



Water and Wastewater Companies for Climate Mitigation (WaCCliM)- JOR

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On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

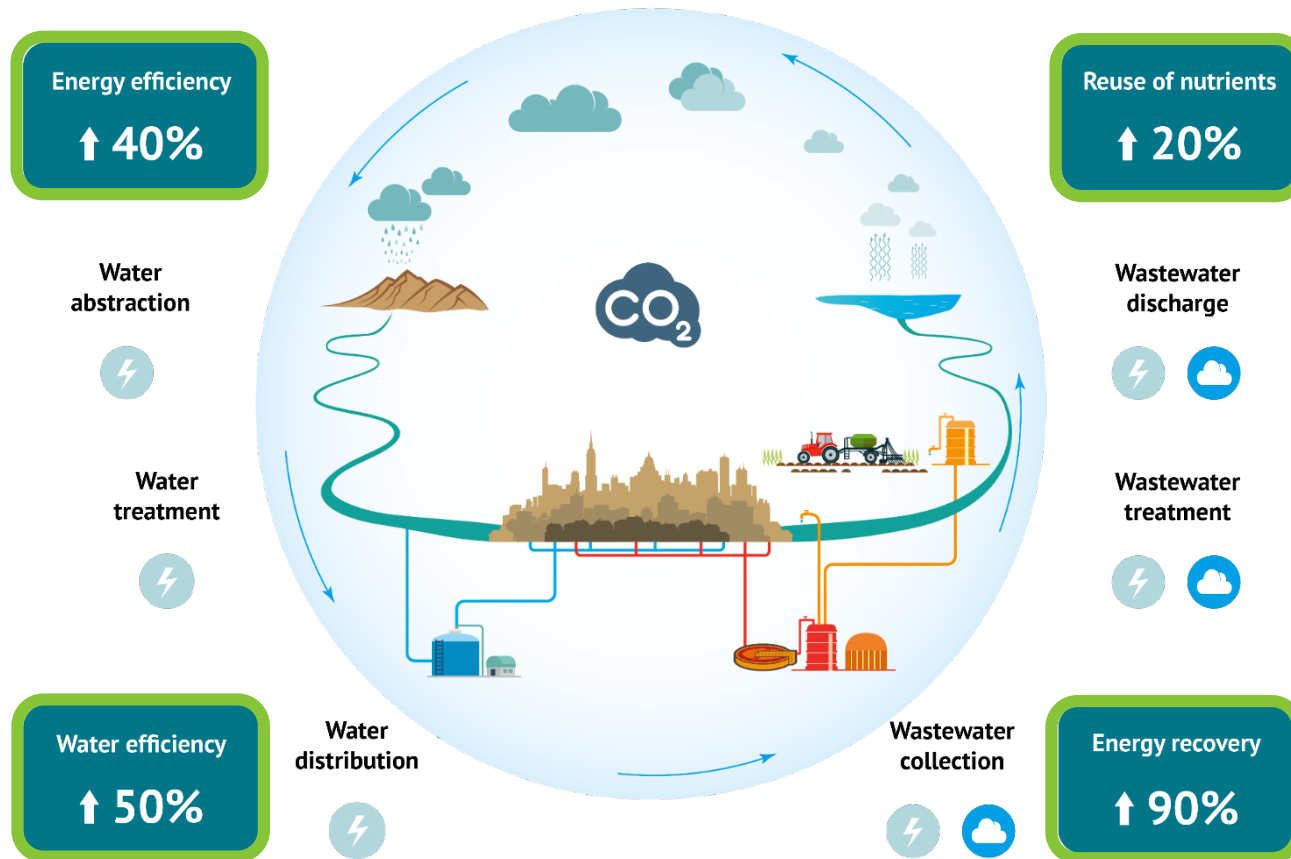
of the Federal Republic of Germany

Implemented by:



What are the mitigation opportunities in the urban water cycle?

Every urban water cycle has its own energy and carbon footprint.
How close can we get to the minimum possible value?





➤ REQUIREMENT

- Needs data management system for continuous implementation of ECAM tool for:
 - GHG assessment
 - Opportunities
 - Monitoring
 - Achieving GHG mitigation

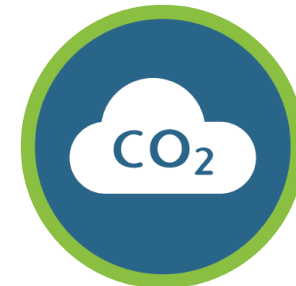


ECAM - Energy Performance and Carbon Emissions Assessment and Monitoring Tool

www.wacclim.org/ecam



Energy Efficiency

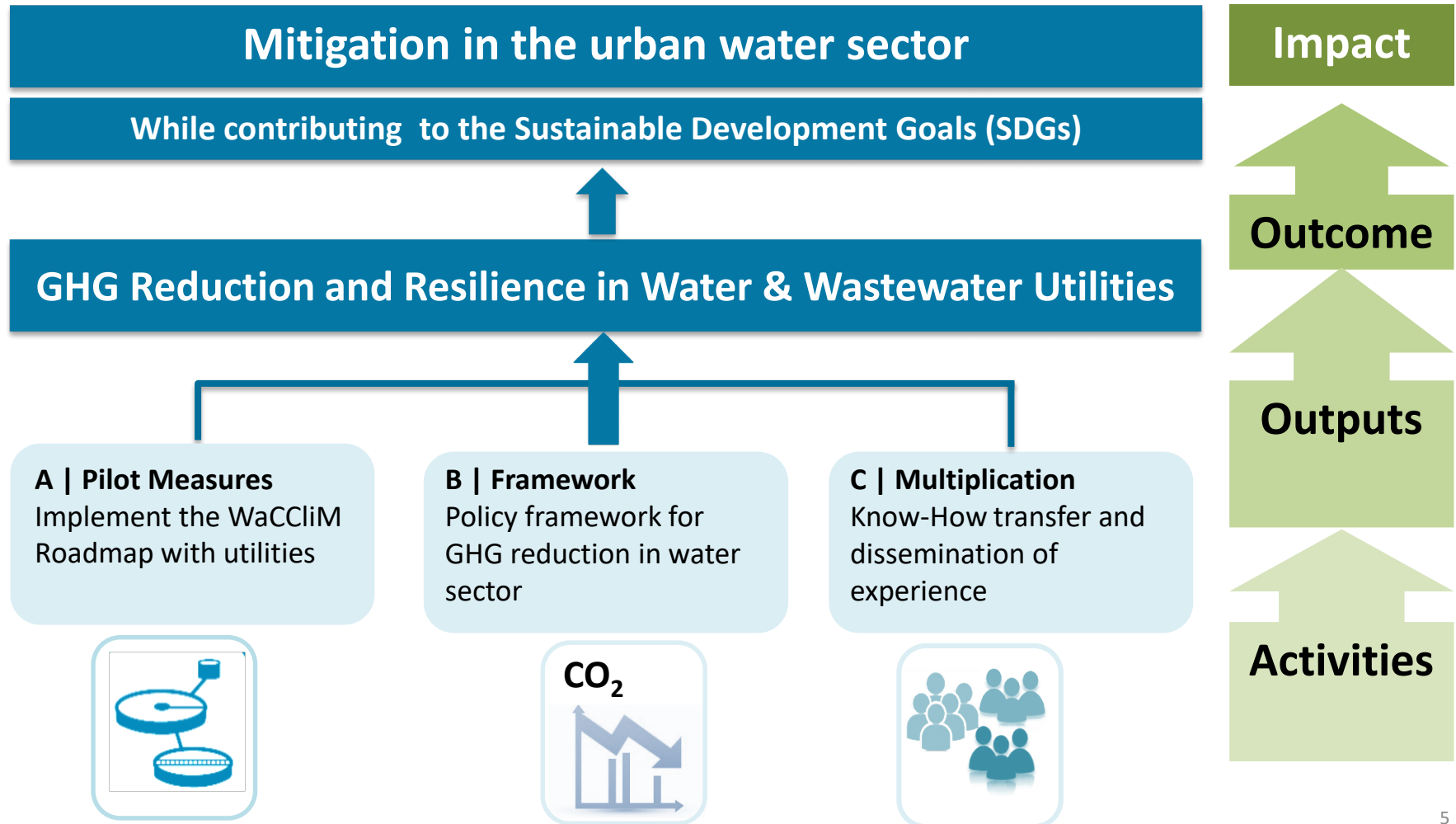


GHG
Assessment

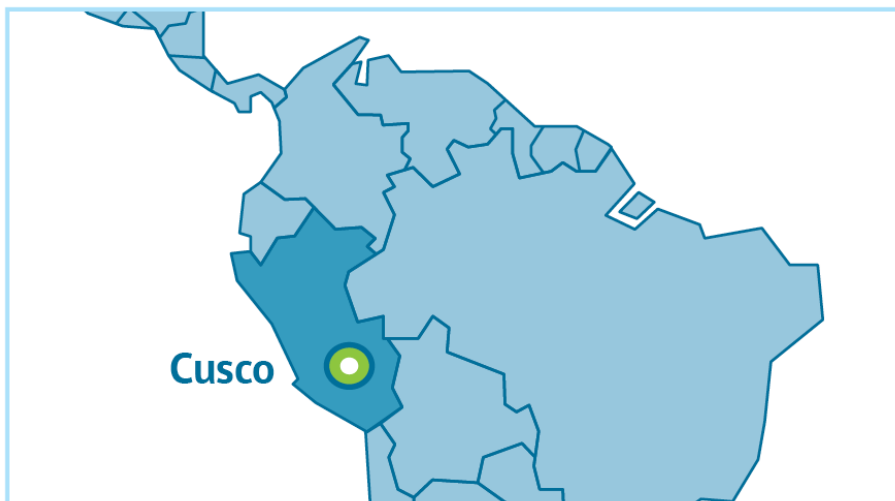
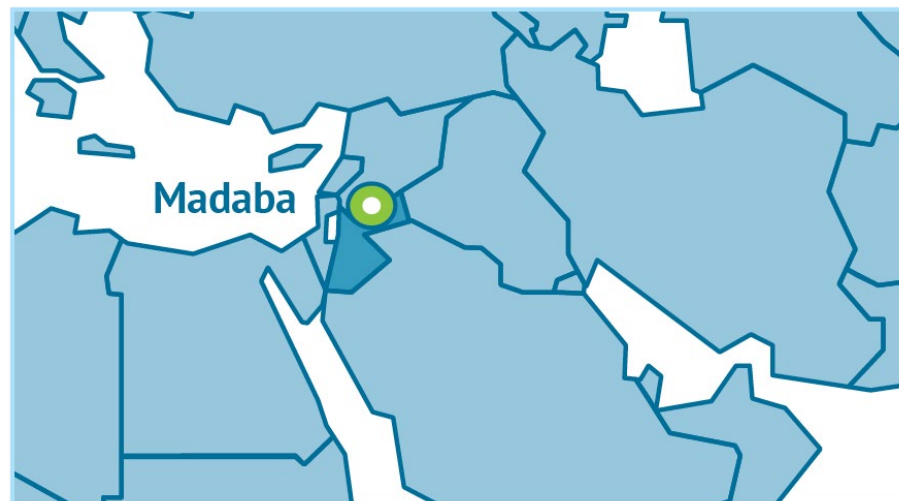


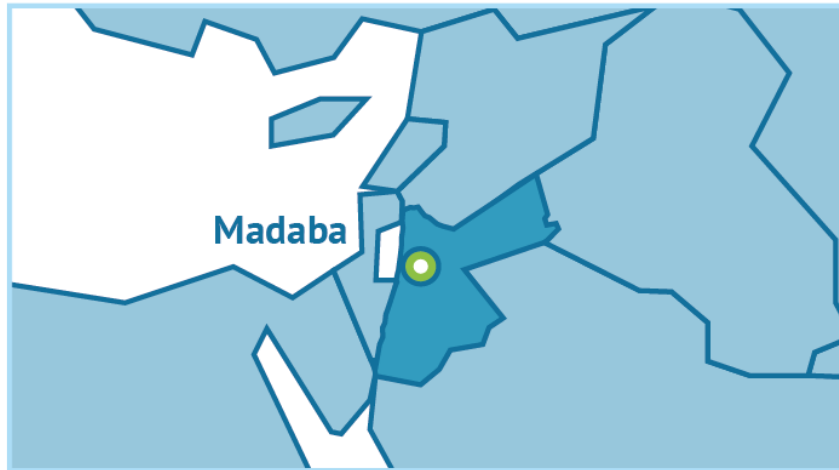
Opportunities

- Free & Open Source
- Online Tool
- IPCC Methodology
- MRV



Where do we work?

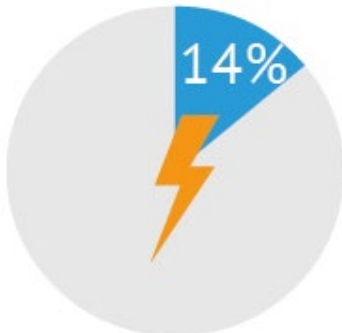




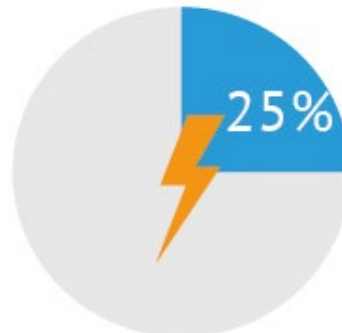
Key Facts

- Most water stressed country in the world
- 14 % of national energy consumption attributed to water supply

2015

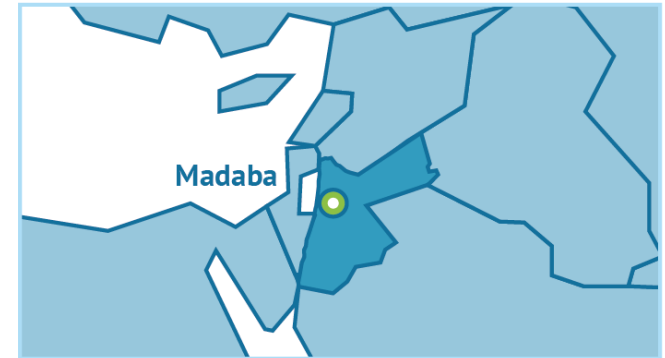


BAU 2030



Madaba Governorate

- Madaba Population: 200,000.00 people (2018)
- Madaba Area: 1000 km²
- Water Supply: 9.8 million m³ (2018)
- Number of Subscribers: 33,800
- Water supply per capita: 134 L/day
- Operated by the Jordan Water Company /Miyahuna - Madaba Water Management



Madaba Water and Wastewater Facilities

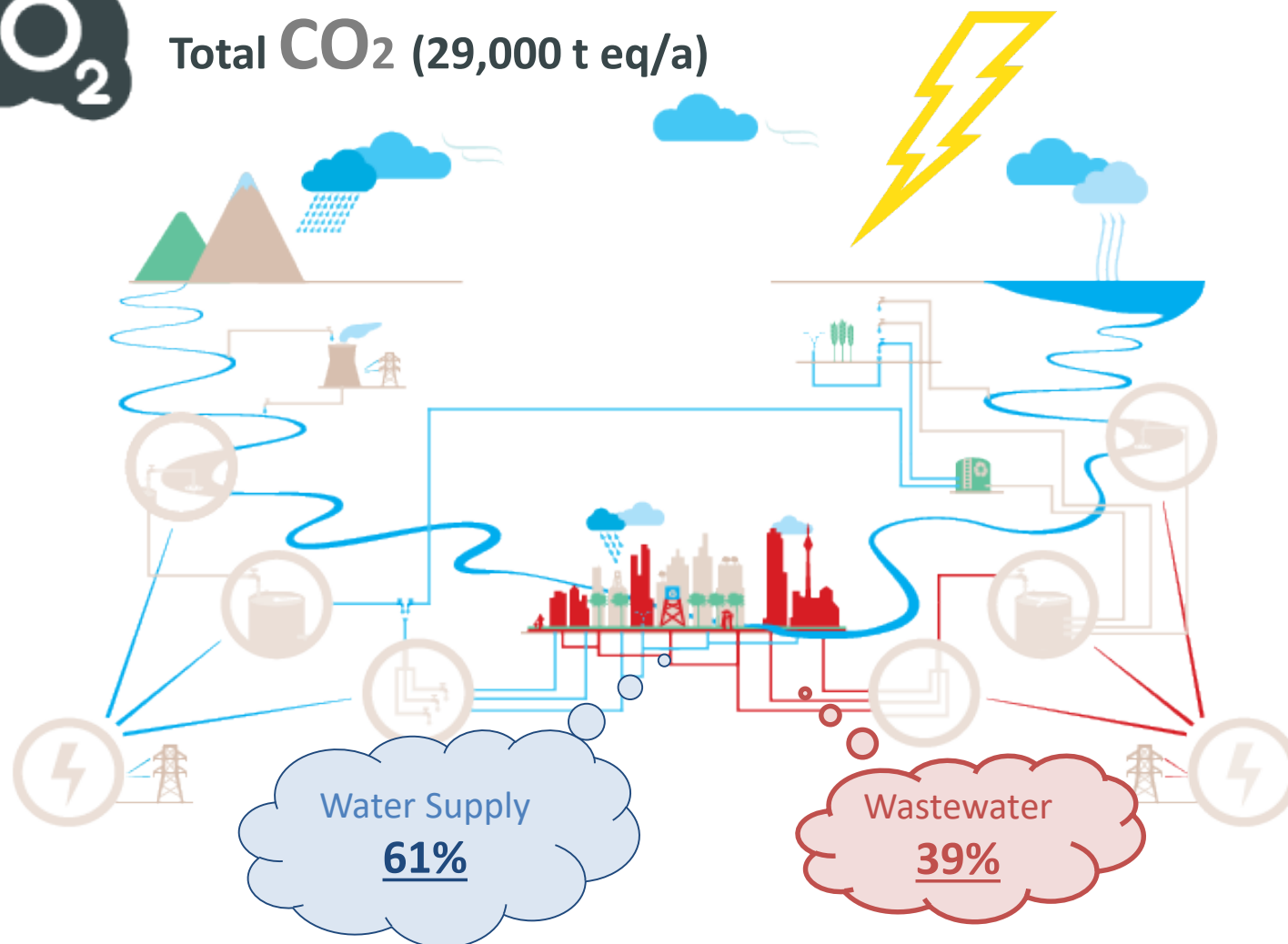
- Madaba Governorate Supply its water from local resources from Al-Wala and Al-Heedan Aquifer.
- Total water production is **1200 m³/hour** from 15 groundwater wells of different production capacities.
- 6 Pumping Stations and 5 Storage Reservoirs in Madaba Governorates.
- Madaba Wastewater Treatment Plant has a design capacity of 7600 m³/day.
- Average wastewater flow is **7,500 m³/day**.

Madaba Urban Water Cycle - Baseline



Total **Energy** consumption (30.5 million kWh)

Total **CO₂** (29,000 t eq/a)



ECAM: Baseline Study and Mitigation Options

Detailed Assessment- Water Supply



Non Revenue water Assessment



ORIGINAL	FREQUENCY	FREQUENCY	FREQUENCY
Complaints	2014	2015	2016

Detailed Assessment- Wastewater



Wastewater Treatment

INPUTS	OUTPUTS — Energy performance
Description Energy consumed from the grid (mwh_{grid}) Volume of treated wastewater ($\text{m}^3_{\text{treated}}$) Influent BODS load ($\text{kg}_{\text{BODS}}/\text{m}^3_{\text{infl}}$) Effluent BODS load ($\text{kg}_{\text{BODS}}/\text{m}^3_{\text{eff}}$) BODS mass removed ($\text{kg}_{\text{BODS}}/\text{m}^3_{\text{removed}}$)	Description Energy performance

Wastewater D

INPUTS
Description Energy consumed from the grid (mwh_{grid}) Volume of treated or untreated discharged ($\text{m}^3_{\text{discharged}}$) Energy recovered during wastewater disposal

GHG and Energy Projections

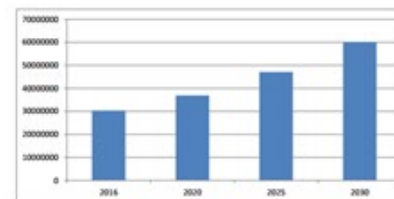


Figure 23. Electricity Consumption projection in kWh for Madaba

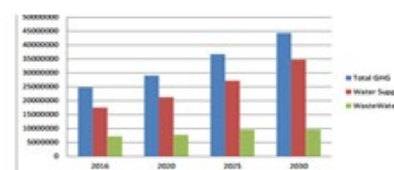
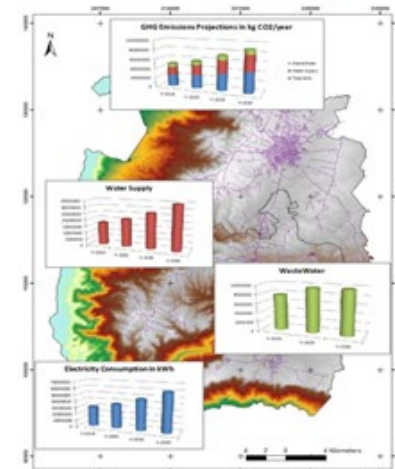


Figure 22. GHG Emissions Projections in kg CO2eq/year for Madaba



ECAM 2.0

Energy Performance and Carbon Emissions
Assessment and Monitoring Tool

Energy Consumption in Madaba Water Facilities

- Costs of energy consumption in Madaba Water facilities reached to **4.2** million JOD in 2018.
- Average Energy Consumption in Al Heedan wells is **0.60 kWh/m³**, with a total energy consumption of **6.3 million kWh** in 2018.
- Costs of Energy Consumption in **Al Heedan wells** = **790,000 JOD** in 2018.
- Average Energy Consumption in Madaba Reservoir Pumping Station is **0.63 kWh/m³**,



Energy Consumption in Madaba Water Facilities

- Total energy consumption in Madaba Reservoir Pumping Station of **4.1** million kWh; cost = **385,000 JOD** (Baseline).
- Costs of Energy Consumption **in 2018** reached to **450,000 JOD**.
- Energy Consumption in Madaba Wastewater Treatment Plant = **2.3** million kWh/Year = **340,000 JODs** in 2018.




Energy efficient
pumps in reservoir

Optimised
wastewater
treatment

Photovoltaics in
wastewater handling

Identifying and preparing optimal project design &
accessing climate funds

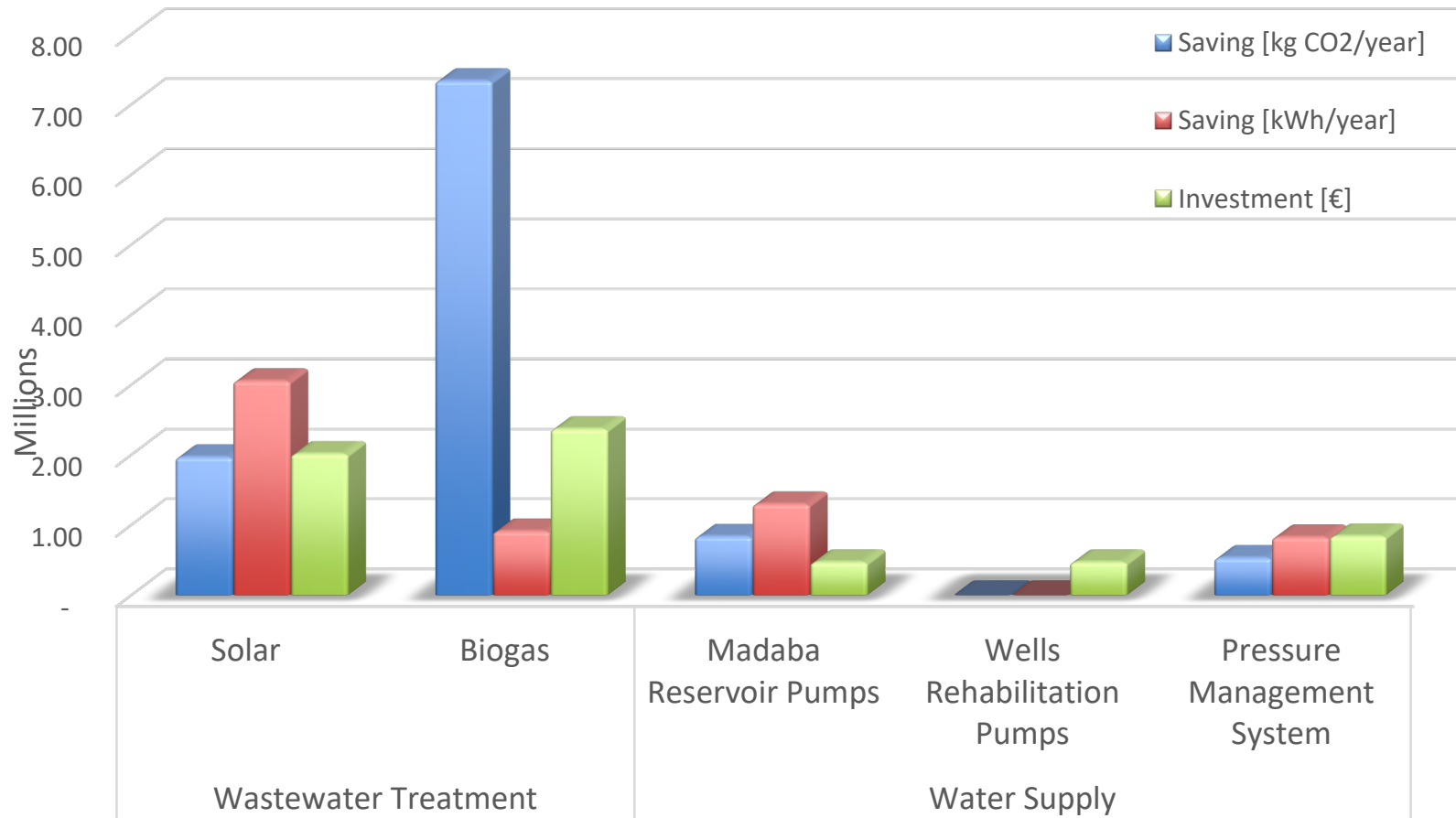
11,000 t/a 

Saving
1 Mio. \$/a 

6 GWh/a 

190,000 

Feasibility Assessment



Energy Efficiency in Madaba Reservoir Pumping Station - WaCCliM

The new system is in place:

- 6 energy efficient pumps; 3 HH & 3 LH, controlled by Variable Frequency Drives (VFDs) to maximize the savings.
- 2 pumps are operating and the rest will be operated by end of March 2019.



Before



New system

Energy Efficiency in Madaba Reservoir Pumping Station - WaCCliM

- This initiative is sought to reduce energy consumption and water losses **at pumping station** and provide better service to the customers.
- Initial estimations shows **32% energy saving** (1.3 million kWh/Year; 180,000 JODs*) from the current energy consumption.

* Tariff = 0.138 JODs

Visit:

www.wacclim.org

www.climatesmartwater.org



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