



DIGESTATE TREATMENT APPLICATION

ESMIL and Partners have gained vast experience in the field of digestate treatment. From bench scale studies, right the way through to full scale size plant, we strive to offer the **Best Available Technology (BAT)** by using state-of-the-art separation and concentration processes.

ESMIL Solution

We design and offer a range of processes depending on the digestate and the Clients expectations for treatment.

Esmil has developed two main innovative and robust process lines. These are based on **membrane technology** and **advanced sludge flocculation**. Both of these processes are improved with additional treatment stages **to achieve the requirements for solid and liquid products**. Also, the main processes can be individually adjusted combining several treatment methods, for example some of the first process and some of the second process outlined above. Such **unique hybrid processes** will benefit from both **low capital and low operating costs**.

When designing any treatment process, we utilise only best available solutions for every stage and applying cutting edge technologies for the challenging cases. All processes are tested **in our laboratory or on Client site**. Esmil possesses **several portable equipment units**, which can be used for pilot projects to prove that the process works and is efficient.

Process Description

The digestate treatment process consists of a few stages; each stage envisages aims:

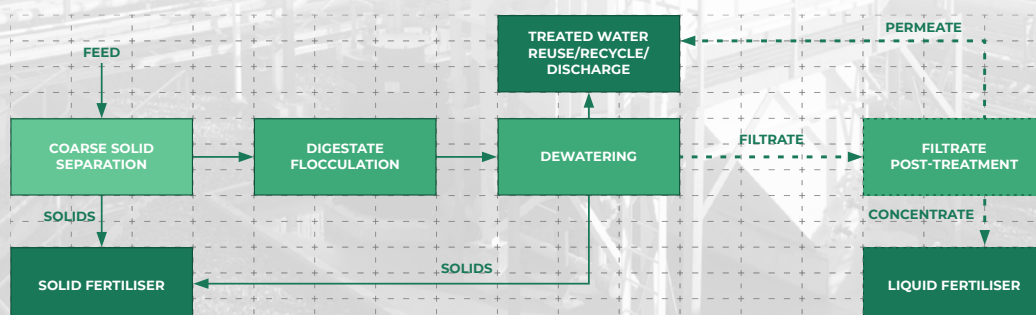
- To separate solids from liquid,
- To remove contaminants,
- To concentrate the valuable product.



Some treatment methods may focus on only one of the above aims where others may overlap **to achieve the requirements needed by our Client with the lowest costs**.

Case A - Advanced Flocculation Based Process (AFP)

The main stage of the process is **advanced digestate conditioning and dewatering**. First, the digestate is treated in a way to get it to coagulate, making it possible for water to separate from the solids. Then a highly efficient dewatering process utilising a superb **multi-disc dewatering press (MDQ)** is applied. Typically, the separated solid part contains around 30% of dry matter (DM), making it a **ready-to-store and transport highly nutritious product**. The liquid part is then treated, utilising a method depending on the need, to concentrate the dissolved **nutrients** with **reverse osmosis (RO)** or simply **removing contaminants** which are left when using **conventional treatment methods among others**.

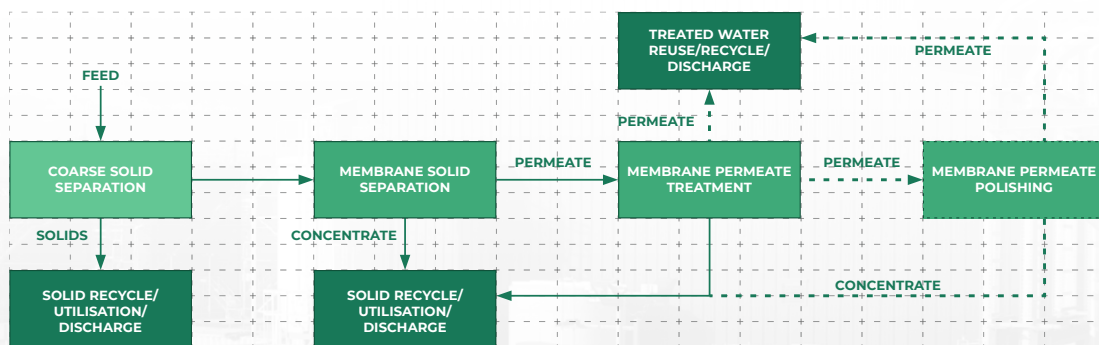


CUTTING EDGE SOLUTIONS FOR CHALLENGING INDUSTRIAL EFFLUENTS

Case B - Advanced Membrane Based Process (AMP)

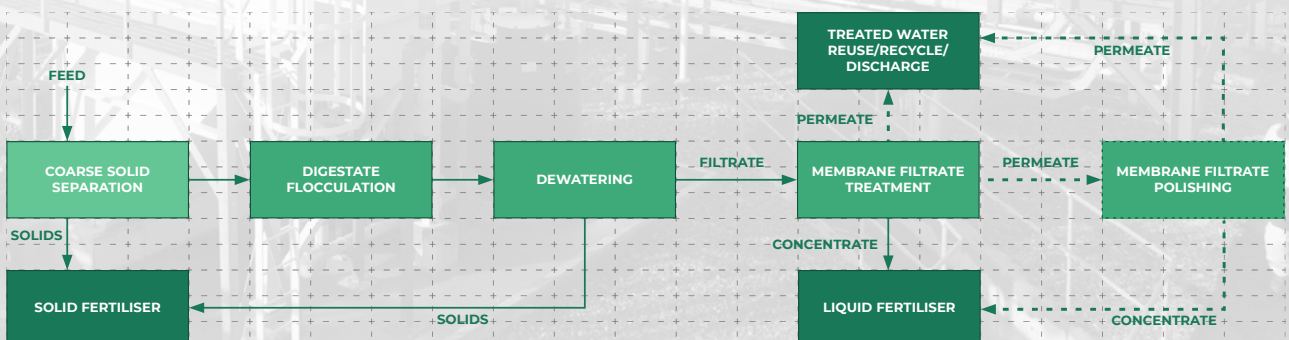
In cases when the digestate cannot be conditioned, a special type of membrane can be applied. After a simple **mechanical solid separation** goes through a **membrane separation stage**. Depending on the digestate and a final goal, a **special technological membrane technology** can be initiated. For example by using a cutting-edge **special vibratory membrane technology (VSEP)** utilising RO or any other type of membranes, as well as a **special modification of ultrafiltration (UF)** process.

Choosing among different types of membranes gives a certain level of flexibility allowing us to design a specific process depending on what kind of contaminants and **nutrients** should be in the **concentrate** and **permeate** or even **producing a high-purity water** to reuse.



Case C - Optimal Hybrid Process (OHP)

Described above treatment concepts have proved to be both robust and efficient. But wise **combination of the methods** and processes at each stage can provide even more options to the Client in regards of products that can be obtained, **effluents reuse** routes or requirements for their **discharge**, etc. A well-adjusted process can lead to a **significant reduction in capital and operating costs overall**.





Products Use and Possibilities

In our world of **sustainable development** and reaching **Zero Waste** and **Zero Liquid Discharge** concepts, both solid and liquid products obtained with the Esmil process can be used as:

- **Nutrient-rich** ready to store/pack/transport **solid fertiliser**.
- **Nutrient-rich liquid concentrate** for soil conditioning.
- **Boiler feed** at the plant.
- Anaerobic digester **feed dilution**.
- **Cleaning/washing** operations at the plant.
- **Discharge** to a **sewer system** at lower cost.
- **Discharge** into **surface waters**.

Esmil Design Philosophy and Capabilities

As no two digestates are equal, it is important to be ensure that the selected treatment process performs **efficiently** and **economically** to achieve the Clients' goals. The Esmil Team is with the Customer throughout the whole journey:

- starting from the **laboratory studies** and **trials**,
- the **pilot trials at site**,
- the **long-term studies** in case of high feed variation,
- providing **extensive plant design** and **calculations**,
- **production** and **commission the plant**.

Moreover, we never leave the Customer on their own and provide a **comprehensive service** support, including **maintenance** and **system upgrades**.

References

Grain Ethanol Plant, AMP type treatment plant; Kurana UAB, Lithuania, 2013
Municipal WWTP, AFP type treatment plant; Quasar Energy Group LLC, USA, 2018
Agriculture Waste Biogas Plant, AFP type treatment plant; Renergy Inc., USA, 2018
Municipal WWTP, AFP type treatment plant; KB BioEnergy Inc., USA, 2018
Whiskey Distillery, AMP type treatment plant; Scotland, UK, 2021

Unit 5, the Courtyard, Glory Park, High Wycombe, UK,
HP10 0DG

+44 (0) 1494 526 155 www.esmil.co.uk info@esmil.co.uk