

ONLINE

(Cisco Webex)

Delivering Sustainable Water Solutions Through Decentralization



12th January 2021 Tuesday



3:00 pm – 4:00 pm SGT



Time	Agenda	Presented by
3:00 - 3:05pm	Opening & Housekeeping	Singapore Water Association
3:05 - 3:15pm	Welcome Address	Mr YONG Wong Jin CEO of Fluence Asia
3:15 - 3:45pm	Delivering Sustainable Water Solutions Through Decentralization	Mr Gilad Yogev Senior Product Manager of MABR Products at Fluence Corporation
3:45 - 3:55pm	Q & A	SWA / Fluence Corporation
3:55 - 4:00pm	Closing	Singapore Water Association

Joint Organisers

For further enquiries, contact
enquiry@swa.org.sg
T: (65) 6515 0812



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Delivering Sustainable Water Solutions Through Decentralization

HOUSEKEEPING

- ✓ To ensure better connectivity, please mute your microphone and turn off the camera. You may communicate with us after the event.
- ✓ Please share your questions in the chat where we will try to provide answers where possible in the Q & A Segment.
- ✓ Do identify yourself so we can respond to any unanswered questions
- ✓ We will be recording this session and reserve the rights to the video
- ✓ Please complete a post event survey which upon return, we will forward the recording and presentation deck to the respondents.



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Welcome Address

Mr YONG Wong Jin
CEO of Fluence Asia



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Global Water, Wastewater & Reuse Treatment Solution

Introduction of Fluence

fluence - Value from Water



Merging global innovators
with a field-proven
execution team
to deliver
breakthrough water
technology solutions to the
world

Fluence is a foreign company with core technology from Israel

Traded on the Australian Stock Exchange (ASX: FLC)

R&D Center in **Israel**, with 4 production plants, 3 in China and 1 in Israel

210+ MABR Project References in Asia

Wastewater treatment for reuse in municipal, industrial and commercial sites

300 highly-trained water professionals

Experience operating in 70 countries



+



Innovative Solutions



Fluence Asia Footprint



6 Entites

3 plants + 3 regional offices
Shanghai, Beijing, Manila



213 Projects

Across 15 provinces
in China + SEA



> 40 Partnerships



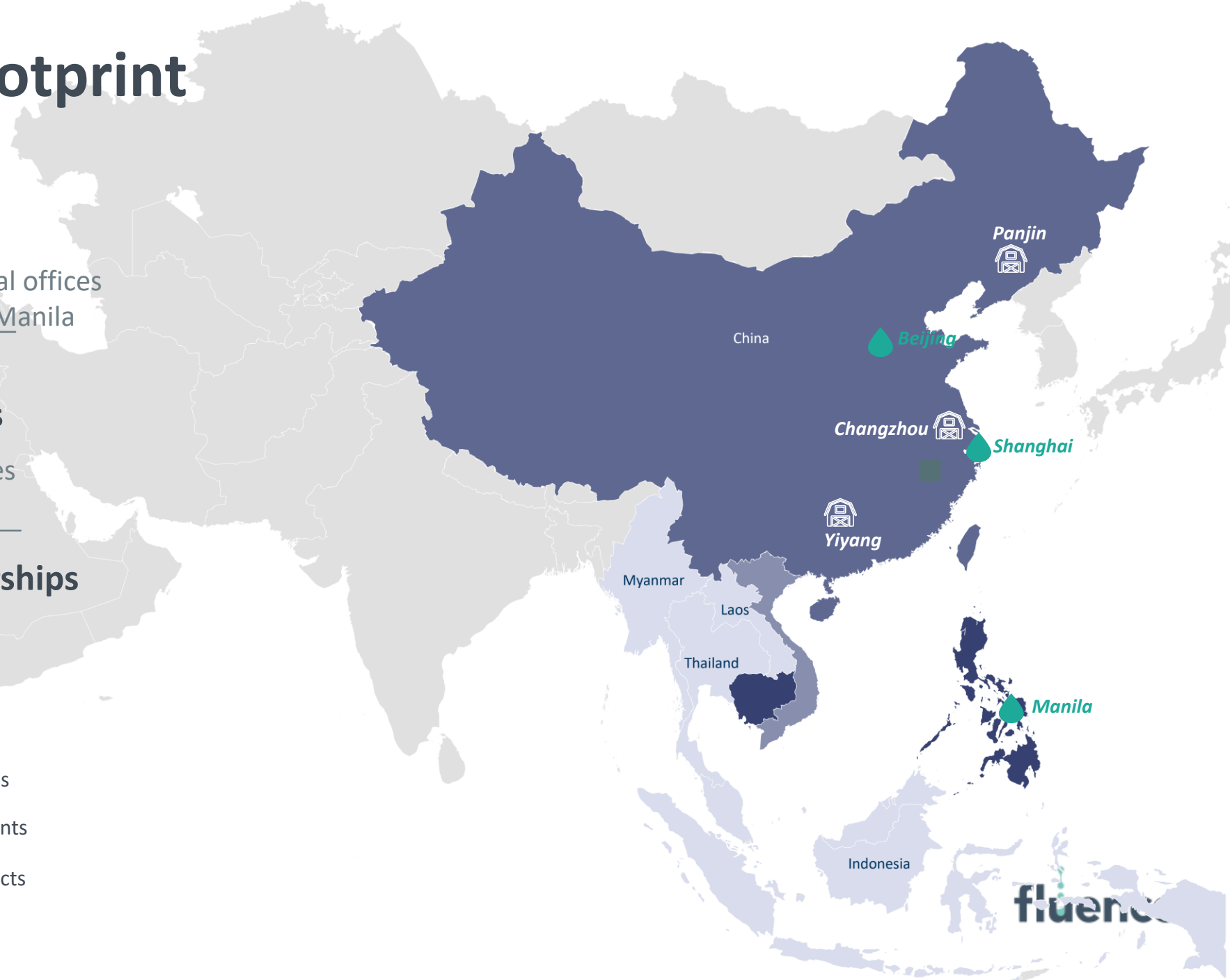
FLC regional offices



Manufacturing plants

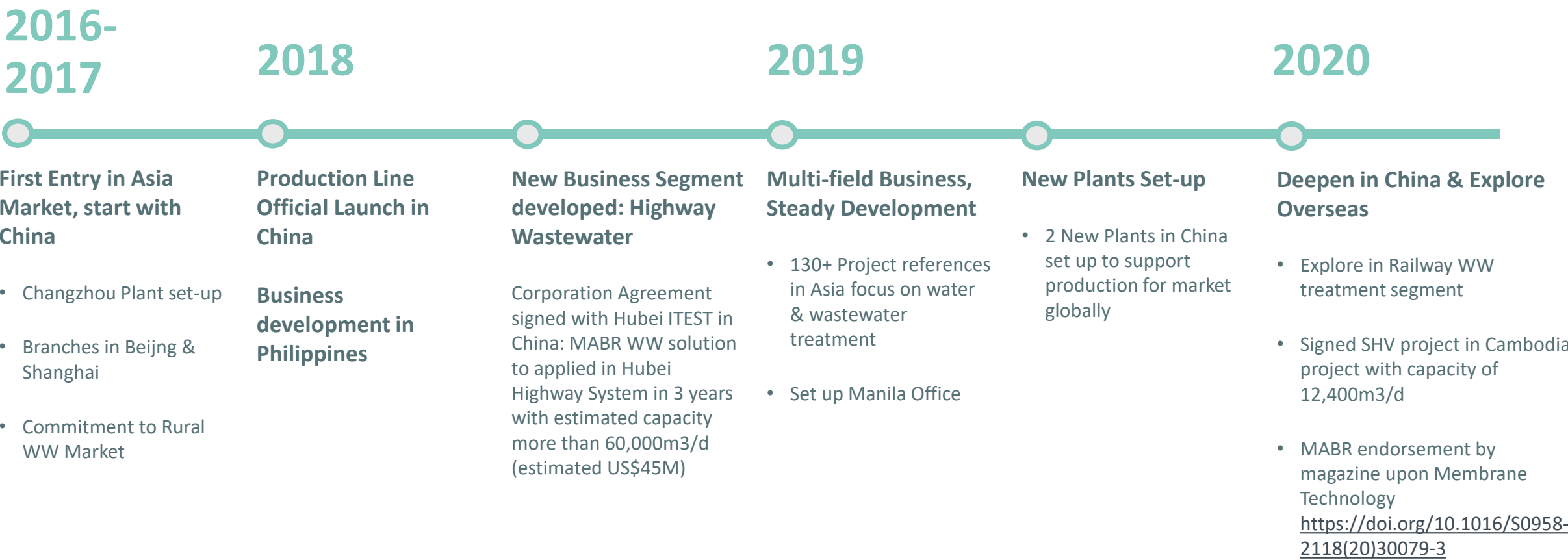


Partnerships/Projects



Fluence Asia Footprint

Fluence (former named as Emefcy) entered Asia market with its MABR wastewater treatment solution in 2016, starting from China and established the 1st manufactory plant in Jiangsu Province to support the product delivery to projects but not limited to Asia.



Key Business Partners in Asia



Panjin
Liaoning Province

Yiyang
Hunan Province



Xiong An New
District



Thank you!

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Delivering Sustainable Water Solutions Through Decentralization

January 2021

Water Stress: Widespread & Growing

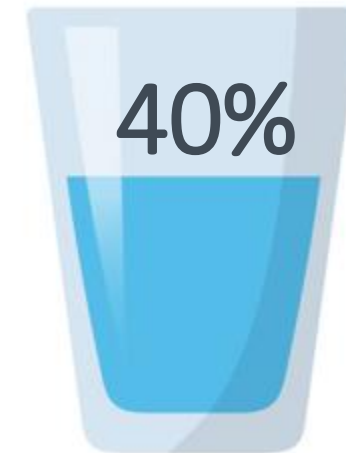
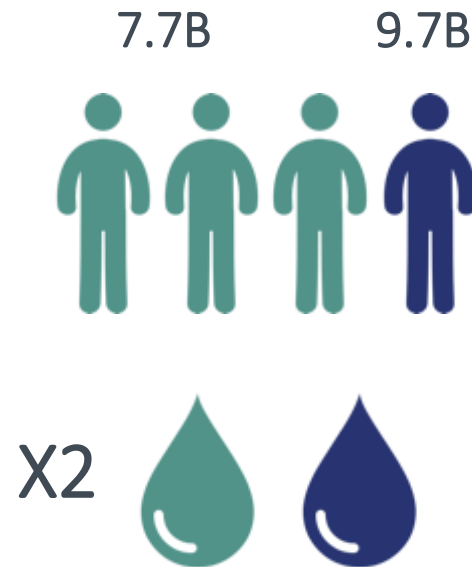
2.2B People Lack Safe Drinking Water

4.2B People Lack Safe Sanitation

NOW

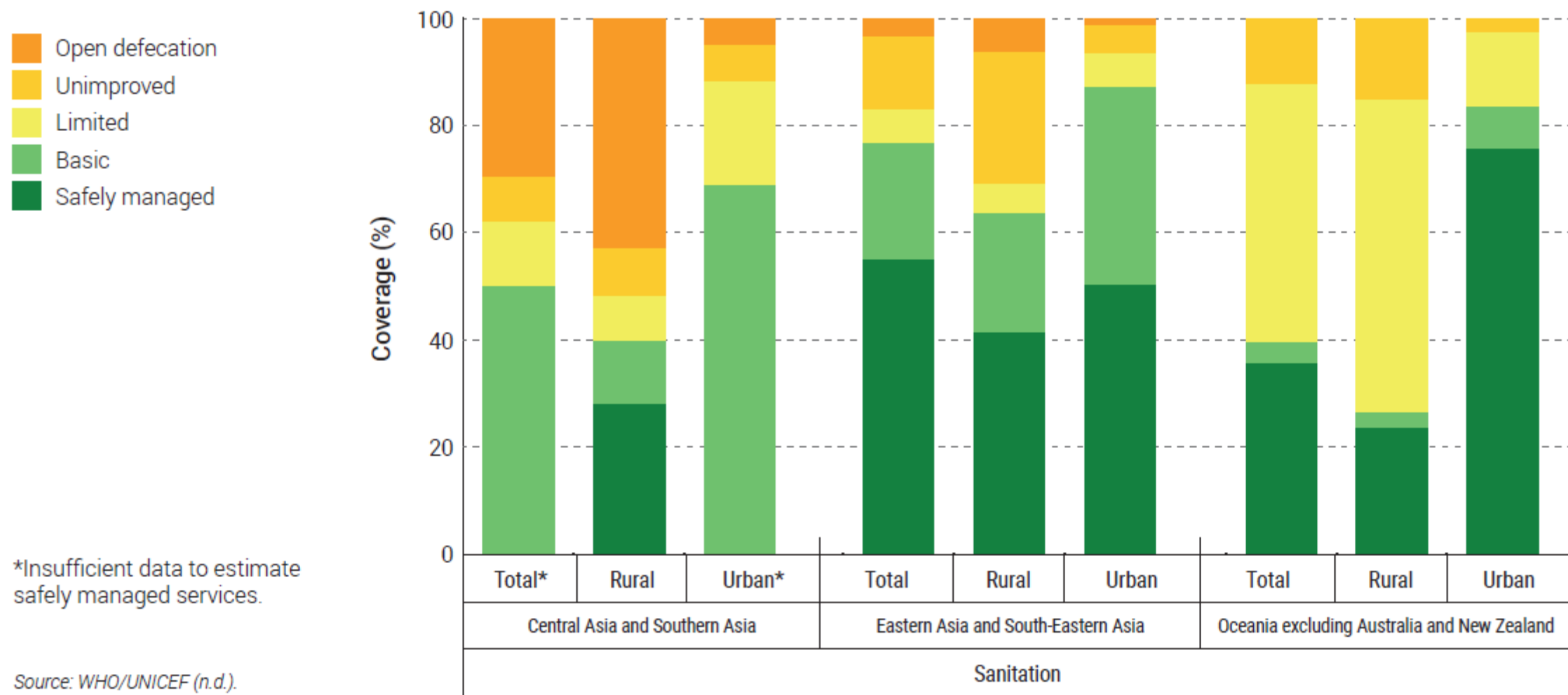
Population Growth
2019 → 2050

Global Water
Consumption by 2050



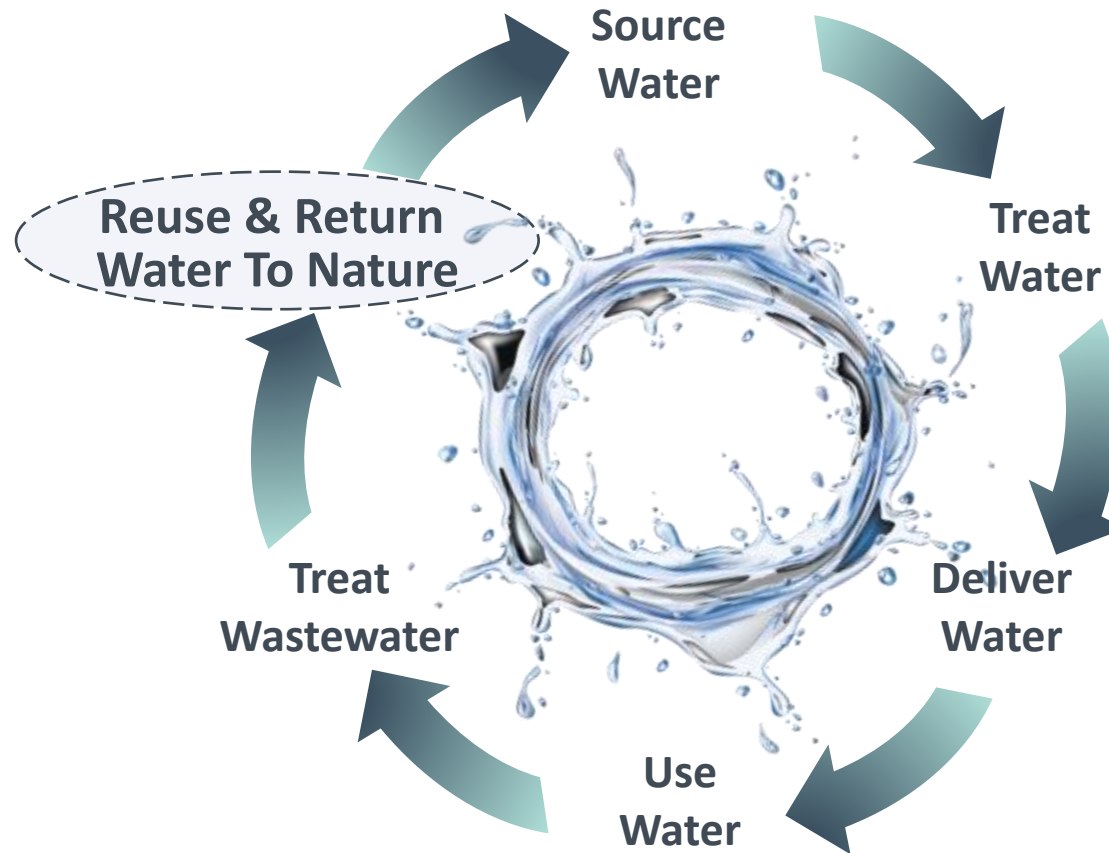
water
deficit by
2030

Figure 9.4 Sanitation coverage in the SDG sub-regions of Asia and the Pacific (excluding Australia and New Zealand), 2015



Source: WHO/UNICEF (n.d.).

Future of Water: Manage the Full Water Cycle Via Reuse



Future of Water

New or Expanding Cities



Rural Areas

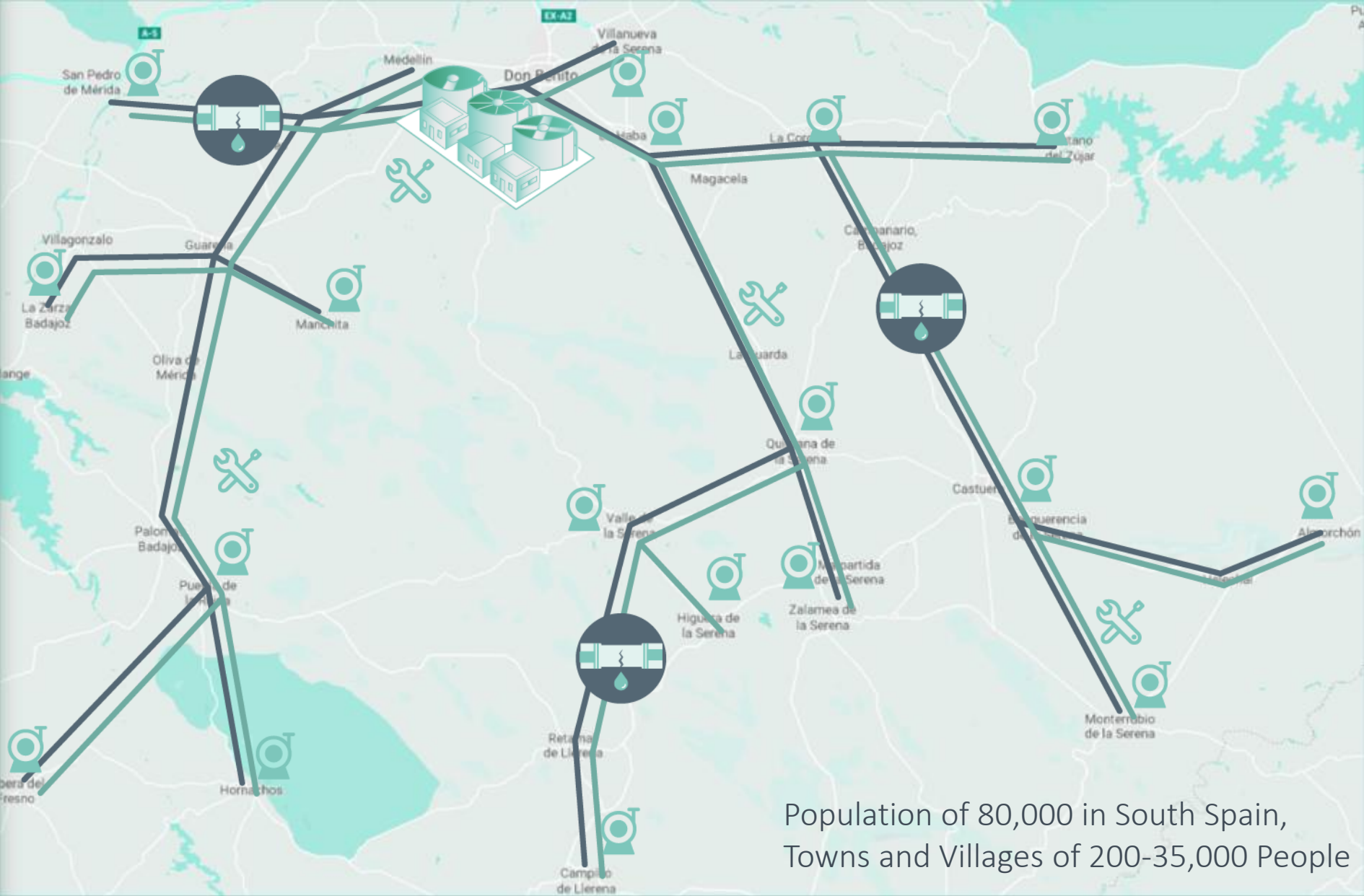


Developing Countries



Limited or No Water Infrastructure
Water Reuse Is Essential

The Centralized and Conventional Approach to Wastewater Management



CAPEX

CENTRALIZED PLANT

Huge Capex up-front, slow to build and expensive to maintain

SEWER NETWORK

Pump and pipe network is 2/3 of Capex

DISTRIBUTION NETWORK

Treated wastewater is lost – cannot be reused locally

OPEX

PUMPING STATIONS

Pumps increase system energy demand ~50%

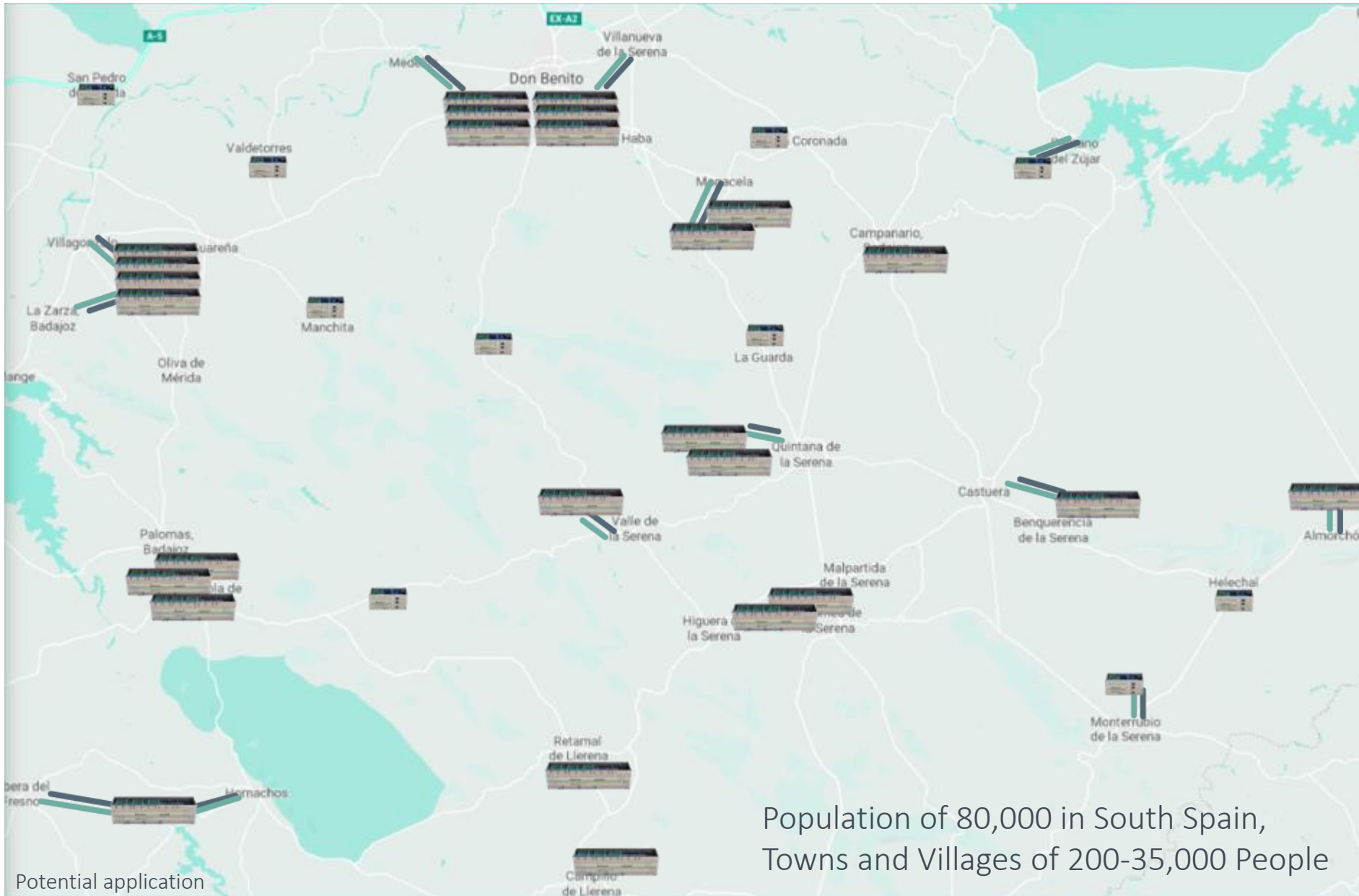
MAINTENANCE

Plant and network maintenance is expensive and complex

FAILURES & LEAKS

Failure and leaks can cause catastrophic pollution

The Decentralized Approach to Wastewater Management



CAPEX

DECENTRALIZED PLANTS

Capex spread out over time, fast to deploy and upgrade as needed

SEWER NETWORK

Eliminates most of the costs of pipe and pump network – no large pipes

DISTRIBUTION NETWORK

Treated wastewater is a valuable resource - easily reused locally

OPEX

EFFICIENT TREATMENT

Aspiral™ saves up to 90% of aeration energy. Pumping is negligible.

OPERATION

All plants operated remotely under central control
Renewable energy for off-grid O&M

MAINTENANCE

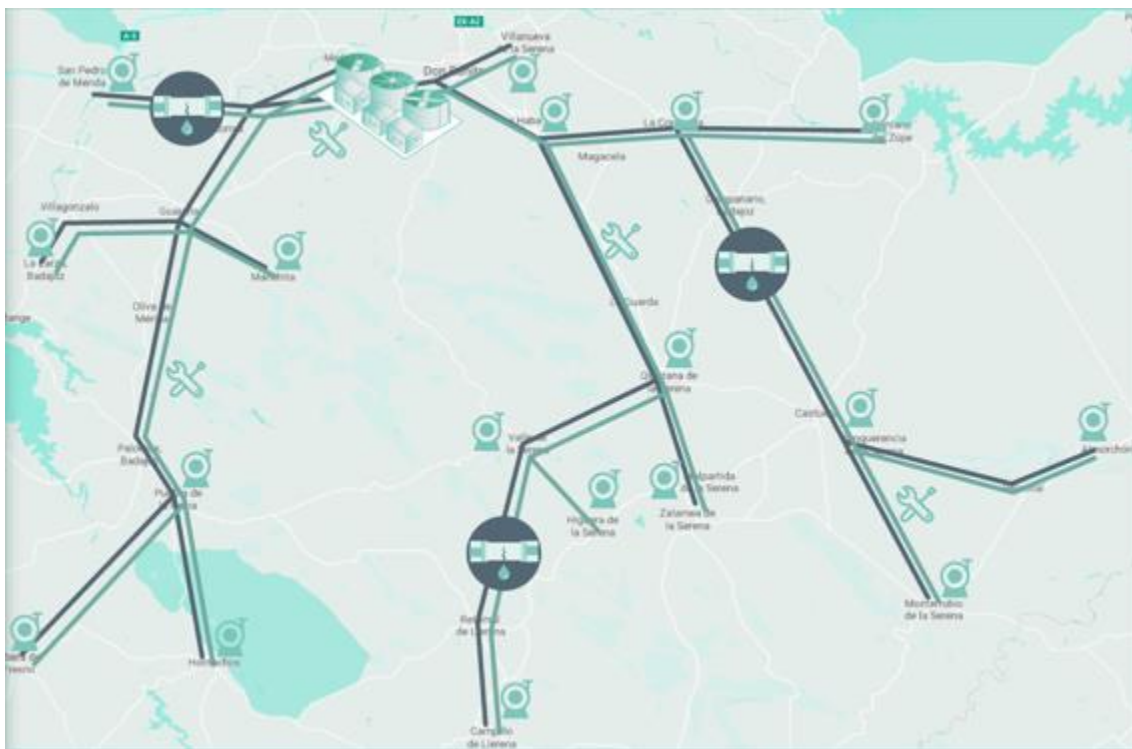
Resilient to local failures
Maintenance is simple and quick

Old Wastewater Management

CENTRALIZED

One big network:

Very costly, hard to fix, doesn't help the water cycle

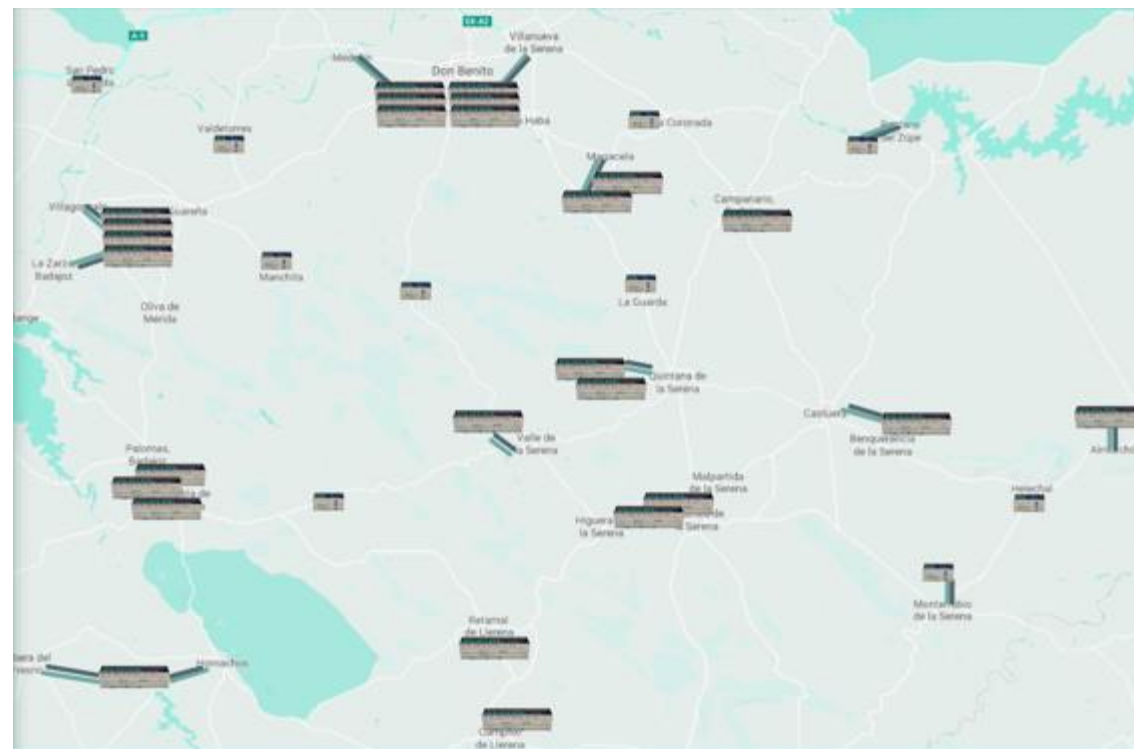


Future of Wastewater Management

DECENTRALIZED

Network of cost-efficient small plants:

Modular, Just In Time Capex, easy to scale & maintain



Future of Wastewater



CAPEX



Save 2/3 of capex for
sewer network

Just-In-Time
infrastructure

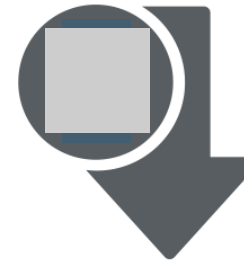
Energy



Save energy for
collection and
distribution

Energy efficient
treatment

Operation



No need for water
professionals - up to 50%
savings in operation

Capability for solar-powered
system to operate off-grid

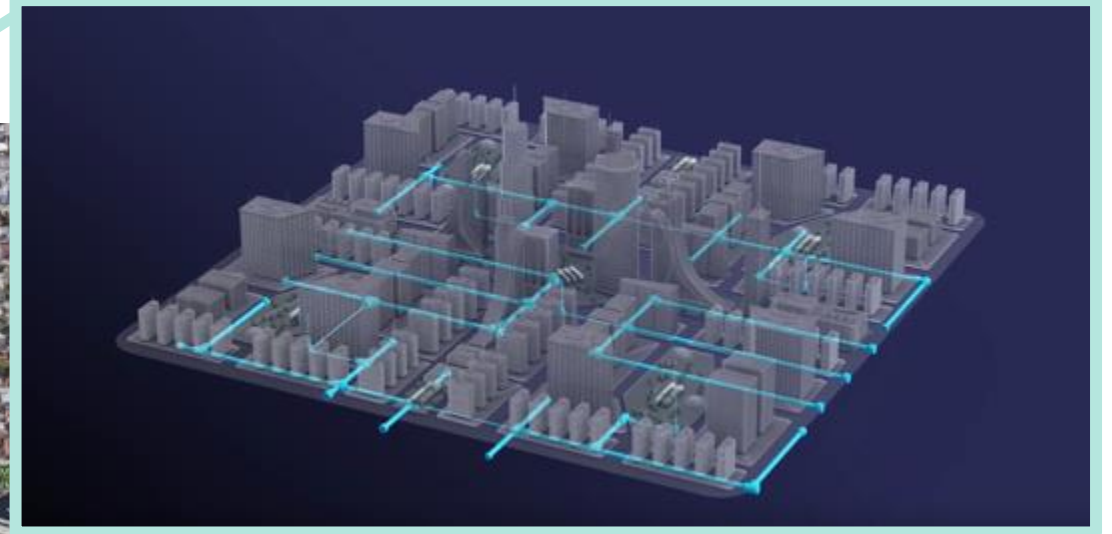
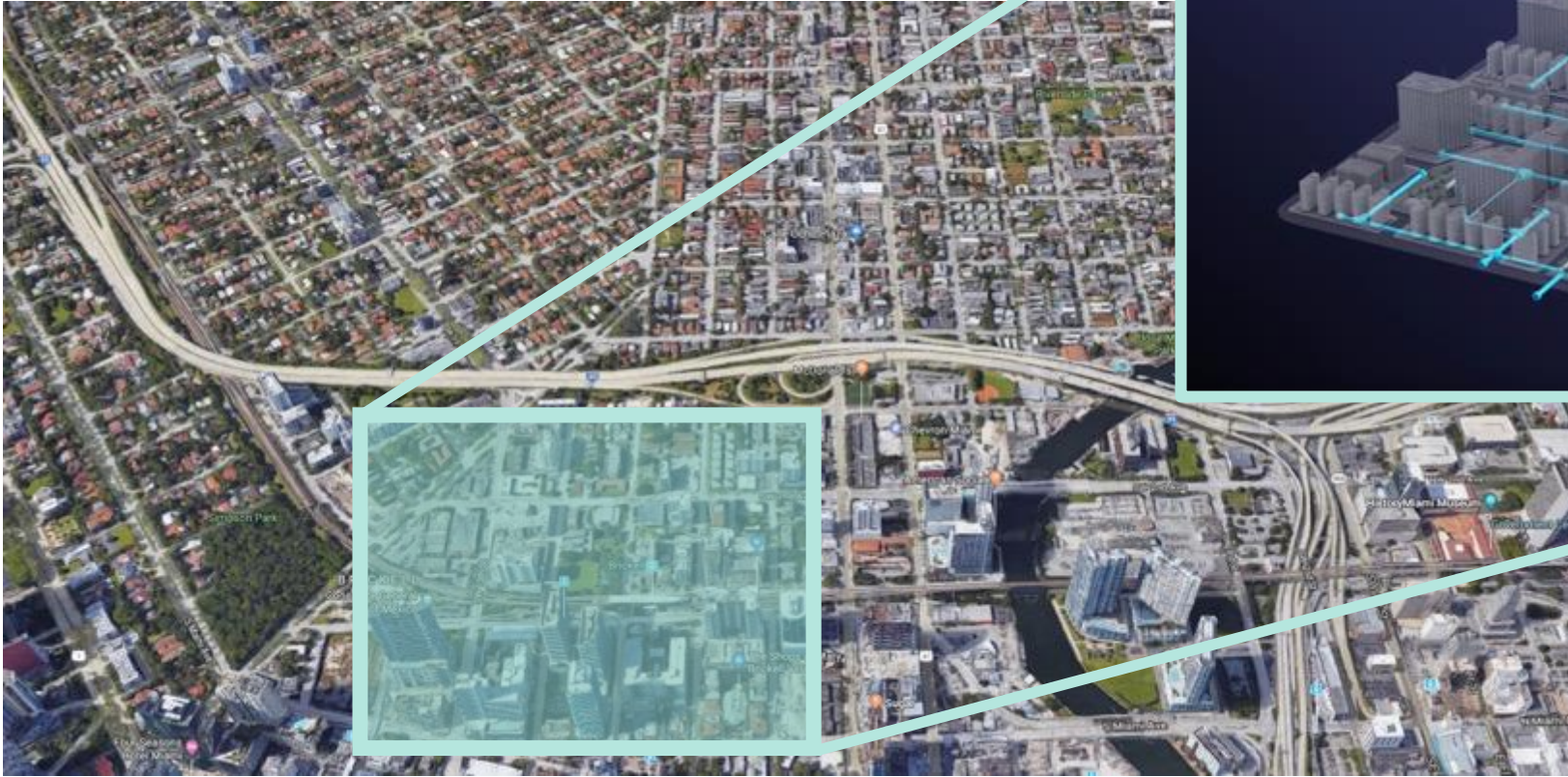
Maintenance



Durable and reliable
prefabricated systems

Plant optimization with
remote connectivity

New or Expanding Cities



Design infrastructure to last for years – scale as the city grows
Smart city water management – efficient and sustainable

Overlay: The Best Way To Upgrade Existing Infrastructure

Old decayed water infrastructure will require upgrade in big cities

Overlay of decentralized system can bypass the old network

Deployment is fast and simple, gradual project implementation



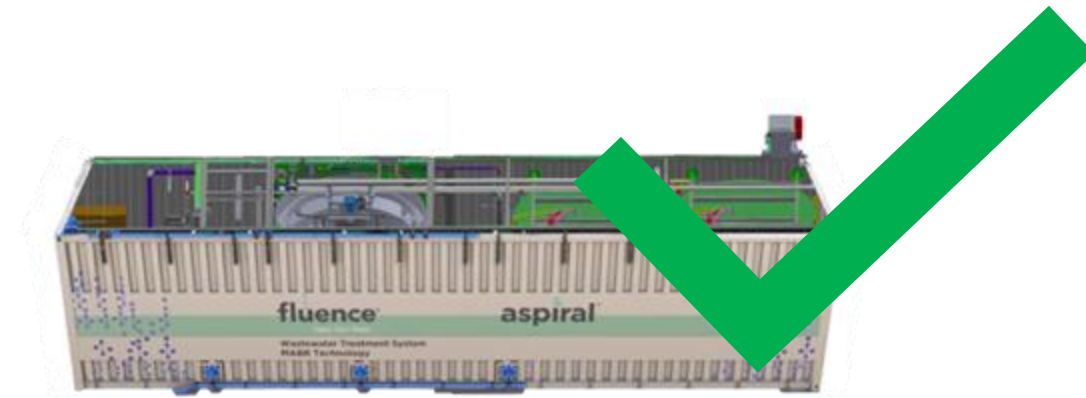
Decentralized systems are the only solution

Entirely Off-grid, solar-powered systems to treat wastewater and supply water for remote communities

Fast improvement in water stress with no need for long and complex projects

Start with a decentralized approach:

- Cost efficient
- Simple, fast
- Independent
- Sustainable



Global Evidence and Support

- China 13th 5-year plan: includes wastewater treatment in most of 130,000 administrative villages
- EPA provide guidelines for decentralized treatment for 20 years
- Sydney water- sewage mining
- ISO Standards:
 - Guidelines for Life Cycle Cost Analysis in Planning of Decentralized Wastewater Treatment Systems for Reuse
 - Guidelines for decentralized and onsite water reuse system — Design principle of a decentralized / onsite system
 - Guidelines for Cost Analysis in Planning of Decentralized Wastewater Treatment in Urban Areas



Policy



Sewer Mining

Centralized vs. Decentralized Cost Analysis

Table 1 | Total project value summary for the scenarios I-IV in JOD (30 years, 5% discount rate)

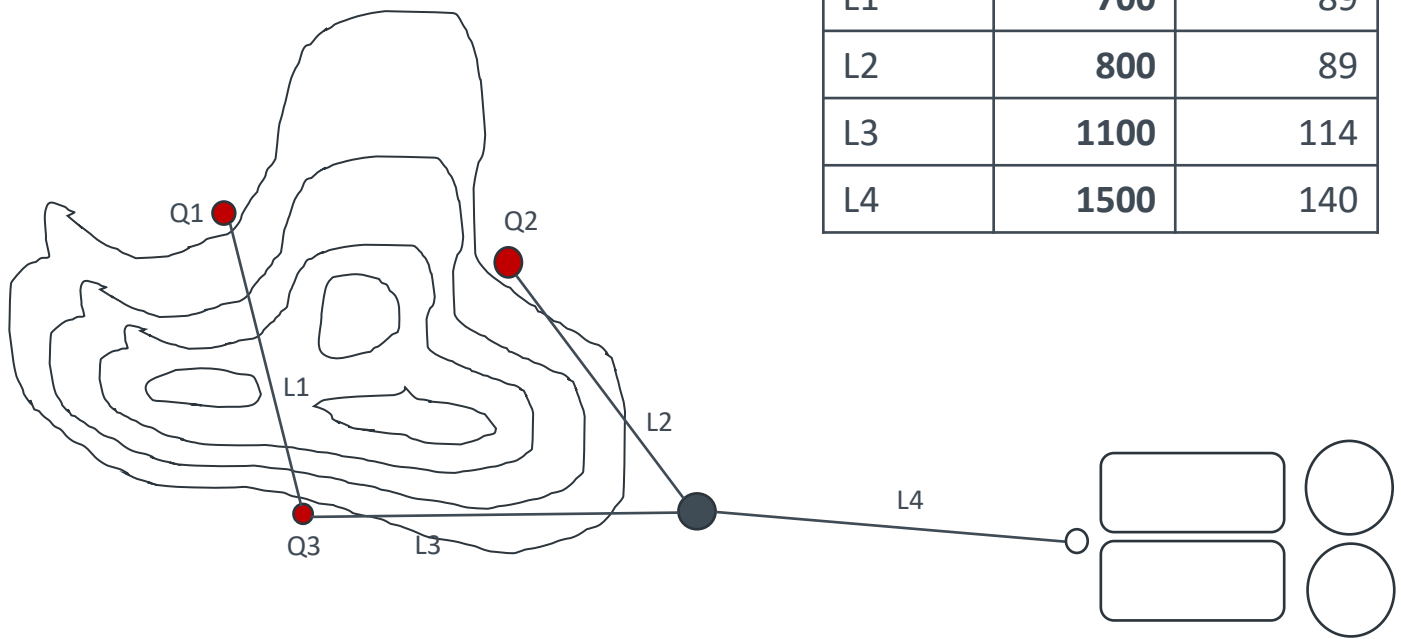
Item	Scenario I	Scenario II	Scenario III	Scenario IV
	Centralized	Decentralized		
Total investment	19,840,354	10,741,188	10,741,188	10,741,188
Total reinvestment	4,604,938	2,582,440	2,582,440	2,582,440
Reuse benefits (JOD/year)	0	0	0	37,170
Total O&M (JOD/year)	245,871	364,835	243,635	206,476
TOTAL PROJECT VALUE	25,324,000	17,498,000	15,635,000	15,063,000
Annualized cost (JOD/year)	1,647,362	1,138,270	1,017,079	979,870
O&M JOD/m ³	0.66	0.98	0.66	0.56
Specific treatment cost per m ³	4.43	3.06	2.74	2.64

All cost estimates are calculated in JOD (2011, 1 JOD = 0.94 euros).

Supporting regulation

Parameter	China 1A	China grade IV	Philippines DAO 2016
COD	50	30	
BOD ₅	10	6	50
TSS	10	10	70
TN	15	1.5 (10 in para IV)	
NH ₄ ⁺ -N	5	1.5	0.5
TP	0.5	0.3 (1 for lake, reservoir)	1
Nitrate			14

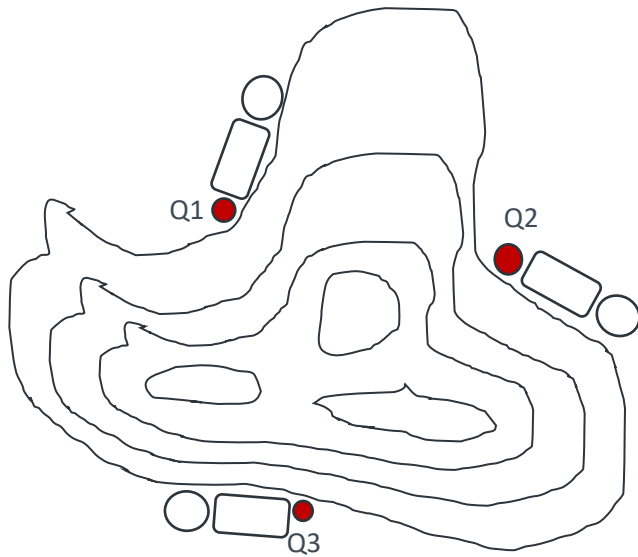
Conceptual Example – Cost Benefit



Pipe Section	Length m	Diameter mm
L1	700	89
L2	800	89
L3	1100	114
L4	1500	140

Pump station	Outlet m3/d	Pressure bar	Power kW
Q1	300	2.04	1.4
Q2	300	2.46	1.7
Q3	600	2.32	3.3
Q4	900		

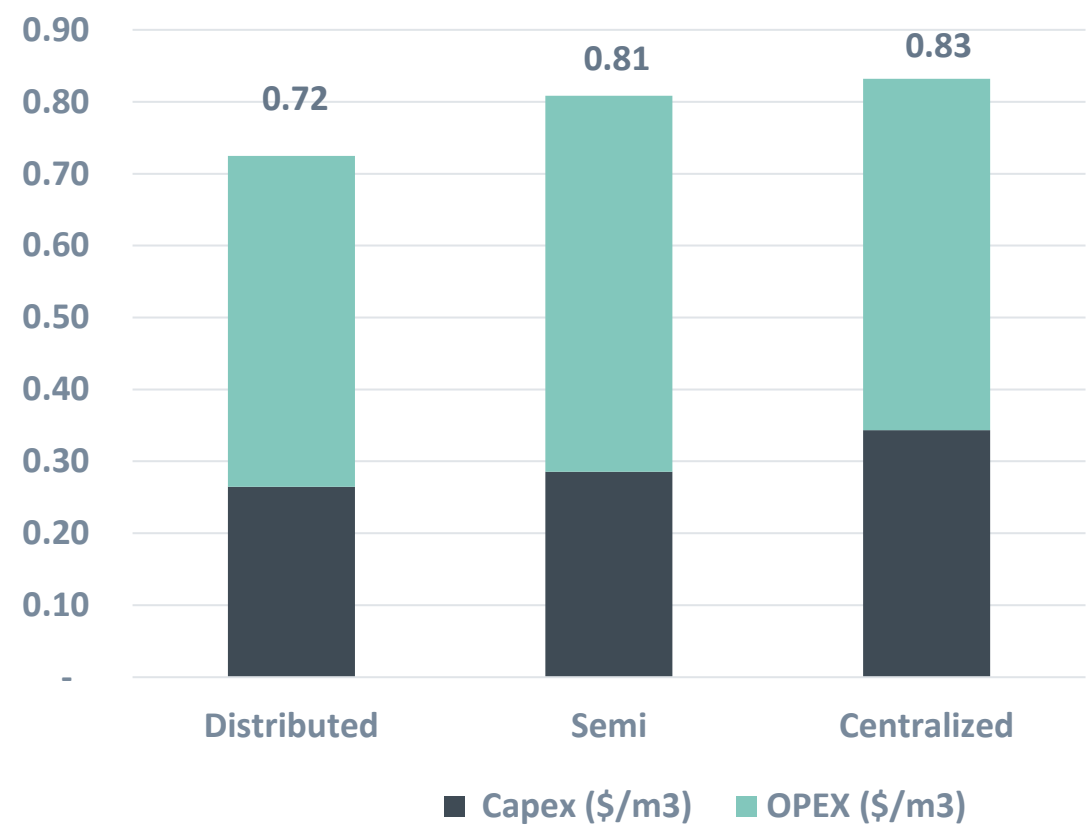
Conceptual Example – Cost Benefit



Treatment plant	Capacity m ³ /d
Q1	300
Q2	300
Q3	300

- No piping
- No pumping stations
- No pumping energy
- Installation cost benefit: US\$ 134k
- Life cycle cost benefit: US\$ 442k

Degree of Distribution Cost Analysis



Degree of Distribution	Scenario 1 Centralized	Scenario 2 Semi	Scenario 3 Decentralized
Type of WWT	CAS	MABR	MABR
Number of WWTPs	1	2	3
Number of Pumping Stations	3	2	1
Collection System (m)	2,400	500	0

Fluence's Smart Products Solutions



Aspiral™: treats wastewater for communities from 150 to 35,000 people



NIROBOX™: potable water for communities of 3,000 to 500,000 people



SUBRE: treats wastewater for communities up to 1 million people

Standardized Building Blocks:

Installed In Weeks, Not Years

Low Cost Operation

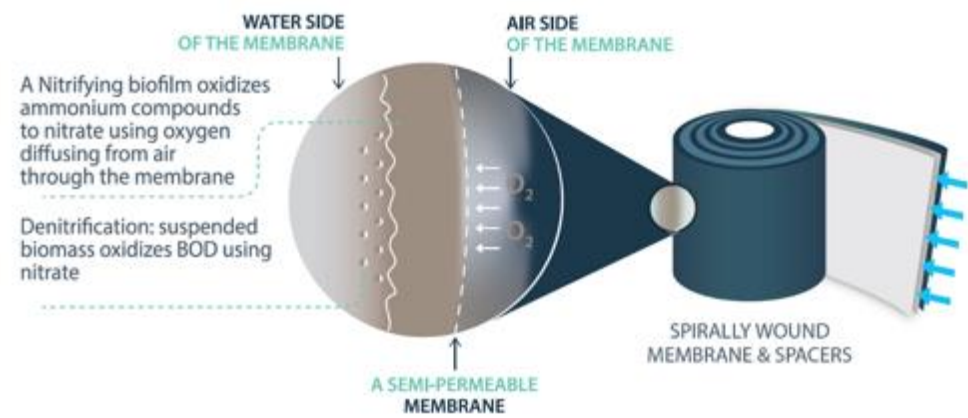
Simple To Maintain

Easy To Upgrade

Modular Plants

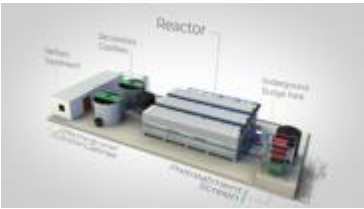
Fluence MABR Overview

Fluence MABR Process



Fluence MABR Benefits

- ✓ Well-Validated Technology: +160 plants
- ✓ Low-Energy Treatment: 90% less than conventional technologies
- ✓ Highly Efficient Biological Nutrient Removal: TN: <5 mg/L, TP: <1 mg/L
- ✓ Patented Globally
- ✓ Minimal Footprint and civil works
- ✓ Meets Highest Regulatory Standards And Enables Reuse



MABR Validation

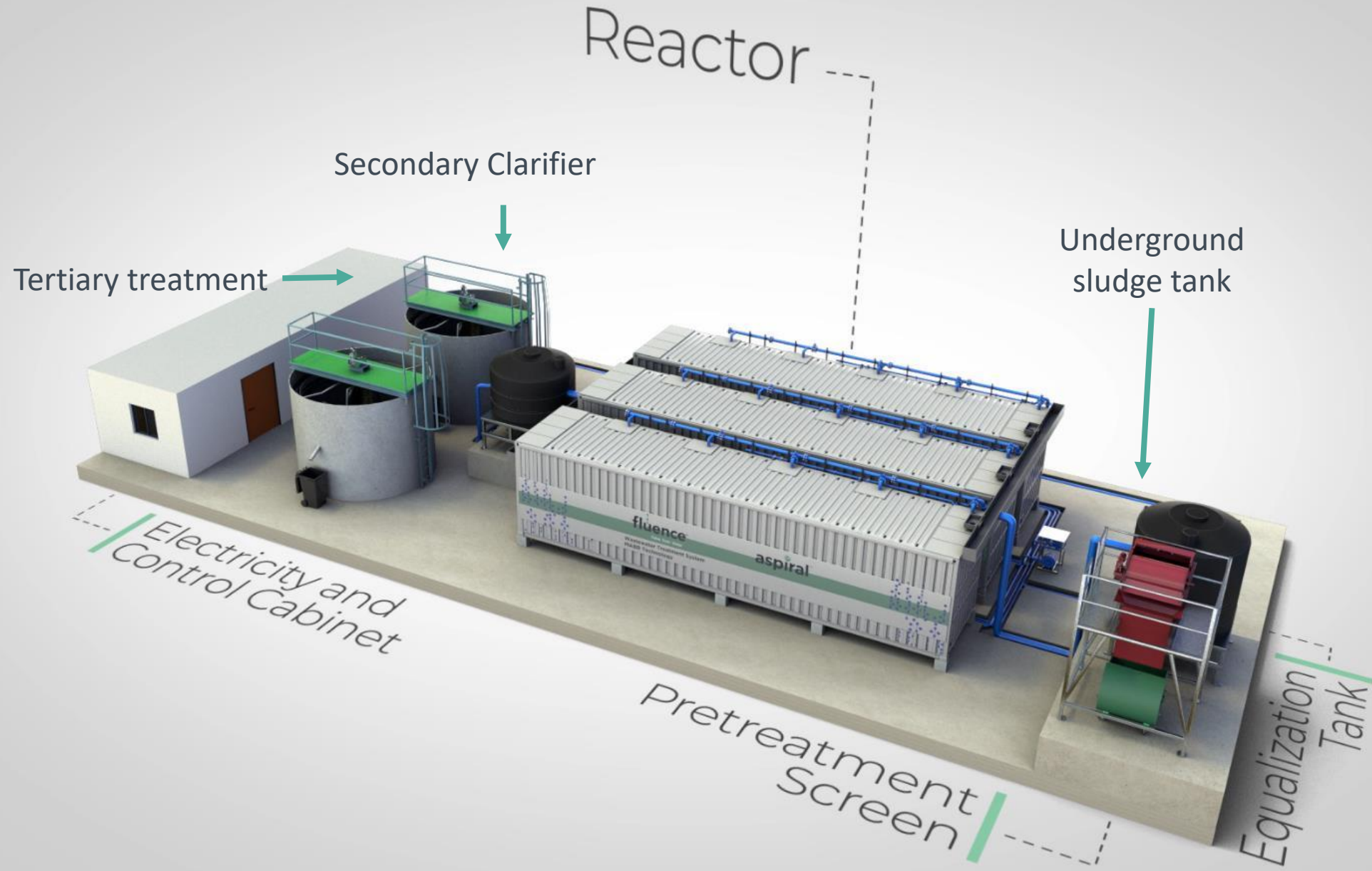


“The three vendors of the technology...have each achieved important milestones in the last 18 months...interest from utilities remains high, with myriad commercial demonstrations being conducted all around the world”

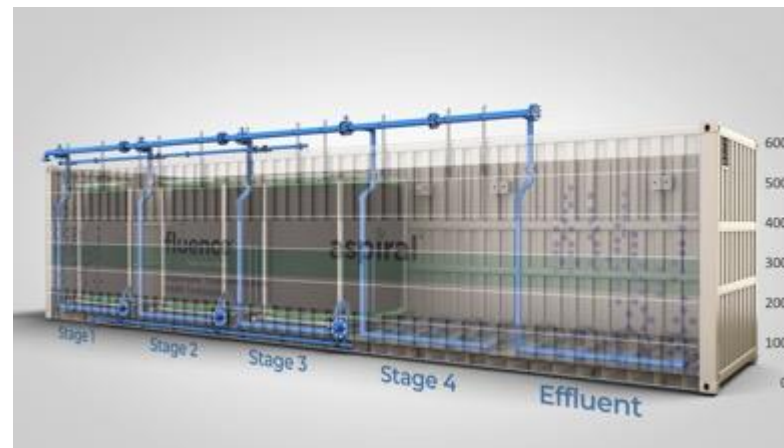
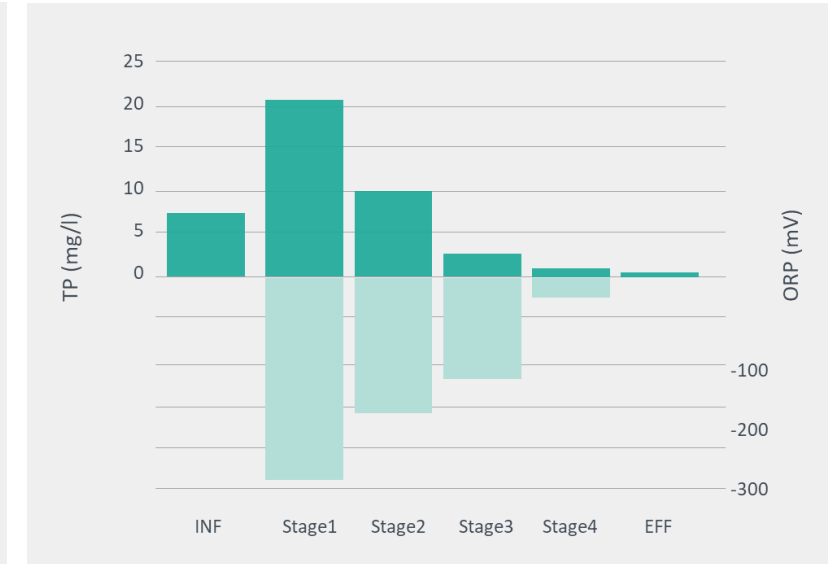
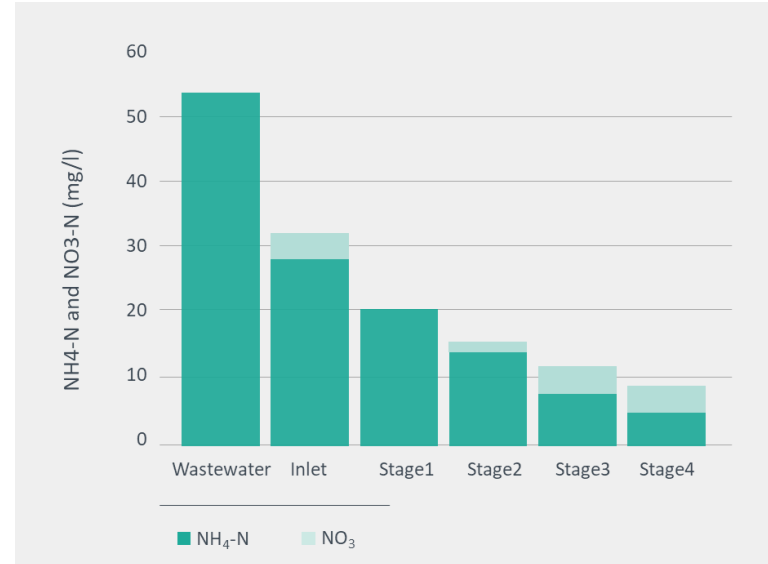
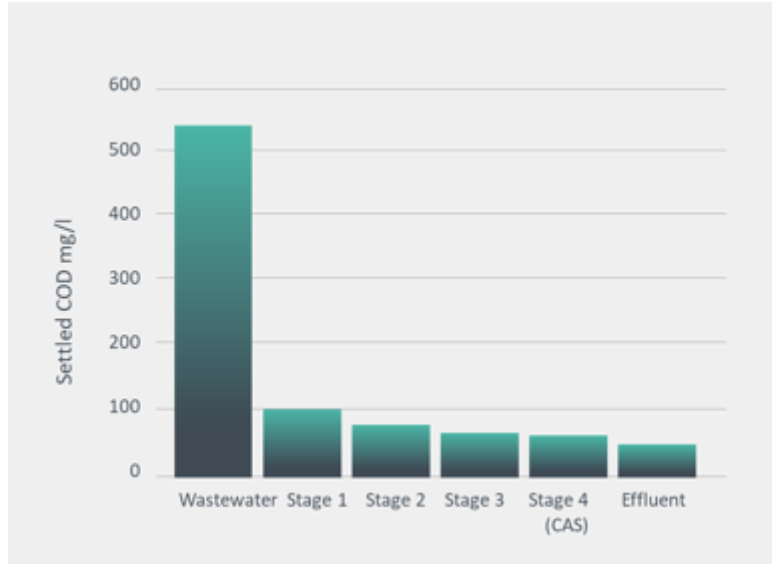
-GWI April 2019 Article

“One of the Top 10 Water Tech Inventions of the Decade”

Breakthrough technology	Developer	Description
1 Nereda	Royal Hacking/DHR	Aerobic granular sludge technology which saved 50% on energy costs while removing nitrogen and phosphorus. It has become a global success for its licensees.
2 Nanocomposite membranes	NanoH2O/G Nano	High-performance nano-engineered thin film reverse osmosis membranes. The takeover by LG Nano represented the highest exit valuation of any water technology during the 2010s.
3 Thermal hydrolysis	Cambi, Veolia, Eliquo, Suez, and others	High pressure boiling and decompression as a pretreatment for sludge digestion. It is rapidly becoming the standard for maximizing energy recovery in sludge treatment.
4 Membrane-aerated biofilm reactor	Fluence, OxyMem/ DuPont, Suez WTS	A modular aerobic wastewater treatment system where the biofilm grows on the membranes which provide the aeration. Fluence has done extremely well with it in China.



Decentralized is where MABR really excels



Decentralized is where MABR really excels...



Westgrove, Philippines, 4XL3 400 m³/d



Tonglu, China 1xL3 100 m³/d



Luoyang, China 2xL3 300 m³/d



Aspiral Micro, China, 5 m³/d



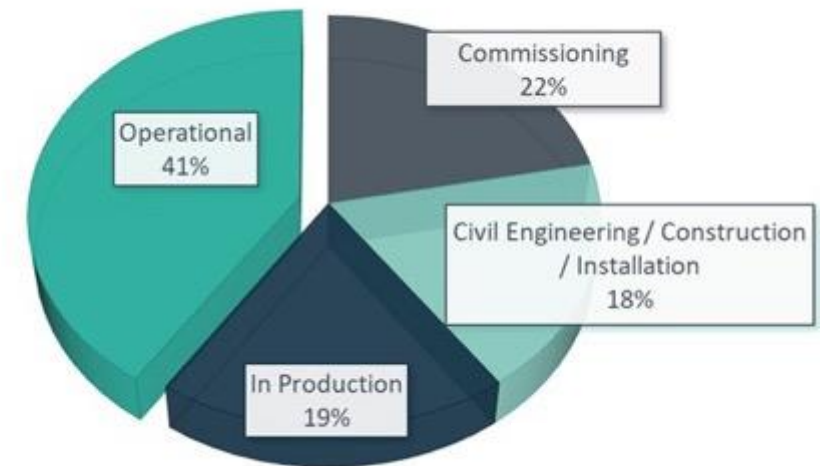
Xiaogan, China 2xL3 200 m³/d



200 existing projects in China alone (3 years)



Project / Installation Status	Quantity
In production	37
Civil Engineering / Construction / Installation	35
Commissioning	42
Operational	78
Total	192



Fluence MABR Configurations

Aspiral Micro
On-site sewage treatment



Aspiral
Smart Packaged Plant



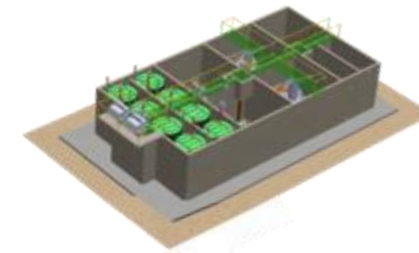
Aspiral plant
End-to-end wastewater solution



SUBRE Upgrade
Retrofit using MABR



SUBRE Plant
Concrete MABR plant



Modules
Integrate MABR in
existing solutions





Thank you!

Gilad Yogev, MABR Product Manager: gyogev@fluencecorp.com



Visit our new website:
www.fluencecorp.com

The logo graphic consists of a vertical stack of four teal-colored shapes: a small circle at the top, followed by a larger circle, then a smaller circle, and finally a larger circle at the bottom. These shapes are positioned over the letter 'u' in the word 'fluence'.

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Q & A



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Delivering Sustainable Water Solutions Through Decentralization



Upcoming.....

SWA/SgWX Water Utilities Series – Total Water Management in Hong Kong

13rd January 2021, 3pm – 4pm

SWA/SgWX Industrial Water Series - Asia Pacific Brewery Singapore

28th January 2021, 3pm – 4pm

Young Water Professionals Sharing with SUTD

29th January 2021, 4pm – 5pm



12th January 2021 Tuesday



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Thank You



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E: enquiry@swa.org.sg

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