Energy efficiency at WWTP in Baltic Sea region

Cracow WWTP’s

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Cracow WWTPs
Sewage system
Cracow WWTPs

Process

Wastewater treatment

Primary treatment (screens, grit chamber) → Primary sedimentation → Biological treatment (3 phase Bardenpho with predenitrification)

Sludge processing

Primary sludge - gravity thickening (Kujawy) → Excess sludge – belt thickeners/decanters → Digestion (mesophilic) → Dewatering (decanters + belt presses) → Sludge incineration
Kujawy WWTP
Modernisation & Extension
Kujawy WWTP
Modernisation & Extension

Object: 373000 PE, Nitrogen removal improvement,
• New screens & grit chamber,
• 4th biological line,
• New aeration system (turboblowers),
• Decanters – sludge thickening and dewatering,
• Biogas pipes renovation,
• Sidestream Deammonification – DEMON®
• Advanced Process Control
Kujawy WWTP
Sidestream Deammonification – DEMON®

- SBR System
- Nitrogen removal shortcut
  Nitritation + Anammox
- 70-80% Ntot reduction
- Less energy demanding
Kujawy WWTP

Advanced Process Control

- Advanced algorithms
- Intermittent aeration
- Internal recirculation
- Sludge recirculation
- Fe dosing control
- Sensor quality control
Kujawy WWTP
Nitrogen removal

N_{tot}, \text{mgN/dm3}
Kujawy WWTP
Biogas production

MgDS/day

Nm3/d

excess sludge, Mgsm/d
primary sludge, Mgsm/d
Biogas production, Nm3/d

2015
2016
Kujawy WWTP
Energy consumption

![Energy consumption graph](attachment:image.png)

- **External energy kWh/m³**
- **Energy produced kWh/m³**
Kujawy WWTP
Next project

• Excess sludge retention,
• Biogas tank,
• Biogas torch,
• Siloxane removal,
• Biogas turbine,
Plaszow WWTP
Project: Integrated Energy Efficiency System
Plaszow WWTP

Project: Integrated Energy Efficiency System

• Energy Production:
  • Water turbine,
  • Biogas turbines

• Process Control based on energy efficiency
  • Blowers
  • Pumps

• System integration with other sources:
  • CHP,
  • PV
Plaszow WWTP
Project: Integrated Energy Efficiency System
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