen (N) per year are released into the air as nitrogen oxides (NO_2 and NO) and just over 500,000 tonnes of carbon dioxide (CO_2) per year. About 3,500 tonnes of carbon (C inorganic) end up in ashes.

Sewage sludge, that is used as raw material in biogas plants, is formed when food and toilet waste is flushed down with drinking water mixed with wastewater containing chemicals from various activities and companies.

To reduce nitrogen emissions to watercourses and the sea, reactive nitrogen (Nr) in sewage treatment plants is converted to nitrogen gas (N_2). Unfortunately, some nitrogen is converted to nitrous oxide (N_2O). Nitrous oxide is a greenhouse gas. 1 kg of nitrous oxide corresponds to emissions of approximately 298 kg of carbon dioxide from a 100-year perspective. In one of the sewage treatment plants, 11% was converted to nitrous oxide. The cost of sending 1 kg of nitrogen to the air is about 300 dollars - according to information from the United States where the average cost is 140 dollars per pound of nitrogen.

There is still so much nitrogen in outgoing water that from just over 340,000 inhabitants who send wastewater to Malmö, 481 tonnes of nitrogen go to the sea per year. Some nitrogen remains in the sludge, which mostly contains so many chemicals that it is inappropriate to use it on cultivated land. Therefore, sludge after biogas plants often goes to combustion and the nitrogen is converted to nitrogen oxides (NO_2 and NO) which together with the nitrous oxide (N2O) and other forms of reactive nitrogen (Nr) have already crossed the Planetary boundaries.

Before the war in Ukraine farmers bought imported artificial nitrogen fertilizers, where 1 kg of nitrogen costs about 1 euro. About 2 % of all energy used in the world is spending on to produce artificial nitrogen in the so-called The Haber-Bosch process. The process uses nitrogen gas (N_2) from the air and hydrogen gas (H_2) from mostly natural gas. About 60% of the natural gas is used as raw material, while the rest is used to drive the synthesis process. Fossil natural gas causes emissions of 3–11 kg CO_2e per kg nitrogen depending on product and production

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technology. It is claimed that nitrous oxide (N_2O) emissions from the use of synthetic nitrogen have 3-4 times as much climate impact as production.

To ponder:
A mixture of food and toilet waste from 1,000 inhabitants per year (collected in foil of starch without water, ca 535 tonnes) mixed with different types of pellets (wood, straw, about 167 tonnes) became about 702 tonnes per year with about 30% dry matter, called substrate for microorganisms that carry out microbial conversion in biogas plants. **The substrate contains more than 1,000 MWh of bioenergy** and about 100 tonnes of organically stored carbon (C org), which corresponds to 367 tonnes of carbon dioxide (CO_2) per year.

Depending on the precision during the bioconversion process of anaerobic digestion, about **600 MWh of biogas** can be produced and then converted by trigeneration to about **180 MWh of electricity** and about **390 MWh of heat** that can be used during the summer for cooling.

The rest of the bioenergy from the mixture of raw materials remains as organic bound carbon, oxygen, and hydrogen in **biofertilizers** that contain about 3.7 tonnes of reactive nitrogen (Nr), about 0.6 tonnes of phosphorus, all other plant nutrients and many living microorganisms that act during microbial conversion in biogas plants. Some enrich the biodiversity in cultivated land. Biofertilizer ensures soil fertility / production capacity when all plant nutrients are recycled, organic carbon becomes a carbon sink and is also energy source for soil organisms that can inactivate several drug residues.

The picture shows the latest prototype of **CC-BAS** (Collecting Closet BAS) used to display the function. The box can be replaced with a beautifully designed exterior.
Description of function CC-BAS:
The welding of the biomaterial of starch is carried out after each use of the collecting toilet with 12 V. Not a drop of urine or faeces may come out of the package all the way to the place of pre-treatment in a local high-tech biogas plant. CC-BAS is connected to a 12 V battery to be able to be used even when the mains supply is not available. Connection to solar cells is made if necessary.

CC-BAS can be used anywhere. From the beginning, CC-BAS should be introduced on public places, trains, planes, buses, boats, colleges, universities, etc. to verify the acceptance of residents. CC-BAS connected to local high-tech biogas plants would benefit on refugee camps.
http://biotransform.eu/wp-content/uploads/2022/05/THE-TOILET-OF-THE-FUTURE-CC-BAS-BS-RS-1.pdf
CC-BAS requires connection to systems for sustainable use of the human waste as raw material for production of biogas and biofertilizers, minimizing hazardous emissions as well as energy consumption. Therefore, BAS-konsult AB proposes development of the SBRS concept.

No time to waste!
During the year 2002 the Expression of Interest was submitted in response to Call EOI.FP6.2000 (http://biotransform.eu/wp-content/uploads/2015/03/0-2002-EoI-int_26219-RS.pdf). Researchers from 17 countries expressed interest in collaborating. Unfortunately, five proposals sent to the EU were rejected. Copies of proposals are available at http://biotransform.eu/proposals/.

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