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Your partner for more efficiency
in
water and waste water management



40 years experience in
water & waste water
technology





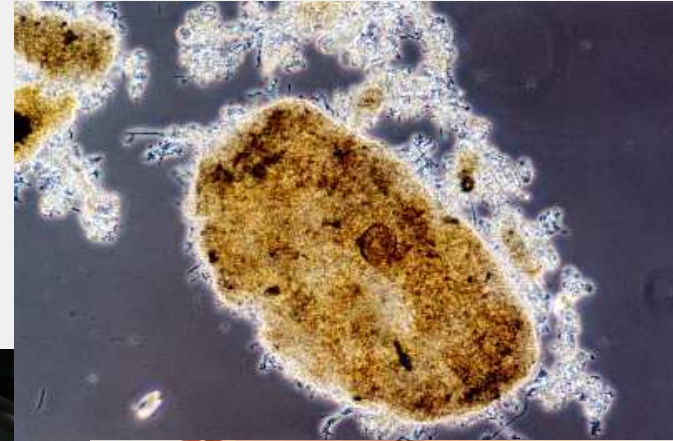
PVS In-House capacities

- Production
- Engineering
- Research & development
- Laboratory
- Technicians for training and start-up all over the world



PVS WASTE WATER TECHNOLOGY

- SBR Cycle
- Biological treatment
- VOPROM
- Nitrogen control
- TRASMA
- ESTRASMA

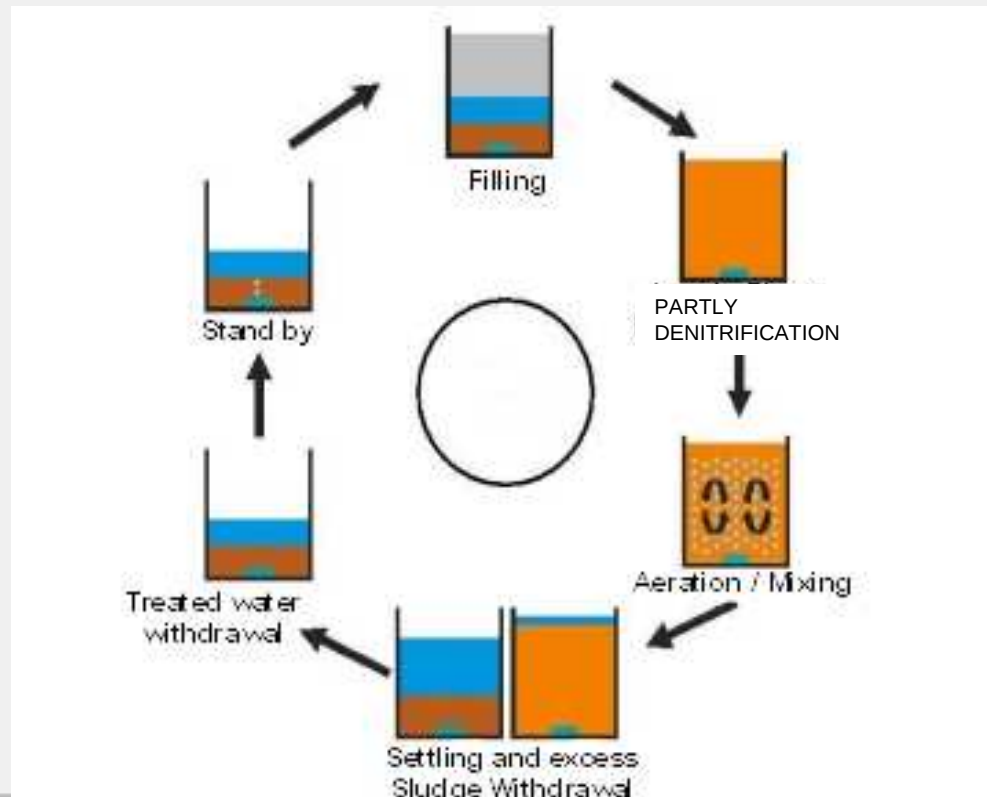


PVS SBR Cycle

Standard SBR Cycle

Additional PVS components

- VOPROM
- PANS
- ESTRASMA





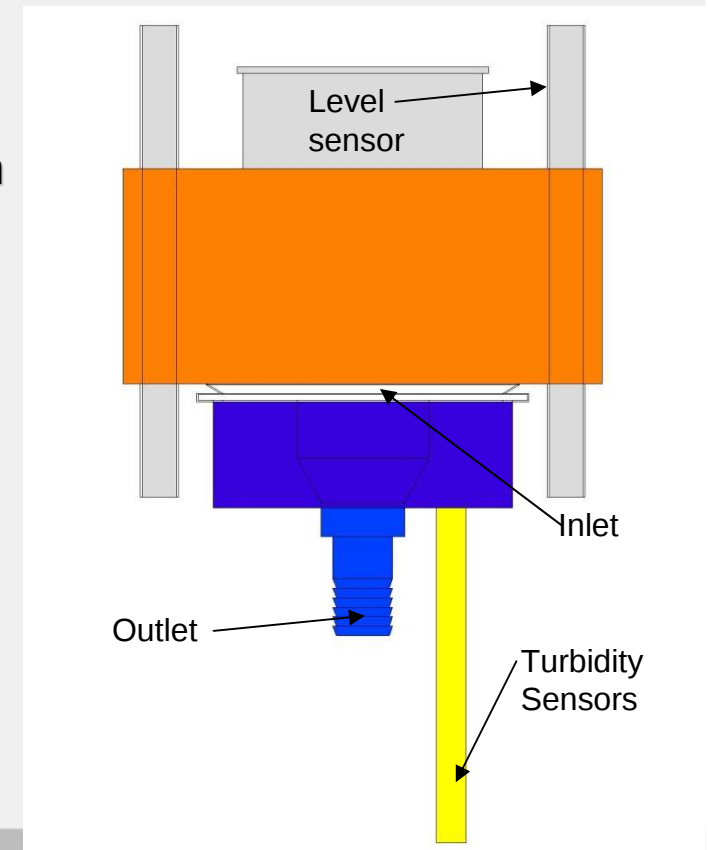
Biological treatment

SBR process has been fundamentally optimized with several innovations and tough revolutionized by PVS process technology:

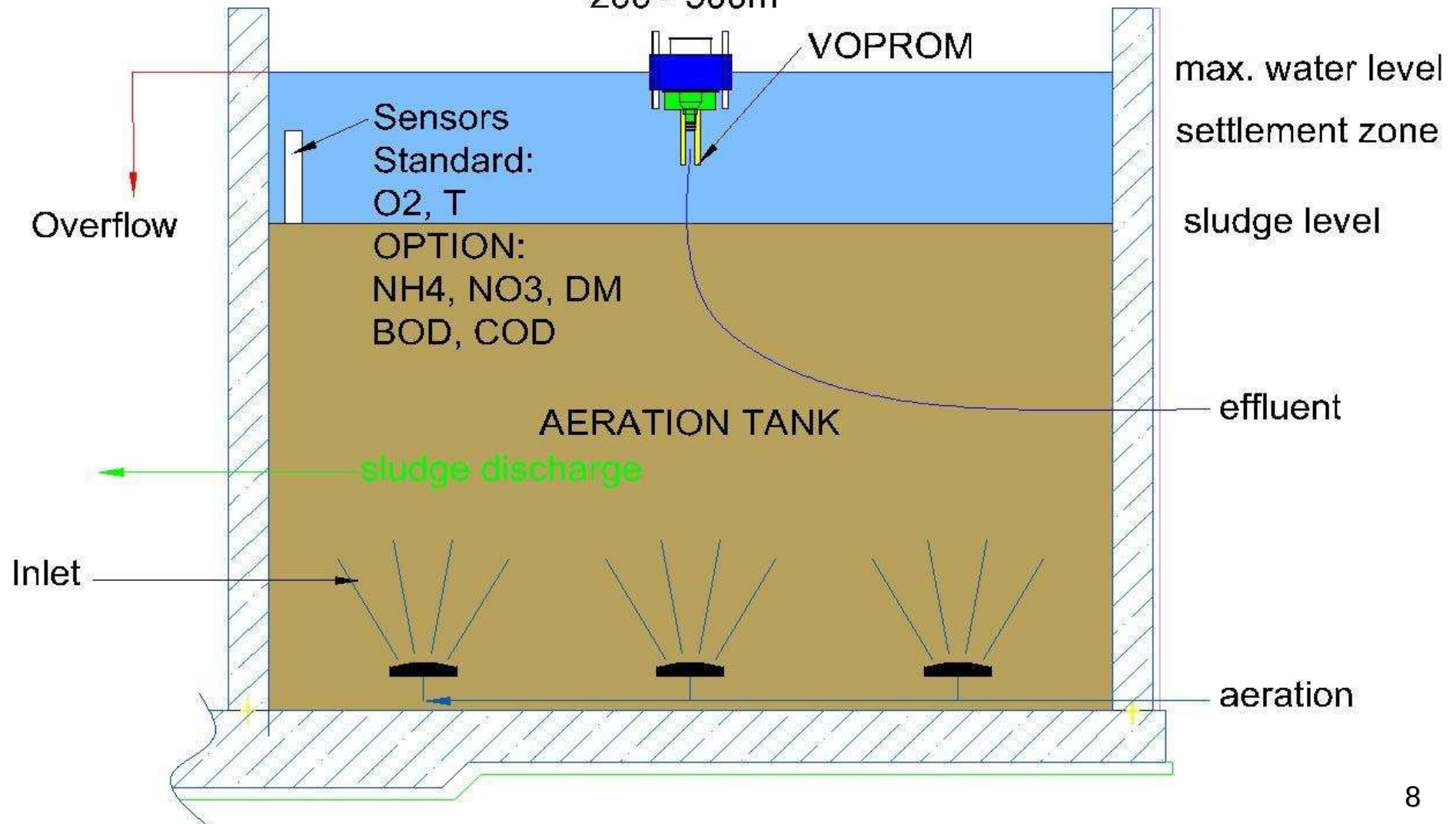
- Sludge management (VOPROM)
- Nitrogen control (PANS)
- Transfer sludge management (TRASMA)
- Energy Saving TRASMA (ESTRASMA)

• PVS-SBR-VOPROM

- Control of sludge volume and level inside reactors
- Controlled effluent discharge
- Fill and discharge monitoring
- Turbidity control for separation layer between sludge and treated water
- Level-controlled and automated excess sludge discharge
- Measuring of sludge settlement speed
- Settlement and discharge is controlled by time
- Level detection system
- Remote monitoring via PC-Visualization and internet connection

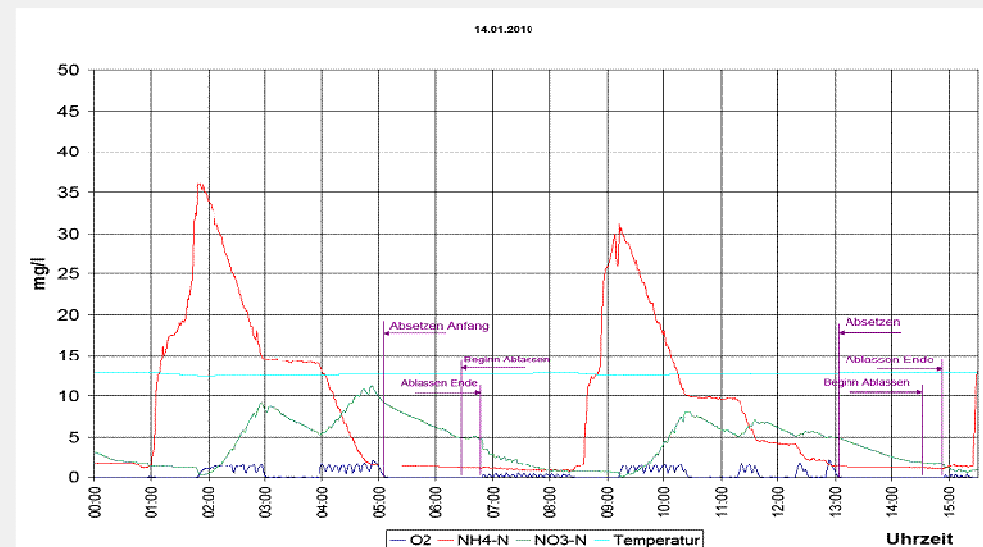


PVS SBR CONCRETE TANKS
200 - 500m³



• PVS-SBR-PANS

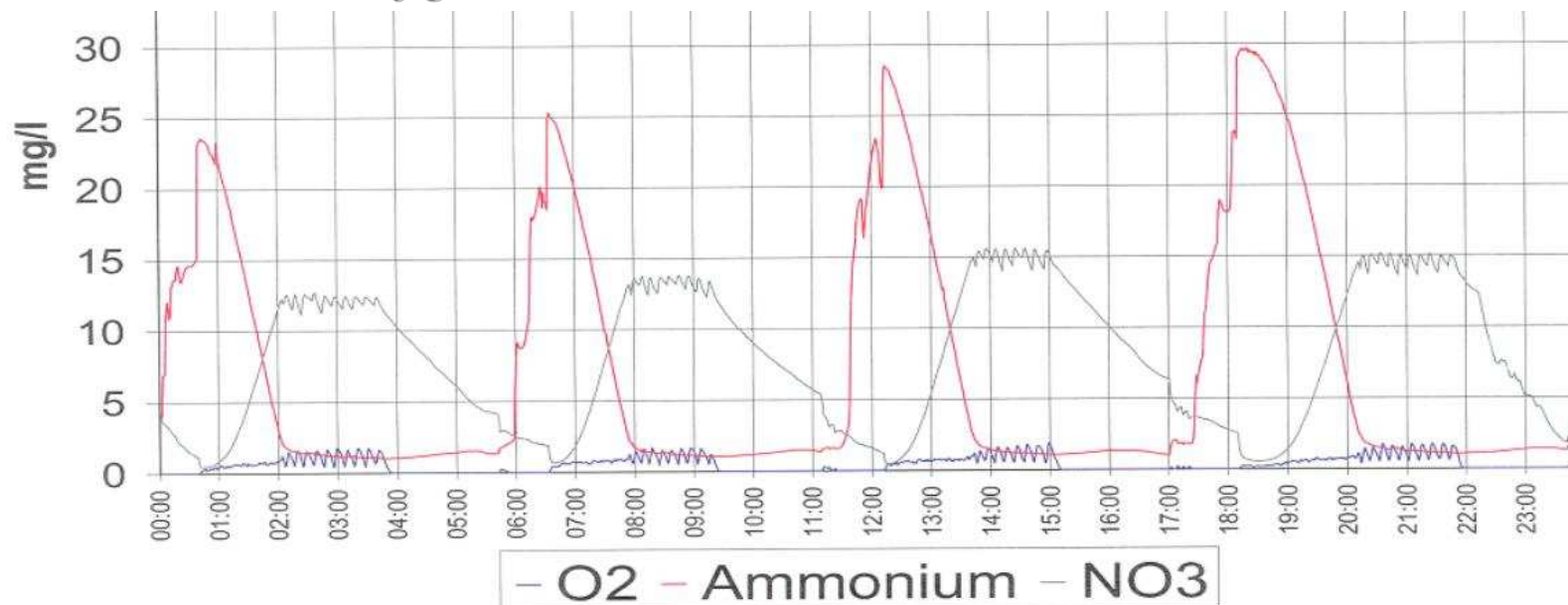
- Measuring of NH_4 inlet load
- Adaption of aeration times regarding to the measured inlet concentrations
- Control of nitrogen removal inside bio reactor ($\text{NH}_4 + \text{NO}_3$)
- Documentation of measured values
- Directed denitrification
- Energy saving by extensive denitrification
- Automated program selection for nitrogen removal



Virtual scheme

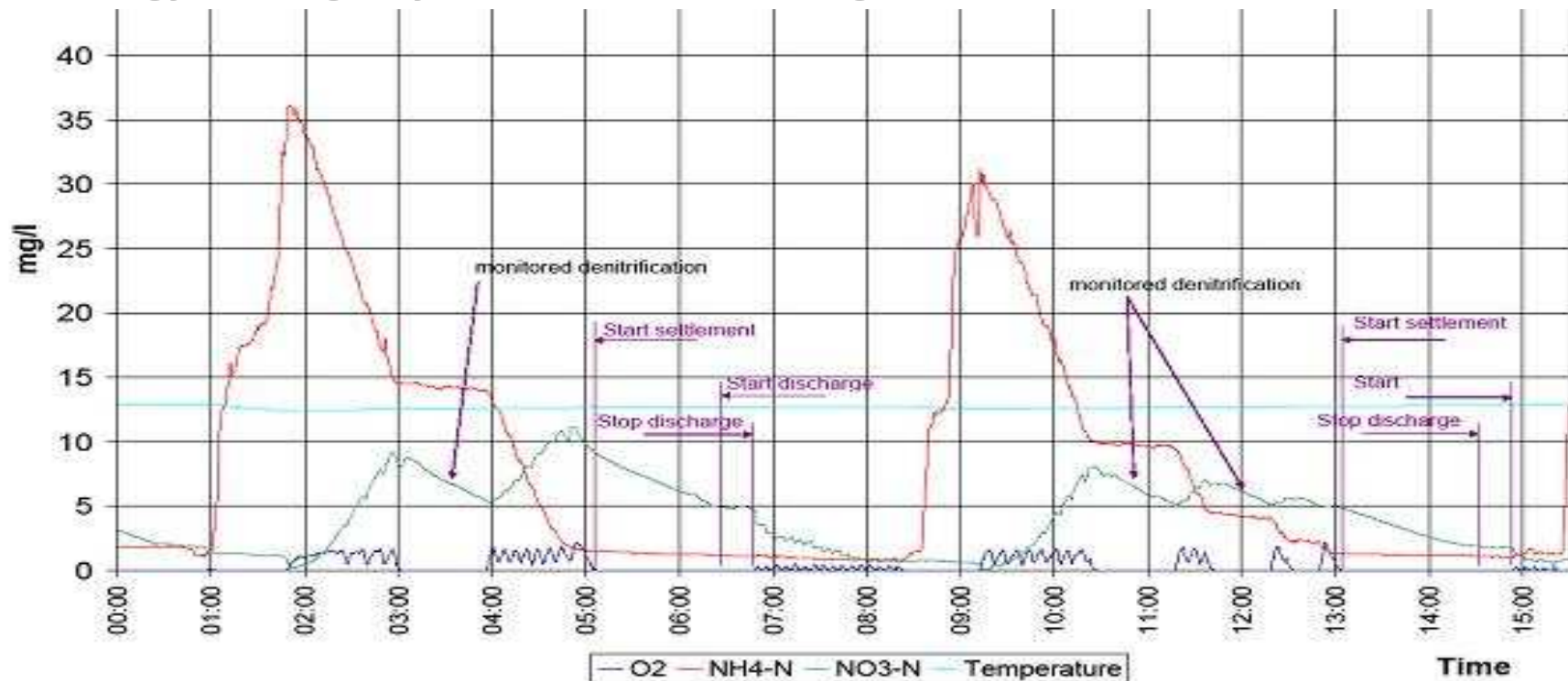
SBR plant without PVS PANS

- Time losses caused by too much aeration → energy waste
- High NO₃ effluent values
- No control of oxygen concentration and aeration times



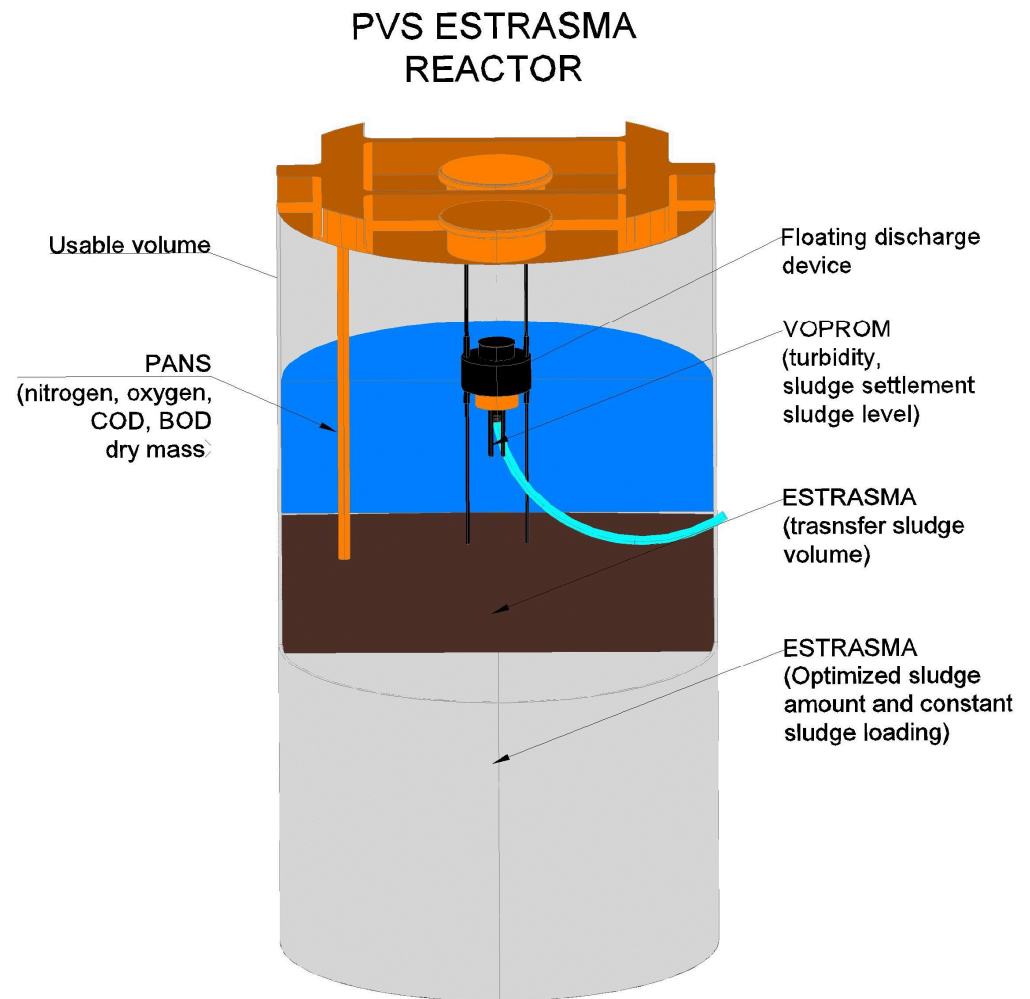
SBR plant with PVS PANS

- Controlled and documented nitrogen removal (>85%)
- Set point and surveillance of effluent concentrations (NH₄, NO₃)
- Energy savings by ONLINE monitoring

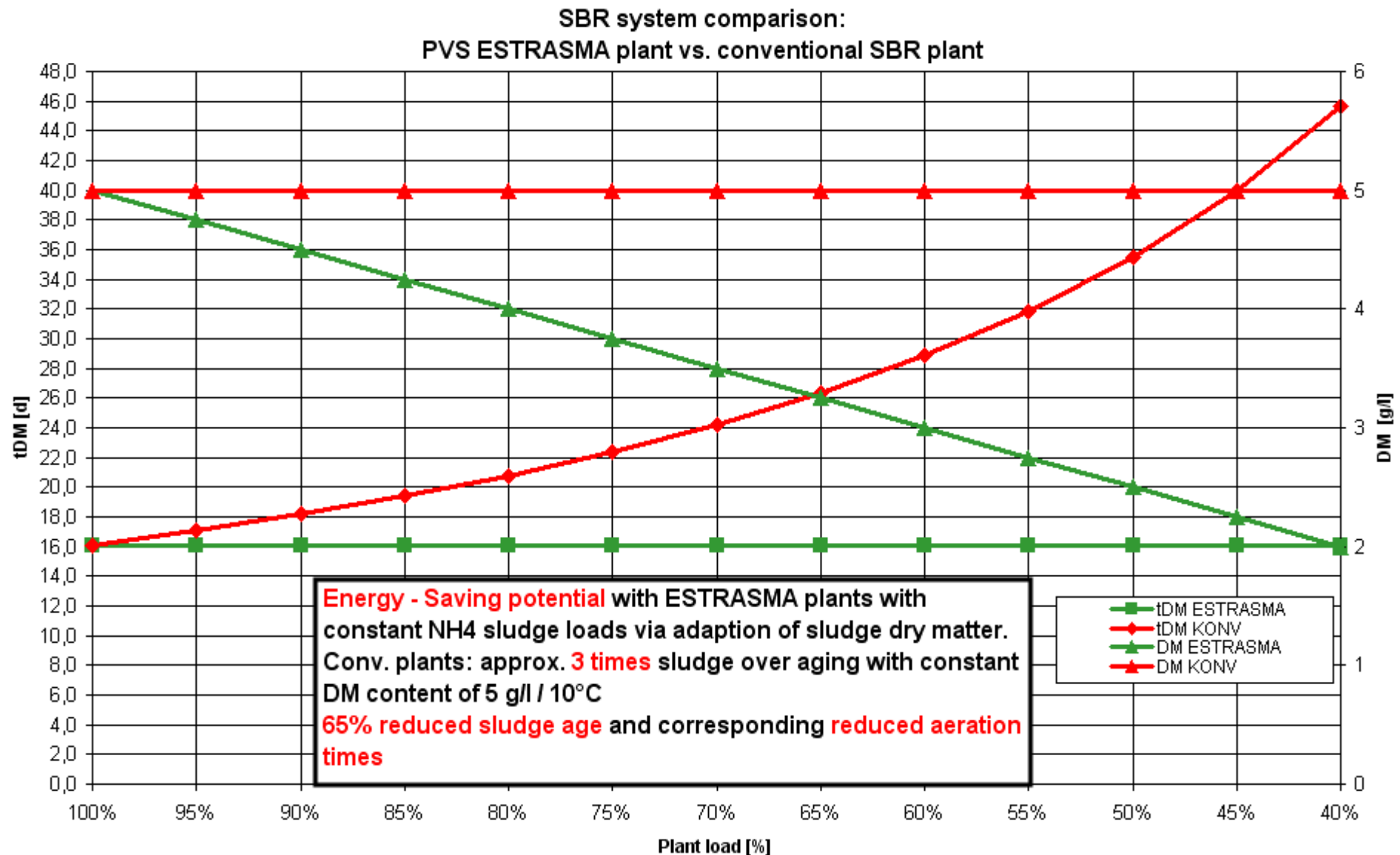


• PVS-ESTRASMA

- Efficient operation during part loads
- Adaption of sludge amount to the load by transfer sludge system
- No sludge over aging in biological reactors
- Constant and optimized sludge loads
- Efficient, fast biological degradation together with shortest aeration times
- Adaptable usable volume

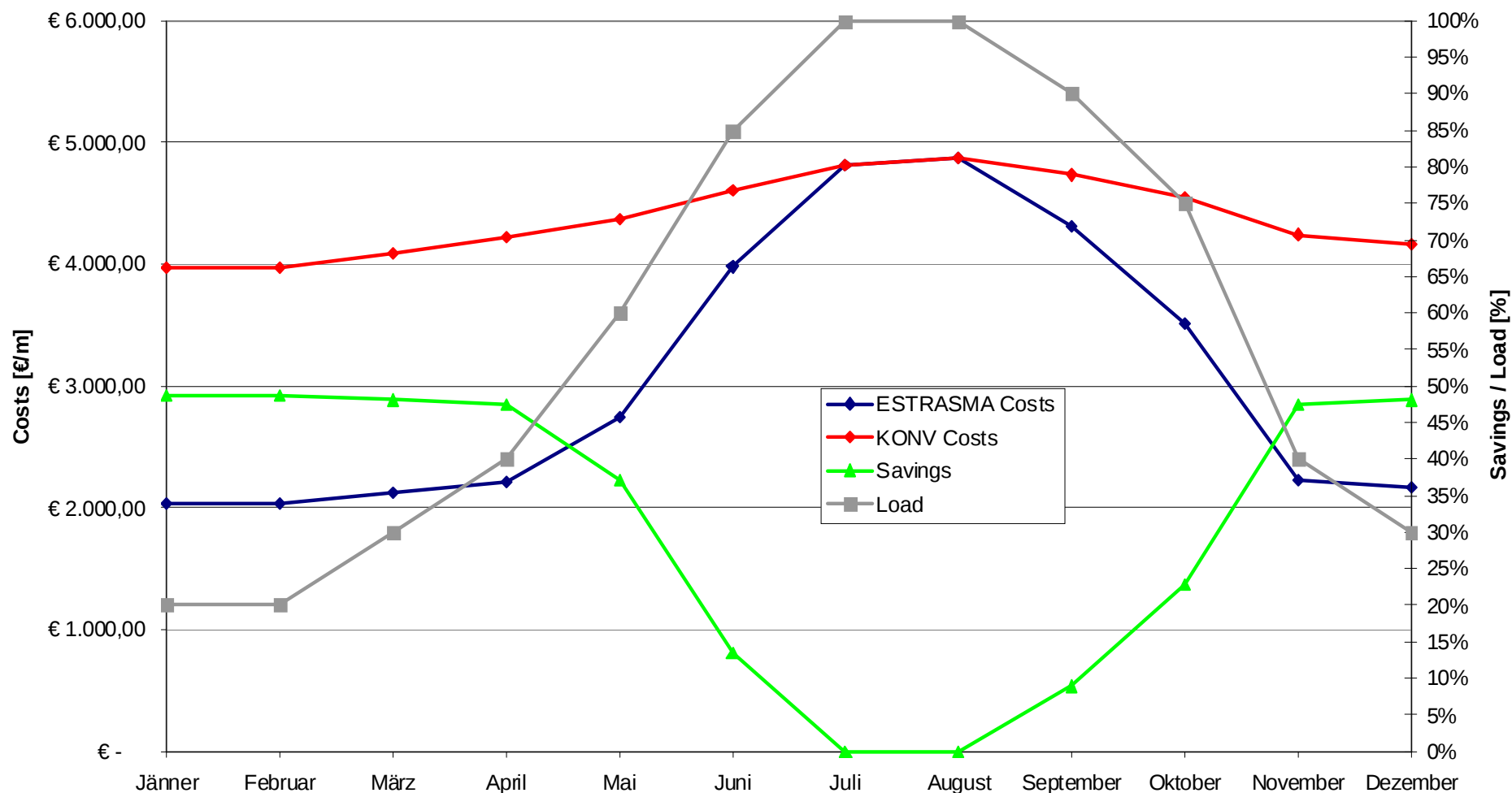


Sludge age and DM within part load operation



Energy costs throughout the year with different loads

COMPARISON: PVS ESTRASMA vs. CONVENTIONAL SBR PLANT:
Monthly energy costs for biological treatment
Example: 20000 PE, 250 l/PE60



Best possible effluent parameters



BOD ₅	<	5	mg/l
COD	<	25	mg/l
NH ₄ -N	<	0,5	mg/l
NO ₃ -N	<	5	mg/l
SS	<	0,1	mg/l
P	<	3	mg/l
E-Coli (optional)			
	>	4	log



PVS Design and Engineering

1. PVS Basic SBR Plant (standard equipment)
 - Oxygen & temperature control
 - Time control for excess sludge
 - No sludge level control
 - No nitrogen control
 - 5 programs for adaption of inlet flow
2. PVS VOPROM Plant (optional)
 - Full automated sludge level control
 - Turbidity effluent control
3. PVS TRASMA Plant (optional)
 - Transfer sludge equipment
 - DM sensor
4. PVS ESTRASMA Plant (optional)
 - PANS nitrogen control
 - BOD, COD sensor



PVS Design and Engineering

5. PVS Start-up assistance (optional)
 - Main control devices during start up and run-up phase of the project (also for rental)
6. PVS customer-made solutions
 - All control devices can be adapted as required or requested
7. PVS after-sales service
 - Provided an internet connection is available PVS can assist with adaption and regulation of all program parameters and plant processes.



Advantages of PVS WWTP

- Flexible for inlet variations (whether hydraulic or organic)
- Low operation & workforce costs
- Small footprint and minimum of excavations
- All components installed inside
- Free selectable architectural design
- No odor
- No noise
- Modular design
 - Easy to enlarge
 - Reliability
- Easy maintenance
- Full automation and process control available



PVS product concept

50 – 5000 PE

- Monolithic polyethylene tanks for indoor installation

5000 – 50000 PE

- Concrete tanks for outdoor installation (covered design)



50 – 5.000 PE PVS SBR WWTP



International projects



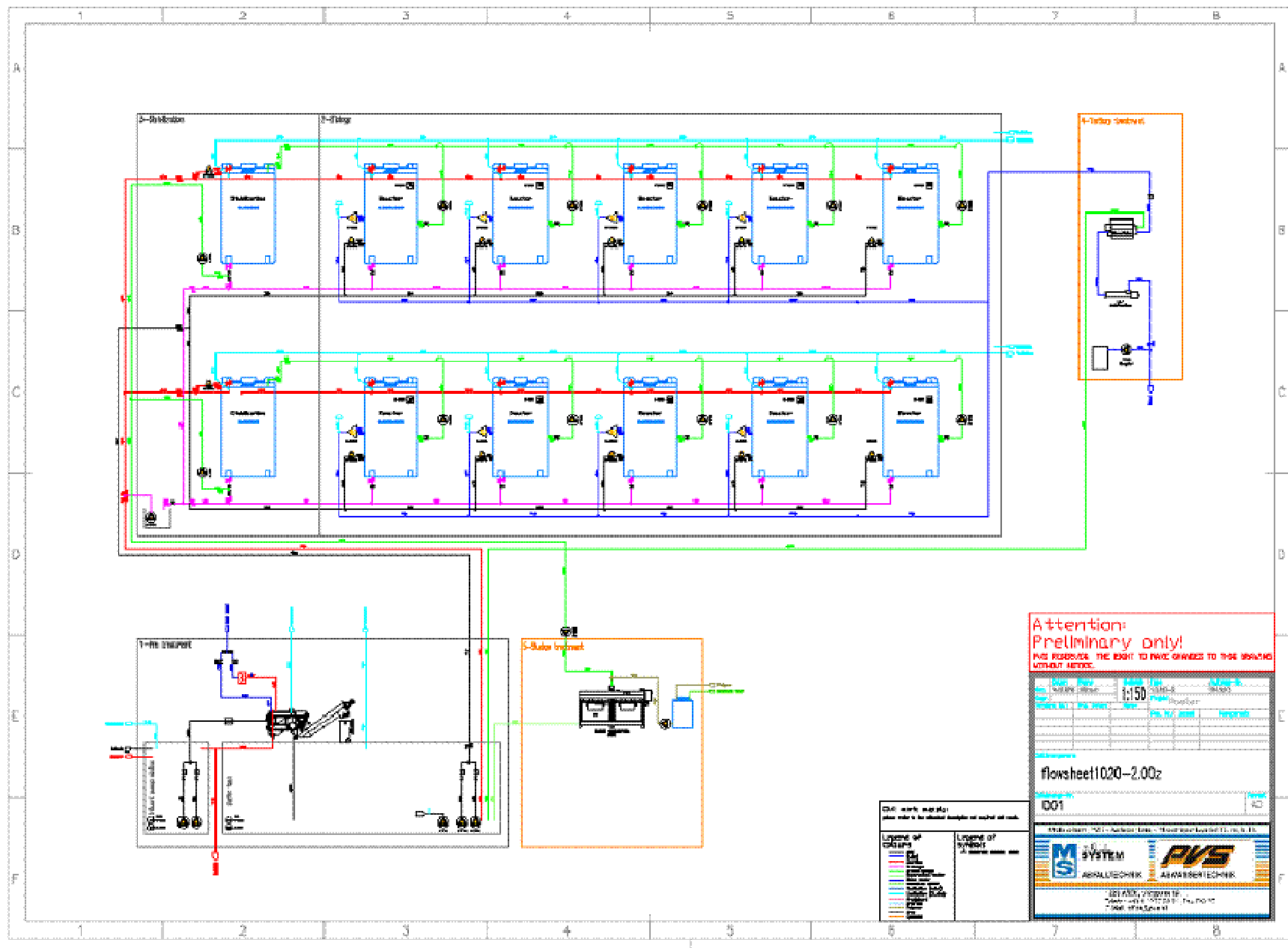
Projects in Austria

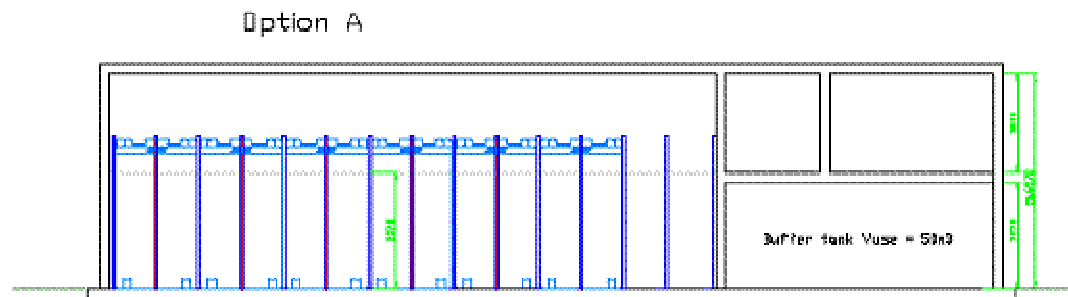
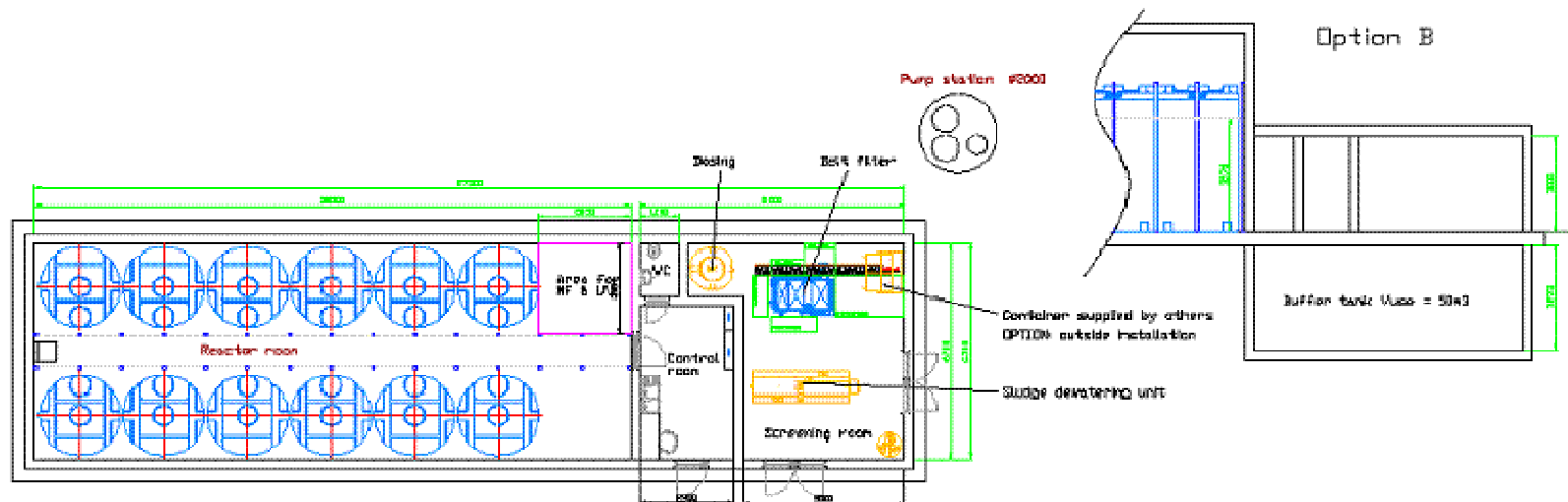




Fits every landscape







Reactor-Typ 20m³

h = 4570 mm
d = 2500 mm

**Attention:
Preliminary only**

Proj. Name	Proj. No.	Proj. Date	Proj. Rev.
Proj. Description	Proj. Status	Proj. Owner	Proj. Manager
hyatt00-200 002			
Approved by: [Signature] Date: [Date] Approved by: [Signature] Date: [Date]			
MS SYSTEM ADVANCED THINK RVS ADVANCED THINK			



5.000 – 50.000 PE PVS-Concrete SBR WWTP Plants





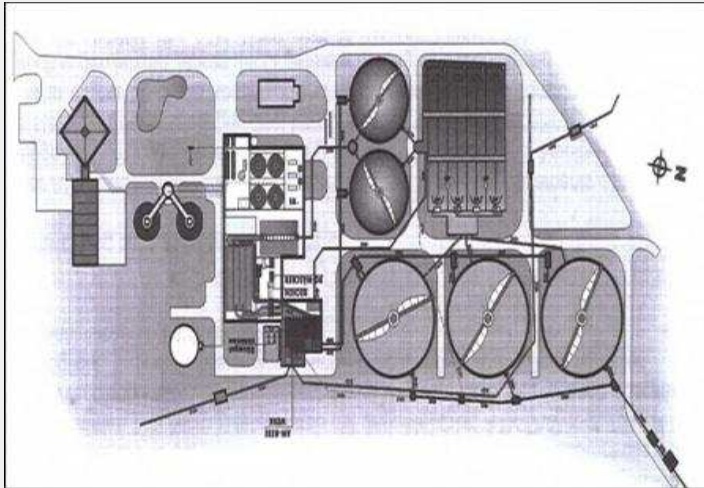
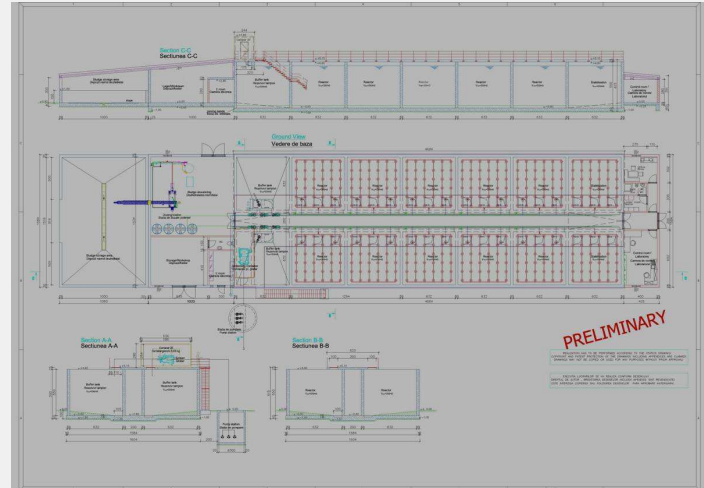
Established and proved PVS-SBR technology included in cost-effective concrete construction work.

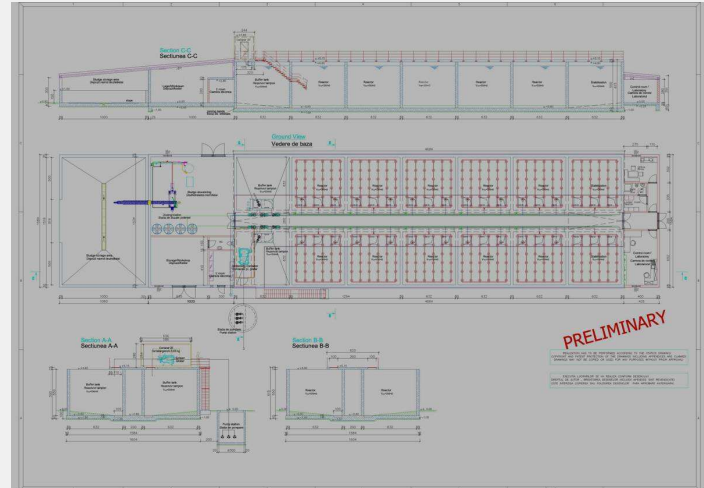
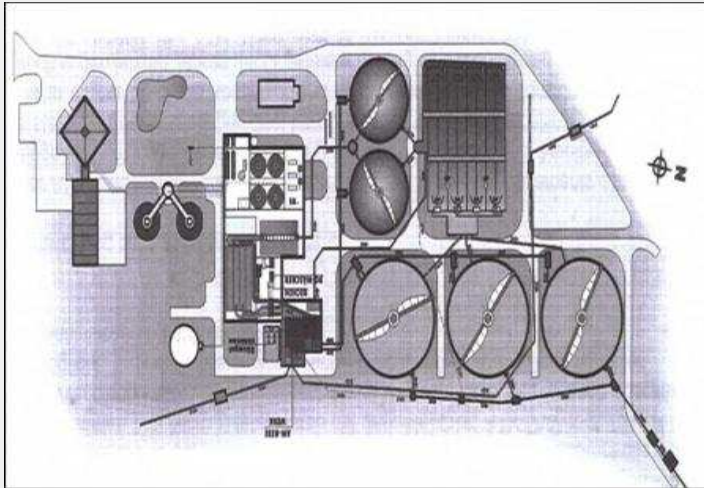




10.000 PE Plant

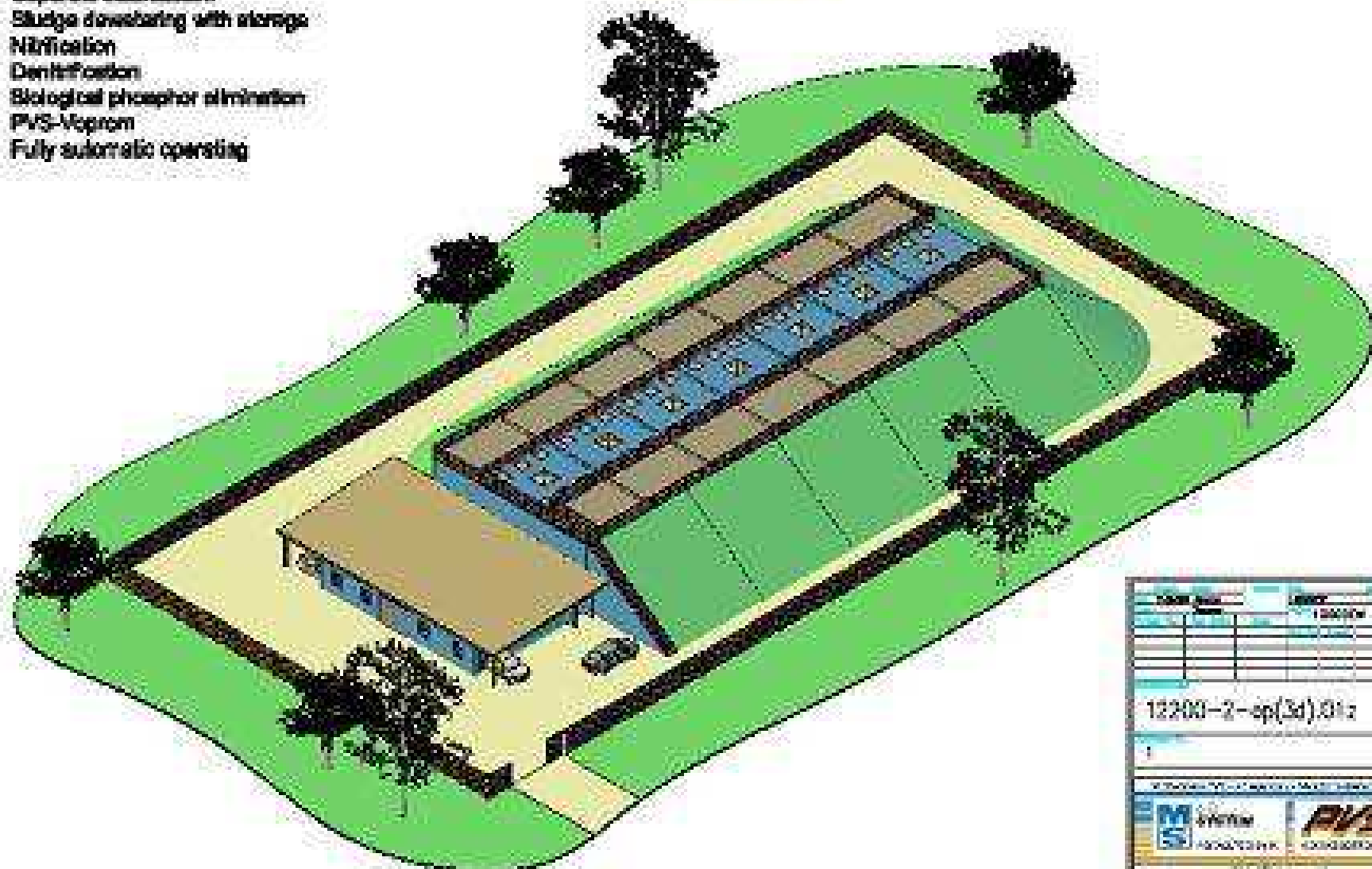
Footprints for

Conventional	PVS
4.000 m ²	1.000 m ²
	

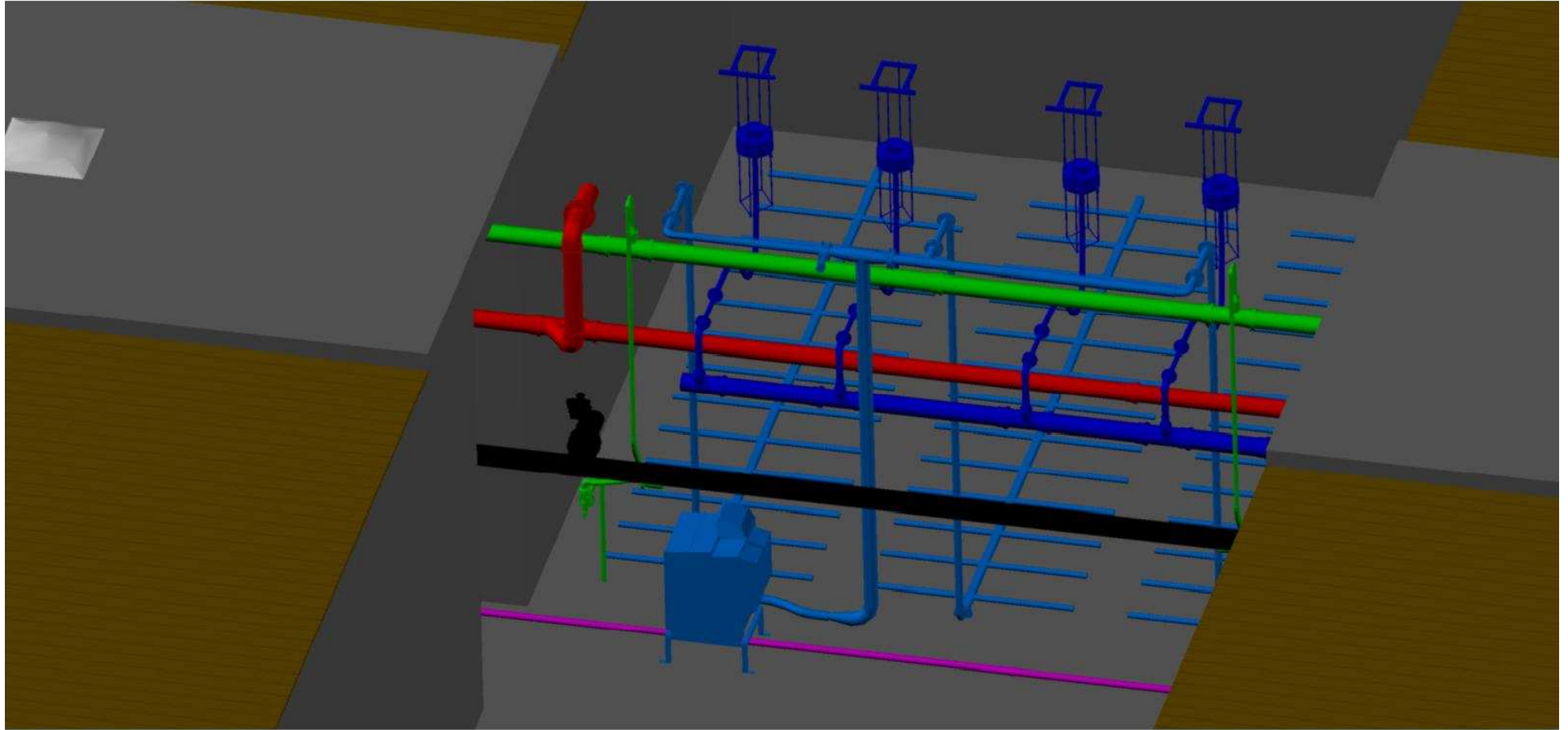


Fully automatic operating

400 to 5000 FE

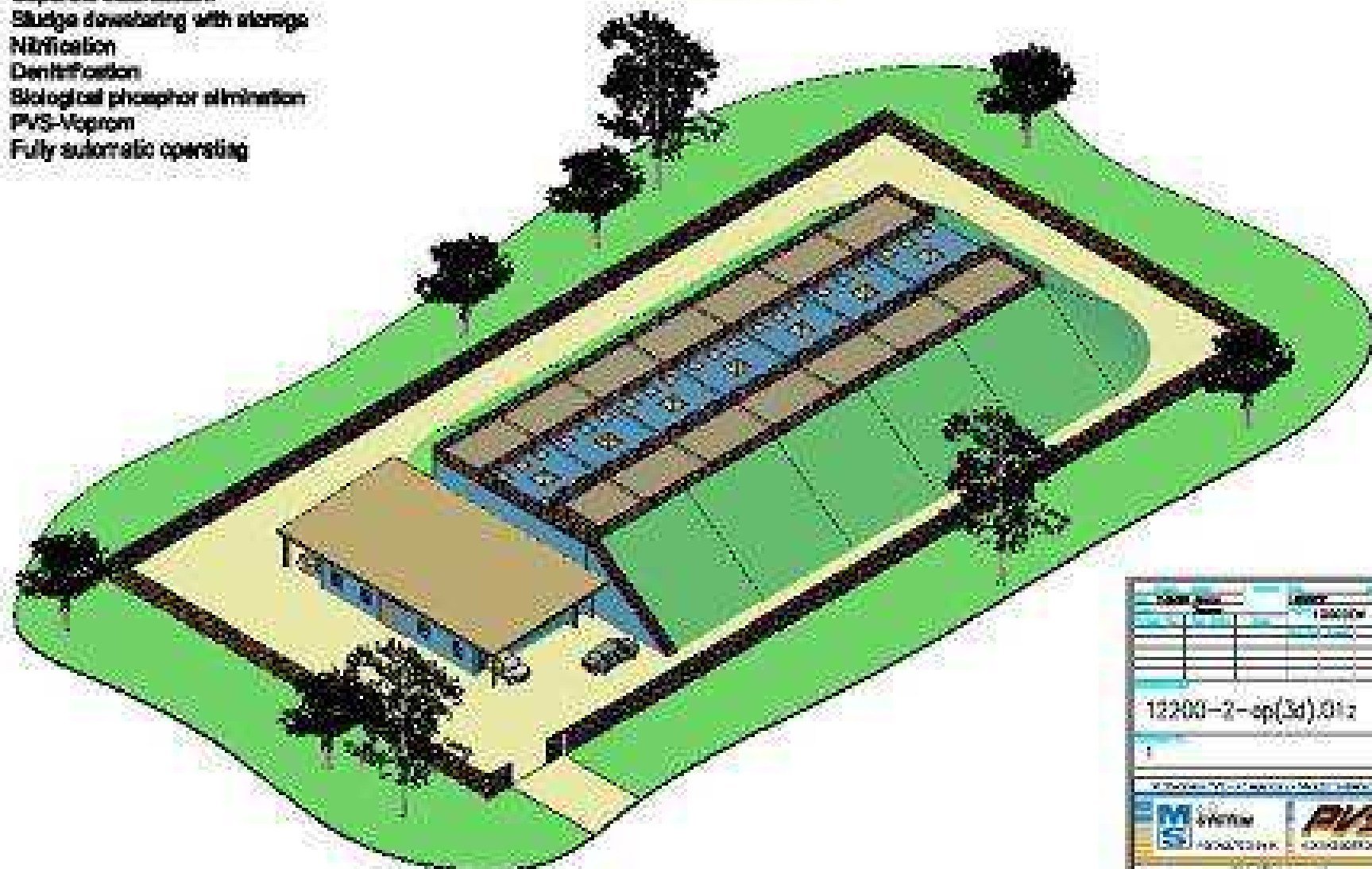






Fully automatic operating

4000 to 5000 FE

[illegible]



PROJECT

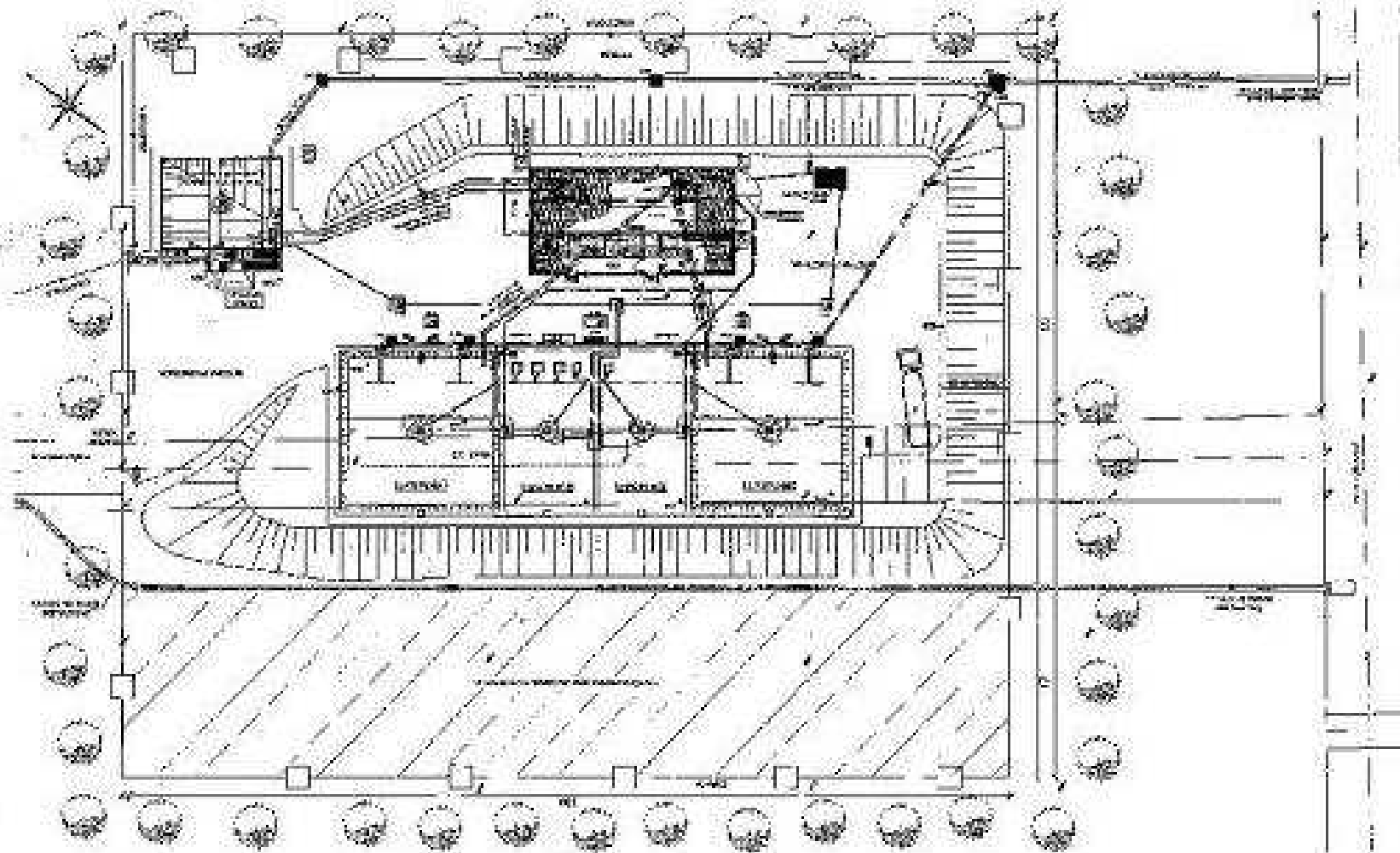
ORIGINAL DESIGN

1. 9000 PE at 60 g BOD/d and 350 l/PE.d
2. 2x 2100 m³ aeration tanks
3. Aeration/mixer without membrane diffusers
4. Sludge age up to 50 days
5. Sludge age and temperature not specified
6. Floating sludge will enter the effluent discharge pipe
7. 0,05 kg BOD/kg DM = too low BOD loading
8. Too low sludge dry mass (2,5 kg/m³)
9. 50% charging zone

PVS DESIGN

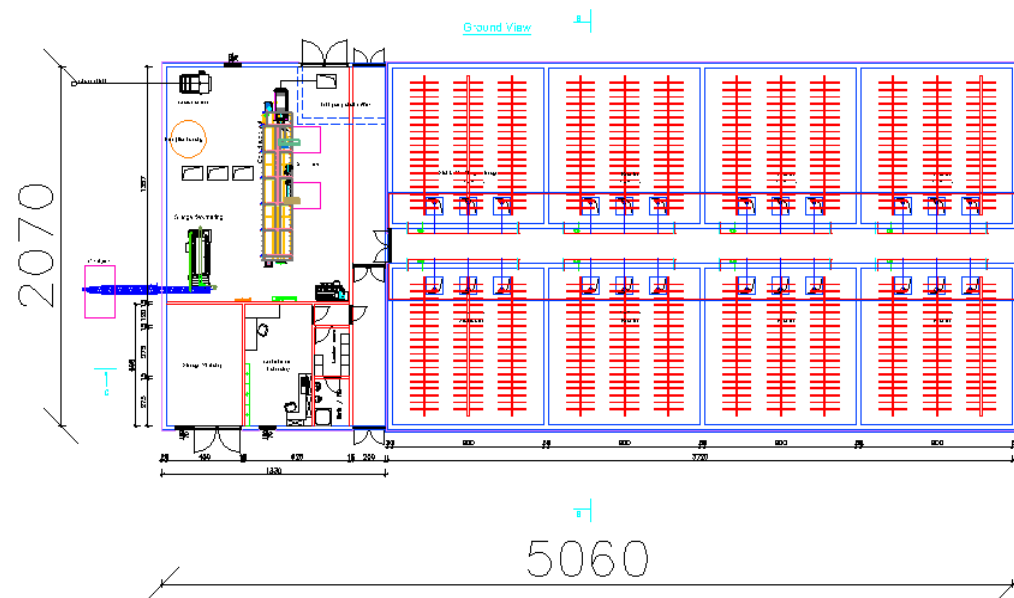
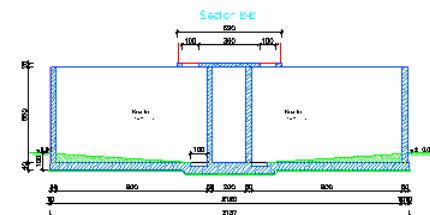
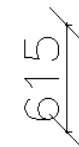
1. 9000 PE at 60 g BOD/d and 350 l/PE.d
2. 6x 400 m³ = more flexibility for flow fluctuations
3. Membrane diffusers = higher oxygen transfer rate
4. Sludge age max. 25 days after stabilization = no energy waste
5. Optimized sludge age for the design temperature
6. Floating effluent valve and overflow technology avoids floating sludge flowing into effluent pipe = controlled effluent
7. 0,15 kg BOD/kg DM = better degradation efficiency
8. Dry mass of approx 4 - 5 kg/m³ = better settlement
9. 20 – 30 % charging zone = less settlement time shorter cycles

2. ORIGINAL design



1:500

Sector Coefficients, 1990-2000



Attention:
Preliminary only!
FIGURES THEFT TO BE CHARGED TO BLAME

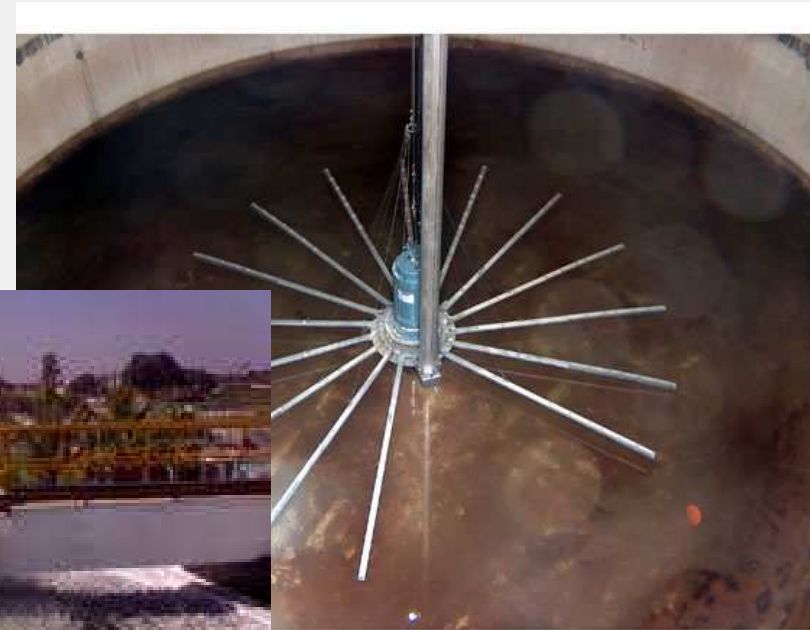
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Müllsystem PVS - Anlagenbau - Maschinenhandel G. mb. H.


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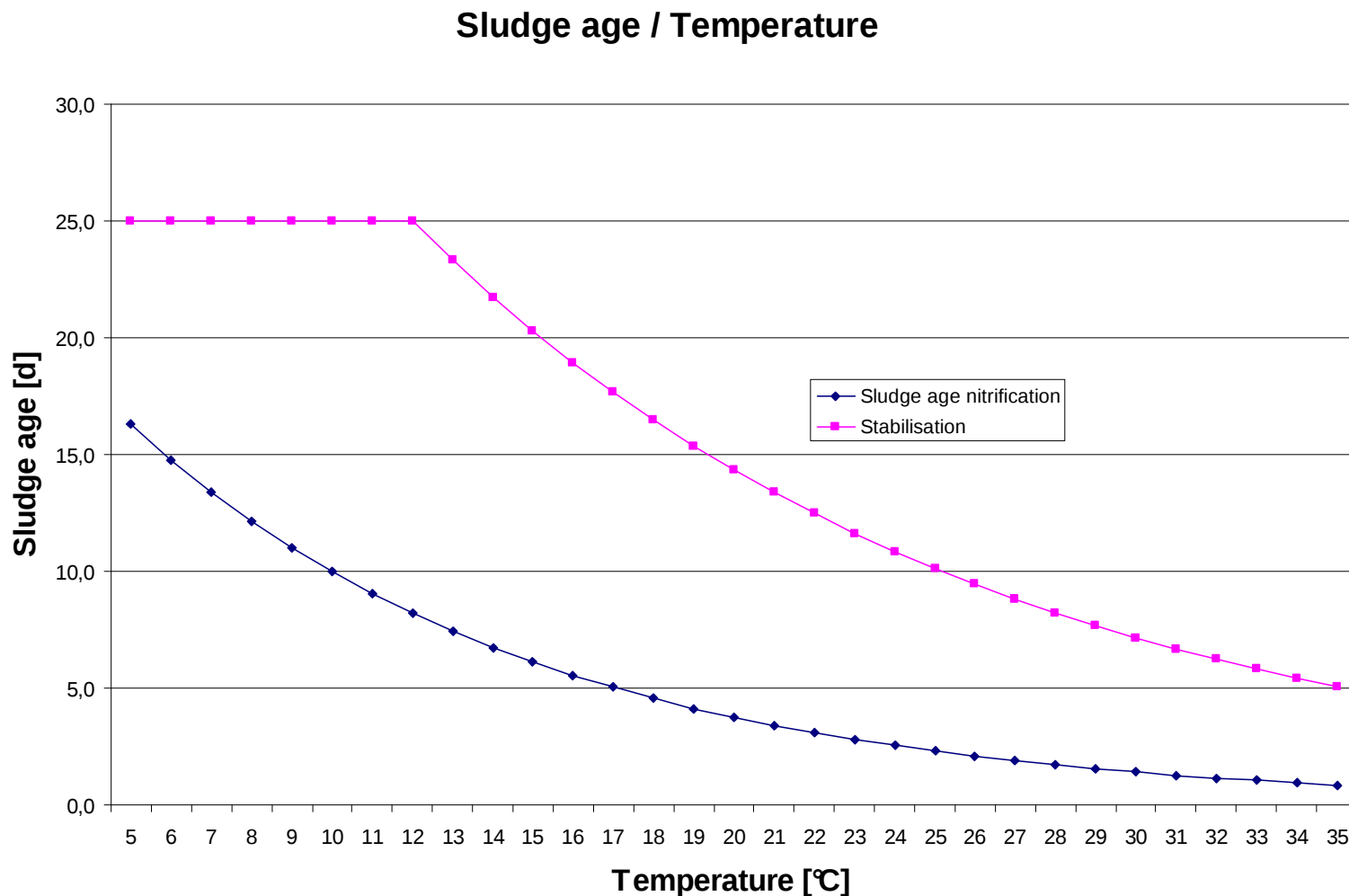
3. ORIGINAL aeration



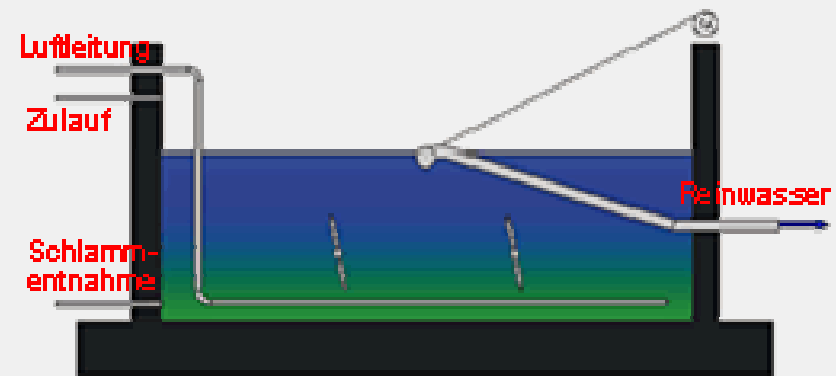
3. PVS aeration



4. + 5. Calculation of sludge age conforming to ATV A 131



6. ORIGINAL effluent



6. PVS effluent



7. + 8. Sludge settlement





PROJECT

OPERATION COST SAVINGS WITH PVS PLANT TECHNOLOGY:

Lower sludge age = energy savings approx. 20 – 25%

1. Better oxygen distribution = energy savings approx. 10%
2. Better sludge level control = better effluent values and lower work costs
3. Better effluent values, because no floating sludge in effluent pipe
4. Better control of cleaning efficiency
5. Better capability for load and flow fluctuations = energy savings up to 50%

PVS plant ~ 1 kWh/m³

ORIGINAL plant ~ 1,8 kWh/m³

ENERGY SAVINGS: between **€ 80,000.- and € 140,000.- per year**

WORK FORCE SAVINGS: **approx. 25%**



PROJECT

POSSIBLE SOLUTIONS:

1. PVS ALTERNATIVE will be executed, including:
 1. PVS 06400-2 plant including pre-treatment and sludge treatment
 2. Oxygen reference control, pH control and flow meters
 3. PVS VOPROM technology
 4. PVS sludge management technology
 5. PVS effluent discharge technology
 6. Full automated operation
 7. Membrane diffusers
2. PVS will offer some adoptions for tender description, including:
 1. PVS VOPROM technology
 2. PVS sludge management technology
 3. Membrane diffusers
 4. Changes in technology and automation



Thank you for your attention

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