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Technology Options for Wastewater Treatment

April 24, 2012

Outline

- 🌐 Basic Sewage Treatment Processes
- 🌐 Existing Maynilad Sewage Management Facilities and Technologies Used
- 🌐 Sewage Treatment Processes
- 🌐 Selection Criteria
- 🌐 Technology Options

Basic Sewage Treatment Process

Preliminary (Physical)

- Screening
- Grit Removal
- Oil and Grease

Primary (Physical)

- Flow Equalization
- Aeration
- Sedimentation

Secondary (Biological)

- Suspended Growth Process
- Attached Growth Process
- Integrated Fixed-film Activated Sludge Process

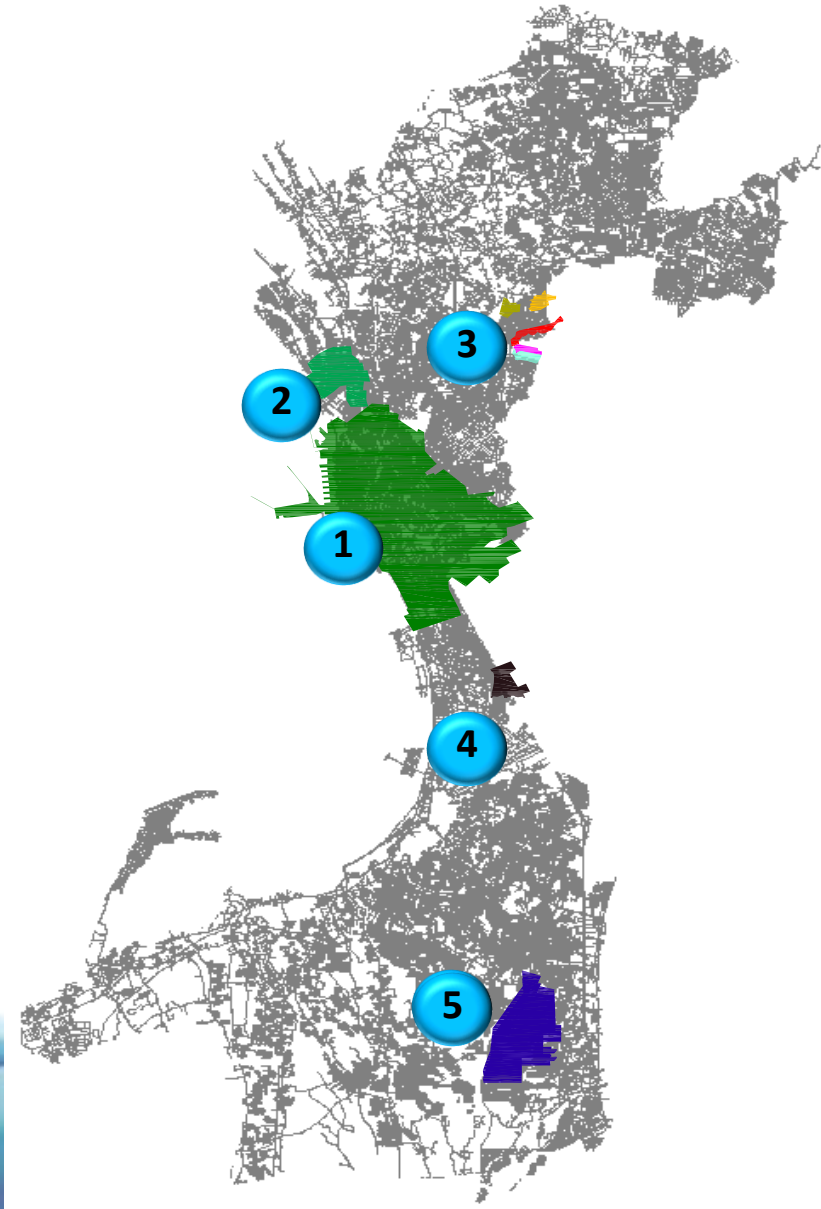
Tertiary Treatment

- Disinfection
- Nitrification and Phosphorus Removal
- Micro/ultra/nano filtration
- Reverse osmosis

Sludge Management/ Disposal

- Sludge Stabilization
- Digestion
- Sludge Dewatering
 - ✓ Decanter
 - ✓ Filter Press
 - ✓ Screw Press
 - ✓ Sun drying
 - ✓ Thermal drying
- Sludge Disposal
biosolids ,
vermiculture, waste
to energy

Existing Wastewater Facilities



5 Sewerage Systems in Maynilad

1. Central Manila Sewerage System (CMSS)
- (ISO 9001&14001; OSHAS 18001)
 2. Dagat-dagatan Sewerage System (DDSSTP)
- (ISO 9001 &14001; OSHAS 18001)
 3. Sewerage System with communal septic tanks
 4. Makati Isolated System
 5. Ayala Alabang System (AASP)
- Total capacity of 469,000 cmd
 - More than 480 km of sewer lines
 - ~120,000 households served



Maynilad

Technologies Currently Used



Physco/Chem Screening/Grit Removal/Aeration

- preliminary treatment (physical)/bio chemical
- treatment Process in **CMSS** and communal septic tank



Lagoon (Oxidation Pond)

- a man-made pond used to treat organic wastes through the symbiotic actions of algae and microorganisms (by natural and mechanical aeration) aerobic/facultative and polishing ponds
- treatment process in **DDSSTP**



Activated Sludge - Extended Aeration

- a type of activated sludge process with no primary settling and long aerobic detention time to generate less excess sludge overall
- treatment process in **AASTP**

Technology Selection Criteria



Technical

- Process robustness
- Process efficiency
- Compact footprint
- Ease of operation and maintenance



Environmental/Health

- Sludge management
- Odor treatment requirement
- Noise



Statutory Requirements



Economics

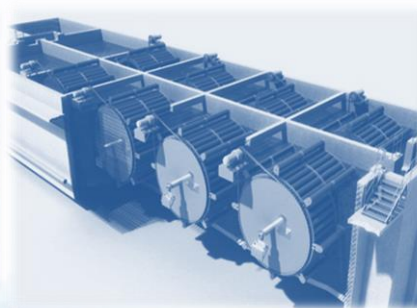
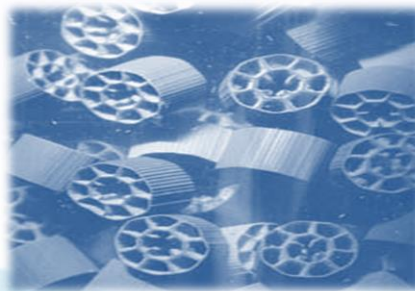
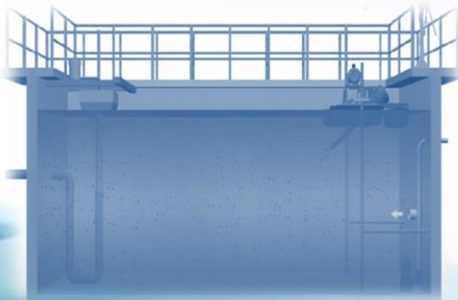
- Cost efficiency



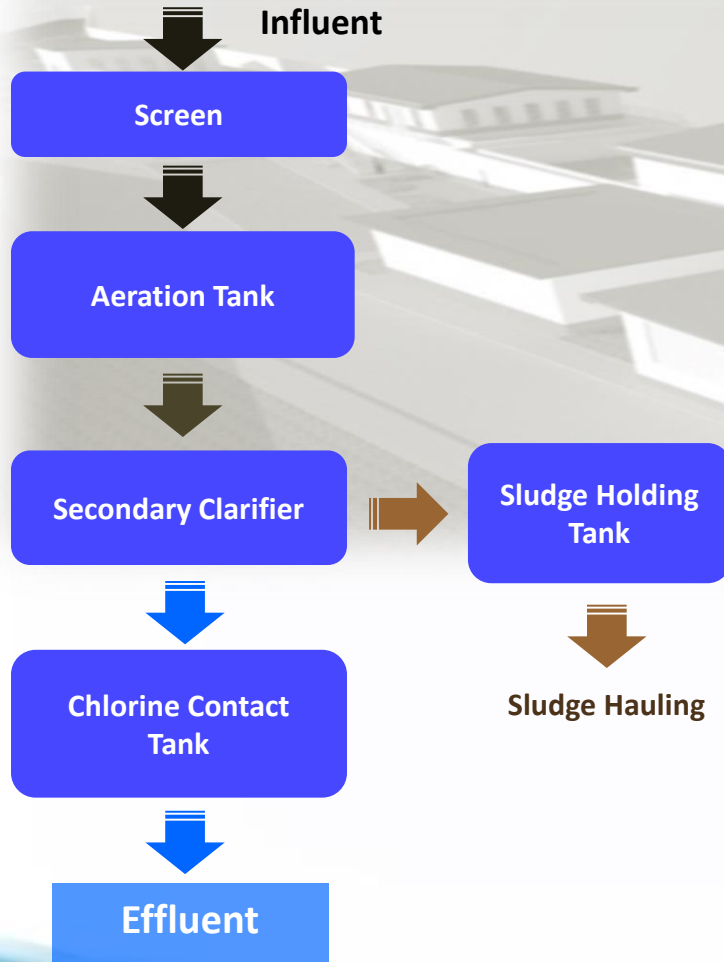
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Technology Options

- 🌐 Sequencing Batch Reactor (SBR)
- 🌐 Moving Bed Biofilm Reactor (MBBR)
- 🌐 STM Aerotor
- 🌐 Activated Sludge Process (ASP)



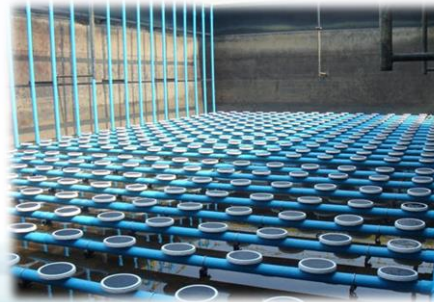
Conventional Activated Sludge (CAS)



CAS is the most common suspended growth process used for municipal wastewater treatment. It consists essentially of an aerated biological reactor followed by a secondary clarifier.

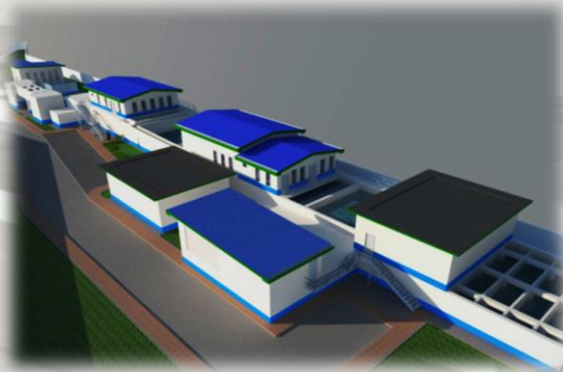
Features:

- Good process flexibility
- Reliable operation
- Proven track record in all plant sizes
- Low odor emission
- Energy production
- Ability to withstand nominal changes in water characteristics

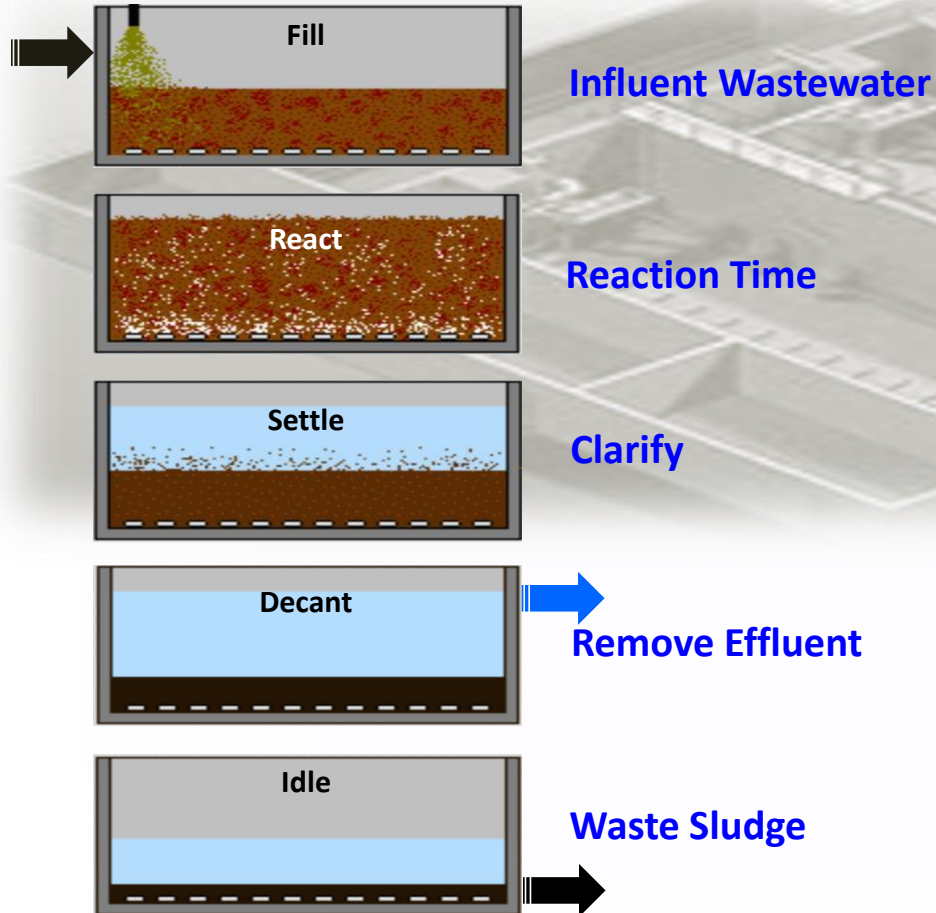


Maynilad's CAS Treatment Plant

Bahay Toro STP
(13,400 cmd)



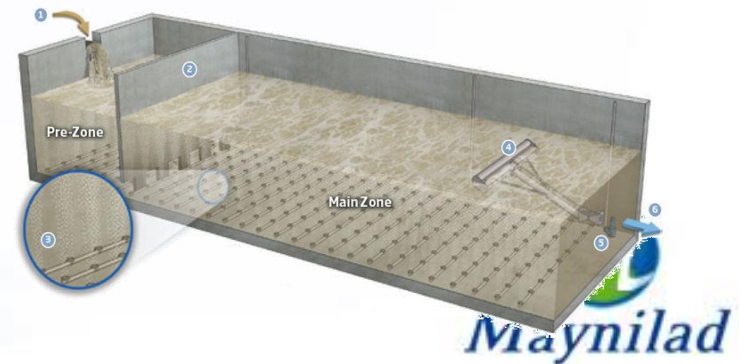
Sequencing Batch Reactor (SBR)



SBR is a fill-and draw activated sludge system designed to operate under non-steady state conditions

Features:

- Smaller footprint because of absence of primary, secondary clarifiers and digester
- Biological nutrient (N&P) removal
- High degree of coliform removal
- Less chlorine dosing required for post disinfection
- Ability to withstand hydraulic and organic shock loads

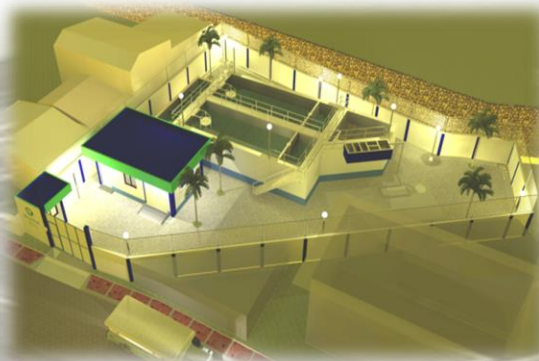


Maynilad's SBR Treatment Plants

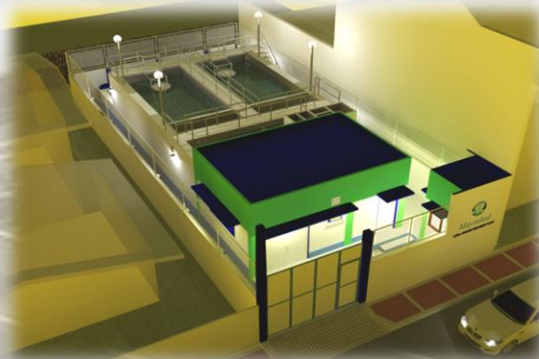
Congressional
STP (567 cmd)



Grant STP
(4,800 cmd)



Legal STP
(4,800 cmd)



Maynilad's SBR Treatment Plants

Bagbag STP
(10,400 cmd)



Tatalon STP
(8,100 cmd)



Tatalon Sewage
Treatment Plant

- 1. Inlet Pumping Station
- 2. Screen Chamber
- 3. Aerated Grit Chamber
- 4. SBR
- 5. Air Blower Building
- 7. Sludge Holding Tank
- 8. Gas Chlorination Room
- 9. Odor Removal Unit Area
- 10. Admin MOC, DG Room
- 11. Diesel Storage Area
- 12. Chemical Storage Building
- 13. Guard Security Room
- 14. PLC Room
- 15. Dewatering Building
- 16. Sludge Pump
- 17. Office Laboratory



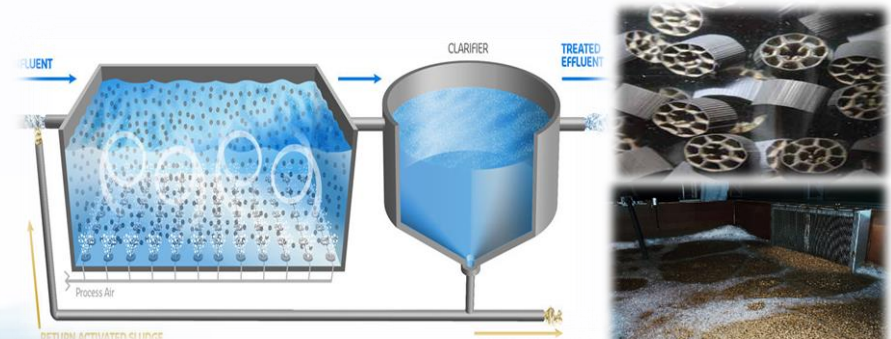
Moving Bed Biofilm Reactor (MBBR)



MBBR is an integrated fixed film activated sludge (IFAS) process and essentially a hybrid between a suspended growth (ASP) and a fixed film system

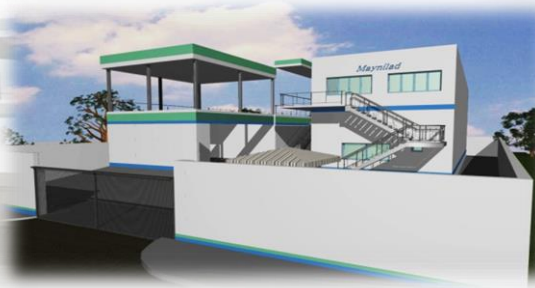
Features:

- Flexible design that allows for increased capacity
- Stable under large load variations
- Smaller foot print
- Single pass treatment
- Extremely compact and simple biological treatment system

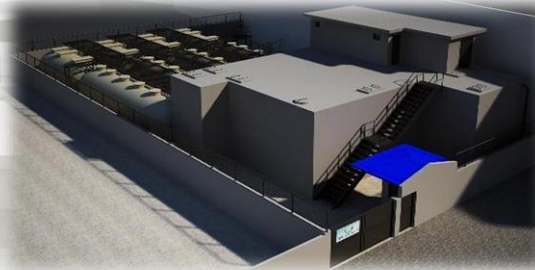


Maynilad's MBBR Treatment Plants

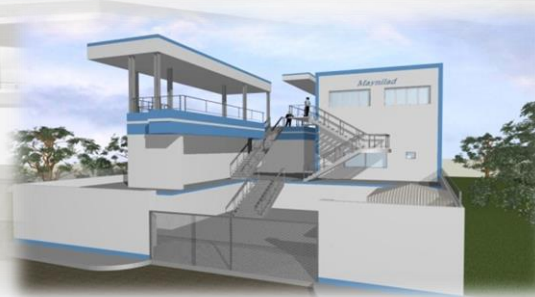
San Antonio STP
(3,310 cmd)



Paco STP
(410 cmd)



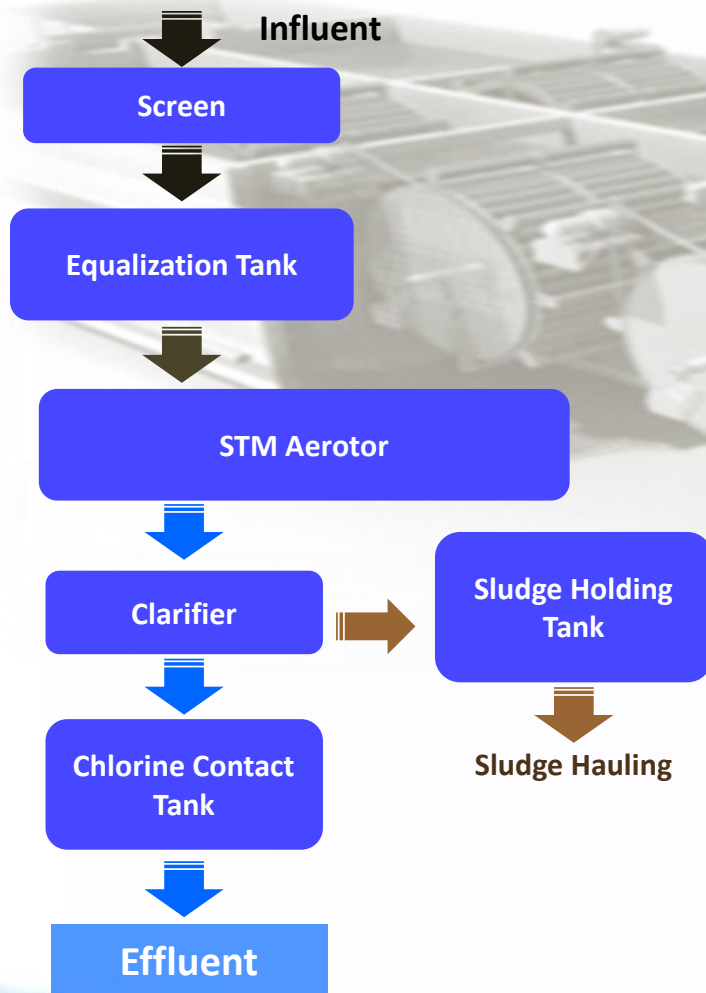
Del Monte STP
(3,510 cmd)



Paltok STP
(4,900 cmd)



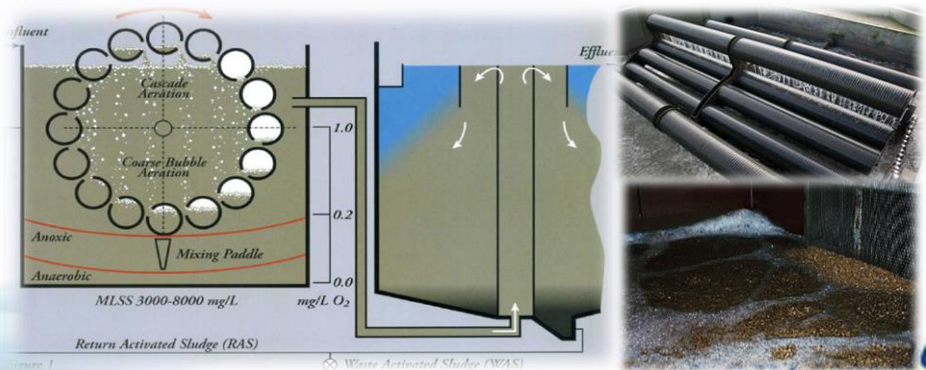
STM AEROTOR



STM Aerotor is activated sludge and fixed film technology as part of a process that provides biological nutrient removal for municipal wastewater treatment

Features:

- Low energy requirement
- Small footprint
- Improved sludge settling and quality
- Low capital
- Advance biological nutrient removal
- Stable process
- No odors
- Can handle various load fluctuations



Maynilad's STM Aerotor Treatment Plants

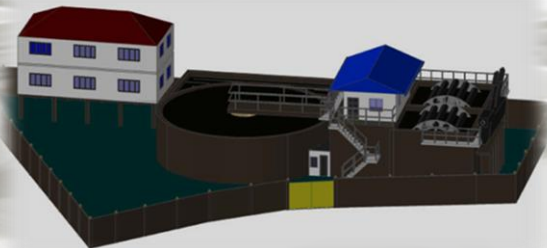
Baesa STP
(390 cmd)



Tandang Sora STP
(1,200 cmd)

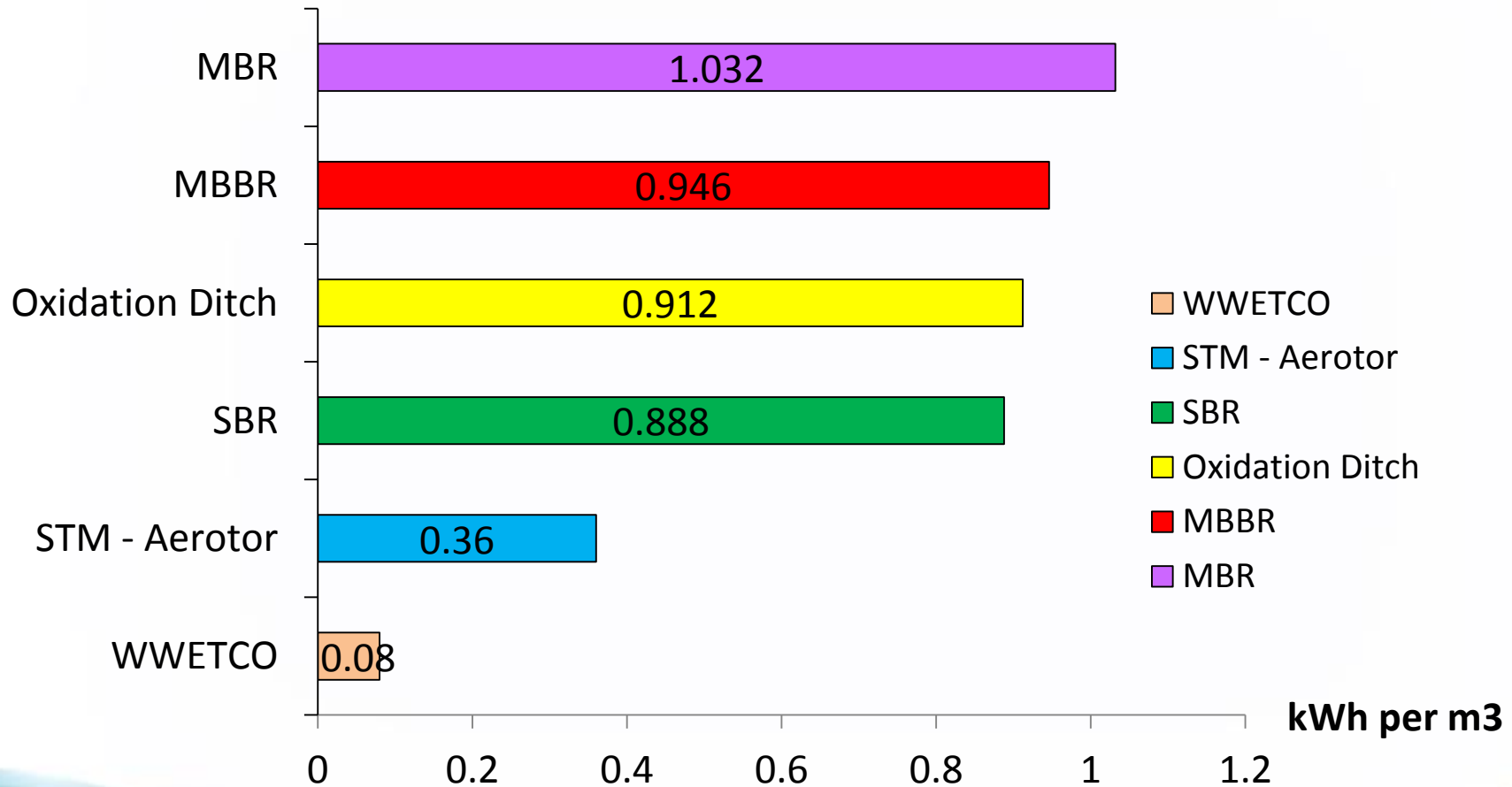


Samson STP (3,510
cmd)

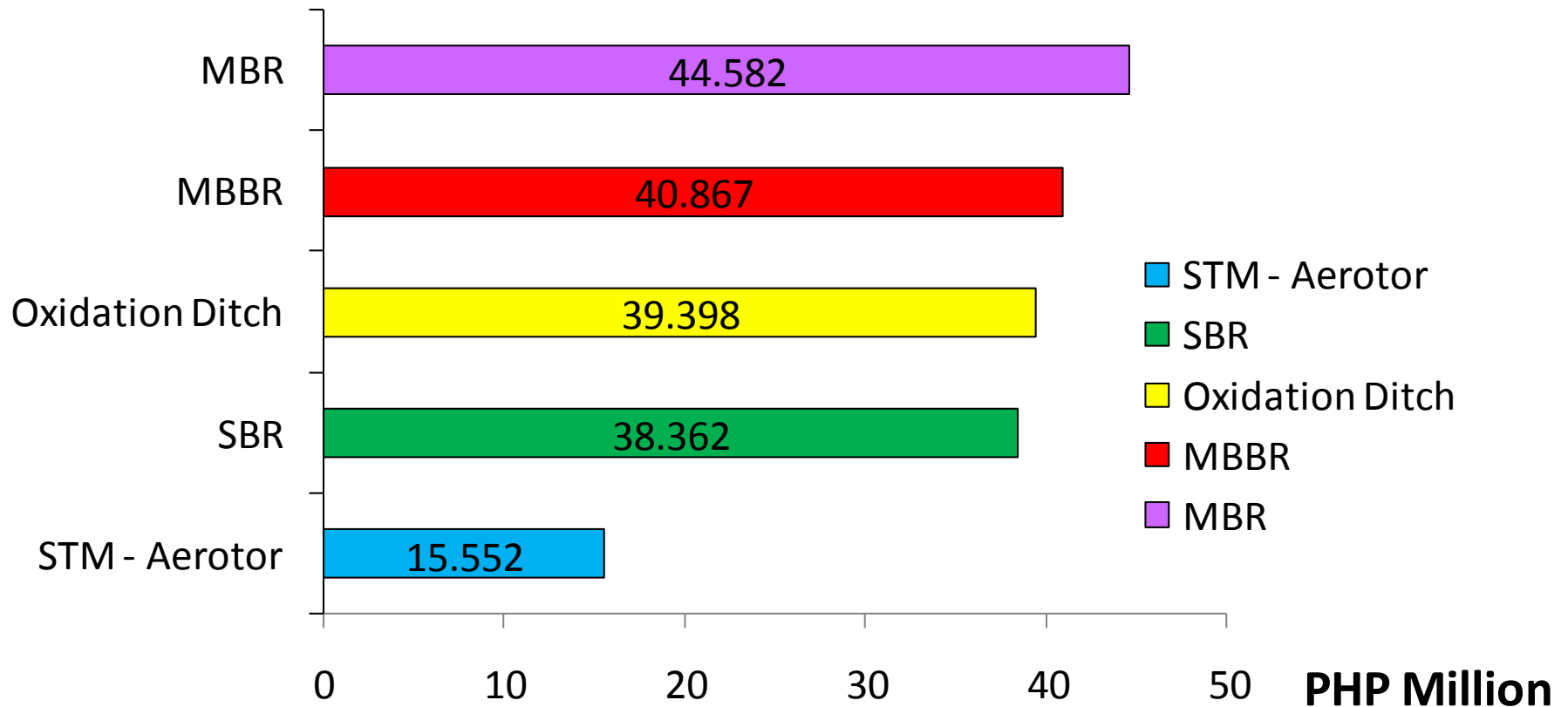


Energy consumption of different technologies

kWh per cu.m Wastewater (Aeration Only)



Annual Energy Costs for 10,000 m³ Facility*



*Based on PHP 12.00 per kWh



Thank You

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Thank you.