Excellence in aeration control -
for energy efficient operation
& improved process control

Hassan Ragab, Alterous – Partner of BINDER Group

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EGYPT

Existing wastewater treatment plants have following needs:

- Treatment capacity – growing population, increase connection rate
- Effluent quality – re-use for irrigation
- Check in needs for
  - refurbishment of existing equipment
  - expansion (new tanks, new technologies e.g. MBBR)

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Wastewater treatment in activated sludge plants

Challenges:

- comparable higher investment costs
- proper design of components & system integration
- Skills of operational staff

Chances:

- high quality effluent (re-use agriculture)
- digestation o sludge reduces load to biological treatment of 1/3
- energy efficient operation & very low carbon footprint
- sustainable investment

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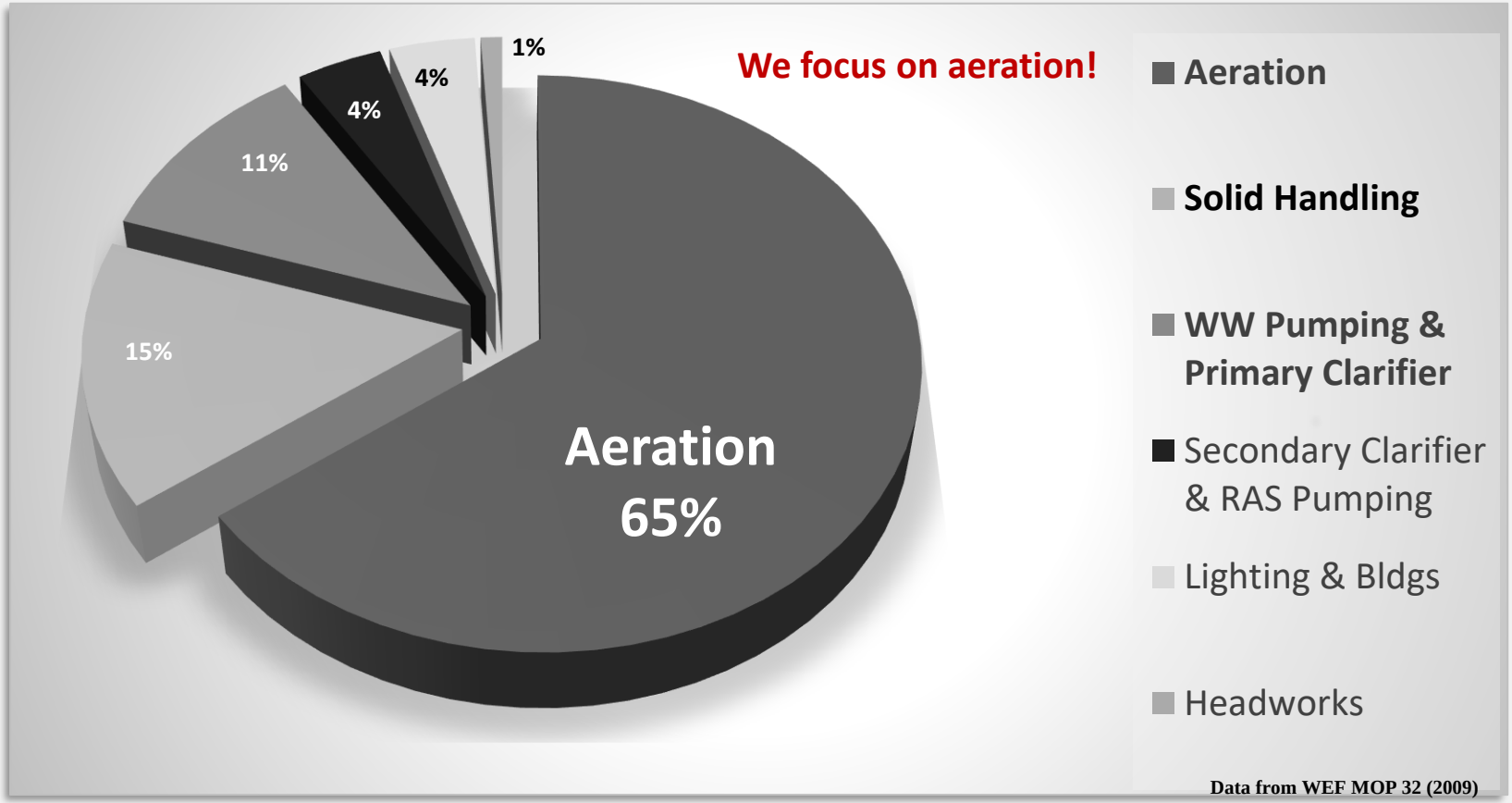
Total Energy Consumption in WWTPs



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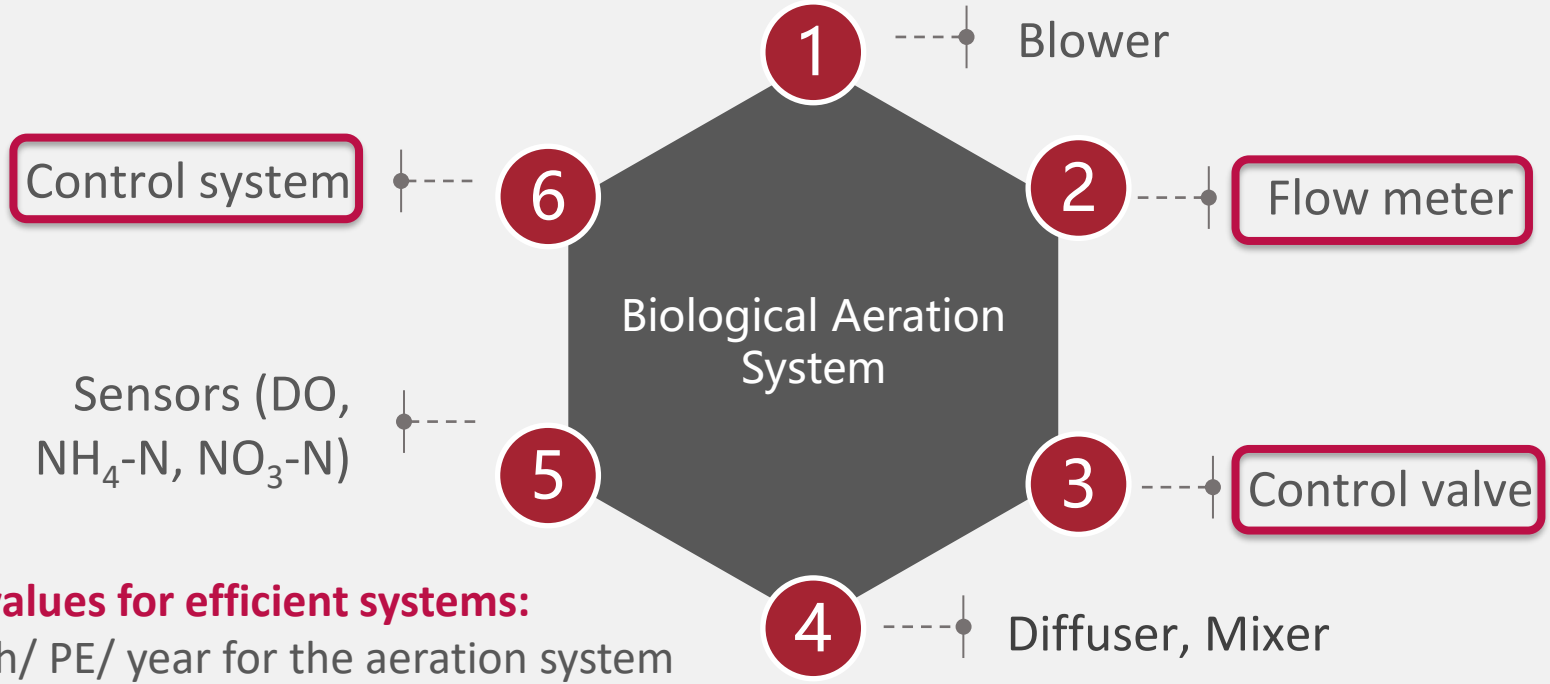
Components Aeration System



Target values for efficient systems:

<15 kWh/ PE/ year for the aeration system

<25 kWh/ PE/ year for the whole plant

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Valve-Control-Massflow - VACOMASS®

- Thermal mass flow meters
- Jet control valves – Patented, pressure recovery up to 75%
- Diaphragm control valves
- Aeration controller, flexcontrol including “flex algorithm” with Artificial Intelligence (AI)

Specially designed for biological process in wastewater treatment industry

Patented

Patented

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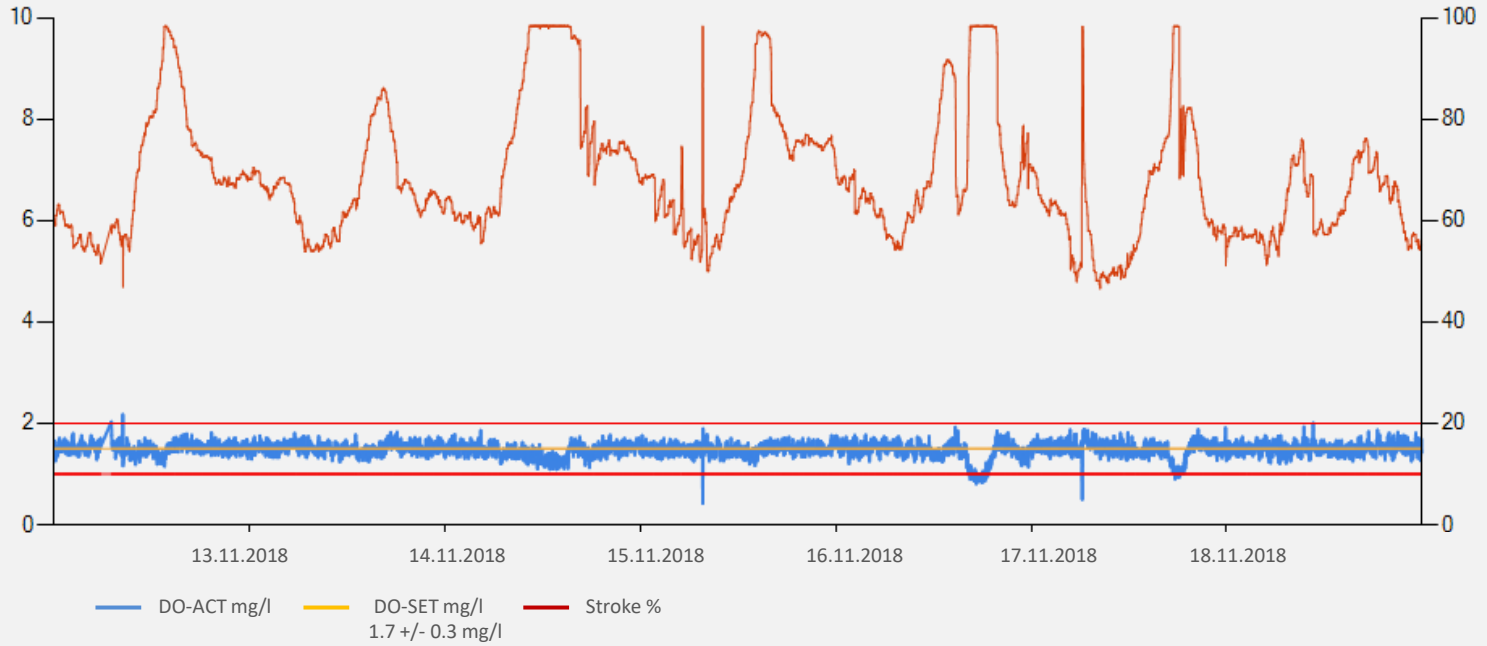
Stable DO-Control in tank 1, zone M3 (start-up 2018)



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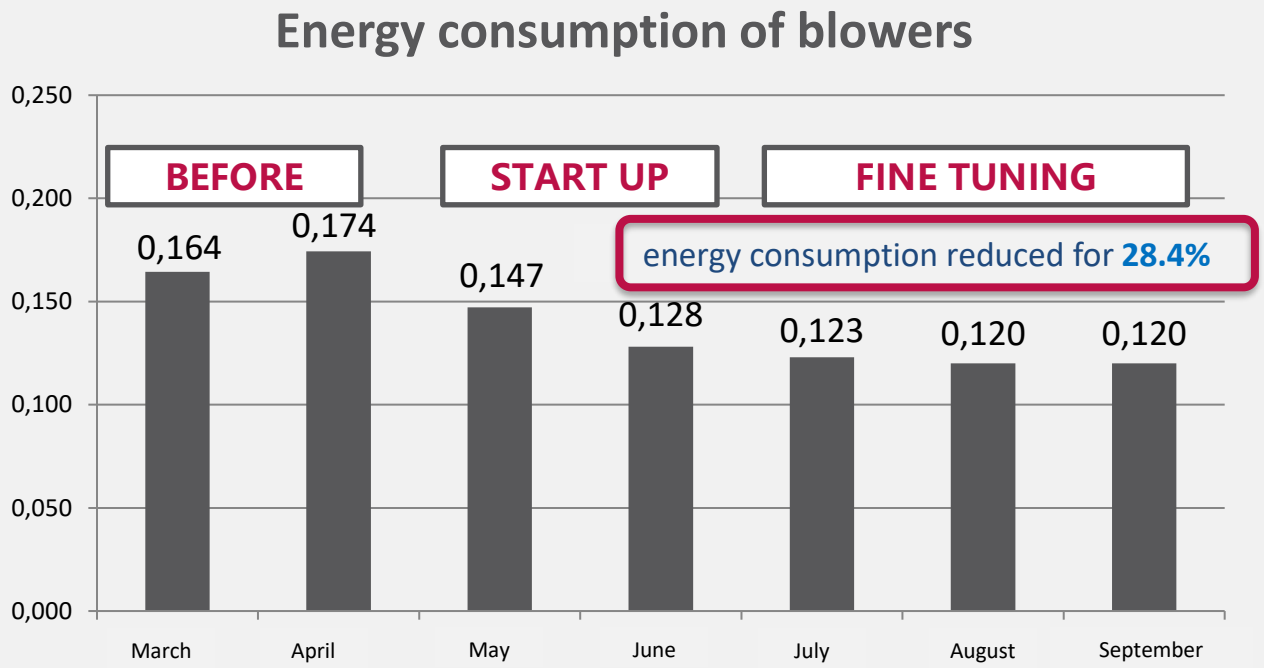
Reduction in energy consumption of blower



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Improvement of effluent quality

Total nitrogen concentration in the effluent is reduced for 20%

TIME	May	June	July	August	September	October
AVG	10.66	11.53	10.46	9.93	8.24	8.81
MAX	14.33	13.07	11.63	12.39	10.39	10.91
MIN	8.88	8.90	8.10	6.11	6.26	6.93

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Reduction of chemical´s consumption

Results: reduction of total nitrogen in the effluent with 19% less energy consumption plus 22% savings in chemicals

	Improvement due to PI²D-AI and ABAC
C-Dosing	22.4 %
COD reduction	24.3 %
NH_4 reduction	30.4 %
NO_3 reduction	52.9 %
Energy savings	19.0 %

5-month comparison
Water inflow 30,000 m³/d
2 lines – 2 zones each

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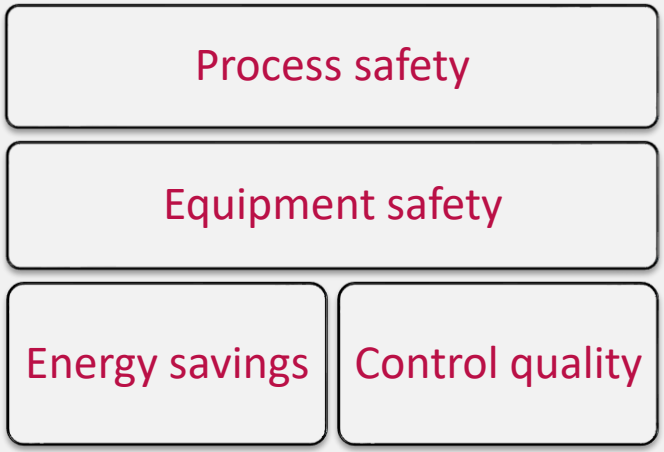
Conclusions

- Advanced aeration controller
  - Automatic parameter adjustment through AI
  - Eliminates disturbing factors due to load changes
  - Control, maintenance and monitoring functions
- High control quality
  - Typical max. DO-deviation +/- 0.3 mg/l
- Proven improvement total N
  - Precise aeration control: 15 – 30 %
- Proven energy savings
  - Precise aeration control: 10 – 40 %
  - Precise control valve, low Δ p: 5 – 15%
  - Sliding header pressure: 8 – 10 %
  - Ammonia-based DO-SET: 8 – 20 %

Quality features of aeration control



Target value
15 kWhr/ PE/ year

Actual reality
> 50 kWhr/ PE/ year

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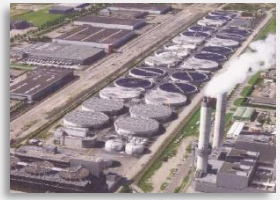
Worldwide References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Many thanks for your attention!

Do you have any questions?

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Please feel free to contact us directly

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