Clean energy, water, air, and cities, sustainable crop production and lower costs for residents thanks to the SBRS concept.

The SBRS concept stands for Sustainable Biological Recycling System of the basic chemical elements[i] that are the building blocks of most living organisms, including humans, and the use of bioenergy with which the elements are bound in the biomass of both plants and animals.

- Questions for politicians at all levels:
  Can we have clean cities without sustainable management of renewable organic material in waste and wastewater?
  Can we have sustainable production of food, feed, and wood without sustainable recycling of plant nutrients?

In all villages and all urban districts, local, hygienic, and high-tech biogas plants can be built that receive hygienically packaged food and toilet waste and local, hygienic biological treatment plants for grey water according to the SBRS concept.
The biogas can be used locally and biofertilizer is used by local farms.

Table 1 shows how many tons of human excreta (HE) and food waste (FW) can be used as raw material in biogas plants in Malmö each year. In case everything go to incineration, it shows how much carbon dioxide (CO_2) is released into the air. Unfortunately, pellets are burned up and pollute the air with carbon dioxide (CO_2), nitrogen oxides (NO, NO_2), sulfur dioxide (SO_2), particles, etc. Phosphorus (P), potassium (K) and other plant nutrients are found in the ash, which is occasionally spread on cultivated soils.

Instead of sewer tunnels for 210 million euros, approx. 100 biogas plants and the same number of biological treatment plants for gray water can be built. The sewer tunnel, which is planned to be built over 7 years, supports the current unsustainable end-of-pipe i.e., linear system that pollutes air and water and thus everything, is both unsanitary and very costly. The working environment for people who manage sewage systems is unhealthy.

Table 1: Malmö inhabitants can mix human excreta (HE) and food waste (FW) with dry renewable organic material to get optimal water content in substrate för microorganisms that convert it to biogas and biofertilizer during Optimum Solids Anaerobic Digestion in local high-tech biogas plants. Here, the amount of pellets whose analyzes are available is estimated.

Malmö

340 000 persons	ton/d	days	ton/y	DM	ton DM/y	ton C/y	ton CO_2/y
Human excreta (HE)	408	365	148 920	0,07	10 424	5 212	19 129
Food waste (FW)	90	365	32 980	0,30	9 894	4 947	18 155
Totally FW + HE	**498**	365	**181 900**	**0,11**	**20 318**	**10 159**	**37 284**
Different pellet types	155	365	56 644	0,91	51 546	25 773	94 587
Mixture/substrate	**654**	365	**238 544**	**0,30**	**71 563**	**35 782**	**131 318**

Content of bioenergy in FW + HW can be estimated at 100 GWh per year. About 50 GWh can be converted into biogas, and the bioenergy of the biogas with trigeneration provides **15 GWh of electricity and 32.5 GWh of heat, which during the summer can be converted into cooling.**

Mixture/substrate contains roughly 250 GWh of bioenergy. How many percent becomes biogas needs to be verified in practical tests. On the other hand, it is certain that C org in bio-fertilizer is much cheaper and for cultivated land an important carbon sink compared to technical methods of sequestering carbon dioxide when dry materials are burned.

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The following sentences have been taken from "Sustainable wastewater treatment" hallbaravloppsrening.vasyd.se/samrad

Chemicals (used 2015 – 2019 or will be used 2045): Precipitation chemical, Polymer water purification, Carbon source – methanol, pH adjustment, Dry polymer, Citric acid, Sodium hypochlorite, Hydrochloric acid 34%, Activated carbon, Liquid oxygen.

Every year, 26,600 tonnes of watered sewage sludge, 450 tonnes of coarse cleaner and 80 tonnes of sand are generated.

Biogas may be used for heating sludge when no other heat source is available.

Purification of pharmaceutical residues involves new techniques for Swedish treatment plants. …VA SYD suggests that a trial period begins after the facility has been installed.

Emissions from wastewater plant in Malmö, year 2017:
Carbon dioxide emissions (water,) (ton CO2e/year) 3,800 Methane emissions (water), (ton CO2e/year) 1,600 Carbon dioxide emissions (reject), (ton CO2e/year) 900 Methane leakage (digestion), (ton CO2e/year) 2 300 Methane emissions storage, (ton CO2e/year) 1,300 Respiration of external carbon source process, (ton CO2e/year) 1,900. A total of 11,800 tons of CO2e/year.

Emissions of carbon dioxide, nitrogen oxides, particles, hydrocarbons, and carbon monoxide from heavy transport will increase in relation to increased number of transports.

With the outgoing water, an average of 481 tons of nitrogen (N) and 12 tons of phosphorus (P) were released into the water system each year during the years 2015 to 2019.

Table 2: Content of plant nutrients nitrogen (N), Phosphorus (P), potassium (K), and sulphur (S) in human excreta [ii] and food waste.

Malmö

340 000 pers./year	**N ton**	**P ton**	**K ton**	**S ton**	**H_2O ton**
Urine	1 360	126	309	65	116 620
Faeces	187	61	126	41	20 400
Total HE	**1 547**	**187**	**435**	**105**	**137 020**
FW	337	27	102	24	23 086
HE + FW	**1 884**	**214**	**537**	**129**	**160 106**

There is no information on how much nitrogen and phosphorus was in sewage sludge.
Between 800 and 1,000 tonnes of nitrogen (N) per year were sent into the air.
Nitrogen from the air is produced using the costly and energy-intensive method of synthetic nitrogen fertilizers.
Is it sustainable?

[i] Essential elements for all living things-RS
[ii] Analyzes of human urine and faeces Analyser av urin och avföring