Part-financed by the European Union
(European Regional Development Fund)

# Feasability report Silale

**Municipality of Silale**

2014

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## EUROSLAM TECHNOLOGY AND COST ANALYSIS QUESTIONNAIRE: WWTP WITH EXI

| GENERAL INFORMATION | |
|---|---|
| WWTP Name: Šilalė town biological wastewater treatment plants | |
| Type: Municipal WWTP | |
| Name of Municipality/Organisation: Šilalė municipality | |
| Plant location: Lentinės villige, Šilalės region | |
| Contact Name, Phone Number: E. Auškalnis +37069959865 | |
| E-mail: silvanduo@is.lt | |
| WWW: | |
| Google Maps: | |
| Photos: | |
| Average flow rate by design | |
| Maximum flow rate by design | 2 800,00 |
| PE dimension by design | |

| WASTEWATER TREATMENT ----------> 2012 average day | ------> WWTP Pr |
|---|---|
| **Raw sewage** | |
| Real flow rate average | 832,00 |
| Real flow rate maximum | 2 603,00 |
| Real PE dimension | |
| COD | 830,25 |
| BOD7 | 538,17 |
| N | 76,67 |
| P | 10,88 |
| **Primary treatment** | |
| HRT | |
| **Primary Sludge (PS)** | |
| Flow rate | 1 583,00 |
| TS | |
| VS (% TS) | |
| **Activated sludge tank** | |
| Flow rate | 832,00 |
| Volume | 2 800,00 |
| BOD7 at the inlet | 538,17 |
| COD5 at the inlet | |
| Type of aereation | Diffuse |
| Oxygen concentration | |
| MLSS | 234,00 |
| MLVSS | |
| Sludge load | |
| Sludge age | |
| **Nitrogen removal** | |
| Type | Upstream bio |
| External carbon sources used | No |
| Quantity of external carbon source necessary for denitrifying | |
| Type of carbon source used for denitrifying | |
| Nitrates to remove | |
| Volume of the anoxic zone in the biological reactor | |

| **Phosphorus removal** | |
|---|---|
| Biological removal (Bio-P) | Yes |
| Chemical P-precipitation | No |
| Simultaneous | No |
| **Secondary clarification** | |
| HRT | |
| SVI | |
| Bulking | |
| Foaming | |
| **Return Activated Sludge (RAS)** | |
| Flow rate | |

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## EUROSLAM TECHNOLOGY AND COST ANALYSIS QUESTIONNAIRE: WWTP WITH EXI

| | |
|---|---|
| TS | |
| Load | |
| VS (% TS) | |
| **Waste Activated Sludge (WAS)** | |
| Flow rate | |
| TS | |
| Load | |
| VS (% TS) | |
| **Effluent characteristics** | |
| **COD** | 65,72 |
| **BOD7** | 9,16 |
| N residual | 18,07 |
| P residual | 1,33 |
| TSS | |

| **SLUDGE THICKENING** | -------> MORE: TECH |
|---|---|
| **Thickened Primary Sludge (TPS)** | |
| Equipment | |
| Flow rate | |
| TS | |
| TS load | |
| VS (% TS) | |
| VS load | |
| Flocculant | |
| Flocculant quantity | |
| **Thickened Waste Activated Sludge (TWAS)** | |
| Equipement | |
| Flow rate | |
| TS | |
| TS load | |
| VS (% TS) | |
| VS load | |
| Flocculant | |
| Flocculant quantity | |

| **MIXED DIGESTER FEED ----> BEFORE PRE-TREATMENT** | -------> MORE: TECH |
|---|---|
| Flow rate | |
| Wet Feedstock Consumption | |
| Wet Feedstock Consumption | |
| Sludge | |
| Sludge load | |
| Another Fuel ------ > see: Expenses. Fuel Cost. | |
| Another Fuel load | |
| Total Solids Fraction of Wet Feedstock (kg/kg) | |
| TS load | |
| Ratio of Volatile Solids to Total Solids in Feedstock (kg/kg) | |
| VS load | |
| Inorganic solids load | |
| % of TPS in mixed digester feed | |
| % of TWAS in mixed digester feed | |

| **FEESTOCK PRE-TREATMENT** | -------> MORE: TECH |
|---|---|
| Technology: | |
| Technology: | |
| Technology: | |
| Manufacturer | |
| …….. added | |
| Manufacturer | |
| Dosage | |
| ……..cost | |

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## EUROSLAM TECHNOLOGY AND COST ANALYSIS QUESTIONNAIRE: WWTP WITH EXI

| | |
|---|---|
| Total electrical energy associated with feedstock pre-treatment | |
| Total electrical energy cost associated with feedstock pre-treatment | |
| Total heat associated with feedstock pre-treatment | |
| Total heat cost associated with feedstock pre-treatment | |

| ANAEROBIC DIGESTION | -------> MORE: TECH |
|---|---|
| **Anaerobic digestion** | |
| Anaerobic Digestion System: | |
| Types of Anaerobic Reactors: | |
| Manufacturer | |
| Nº of digesters tanks | |
| Volume per digester tank | |
| Total volume of digestion | |
| Temperature in digester Nº 1 | |
| Temperature in digester Nº 2 | |
| Operational pressure | |
| Capacity, throughput | |
| HRT | |
| Gas storage capacity | |
| **Digester feed** | |
| Total Solids Fraction of Wet Feedstock (kg/kg) | |
| TS load | |
| Ratio of Volatile Solids to Total Solids in Feedstock (kg/kg) | |
| VS load | |
| Wet Feedstock Consumption | |
| Wet Feedstock Consumption | |
| …….. added | |
| Manufacturer | |
| Dosage | |
| ……..cost | |
| **Performances** | |
| Biodegradability (kg VS destroyed/kg VS added) | |
| VS reduction in loading (∆) | |
| TS reduction | |
| TS reduction in loading (∆) | |
| **Biogas & Methane** | |
| Biogas production | |
| Biogas production | |
| Biogas production (Nm3/kg VS destroyed) | |
| Biogas produced per VS fed | |
| Methane Concentration in Biogas | |
| Biogas for cogeneration | |
| Biogas flared | |
| Biogas for other uses | |

| BIOGAS UPGRADING | -------> MORE: TECH |
|---|---|
| Technology description: | |
| Manufacturer | |
| Biomethane capacity | |
| Biomethane quality --- vol.-% CH4 | |
| Losses | |
| Utilisation | |
| Total electrical energy associated with biogas upgrading | |
| Total electrical energy cost associated with biogas upgrading | |

| ELECTRICAL ENERGY | -------> MORE: TECH |
|---|---|
| Plant electricity consumption per year (KWh) | |
| Total electrical energy cost | |
| Total electrical energy associated with aeration | |
| Total electrical energy cost associated with aeration | |

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| | |
|---|---|
| Total electrical energy associated with AD | |
| Total electrical energy cost associated with AD | |
| Power generation facilities | |
| Power in Biogas (kW) | |
| Gross Electrical Capacity (kWe) | |
| Net Electrical Capacity (kWe) | |
| Availability of CHP | |
| CHP operational hours per year | |
| Net Efficiency -- Biogas to Electricity (%) | |
| Gross Efficiency -- Biogas to Electricity (%) | |
| Purchased power cost | |
| Aggregate sales price for power | |

| HEAT | -------> MORE: TECH |
|---|---|
| Total heat associated with AD | |
| Total heat cost associated with AD | |
| | |
| Total heat production rate (kWth) | |
| Aggregate fraction of heat recovered (%) | |
| Recovered heat (kWth) | |
| Installed heating power | |
| Plant heat consumption per year | |
| Purchased heat cost | |
| Aggregate sales price for heat | |

| SLUDGE DEWATERING | -------> MORE: TECH |
|---|---|
| Equipment | |
| Manufacturer | |
| Polymer added | ZETAG 7557 |
| Dosage | 2,40 |
| Polymer cost | 18,00 |
| Cake dryness | 25,00 |
| Total electrical energy associated with dewatering | |
| Total heat associated with dewatering | |

| SLUDGE FOR DISPOSAL | -------> MORE: TECH |
|---|---|
| Final use | |
| Biosolids disposal cost | |
| Biosolids load for disposal (dry matter) | 578,00 |
| Biosolids load for disposal (wet matter) | |

| STING AD |
|---|

| |
|---|
| |
| |
| |
| |
| |
| |
| |
| |
| |
| **m³/d** |
| **m³/d** |
| **PE** |

| ocess Flow Diagram |
|---|
| |
| **m³/d** |
| **m³/d** |
| **PE** |
| **mg/l** |
| **mg/l** |
| **mg/l** |
| **mg/l** |
| |
| **h** |
| |
| **t/d** |
| **g/l** |
| **%** |
| |
| **m³/d** |
| **m³** |
| **mg/l** |
| **mg/l** |
| d areation |
| **mg/l** |
| **mg/l** |
| **mg/l** |
| **kg BOD5/kg TS·day** |
| **d** |
| |
| filtration process |
| **Y/N** |
| **kg/d** |
| |
| **mg/l** |
| **m3** |

| |
|---|
| |
| **Y/N** |
| **Y/N** |
| **Y/N** |
| |
| **d** |
| **ml/g** |
| **Y/N** |
| **Y/N** |
| |
| **m³/d** |

| STING AD |
|---|
| g/l |
| ton/d |
| % |
| |
| $m^3/d$ |
| g/l |
| ton/d |
| % |
| |
| mg/l |
| mg/l |
| mg/l |
| mg/l |
| mg/l |

| NICAL DATA, PHOTOS |
|---|
| |
| |
| $m^3/d$ |
| % |
| ton/d |
| % |
| ton/d |
| Y/N |
| kg/ton TS |
| |
| |
| $m^3/d$ |
| % |
| ton/d |
| % |
| ton/d |
| Y/N |
| kg/ton TS |

| NICAL DATA, PHOTOS |
|---|
| $m^3/d$ |
| ton/d |
| ton/year |
| % |
| ton/year |
| % |
| ton/year |
| % |
| ton/year |
| % |
| ton/year |
| ton/year |
| % |
| % |

| NICAL DATA, PHOTOS |
|---|
| |
| |
| |
| |
| Y/N |
| |
| kg/dry matter ton |
| LCU/kg |

| STING AD |
|---|

| KWh/year |
|---|
| LCU/year |
| KWh/year |
| LCU/year |

| NICAL DATA, PHOTOS |
|---|
| |
| |
| |
| |
| Each |
| m³ |
| m³ |
| ° C |
| ° C |
| mbar |
| m³/d |
| d |
| m³ |
| |
| % |
| ton/year |
| % |
| ton/year |
| ton/year |
| m³/d |
| Y/N |
| |
| kg/dry matter ton |
| LCU/kg |
| |
| % |
| ton/year |
| % |
| ton/year |
| |
| Nm³/d |
| Nm³/year |
| Nm³/kg VS destroyed |
| Nm³/kg VS fed |
| % by volume |
| Nm³/year |
| Nm³/year |
| Nm³/year |

| NICAL DATA, PHOTOS |
|---|
| |
| |
| Nm³/h |
| % by volume |
| % by volume |
| |
| KWh/year |
| LCU/year |

| NICAL DATA, PHOTOS |
|---|
| KWh |
| LCU/year |
| KWh/year |
| LCU/year |

TAB]

| STING AD |
|---|
| KWh/year |
| LCU/year |
| Y/N |
| kW |
| kWe |
| kWe |
| % |
| hours |
| % |
| % |
| LCU/KWh |
| LCU/KWh |

| NICAL DATA, PHOTOS |
|---|
| KWh/year |
| LCU/year |
| |
| kWth |
| % |
| kWth |
| kWth |
| KWh |
| LCU/KWh |
| LCU/KWh |

| NICAL DATA, PHOTOS |
|---|
| Belt press |
| SALTEC CP 800FII+RF 4-1 |
| Y/N |
| kg/dry matter ton |
| L/kg |
| % |
| KWh/year |
| KWh/year |

| NICAL DATA, PHOTOS |
|---|
| lanfill |
| LCU/wet matter ton |
| Dry matter ton/year |
| Wet matter ton/year |