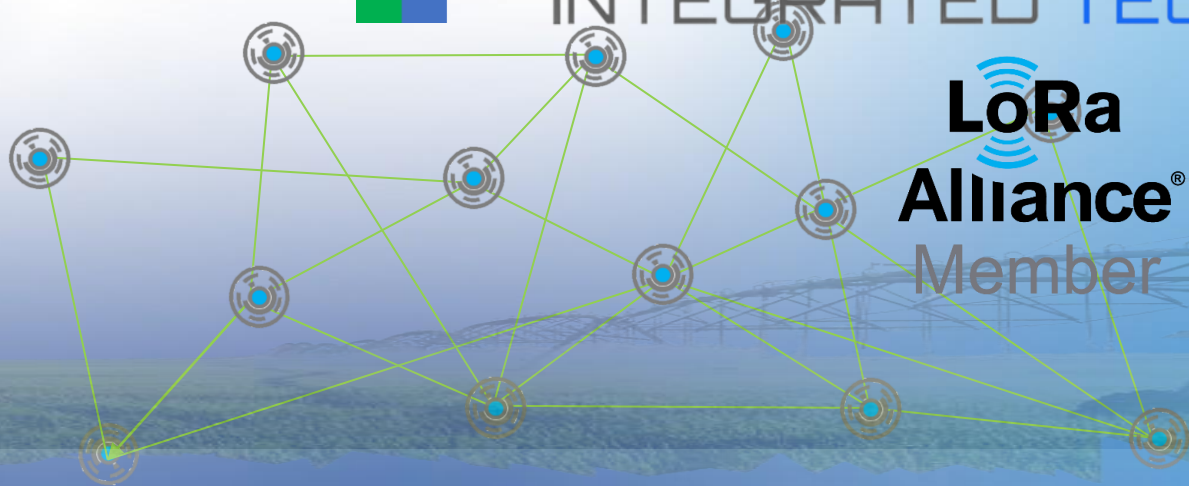


Value Added is Our mission



LoRa
Alliance[®]
Member

IOT in WASTEWATER MANAGEMENT

Index

1. **What is Wastewater**
2. **Overview of Wastewater Management**
3. **Associated Challenges & Concerns**
4. **Leveraging IIOT in Wastewater Management**
5. **LoRaWAN Technology**
6. **LoRaWAN System Architecture**
7. **Wastewater Network Model & Use Cases**
8. **Our Solutions & Key Benefits**

1.0 - What is Wastewater

sewage and any water that has been contaminated by human activities.



Storm Water

Domestic Wastewater

Gray water
Black water

Natural pollution
Chemical pollution

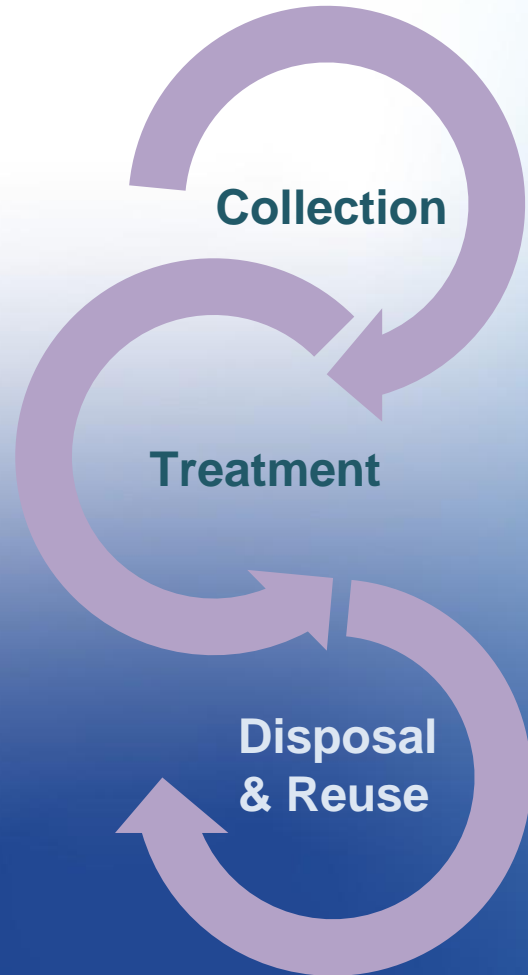
Inorganic water
Organic water

Industrial Wastewater

Dredging
Ships, platform

Offshore & Harbor

2.0 - Overview of Wastewater Management



Proper wastewater management is essential for

Protecting public health

Preserving the environment

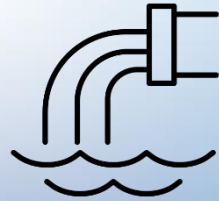
Ensuring the availability of clean water resources.

3.0 Associated Challenges and Concerns

Industrial Discharges
Awareness



Pollution and
Contaminants



Population
Growth



Public
awareness



Energy
Consumption



Discharge
Standards and
Regulations



Aging
Infrastructure



Urbanization



Resource
Recovery



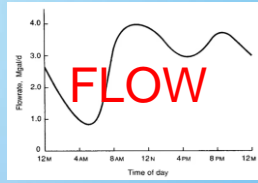
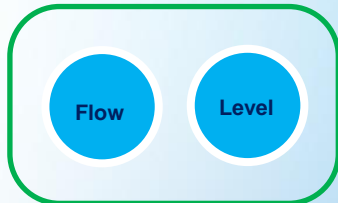
Climate
Change



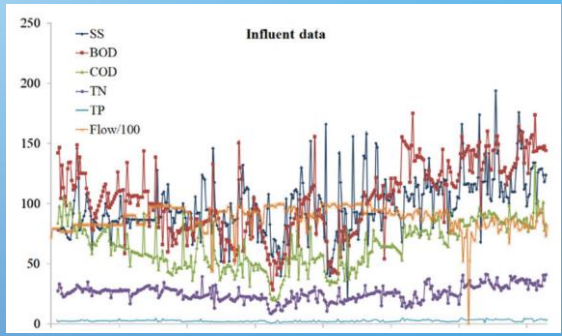
4.0 - Leveraging IIOT in Wastewater Management

CHARACTERISTICS

HYDRAULIC



CHEMICAL



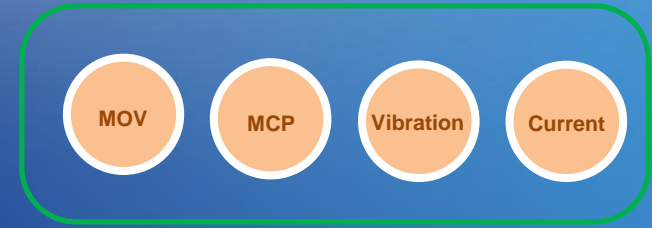
PHYSICAL



BIOLOGICAL



MECHANICAL



..data collection, analysis, and calculation for actionable insight...

5.0 - LoRaWAN Technology





Why LoRaWAN Technology?



No need for a frequency license

LoRaWAN operates on a free public spectrum, available for anyone to use, LoRaWAN networks are deployed on free ISM bands (EU868) in UAE & GCC Countries allowing any service provider or enterprise to deploy and operate LoRaWAN networks without a frequency license.

Wide Coverage Range

Using CSS and ADR, LoRaWAN can communicate with a gateway up to 15 km away in unobstructed open areas or up to 5 km away in urban areas. This means that a single gateway can cover all devices in an area of approximately 700 square kilometers.

Low Power Consumption

Compared to 4G , LoRaWAN boasts ultra-low power consumption, whereas 4G lacks low power features. In outdoor settings such as agriculture and forestry, 4G cannot be battery-powered like LoRaWAN.

Low Cost

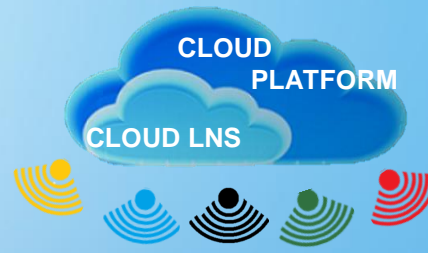
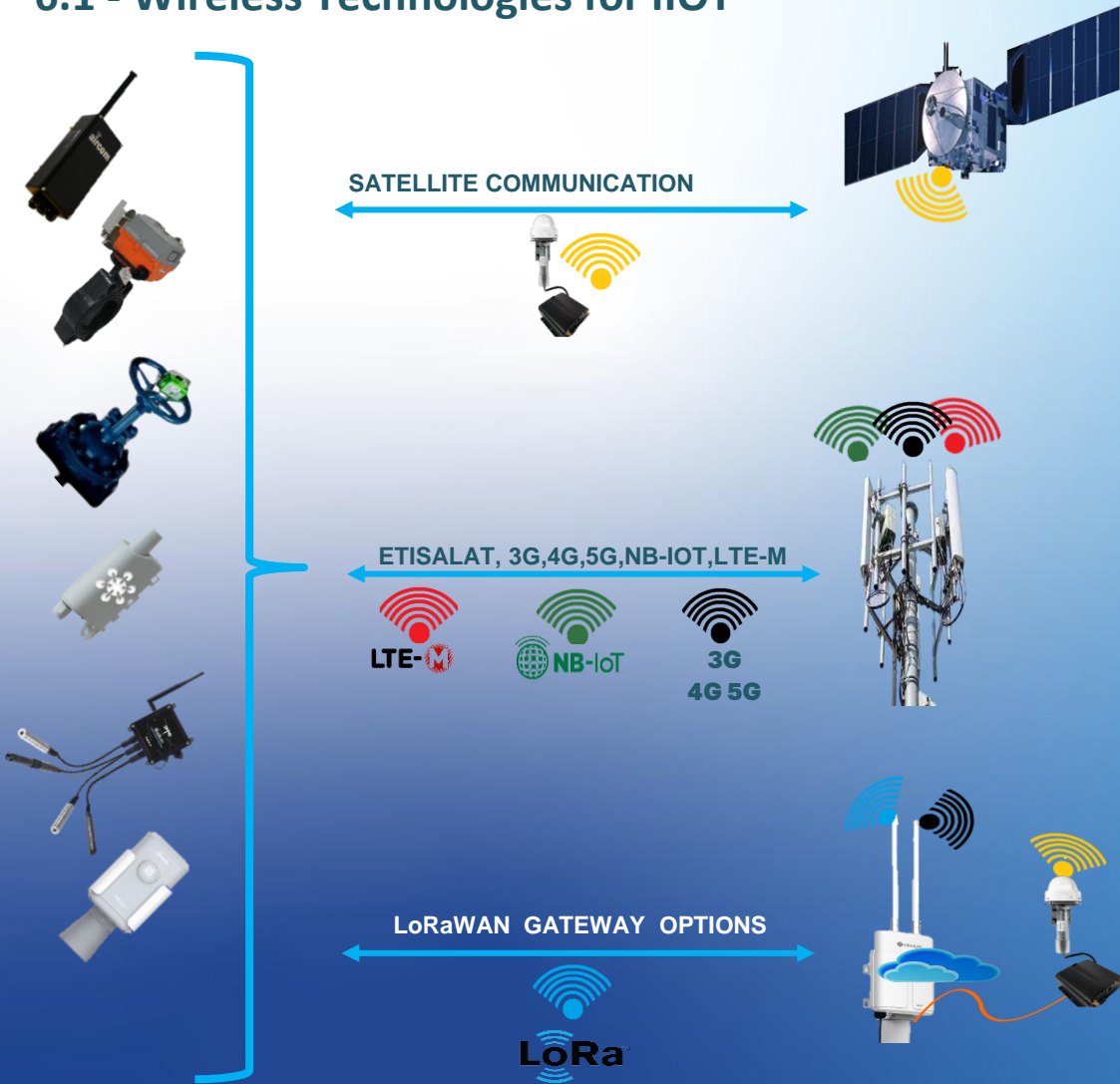
In LoRaWAN, the devices that are usually in greater quantity are the gateways and terminals. Since the gateway only serves as a data forwarder, its price is relatively cost-effective.

Strong Penetration Capability

LoRa wireless modulation technology can penetrate indoor depths, with the ability to reach underground water and gas meter sensors.

6.0 - LoRaWAN System Architecture

6.1 - Wireless Technologies for IIOT



- LoRaWAN Communication
- Satellite Communication
- NB-IOT Communication
- 3G,4G,5G Communication
- LTM-E Communication

IP Based connection

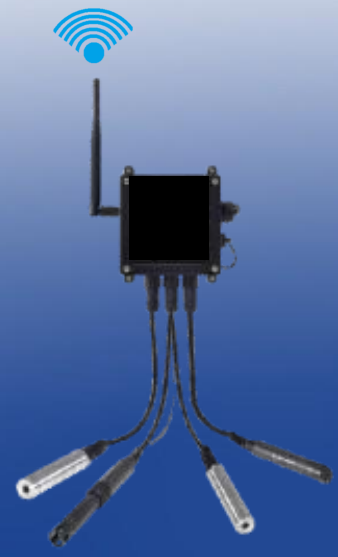


IN PREMISES PLATFORM

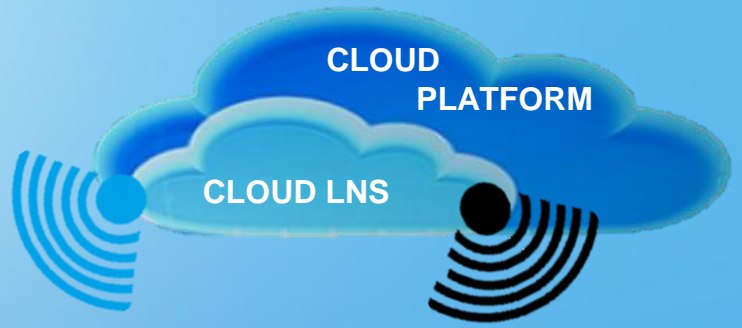
6.2 - LoRaWAN System Architecture

LoRaWAN[®]

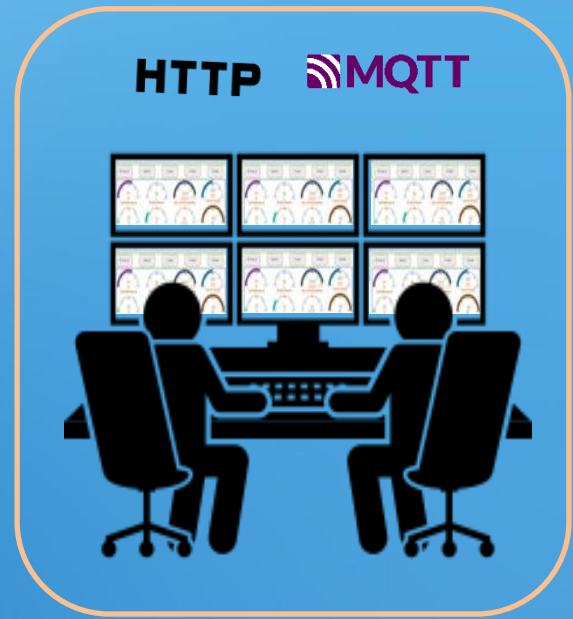
LoRa[™]



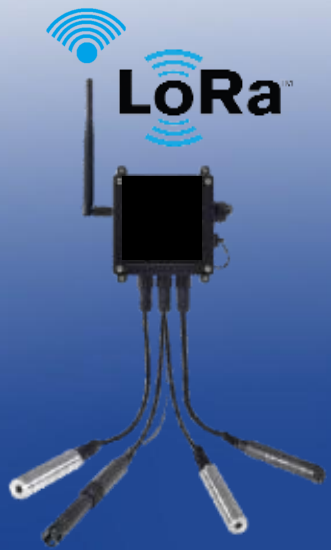
3G
4G 5G
Backhaul



IP Based connection



6.3 - LoRaWAN Gateway Built-In LNS Architecture



IP Based connection



7.0 - Wastewater Network Model & Use Cases

Domestic Sewage Wastewater



Industrial Wastewater



Storm Wastewater



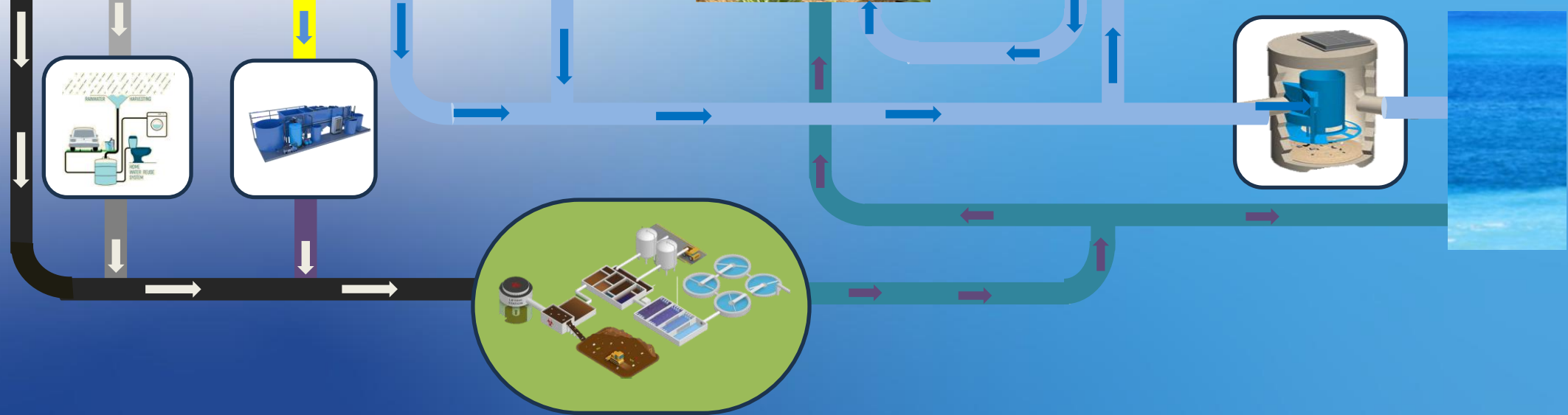
Landscaping & Agriculture Treated Water



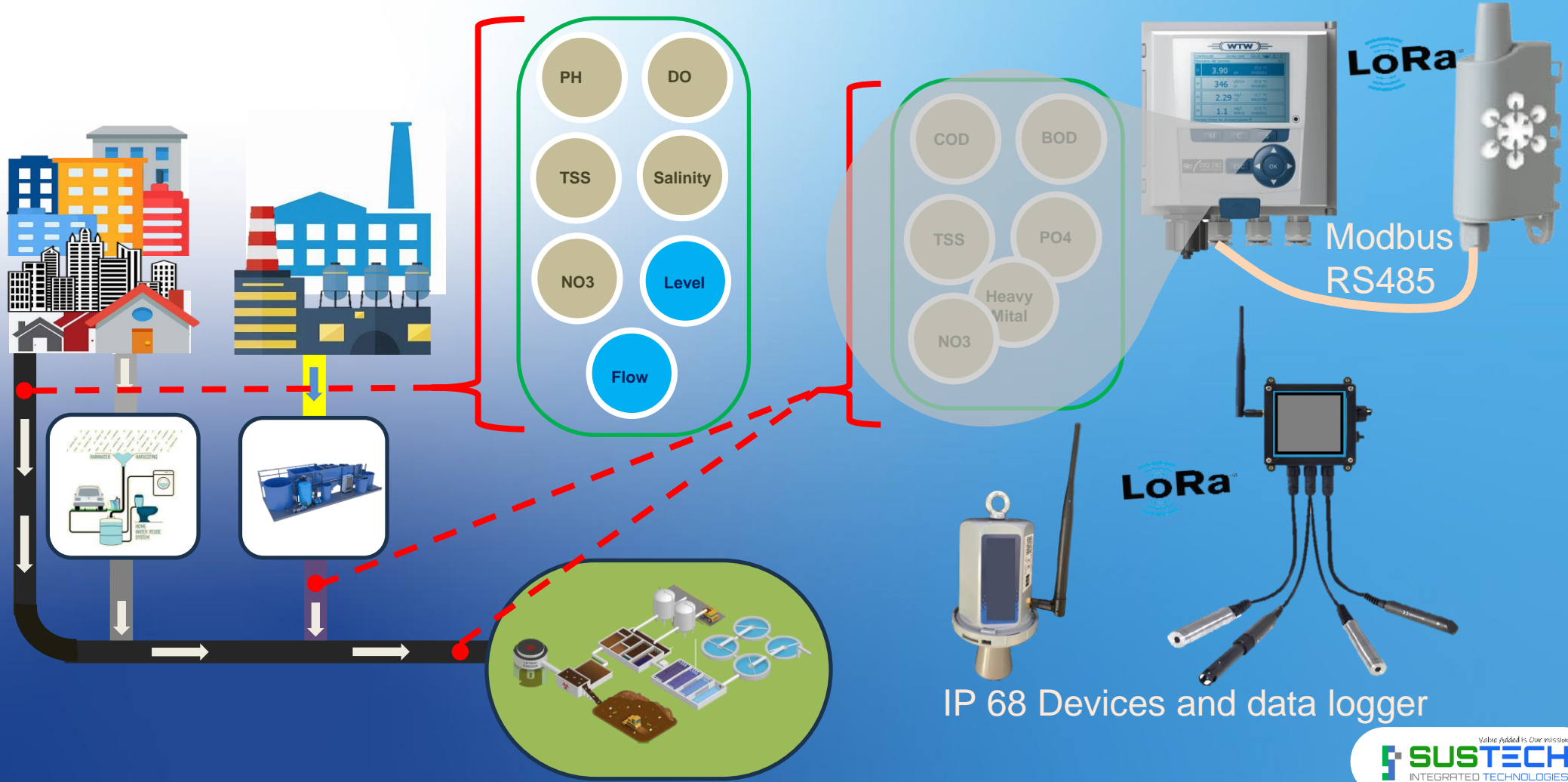
Water Storage Reservoir



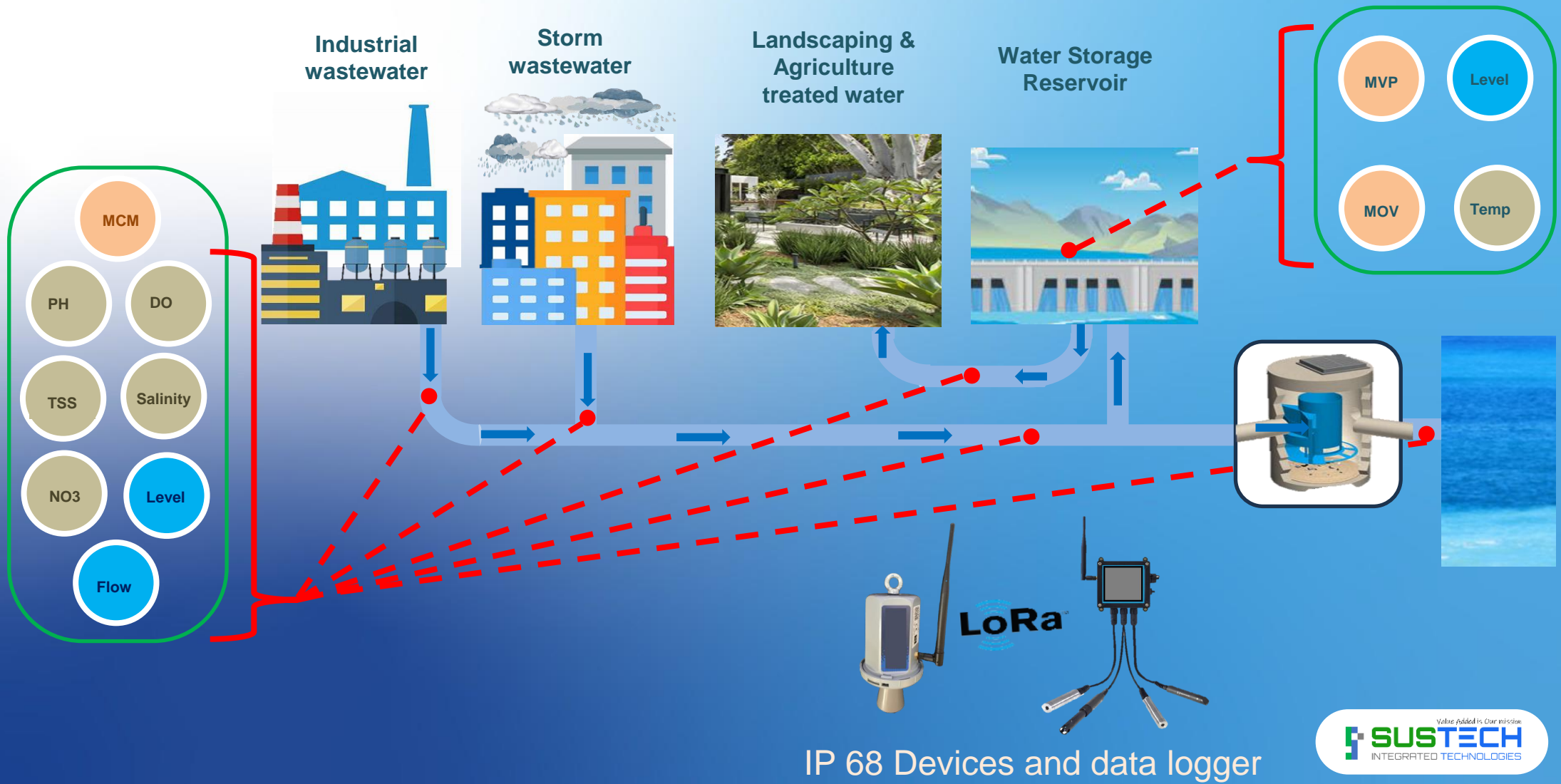
Offshore & Harbor



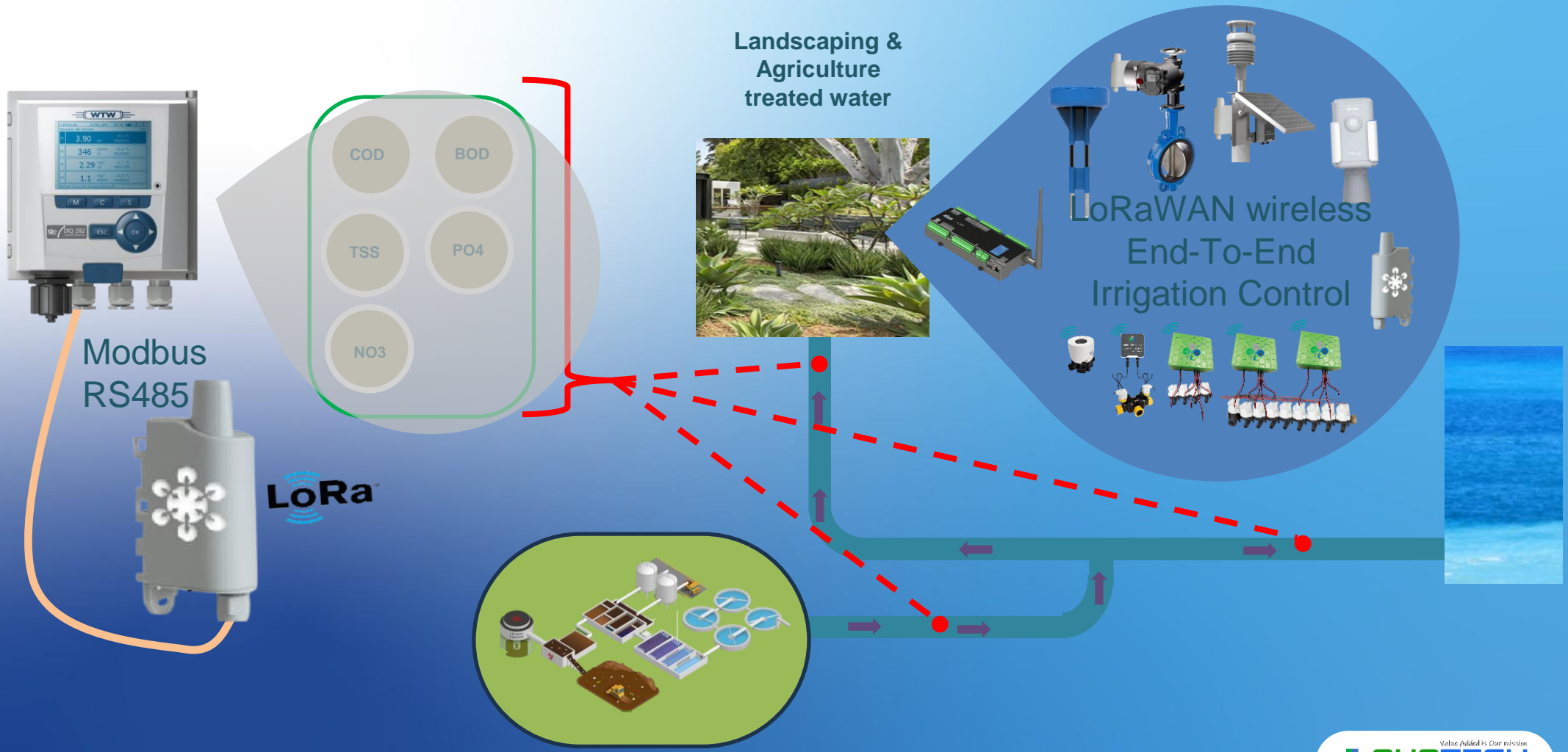
7.1 - Domestic and Industrial Use case



7.2 - Storm wastewater Use Cases

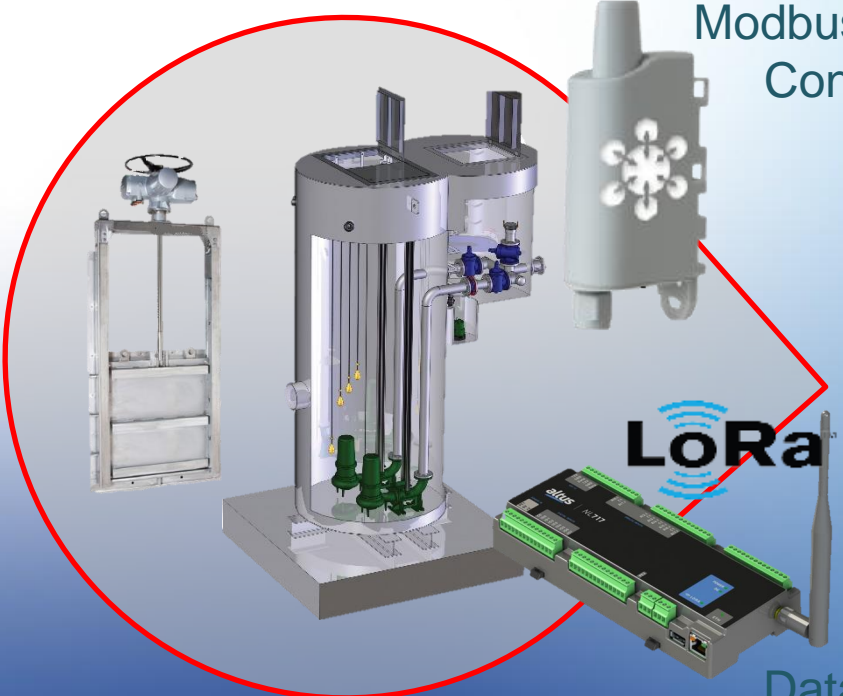


7.3 - Treated wastewater for reuse in Agriculture & Landscaping



7.4 - Wastewater Lifting station and Penstock

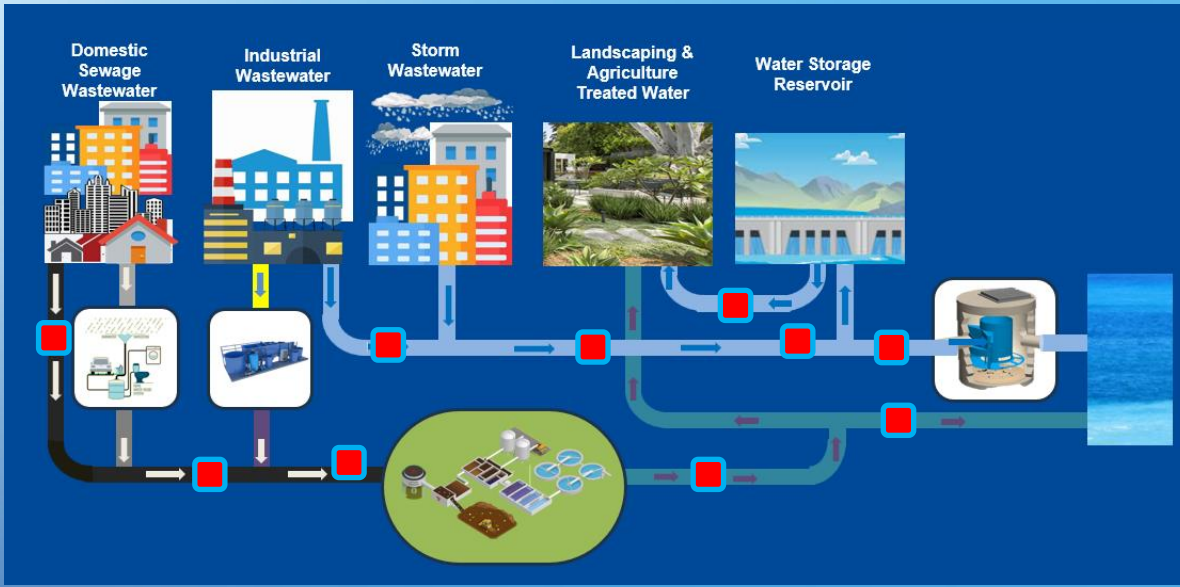
Modbus to LoRa Converter



LoRa

Data Logger & I/O LoRa Device

- MOV
- MCP
- Vibration
- Current



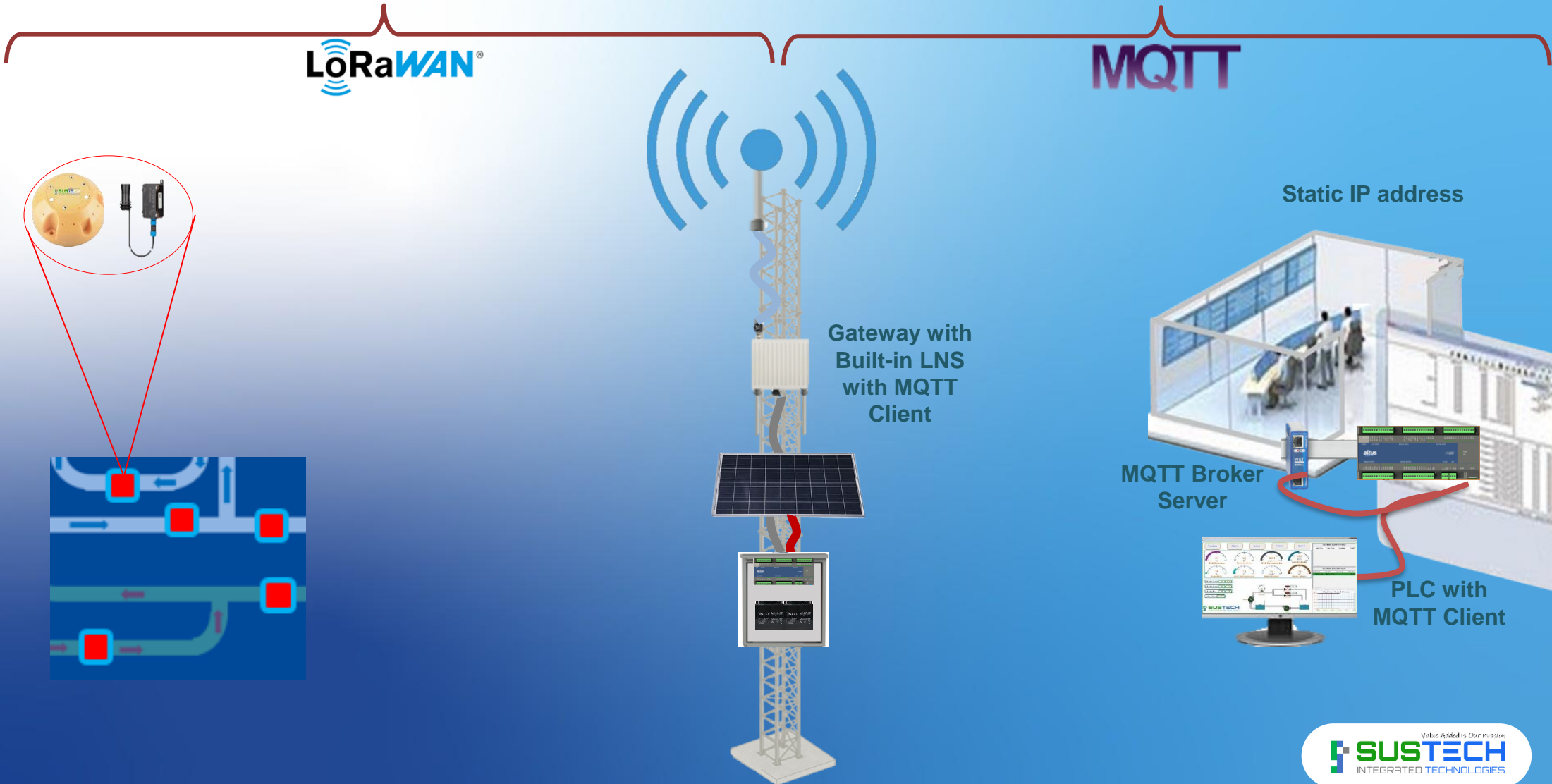
7.5 - Wastewater from Ship, Offshore & Dredging



7.6 - Wastewater Reuse in Landscaping and Irrigation Based on LoRaWAN



7.6 - Wastewater Manhole cover monitoring "MCM" Based on LoRaWAN



8.0 - Key Benefits of Our Solution

8.1 - Selecting the Right Device for the Application

Data collected with the right instrumentation is crucial for effective and efficient wastewater management



Different Lora Devices

LoRa I/O
Devices

LoRa Datalogger
device

Modbus to LoRa
Converter device

8.2 - Helping to achieve the maturity level

The objective is to provide solutions to end users to help them achieve

1

REMOTE OPERATION MONITORING

- Fast and effective Problem-solving
- Fast Design Making
- Optimizing and efficient operation

2

REMOTE OPERATION CONTROL

- Remote monitoring and control
- Agile decision making
- Minimize human involvement

3

UNMANNED OPERATION

- Digital Twin integrates with PCS
- AI & ML integrate into PCS
- Analytics and Control



- Main Office in Masdar – UAE
- Abu Dhabi Office - UAE
- Backoffice support – Manila
- Backoffice support – Jordan

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