20 June 2025

#EU GREEN WEEK

EU Green Week Partner Event

Integrated Sewage Sludge Management and Energy Optimization: a Romanian Operator's Perspective

AQUATIM

WASTEWATER AS A RESOURCE:
REGIONAL WORKSHOP ON
SEWAGE SLUDGE MANAGEMENT
AND ENERGY EFFICIENCY

DANUBE REGION strategy Water Quality

ICPDR IKSD
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

AQUATIM SA – Regional Water & Wastewater Systems Operator in Romania

570,000 Inhabitants

310	42	2,600+	110,000+
boreholes	Water Treatment Plants	km water supply	household connections (96.3% metered)

1,600	53,000	247	28
Km sewerage	household connections	pumping stations	WWTPs

WWTP Timisoara - specifications:

- Capacity = 440,000 LE
- Average daily flow rate= 2,400 l/s;
- Maximum daily flow = 3,000 l/s;
- Annual sludge production = 38,000 m^3/year;
- BOD5 = 22,000 kg/day;
- Suspended solids = 28,000 kg/day;
- Nitrogen = 5,400 kg/day;
- Phosphates = 1,600 kg/day.

Key Elements of the Legislative Framework in Romania

European Union Directives (Transposed into Romanian Law)

- *Council Directive 86/278/EEC*
- *Urban Wastewater Treatment Directive (91/271/EEC)*

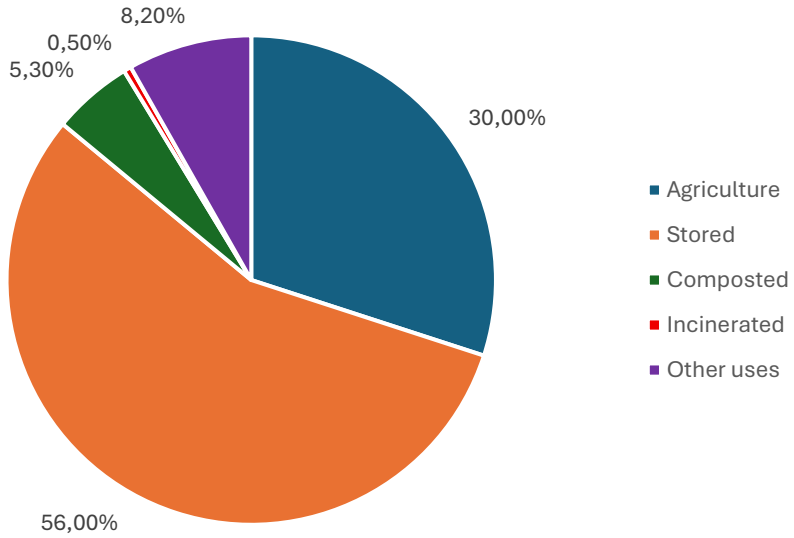
Romanian National Legislation

- *Law Government Decision (HG) No. 344/2004*
- *No. 211/2011 on Waste Regime (updated)*
- *Emergency Ordinance No. 195/2005 on Environmental Protection*
- *Normative Acts on Fertilizers and Soil Protection*

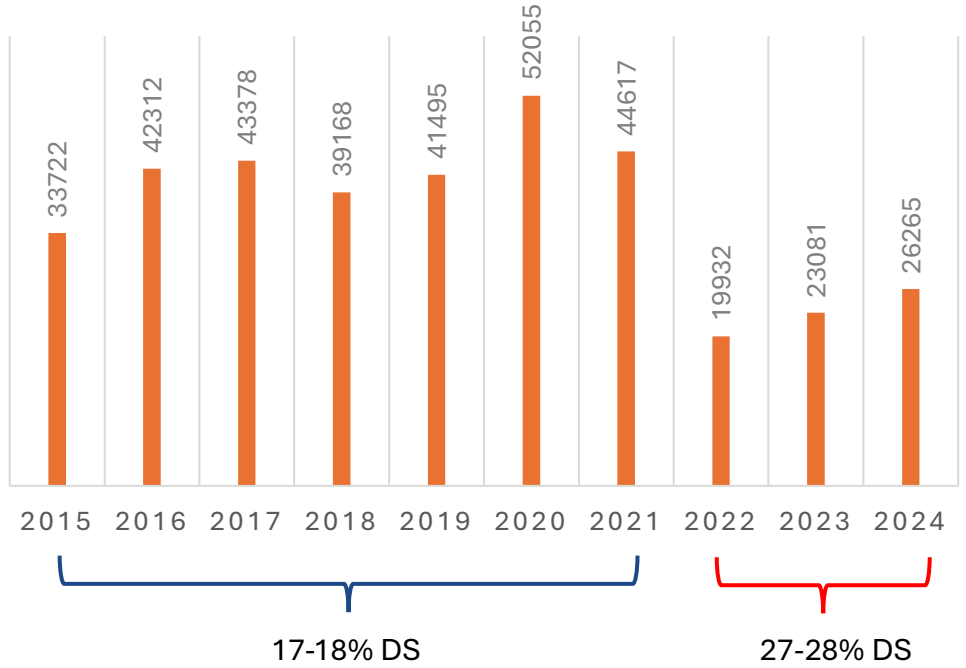
Total sludge from WWTPs produced in Romania:

230,600 t dry matter (2022)

Uses of sewage sludge in Romania:



Sewage Sludge Production WWTP Timisoara [t/y]



Reduced quantity due to change of technology

Sludge Management - WWTP Timișoara

Reuse in Agriculture

Romania promotes the use of sewage sludge as fertilizer in agriculture, under strict conditions:

- *Sludge must be treated and stabilized (e.g., by anaerobic digestion).*
- *Must comply with thresholds for heavy metals and pathogens.*
- *Monitoring of soil quality is mandatory before and after application.*
- *Farmers must record use and obtain sludge quality documentation.*

Sludge Storage

- *Time limited storage on authorized and controlled sites e.g. specially designed platforms*
- *Landfilled **if** DS ≥ 35%*

Sludge thickening and dewatering solutions

SLUDGE THICKENING AND DEWATERING SOLUTIONS

APPLIED SOLUTIONS

Mechanical Thickening & Dewatering:

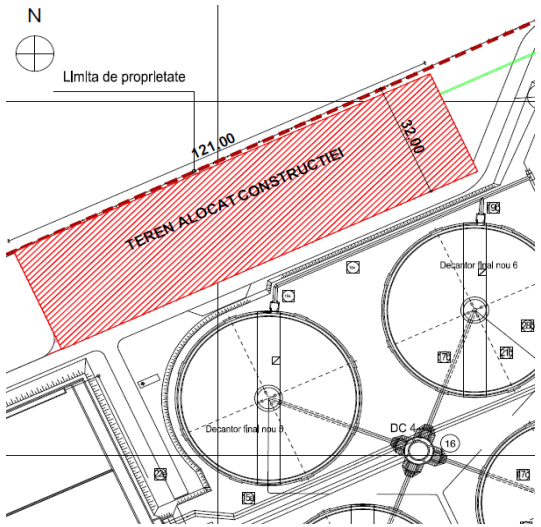
- ✓ *Thickening tables - replaced by centrifugal thickeners*
- ✓ *Belt filter presses - replaced by centrifuge presses*

Solar greenhouse drying:

- ✓ *10 greenhouses structured in 2 batteries (one of 4 and one of 6 greenhouses),*
- ✓ *total surface of 10.000 m^2*
- ✓ *low operating costs:*
  - *for the warm season (7-8 months/y) solar heating*
  - *for the cold season - heating system = heat pumps, which transfer the heat from the effluent of the WWTP, by means of a thermal agent (water with antifreeze), to the underfloor heating network of the greenhouses.*
  - *Heating capacity of the system = 4 MW*

Thermal Processing for Sustainable Sewage Sludge Management

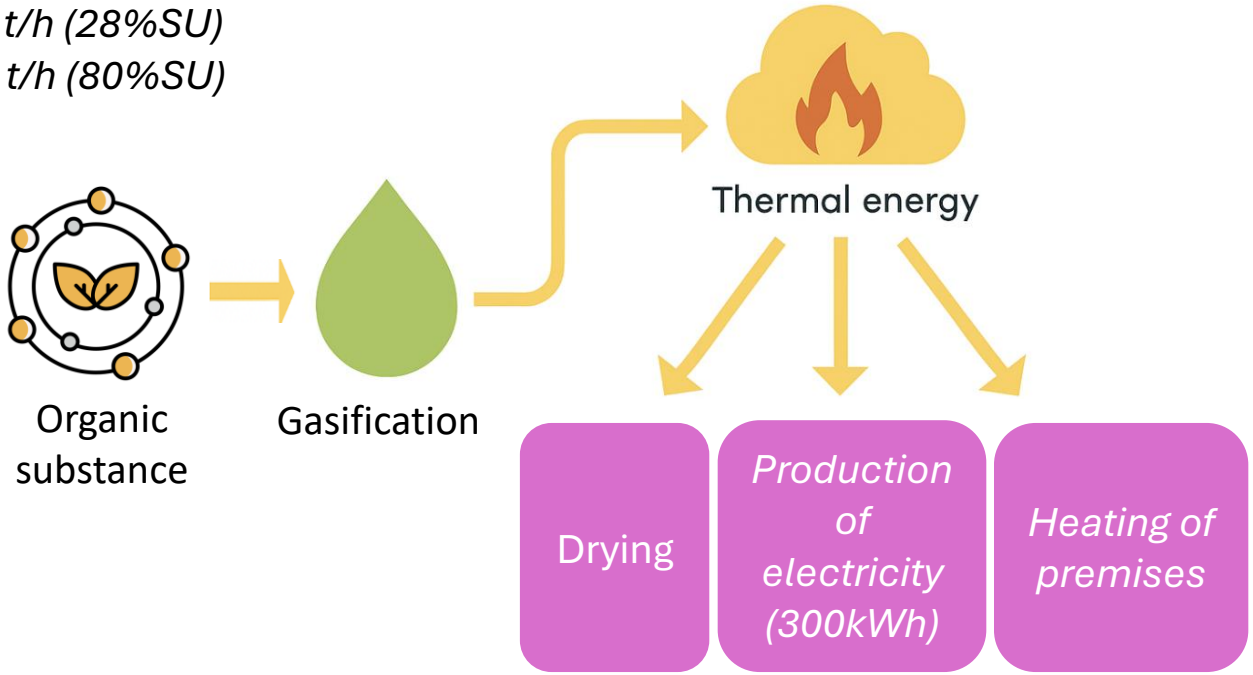
Sludge Drying and Energy Recovery Plant



Design data:

- *quantity of sludge produced in the operating area: 33,182 t (28%SU)/year*
- *average DS content: 28%*
- *plant operating time: 8.000 h/year*
- *drying unit designed for 4,148 t/h (28%SU)*
- *TWO plant designed for 1,451 t/h (80%SU)*

Adopted Technology:



Thermal Processing for Sustainable Sewage Sludge Management

The technological flow of the Sludge Drying and Energy Recovery plant can be divided into 3 zones:

The entire process is controlled via an automation system. Operator intervention is only required for process priming and maintenance operations.

THE SLUDGE DRYING AND ENERGY RECOVERY PLANT - ZONE I.

Reception, drying and pelletizing

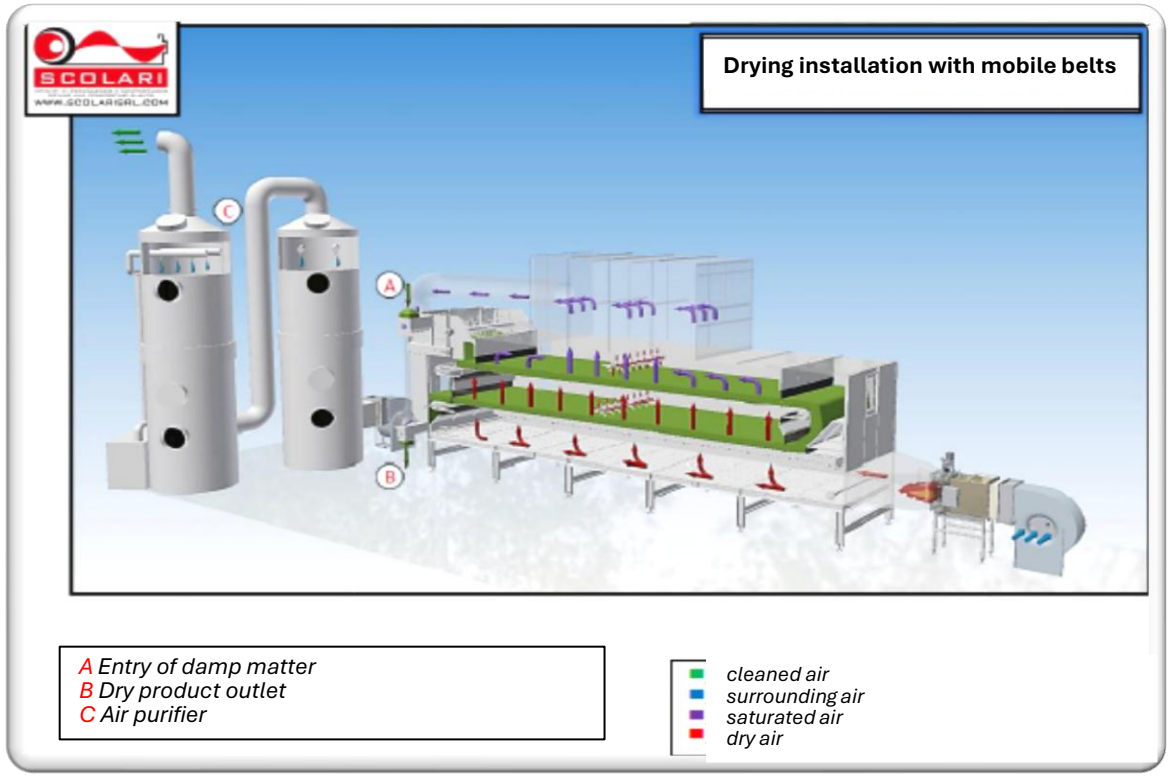
Sludge reception:

- *4 unloading tanks for sludge transportation means.*
- *storage tank - 300 m^3.*

Sludge drying:

- *mobile belt dryer having a capacity of 4,148 kg/h (28%SU).*

Pelletizing: *by extrusion.*



SLUDGE DRYER

THE SLUDGE DRYING AND ENERGY RECOVERY PLANT – ZONE II.

Heat treatment and energy recovery

Thermal Waste Oxidation (TWO):

- *a two-stage thermal treatment of sludge.*
- *in the primary cells the organic matter in the sludge is converted into fuel gas.*
- *in the secondary cells the produced gas is combusted.*

Organic Rankine Cycle:

- *the thermal energy recovered from the flue gases is transmitted to the ORC turbine for electricity generation (300 kWh);*
- *used in the drying process;*
- *used for heating the technological premises.*

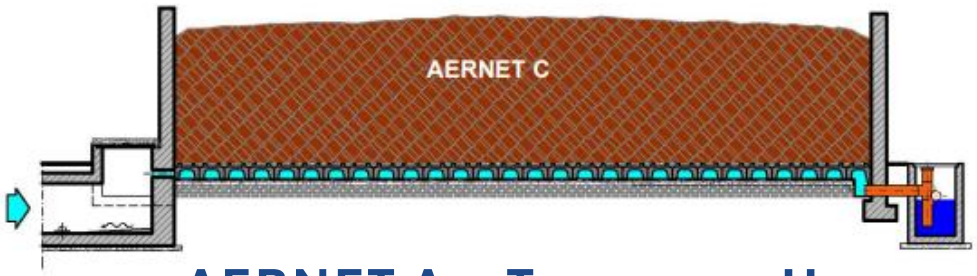
ORC TURBINE

THE SLUDGE DRYING AND ENERGY RECOVERY PLANT - ZONE III.

Treatment of air and water from the process

Air treatment:

- *Reception area odors are treated by an Aernet biofilter. The bacterial biomass is resting on a mineral backfill.*
- *Moist air from the dryer, after condensation, is treated in two reduction towers (basic and acid).*



AERNET AIR TREATMENT UNIT

Water treatment.

- *The amount of water extracted from the dryer is approx. 2,700 l/h.*
- *The treatment process comprises:*
  - Clariflocculation section;
  - Filtration and ultra-filtration section;
  - Membrane washing unit.

WET AIR TREATMENT UNIT

Thank You for your Attention!

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