







# Microscreening: A novel process for the removal of suspended solids from wastewater, upfront of the aeration tank

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# **Overloaded Wastewater Treatments Plants (WWTPS)**

# Energy distribution in conventional activated sludge systems

#### **Typical problems of overloaded WWTPs**





> 70% consumed for aeration and treatment of primary sludge (Siatou et al., 2020)



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## **Advanced Primary Filtration Systems (APFS): Microscreens**

- **APFs** are emerging technologies in wastewater treatment.
- The **goal** is to reduce the organic loading to the secondary treatment process.











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### Main advantages:

- Self-cleaning filtration devices in continuous operation using a fine mesh screen.
- Biosolids production over 35% solids.
- Space requirement is 1/20 compared to primary sedimentation.



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### Microscreen



- a. Microscreen with open housing
- b. Sludge removal (over 35% TS)
- c. Microscreen cloth (100-350 µm openings)







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## **Biosolids**



- Managed as solids
- Total solids: 40-45%
  - Volatile solids: 85-90%of TS
- C/N about: 20
- High Heating Value: 22-24MJ/kg





## Application of microscreens, upstream of various wastewater treatment process





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# **Footprint requirements**

Wastewater flow: 4,000m<sup>3</sup>/d: Microscreen footprint: 4 m<sup>2</sup> Clarifier footprint: 82 m<sup>2</sup>









# **Biosolids to energy**

- Title: New concept for energy self-sustainable wastewater treatment process and biosolids management
- Acronym: LIFE B2E4sustainable-WWTP
- Life duration: 01//09/2017-01/02/2024
- ➤ Total budget: 2.000.000€

> Partners:

Website: www.biosolids2energy.eu





#### Coordinator







# **General description**

#### **Project outline**

- Microsieving: removal of primary biosolids upfront of the aeration tank
- Drying: Moisture removal from biosolids
- Gasification: Syngas production
- Co-generation: Production of thermal and electric energy

#### **Project Facts:**

- Wastewater capacity: 5,000 m<sup>3</sup>/d
- Location: WWTP of Rethymno, Greece
- Biosolids management: ½ t/d
- Biosolids Higher Heating Value: 21.5 MJ/kg
- Syngas productionn: 1,800-2,400 Nm3/d
- Targer electrical energy production: 30-50 kW







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# **ANELIXI project in the frame of Interreg V-A Greece-Cyprus 2014-2020**

- **Title:** Upgrade of WWTPs for the management of increased demands and the reduction of the operational cost
- Acronyme: Anelixi
- **Project duration:** 01/08/2021-31/10/2023
- **Total Budget:** about 1,000,000 €
- Website: anelixi.tuc.gr
- Funders: 🔅 European Union
  - National Funds of Greece and Cyprus









# **ANELIXI project in the frame of Interreg V-A Greece-Cyprus 2014-2020**

# The main objectives of the ANELIXI project:

- Increase the capacity of existing WWTPs
- Low construction and operation cost compared to alternative technologies
- Reduction of energy cost of existing WWTPs by approximately 35%
- Production of biosolids with solids content over 35%







# **ANELIXI project in the frame of Interreg V-A Greece-Cyprus**

Problem
Insufficient performance of WWTPs due to overloading.
High energy consumption of activated sludge plants.

### □ Suggested solution

Application of filtration systems upstream of the aeration tank Locations: Kyperounta,Cyprus/ Paros,Greece. Capacities: 600/1,200 m<sup>3</sup>/d. Solids removal: 80-90%



#### **Expected results**

Managing increased input loads. Reduction of the total electricity consumption of WWTPs by 30-35%.





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## WWTP of Marpissa, Greece-Case study I

#### **Characteristics of the project ANELIXI**

- Maximum hydraulic capacity: 2,500 m<sup>3</sup>/d
- Targets:
  - □ Acceptance of increased input load,
  - □ Reduce energy and operating costs in general.







#### Marpissa's WWTP

- ✤ 5,000 EI
- Maximum flow rate: 865 m<sup>3</sup>/d

Operational Challenges: 70-105 kg/d of biosolids (wet base)





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# WWTP of Kyperounda, Cyprus – Case study II

#### **Characteristics of the project ANELIXI**

- Maximum hydraulic capacity: 600 m<sup>3</sup>/d
- Targets:
  - □ Acceptance of increased input load,
  - Reduce energy and operating costs in general



# Kyperounda's WWTP✤ 2,400 El

✤ Maximum flow rate: 300 m³/d



Operational Challenges: 127-197 kg/d of biosolids (wet base)







# Conclusions

- Biosolids removal, upfront of the aeration tank will significantly improve the performance of existing WWTP.
- Microsieving is a viable option for the expansion and upgrade of overloaded WWTPs, compared to the primary clarifiers
- The produced biosolids (sewage sludge) with solids content over 35% are ideal for the production of fertilizer or energy utilization.
- The wastewater treatment process should be redesigned in light of recent technological advances and the requirements of contemporary society.











# Thank you for your attention

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