



Ministry of the Environment
Japan



 **PT. Artha Envirotama**
Water & Wastewater Treatment Specialist

JANUS

Synergistic JCM Feasibility Project to introduce an energy-creating wastewater treatment system to the Citarum River in Indonesia

AIKEN KAKOKI K.K.

PT. Artha Envirotama

JAPAN NUS CO., LTD.



Project target area

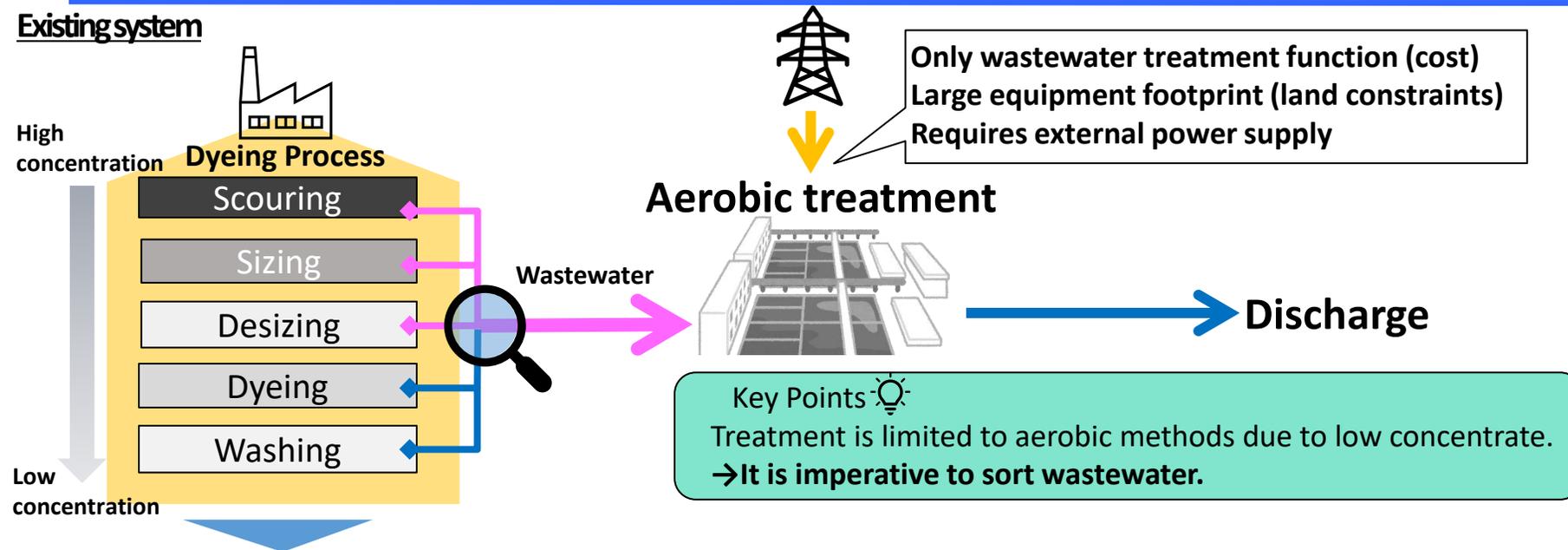
- Many **textile dyeing factories** are concentrated along the Citarum river, **causing serious water pollution** due to untreated wastewater.
 - This project targets wastewater from textile dyeing factories.
 - We aim to assess the application of **Japanese technologies for both water treatment and energy generation** in the Citarum River area.
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Synergistic achievement of Dyeing Wastewater Purification and Decarbonisation – How?

Characteristics of dyeing wastewater and proposed application methods

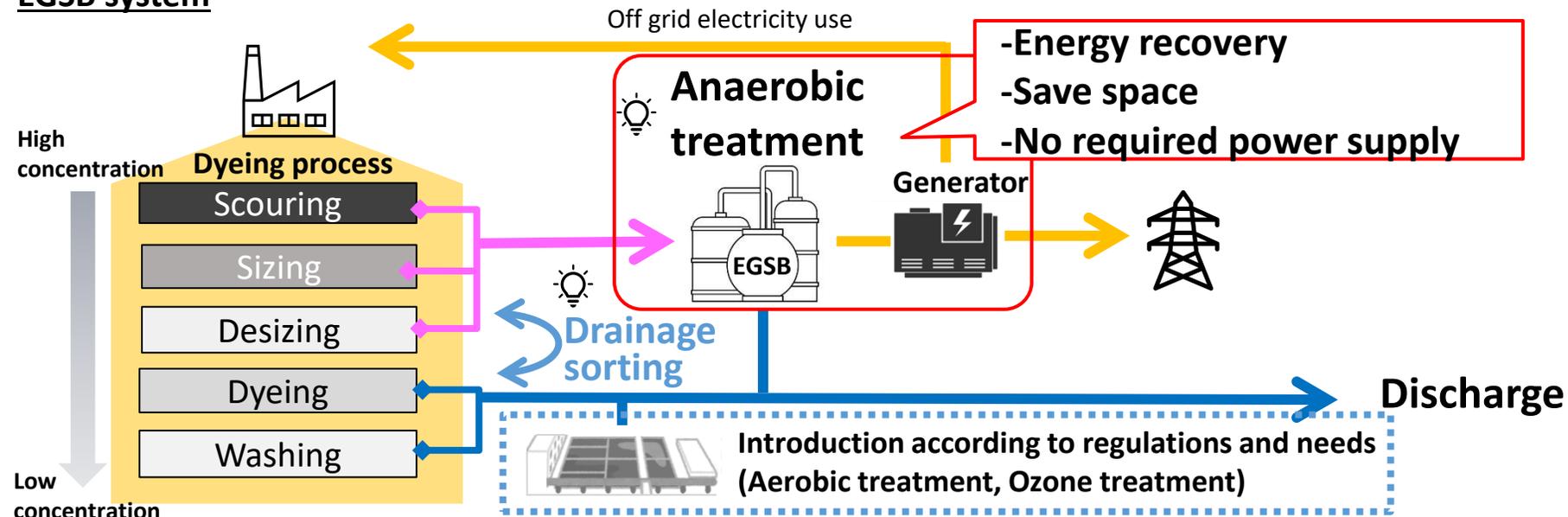
Existing system



【Process Water Characteristics】

Dyeing Process	Characteristics
Scouring	High COD Difficult to decompose
Sizing	High COD、Contains difficult-to-decompose substances
Desizing	Ideal
Dyeing	Low COD、Difficult to decompose

EGSB system

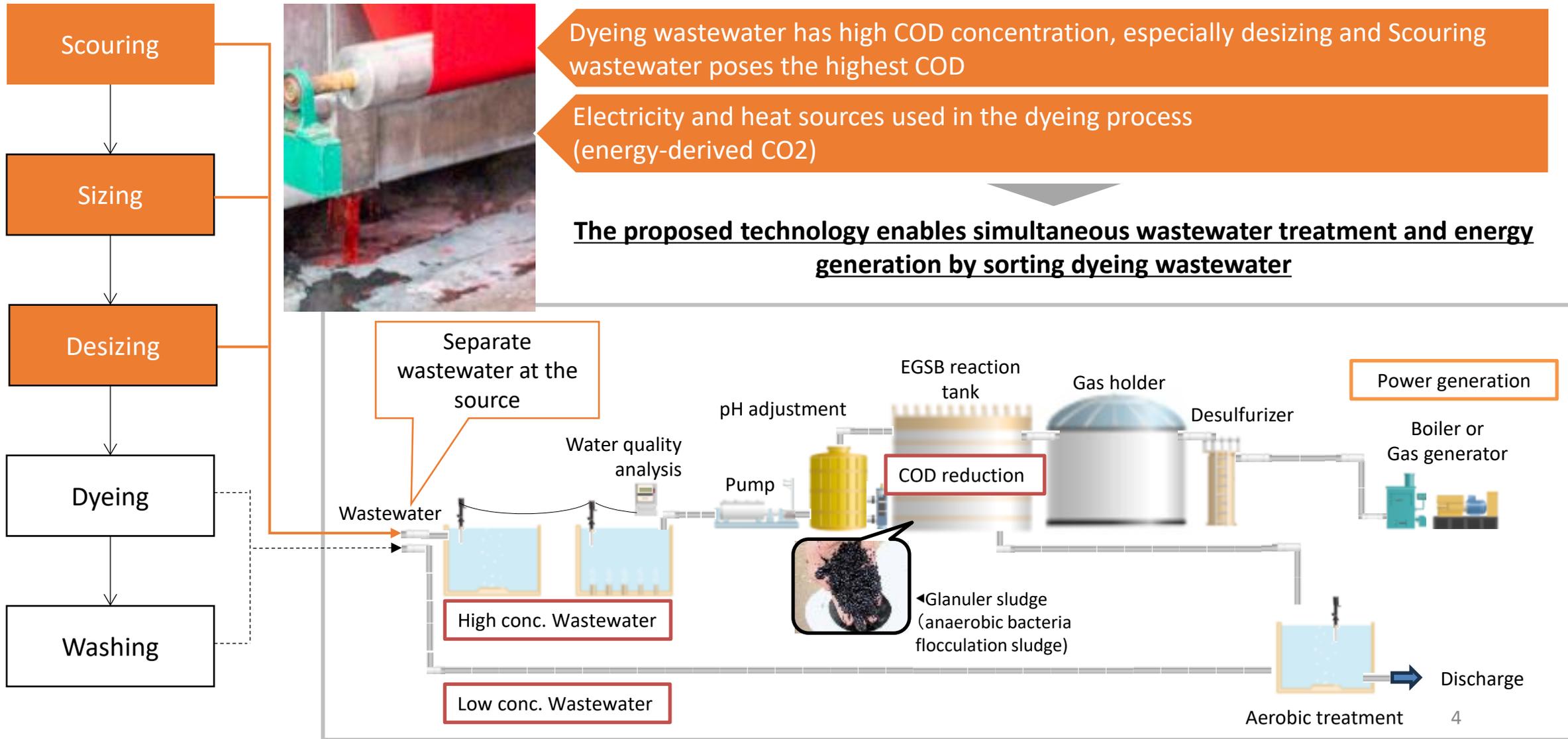


【EGSB system】

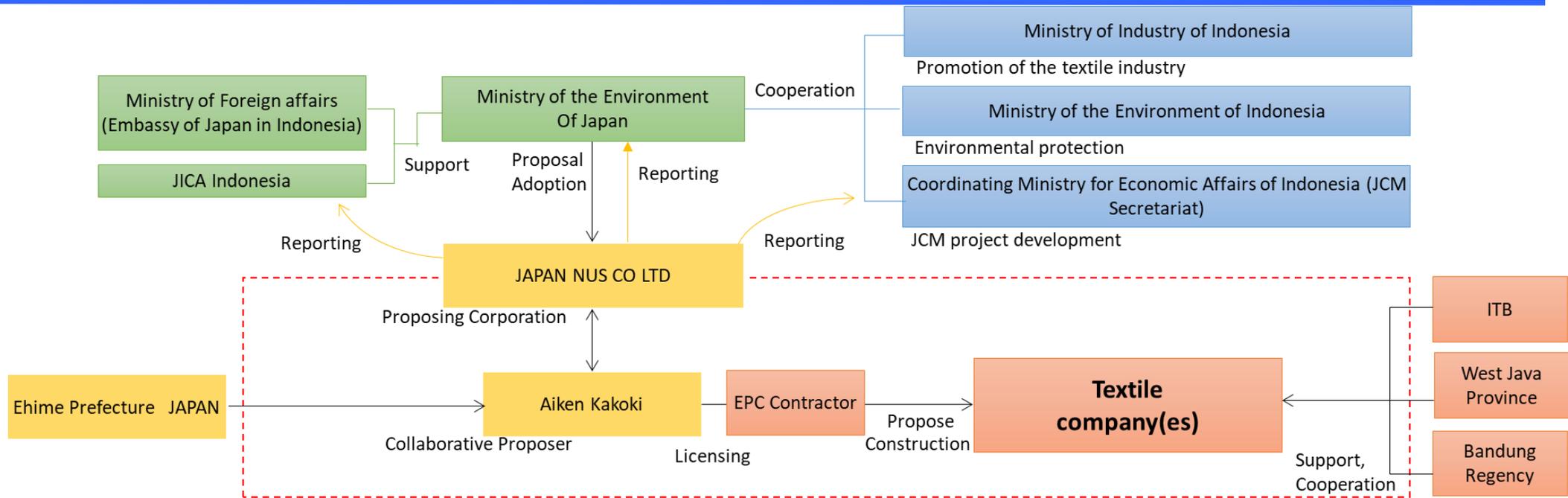
- By sorting wastewater and applying EGSB treatment to high-concentration effluent, energy recovery efficiency is maximized.
- A system achieving a net-zero or negative energy balance across the entire wastewater treatment process has been developed.
- Patent applications filed in Japan, PCT, and Indonesia.

Characteristics of dyeing wastewater and proposed application methods

One example of process flow for dyeing factory



Structure of F/S stage



Introduction of APAN NUS CO LTD

JGC Holdings

- Engineering business
 - Oil and Gas — JGC Global
 - Infrastructure — JGC Global
 - EPC & maintenance For Japan — JGC Japan
- Functional materials manufacturing
 - Catalysts — JGC Catalyst Chemicals
 - Fine Chemicals — JGC Catalyst Chemicals
 - Fine ceramics — Japan fine ceramics
- Consulting business
 - Energy and Environment — Japan NUS

Business field

> Energy transition



LNG
Offshore
Renewable energy
Nuclear energy

CCS
Hydrogen/Ammonia
Petro/gas chemical
CCS

> Circular economy and Health care



Waste gasification chemical recycling
Waste plastic oiled chemical recycling
Polyester chemical recycling
Sustainable aviation fuel(SAF)

Health care/Life science

> Infrastructure



City development
Airport
Agriculture

Transportation
Water treatment
Smart factory

Technology provider-Aiken Kakoki - Company profile

【Company name】 Aiken Kakoki K.K. (Matsuyama-city, Ehime-Pref. Japan)

※The world's most stringent wastewater regulations (Seto Inland Sea, Ise Bay, Tokyo Bay)

【Business contents】 EPC of various types of water treatment (Engineering, Procurement, Construction) business

【Main technology】 Energy recovery (Wastewater•Waste material) 、 Water recycle 、 DX (AI/IoT) etc.

【Sales record 】 40 years since establishment、 Over 500 business experiences to factories, National project etc.



Feasibility study



Basic design



EPC



Operation management

Conceptual Project Schemes

【Ministry of the Environment Government of Japan & INDONESIA Gov.】



➤ **Technical transfer**



 **PT. Artha Envirotama**
Water & Wastewater Treatment Specialist

- Providing
 - Core parts
 - know-how
- Construction
 - SV
- Services
 - Training
 - Operation (IoT)



- Sales activity
- Design & Construction
- **Operation & Maintenance**

«IoT System»





Established in 2000, Headquartered in Indonesia

Engineering Procurement Construction

- Water Treatment
- Waste Water Treatment
- Renewable Energy



>100 Employees

SERVICES

- Consultation Design
- Operation & Maintenance
- Technical Plant Audit
- Spare part & Consumable supply

INVESTMENT

- Capital Investment
- Equity Investment
- BOO. BOT



Successfull 100+ projects

PROJECT EXPERIENCE



WWTP
(Partnership with Aiken Kakoki)
0,16 MLD Hotel
Bali



Drinking Water
2x61 MLD Industrial Estate
Owned by JV Sembcorp – SG
And Jababeka - Indonesia



Waste to Energy
Generate Biogas 2 MW
Cargill USA



Waste to Energy
(Partnership with Kubota Japan)
Generate Biogas 2 MW in 3 location
RGE Group



Recycle Water
2x41 MLD Industrial Estate
Owned by Sinarmas land – Indonesia
and Sojitz Corporation - Japan



Drinking Water
2x1,8 MLD (36 Locations)
Government Project

Facts on Aiken's business



【Indonesia】

- ✓ Constructed WWTP for a hotel in Bali (wastewater recycle)
- ✓ Holds patent related to energy recovery through WWTS
- ✓ Conducted projects:
 - KLHK-MOEJ project (POME)
 - Demonstration Project on EGSB with JICA (POME)
 - Gorontalo-Ehime project (MOEJ Management)
- ✓ Invited key persons to Japan for learning EGSB
 - KLHK, Lampung Univ, PTPN7, APPLI, BRIN
- ✓ Partners: water EPC company



【Japan】

- ✓ Constructed more than 20 EGSB plants for food and textile factories, hold 10% share of EGSB in Japan.
- ✓ Holds patent related to energy recovery through wastewater treatment



【other countries】



【China】



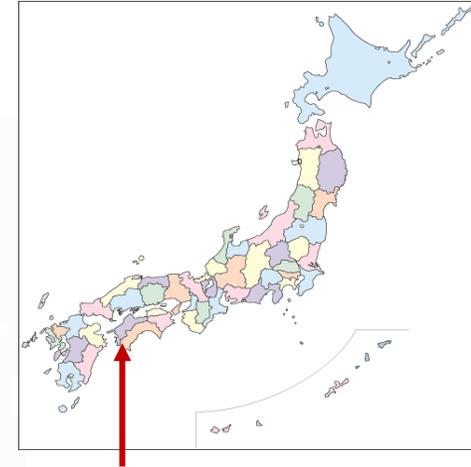
【Vietnam】



【Netherlands】

Background

《Japan (Imabari city, Ehime Pref.)》



- Issues of the largest towel producing area in Japan
[Treatment of biomass-based dyed colored wastewater]
- Dyeing colored wastewater [Outside the rules of the Law Enforcement Order]
- Conventional treatment and physical processing are [high in operating cost]

Imabari is the largest producer of towel in Japan.

《Indonesia (Bandung)》

- Since 2015, survey at the dyeing factory in Indonesian, invitation to Japan, and inspection under the support of JETRO and APPLI
- Opinion exchange meeting between the Governor of Ehime Pref and the Minister of KLHK



"Economical and realistic treatment for dyeing colored wastewater (including operating costs)" is a common issue

Energy recovery from Wastewater (EGSB : Expanded Granular Sludge Bed)

Overview

- ✓ Approximately 20 years of handling
- ✓ Compared to Lagoons · Covered lagoons · Activated sludge · Membrane bioreactor, stable treatment of high-concentration WW and highly efficient energy recovery are possible.

Technology

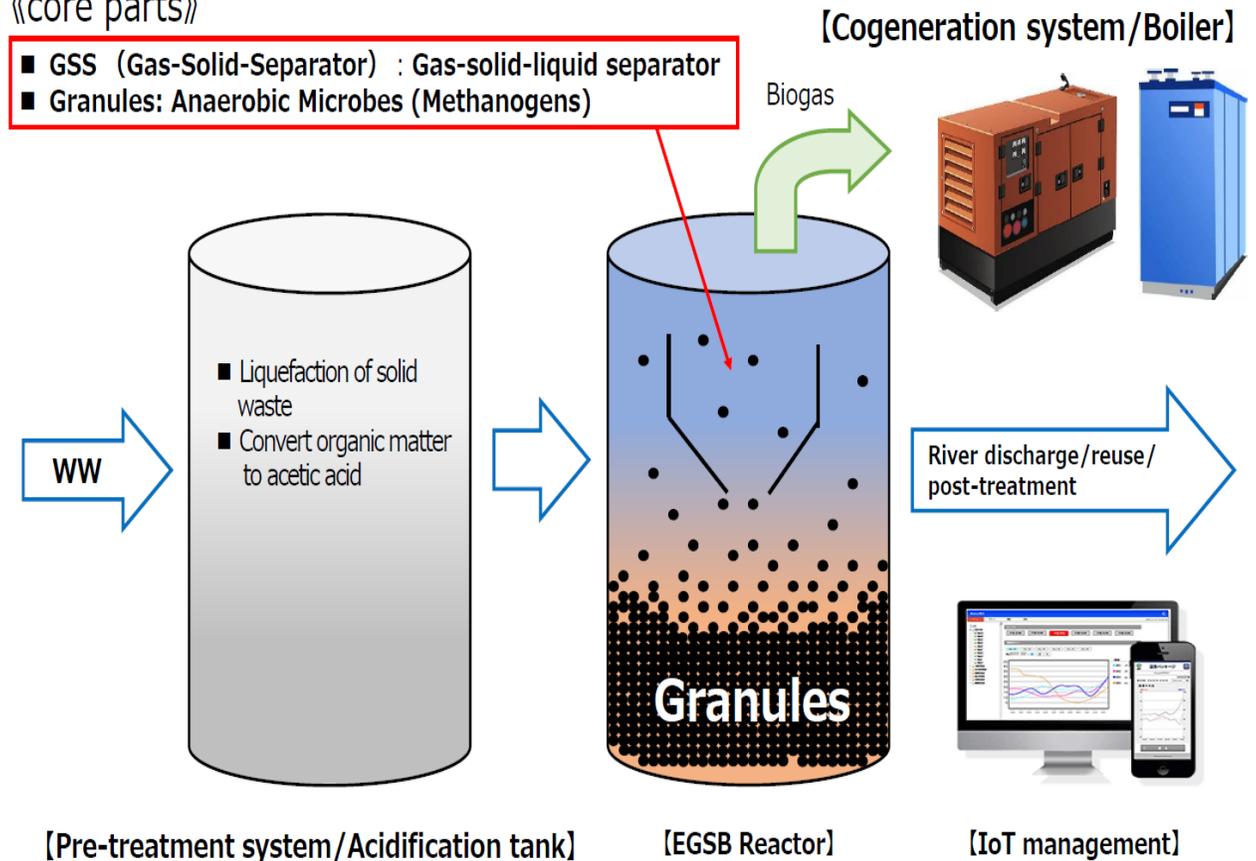
- ✓ Our product targeting palm oil industry uses EGSB method, suite for treatment of high-concentrated effluent like Textile WW with recovering biogas.
- ✓ In our domestic records, EGSB method performs 80-90% COD reduction, recovering biogas containing 80% or more CH₄, making a profit with biogas.
- ✓ In addition to EGSB, we have broad technologies for water treatment.



<<Granular sludge>>

《core parts》

- GSS (Gas-Solid-Separator) : Gas-solid-liquid separator
- Granules: Anaerobic Microbes (Methanogens)



AIKEN's Track Record of EGSB

⇒ **First delivery in 2005, more than 20 units delivery in Japan (10% share in Japan)**

	Capacity	Influent	Effluent	Removal	Recovered energy	Factory
	(m3/day)	COD (mg/l)	COD (mg/l)	%	(kWh/day)	
①	600	5,800	580	90	3,740	Agricultural
②	1,000	8,000	1,200	85	8,120	Textile
③	600	3,500	450	87	2,181	Noodle soup
④	600	3,600	360	90	2,176	side dish production



【Reference】 ※1 JPY = 130 IDR

The operating cost, which was 18,272,785,500 IDR (140,559,888 JPY) annually before the introduction, but profit of 4,263,649,950 IDR (32,797,307 JPY) is obtained after the introduction.

➤ As a result, the investment was **recovered in about two years** due to the **economic effect of about 24,363,714,000 IDR (187,413,184 JPY) per year.**

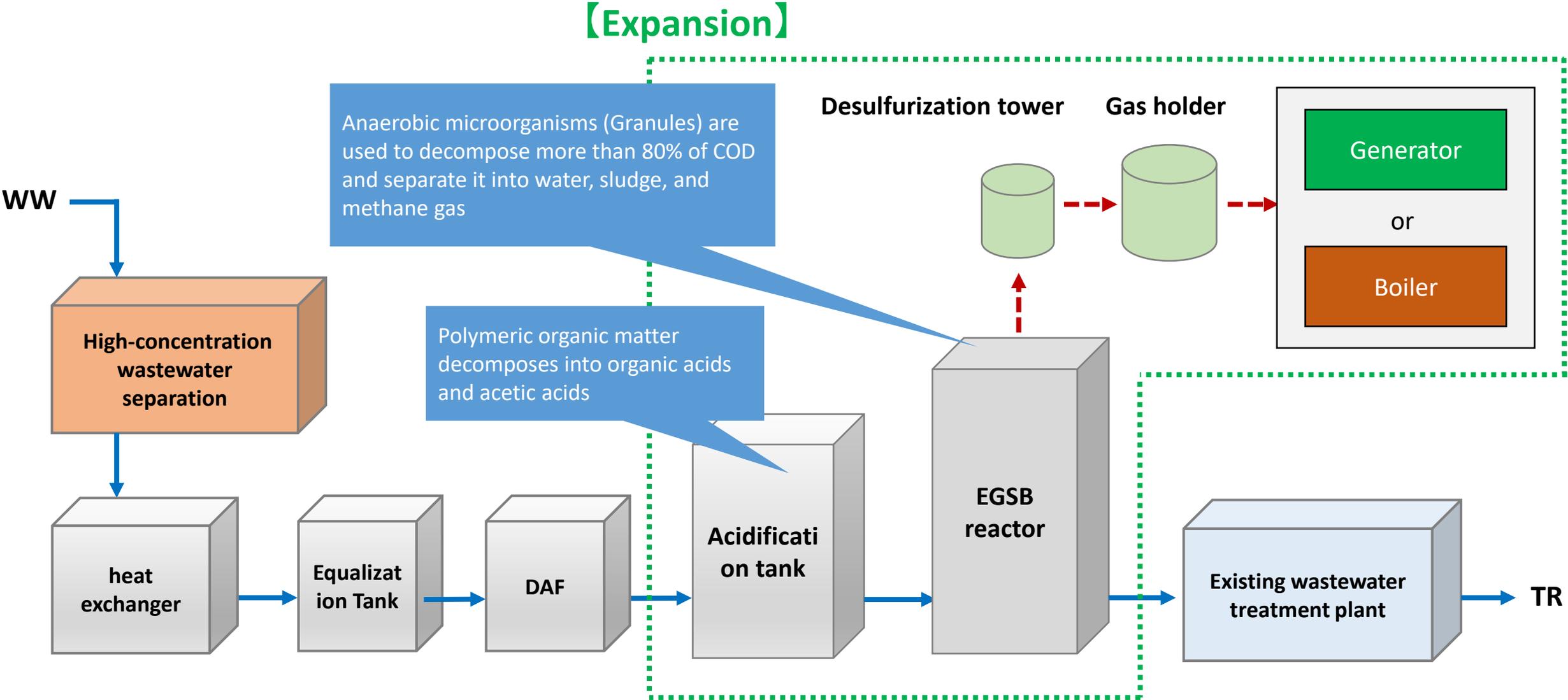
Result of the field survey

- Visited candidate factories in Bandung, conducted technical presentations and interviews
- **Confirmed the feasibility of introducing Aiken Kakoki's EGSB at several factories**
- Conducted assessments of existing wastewater treatment facilities, energy usage status, and wastewater analysis



D. SAMPLING POINTS				
No	Point	Location	Process Type	Documentation
1	Total influent	(checked)	Continuous	
2	Pretreatment effluent	(checked)	Continuous	
3	Desizing effluent	(checked)	Occasional	
4	Scouring effluent	(checked)	Occasional	
5	Washing effluent	(checked)	Continuous	
6	Dyeing effluent	(checked)	Continuous	

Wastewater Treatment System Solutions by EGSB (Net zero energy type)



For factories: Expected Outcomes

【Design Conditions】

Wastewater (m ³ /d)	COD		
	Influent	Removal	Removed
	(mg/l)	(%)	(kg/d)
360	9,257	80	2,666

- Electric power generation from COD.
- Power generation reduces CO2 emissions by eliminating the need for equipment power and surplus power.

- ✓ The above COD value is the energy target COD
- ✓ The influent raw water COD is **XXXXX mg/l**

WWT with EGSB				Existing factory	
Generated CH ₄		Req. Power	(a)-(b)	Include WWTP	(c-d)
CH ₄ Nm ³ /d	kWh/d (a) ※	kWh/d (b)	kWh/d (c)	kva/d (d)	kWh/d
682	2,171	496	1,675		

※Equivalent electricity at power generation efficiency of 32%

- With the installation of EGSB, the entire plant can be powered, and an additional **YYYY kWh/d** of surplus electricity can be generated.

Overview of the implementation procedure

