20 June 2025

#EU GREEN WEEK

EU Green Week Partner Event

Managing of the sludge from non-EU country perspective Bosnia and Herzegovina

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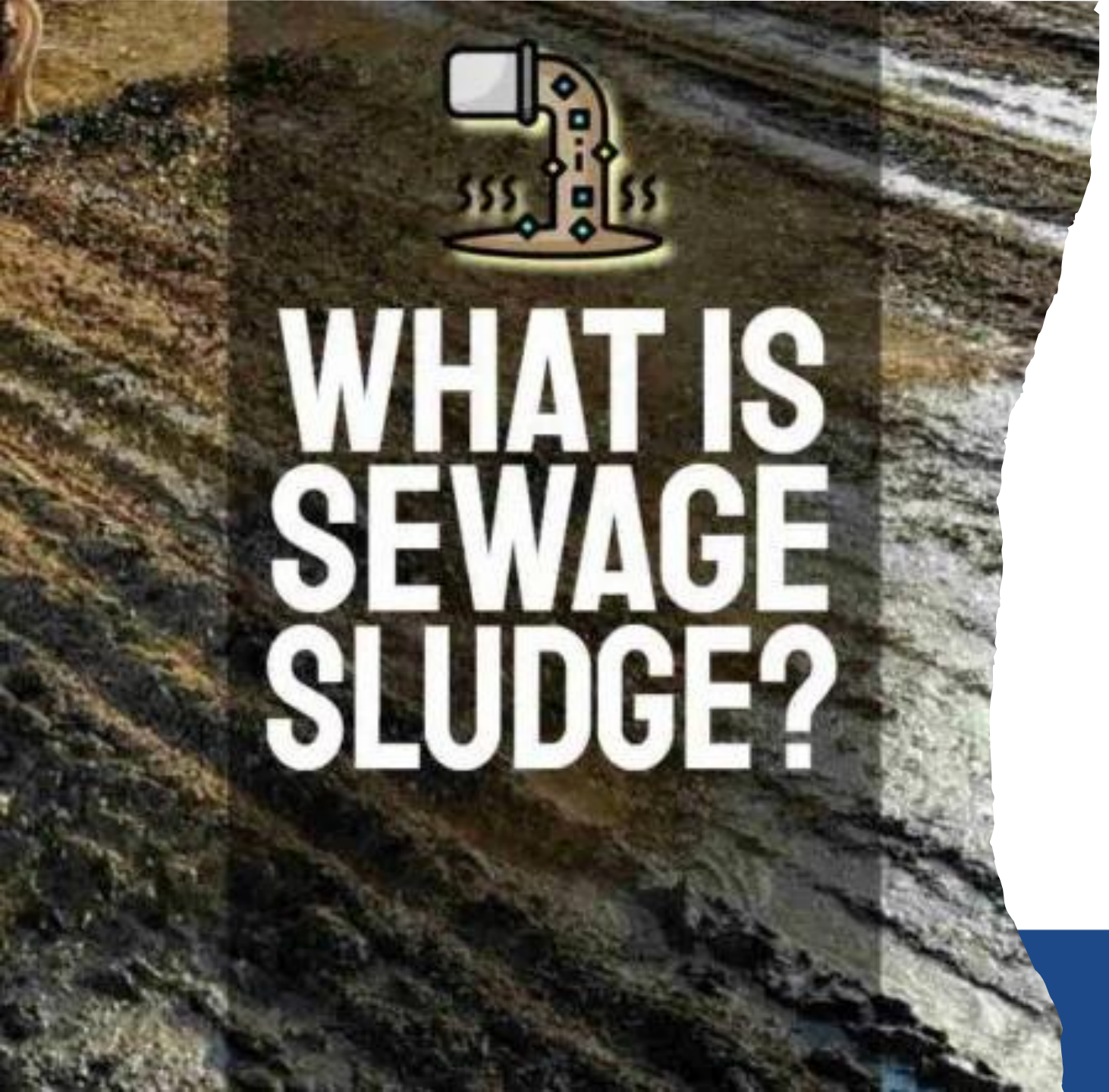
WASTEWATER AS A RESOURCE:
REGIONAL WORKSHOP ON
SEWAGE SLUDGE MANAGEMENT
AND ENERGY EFFICIENCY

DANUBE REGION strategy Water Quality

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



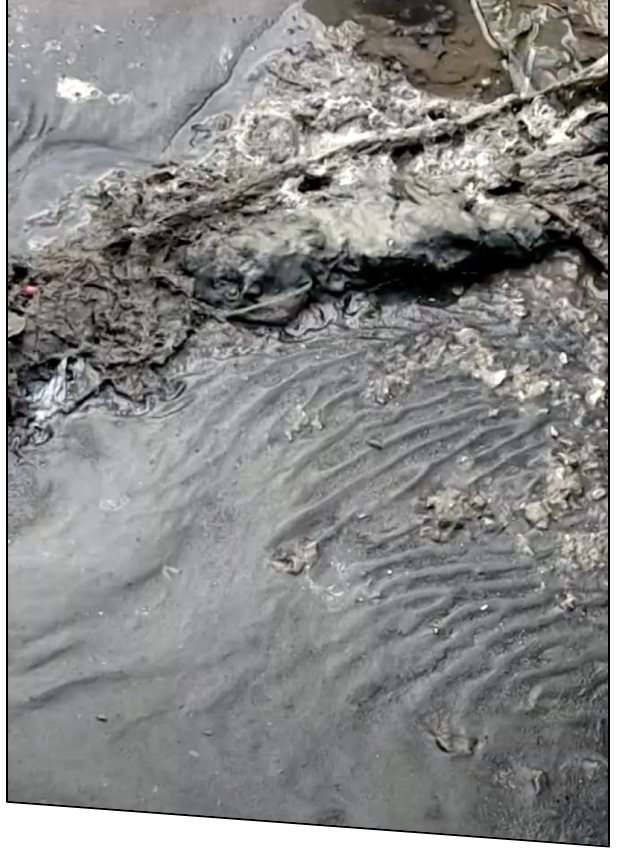
Definition and meaning

- In accordance with the Sewage Sludge Directive 86/278/EEC, Article 28, sludge is defined as:
- 1. Residual sludge from sewage treatment plants for the treatment of domestic or urban waste water and from other sewage treatment plants for the treatment of waste water of a composition similar to domestic or urban waste water;
- 2. Residual sludge from septic tanks and other similar waste water treatment installations;
- 3. Residual sludge from sewage treatment plants other than those referred to in (1) and (2).

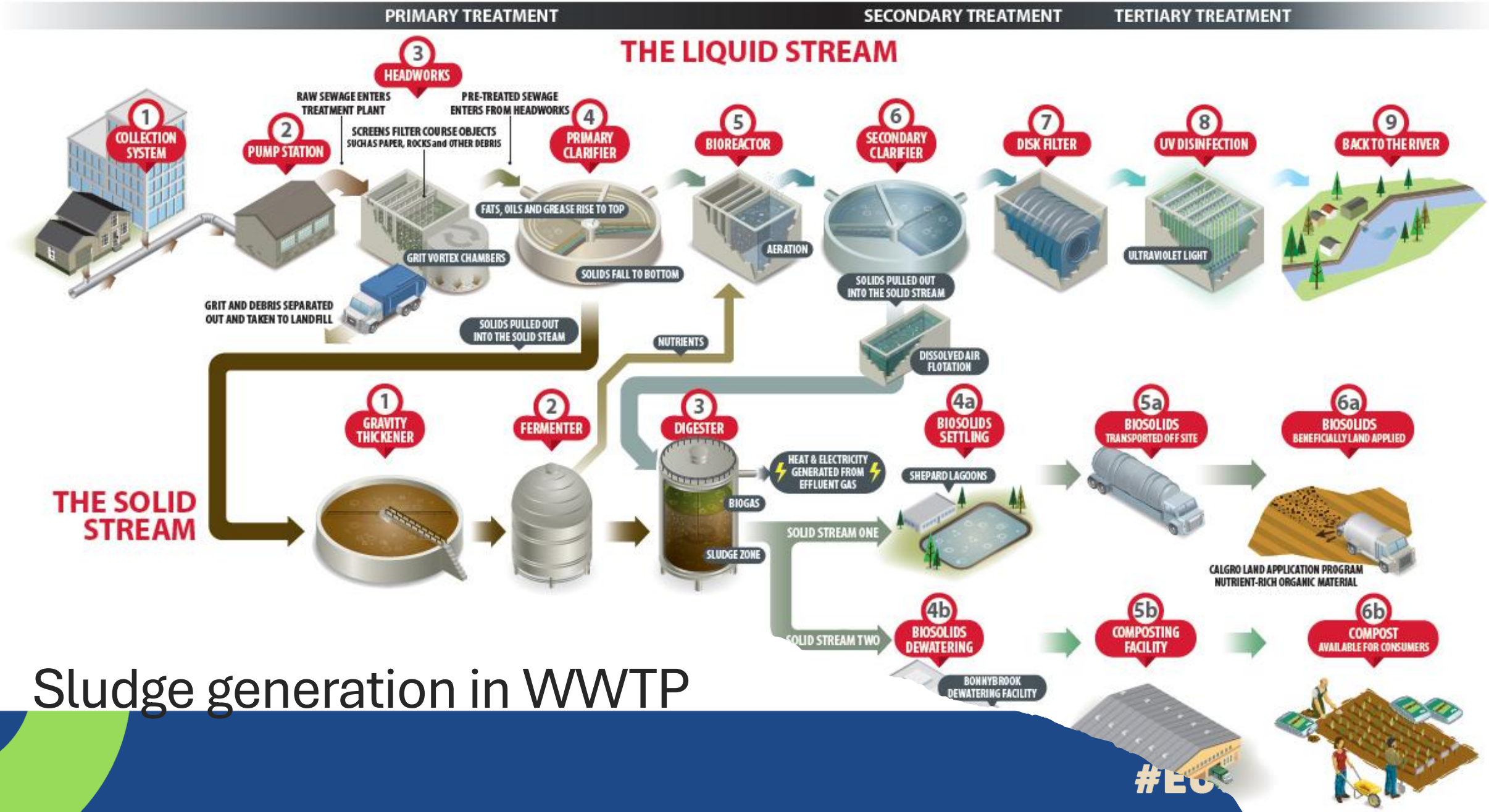
- In accordance with the Regulation on categories of waste with lists:
- 19 00 00 waste generating activities: Waste from waste management plants, urban waste water treatment plants and the preparation of water for drinking and industrial use;
- 19 08 05 sludges from municipal water treatment

- NO *






Population-Sewage-WWTP



Sludge generation in WWTP

ENVIRONMENTAL BENEFITS AND RISKS of sludge management/disposal

Benefits

- Sludge is a source of organic carbon (up to 40% of the total volume), nitrogen (9.8%) and phosphorus (2.7%).
- It improves the structural characteristics of the soil and increases the water retention capacity of the soil, as well as the ability of water to infiltrate into the soil.
- Potential to stabilize soil temperature fluctuations and increase soil microbial activity
- Potential in stabilizing soil temperature fluctuations and improving soil microbiological activity.
- Reduces energy consumption and greenhouse gas emissions (using carbon sequestration, no energy consumption for synthetic fertilizers).
- Potential for energy production from high-energy sludge.

Risks

- Presence of heavy metals, pathogenic microorganisms, organic pollutants.
- A significant risk is represented by recently discovered pollutants, microplastics, etc.
- Risk of eutrophication of surface streams.
- Development of resistance to antibiotics in bacteria.

Sludge directive 86/278/EEC

The main objective of the Directive is to promote the use of sludge on **agricultural land**, and to reintroduce organic matter and nutrients to the soil in order to improve soil quality with an emphasis on environmental and soil protection. The objectives are also:

- Setting limits for the concentration of seven heavy metals in sludge intended for use in agriculture and soil treated with sludge (cadmium, copper, nickel, lead, zinc, mercury, chromium)
- Prohibiting the use of sludge that leads to concentrations of these heavy metals in soil exceeding these limit values.

December 2021 – Q1 2023 **3**

Targeted stakeholder consultation activities to inform the evaluation of the Sludge Directive.

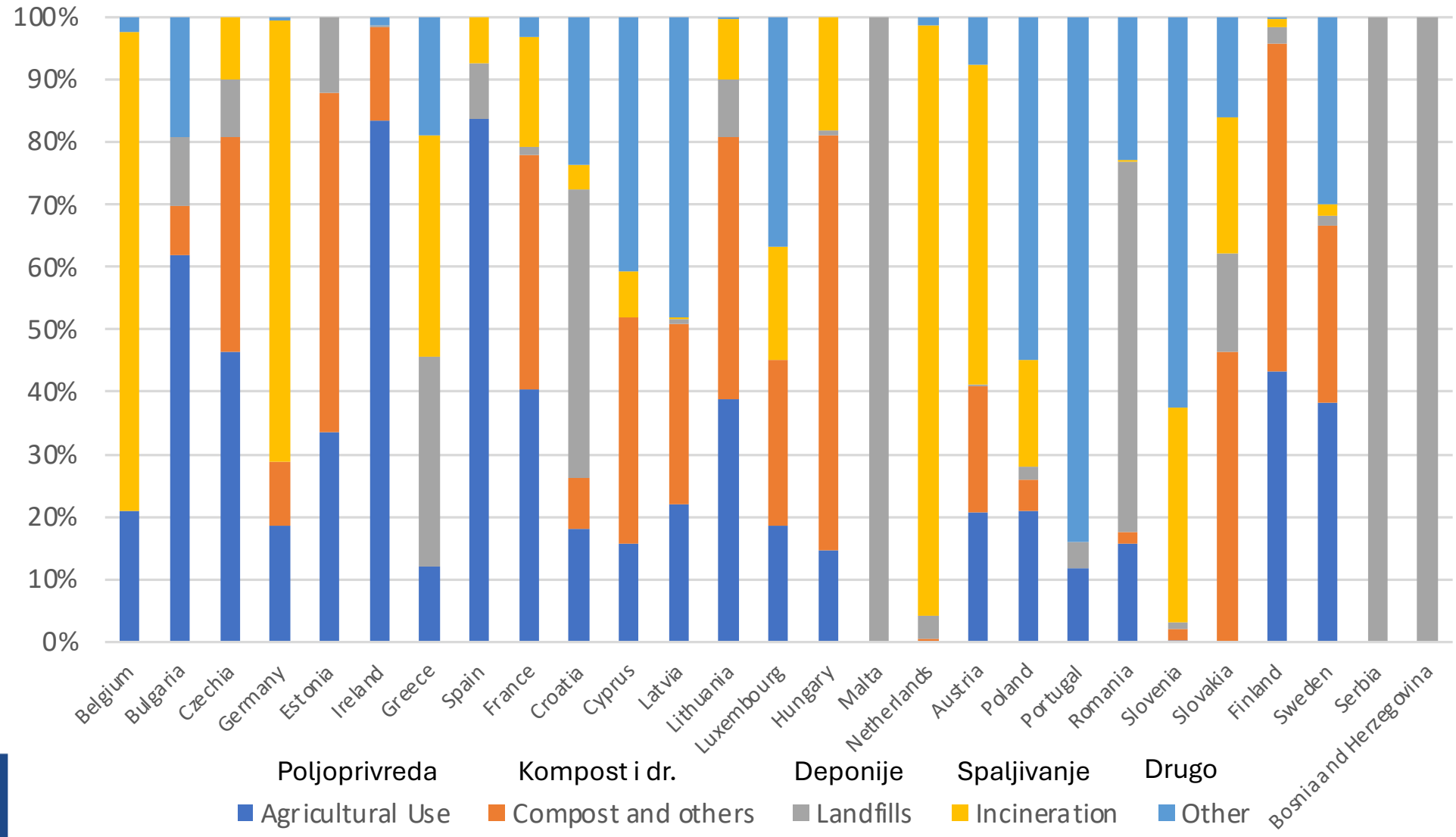
Open public debate on the evaluation of the Sludge Directive

2 **20. November 2020 – 5. March 2021**

18. Junie1986 **1**

The Sludge Directive enters into force

Sludge management in EU

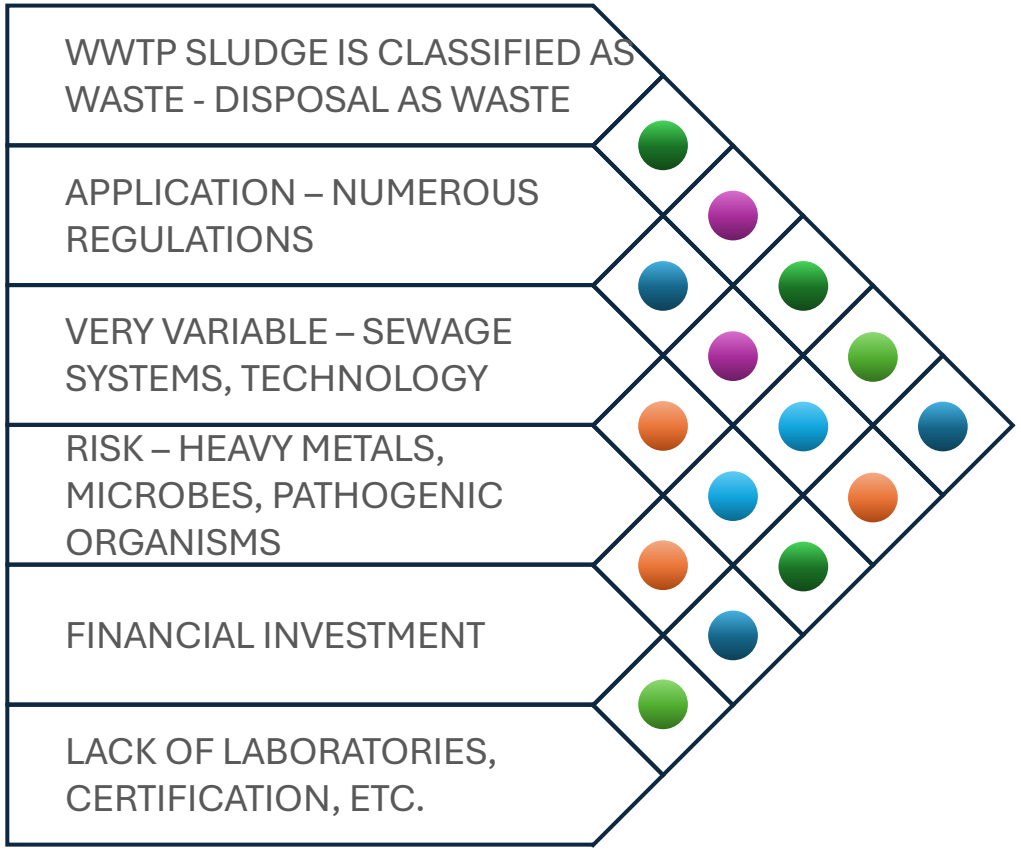


Wastewater treatment in BIH

- Open discharges, septic tanks,
- Individual systems
- WWTPs
- Resorts, hotels, eco-villages?!

The complexity of the problem

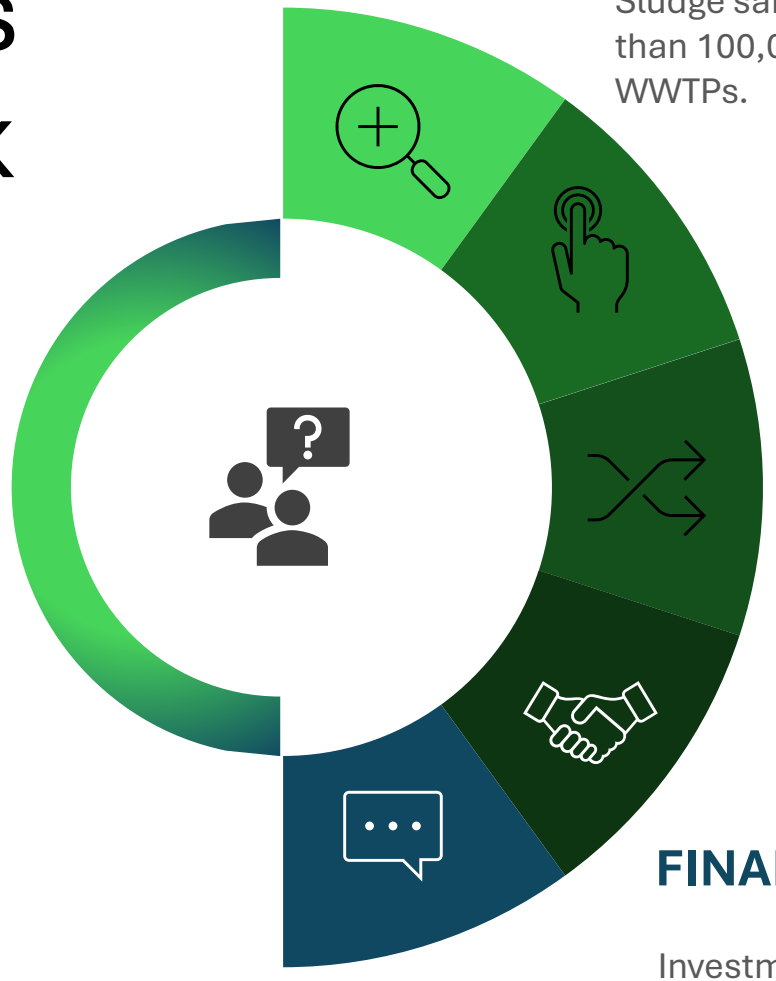
- Waste
- Material/product
- Composition/quality
- Polluting substances
- Understanding the problem



Sludge solutions Not so easy task

Location specifics

Although many of the criteria and aspects are generally followed: legislation for the whole country, technology, environment, etc., there are still some specific aspects related to the wastewater treatment plants themselves, as well as the companies that run them and the general situation in the municipalities.



SAMPLING

Sludge sample. Sludge composition of larger (greater than 100,000 Eps) versus smaller (10,000-50,000 Eps) WWTPs.

REGION

Regional aspects (market, joint solutions, opportunities, etc.)

APPLICABILITY

Applicability of technologies (limited funds, lack of market)
Investment and work / operation (PUC status, private, financial stability, job description, human capacity)

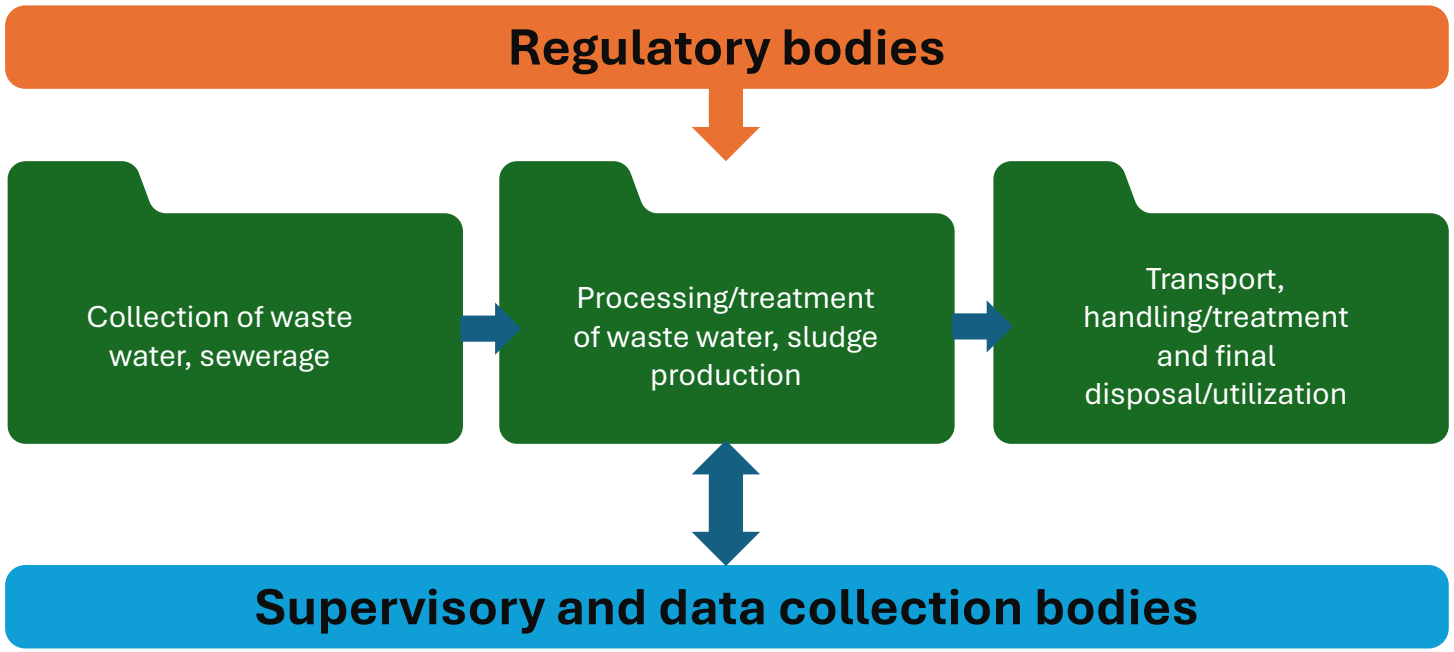
BUSINESS MODELS

Business models (regional companies, private companies, wastewater treatment companies, etc.)

FINANCING

Investment and operational aspects (status of public enterprises, private companies, financial stability, job description, human capacities)

Responsibilities - sludge management



Federal ministry of the environment and tourism

Ministry of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina

Ministry of Spatial Planning, Construction and Ecology of the Republic of Srpska

Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska

Agriculture, Forestry and Water Management Department of Brčko District

Spatial Planning and Property and Legal Affairs Department of Brčko District

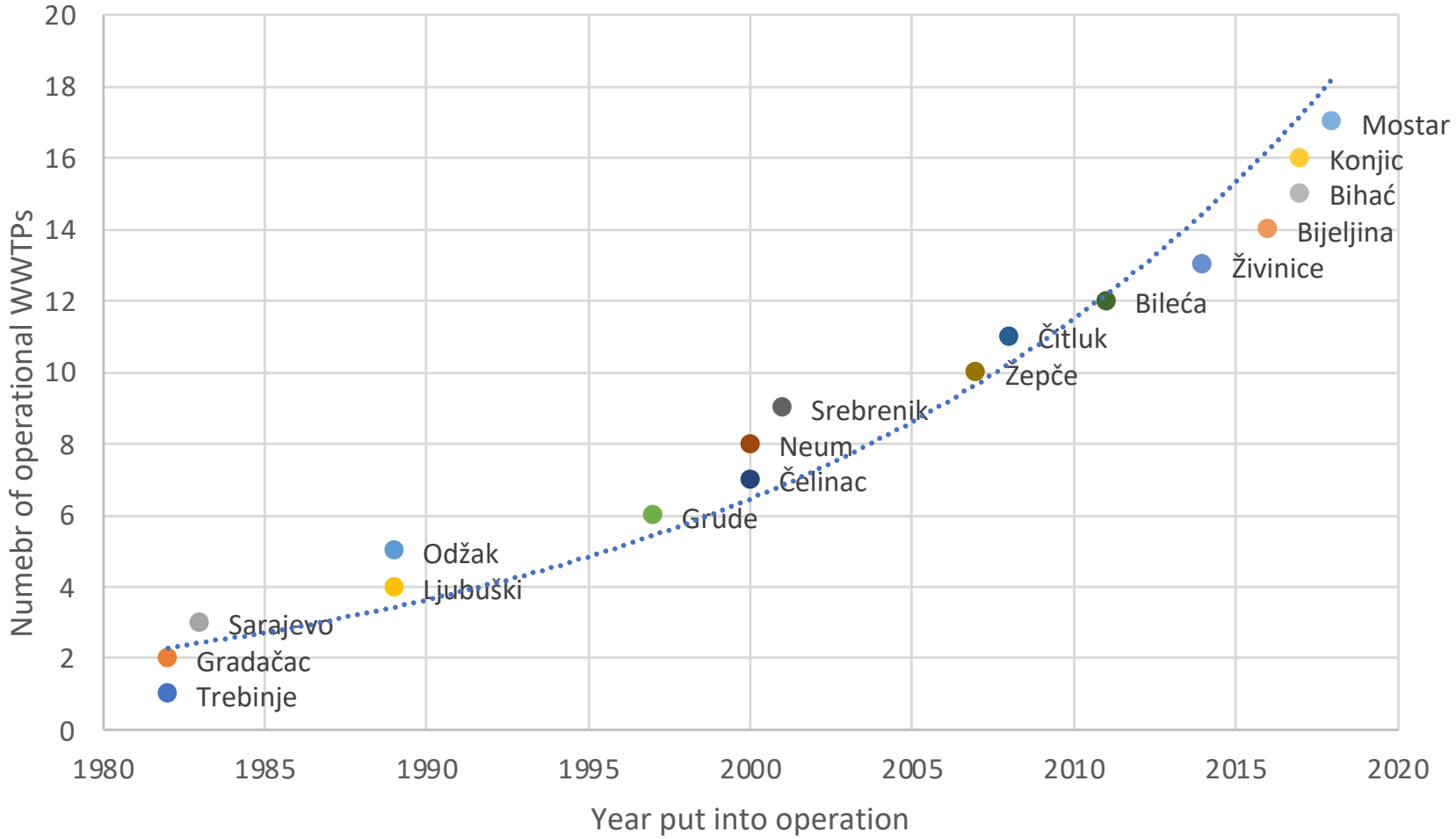
Environmental Fund of the Federation of Bosnia and Herzegovina

Environmental Protection and Energy Efficiency Fund of the Republic of Srpska

Entity inspectorates (market and environment)

BUT MAIN RESPONSIBILITY ON LOCAL COMMUNITY

WWTP (re)construction in BIH - history



Sludge disposal practices in BIH (legal?)

01 **LANDFILLING**

Disposal of sludge in landfills; Analyzes, Treatment, Conditions at the landfill; Different approach (regulatory) in BIH

02 **AGRICULTURE**

Use of sludge as fertilizer, transport to farm locations, agricultural goods. Forests? Analysis? Treatment?

03 **"EXPORT"**

Export of sludge for disposal - incineration, solidification and disposal, agriculture; all after the treatment

04 **OTHER**

Current disposal at the plant (duration, safety, final method); unknown locations, etc.

05 **ENERGY**

Use of sludge as an energy source - attempts, impossible without treatment; condistions in energy producing plants

Prices – assessment in BIH

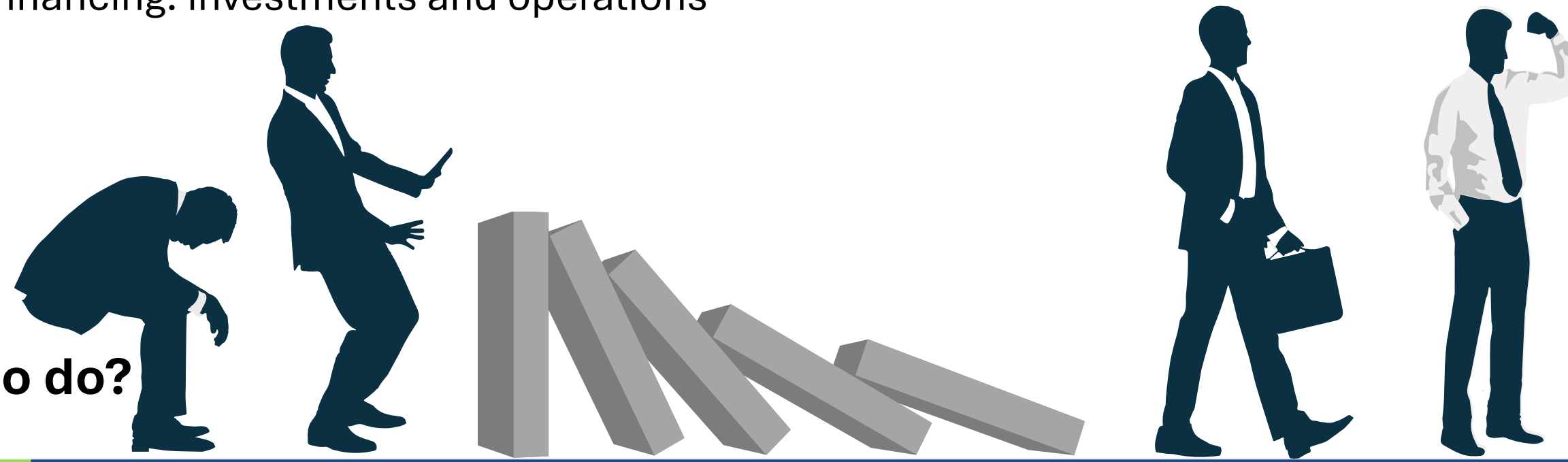
	Konačno zbrinjavanje mulja	Minimalna cijena (EUR/t)	Maximalna cijena (EUR/t)	Srednja cijena(EUR/t)
Agriculture	**Korištenje u poljoprivredi**	22,37	58,36	40,37
		49,97	74,56	62,27
		54,97	82,02	68,49
Recultivation	**Korištenje kao material za rekultivaciju**	19,76	56,23	38,00
		47,36	74,23	60,80
Cement kilns	**Termalni tretman (postojeći kapaciteti)**	115,90	146,15	131,03
		117,15	165,15	141,15
Disposal	**Odlaganje**	54,56	107,89	81,23
		52,06	77,89	64,98
Export	**Izvoz**	200,00	250,00	225,00

Prices to be paid by PUC for the 1 ton of sludge!

Business planning

If the best model is chosen, who will be the main player, investor, manager?

- Sustainable business models - waste management
- Public, private, investors, donors, etc.
- Financing: investments and operations

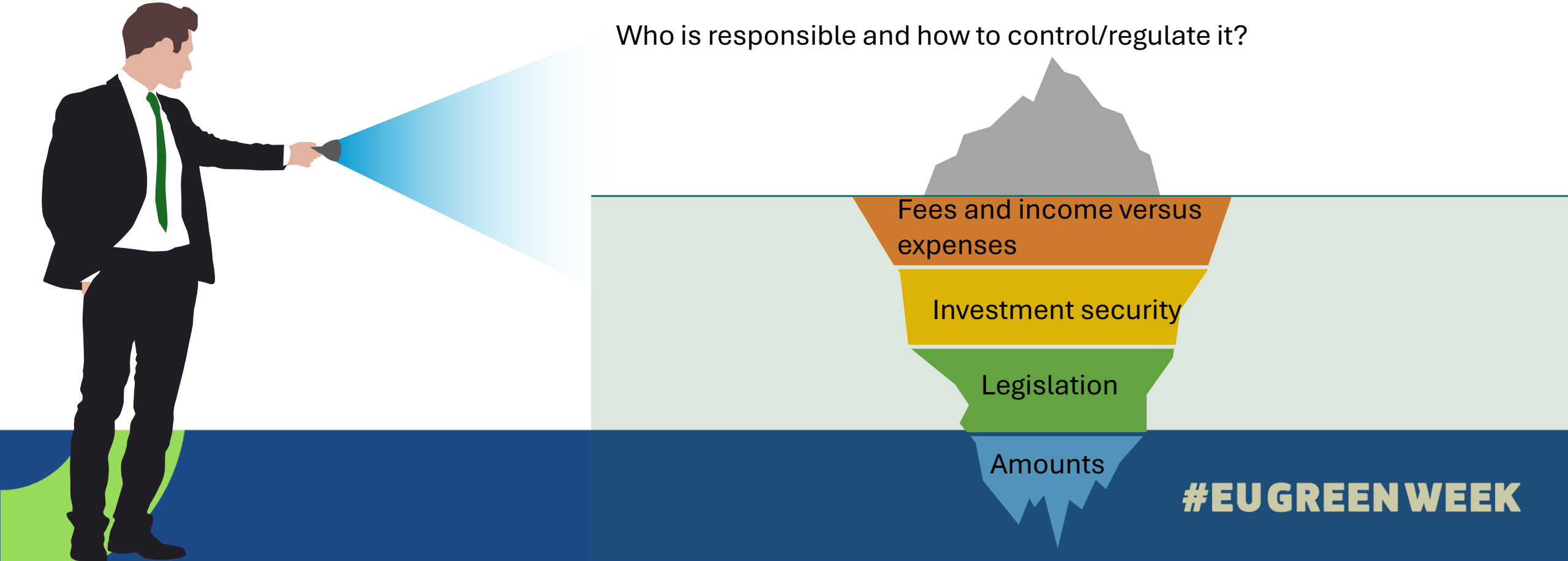


What to do?

External risks and limitations: sludge management

Risks and limitations (how to overcome them) even when the solution is known; External factors:

Who is responsible and how to control/regulate it?



Sludge management and stakeholders perception

Even if we overcome all challenges, what about stakeholders?

o agricultural land?

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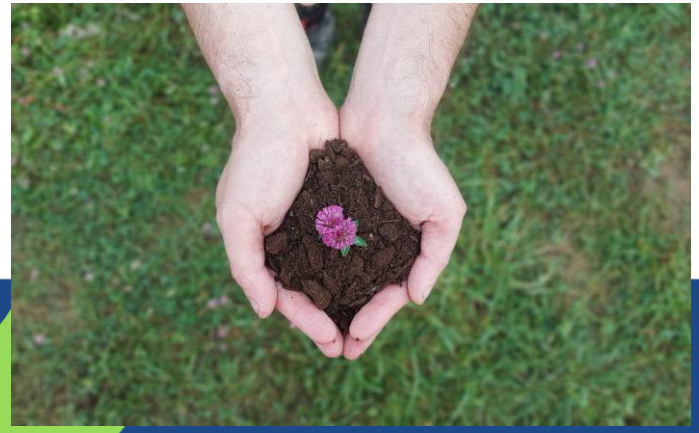

How does sludge treatment look?
Sludge after treatment....

Question for discussion

How to achieve solution?

Thank you for your attention!

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