Hello! My name is Walter (they/them). I am a Wastewater Wizard and mascot of the DARROW project. Join me in exploring what the DARROW project is about.

Making **wastewater treatment** more sustainable and efficient using a **data-driven AI solution**

Save energy

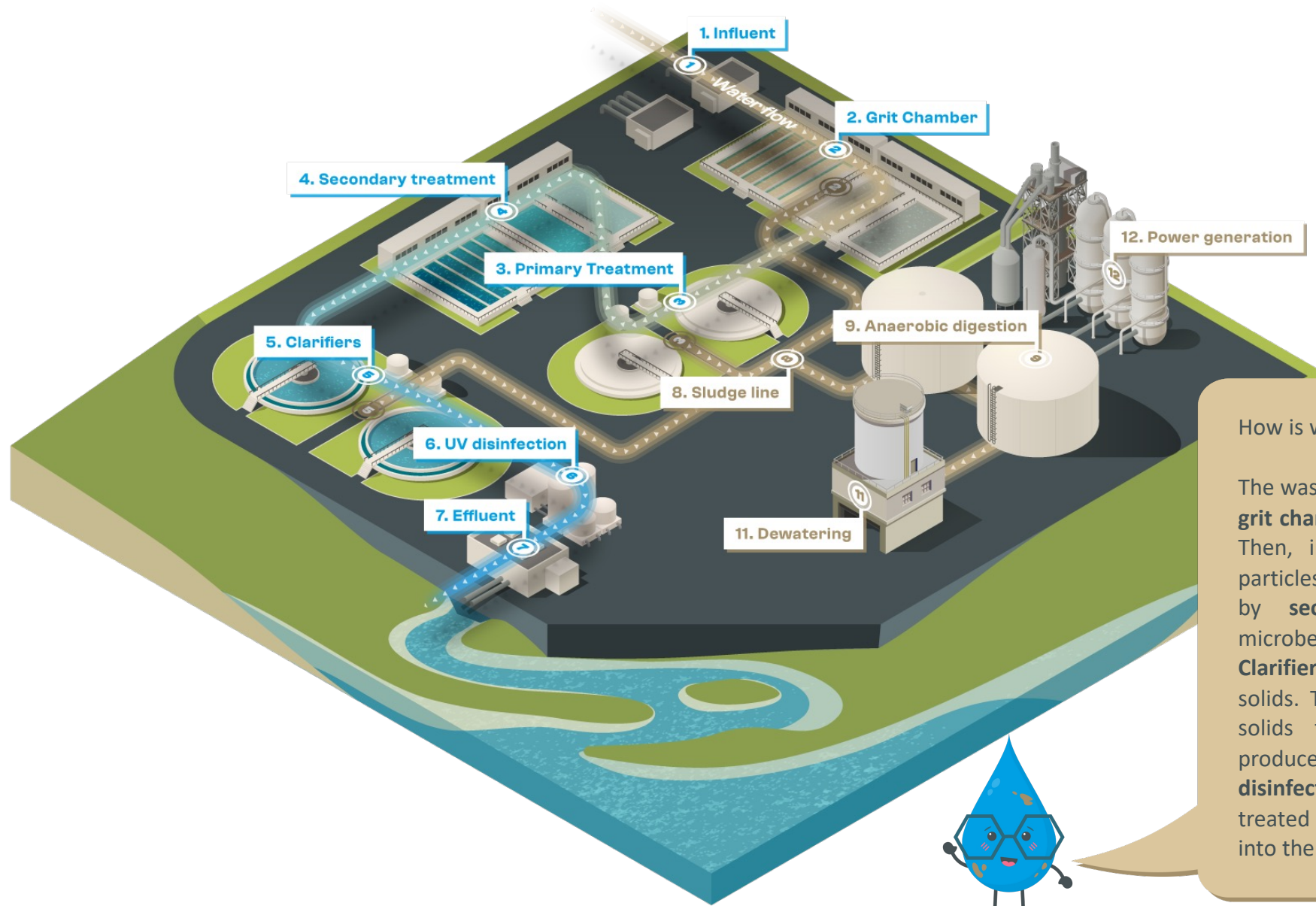Reduce Greenhouse Gas Emissions

Contribute to a circular economy

Reduce Waste

1. Influent

Water flow

2. Grit Chamber

4. Secondary treatment

3. Primary Treatment

12. Power generation

5. Clarifiers

9. Anaerobic digestion

8. Sludge line

6. UV disinfection

7. Effluent

11. Dewatering

How is wastewater actually treated?

The wastewater first passes through a **grit chamber** to remove heavy solids. Then, in **primary treatment**, large particles settle out. This is followed by **secondary treatment** where microbes break down organic matter. **Clarifiers** then separate remaining solids. The **sludge line** carries these solids to **anaerobic digestion** to produce biogas. Meanwhile, **UV disinfection** kills pathogens in the treated water before it is released into the environment.
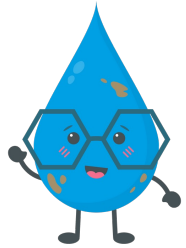
DARROW

DARROW's AI solution for optimising wastewater treatment consists of 3 layers.
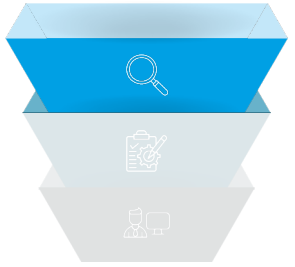
01 — Data augmentation and Data enrichment
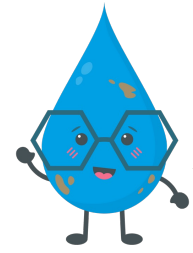
02 — Process control and Process recommendation

03 — End user applications
Digital twins and
Real-time controllers

Data augmentation

Data augmentation

Inflow prediction model

Influent concentration prediction model

Historical concentrations dataset

Gap filling model for lab data
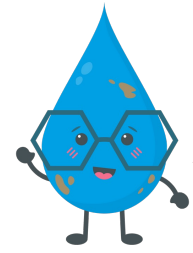
Secondly, lab data. Note that lad data is not collected every day. No problem! AI can fill in the gaps.

Laboratory data

T-3	T-2	T-1	Today

Data augmentation

Inflow prediction model

Influent concentration prediction model

Historical concentrations dataset

Gap filling model for lab data

Anomaly detection model
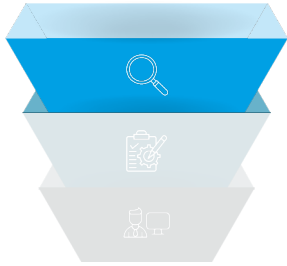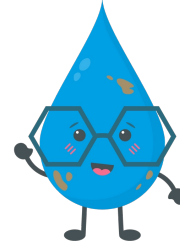
Thirdly, sensor data from the entire plant.

Sensor data

Sensor 1	Sensor 2	Sensor 3	Sensor 4
☑	☑	AI	☑

Data enrichment
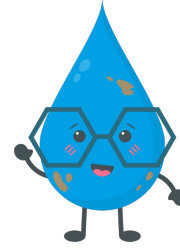
Plant status model

Following data augmentation is data enrichment with the help of AI. Both on a big scale for the entire plant...
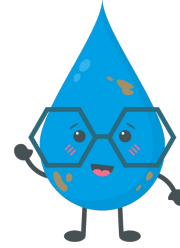
Data enrichment

Plant status model

NH4 software sensor

N2O software sensor

...as well as on a smaller scale for different sensors.

Process control and recommendation

Influent data

Laboratory data

Sensor data

AI-generated data

Meteorological data

Operational data

Secondary treatment RL model
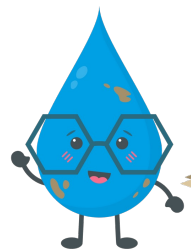
Anaerobic digester RL model

Reinforcement learning (RL) for process control

Anaerobic digester ROM

Secondary treatment ROM

Plant-wide ROM

Reduced order models (ROM) for process recommendation

All the data feeds into the second layer: Process control using reinforcement learning and process recommendation using reduced order models

Co-funded by the European Union

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End-user application

The DARROW tools will ultimately help plant operators **make better decisions**.

Setpoint change advice

KPI's and insights

Process recommendations