The sewage sludge in the Lithuanian town Tauragė is used not only for producing energy, but as a crop fertilizer

Success story

Taurage district municipality
2021-09-09

The European Green Deal is a strategy for sustainable growth, which has gained new purpose after the pandemic. After learning to live with masks and physical distancing people had to start their businesses and production in a more sustainable way. Europe must reach the goal to cut carbon emissions to 0 by 2050, minimize pollution, to decouple economic growth from the resource use and create new competitive, yet sustainable European market. Circular Economy Action Plan foster reducing and reusing various products. Sustainable product is created only by producing as little waste as possible. While Europe's Waste Framework Directive sets the waste treatment hierarchy and waste preparation for re-use is the second best solution after the prevention. It's stated that Member states should establish re-use and repair networks for waste.

In European Green Deal, some of the biggest changes are planned in construction and renovation, clean energy, mobility, biodiversity and farming areas. The new farming strategy is called „From farm to fork". It encourages farmers to grow products without chemical fertilizers in order crops and vegetables to be more resistant to climate change.

From ancient times, farmers knew that animal manure goes back into the soil – this helps to grow new yields. They applied this method. Yet the desire to grow more and more has led them to utilize chemical fertilizers. Unluckily, chemicals eradicated not only the threats to the yield – fungi, insects eating the plant leaves), but also all the biological diversity around. For this reason the strategy „From farm to Fork" obliges farmers to use less pesticides or antimicrobials, enlarge areas dedicated to organic farmlands and help typical farmland insects and birds to return, i.e. restore the biodiversity. However, with such new goals, there the need of natural, harmless fertilizers.

According to recent EU's Green Deal Plan, production plants all over the Europe are urged to recycle products and materials and adopt new technologies that would allow reusing at least some parts of the former products or production waste. If this is impossible – at least to use waste to get energy (through waste incineration). With the technologies that are available today, fertilizer can be produced not only from calf manure, but also from sewage sludge. The amounts of these waste types are enormous and difficult to reduce.

Lithuanian regional water treatment company „Tauragės vandenys" is already using technologies to produce fertilizer from sewage. A limited liability company provides clean drinking water to the region, collects sewage and cleans it.

After implementing new technologies in the sewage plant, the sludge is treated without using any chemical substances. It is turned to dry material and energy (biogas).

In the sewage treatment plant fecal based wastewater is filtrated, deodorized, and sanitized. But how does this process look like? Firstly, the collected sewage sludge is thickened, in order to reduce the amount of water in this material four-fold.

Then this mass goes to the mixing and filtrating reservoir, where additional particles, such as hair, ear buds, paper or small glass parts are taken out. The special sludge bars filter those particles, but in order to ensure none of them are left, sludge is additionally shredded.

After filtering and shredding sludge is treated in an anaerobic digester, it is put into special tanks and in the warm (+36 ° Celsius), dark environment with no oxygen, bacteria eats the organic material in the sludge. This process takes 20 days. Biogas is produced during this process, while organic material is consumed. The biogas produced in this process is the energy source that is used primarily for „Tauragės vandenys" own needs – to run sludge decaying tanks and sludge driers, and to produce electricity for sludge treatments plants. Bacteria produces around 1500 m3 of biogas a day. It's not only the source of clean energy, produced without creating pollution – sludge treatment in closed tanks prevents methane gas from being emitted into the atmosphere.

But there are further steps in the whole sludge treatment process. Sludge is dried with a huge screw press (similar to juicing a fruit in the juicer) and has 5 times less water after this process. Then the sludge is turned into small granules and poured into big bags. This material by this time has already produced some energy (biogas). Now there are two ways to use the rest of it – some of the material is given to producers such as „Akmenės cementas“, who use sludge granules for incineration which produces energy and then use the remaining ashes in the production of cement. Another way to use the material is to provide those granules to farmers as a fertilizer.

At the moment the company provides services for two towns – Tauragė and Skaudvilė – and for 31 villages in the region. 95 % of the water provided is in exclusively good quality, because it comes from deep underground wells. „Tauragės vandenys“ is responsible for more than 320 kilometers of a water supply and sewage pipes network. It provides services for more than 30 thousand citizens. This results in company needing to clean about 5000 – 8000 cubic meters of sewage every day. In „Tauragės vandenys“ sewage plants, around 800 tonnes of sewage sludge accumulates every year and more than 4 tonnes every day. If it is not used as an energy source or fertilizer, such sludge should be taken to local landfills. Luckily the company has found a way to receive a benefit from the sludge and recycle it.

If sewage sludge was left in open reservoirs – it would emit methane, which accelerates global temperature rising 20 times more than CO2.

Sludge pellets are rich in nutrients and plants absorbs them slowly. Also this fertilizer holds moisture in the soil and is not washed out with the precipitation water, as with chemical fertilizers.

Sewage waste is the type of waste we barely can reduce. Huge amounts of it flows to sewage treatment plants every day. But we can use innovative biotechnology and turn sewage into energy or fertilizer for future crops and vegetables in line with the European Union‘s „Farm to fork“ strategy.

Recycling of sewage sludge can look like a quite simple process from outside, but it is a technology created by long trials and research. . From the viewpoint of technology readiness level this system had reached the last level (9) as it continues to successfully operate, recycling sludge waste into energy and natural fertilizer.

In regards to the ISWM framework, as “Tauragės vandenys“ is the stakeholder, a public authority, which has made an investment to reach EU Green Deal and Circular Economy goals, the other stakeholder is service users (including not only general public using the service, but also the farmers), who benefit from this improvement.

The technology that turns wastewater into a fertilizer embodies the ISWM elements of waste collection, transfer and transport, treatment and disposal, also reuse and recycling.

This system is mainly focused on the environmental aspect of, to reduce the amounts of sludge produced and the methane emissions into the environment, so as the use of chemical fertilizers.

<u>Lessons learned:</u>

1. Wastewater sludge turned into a natural fertilizer is a step towards circular economy and also more sustainable farming practices.

2. Manure, fecal waste has always been a natural fertilizer. When the technology allows to clean the wastewater efficiently, the usage of wastewater as a fertilizer destroys the myths that it is something unhygienic, polluted and that it can‘t be used further.

3. General public becomes more aware of “how this works” – they are interested in wastewater reusage, cleaning and sanitizing processes, they want to know how the wastewater they have produced is treated further.