AUSTRIAN DEVELOPMENT COOPERATION

CEI CENTRAL EUROPEAN INITIATIVE

WATER LEAP

Business case development waste water treatment

Partners

BDG Business Development Group

DBGA

PROGRAMME

- TWO CASE WASTE WATER TREATMENT
  - **VILLAGE**
  - **CITY**

- TWO APPROACHES
  - **TRADITIONAL APPROACH**
  - **SUPPLEMENTAL INNOVATIVE APPROACH**

EXAMPLE-1: VILLAGE

TRADITIONAL APPROACH

- INPUT:
  - **Q-av; Q-max,**
  - **COD, BOD, SS, N, P**
  - **Developments**

- OUTPUT:
  - **effluent standards BOD/COD, N, P, ss**

- CONDITIONS:
  - **temperature range**

  - **existing plant**

EXAMPLE-1: VILLAGE

TRADITIONAL APPROACH

- INPUT 2015:
  - **Q-av: 800 m3/d, Q-max: 200 m3/h**
  - **COD: 600 mg/l, BOD: 300 mg/l, SS: 700 mg/l, N: 50 mg/l, P: 10 mg/l**
  - **Population developments:**
    2015: 7.000; 2020: 9.000; 2025: 10.000 people

- OUTPUT:
  - **effluent standards BOD/COD/SS: - , N=15 mg/l, P=2 mg/l**

- CONDITIONS:
  - **temperature range: -20 to 35°C**
  - **existing plant: -**

EVALUATION

- Capacity: **10.000 population; 10/7 x 7.000**

- **Equal characteristics**

- Pretreatment: **no, too small**

- Process:
  - **low loaded activated sludge**
  - **biological or chemical phosphorous removal**
  - **concrete tank with fine bubble aeration**
  - **continuous process: secundary settling tank/return sludge**
  - **discharge to local river**
  - **sludge treatment: thickening; transport to other location**

EXAMPLE-1: VILLAGE

INNOVATIVE APPROACH = traditional + supplemental

- INPUT: Q-av; Q-max, COD, BOD, SS, N, P, Developments
- OUTPUT: effluent standards BOD/COD, N, P, ss
- CONDITIONS: temperature range; existing plant

SUPPLEMENTAL EVALUATION

- **risk analysis population growth**
- **waste water as a source**
- **linking with local organizations**
- **climate change**

EXAMPLE-1: VILLAGE

RISK ANALYSIS POPULATION GROWTH:

- **Scenario 1= 2015: 7.000; 2020: 9.000; 2025: 10.000**
- **Scenario 2= 2015: 7.000; 2020: 7.500; 2025: 8.000**
- **Scenario 3= 2015: 7.000; 2020: 6.500; 2025: 6.000**

Now: 7.000; future: 6.000-10.000

WASTE WATER AS A SOURCE:

- **Source for energy: biogas, electricity , heath**
- **Source for reusable water: industry, agriculture**
- **Source for raw materials: phosphorous, cellulosis, bioplastics**

EXAMPLE-1: VILLAGE

LINKING WITH OTHER ORGANIZATION

- increase overall efficiency
- agriculture: water, nutrients, organic wastes
- industry: water, high concentrated waste water, organic wastes; biogas

CLIMATE CHANGE

- draught??
- increase rain fall; rainwater treatment?

EXAMPLE-1: VILLAGE

CAPACITY:

- modular plant: 2016= 6.000 + 1.000
- decrease or increase capacity

PROCESS:

- Smaller plant
- Sequencing batch reactor; no secundary settling

LOCAL:

- Agriculture
- Draught!!

SOURCING

- Water reuse! Is agriculture willing to pay?
- Phosphorous reuse?!

EXAMPLE-1: VILLAGE

CONSEQUENCES INNOVATIVE APPROACH:

- spreading investments
- no overcapacity; reusable module
- water reuse + phosphorous recovery = circular economy
- circular economy = increase sustainability = financing
- lower initial investments and running costs
- creating value/income = lower total cost of ownership

EXAMPLE-1: VILLAGE

Traditional approach

Innovative approach

EXAMPLE-2: CITY

TRADITIONAL APPROACH

- INPUT:
  - **Q-av; Q-max,**
  - **COD, BOD, SS, N, P**
  - **Developments**

- OUTPUT:
  - **effluent standards BOD/COD, N, P, ss**

- CONDITIONS:
  - **temperature range**

  - **existing plant**

EXAMPLE-2: CITY

TRADITIONAL APPROACH

- INPUT 2015:
  - **Developments:**

  Population= 2015: 40.000; 2020: 45.000; 2025: 50.000

  Industry= 2015: 30.000; 2020: 40.000; 2025: 50.000

  Total= 2015: 70.000; 2020: 85.000; 2025: 100.000

- OUTPUT:
  - **effluent standards BOD/COD/SS: - , N=15 mg/l, P=2 mg/l**

- CONDITIONS:
  - **temperature range: -20 to 35°C**
  - **existing plant: 50.000 p.e., activated sludge, no primary settling; sludge thickening/dewatering**

EVALUATION

- Capacity: **100.000 p.e.; characteristics municipal/industry**

- Pretreatment: **serious option**

- Process:
  - **low loaded activated sludge**
  - **biological or chemical phosphorous removal**
  - **rehabilitation existing aeration tank**
  - **Pretreatment (25% COD-removal)**
  - **100.000 p.e. raw wastewater = 75.000 p.e. pretreated**
  - **50.000 existing biological plant; 25.000 p.e. additional**
  - **sludge digestion, biogas to electricy**
  - **discharge to local river**

EXAMPLE-2: CITY

INNOVATIVE APPROACH = traditional + supplemental

- INPUT: Q-av; Q-max, COD, BOD, SS, N, P, Developments
- OUTPUT: effluent standards BOD/COD, N, P, ss
- CONDITIONS: temperature range; existing plant

SUPPLEMENTAL EVALUATION

- **risk analysis population growth**
- **waste water as a source**
- **linking with local organizations**
- **climate change**

EXAMPLE-2: CITY

RISK ANALYSIS POPULATION GROWTH:

- **Scenario 1**
  - **Population= 2015: 40.000; 2020: 45.000; 2025: 50.000**
  - **Industry= 2015: 30.000; 2020: 40.000; 2025: 50.000**
  - **Total= 2015: 70.000; 2020: 85.000; 2025: 100.000**

- **Scenario 2**
  - **Population= 2015: 40.000; 2020: 45.000; 2025: 50.000**
  - **Industry= 2015: 30.000; 2020: 40.000; 2025: 5.000**
  - **Total= 2015: 70.000; 2020: 85.000; 2025: 55.000**

- **Scenario 3**
  - **Population= 2015: 40.000; 2020: 50.000; 2025: 60.000**
  - **Industry= 2015: 30.000; 2020: 40.000; 2025: 50.000**
  - **Total= 2015: 70.000; 2020: 90.000; 2025: 110.000**

EXAMPLE-2: CITY

WASTE WATER AS A SOURCE:

- Source for energy: biogas, electricity , heath
- Source for reusable water: industry, agriculture
- Source for raw materials: phosphorous, cellulosis, bioplastics

LINKING WITH OTHER ORGANIZATION

- Food processing industry: high concentrated waste water, organic wastes; biogas

ENERGY

- SLUDGE DIGESTION: BIOGAS TOT ELECTRICITY
- SEPARATE ANAEROBIC TREATMENT INDUSTR. WASTEWATER
- REDUCTION ENERGY CONSUMPTION AEROBIC TREATMENT
- COMBINED BIOGAS PLANT

EXAMPLE-2: CITY

CAPACITY:

- rehabilitation existing plant: 50.000
- disconnect industry asap
- existing plant only for municipal waste water and industrial effluent
- Increase capacity either by primary settling or additional biological (modular!) capacity

PROCESS:

- Low loaded activated sludge
- With or without primary setling
- Sequencing batch reactor; no secundary settling

EXAMPLE-2: CITY

LOCAL:

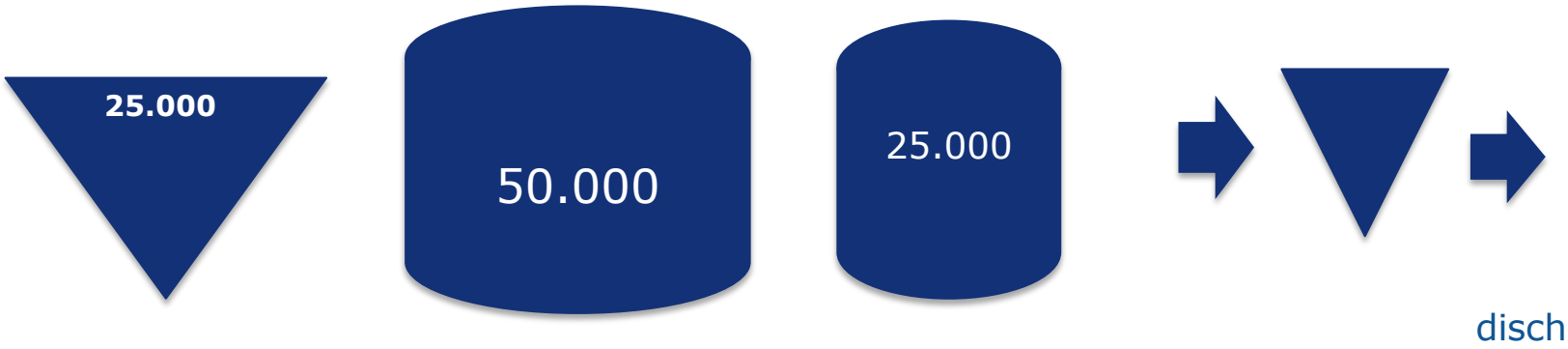
- Industry
- Biogas, sludge, heath

SOURCING

- Anaerobic treatment industrial waste water
- Sludge digestion
- Combining municipal and industrial activities

EXAMPLE-1: VILLAGE

Traditional approach

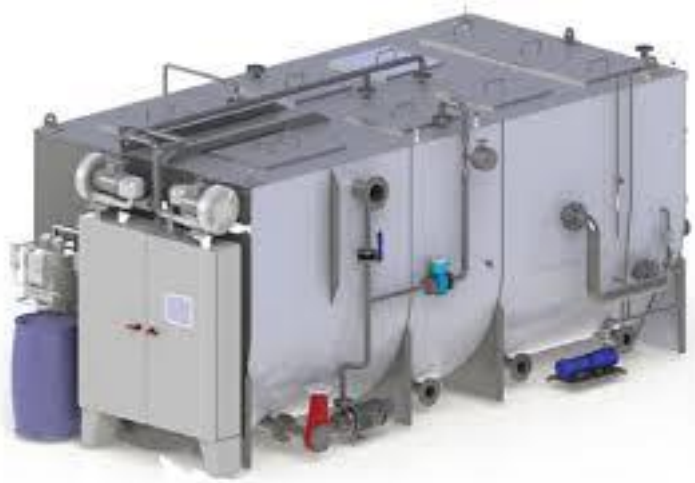


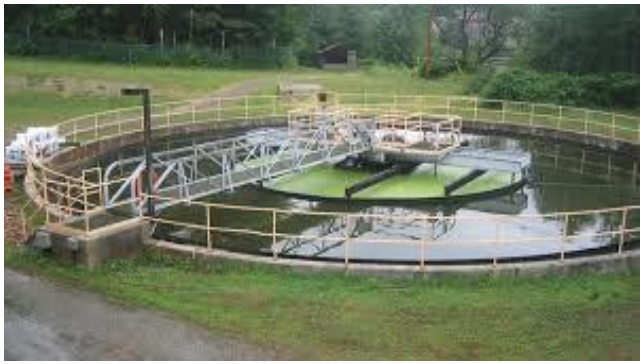
Innovative approach

EXAMPLE-2: CITY

CONSEQUENCES INNOVATIVE APPROACH:

- **no overcapacity; reusable module**
- **waste water ad energy source = circular economy**
- **circular economy = increase sustainability = financing**
- **lower initial investments and running costs**
- **creating value/income = lower total cost of ownership**





MODULAR APPROACH

- Flexibility to deal with changes in INPUT
- Also important, but less: to deal with changes in processes and output
- Driver: cost efficiency

MODULES

- Several separate units in one process
- Plug-and-play
- Containerized and/or collapsible tanks
- Infrastructure and piping above overground

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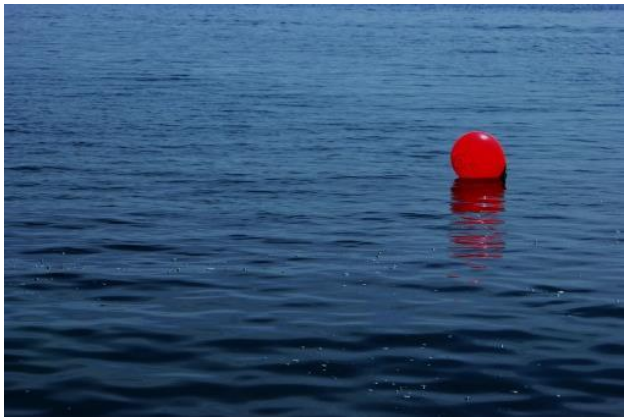

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www.waterleap.eu

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