



SANITAIRE

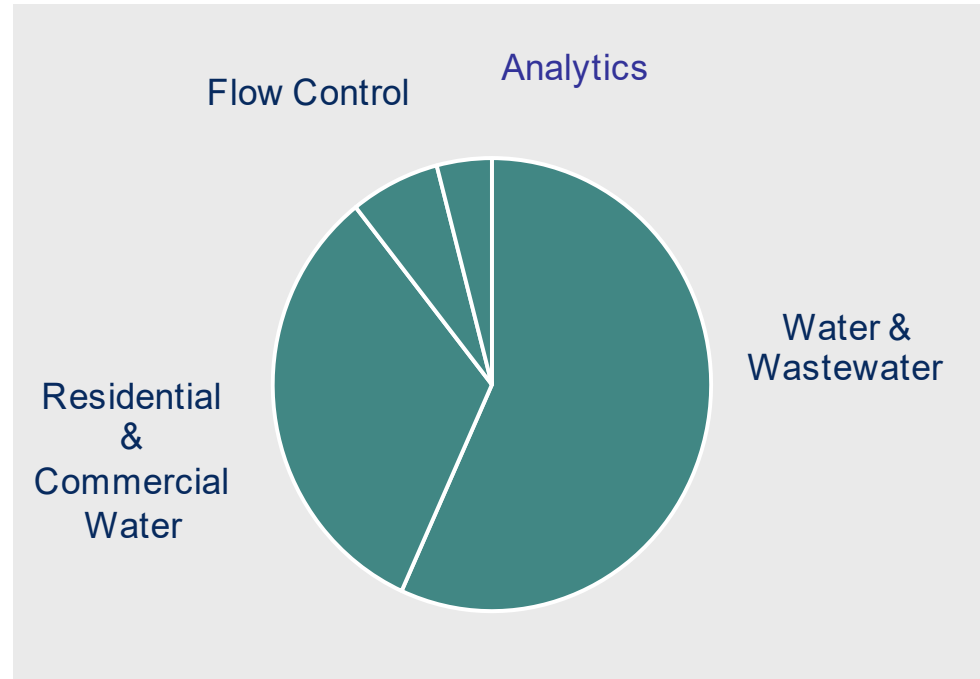
a xylem brand

Biological Wastewater Treatment and Reuse using the ICEAS Technology



Xylem at a glance

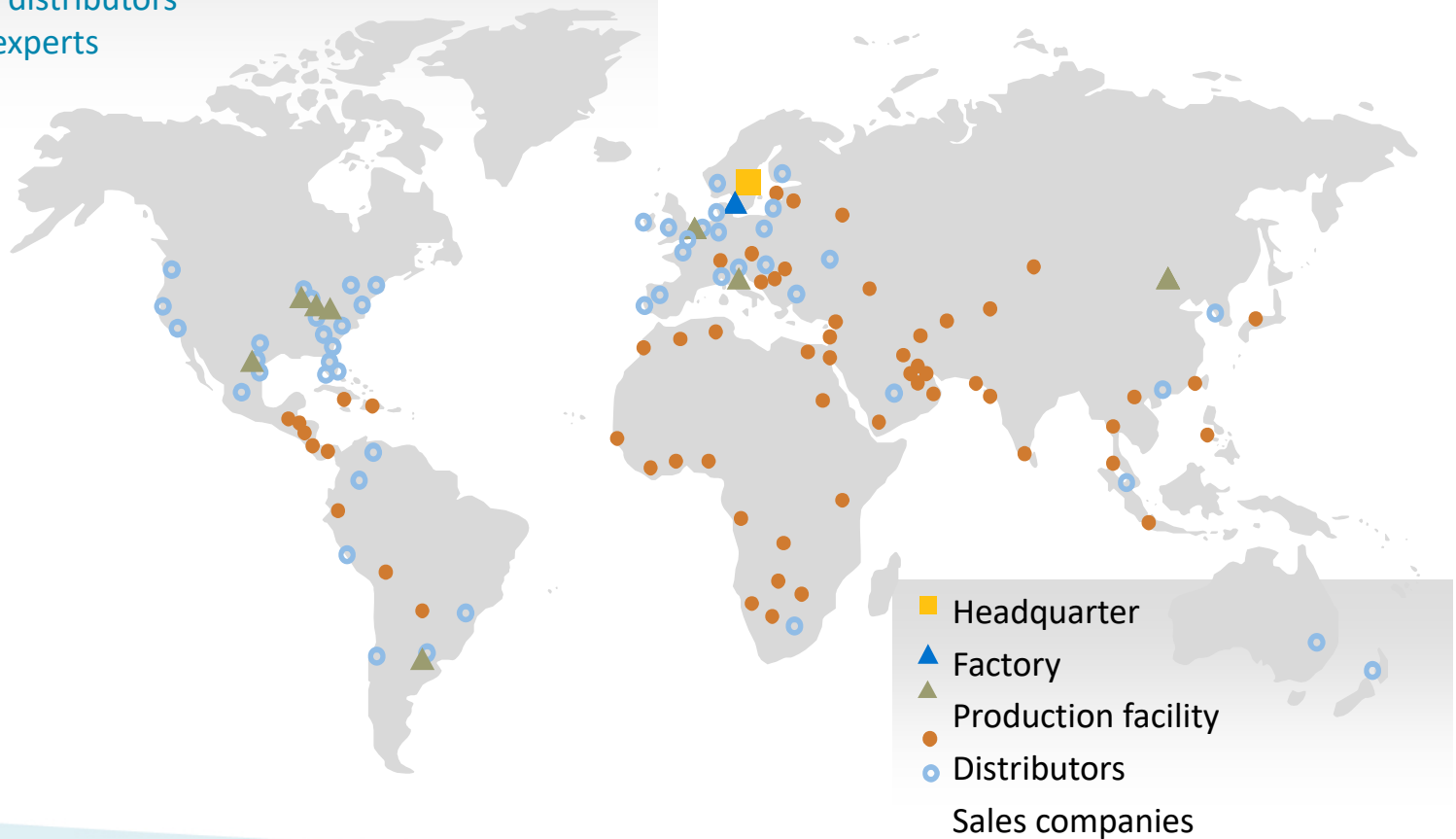
- 12,000 employees
- Doing business in more than 150 countries
- Serving municipal water, wastewater, residential and commercial building services and industrial markets
- A company focused on one of the world's biggest issues - water



Closeness to the customer

Global footprint, local presence

- Present in 150 countries
- 35 Sales companies
- 8 production facilities
- >1,000 distributors
- 6,500 experts



Xylem Water Solutions

Total Revenue 2010
\$1.8 billion

Transport



\$720 million



Treatment



\$350 million



Dewatering



\$340 million



Aftermarket & Service



\$390 million

WEDECO



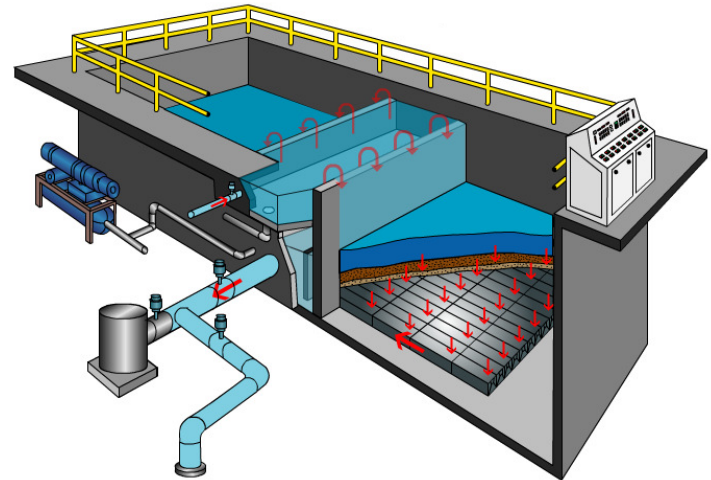
Water Treatment

Membrane Desalination & Filtration Plants

Dissolved Air Flotation & Clarification

Single / Multi Media Filtration systems

UV & Ozone Disinfection systems



Wastewater Treatment

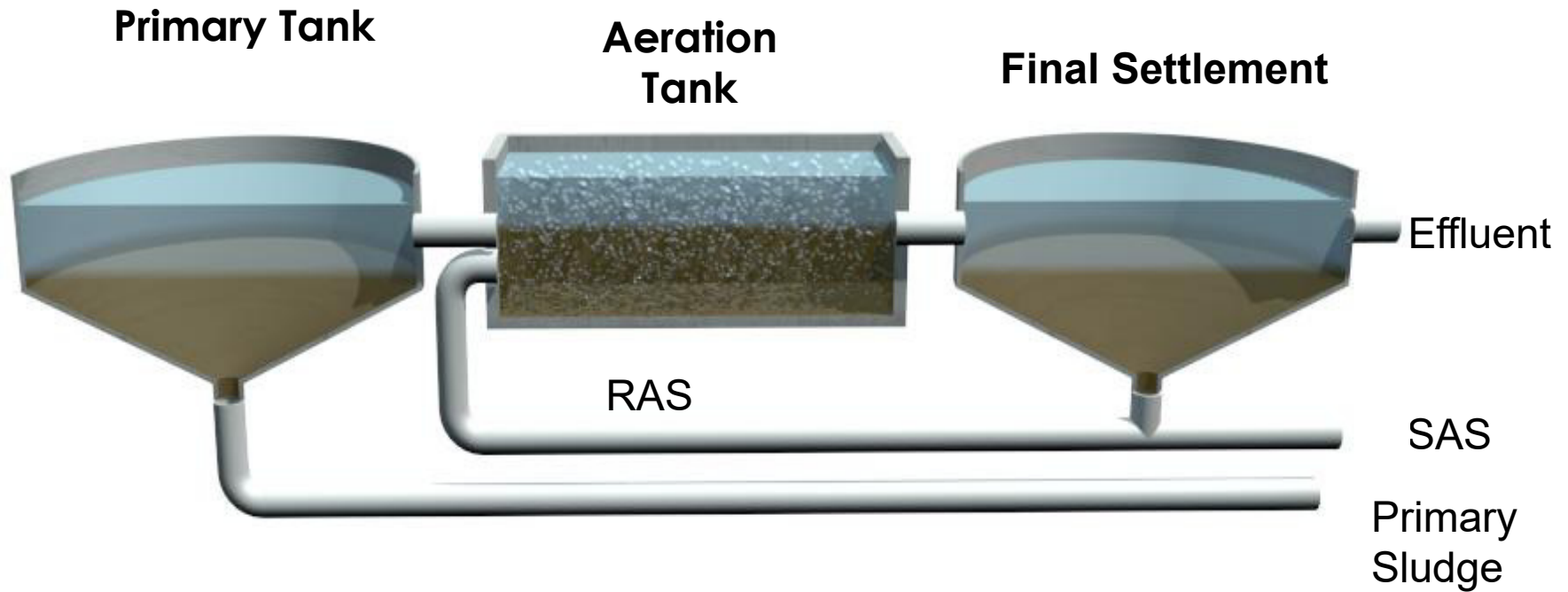


Biological Wastewater Treatment and Reuse using the ICEAS Technology



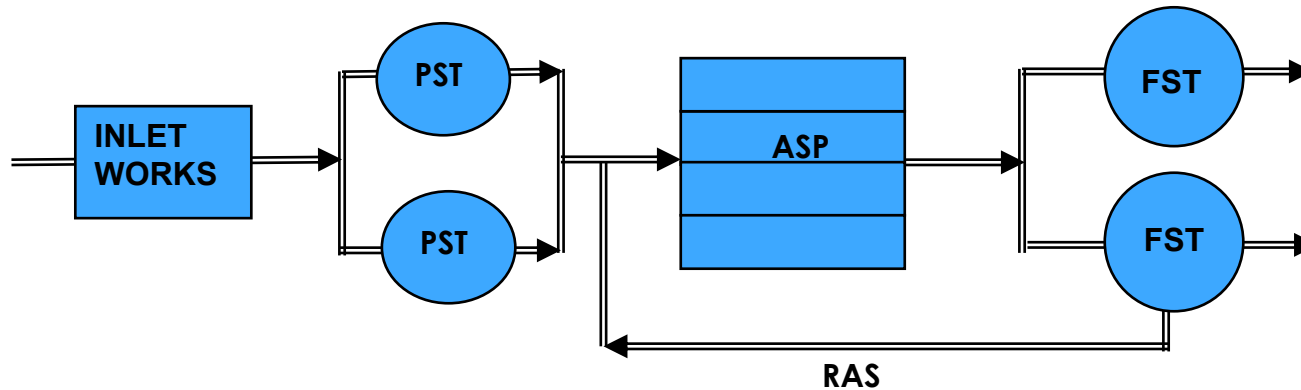
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Conventional ASP Process

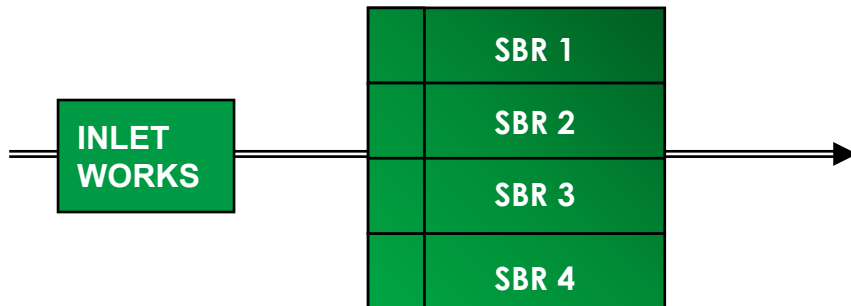


Comparative requirements - ICEAS vs ASP

Conventional ASP



ICEAS Plant

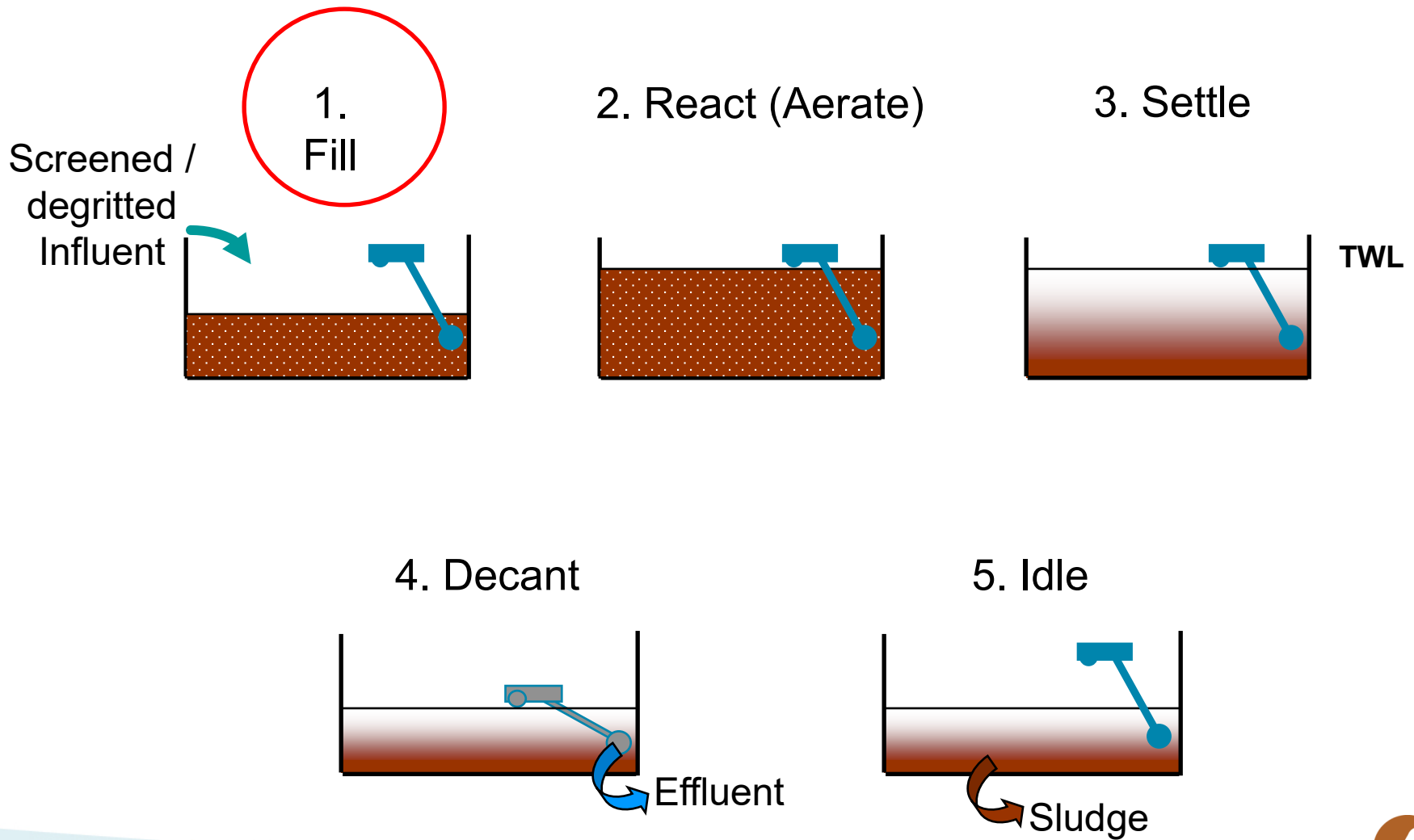


BENEFITS

20-30% Less land area
Lower Construction costs
Less mechanical equipment
Reduced pipe work complexity

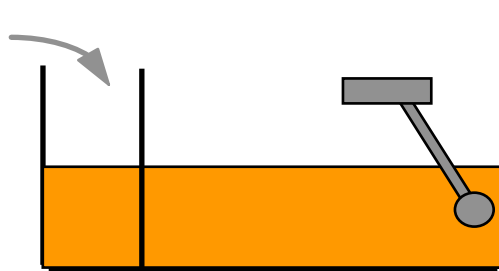


Conventional SBR

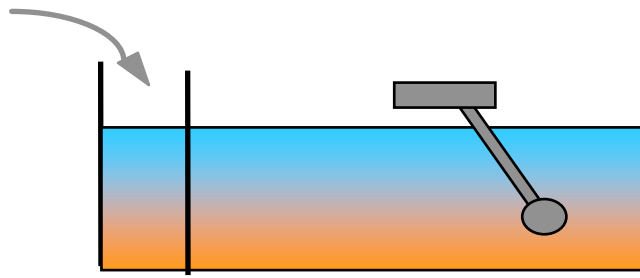


ICEAS Cycle

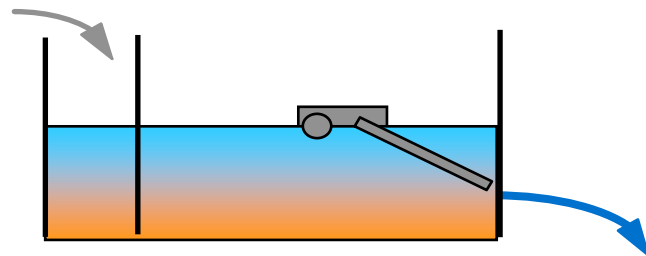
Continuous Flow of
Screened and
Degritted Influent



1. React



2. Settle



3. Decant

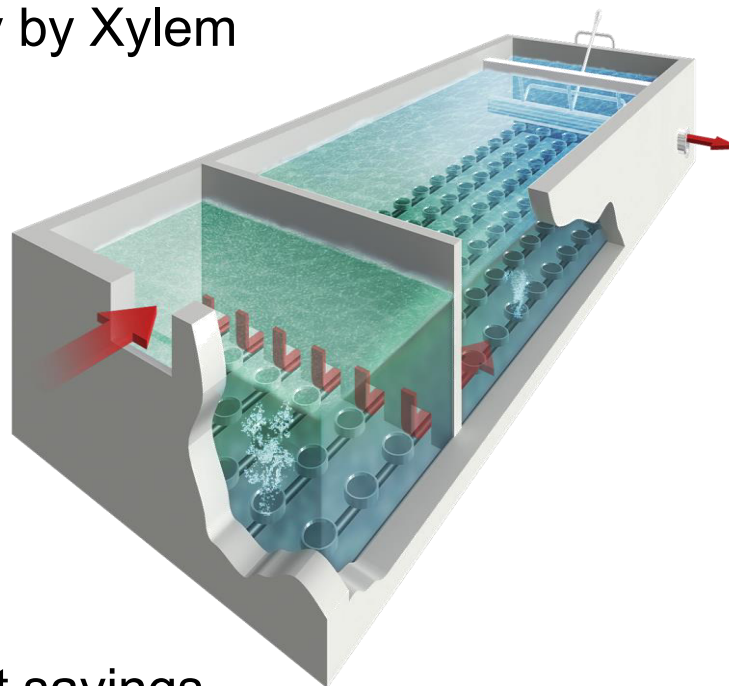
Treated
Effluent



What is ICEAS?

Intermittent - **C**ycle **E**xtended **A**eration **S**ystem

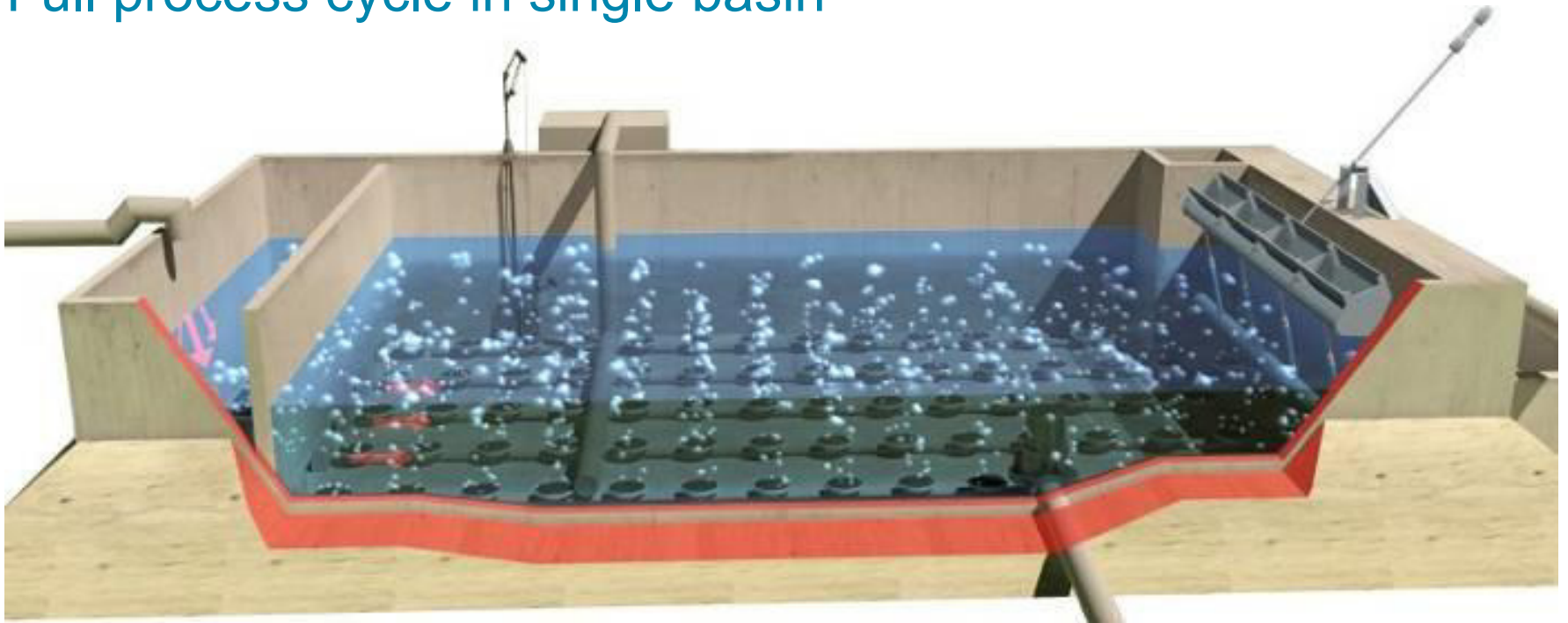
- Advanced SBR System - Offered only by Xylem
- Over 900 installations world wide
- **ICEAS**
 - Continuous Flow SBR System
 - Time based control, simple to operate
 - Robust driven decanter design
 - Efficient aeration system
 - Significant capital and operational cost savings
 - Removes organic matter, suspended solids, nitrogen and phosphorus to: **10 BOD/10 SS/1 NH₄/1 P/5 TN average**



ICEAS

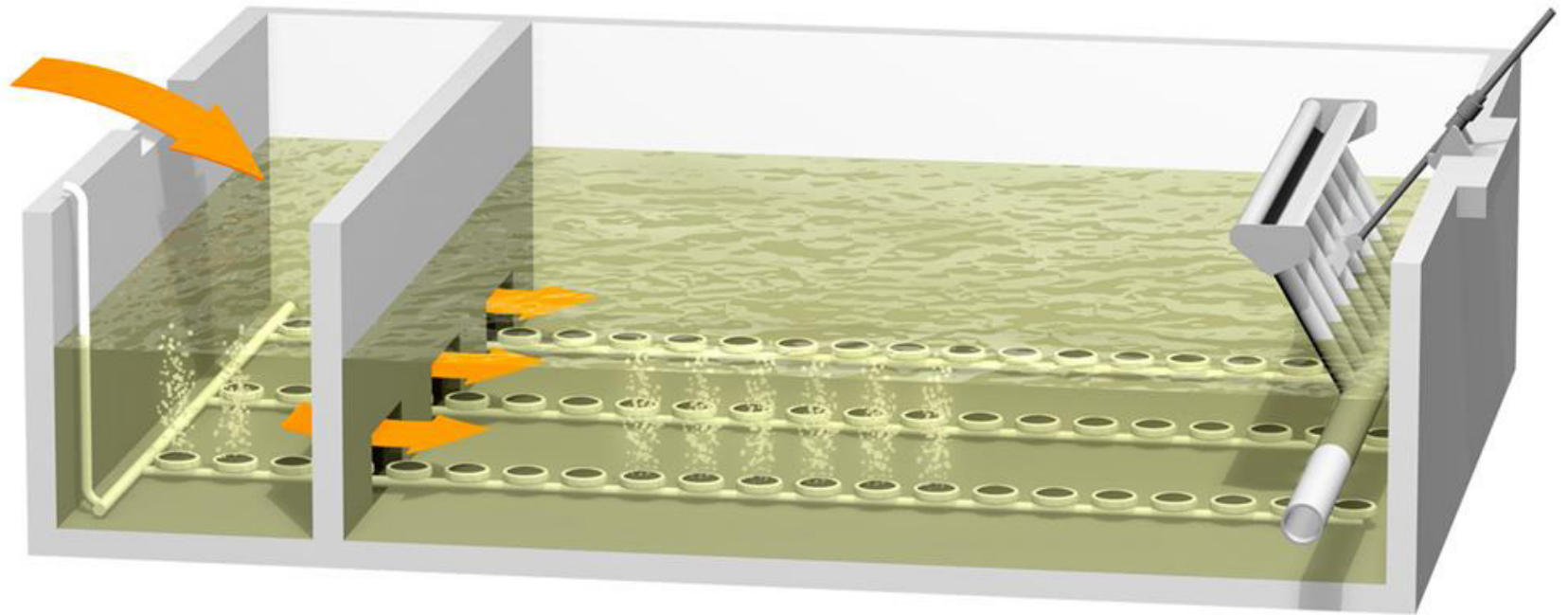
Process Features

- Continuous flow
- Pre react zone
- Settlement buffer zone
- Full process cycle in single basin

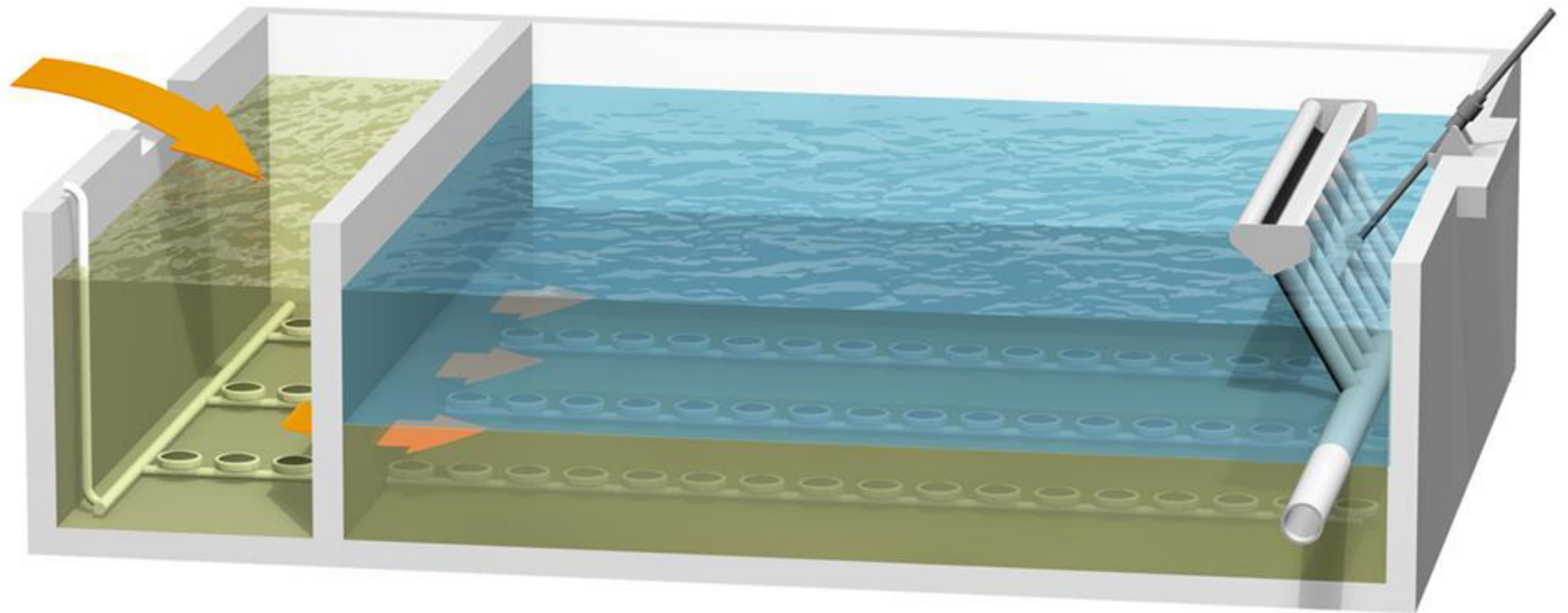


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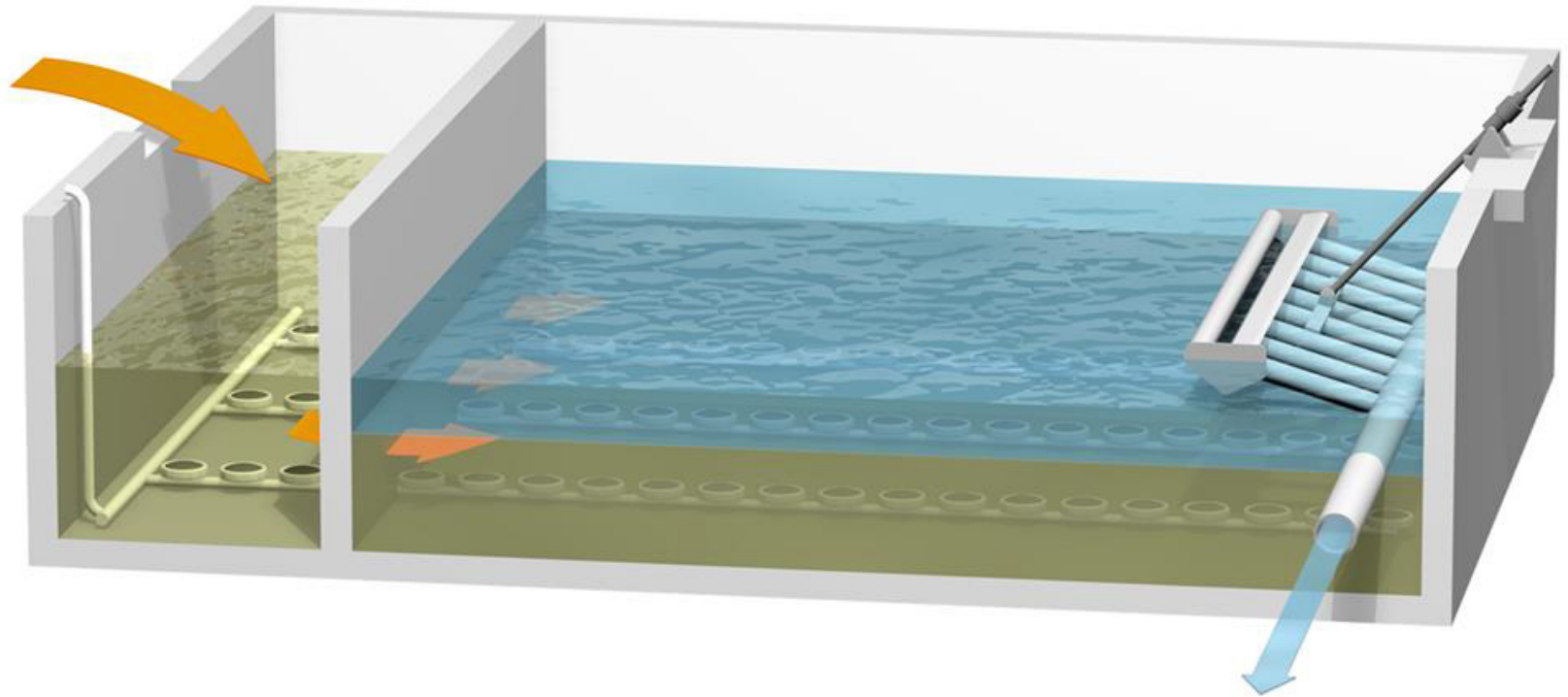
ICEAS Phase 1 - Aerate



ICEAS Phase 2 - Settle

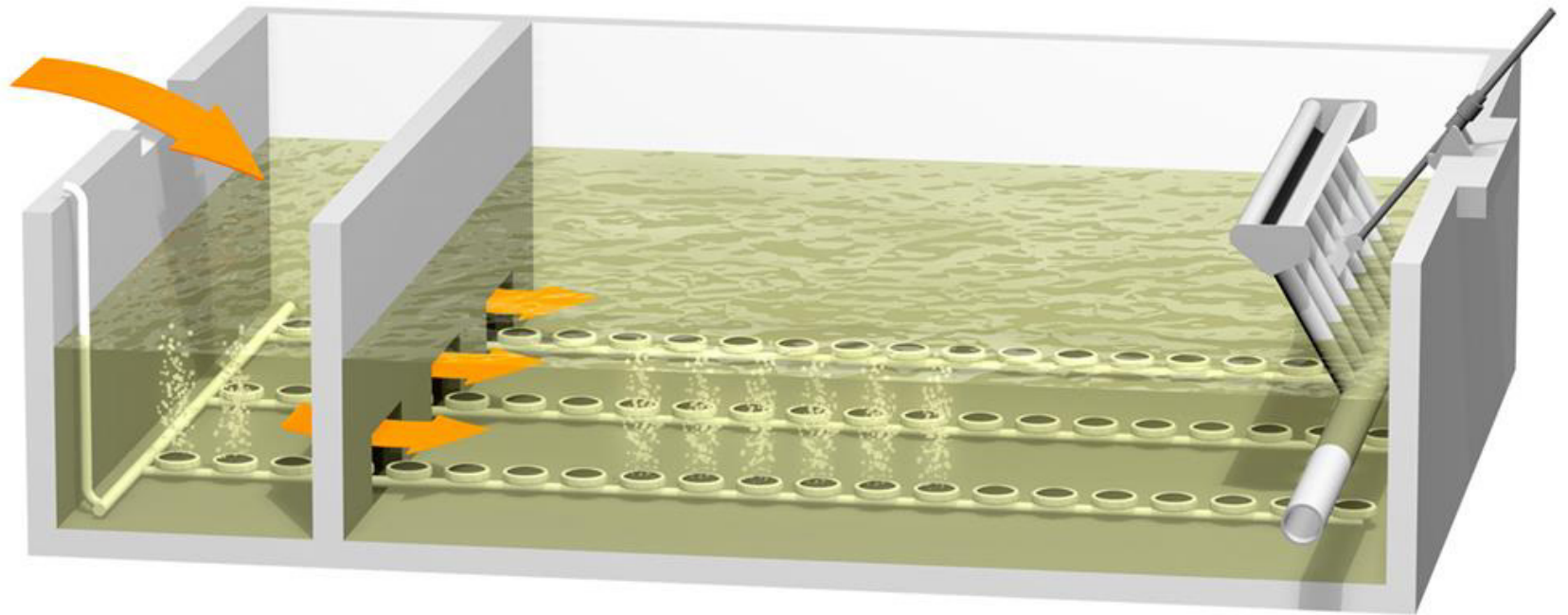


ICEAS Phase 3 - Decant



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ICEAS Phase 1 - Aerate



Design Security

300mm Tank Freeboard

1500mm Decant zone

1000mm Buffer zone

**2500 - 3500mm Settled
Sludge zone**



Process advantage:

Buffer zone provides improved final effluent solids performance through reduced solids carry over throughout the decant cycle even during high flow periods



How Does ICEAS Operate?

Typically 2 Cycles to meet the hydraulic requirements

- Normal Cycle – Treating the Peak Dry Weather Flows
- High Flow Cycle – Treating maximum (storm) flows

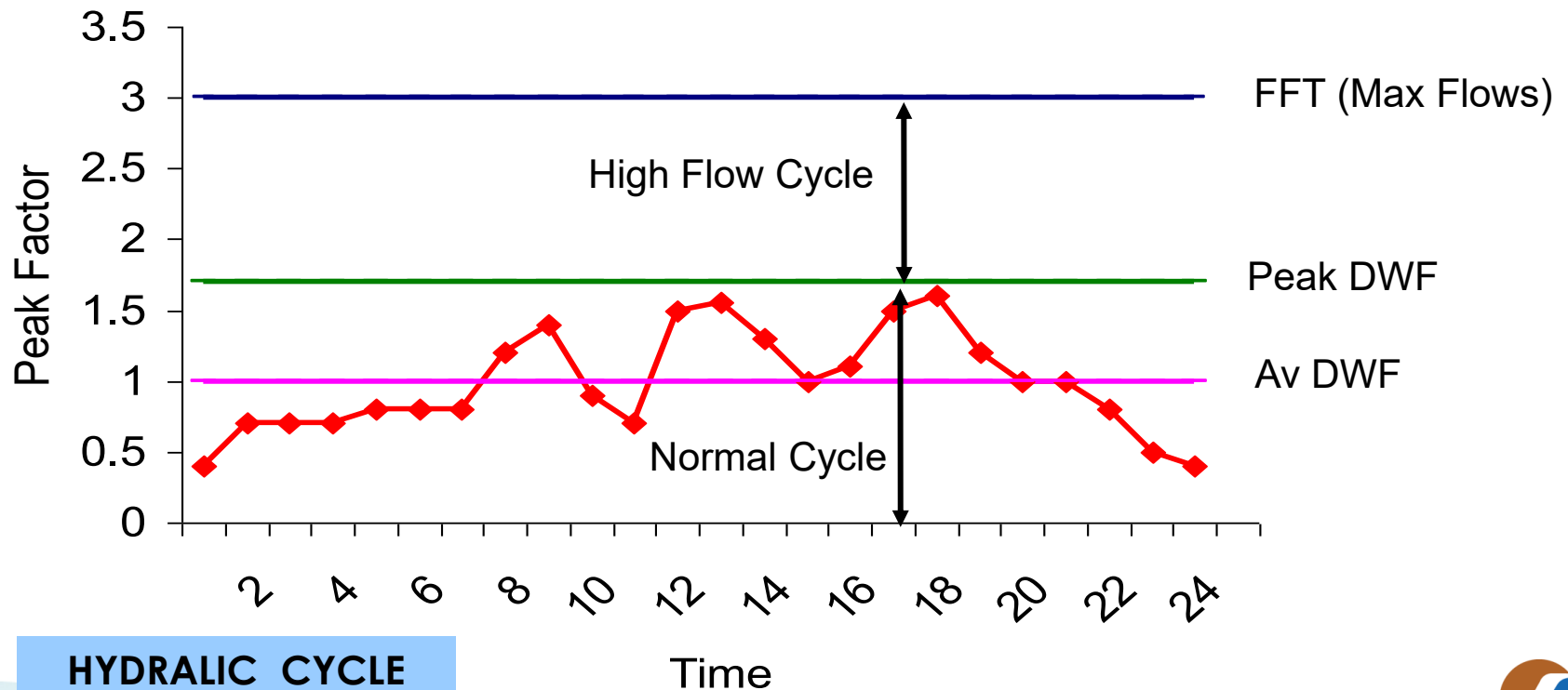
2 Modes of Operation to meet the process requirements

- NIT Mode - for carbonaceous and nitrifying plants
 - basic BOD and Ammonia removal
- NDN Mode - for nutrient removal plants
 - Total Nitrogen and Phosphorous removal



ICEAS Basin Control – Time Based Cycles

- Normal Cycle - Average and Peak Dry Weather Flows
- High (Storm) Flow Cycle - Caters for Max Design Flows

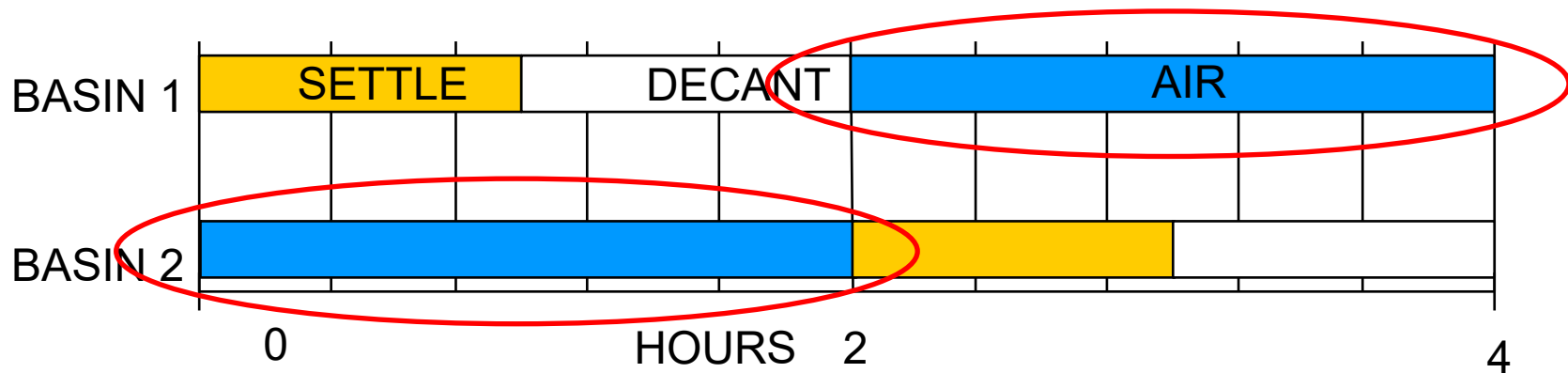


HYDRAULIC CYCLE

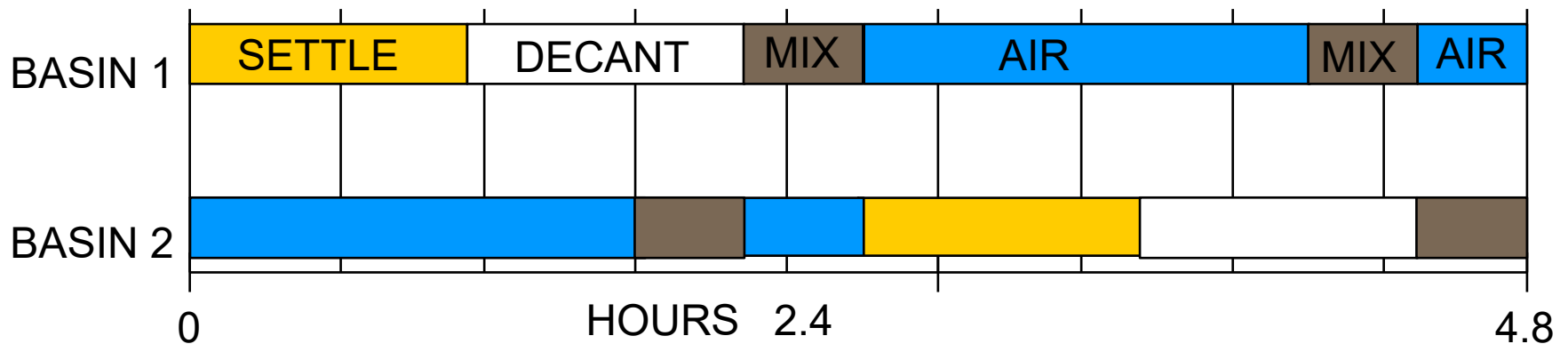


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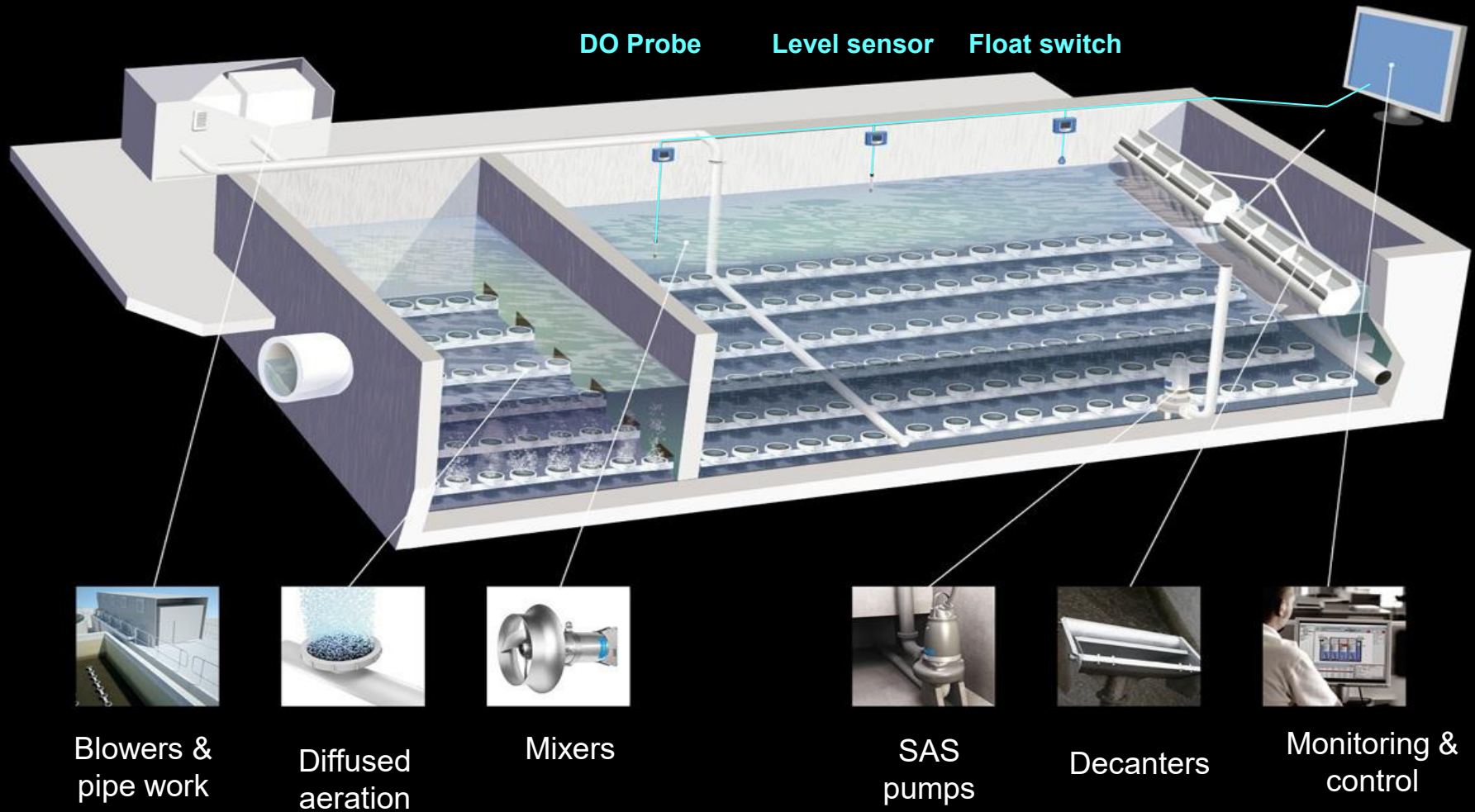
Normal Flow - NIT Cycle – 2 Basins



Normal Flow - NDN Cycle – 2 Basins



ICEAS Equipment Layout



Xylem can supply the complete M&E package

Benefits of the ICEAS SBR

Reduced Capital costs

- Flat bottomed, shared wall construction
- Smaller Footprint
- Shared Blowers

Reduced operational cost

- High efficiency aeration system
- No RAS pumping

Easy to operate

- Simple time based process control
- Easy to maintain

Proven, robust process

- More consistent, higher quality effluent (10 BOD/ 10 SS/ 1 Amm/ 1 P/ 10 TN average)
- Less affected by flow and load variations
- Better decanter design
- Proven, 900+ plants world wide

Reduced risk

- Single source supplier - reducing interfaces



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ICEAS Process – Major Installations



Cardiff, UK

Examples of major Sequence Batch Reactor projects:

Cardiff, Welsh Water, UK (2001)	- 1,000k pe
Doha South STW, Qatar (2006)	- 300k pe
Doha South Phase 2 (2009)	- 400k pe
A Seeb, Muscat (2008)	- 400k pe
Jefferson City, USA (2002)	- 75k pe
Cleveland STP, USA (1988)	- 150k pe
Kunming No.3, China (1997)	- 1,000k pe
Ganol, Welsh Water, UK (1999)	- 85k pe
Afan Baglan, Welsh Water, UK (2000)	- 143k pe



Doha, Qatar 1



Doha, Qatar 2

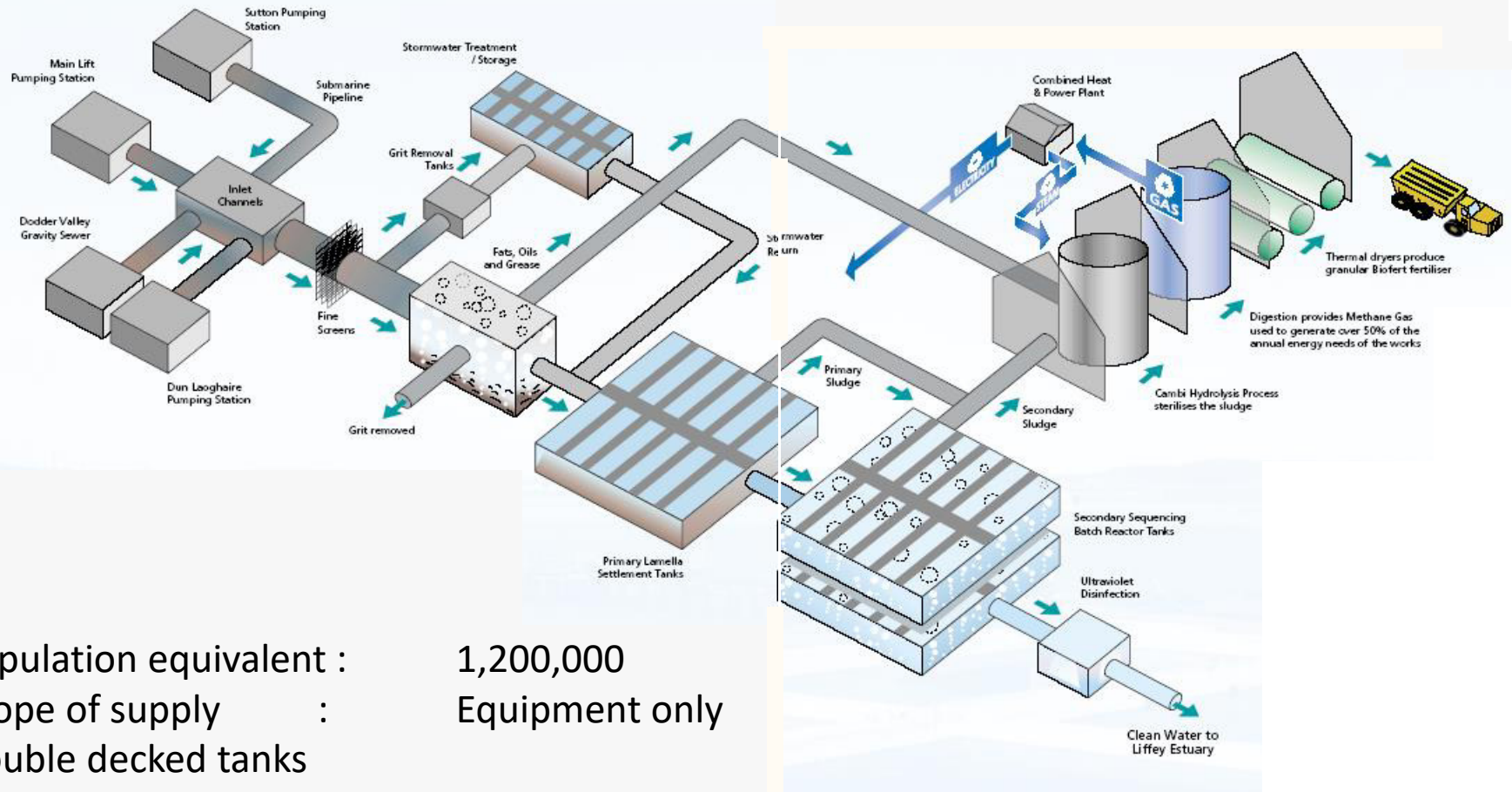


A'Seeb, Oman

Dublin Bay WWTW



Dublin Bay WWTW



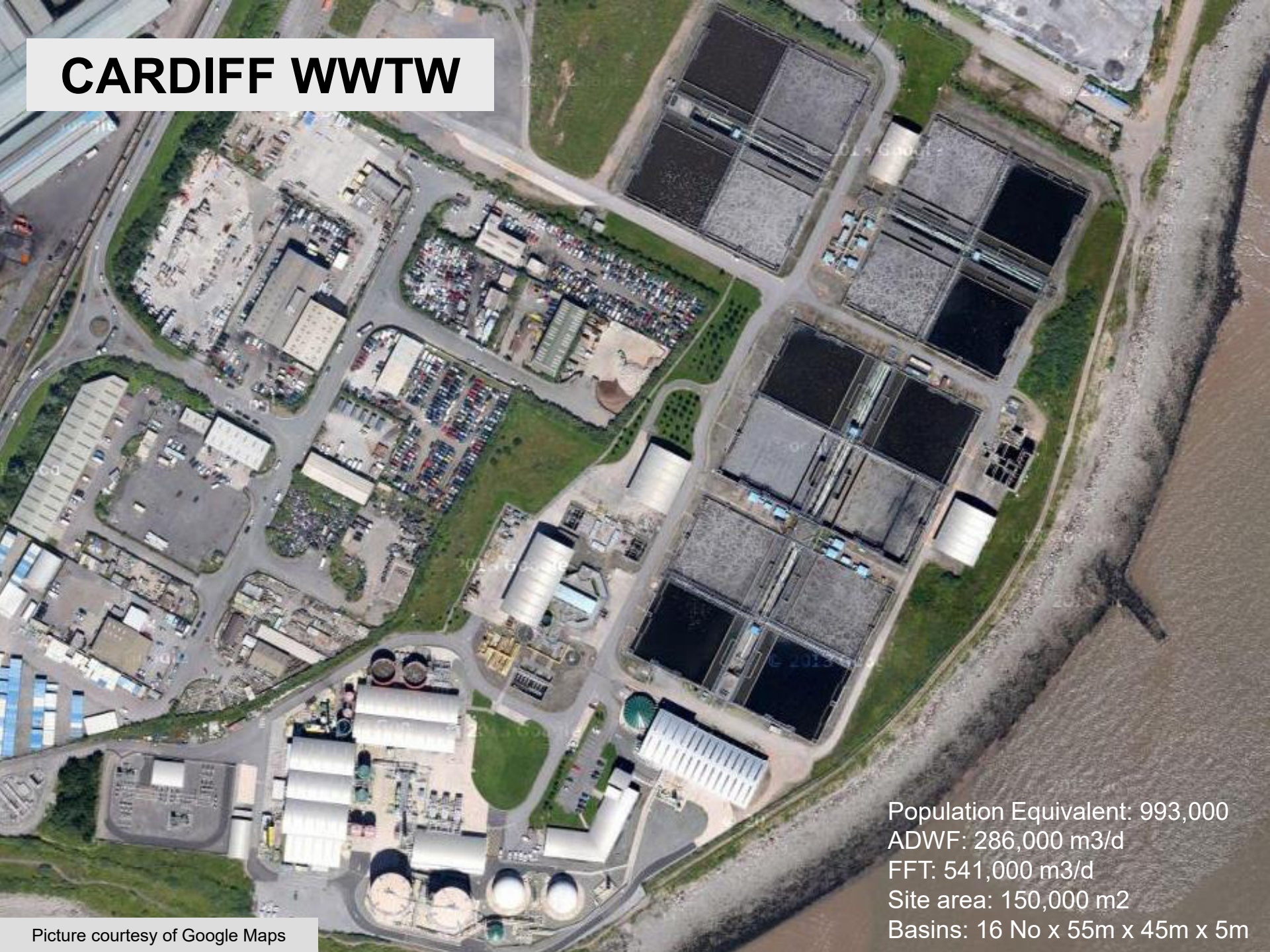
Population equivalent : 1,200,000
 Scope of supply : Equipment only
 Double decked tanks
 Recently converted to continuous inflow

CARDIFF WWTW



Population Equivalent: 993,000
ADWF: 286,000 m³/d
FFT: 541,000 m³/d
Site area: 150,000 m²
Basins: 16 No x 55m x 45m x 5m

CARDIFF WWTW



Population Equivalent: 993,000
ADWF: 286,000 m³/d
FFT: 541,000 m³/d
Site area: 150,000 m²
Basins: 16 No x 55m x 45m x 5m

Cardiff WWTW

Client: Welsh Water

Clients rep: Hyder Consulting

Influent Conditions:

Capacity	993,167 p.e.
ADWF	286,193 m ³ /d
FFT	541,074 m ³ /d
BOD ₅	55,990 kg/d
NH ₃ -N	5,724 kg/d

Effluent Conditions:

BOD ₅	25 mg/l
TSS	35 mg/l
NH ₃ -N	6 mg/l

SBR Process Design:

ICEAS Basins	16 No
Basin length	51.5 m
Basin width	45.0 m
Top water level	5.145 m



Special Features:

Designed to operate in true SBR or ICEAS mode

Able to operate with 2 basins out of service

Uses 2 x Twin 10m decanters per basin.

Basins operated in hydraulic pairs

Cardiff WWTW

ICEAS Basins
Stream 1





DOHA SOUTH STP Ph 1, QATAR

Teyseer were awarded Ph1 of Doha South with ITT providing the overall process design and equipment supply to this 106,000 m³/d ICEAS SBR plant

ITT supply included: Decanters, FBDA grids, blowers, air-main, raw & final water pumping stations and controls.

Commissioned in 2007 – ITT portion \$12M

Doha Design Phase 1 ICEAS

Influent Conditions:

Capacity	300,000 p.e.
ADWF	75,266 m ³ /d
FFT	238,160 m ³ /d
BOD5	18,139 kg/d
TKN	4,516 kg/d

Effluent Conditions: Average

BOD5	10 mg/l
TSS	10 mg/l
NH3-N	1 mg/l

SBR Process Design:

ICEAS Basins	8 No
Basin length	33.4 m
Basin width	50.8 m
Top water level	6.0 m





DOHA SOUTH PH2, QATAR

Larsen & Toubro won the 106,000m³/d extension to Doha South with ITT as their process partners responsible for the overall process design, M&E equipment selection, supply and commissioning.

ITT supply includes: SBR Decanters, FBDA grids, blowers, air-main, raw & final water pumping stations and controls, plus UF tertiary filtration stage for phases 1 and 2.

The plant will provide TSE for unrestricted irrigation to meet TN 10mg/l and TP 2mg/l

To be commissioned in 2013 - Xylem's part \$30M

Doha Design Phase 2 ICEAS

- Awarded 2010: Expansion of Biological WWTW together with UF membrane filtration and disinfection for “unrestricted” reuse
- Design, supply, install and commission an 84MLD ICEAS SBR biological WWT process extension
 - Include nutrient removal
 - TN: 10mg/l TP: 2 mg/l
- Ultra filtration membrane plant for all the works 200 Mld
- M+E supply: SBR Decanters, diffused aeration grids, blowers, air-main, interstage pumping stations, UF membrane plant and controls.

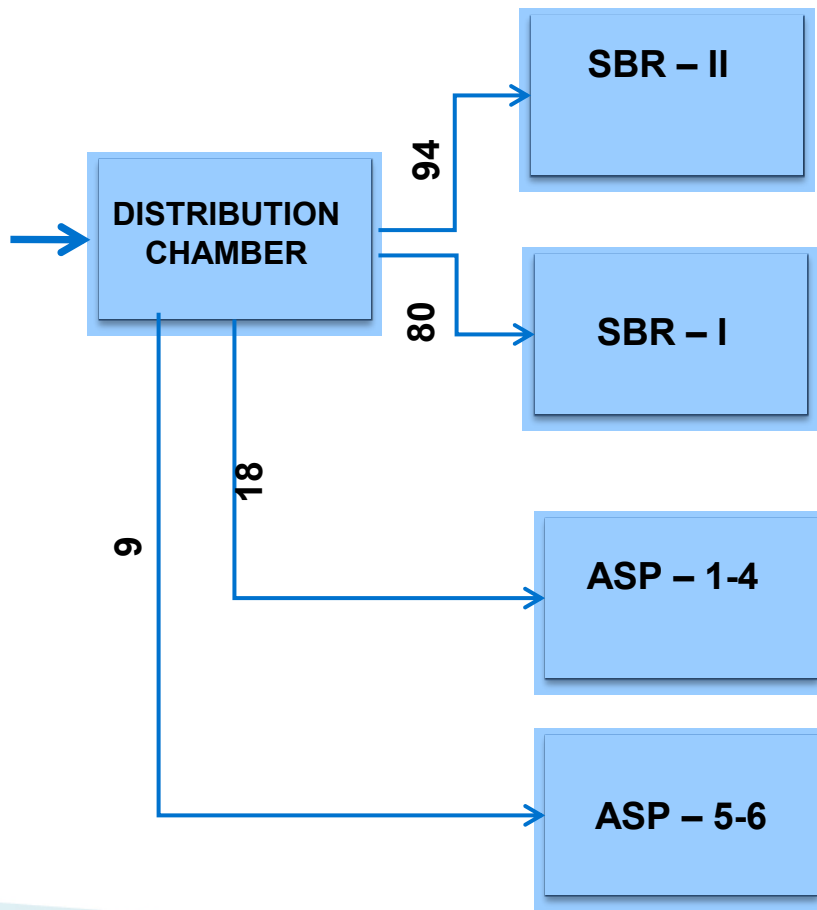


The plant due to be commissioned in 2013.
Value of Xylem portion \$30M

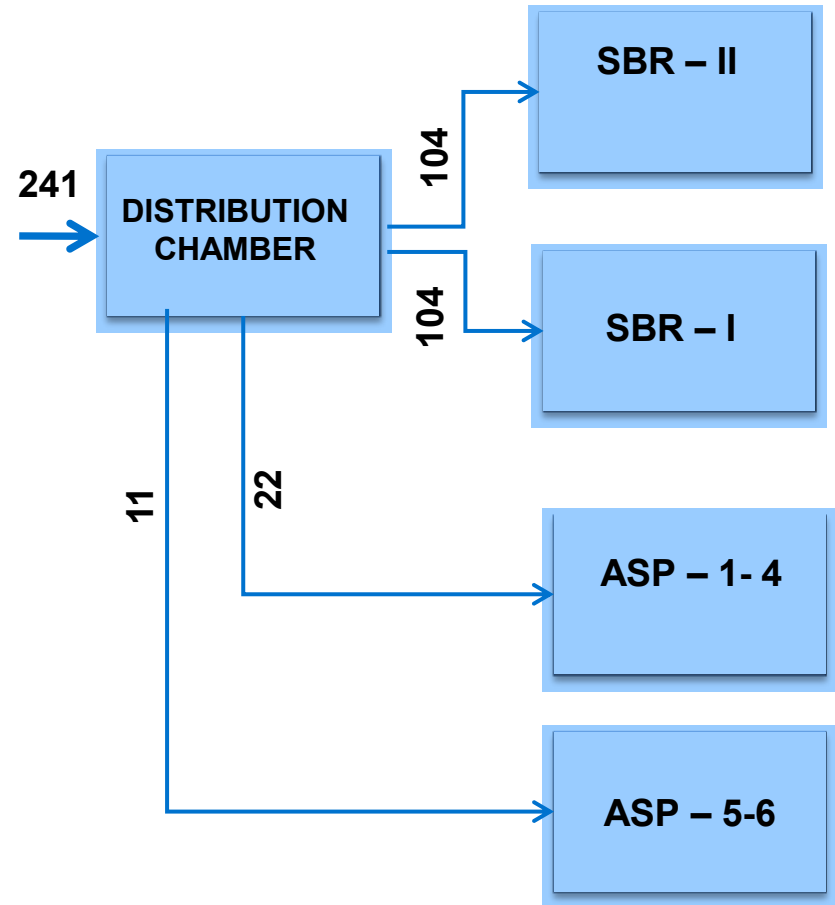
Further Phase expansion underway to add 40MLD more capacity to the works by 2014

PHASE III FURTHER 40MLD EXPANSION

PHASE II



PHASE II Further Expansion





SE'EB STP, OMAN

Hyundai Rotem awarded ITT (now Xylem) the process design and equipment supply for this new 350,000 p.e WWTW which included UF tertiary treatment for TSE for uncontrolled irrigation

Scope included Process design, and supply of decanters, FBDA system, raw and final water pumping stations & controls – 8 out of 12 basins to be commissioned in 2013 and the rest later in 2018 as capacity to plant increases

Commissioning of 1st 8 basins is due March 2013



HOLYHEAD STP, UK

Design supply and commissioning complete MEICA scope on a 30,000pe plant including inlet works, 4 basin SBR, blowers, FBDA system, odour control, sludge dewatering, transfer pumping, controls, MCC, SCADA, and standby generation

Completed 2006



JINSHAN STP, CHINA

ICEAS NDN installation with UV disinfection - completed in 2007

Effluent quality – 10 BOD / 10 SS / 1 Am / 2 TP - ADWF 50,000 m³/d to serve 250,000pe

Xylem supplied core ICEAS basin equipment, SIMS (sludge inventory management system) controls and Wedeco UV system



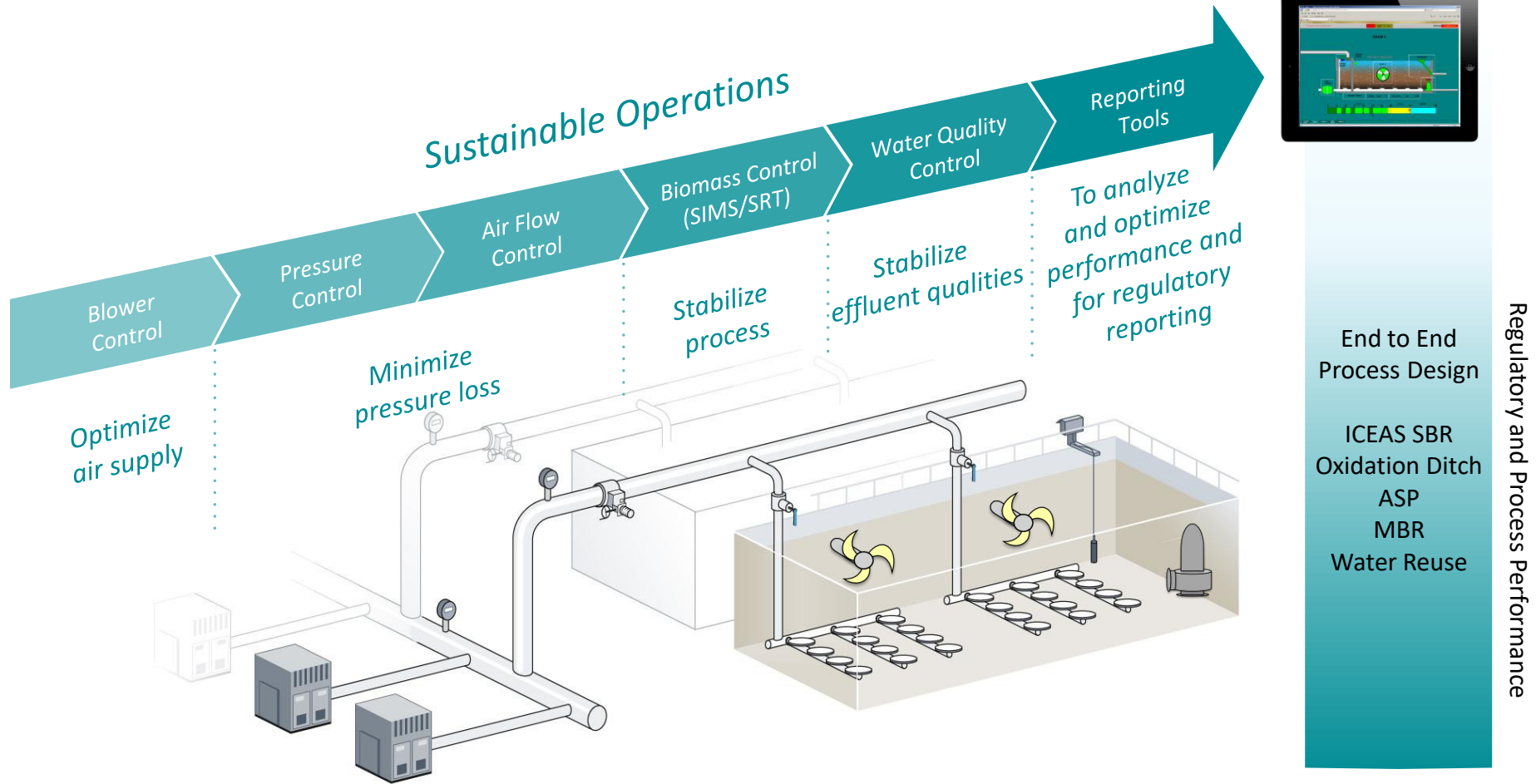
JEFFERSON CITY, USA

41,000m³/d ICEAS NDN plant with reuse for Wetlands - plant commissioned in 2004.

Scope: Design, supply and commissioning of an ICEAS SBR biological WWT process

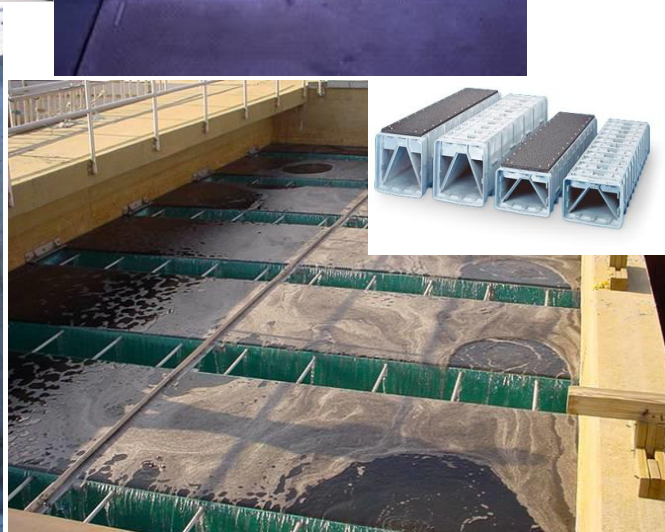
M+E supply: SBR Decanters, FBDA system, blowers, air-main, raw & final water pump stations and controls.

Xylem Advanced Process Control

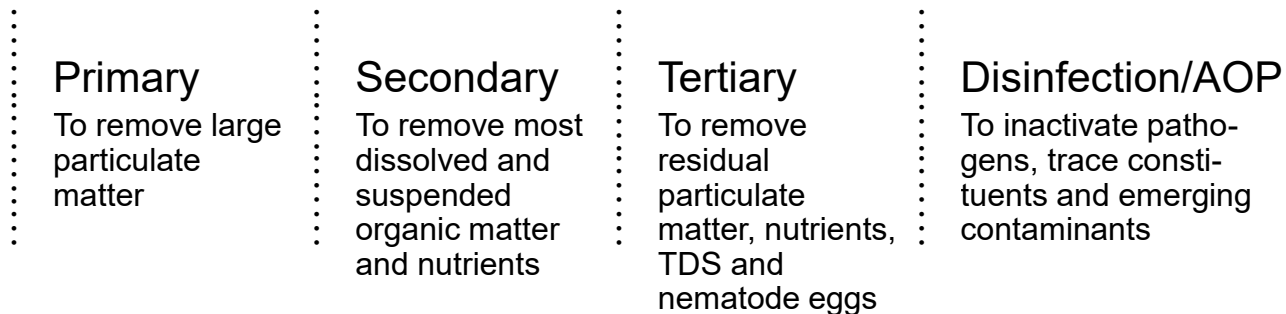


Energy Efficiency achieved through continuous Process Control & Optimization

Xylem Integrated Systems for Reuse



Reuse Treatment



Primary
influent



Reusable
water

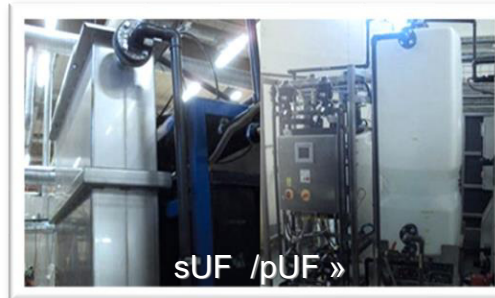
Secondary

To remove most dissolved and suspended organic matter and nutrients



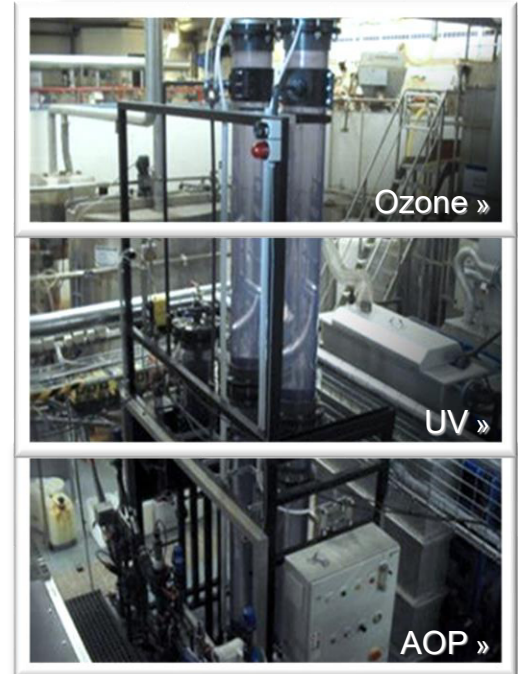
Tertiary

To remove residual particulate matter, nutrients, TDS and nematode eggs



Disinfection/AOP

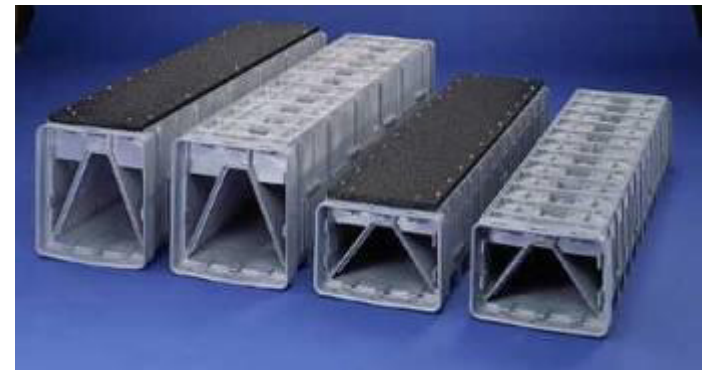
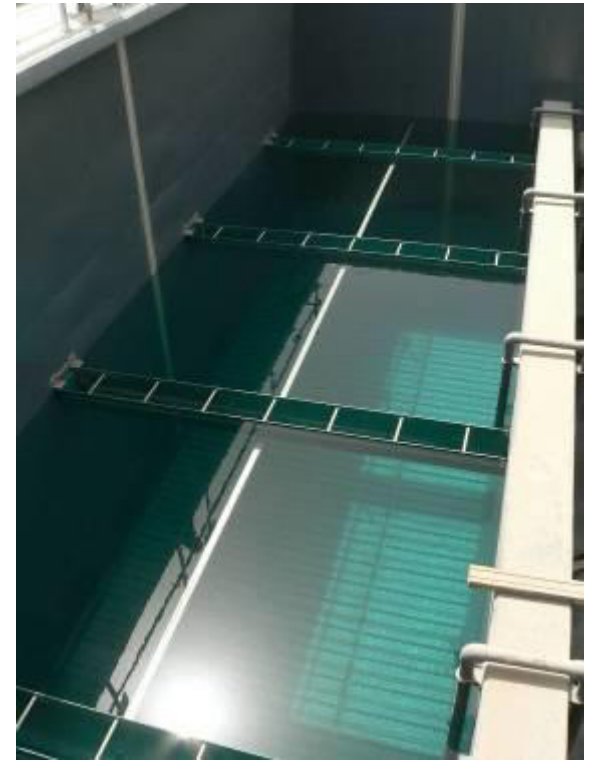
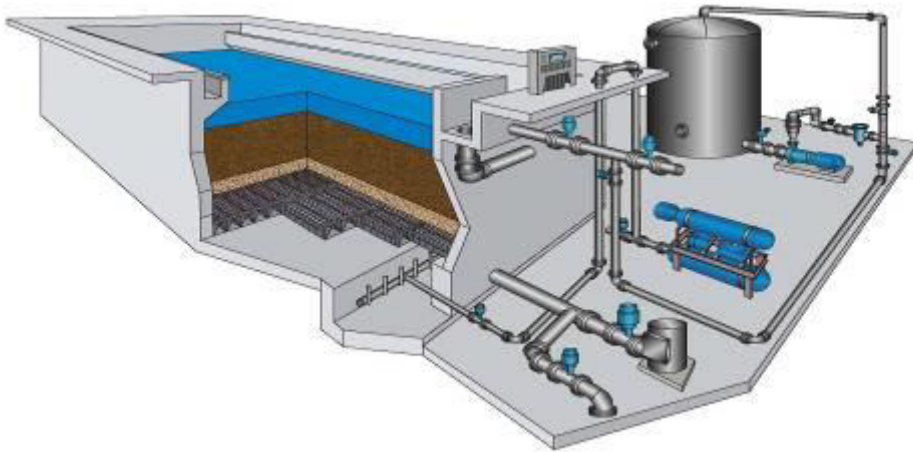
To inactivate pathogens, trace constituents and emerging contaminants

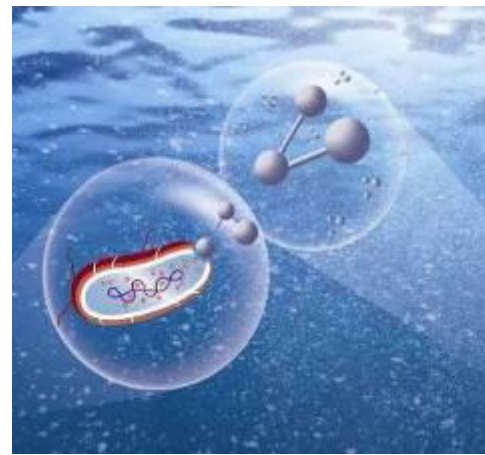


Analytical monitoring »



Rapid gravity sand filtration Clari- DAF floatation





UV Disinfection

UV light destroys micro organisms absolute reliably and without harmful side effects in just seconds

UV destroys more than 99.99 % of all pathogens

Ozone generation

The ozone molecule reacts quickly with a number of organic and inorganic compounds

Ozone used up completely by this oxidation process and decomposes to oxygen



- Sensor Net linking of instruments
- Plug and play
- DO sensors
- Total Suspended Solids and turbidity Ammonia sensors
- Nitrate sensors
- Phosphate sensors
- pH/ORP Instruments
- Sludge Blanket Level sensors



Fully-integrated WWT process solutions

Process expertise

- Conventional ASP
- ICEAS SBR
- BioLoop
- MBR
- Water Reuse

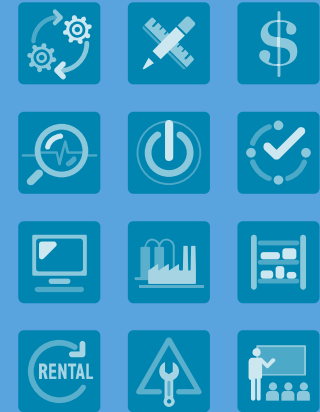
World-class products



Advanced Process Control

- Process quality
- Energy efficiency
- Operational excellence

Comprehensive Total Care services



Thank you – any questions