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HUBER TECHNOLOGY
WASTE WATER Solutions

Fine Screening System: The More Intelligent Primary Clarifier

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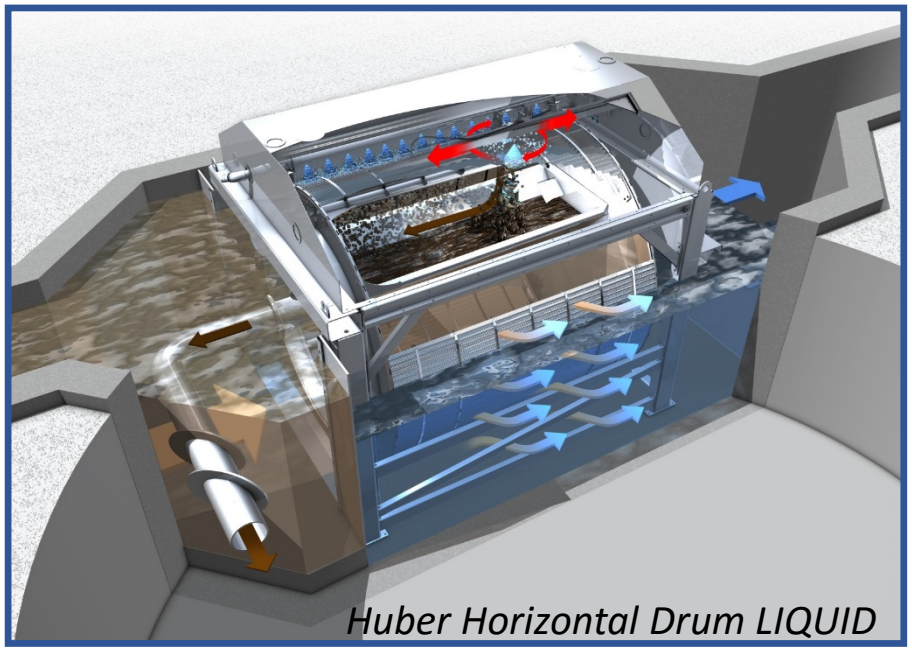
Agenda

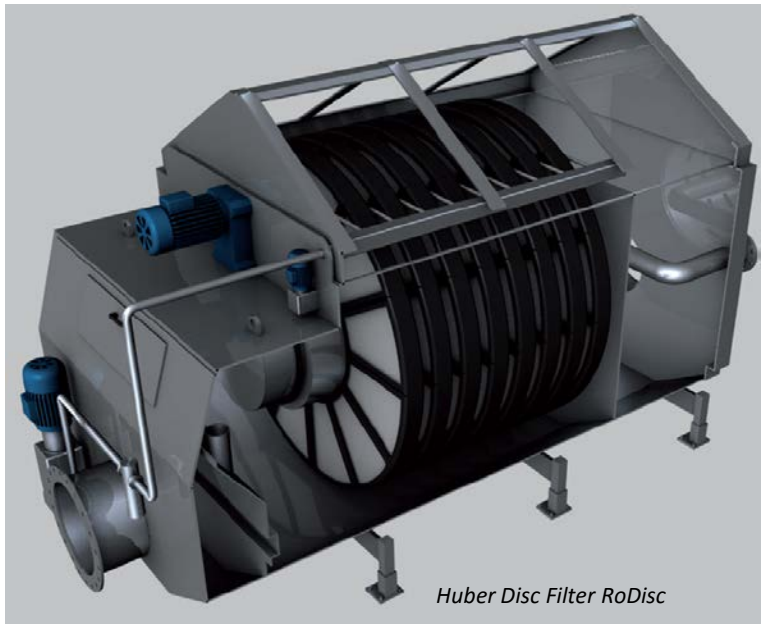
- Introduction to Huber Technology’s primary filtration technology
- Huber Drum Screen LIQUID
- Research Project E-Klaer
- Results from 8 trials over a total of 3 years
- Summary and Conclusion

Experience in Fine and Microscreening

Over 4500 units installed worldwide

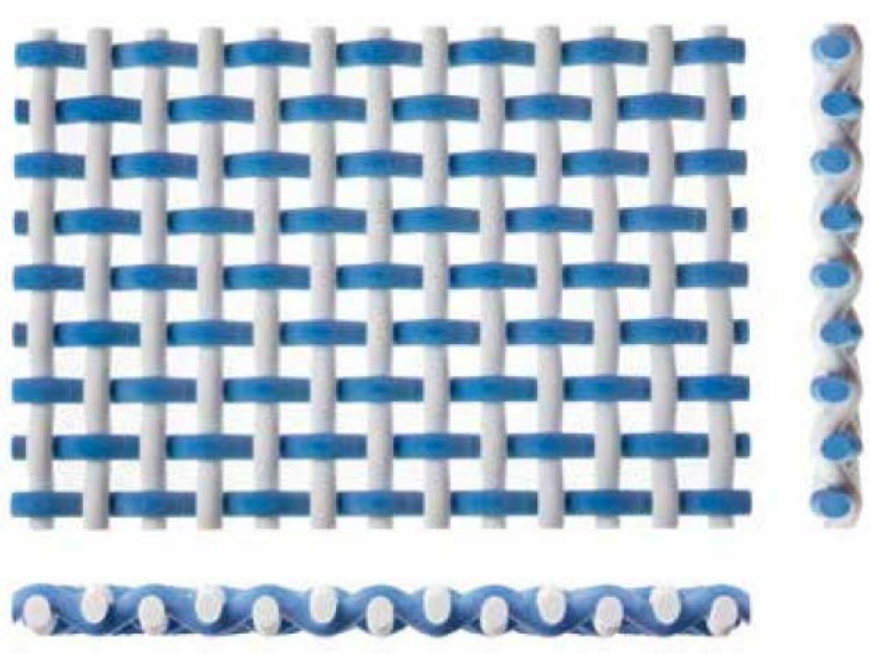
Different Systems for Different Applications


Huber Horizontal Drum LIQUID

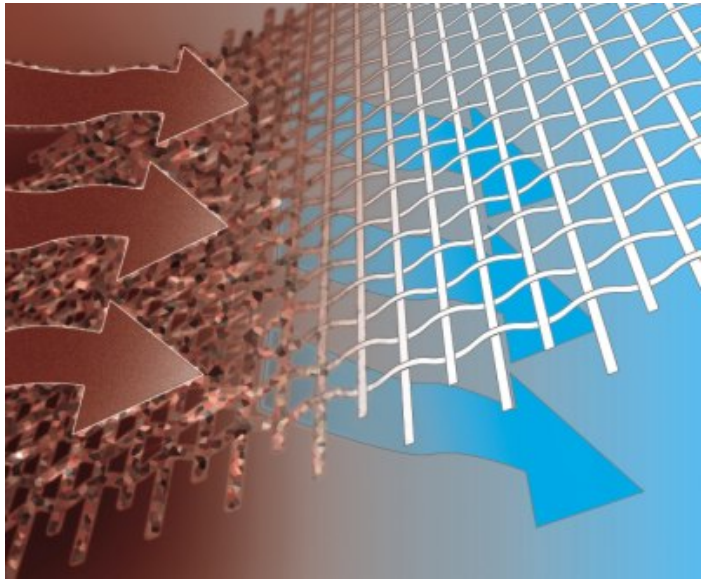

Huber Disc Filter RoDisc

- 2 dimensional woven mesh significantly increases removal rate
- SSTL mesh with ≥ 40 micron for max. stability
- Adaption of pressure loss based on opening size for max. hydraulic throughput

Stainless Steel Woven Mesh



Plain-woven mesh for exact opening size

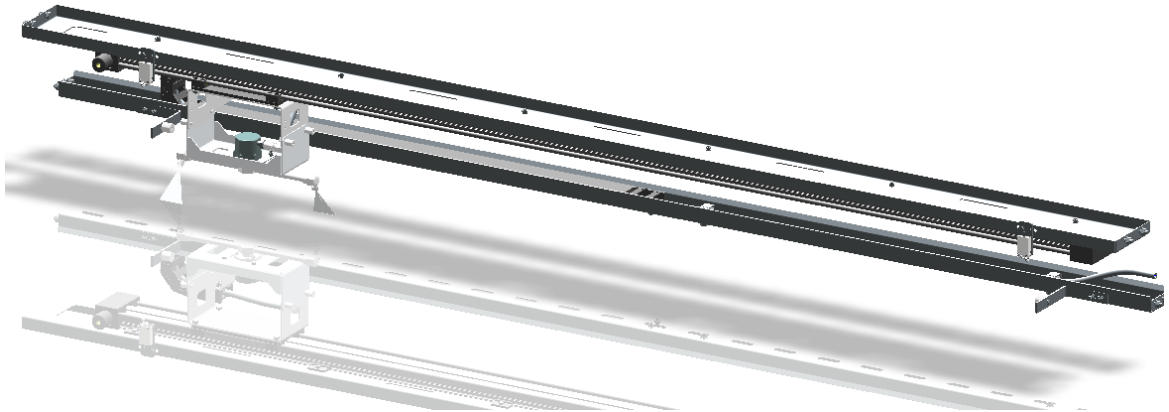


*2-dimensional screening with **SSTL mesh***

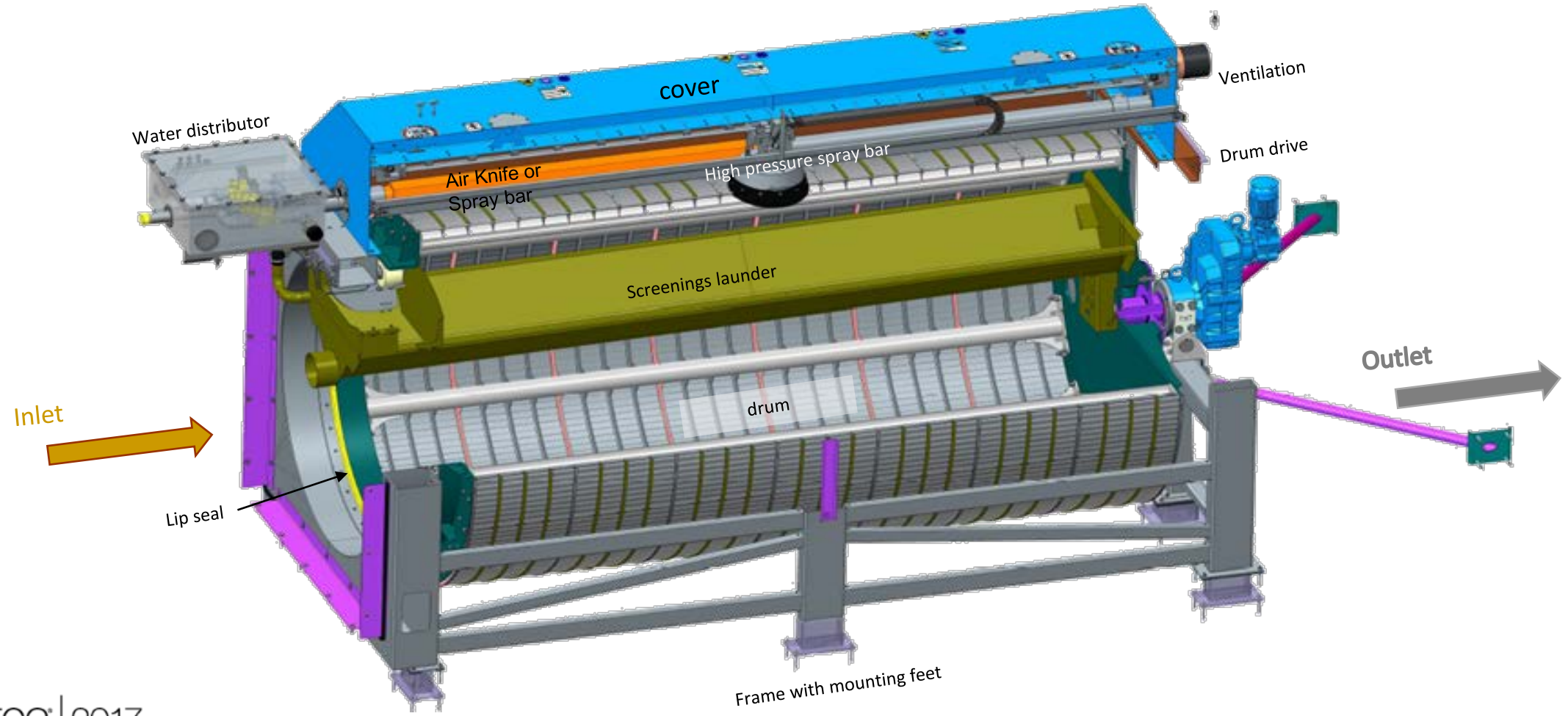
- Resistance to aggressive fluids, water and acids
- Long lifetime and therefore very economical (high durability)

High Pressure Cleaning

- Important to sustain hydraulic throughput for openings < 1mm
- Proper cleaning reduces runtime and wear of machine
- Prevents FOG clogging



Huber Drum Screen LIQUID



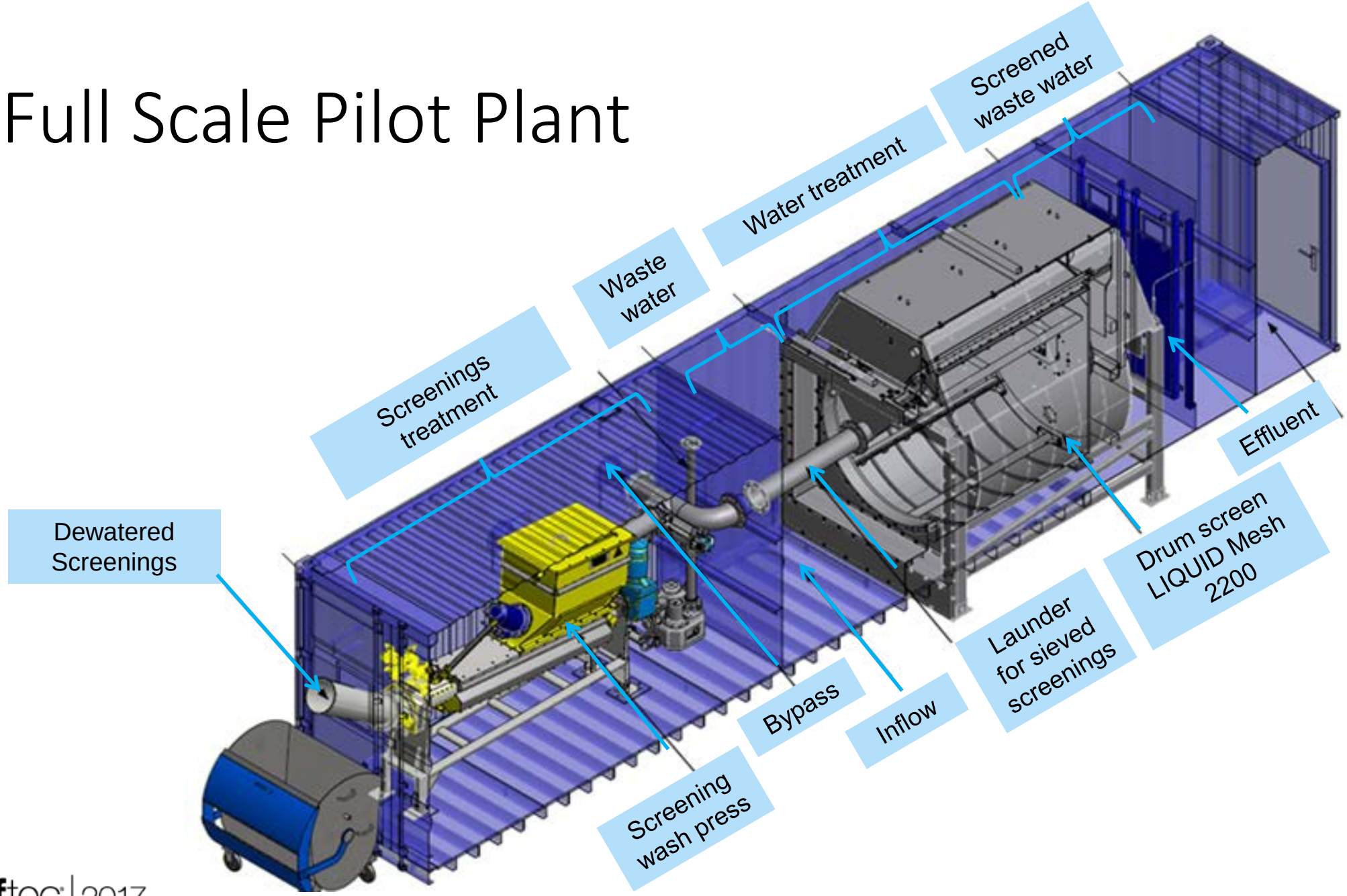
Project E-Klaer

- Research project over 2 years
- RWTH Aachen University, Institute of Environmental Engineering
- Goal: Carbon diversion for thermal reuse
- 3 different WWTP test sites in Germany

Full Scale Pilot Plant

Full scale container plant 12m long x 3m wide x 3m tall (39‘x10‘x10‘)

Full Scale Pilot Plant



Sampling and Methods

- Duration: 3 years
- Total of 8 plants, 3 plants part of E-Klaer project
- Time proportional sampling
- 2hr, 10hr and 24hr composite samples at each WWTP
- Inlet TSS/COD- inlet of pump (grit trap) and inlet of drum screen
- Outlet TSS/COD – after outlet weir

- Hydraulic throughput between 30-70 L/s (475 gpm – 1,110 gpm)
- 0.3mm (300 micron) mesh opening

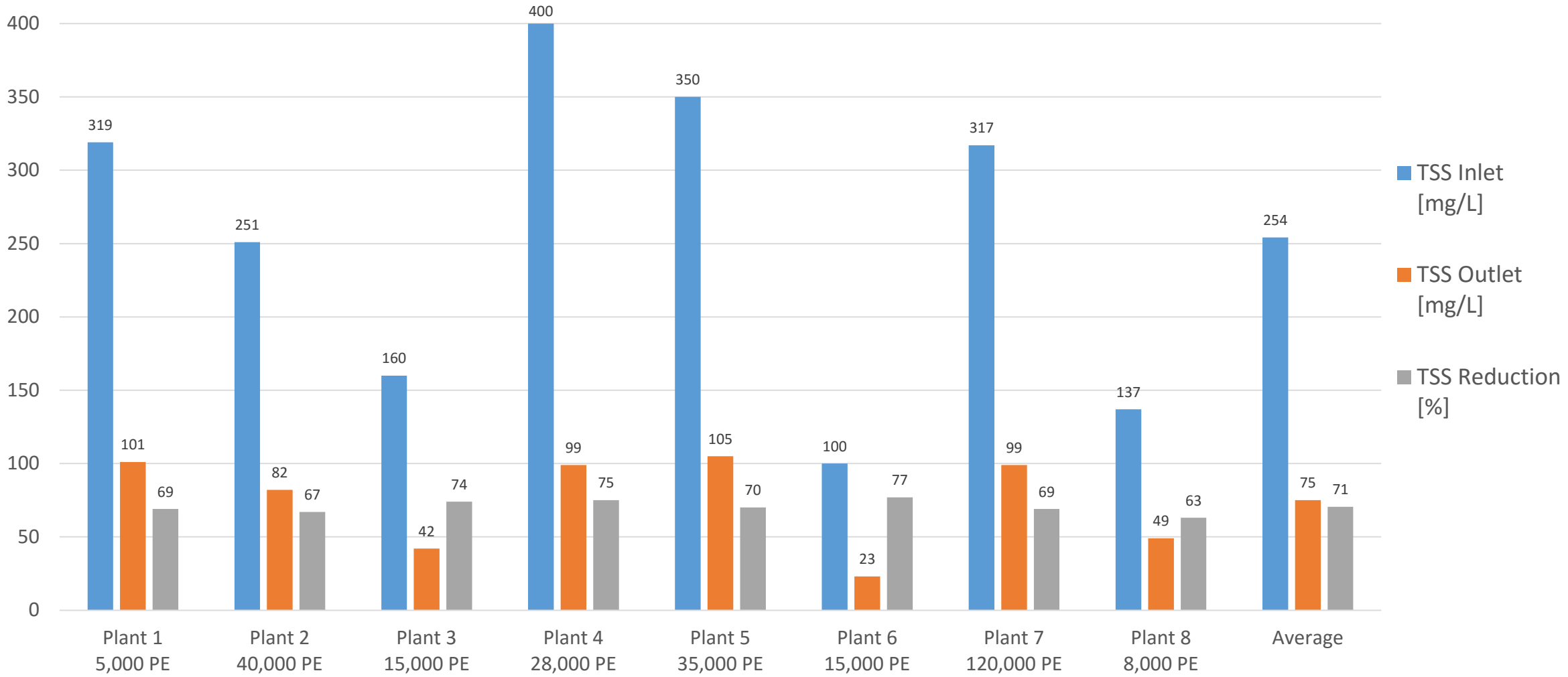
Results from all 8 WWTP – TSS, COD, COD Ratio

Plant Size	TSS Inlet [mg/L]	TSS Outlet [mg/L]	TSS Reduction [%]	COD Inlet [mg/L]	COD Outlet [mg/L]	COD Reduction [%]	COD part. [%]	COD soluble [%]	COD part. [mg/l]	COD part./ COD tot
Plant 1 5,000 PE	319	101	69	652	347	46	80	20	522	0.8
Plant 2 40,000 PE	251	82	67	572	310	46	81	19	463	0.81
Plant 3 15,000 PE	160	42	74	330	183	45	75	25	248	0.75
Plant 4 28,000 PE	400	99	75	868	395	54	86	14	746	0.86
Plant 5 35,000 PE	350	105	70	600	210	65	x	x		
Plant 6 15,000 PE	100	23	77	330	228	31	50	50	165	0.5
Plant 7 120,000 PE	317	99	69	700	483	31	75	25	525	0.75
Plant 8 8,000 PE	137	49	63	231	148	36	x	x		
Average	**254**	**75**	**71**	**535**	**288**	**44**	**75**	**26**	**x**	**x**

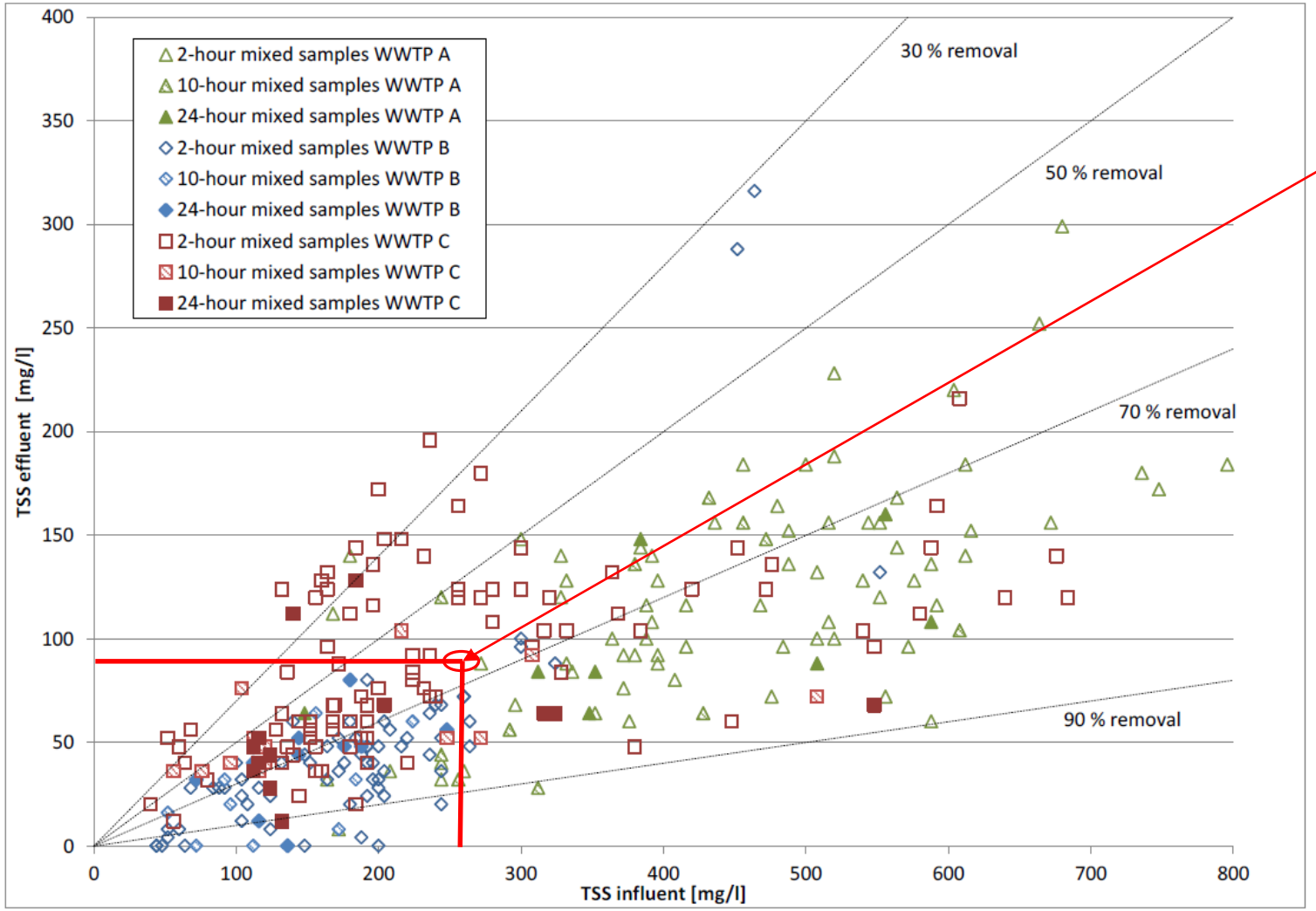
Results from testing by

- *University Aachen (Germany) – E-Klaer project*
- *University Amberg/Weiden (Germany)*
- *Technische Hochschule Nürnberg (Germany)*

TSS Concentration in mg/L and TSS Removal Rates in %



Result TSS removal – E-Klaer

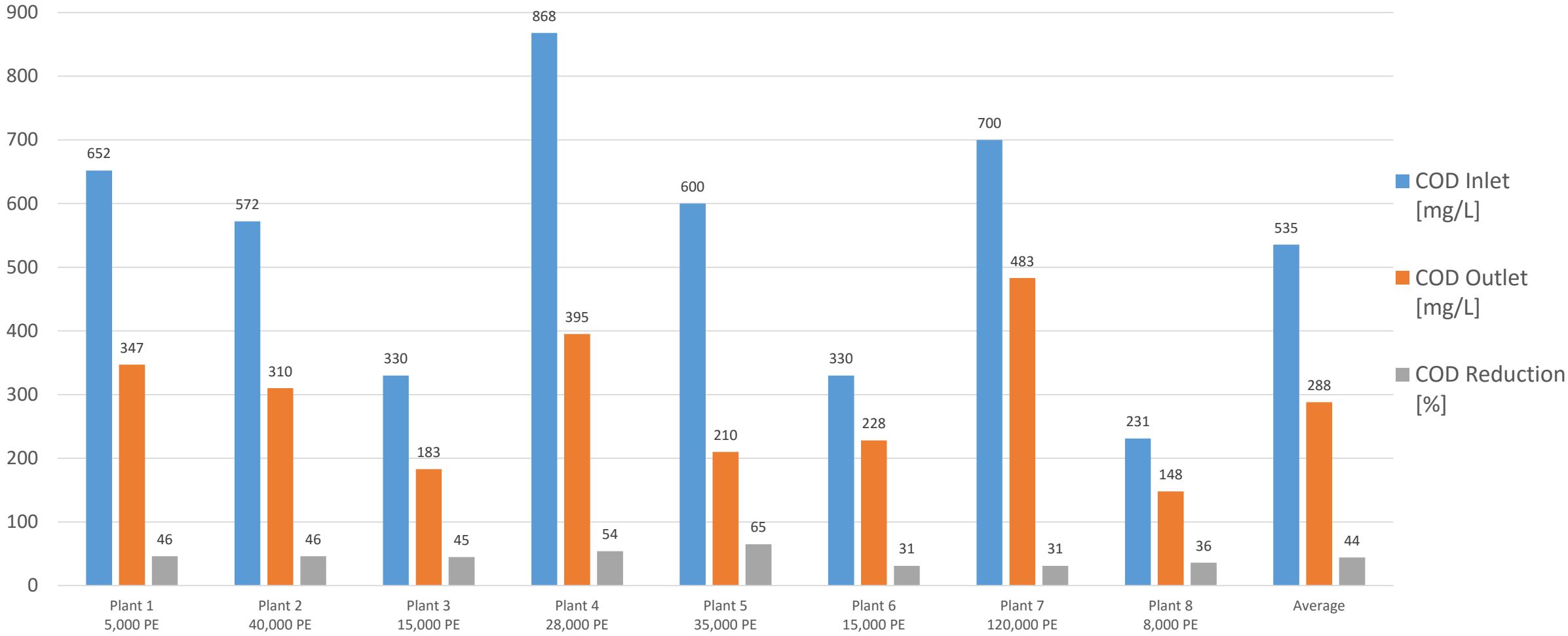


Average Removal from all 8 WWTP 71%

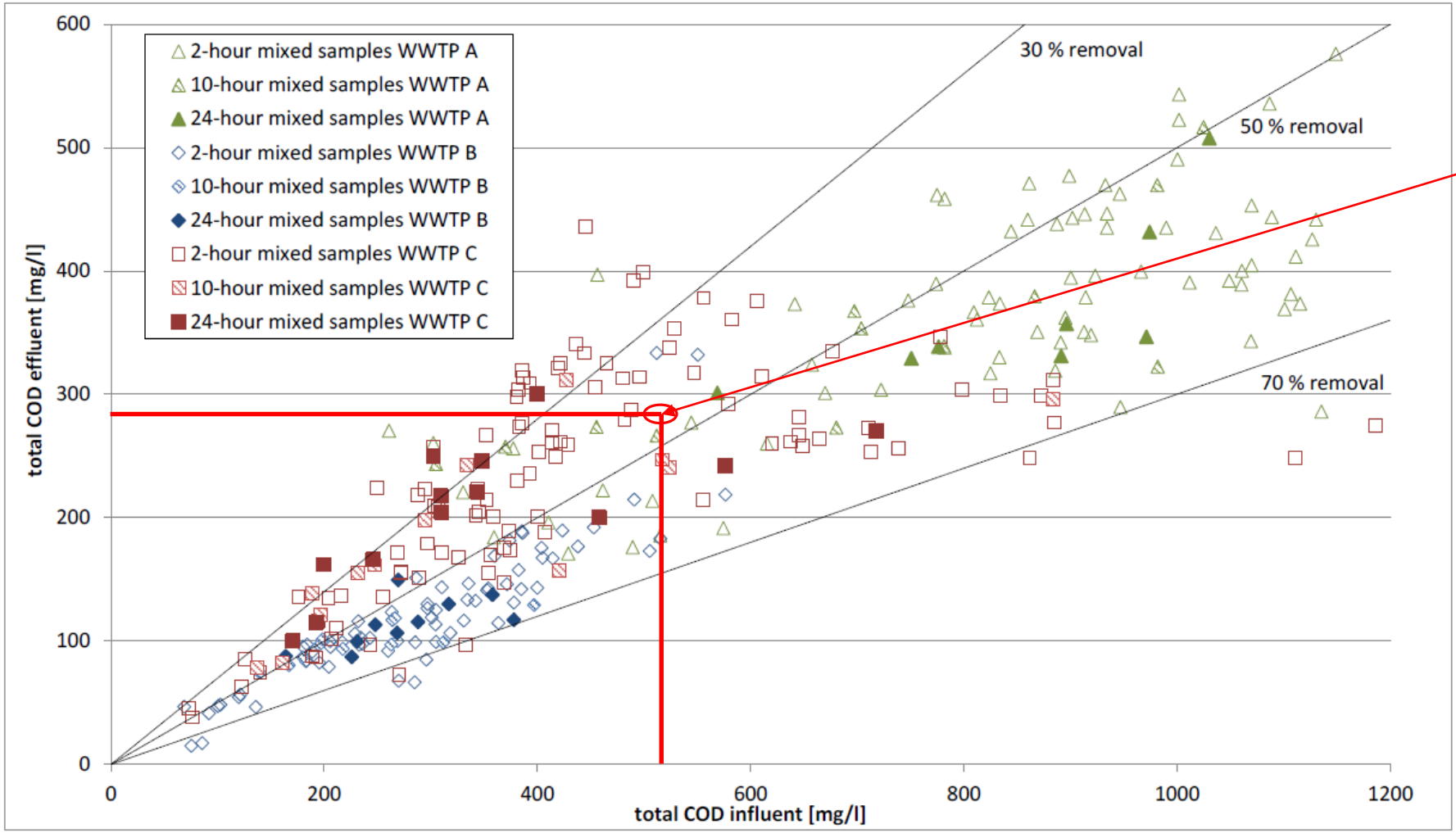
68-72% TSS Reduction

(compared to 50-60% for Primary Clarifier)

COD Concentration in mg/L and COD Removal Rates in %



Results COD removal – E-Klaer

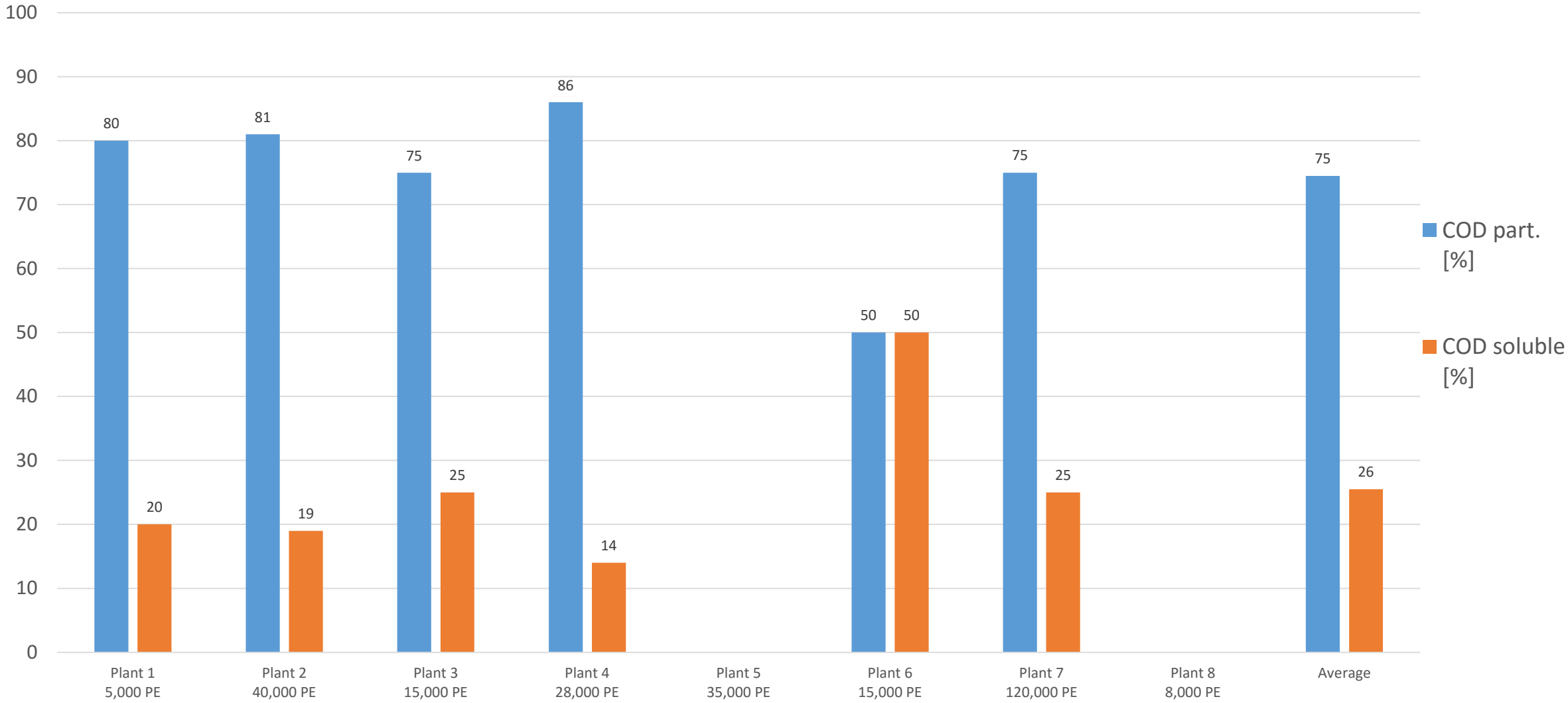


Average Removal from all 8 WWTP 44%

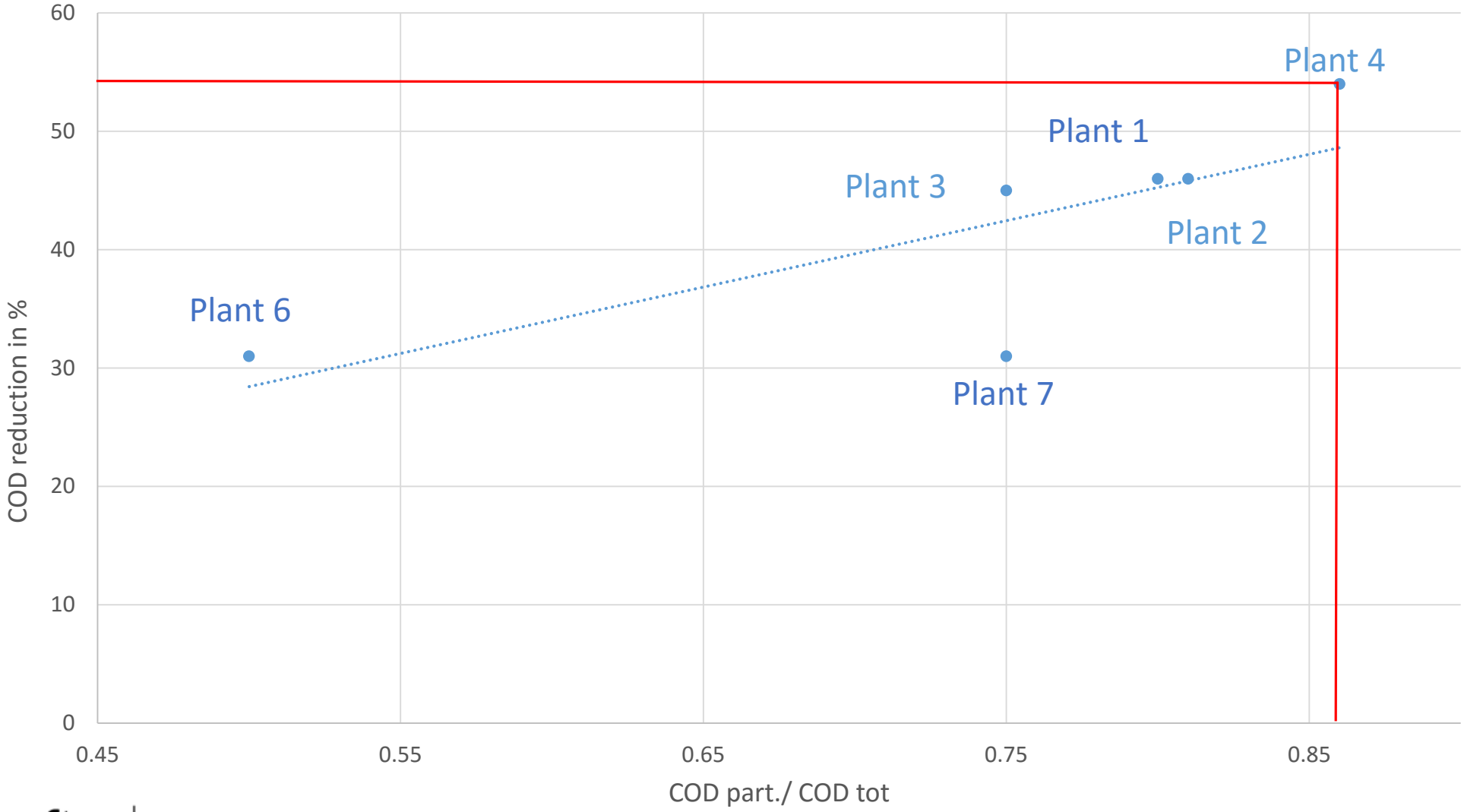
47-57% COD Reduction

(compared to 30-35% for Primary Clarifier)

Particulate and Soluble COD in %



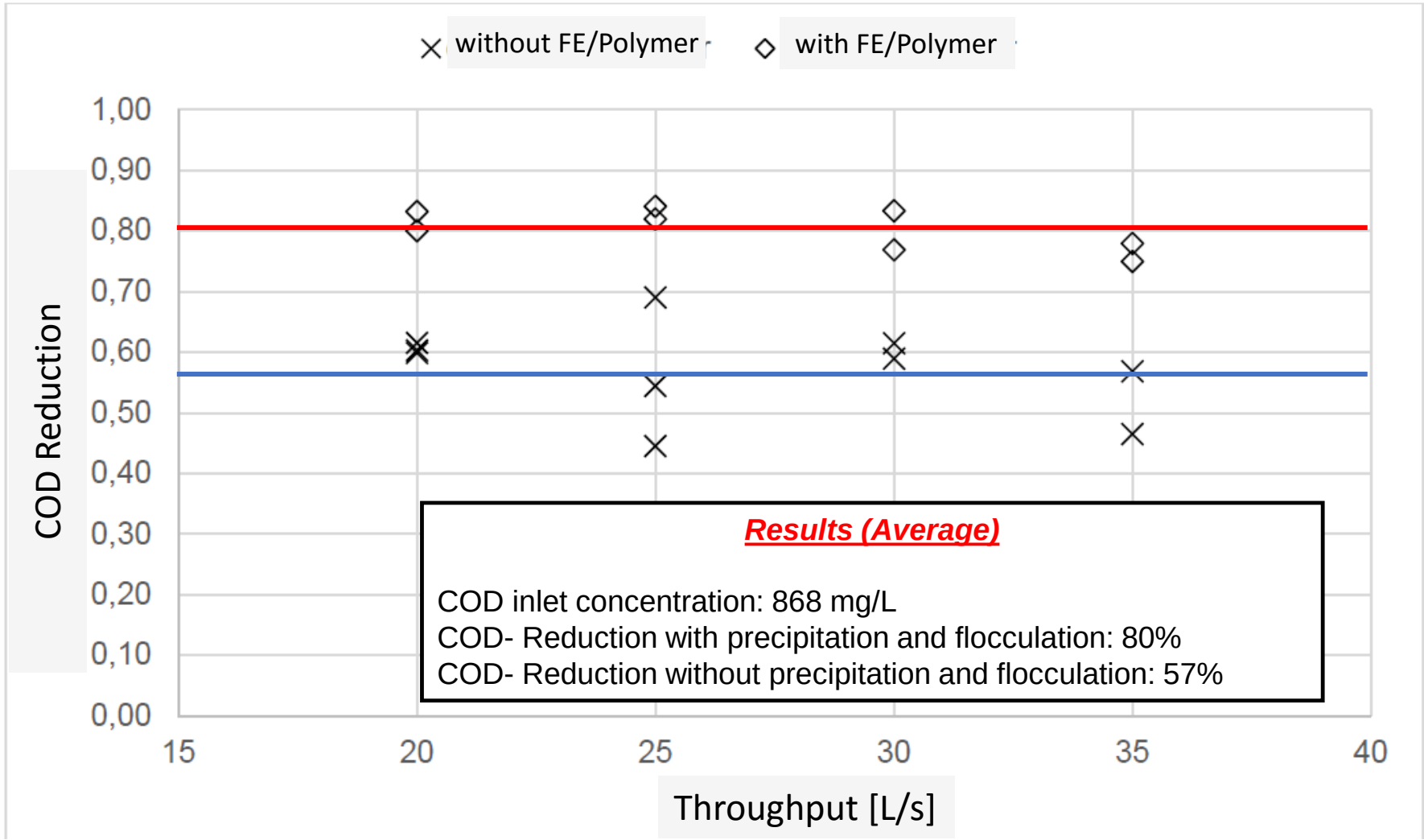
COD reduction based on COD ratio



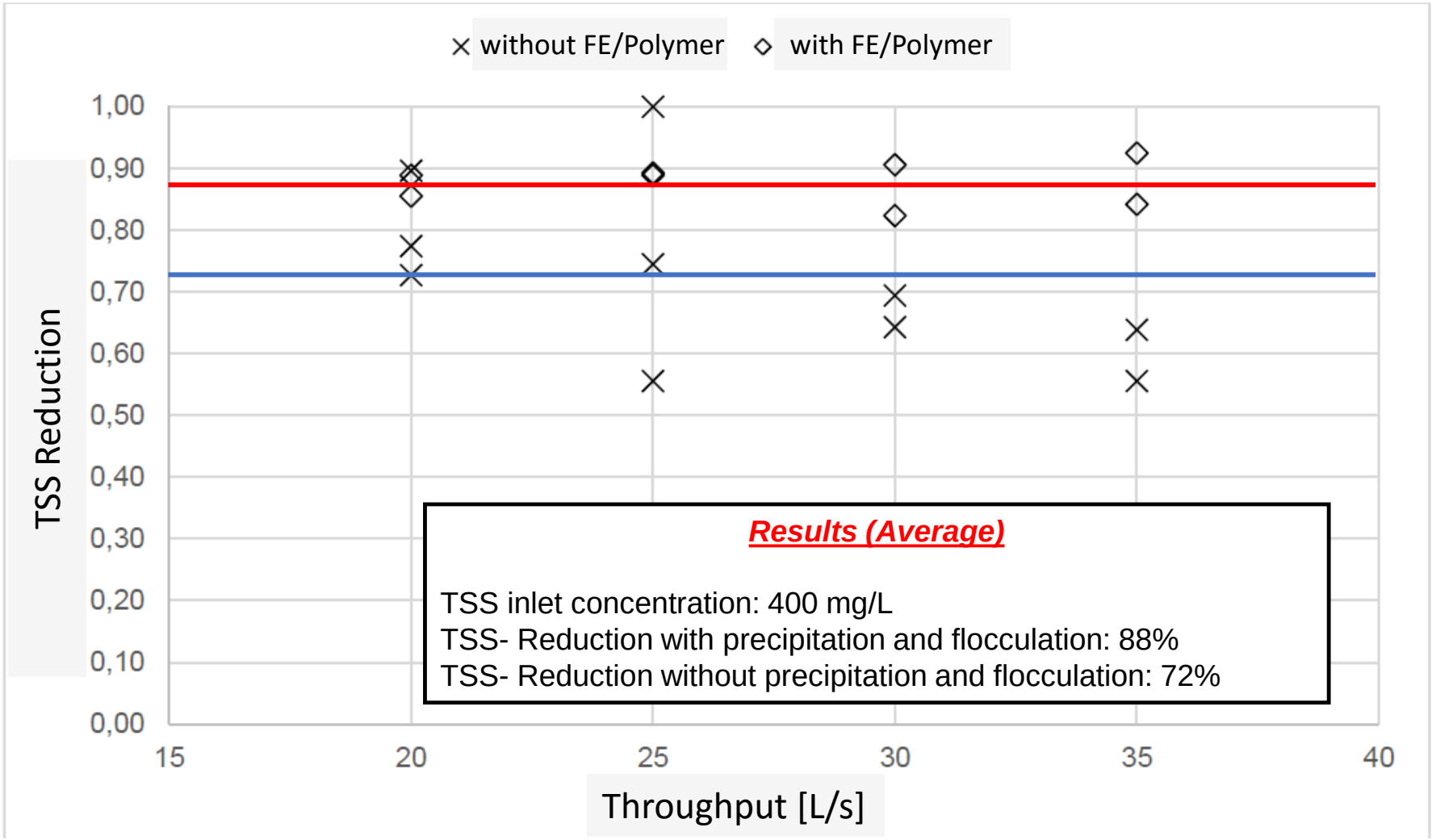
Max. 54% COD- reduction for a COD part./COD tot ratio of 0.86

Ratio can be used to estimate removal rate

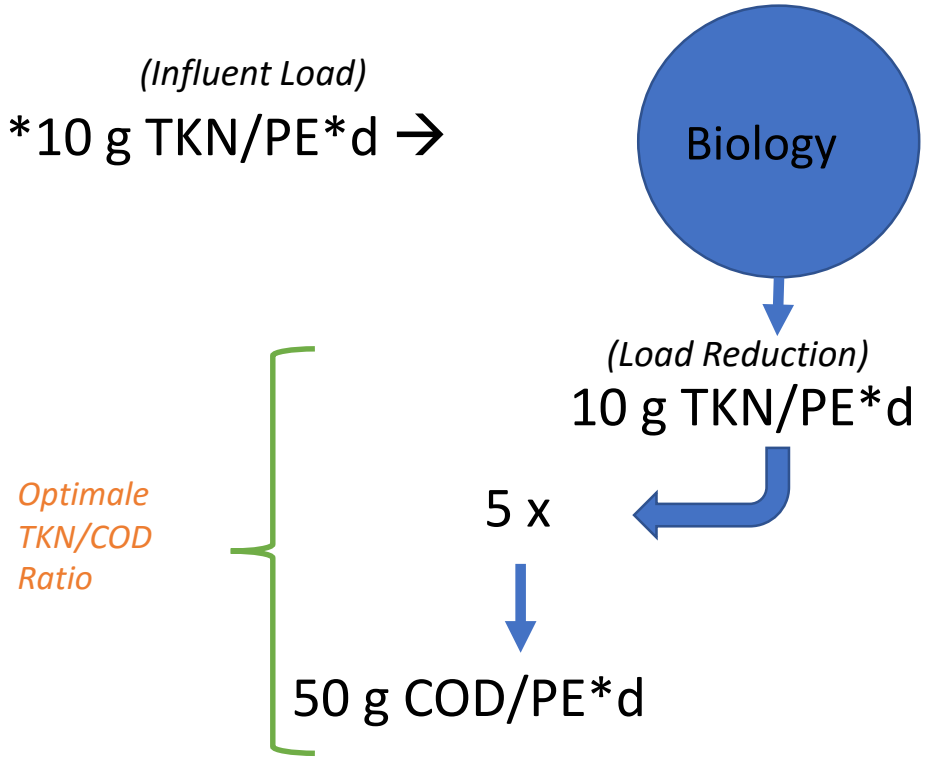
COD Reduction with Chemical Addition



TSS Reduction with Chemical Addition



Max. Feasible COD Reduction



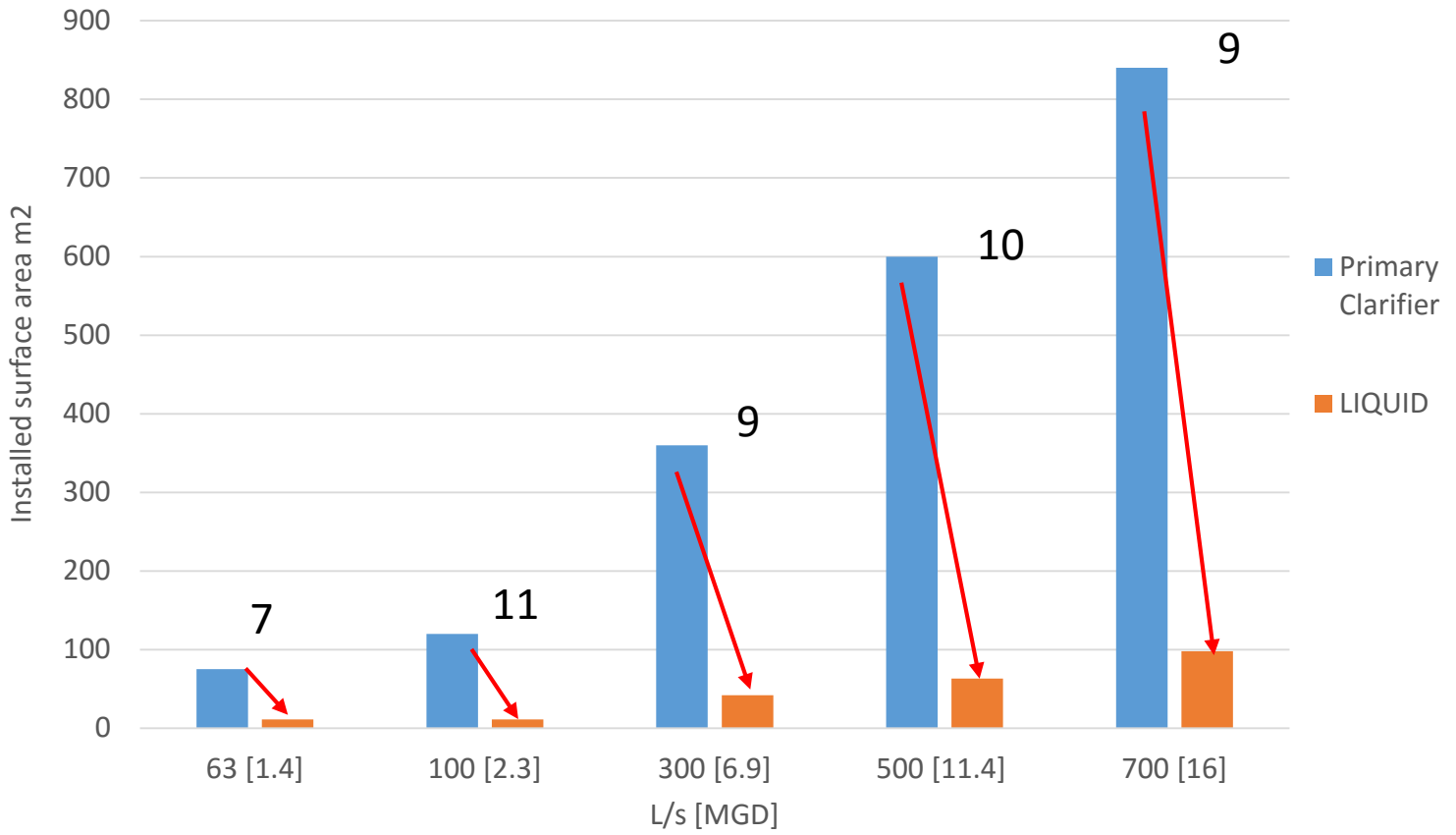
For COD reduction of > 54% → either use of polymer, smaller mesh openings or different technologies such as HuberRoDisc disc filter is necessary

Functioning Denitrification with approx. 58-64 % COD removal via primary screening

120-140 g COD / PE*d – 50 g COD/E*d → 70-90 g COD / PE*d

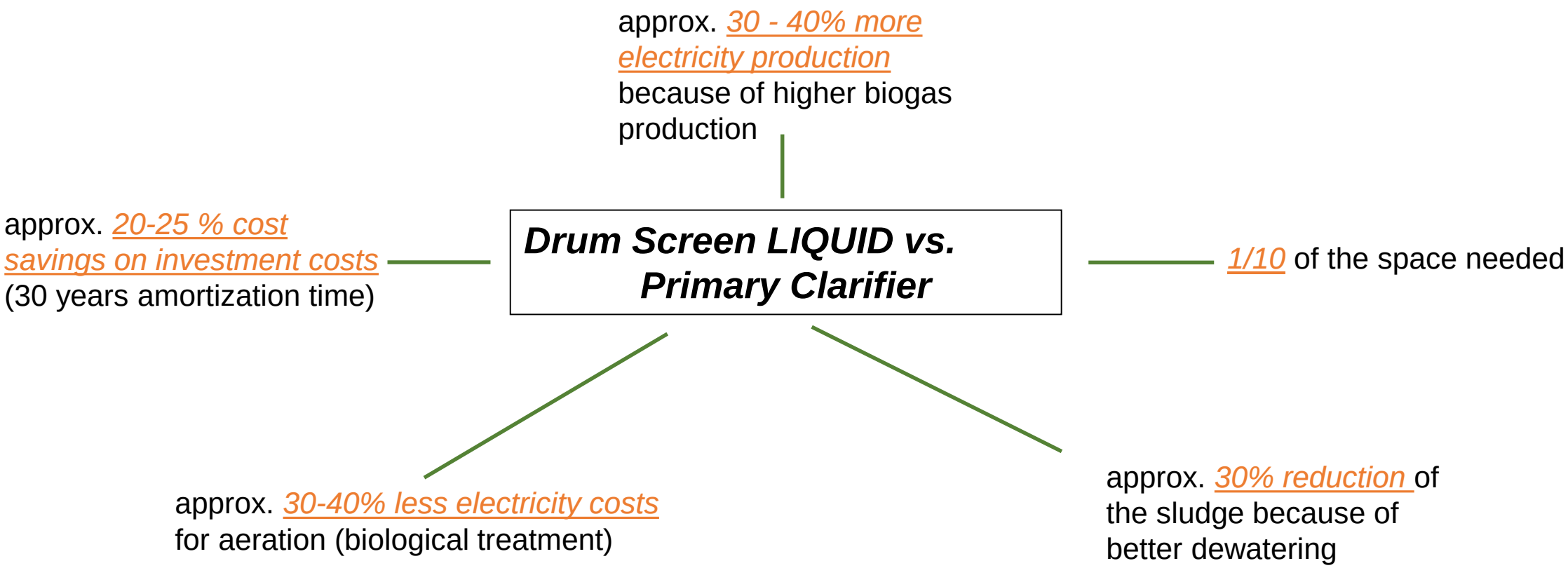
*11 g TKN/PE*d -1 g removed by preliminary treatment

Comparison Footprint LIQUID and Primary Clarifier



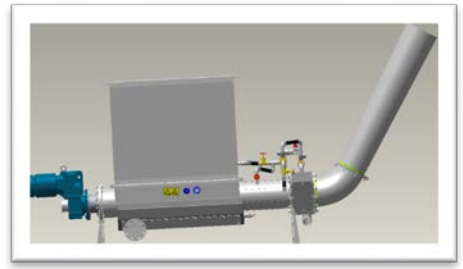
7-11 less surface area needed for mechanical screen!

Economical Advantages LIQUID vs Primary Clarifier



Sludge Handling – Available Options

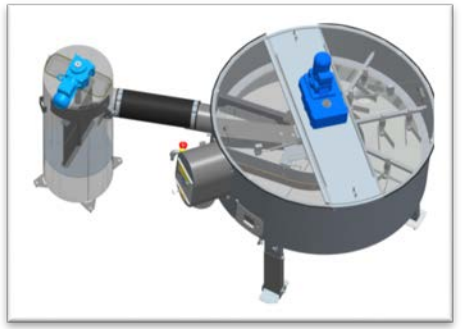
Huber Drum Screen LIQUID → Thickening with Huber WAP-lq → Digester



Huber Drum Screen LIQUID → Mixing of Primary Sludge + Secondary Sludge → Thickening with Huber S-Disc → Digester

Huber Drum Screen LIQUID → Drum cleaning with air-system → Digester

Huber Drum Screen LIQUID → Thickening of primary sludge with S-Disc → Digester



Sludge Handling – Thickening with WAP liquid up to 10%

Summary and Conclusion

- Results from extensive trials show avg 44% COD and 71% TSS removal
- High guaranteed throughput with up to 400mm pressure loss possible because of sturdy SSTL mesh construction
- Reliable mesh cleaning with high pressure spray bar using 120 bar (1740 psi)
- No chemical cleaning required to sustain throughput
- No throughput reduction because of FOG in WW