

# ***Optimizing Kufranja Wastewater Treatment Plant***

This presentation is a summary of activities conducted by the ExI project to optimize the operational conditions at Kufranja Wastewater Treatment Plant.

*Export Initiative - Supporting Environmental Technologies* | 20 March 2019

# Agenda

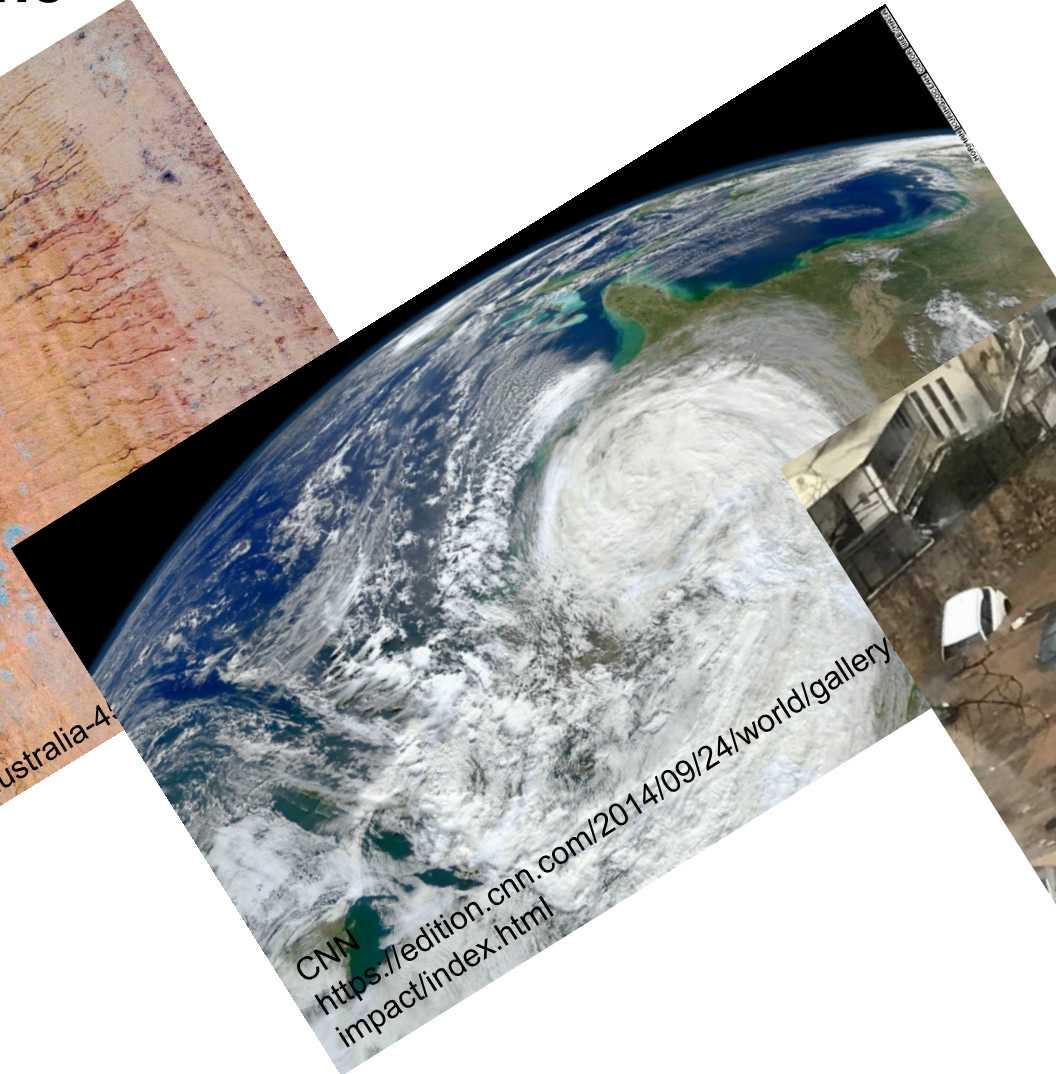
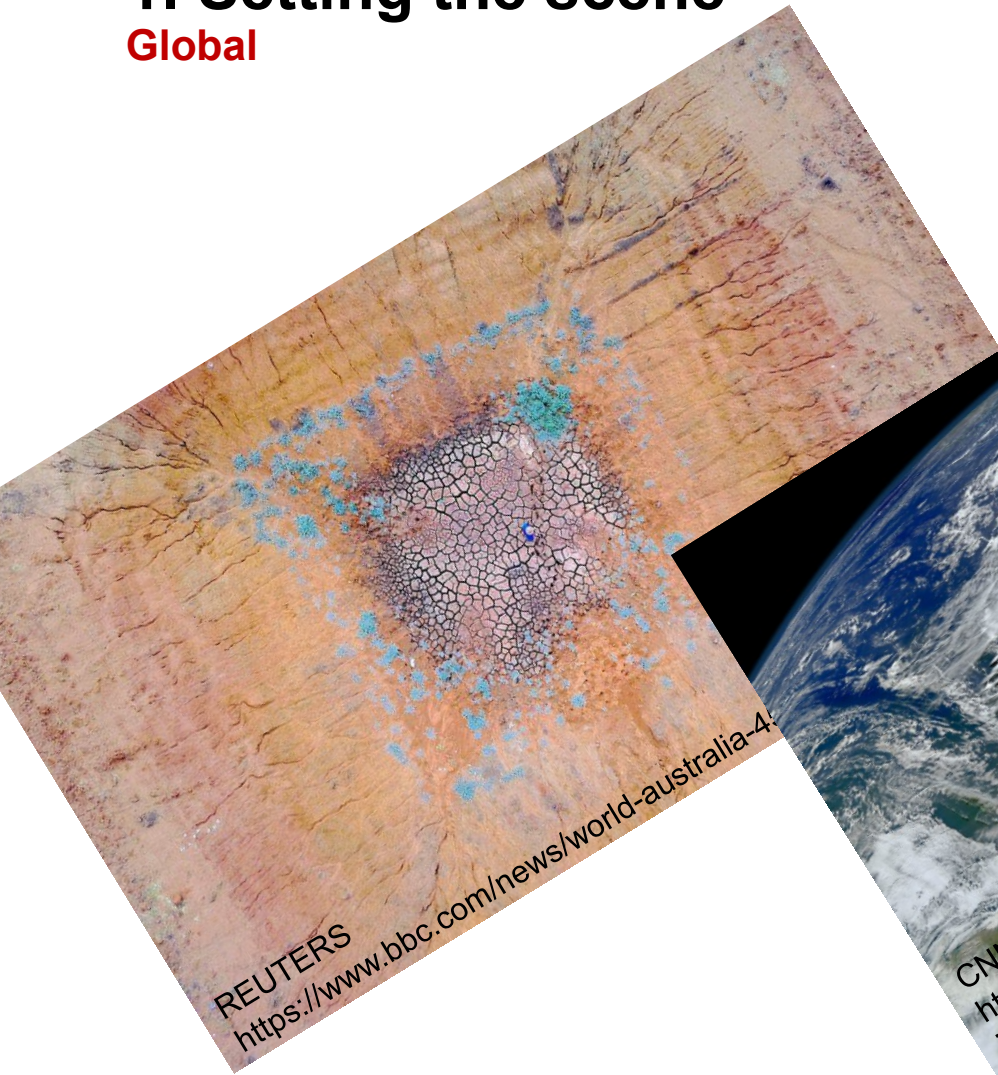
1. Setting the scene
  - On global scale
  - On country scale
2. Introduction to the project
3. Introduction to the Wastewater Treatment Plant
  - Location
  - Treatment technology
4. Utility assessment
5. Optimization measures devised
6. Results





# 1. Setting the scene

Global



# 1. Setting the scene

## Global

### How much of that is related to Energy?

- In 2016, emissions of carbon dioxide (CO<sub>2</sub>) produced from burning fossil fuels for energy were equal to 76% of total U.S.
- An increase by 1.4% of global energy-related CO<sub>2</sub> emissions in 2017, reaching a historic level of 32.5 gigatons.

### How much of that related to Electricity?

- In 2017, emissions of CO<sub>2</sub> by the U.S. electric power sector were about 34% of the total U.S. energy-related CO<sub>2</sub> emissions.

#### Resources:

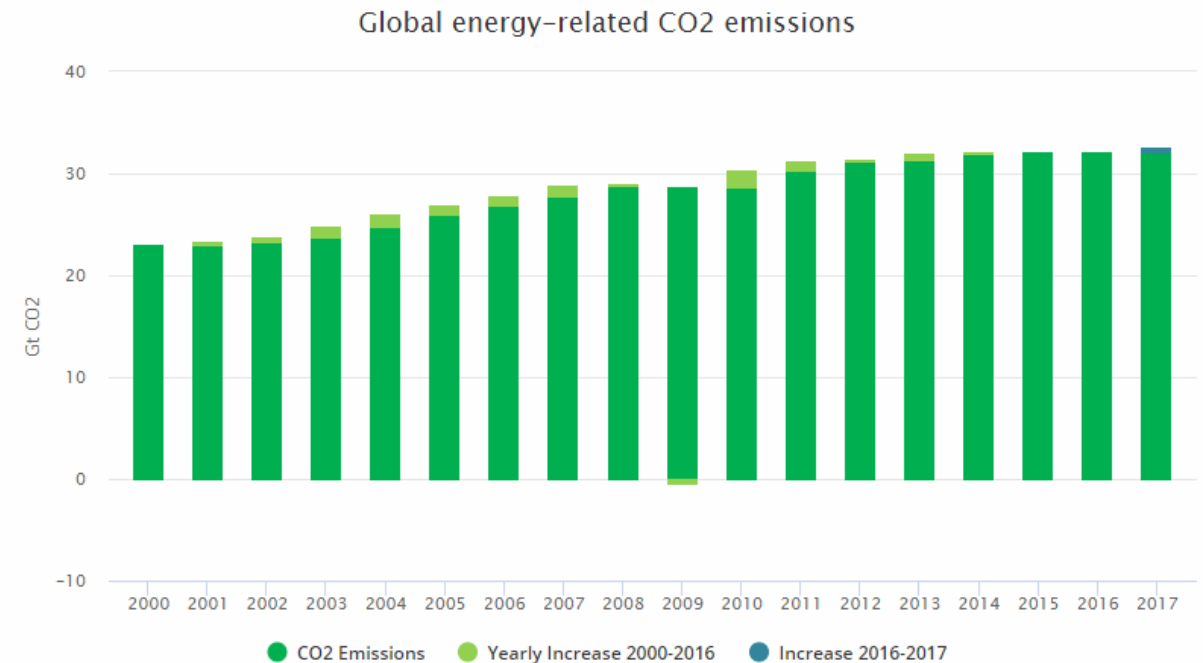
International Energy Agency IEA /Global Energy & CO<sub>2</sub> Status Report/ <https://www.iea.org>

US Energy Information Administration/ <https://www.eia.gov/>

#### Further reads:

CO<sub>2</sub> emissions from fuel combustion overview 2018 by IEA

<https://webstore.iea.org/co2-emissions-from-fuel-combustion-2018-overview>



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# 1. Setting the scene

## In Jordan

### FACTS:

- Jordan climate is arid to semi arid.
- Jordan is one of most water scarce countries in the world
- 15% of energy produced is used for water pumping only.
- 98% of energy is produced from imported fossil fuels.



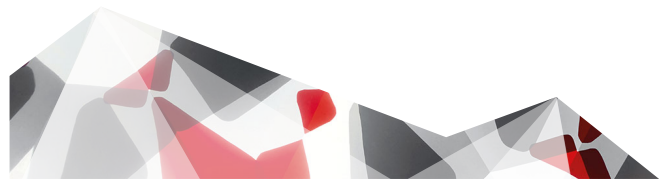
## 2. ExI project

### Overall Goal

Improving the enabling conditions and developing markets for the introduction of modern, integrated environmental and climate change mitigation technologies and the creation of innovative green infrastructure.

### Project Objectives

- Reduce energy consumption in selected WWTP/s
- Reduce CO<sub>2</sub> emissions in selected WWTP/s
- Facilitate direct knowledge transfer and capacity development



## 2. Kufranja WWTP

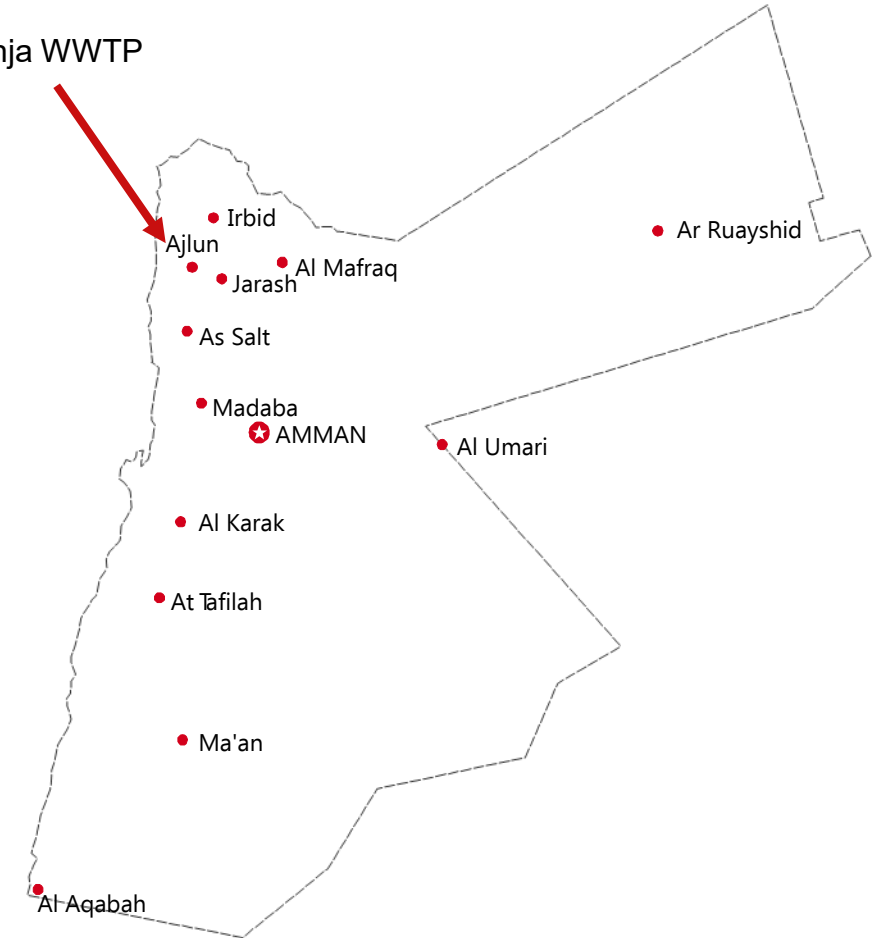
### Location

- Kufranja WWTP is located in the north of Jordan about 68 km north-west of the capital Amman and is operated by Yarmouk Water Company (YWC).

### Area serviced and population

- The WWTP lies within Ajloun governorate and serves four main areas: Qasabat Ajloun, Kurfanja, Anjra and Ain-Janna with total population of 91,458 people.

Kufranja WWTP



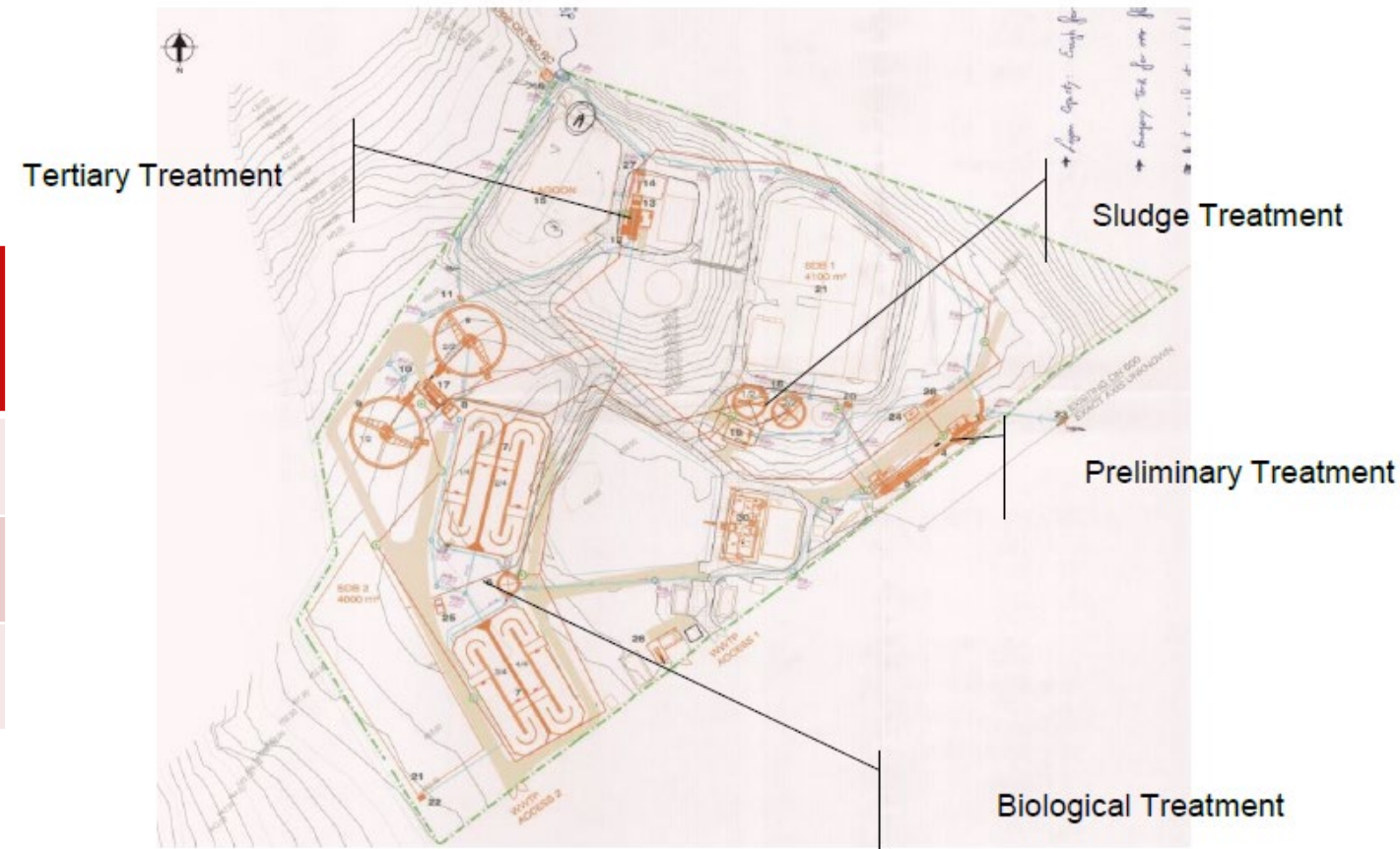
## 2. Kufranja WWTP

### Design

- The WWTP has been commissioned in 2016.
- The design horizon is 2035. (Dorsch Consult/Engicon/GITEC, 2009)

	Design Report		Interpolation (2017)	Actual (2017)
	2015	2020		
PE	67,703	72,802	69,743	61,291*
Inflow [m <sup>3</sup> /d]	5,687	6,407	5,975	~3,497
BOD <sub>5</sub> [kg/d]	4,205	4,521	4,331	~2,458

\*based on 40 g BOD/person/day.





### 3. Utility Assessment

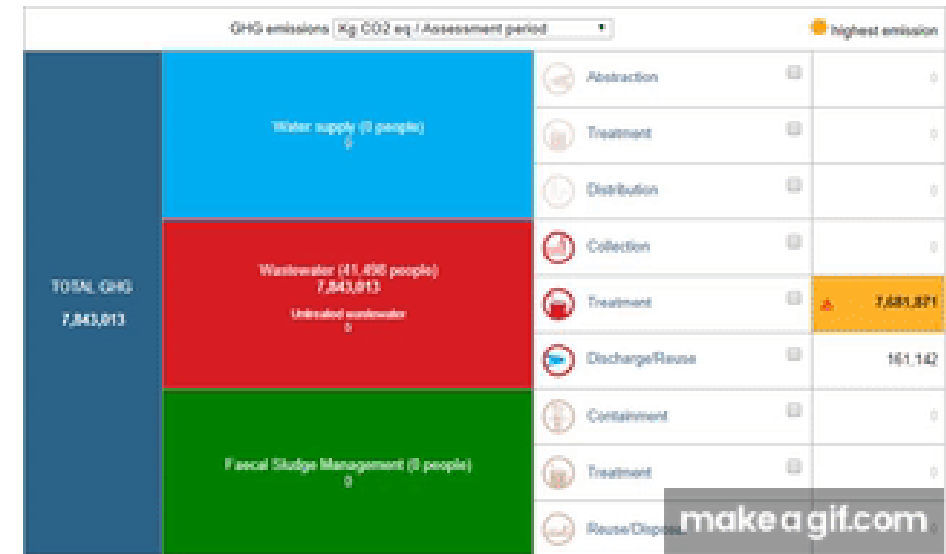
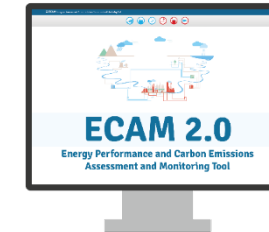
- A comprehensive audit of the utility was conducted. Accordingly, a list of optimization measures were devised, analyzed and prioritized.
- This was by close cooperation between the project team and the project consultant p2mberlin.

#### Greenhouse Gases (GHG) & Energy Efficiency

The utility was first assessed by the project team by following the roadmap and using the tool “Energy and Carbon Assessment and Monitoring tool **ECAM**” that were developed by the giz project **WaCCliM**.

#### Main highlights from the assessment

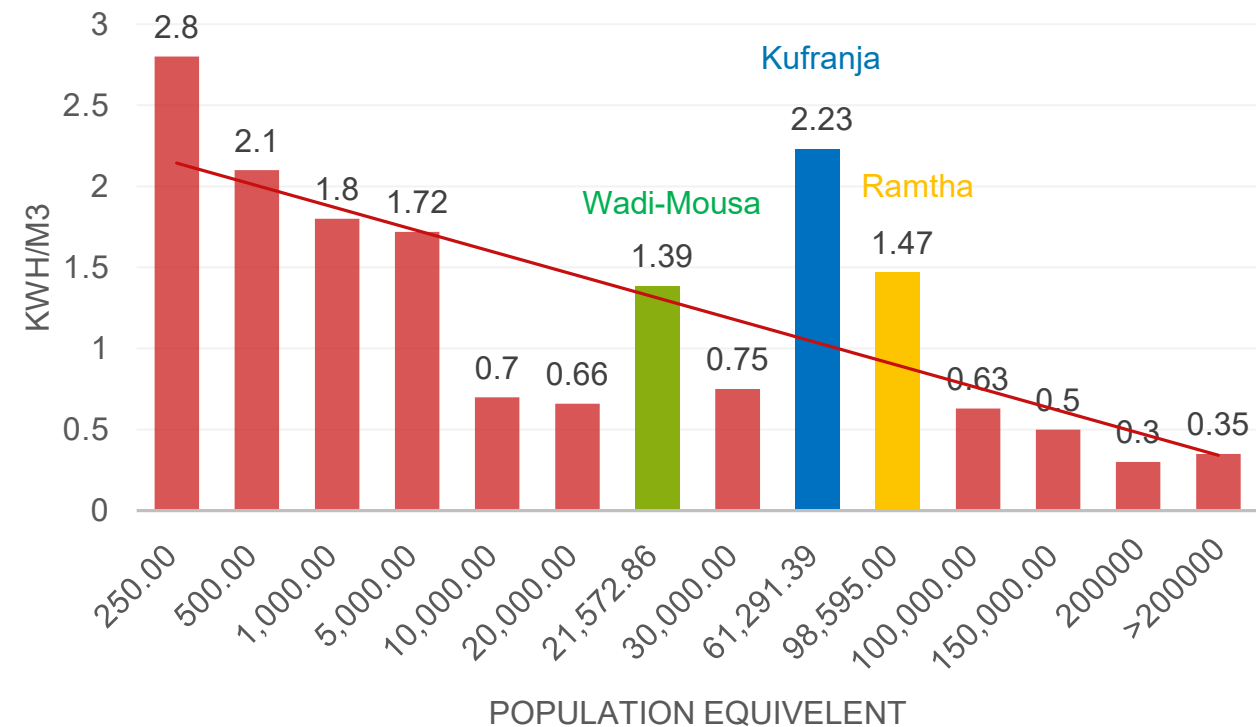
- The tool calculated a total amount of **7,790,829.64 kg CO2 eq / year** contributed mainly to the treatment process.
- Energy consumption reached **3,092,355.26 kWh/year** in 2017, where treatment process is the main consumer.



### 3. Utility Assessment

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Kufranja WWTP		
Total energy per treated wastewater	kWh/m <sup>3</sup>	2.43
Energy for Treatment per Wastewater treated	kWh/m <sup>3</sup>	2.23
Total energy per BOD load	kWh/kg	3.46
Total energy per population equivalent	kWh/pe	50.45
Capacity Utilization	%	38.75



## 4. Measures



### Operation

- Rearranging of ASTs operation, number of tanks used and water table as per actual load;
- Fixing WAS/RAS operating hours;
- Fixing Sludge emptying process;
- Operation remote-assistance by [p2mberlin](#).



### Maintenance

- maintaining all aerators;
- Maintaining WAS/RAS pumps;
- Maintaining Decanters, and sludge emptying pumps;
- Sand filter compressors...etc.



### Capacity Building

- Training and engaging in the on-site energy check & analysis (based on DWA – A216 guide);
- Introduced, via a study tour, to energy efficient and environmental best practices in Germany;
- Trained and practiced the usage of the ECAM tool;
- Introduced to proper laboratory analysis practices.



### Data Acquisition & Management

- Provide data-acquisition systems (DO, flowmeter, level-meter);
- Integration of master data sheet with training on data - collection

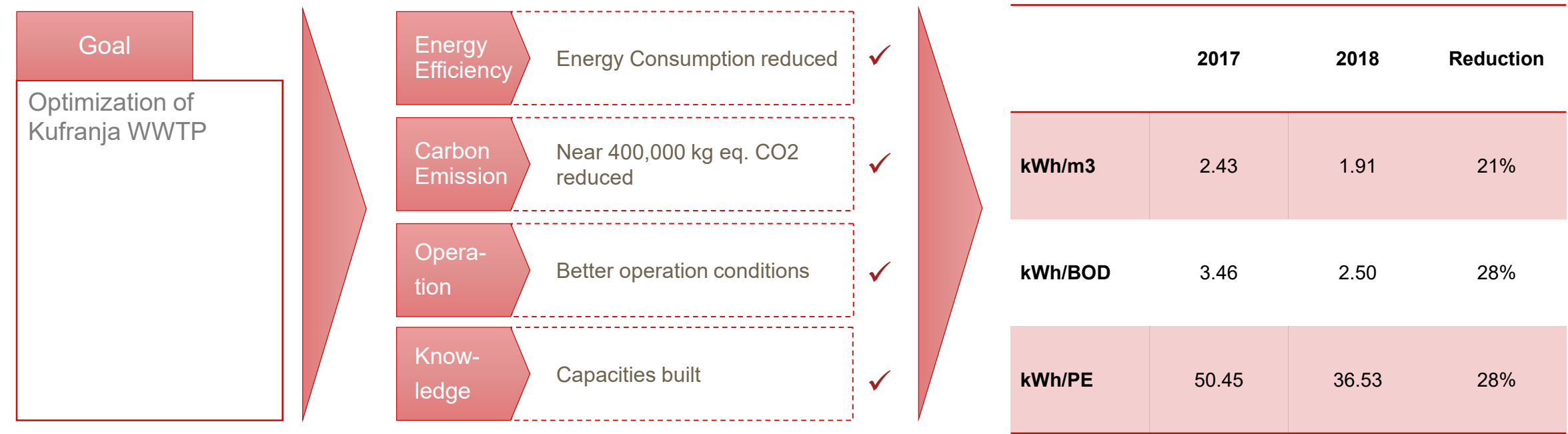



### Technology Integration

- Two AST motors from IE1 to IE3;
- Two AST motors became VFD driven according to DO reading;
- Smart electric panel to run RAS/WAS;
- Wilo type water service pumps.



# 5. Results (So far)





Thank you for your attention

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