Energy efficency

WWTP Berlin

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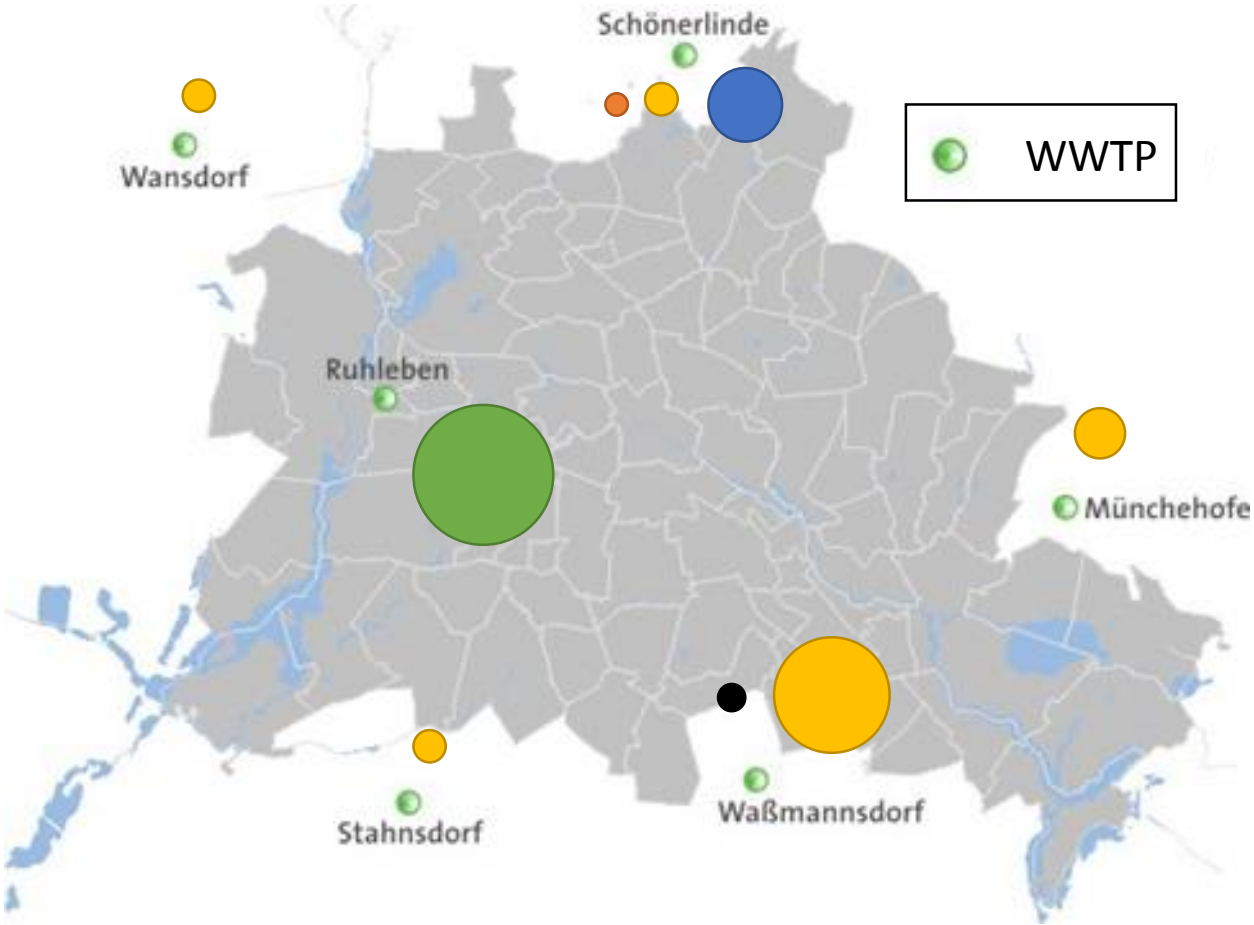
Electricity production



WWTP

- CHP
- wind
- micro gas turbine
- turbogenerator
- co-substrate

from digester gas, steam and wind 90 GWh of electricity were produced in 2016

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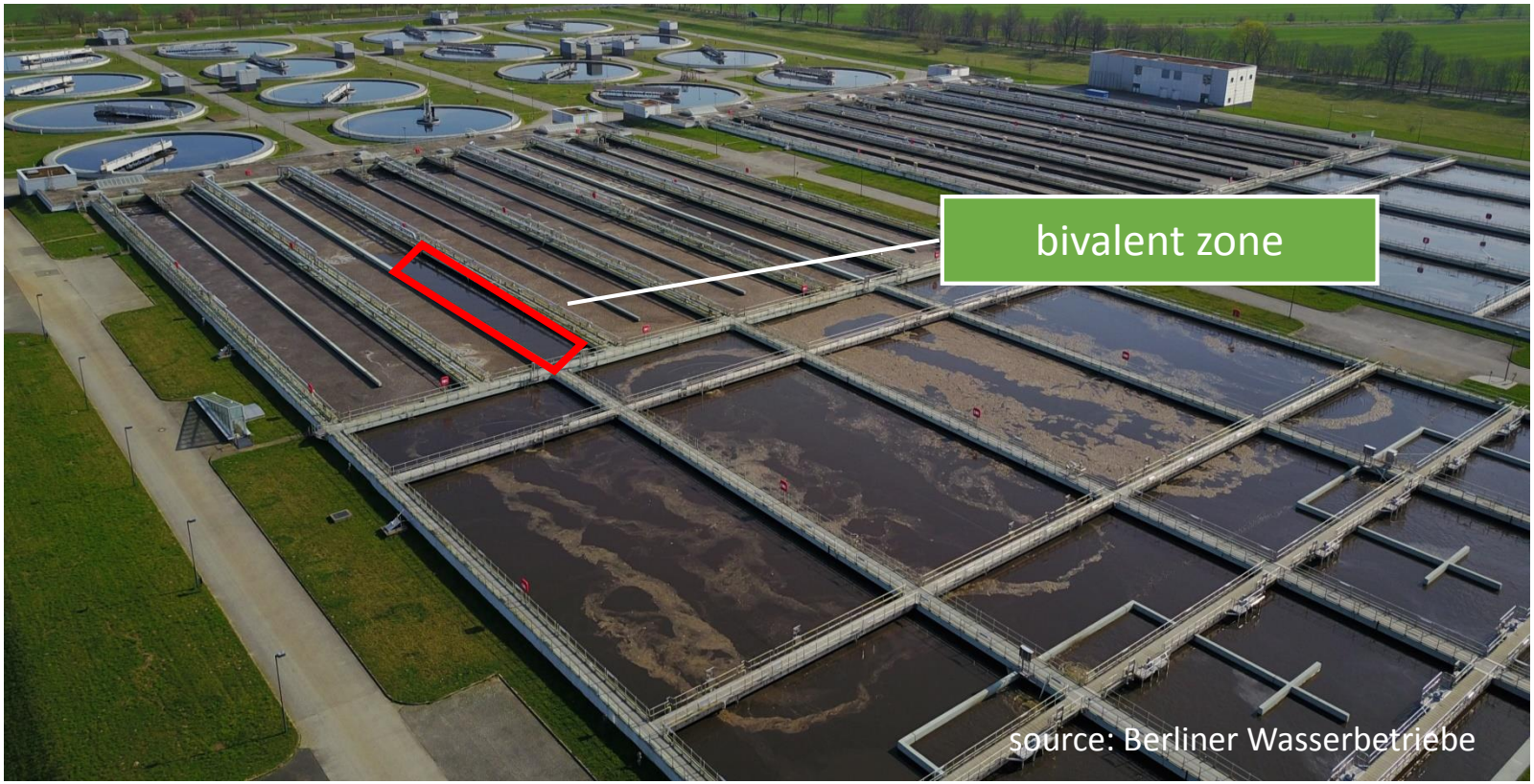
WWTP Waßmannsdorf - bivalent zone

Process optimisation



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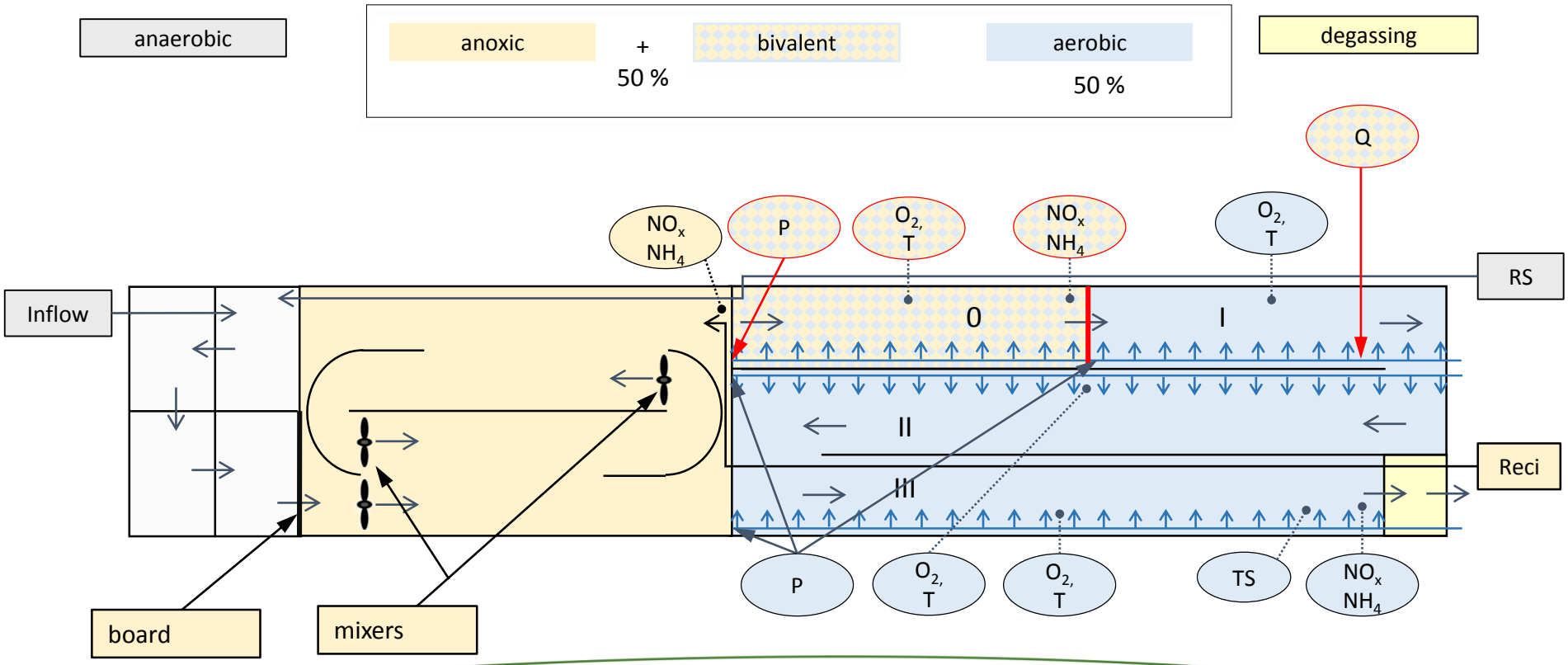
WWTP Waßmannsdorf - bivalent zone

Process optimisation



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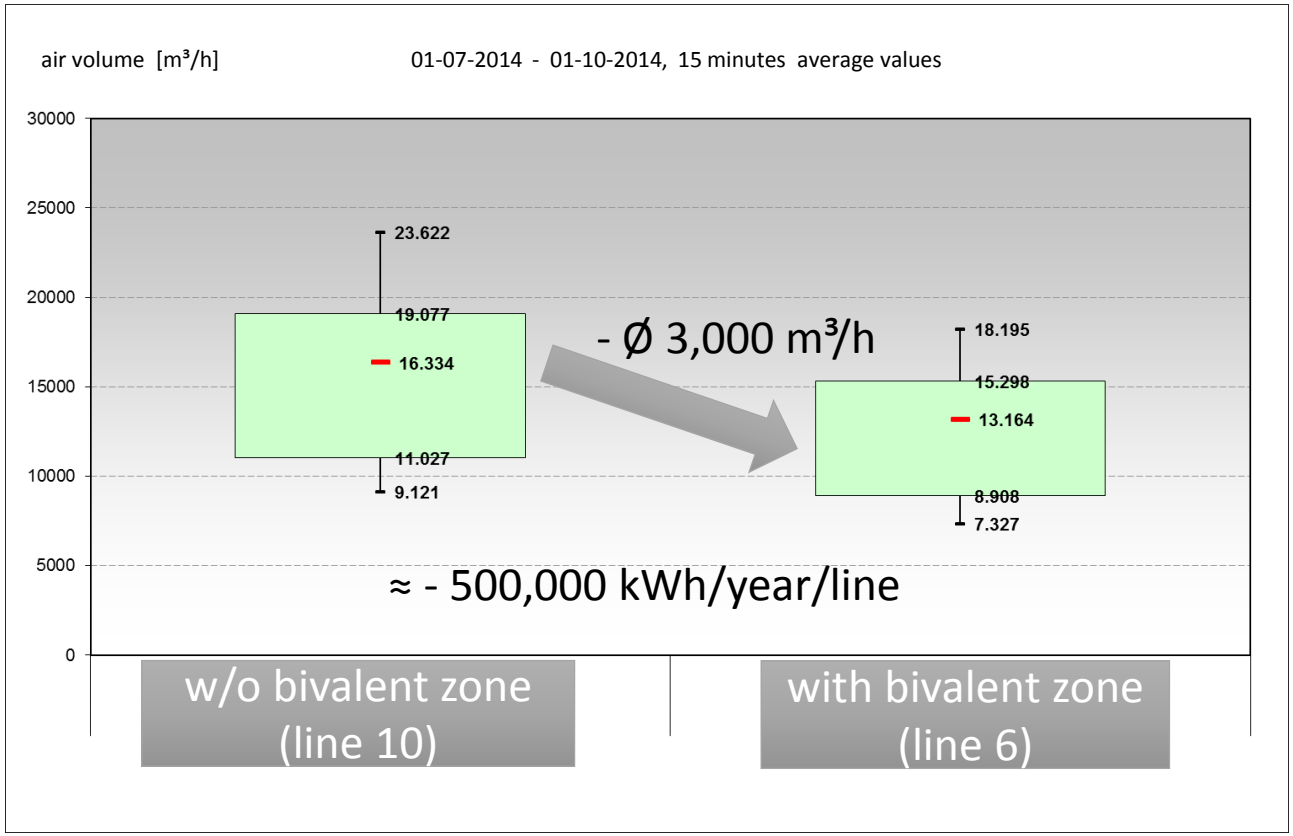
WWTP Waßmannsdorf - bivalent zone

Effect on energy demand



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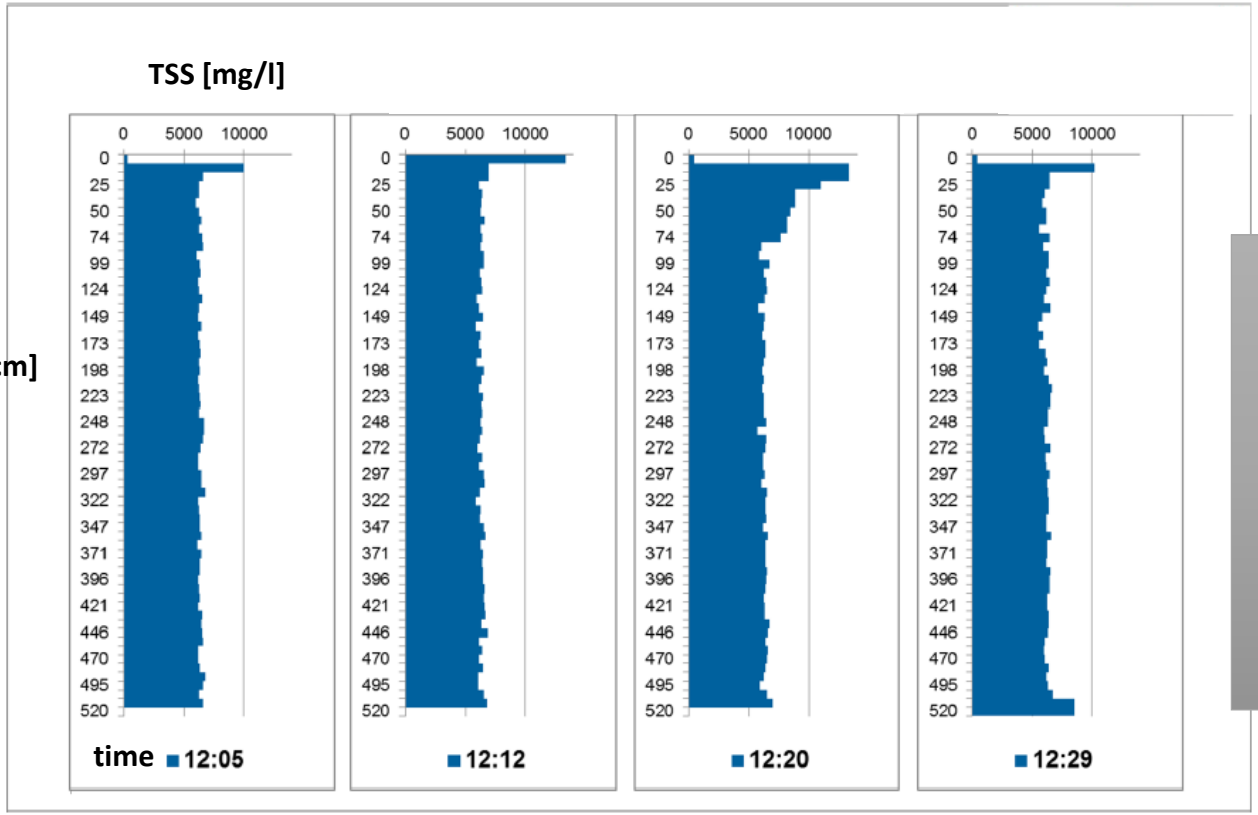
WWTP Waßmannsdorf - bivalent zone

Mixing

bivalent zone
with mixers

WWTP Waßmannsdorf - bivalent zone

TSS profile measurement (SVI ≈60 ml/g)



aeration break 12:01 – 12:30

short term aeration
with
30 minutes breaks
w/o sedimentation

SVI tested :
40 - 120 ml/g

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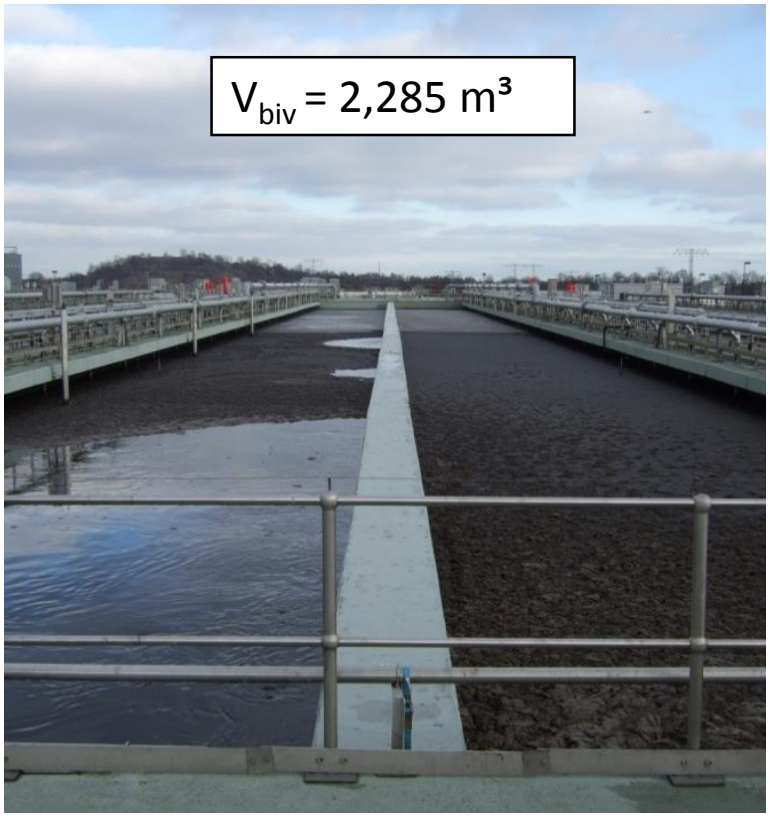
WWTP Waßmannsdorf - bivalent zone

Mixing – effect on energy demand

3 mixers a 3 kW = 9 kW
3.9 W/m³



Ø 60 - 80 m³/h air volume
21 Wh/m³ → 1.3 – 1.7 kW
0.55 – 0.74 W/m³

≈ - 65,000 kWh/year/line

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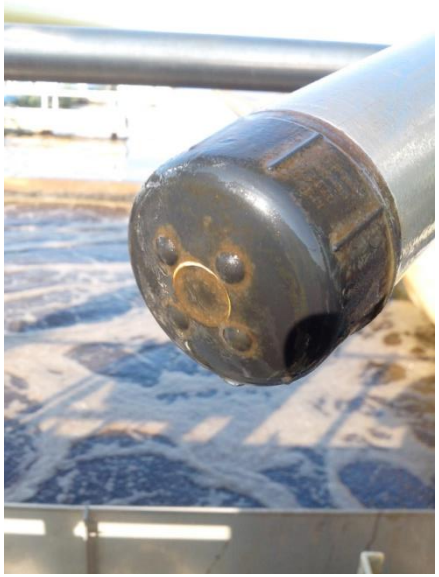
Oxygen probe

Contamination



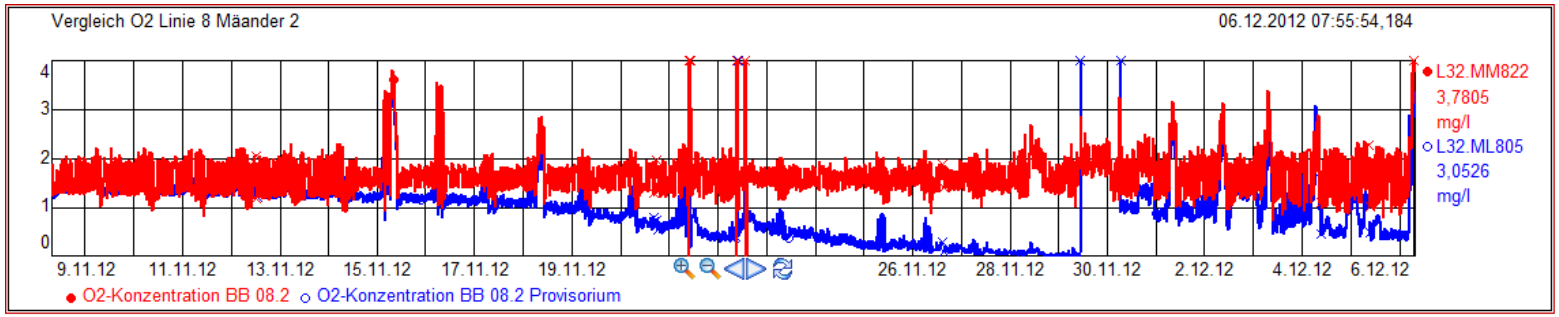
Oxygen probe

Effects of dirty O_2 probes – less aeration

- measuring of too high O_2 concentrations
- feedback control results in minimum aeration

→ low aeration - danger of high ammonia

process probe (red) / real concentration (blue)



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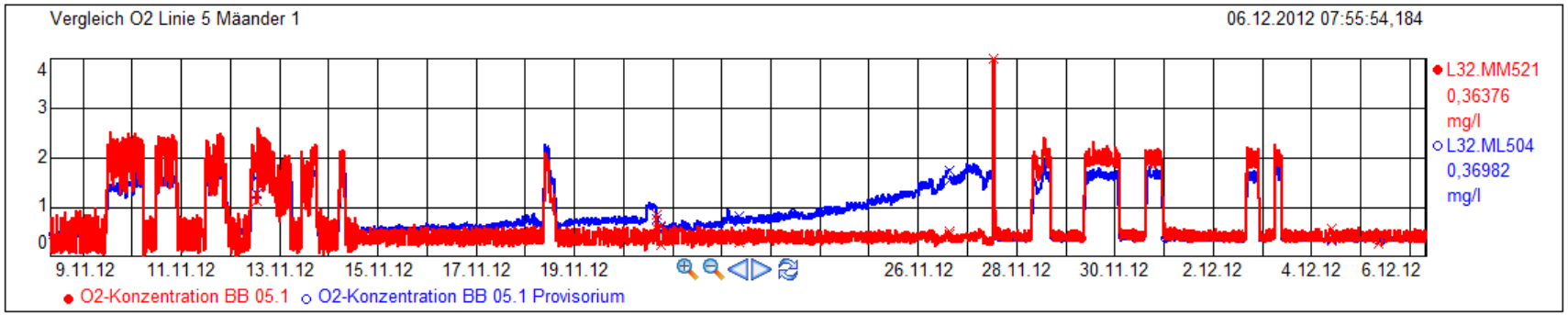
Oxygen probe

Effects of dirty O_2 probes – excess aeration

process probe (red) / real concentration (blue)

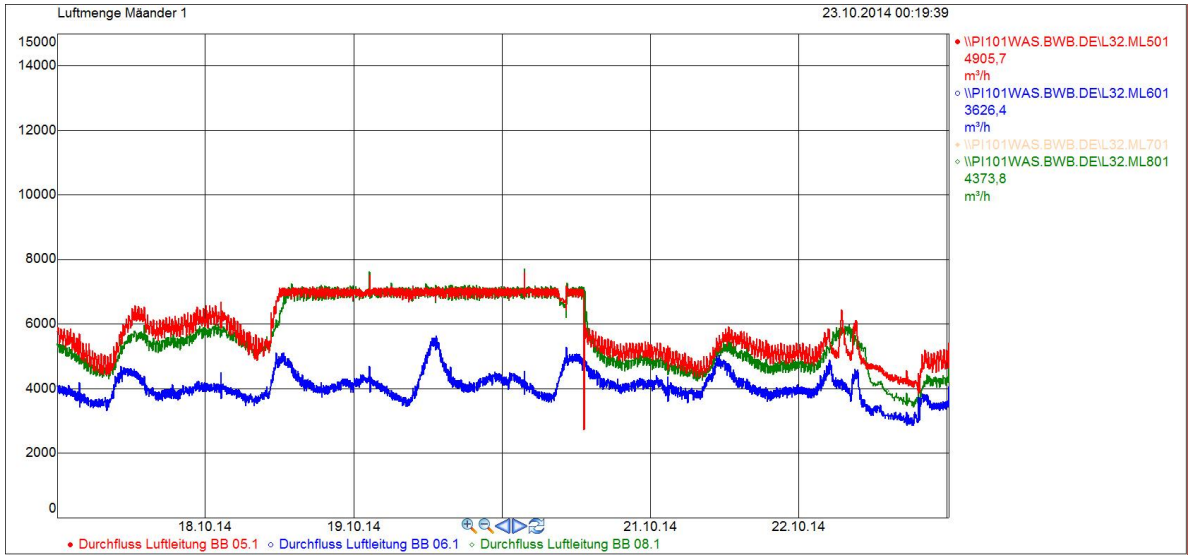


- measuring of too low O_2 concentrations
  → excess aeration - higher energy demand

Oxygen probe

Effects of dirty O_2 probes – excess aeration

air volume [m³/h]



O_2 measurement has a significant impact on the energy demand!

Worst case:

additional costs of

1,000 € / d / line

due to dirty O_2 probes

Improvement of cleaning strategies for all WWTP

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Optimisation of aeration

Fields

Blower

- model
- operating range
- efficiency
- adjustment

Air distribution system

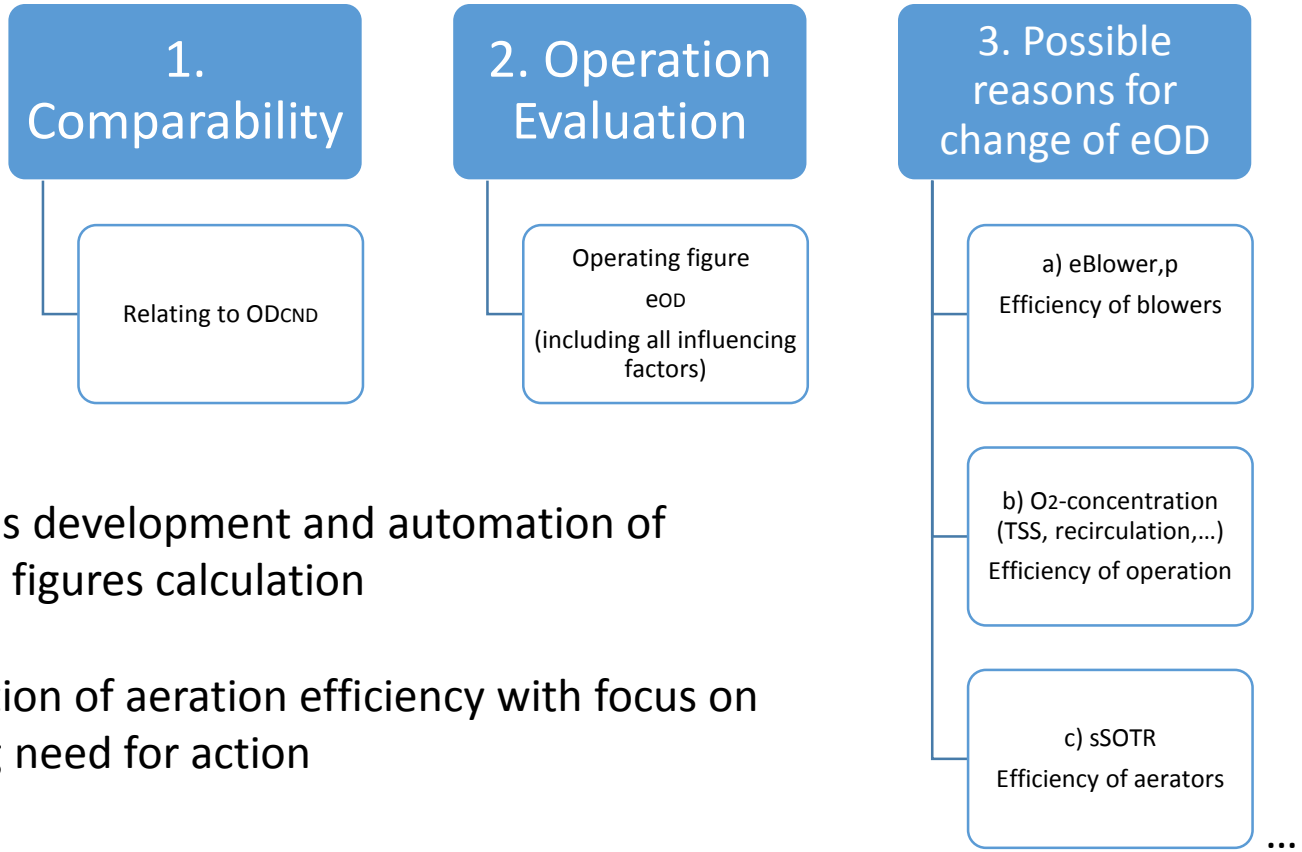
- number of adjusted zones
- O_2-concentration
- control devices
- measurement accuracy

Air diffusion system

- material
- shape
- efficiency
- lifetime

Optimisation of aeration

Evaluation

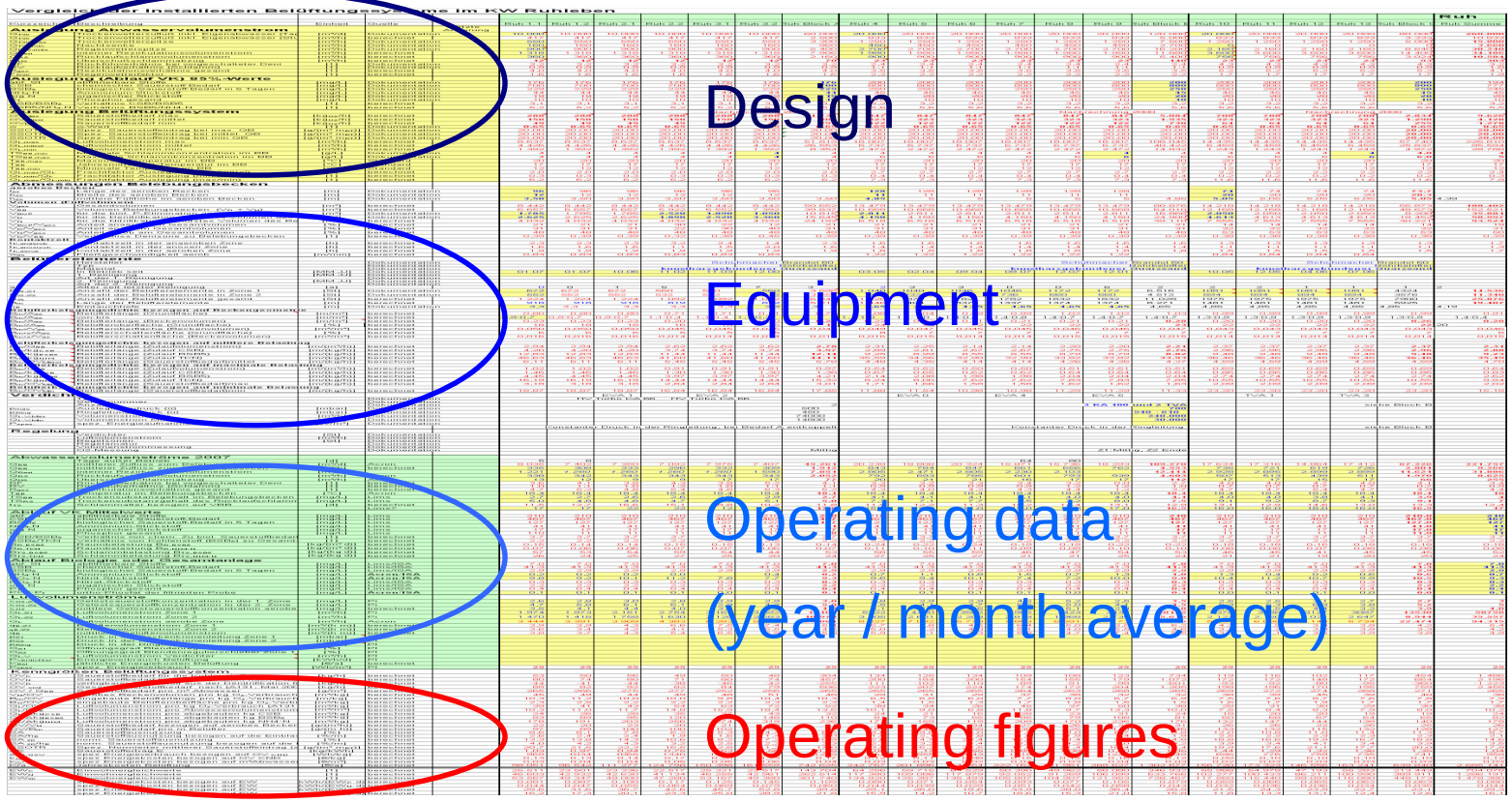


Continious development and automation of operating figures calculation

►Evaluation of aeration efficiency with focus on indicating need for action

Optimisation of aeration

Database



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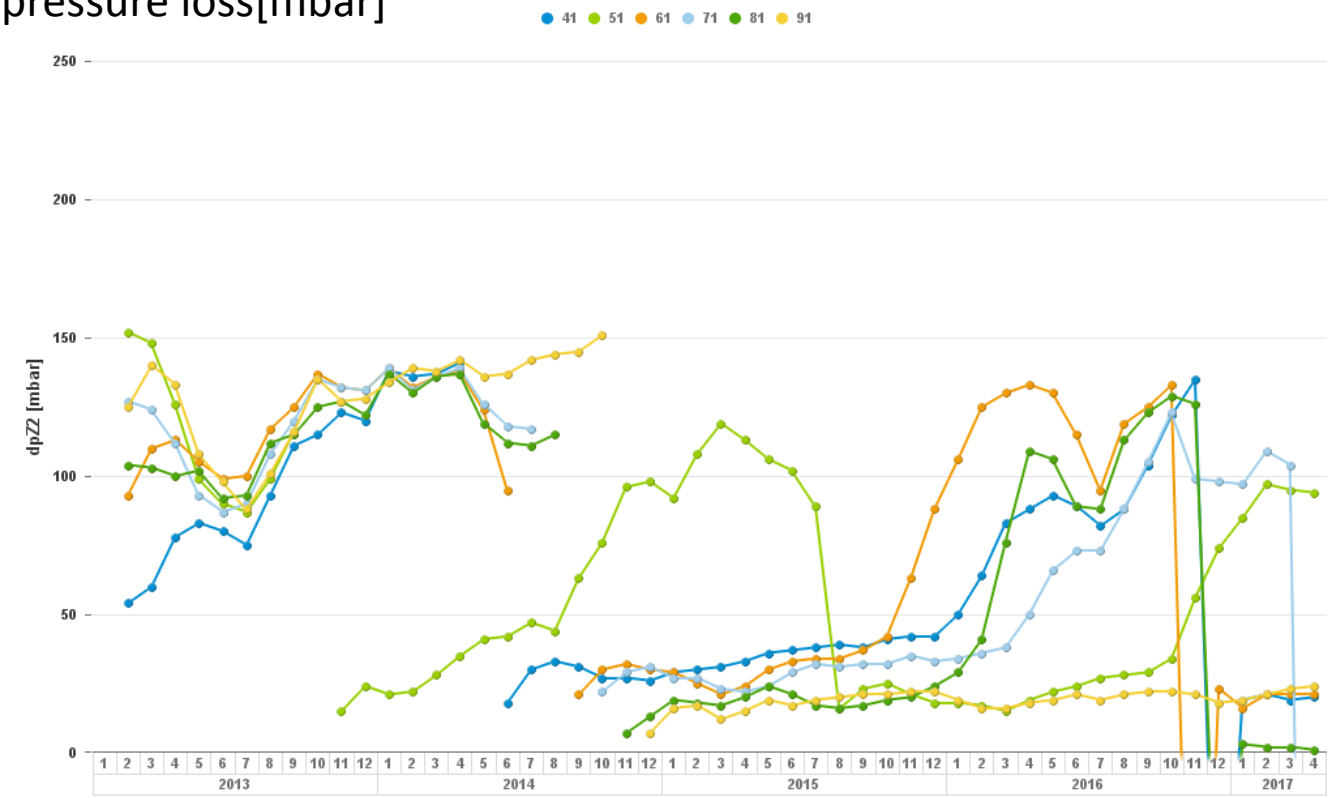
Optimisation of aeration

Evaluation of pressure loss

pressure loss[mbar]



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Optimisation of aeration

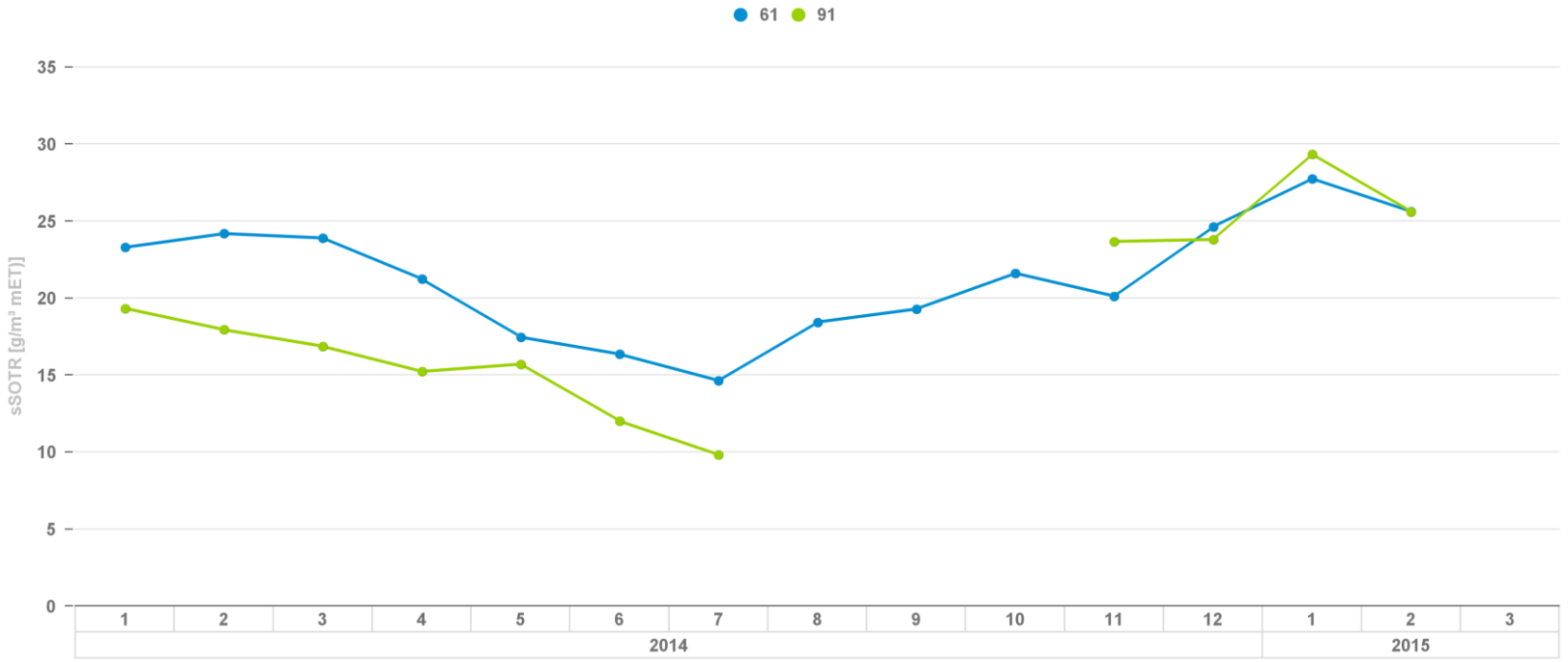
Aerator cleaning

Brandol 60 with hydrochloric acid (5%)

Optimisation of aeration

Cleaning Results

sSOTR (specific standard oxygen transfer rate [gO2/m³/$m_{submersion\ depth}$])



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