



Disruptive Innovations in Green Energy

Main Characteristics of Sewage Sludge Treatment Plant:

The company Enervoxa is based in Bolton, Ontario, Canada.

The Company owns more than fifty unique patents and worldwide technology licenses in the green energy and biomass field.

We aim not only on improving the local environment but also take part in a global effort to create a sustainable world. Enervoxa Inc.'s vision is to establish itself as a leader in the renewable energy field by taking its technology to fertilization stage in the way of building operating plants.

We will offer small and medium size operations that are cheap, fast to install, self-sustained, operating efficiently, working in the highest standards and additionally running a global management platform to serve our franchises and help them operate smoothly Enervoxa Inc.'s mission.



Enervoxa Inc. can supply and install sewage sludge treatment plants in capacity from 50 m³ to 500 m³ /day.

Installation of automated, compact and easy to use, do not require permanent attendance.

The implementation of technology projects, Enervoxa Inc. has the following advantages:

High cleaning effect
no sludge beds (the minimum amount of silt)
complete biological self-regulation
high resistance to biocenose peak loads and vibrations
reduction in the area of building
reducing the cost of cleaning due to the ergonomic treatment facilities
a significant reduction in maintenance time and the need to attract skilled workers
possibility of reuse of purified water
the opportunity to expand
absence of odor and noise
improving the efficiency of wastewater from nutrients,
reduction in weight of the resulting sludge
reduce the cost of construction and maintenance,
reuse of treated water.

The technological scheme of sewage treatment unit includes mechanical cleaning, balancing reservoir unit of biological treatment with nitrification-denitrification, post-treatment units, reagent phosphorus removal and disinfection of wastewater and sludge dewatering. Used engineering solutions allow achieving high standards for the quality of treated wastewater and without sludge beds.

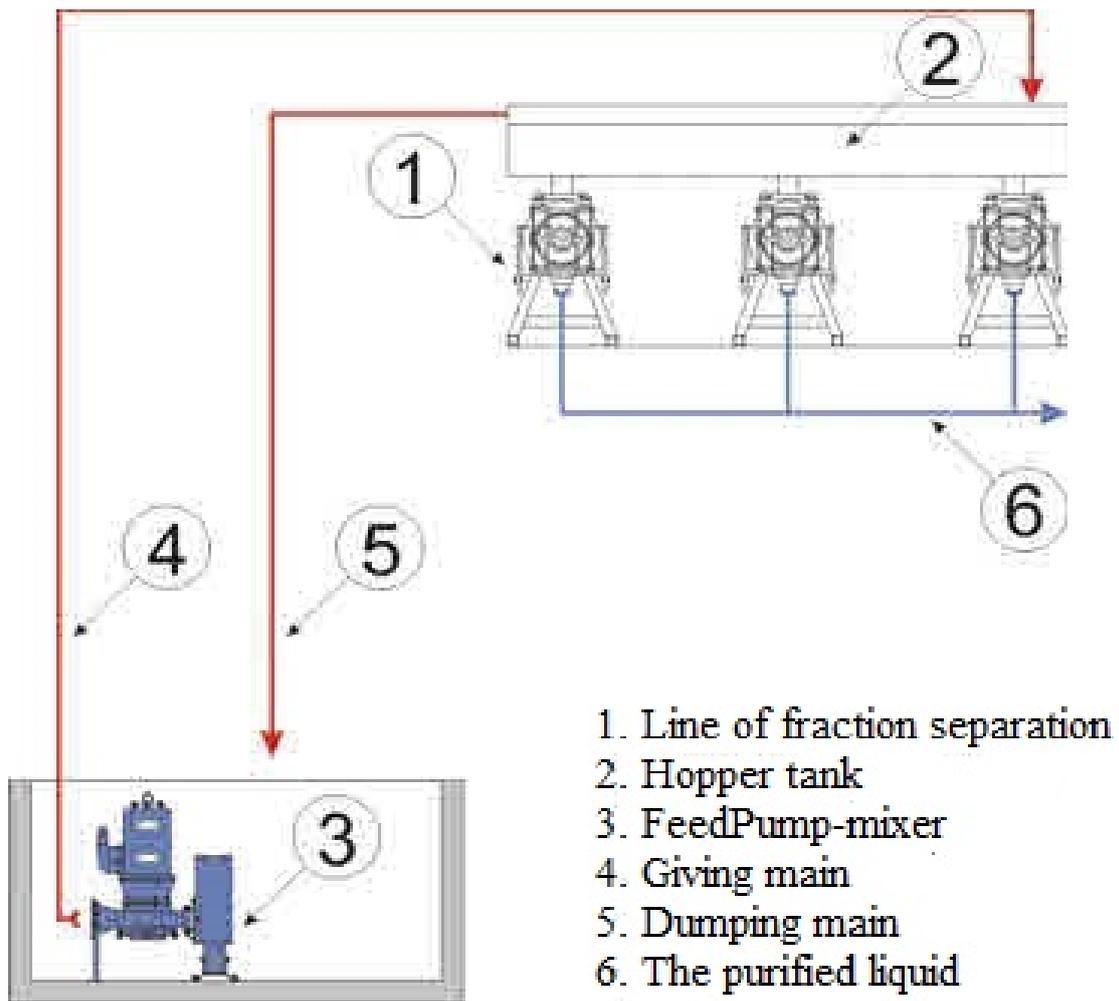
The derivatives are:

Solid fraction (filter cake) - humidity 45 - 65% (further – pellets compressing);

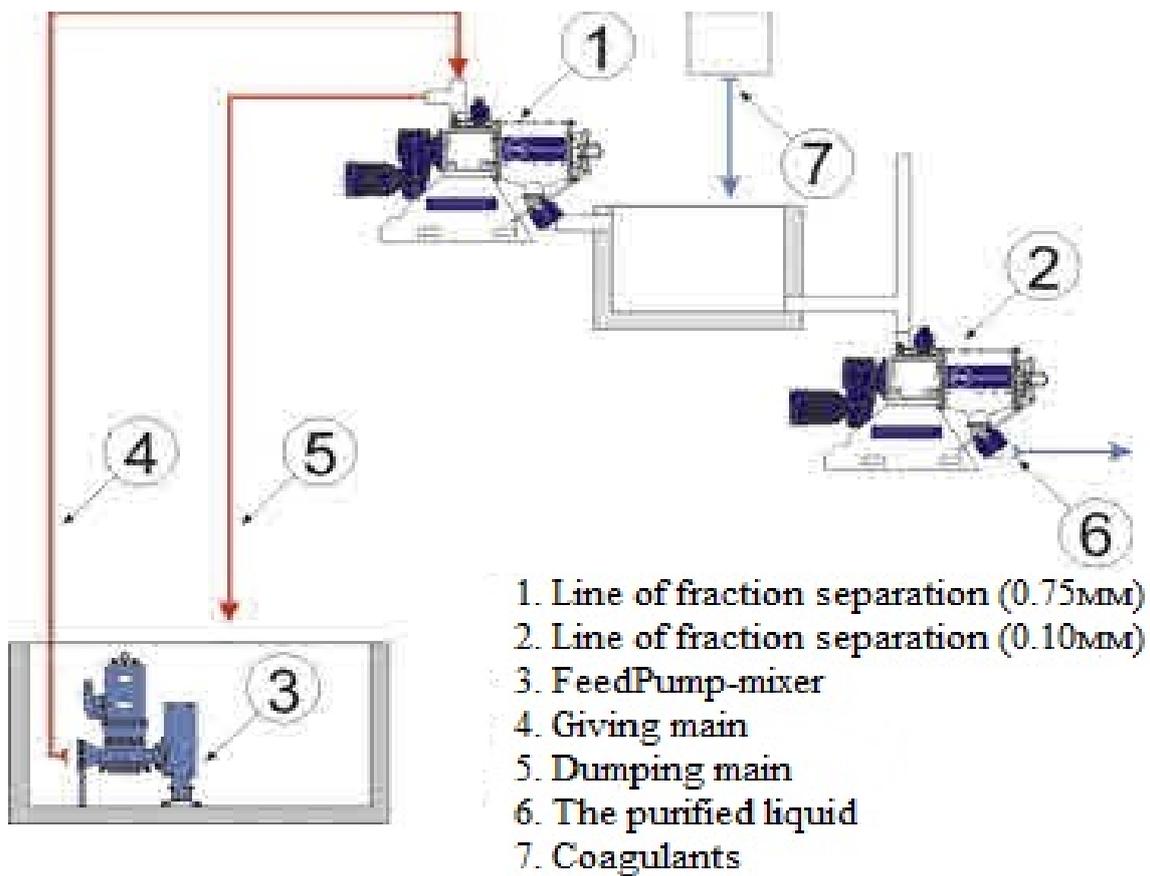
Liquid fraction (fugate) – solids less than 1% (further filtering – sewage water within acceptable

limits of MPC (Maximum Permissible Concentrations)

Humidity of solid fraction, productivity of the dehydration line and energy consumption depend on primary substances (granulo-metric composition, density, temperature). To achieve the demanded characteristics on dehydration line there is used step separation by special mesh sizes which are configured in the process of working in a certain mode. Based on initial data and requirements for the derivatives the parallel (**Picture. 1**) or serial (**Picture. 2**) technological mode of line operation is used.



Picture 1. Parallel mode of line operation.

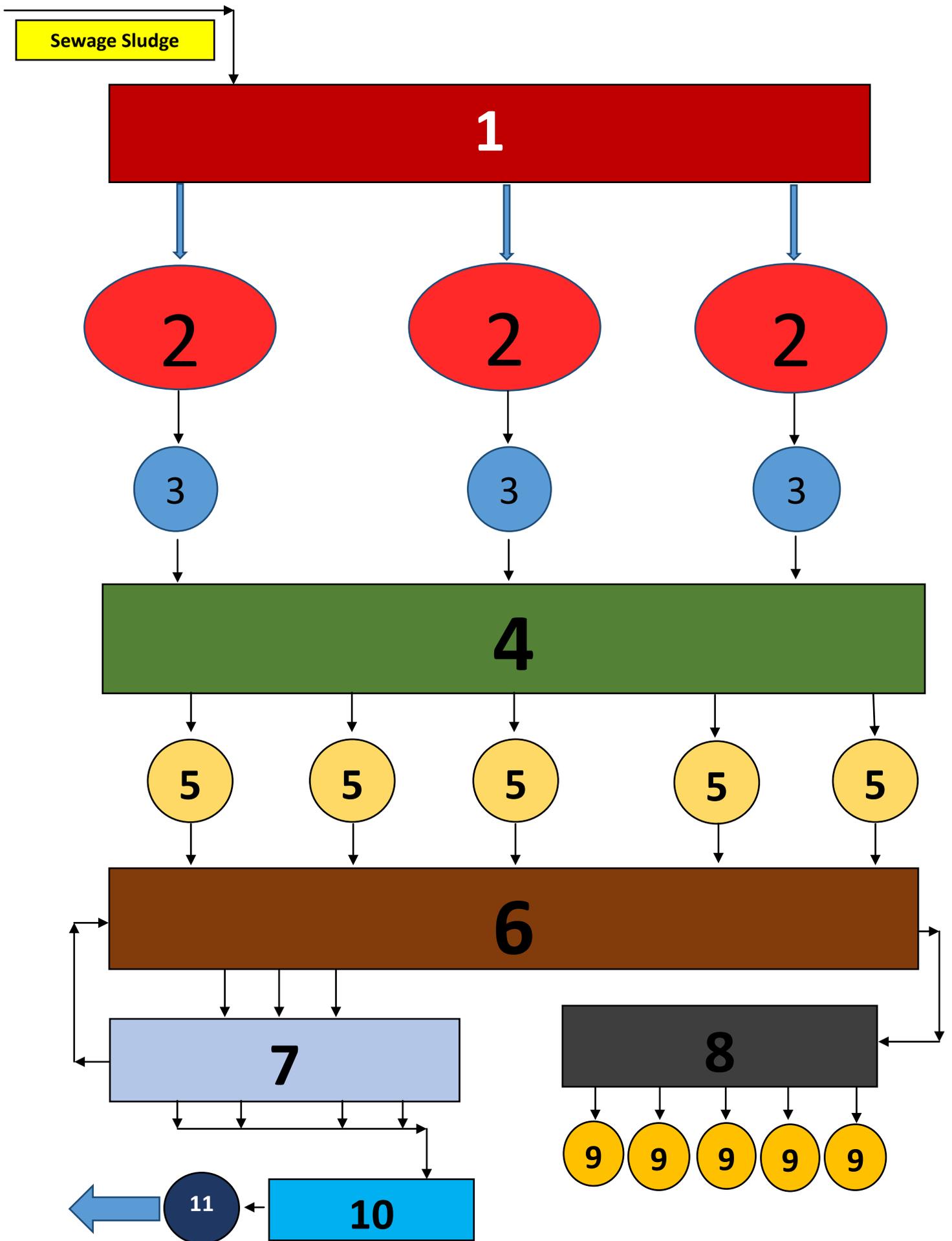


Picture 2. Serial mode of line operation.

Principle of operation :

The process flow diagram and technology of production plant operation of sludge sewage Treatment is introduced on Picture 3.

1. Line of sewage pre-treatment.
2. Intermediate tanks.
3. Pump-mixer
4. Homogenization line Storage tanks
5. Line of fraction separation
6. System of fine purification of liquid fractions
7. Storage hopper of the solid
8. Automatic presses
9. Collector of purified water
10. Water discharge pump



Picture 3. The process flow diagram

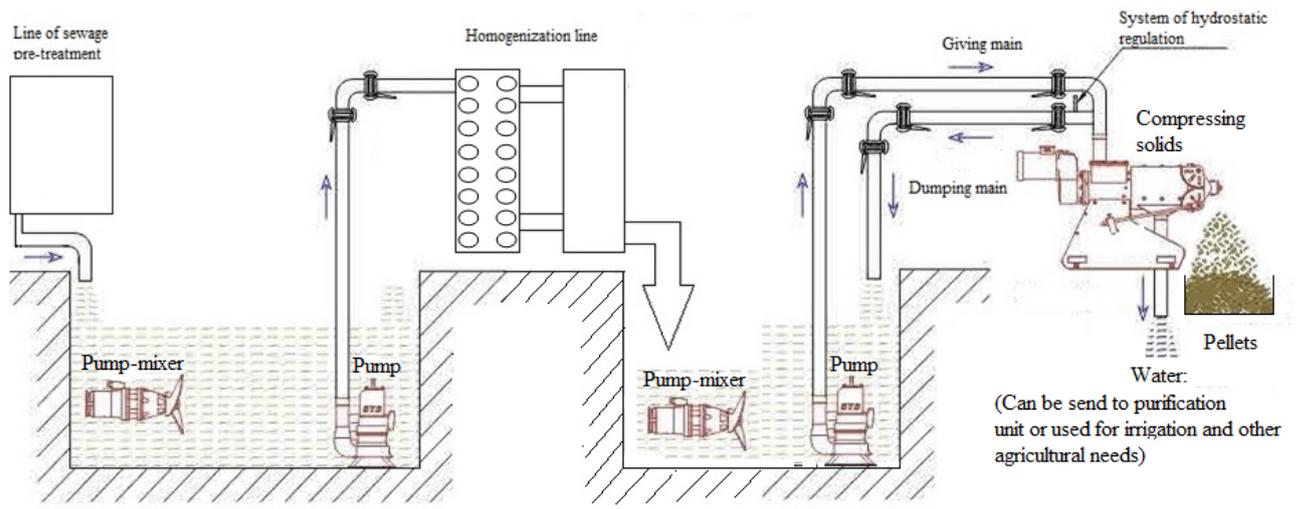
Sludge sewage come to the line of pre-treatment **1** for purification from foreign objects and metal. Further they are fed into the intermediate tanks **2**. Further chopper pumps **3** feed into homogenization line **4** (developer's patent). While Treatment the sewage the homogenization line performs their decontamination. Further the prepared sewage is fed into the storage tanks **5**. From the storage tanks **5** the sewage is fed into the inlet sections of the fraction separation line **6** into liquid and solid phases. On each section there is installed the harmonic oscillator which generates live pressure in liquid (developer's patent). This promotes higher leak-off capacity, prevents deposits on the inner surfaces what significantly improves the performance of the whole plant. In sieves the fibrous solids separate from the liquid and form the initial filtering layer which entraps finer particles in the liquid. The equipment blades push this layer to the outlet. The surface is refined and the following new and new filtering layers are formed iteratively. Structurally sieves are arranged so to eliminate blockages.

The pressure in the first part of the sieves is low, which increases proportionally with increasing concentration of solids in the effluent. Between the blades and the valve of the double urging device there is created the working plug of solids. The pressure of the device blades, constantly adding solids from one side and the urging device from the other side, allows to retrieve from the solid fraction the whole free and parts of the bound liquid.

To ensure the technological process before filtration coagulants can be applied. Further the derived liquid is filtered by the system of fine purification **7** for separation of fugate. Thus we get the waste water which corresponds to requirements of MPC (Maximum Permissible Concentrations). Water is pumped by pumps **11** into the drainage system or a storage drained tank **10**. (Water can be send to purification unit or used for irrigation and other agricultural needs)

Solid fraction is pressed into the storage hopper **8** and then onto automatic presses **9** for pressing pellets then what decreases expenses for warehousing and transportation.

Simplified scheme of the equipment of the sludge sewage treatment plant is illustrated on **Picture 4**.



Picture 4. Scheme of the sludge sewage treatment plant



Picture. 5. Press machine for the pellets production.

Press machine for the pellets production on **Pictures 5.**

The process of forming the pellets at the pressure of about 300 atmospheres, without any additives and adhesives. The size of the pellets at the average is from 10 to 30 mm in length and from 6 to 10 mm in diameter. Combustive pellets are environmentally friendly type of fuel. When burning pellets as much carbon dioxide emits into atmosphere as formed during the natural decomposition of sewage sludge. The end product is dry, anti-mold pellets and can be

stored and transported easily. The average calorific values is about 2500 – 3200 kcal/kg and the burning point is around 250 – 270 °C.

Pellets are used for bio clean bedding for animals in agriculture. It is also used for burning in the power plants to produce energy.



Pictures 6. Pressed pellets



Pictures 7. Packed pellets



Pictures 8. Combustion of pellets