



Republic of North Macedonia  
**Ministry of Environment  
and Physical Planning**

# Turning wastewater into a resource the example of Skopje WWTP

**Lindita Shakiri**



Republic of North Macedonia  
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International Association  
of Water Service Companies  
in the Danube River  
Catchment Area

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# Introduction of the Skopje WWTP

- National importance
- North Macedonia is an EU candidate member state.
- The project will support North Macedonia's process for gradual compliance with EU standards and regulations on water, sanitation and the environment, and will provide the base for a possible accession agreement in the environmental chapter.
- UWWT Directive (91/271/EEC)
- EU Finance

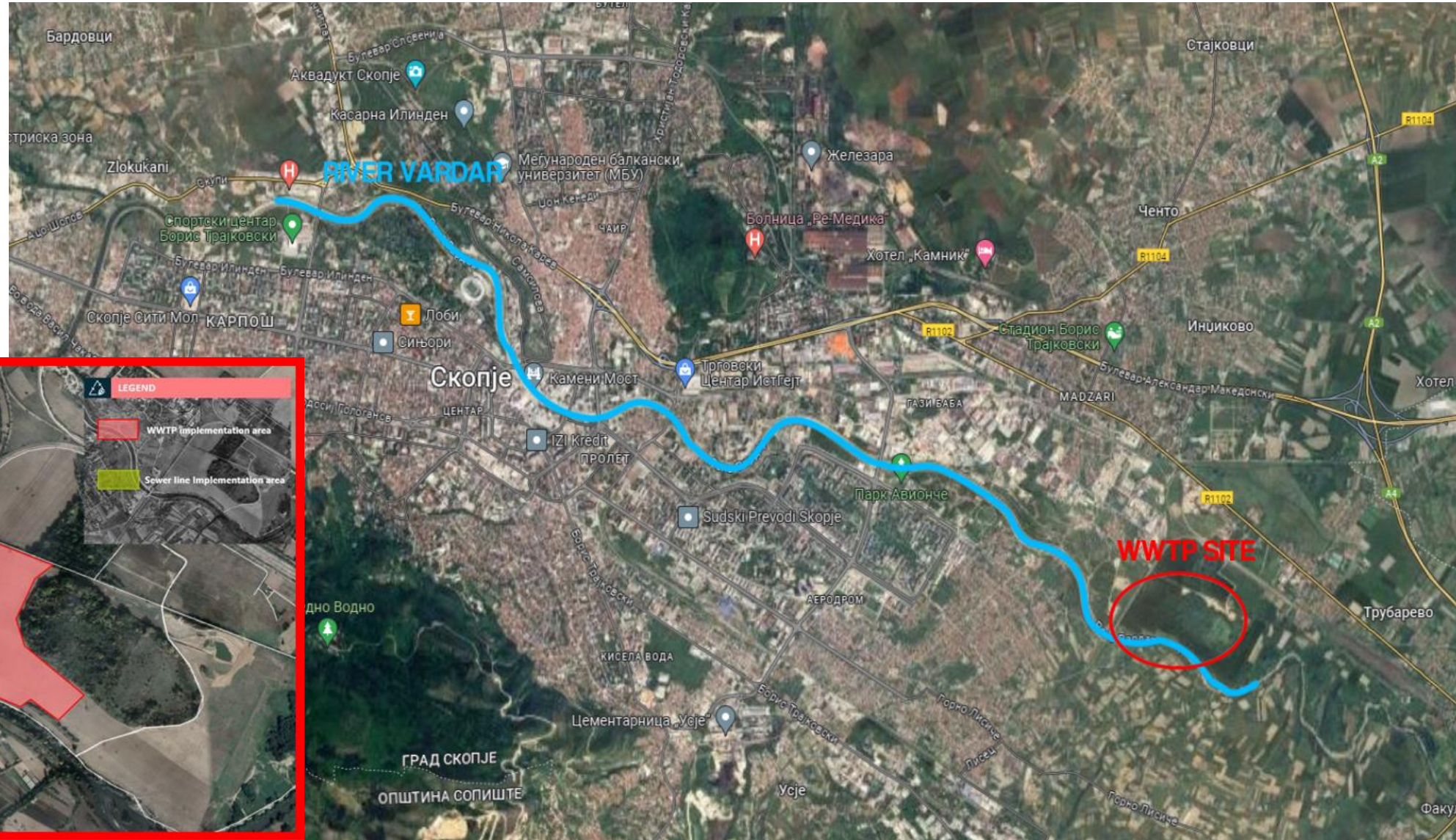
<b>EIB</b>	<b>68.000.000 EUR (loan)</b>
<b>EBRD</b>	<b>58.000.000 EUR (loan)</b>
<b>WBIF</b>	<b>69.784.283 EUR (grant)</b>



# Main characteristics of the Plant (Location)

The site is located in south eastern side of the City of Skopje.

Site size = 91.90 ha



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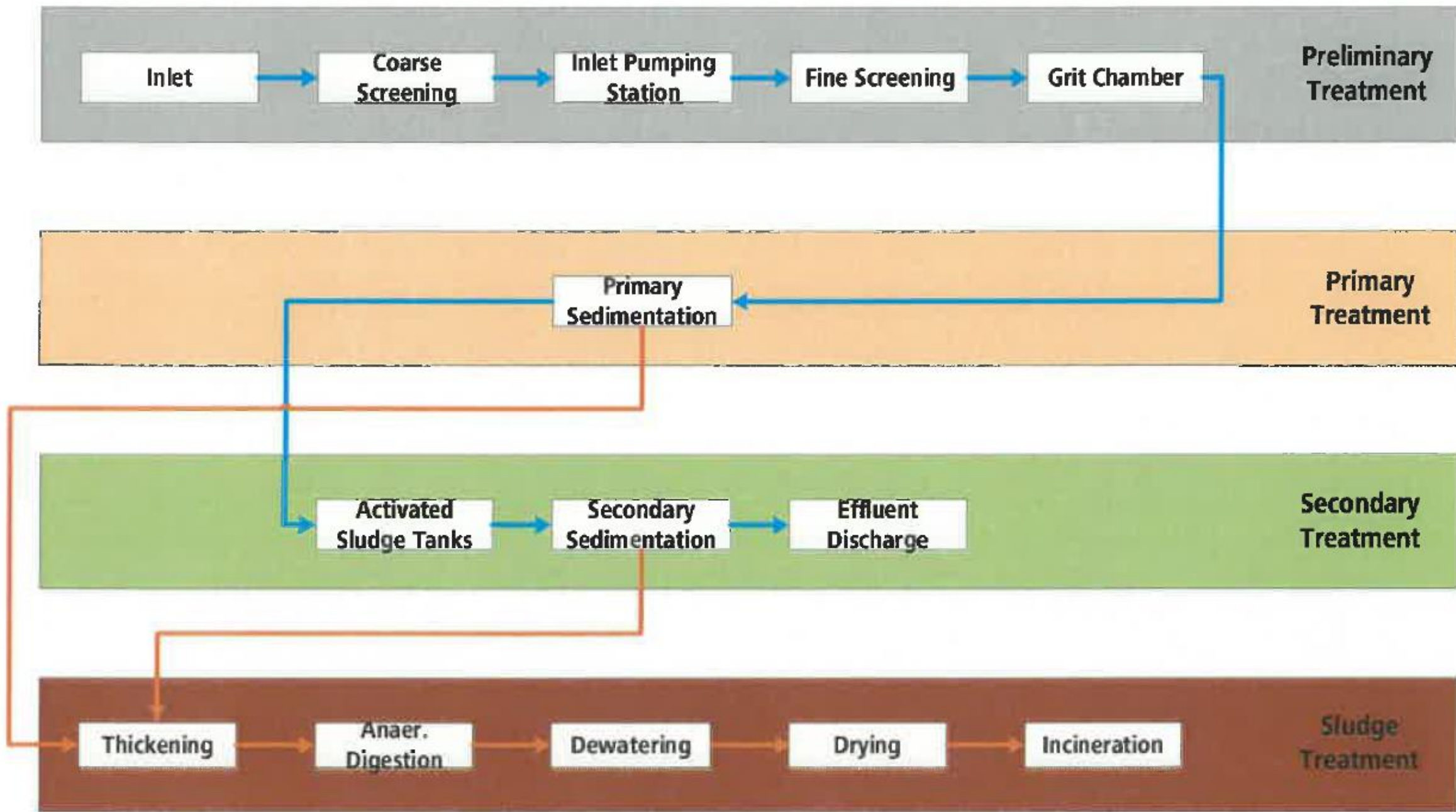


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# Main characteristics of the Plant (Capacity and Process)

- The WWTP is design for Horizon 2045
- Up to 650.000 p.e.
- Preliminary Treatment
- Primary Treatment
- Secondary Treatment
- Sludge treatment including sludge incineration





# Main characteristics of the Plant

# (Design loads and flow)

- The WWTP can operate in regimes = Incoming wastewater loads range from 33 to 100% of the design loads.
- Design Loads BOD5 - (quantity of sludge) = **39,000 kg/day (maximum)**
- Design Flows – (quantity of water) = **171,000 m<sup>3</sup>/day (maximum)**
- Minimum performance levels to be achieved. (according to UWWT Directive (91/271/EEC))

MINIMUM PERFORMANCES LEVELS TO BE ACHIEVED

Parameters	Minimum performances levels	
	Concentration (mg/l)	Treatment efficiency (%)
BOD <sub>5</sub>	25	70-90
COD	125	75
TSS	35	90
N total	-	-
P total	-	-

LONG-TERM OBJECTIVES

Parameters	Year 2045	
	Concentration (mg/l)	Treatment efficiency (%)
BOD <sub>5</sub>	25	70-90
COD	125	75
TSS	35	90
N total	10	70-80
P total	1	80



# Energy Generation

- **Sources of renewable energy proposed for Skopje WWTP are:**

- **Co generation:**

- CHP Combined Heat Power Biogas Utilization (Generating up to approx. 10.700.000 kWh)

- **Steam – Generation:**

- Turbine Incineration Plant (Generating up to approx. 800.000 kWh)

- **Solar Power Plants:**

- 1.5 MWp and 0.5 MWp (Generating up to approx. 3,170,000 kWh)





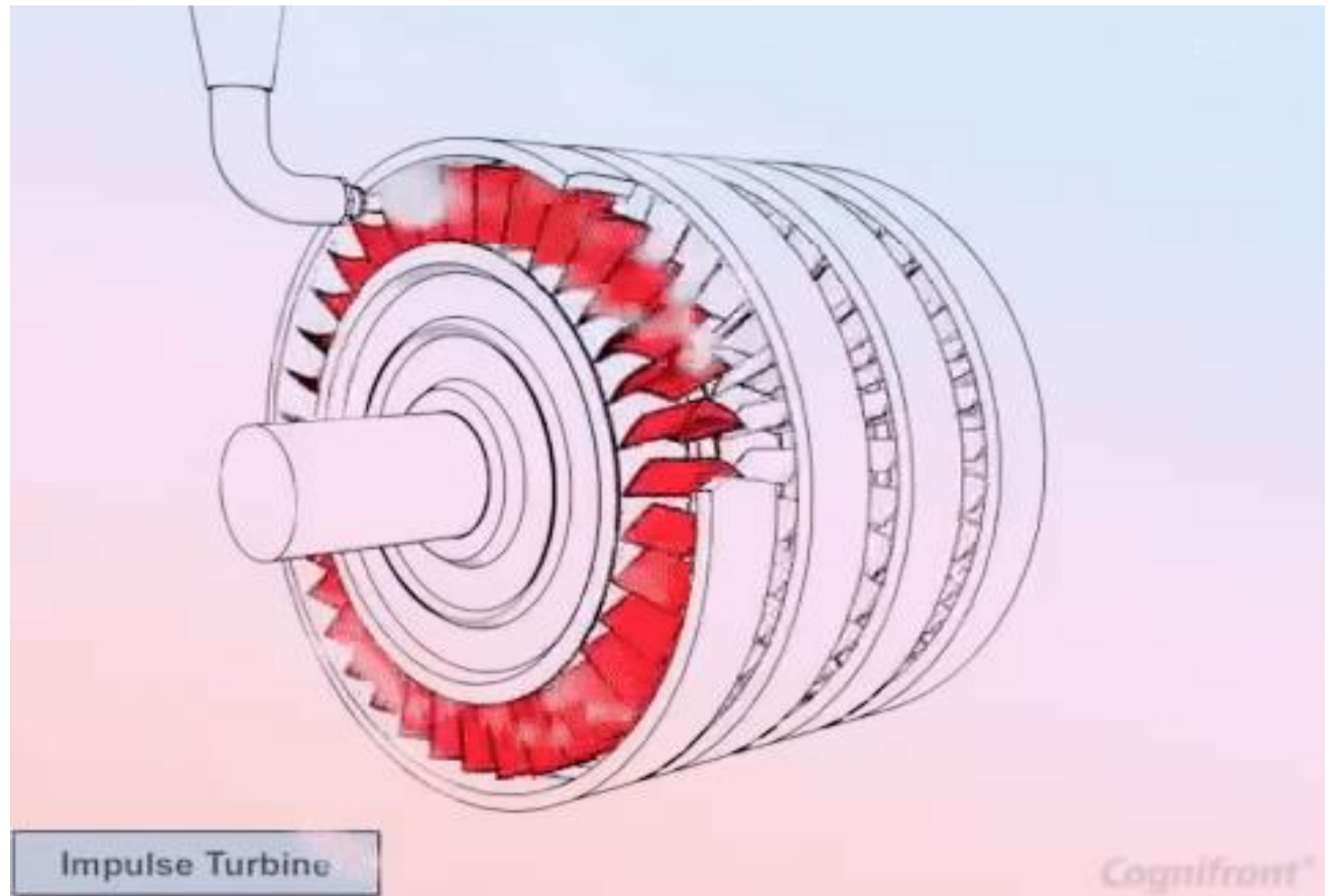
# Co-generation

- In Skopje WWTP, the CHP Combined Heat Power Biogas Utilization can generate up to approx. 10.700.000 kWh per year.



# Steam Generator

- In Skopje WWTP, the steam turbine can generate up to approx. 800.000 kWh per year.



# Solar Power Plants

- Two solar power plants will be built.
- 1.5 MWp and 0.5 MWp
- In total, the Solar Power Plants will contribute to an average annual electricity production of 3,168,000 kWh.



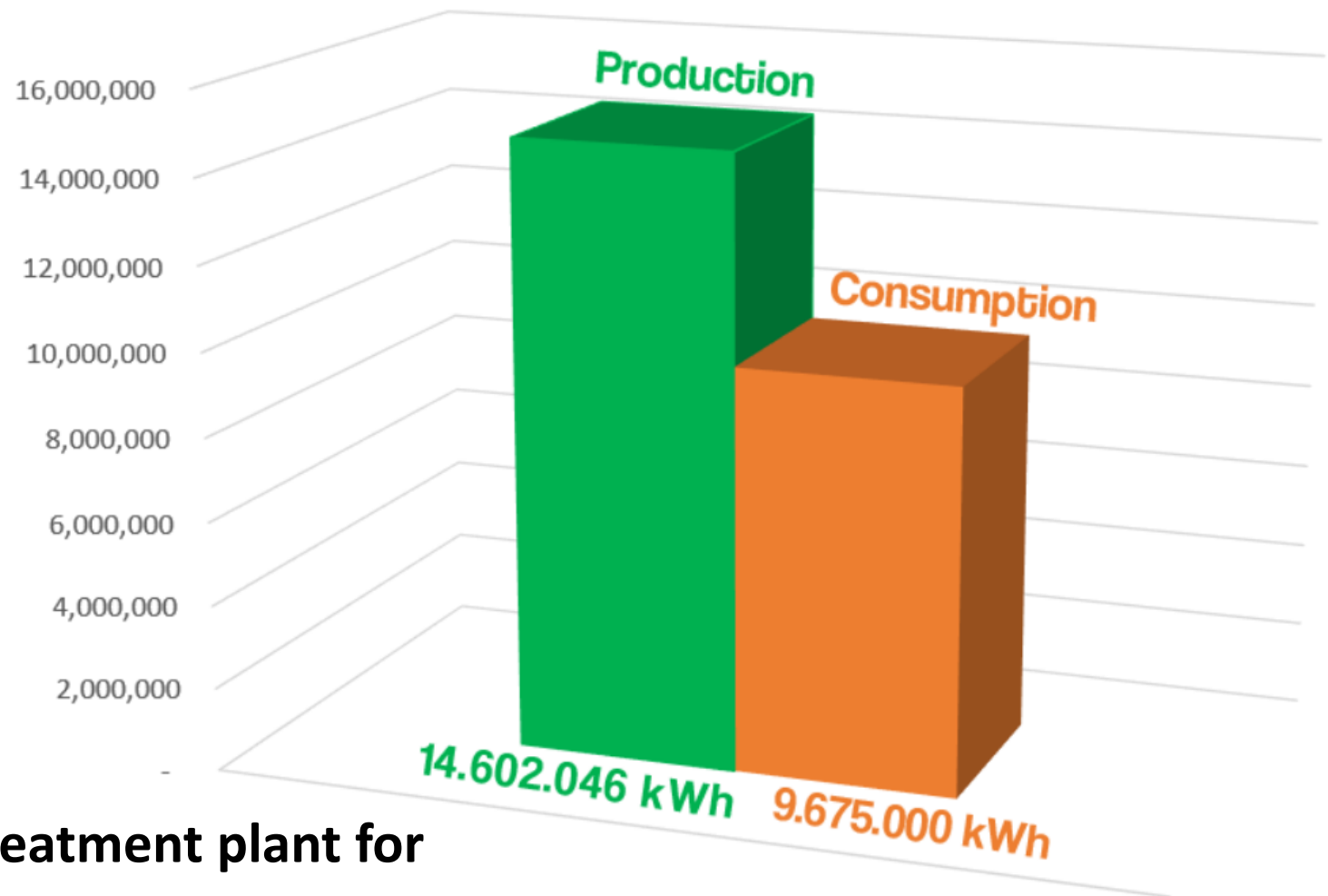
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# Summary energy production

Electricity	Unit	Annual Quantit
Production of electricity by CHP	kWh	10.671.674
Production of electricity by Steam turbine	kWh	3.167.000
Production of electricity by PV-Plant	kWh	762,372
<b>Total</b>		<b>14.602.046 kW</b>
<b>Skopje WWTP Electricity Demand</b>		<b>9,675,000 kWh</b>



**Skopje WWTP will not just be a treatment plant for wastewater – it will be green energy power plant.**



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# Other possibilities (reuse of the ash residuals)

- 1. Construction Materials**
- 2. Road Construction**
- 3. Soil Amendment and Fertilizers**
- 4. Metals Recovery**



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# Thank you for your attention!

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