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Let's Solve Water

Sludge Level Monitoring with the WTW IFL Sensor

Dr Tao Su, Nitin, Zhao Li

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Today's Topics

1. Background
2. What is the Xylem Solution
3. How IFL works
4. Application cases

House Keeping

☐ We are recording!

☐ Ask your question at any time in the "question" section of your Zoom screen

☐ All questions will be answered at the end of the webinar

☐ A link to the recording will be shared in a follow up email

Profiles

Presenter: Dr. Tao Su

Responsible for product sales and promotion of WTW online products throughout North Asia. Dr. Tao has been with Xylem for 5 years and has a PhD in Environmental Sciences from the University of Tokyo.

Presenter: Nitin Marchareddi

Nitin graduated as a Mechanical Engineer and has been associated with instrumentation for 25 years. He has been with Xylem for 10 years and works closely with customers to understand their applications and find solutions to the challenges they face.

Presenter: Zhao Li (Cindy)

Cindy has a Master's degree in water treatment from Stanford University and has been in the industry for more than 16 years. Cindy joined the Xylem team last year as the product director of the analytical product line in Xylem across Asia, Australia, the Middle East, and Africa.
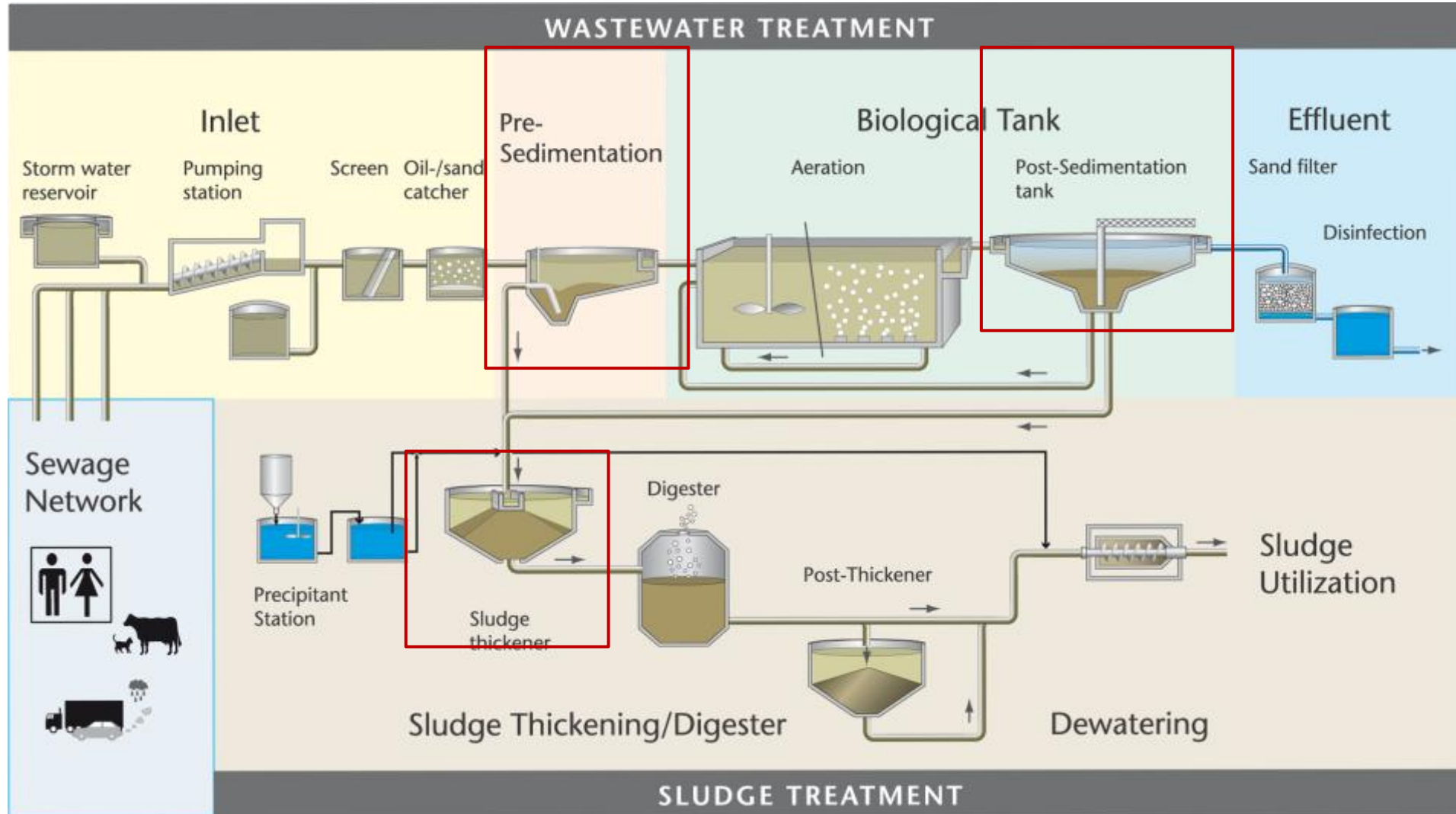
Why Sludge Level Measurement Is Necessary?

Principle of biological wastewater treatment
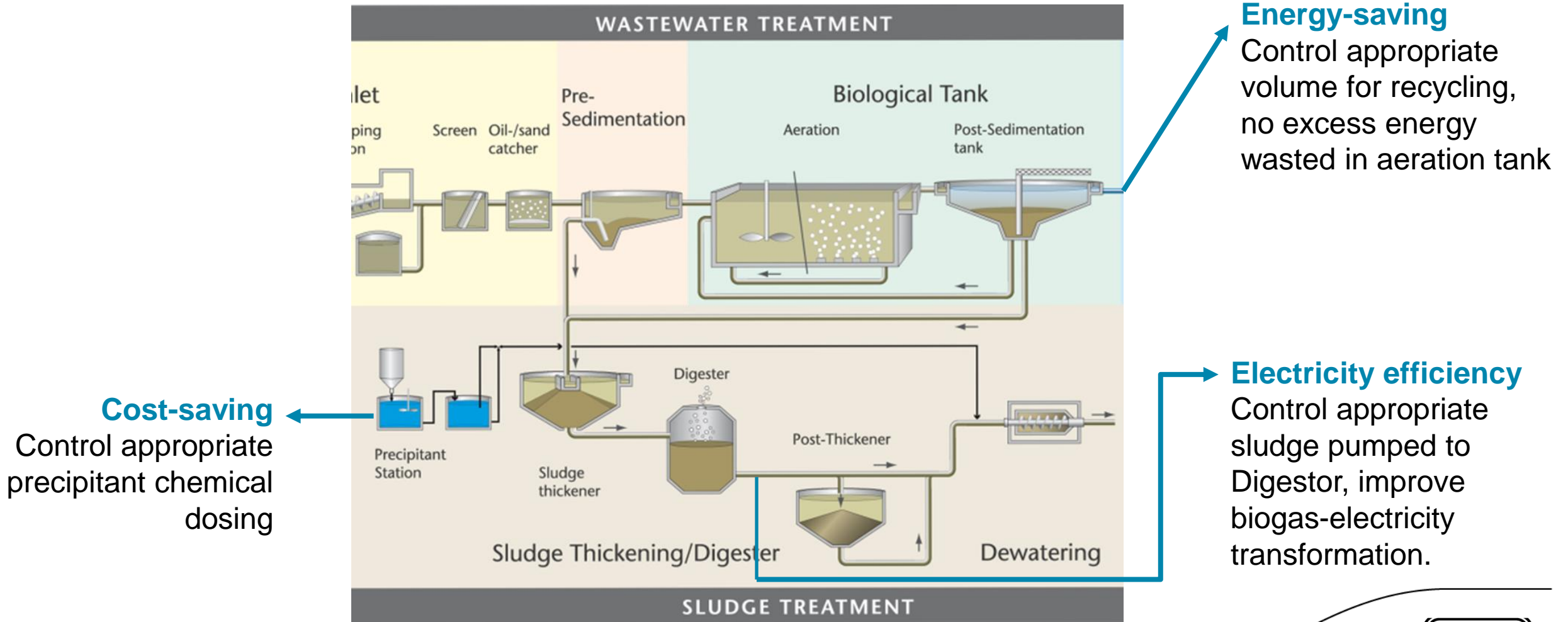
New activated sludge will Increase everyday!!

$$\text{Organic material} + O_2 + NH_3 + PO_4 \xrightarrow{\text{Microorganisms}} \text{New cells} + CO_2 + H_2O$$

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Where Sludge Levels Need to be Checked

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Why Sludge Level Measurement is Necessary

Necessary to maintain the process working

Energy-saving
Control appropriate volume for recycling, no excess energy wasted in aeration tank

Cost-saving
Control appropriate precipitant chemical dosing

Electricity efficiency
Control appropriate sludge pumped to Digestor, improve biogas-electricity transformation.

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Poll Question #1

? What method are you using to measure sludge level in your process?

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Old Measurement Method

Sludge Judge, visible depth

- Manually, Troublesome

- More deviation, human error

- Unaccurate, Measurement is influenced by light and pipe

Xylem Solution: IFL Sensor

InterF**ace L**evel Measurement

Features

- Intelligent signal processing results in more reliable readings

- Ready-to-go with simple system configuration

- Contact-free and maintenance-free cleaning system with automatic adjustment of cleaning intervals

- Detailed display of echo profile for visualization and maximum user benefit

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Measurement Principle

Ultrasonic waves transmitted by the ultrasonic transducer are reflected by layers (sludge blanket or bottom of the basin), and then received again.

Based on the reflection intervals, the distance between the levels and the ultrasonic transducer is determined.
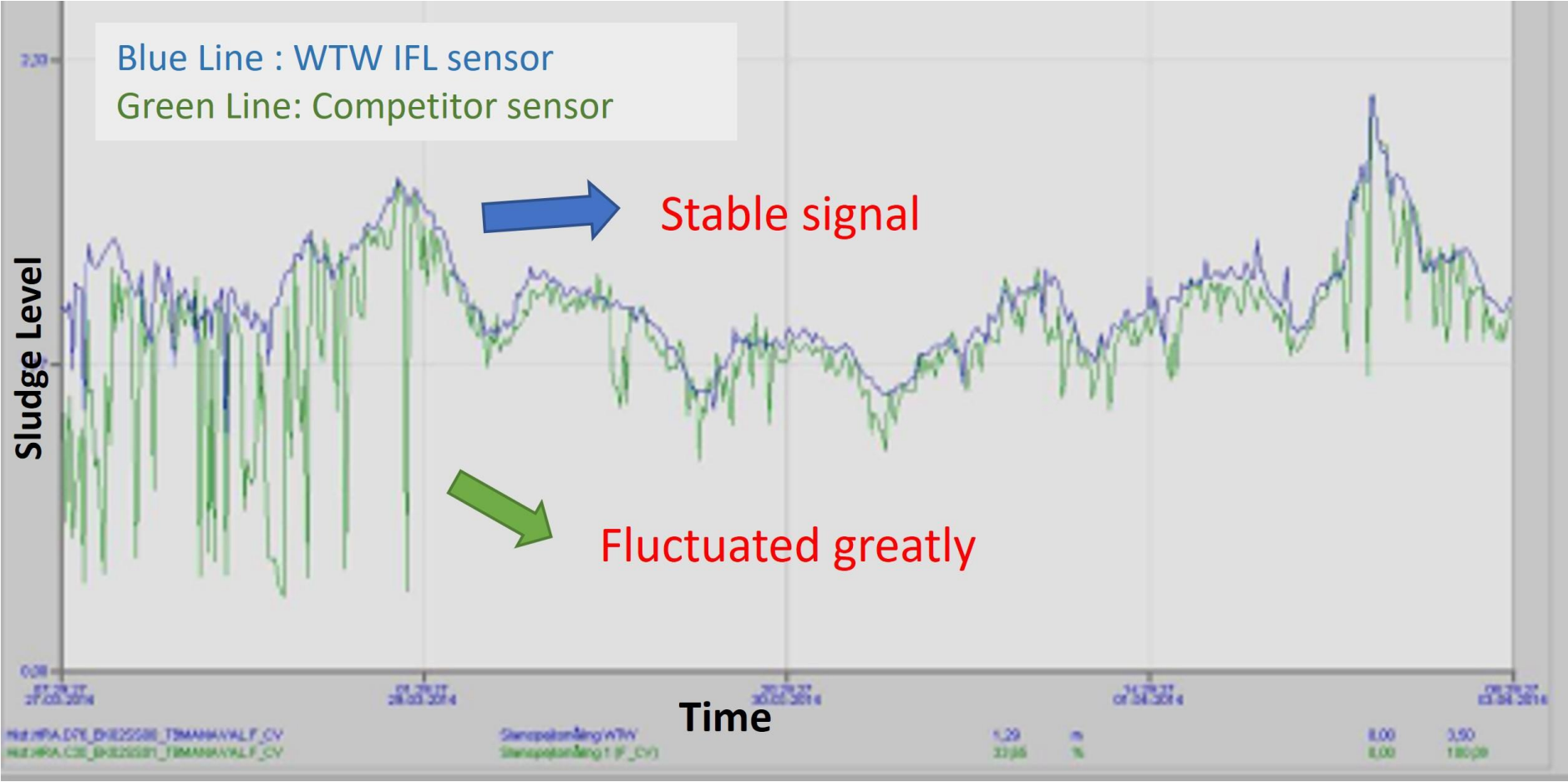
Sludge level = Distance3 – Distance2
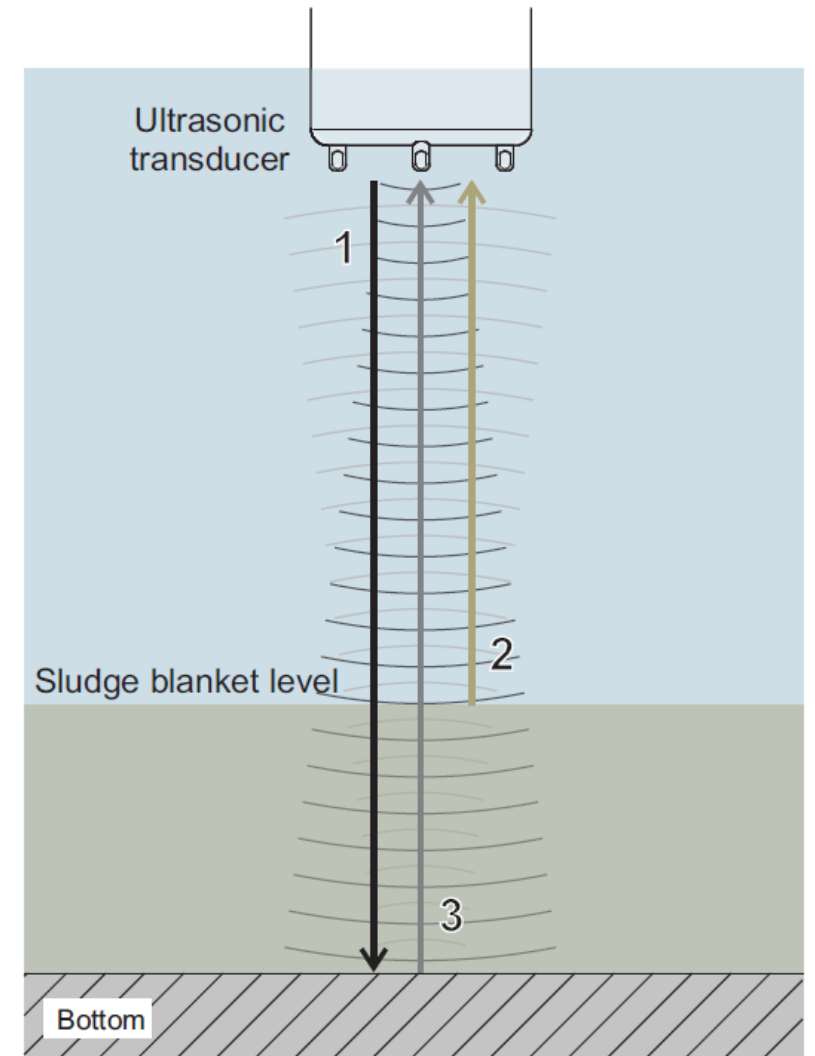
Advantage 1: Reliable

Intelligent signal processing results in more reliable readings: Filtering out of undesired signals caused by floating sludge, obstacles or moving skimmers

| Original Signal | → | Signal Processing | → | Result |

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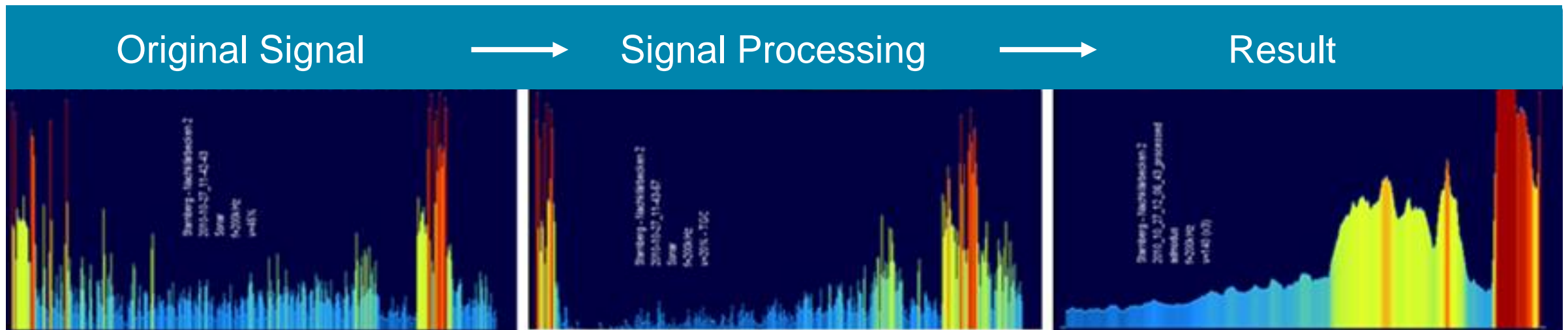
Comparison

IFL 700 IQ senor is much more reliable and stable compared with our competitor.

Blue Line : WTW IFL sensor
Green Line: Competitor sensor

Sludge Level

Stable signal

Fluctuated greatly

Time

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Advantage 2: Simple

Calibration-free
(Factory Calibrated)

→ ready-to-go

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Advantage 3: Easy

Contact-free and maintenance-free cleaning system with automatic adjustment of cleaning intervals

Maintenance free scraper

• Triple sealing

• High-quality materials (Titanium)

• No moving parts

• Maintenance-free operation

→ **no spare parts!**

• No influence of bubbles

• Removal of algae layers

(Smaller layers of grease or algae do not interfere)

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Advantage 4: Visible
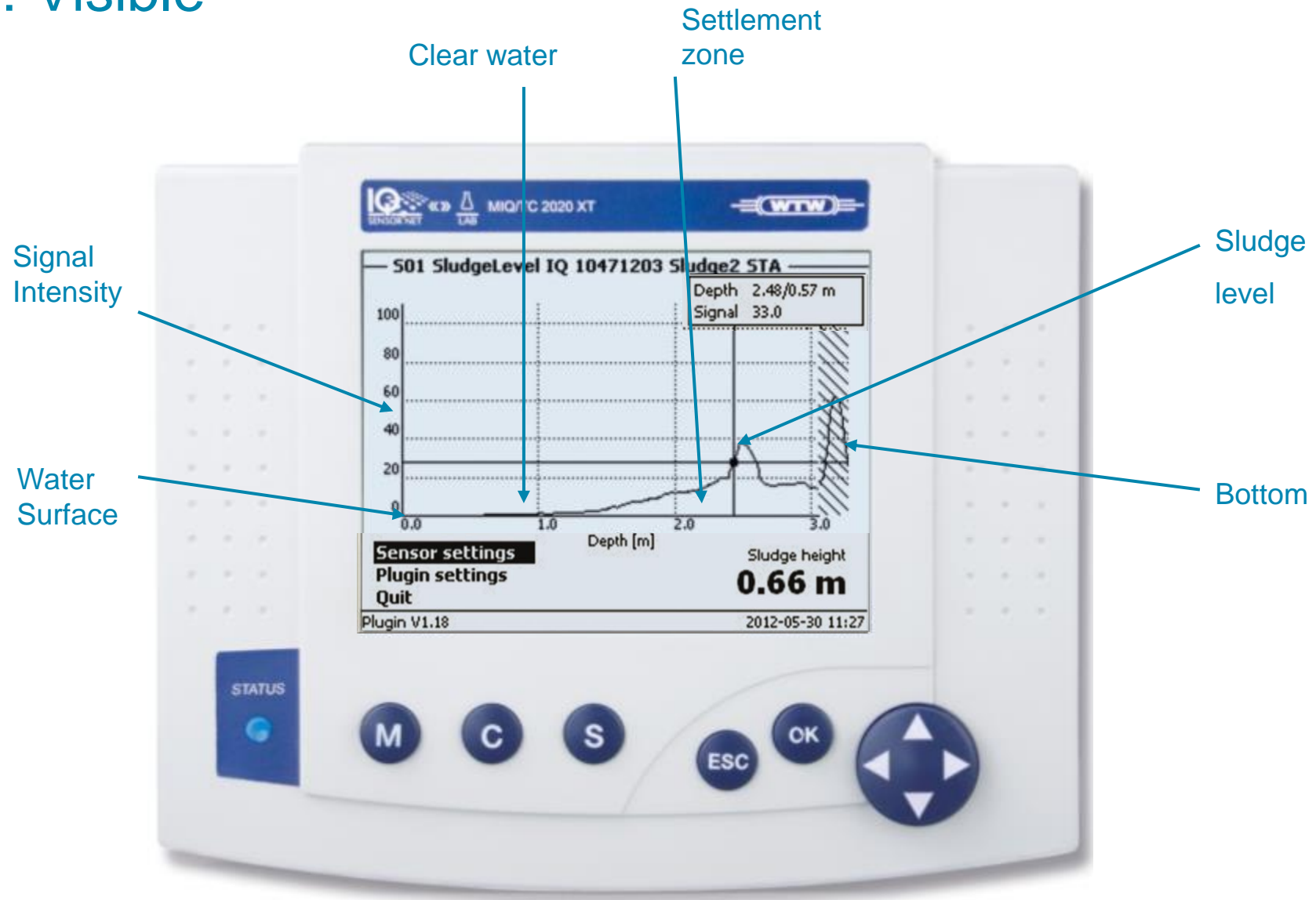
Detailed display of echo profile for visualization

? What is your key issue in sludge level monitoring?

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Application 1 (Chongqing Drinking Water Plant, China)

The raw water is taken from upstream of the Chongqing River Basin of the Yangtze River. Coagulation and sedimentation tanks are used to remove suspended solids in the raw water.

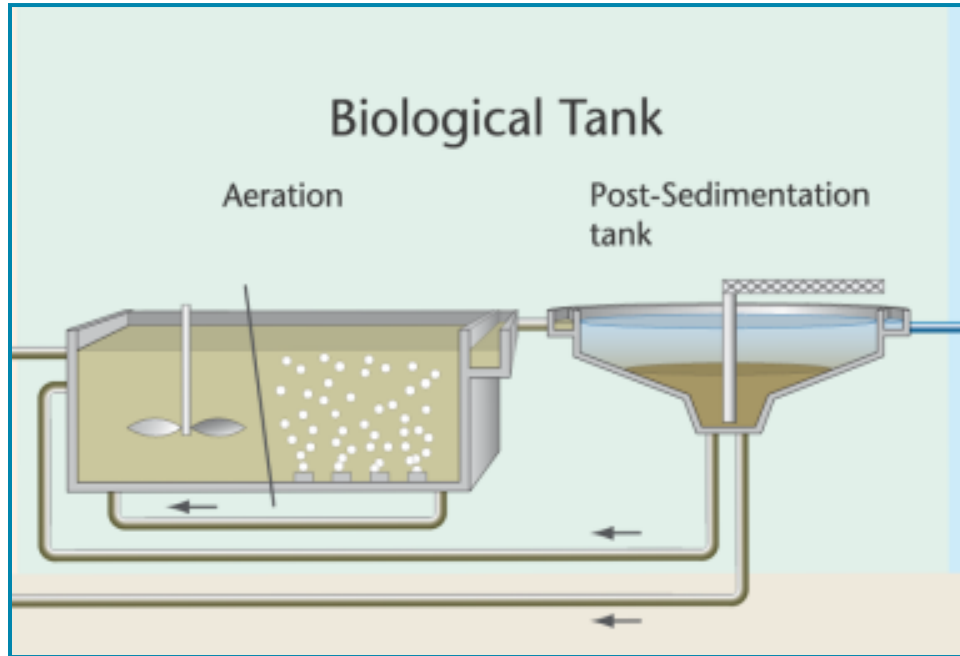Process of Coagulation sediment tank

Poly Aluminum Chloride → Add PAC

Raw water → Reaction → Transition → Sediment →
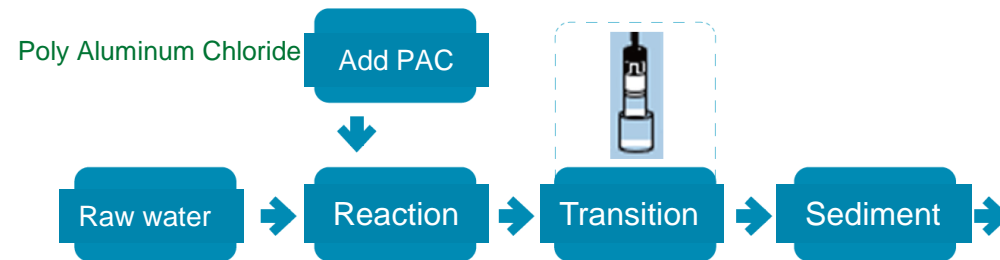
Customer problem
PAC has to be added based on Staff experience.

Xylem Solution
IFL sensor introduced for automatically and preciously measurement

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Application 2 (Beijing WWTP, China)

Process

Settlement tank

Customer problem
Sludge level checked by TSS meter twice/d, troublesome.

Xylem Solution
IFL sensor introduced for automatic and precise measurement.

Results

Sludge level measured automatically and with high consistency with old method, in addition, no calibration and maintenance satisfied the customer.
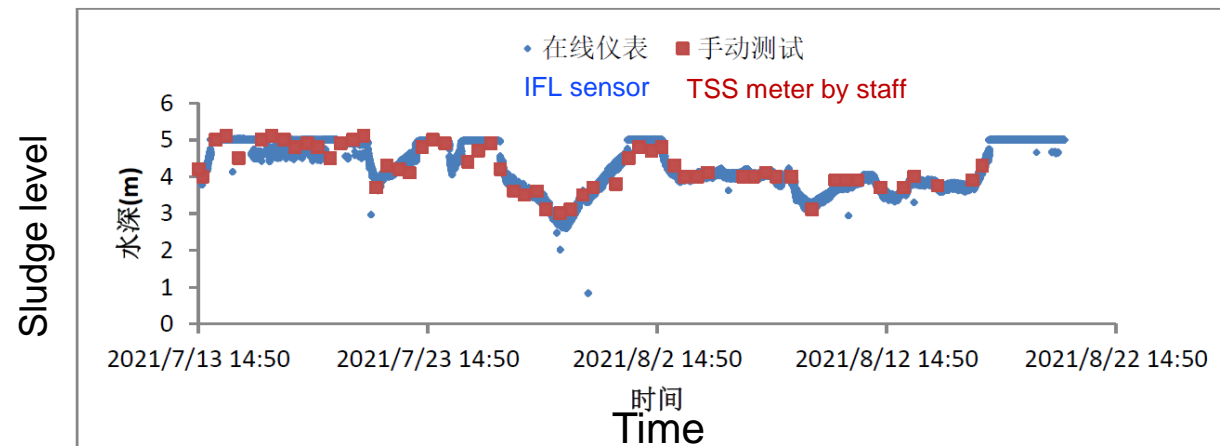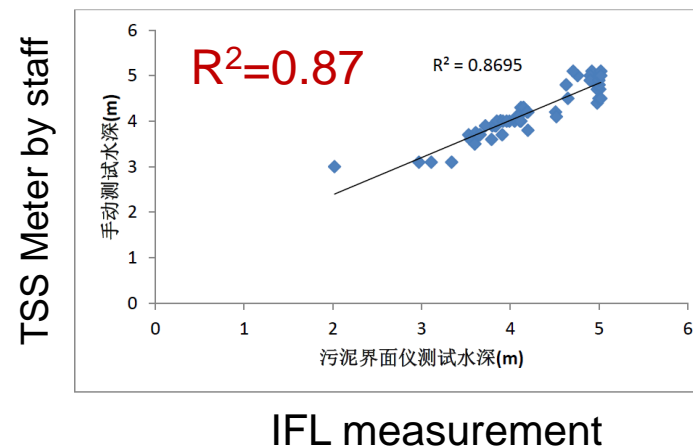

图 1 在线传感器与手动污泥界面测试结果

Application 3 (Eastern Denmark WWTP)

Customer problem

Difficult for a continuous sludge level measurement rotating scraper bridges

- Mounting on the edge of the tank:
Affected by obstacle and not the ideal location

- Mounting on the edge of the tank:
Connection to a central controller or even the PLC is difficult.

Xylem Solution

Radio connection copes with all these challenges: ideal measuring location on the bridge, connection to an existing controller and therefore easy integration to the PLC.
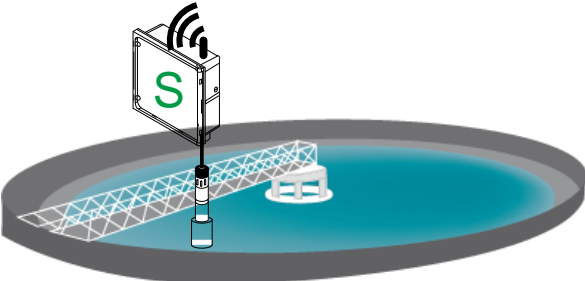

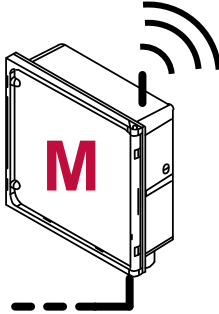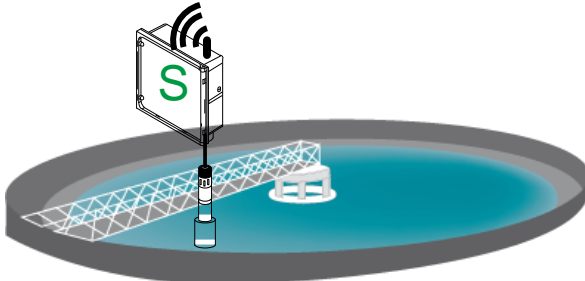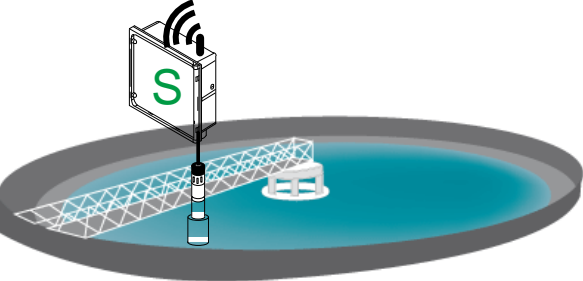Fig. 1: Aerial image of the plant in Denmark

Installation Details
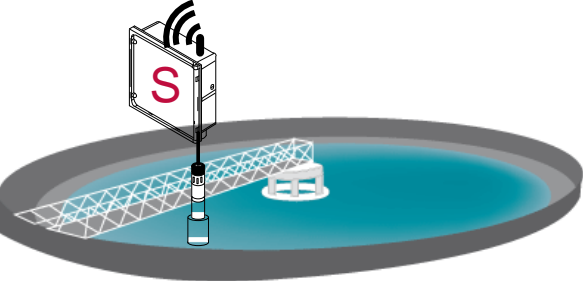
Starter Set
MIQ/WL PS SET

M: Master
S: Slave

Extension Unit
MIQ/WL PS

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Results

The operator was excited not only by the easy extension, but also that there was no need to run additional fieldbus cables. The data is transferred to the controller of the IQ Sensor Net and further on to the PLC by radio connections and already existing modules, respectively.
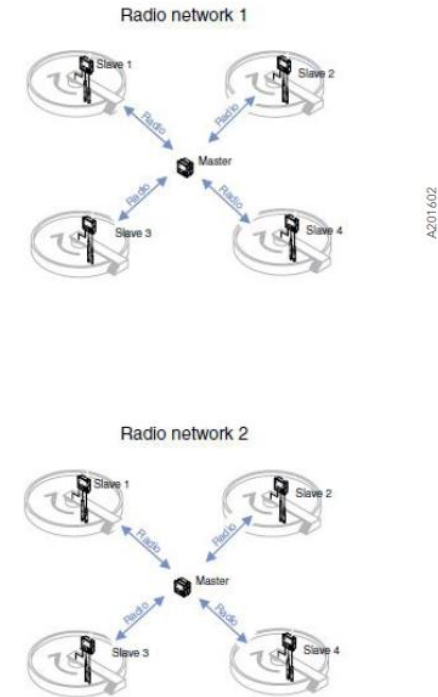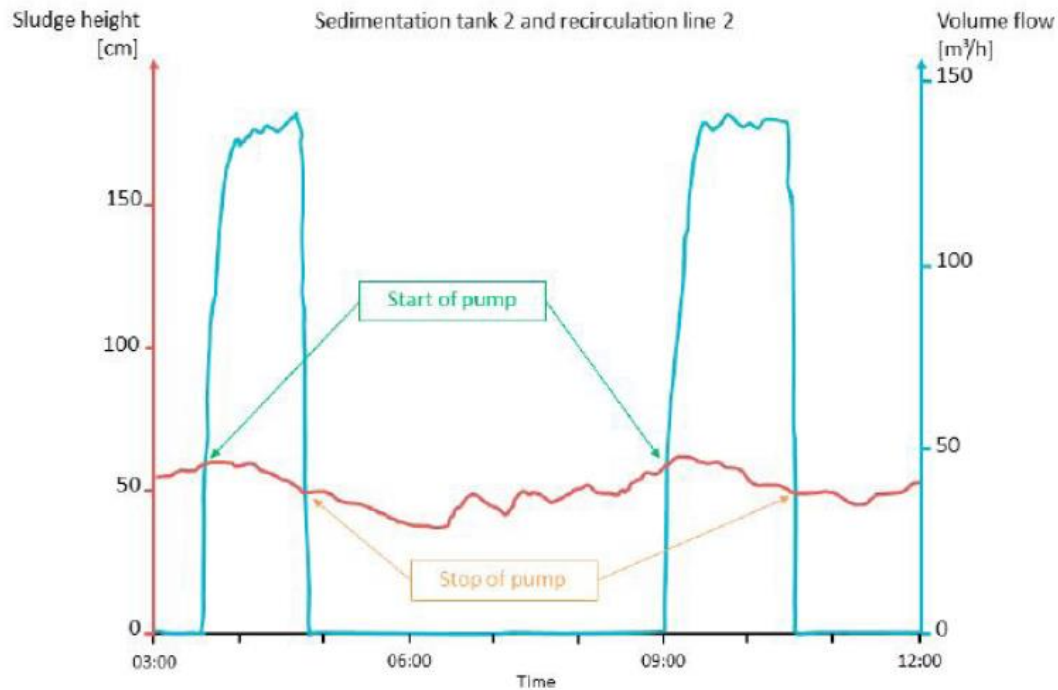

Fig. 4: Set up of two radio networks with one master and four slaves each

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Application in South Korea and Japan

Xylem Solution

IFL sensor introduced for automatic and precise measurement

South Korea Suwon WWTP

Japan WWTP

Special Application (Coal Thickening Pool in ShangXi, China)

The slime thickening tank of the coal washing plant relies on the gravity sedimentation of coal particles in the water flow of the slime water system to achieve the purpose of collecting slime.
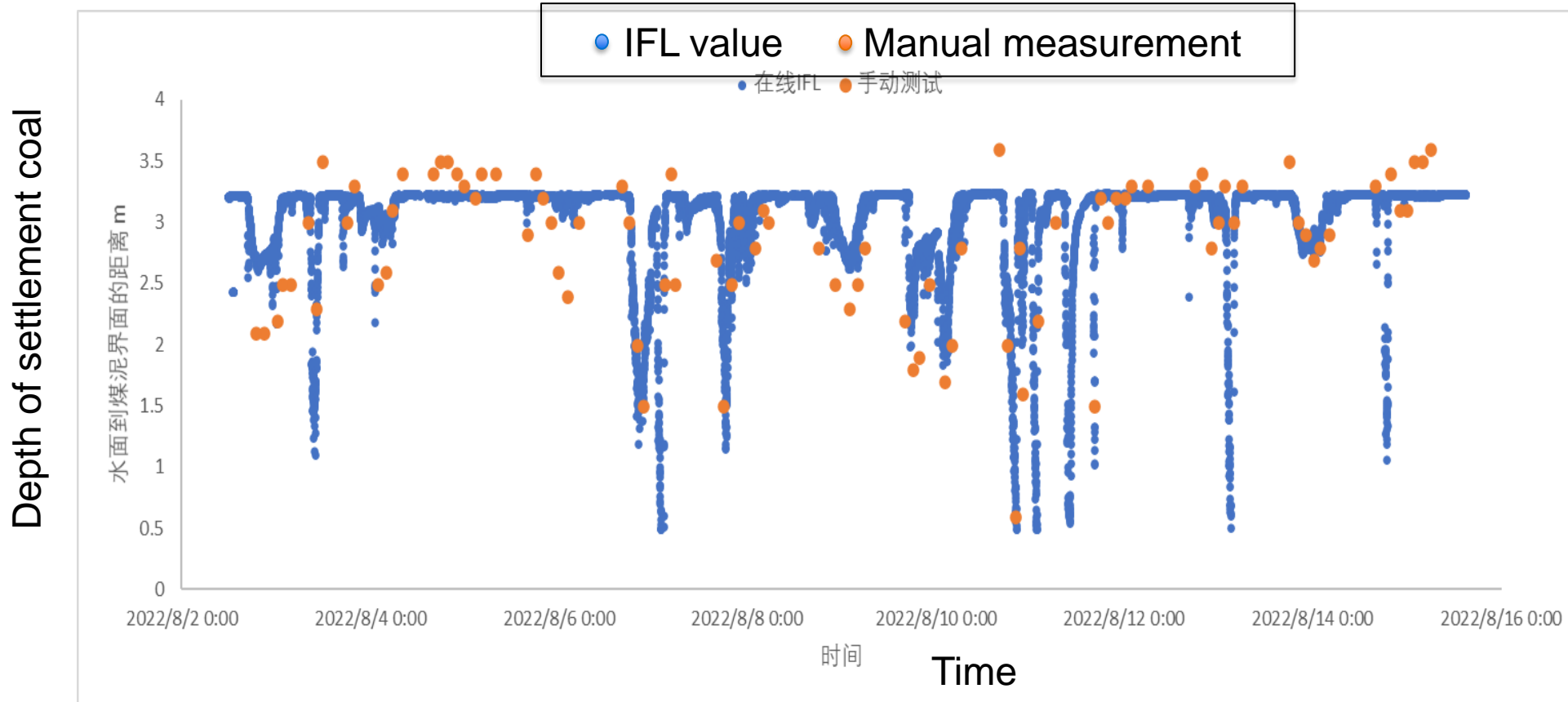

Customer problem
Slime level measured per hour, hard for staff especially in the night.

Xylem Solution
IFL sensor introduced for automatic and precise measurement.

Results

IFL 700 IQ value is in good agreement with the manual test data, in addition, free-maintanence and free-calibration helped the customer to save cost.

Poll Question # 3

? Would you like a WTW product specialist to contact you with more information?

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Questions?

CONTACT US

**An email will be sent out in the next few days that will include a link to the recording

Dr. Tao Su
Product Manager Process and Treatment Sales
tao.su@xylem.com

Xylem General Information
info.em@xylem.com

www.xylem.com | **www.wtw.com**