CAIRO Water Week 2021

PROJECT ATLANTIS

Technische Universität Berlin

Wastewater treatment plants as a resource for water, energy and nutrients in arid zones in Egypt

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Cairo Water Week 2021

Monday, 25.10.2021

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Wastewater treatment plants as a resource for water, energy and nutrients in arid zones (ATLANTIS)

- Aim of the project is the preparation of a feasibility study for the conversion of two existing plants in Egypt to a resource for water, energy and nutrients ➔ results transferable to countries in MENA
- Addressing sewage sludge disposal options, utilization and storage:
- Project partners

German Water Partnership
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Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Building Partnerships for a ENVIRONMENTAL PROTECTION made in Germany Sustainable Infrastructure

based on a decision of the German Bundestag

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Adapted plant concept based on local discharge limits for zero-energy waste water treatment and sludge disposal

Adapted treatment process

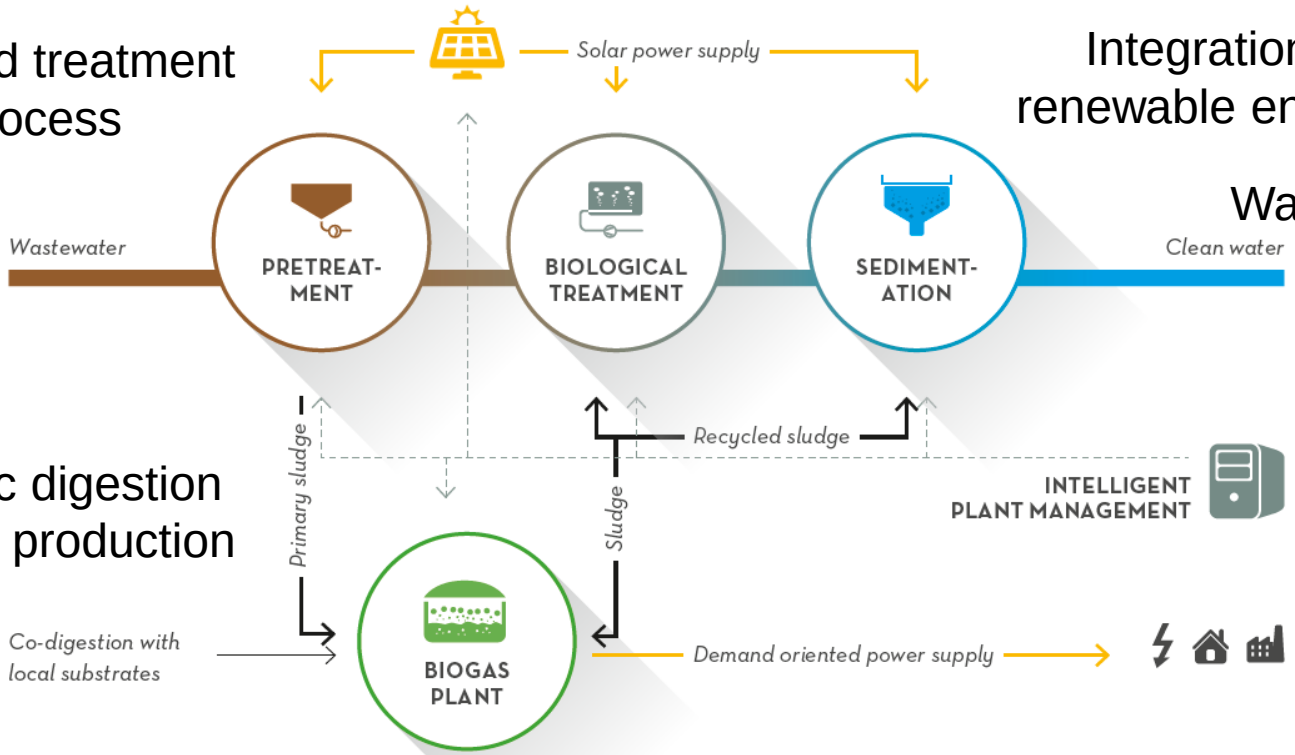
Integration of renewable energies

Water and nutrients for farming

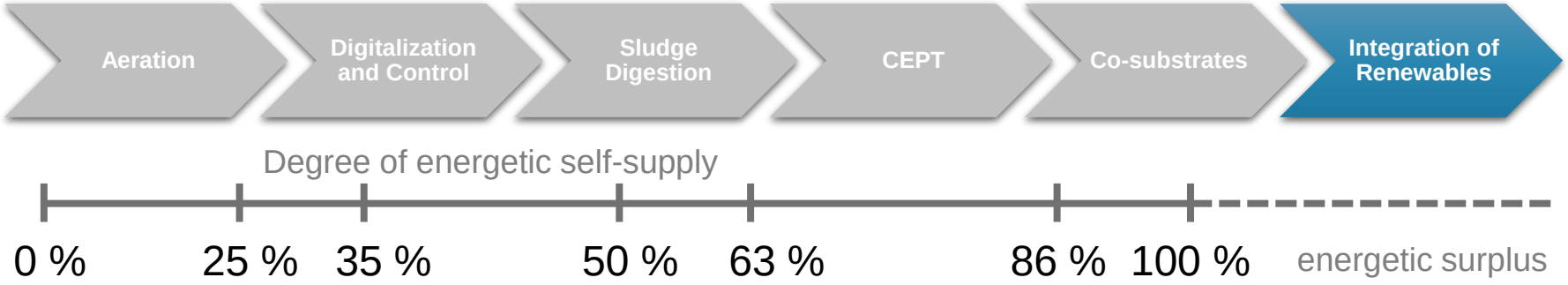
Anaerobic digestion for biogas production

Monitoring of plant conditions

Generation of surplus power



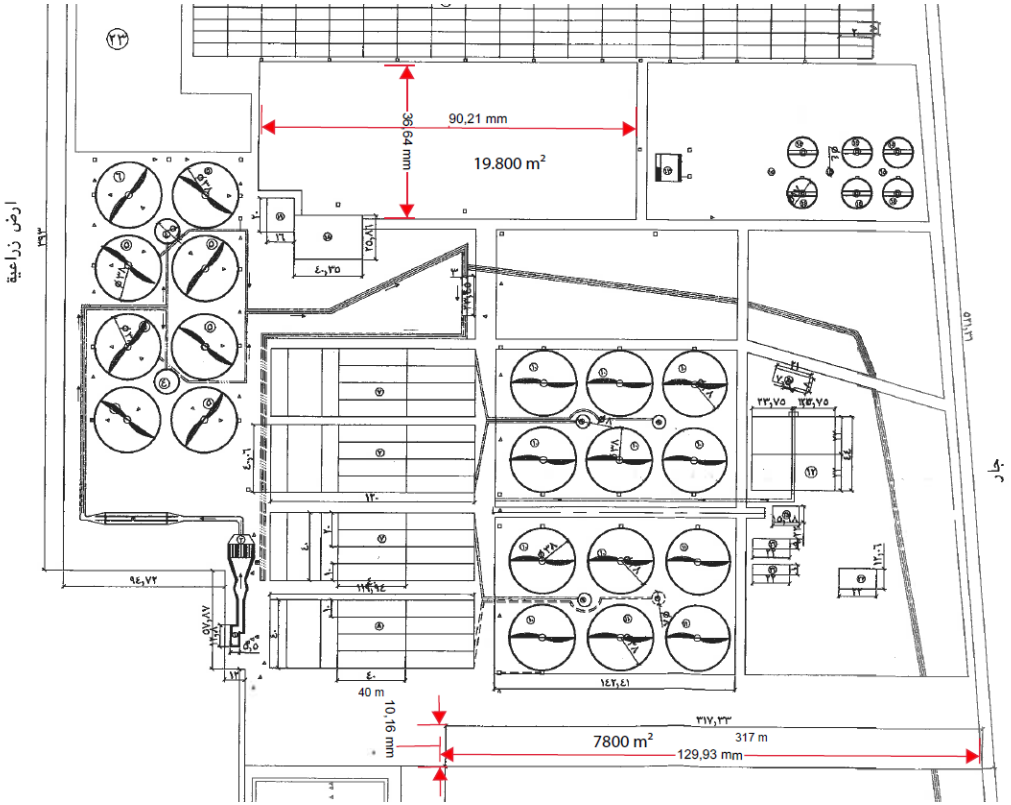
Wastewater treatment plants ➔ Conversion into power plants!



Example of solar photovoltaic (PV) systems on the free spaces of the plant

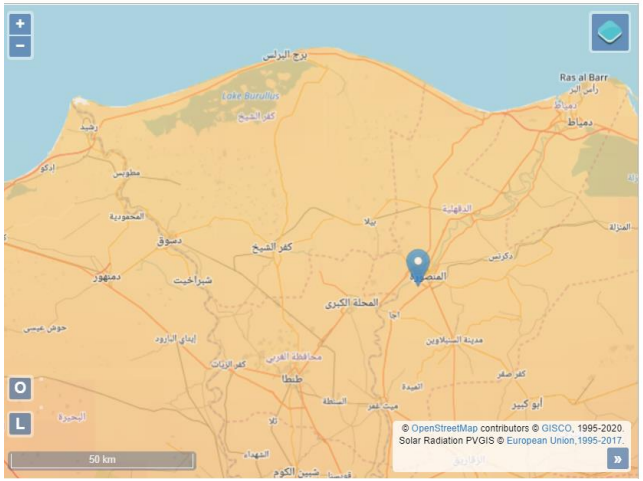
- ➔ Support of aeration systems during daytime
- ➔ Easy scalable to available spaces and plant dimensions
- ➔ Short amortization time due to high solar radiation

WWTP Mansoura: example of integration of renewables

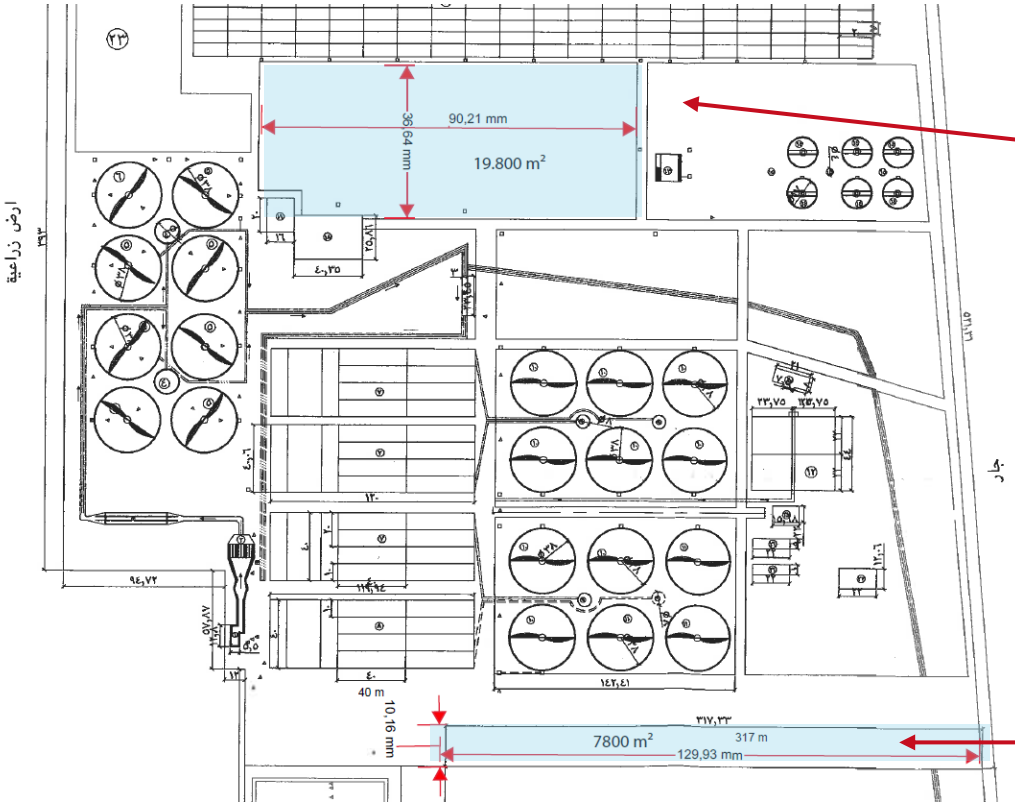


Location: Mansoura, Egypt

Location [Lat/Lon]	31.010, 31.360
Horizon	Calculated
Database used:	PVGIS-SARAH
PV technology:	Crystalline silicon
PV installed [kWp]:	4778,55
System loss [%]:	15



WWTP Mansoura: two exemplary solar fields



19,800 m² → 9,350 modules

Solar PV power plant performance

4,778.5 kW peak

Yearly PV solar energy generation

8,222,150 kWh

Yearly in-plane irradiation

2,298 kWh/m²

7,800 m² → 3,565 modules

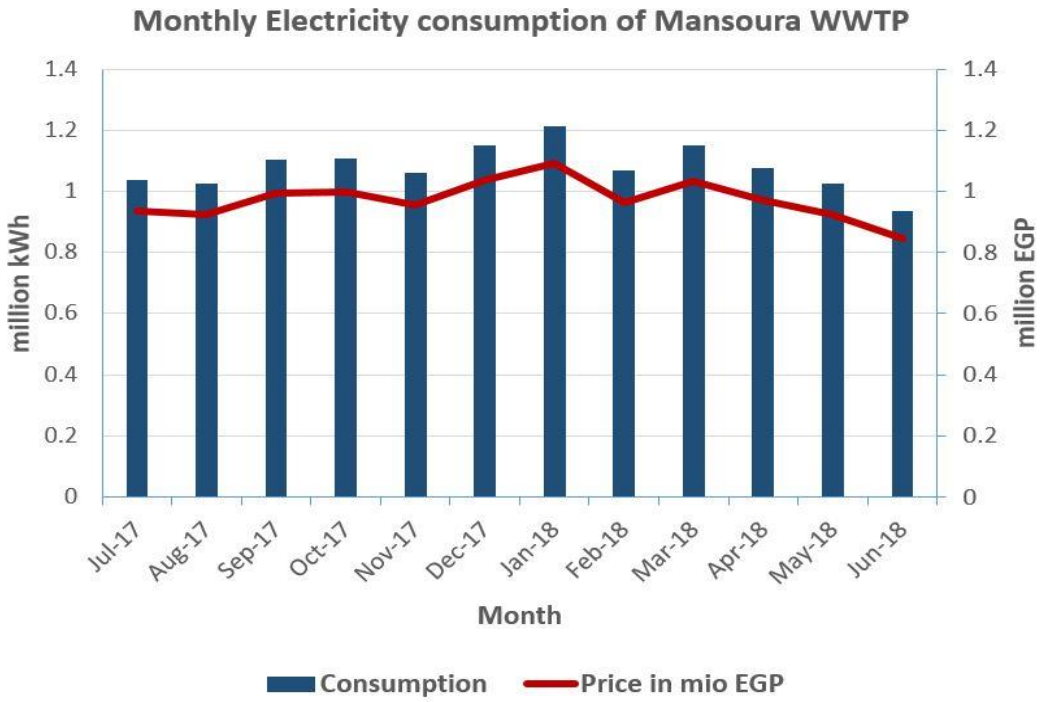
WWTP Mansoura: electricity consumption for aeration

Yearly electricity consumption:

- 12,950,000 kWh

Total costs for electricity:

- 970,000 EGP/month



➔ Yearly PV solar energy generation could cover
63 %
of the electricity demand before any optimization

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WWTP Mansoura: economic calculations

Specific costs for 1 kWp solar PV	**1,300**	**US $ / kWp**
Estimated plant costs	**6,212,000**	**US $**
Amortization time at given energy demand	**8.4**	**years**

➔ All calculations do not include efficiency gains of process optimization

Thank you for your attention!

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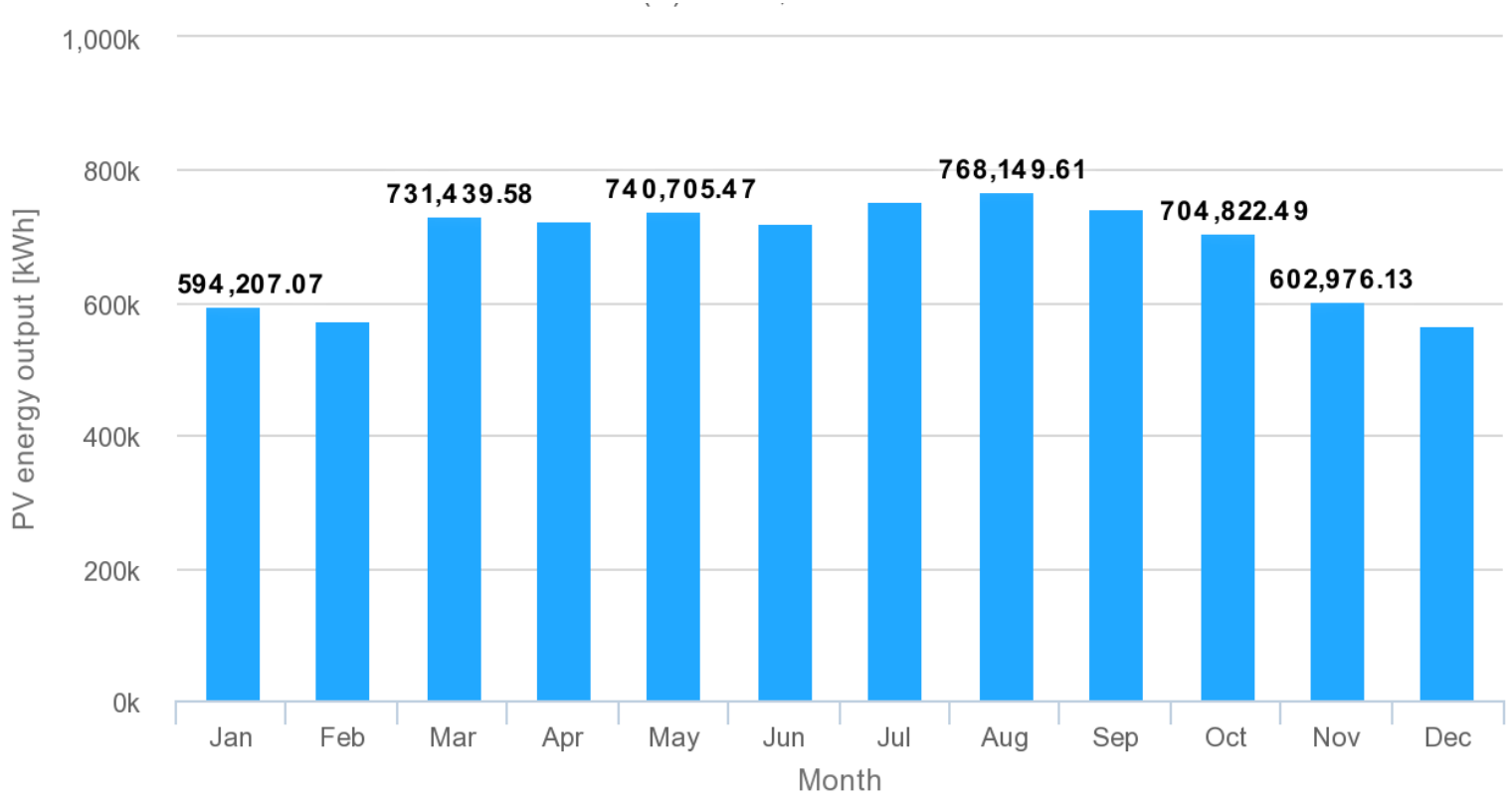
Monthy energy output from fix angle PV system



Online Workshop for the „Optimization of wastewater treatment plants“

1.

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