

# Business Development in Sewage Treatment in India

**TOSHIBA**

Toshiba Water Solutions Private Limited  
January 13<sup>th</sup>, 2023

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Organic Wastewater Treatment

# 01

## **Company Profile**

# 1-1 Toshiba Group

## Toshiba Corporation

❖ Establishment	July 1875
❖ Headquarters	Minato-ku, Tokyo, Japan
❖ Employees (Consolidated)	Approx.116,224 (as of 31, March, 2022)
❖ Net Sales (Consolidated)	¥ 3,337 billion (as of 31, March 2022)

**Energy Business Domain**

Toshiba Energy Systems & Solutions Corporation



**Social Infrastructure Business Domain**

- Toshiba Infrastructure Systems & Solutions Corporation
- Toshiba Tec Corporation
- Toshiba Elevator And Building Systems Corporation
- Toshiba Lighting & Technology Corporation
- Toshiba Carrier Corporation

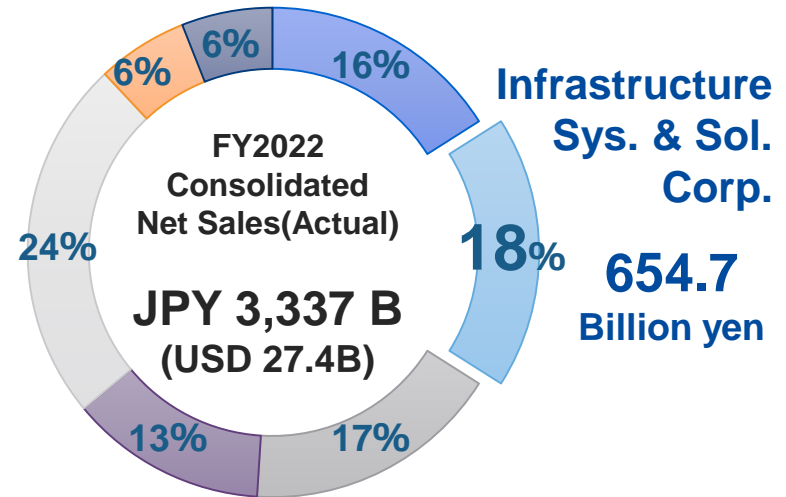


**Electronic Devices Business Domain**

Toshiba Electronic Devices & Storage Corporation

**Digital Solutions Business Domain**

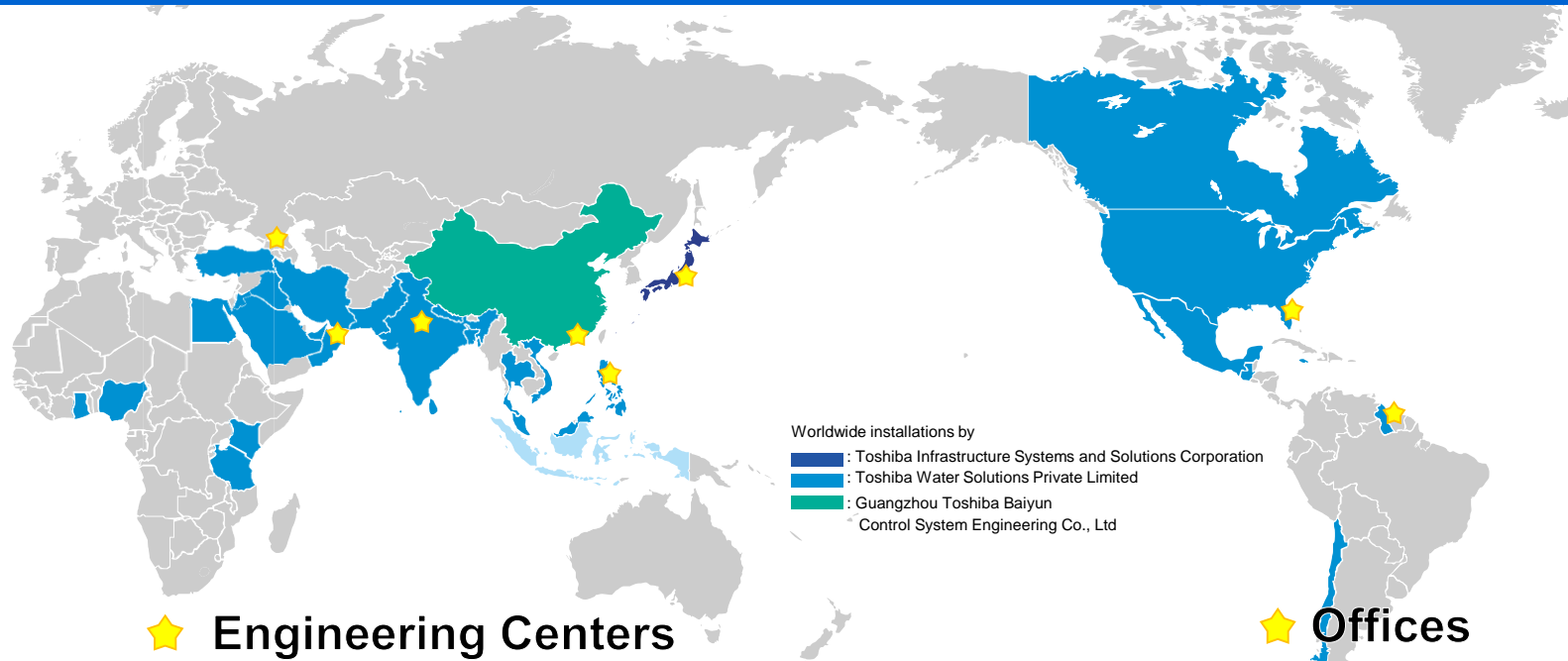
Toshiba Digital Solutions Corporation



■ Energy ■ Infra. ■ Building ■ Printing ■ Device ■ Digital ■ Others

# 1-2 Water & Environmental Business Global Reach

Approx. 4,000 employees across the world  
Project experience in more than 35 countries



Toshiba Infrastructure Systems & Solutions Corporation



Main Business : Electrical System Integration  
EPC of Industrial WWTP

Kawasaki-shi, Kanagawa, 212-8585, Japan  
Tel: +81-44-331-0811

Toshiba Water Solutions Private Limited



Main Business : EPC and O&M of ETP and WWTP

4th Floor, Pioneer Urban Square, Tower-D,  
Sector-62, Gurgaon – 122 102, Haryana, INDIA  
Tel: +91-124-6447000

Toshiba Water Solutions Private Limited (OMAN BRANCH)



Main Business : EPC and O&M of ETP and WWTP

CR No. 11209181  
PO Box-378, Postal Coe-325  
Al Batinah-Liwa, Sultanate of Oman  
Tel: +968-9947-2479

Toshiba Water Solutions America Inc.



Main Business : EPC and O&M of ETP and WWTP

2054 Vista Parkway, Suite 400  
West Palm Beach, FL 33409 USA  
Tel: +1-561-633 3553

Guangzhou Toshiba Baiyun Control System Engineering Co., Ltd



Main Business : Electrical System Integration  
EPC of WTP & WWTP

18, Daling Nan Lu, Industrial District Shenshan Town,  
Baiyun District, Guangzhou, P.R. China  
Tel:+86-20-2626-1282

Toshiba Water Solutions Private Limited (Georgia BRANCH)



Main Business : EPC and O&M of ETP and WWTP

Toshiba Water Solutions Private Limited (Philippine BRANCH)



Main Business : EPC and O&M of ETP and WWTP

19/F Panorama Tower 34<sup>th</sup> Street corner Lane A Bonifacio Global City Taguig City 1634 , Philippines  
Tel: +63-2-819 1048

Toshiba Water Solutions America Inc. (Guyana BRANCH)



Main Business : EPC and O&M of ETP and WWTP

Toshiba Water Solutions America Inc. (Trinidad & Tobago Branch)



Main Business : EPC and O&M of ETP and WWTP

22 Crawford Street, Vistabella San Fernando, Trinidad, WEST INDIES  
Tel: +1-868-652-9713

# 1-3 Toshiba Water Solutions

❖ <b>Company Name:</b>	<b>Toshiba Water Solutions Private Limited</b>
❖ <b>Established:</b>	<b>1973 USA (1977 Trinidad &amp;Tobago / 1983 India)</b>
❖ <b>Managing Director:</b>	<b>Hiroaki KOBAYASHI (CMD)</b>
❖ <b>Head Office:</b>	<b>New Delhi</b>
❖ <b>Offices:</b>	<b>USA (Florida), Trinidad &amp; Tobago Oman, Philippine, Georgia</b>
❖ <b>Capital:</b>	<b>Toshiba 100%</b>
❖ <b>No. of Employees:</b>	<b>Approx. 700</b>
❖ <b>Main Business:</b>	<b>EPC, O&amp;M Service for Municipal and Industrial Water Treatment System</b>
❖ <b>Achievements:</b>	<b>More than 400 Water and Wastewater Treatment Plants in 50 countries</b>

# 02

## **Ozonation System - TOSHIBA TGOGS™**

# 2-1 What is OZONE for?

## for Drinking water treatment



- Improvement of odor, taste, color
- Disinfection
- Reduction of organic compounds
- **Reduction of trihalomethanes (THMs) precursor**

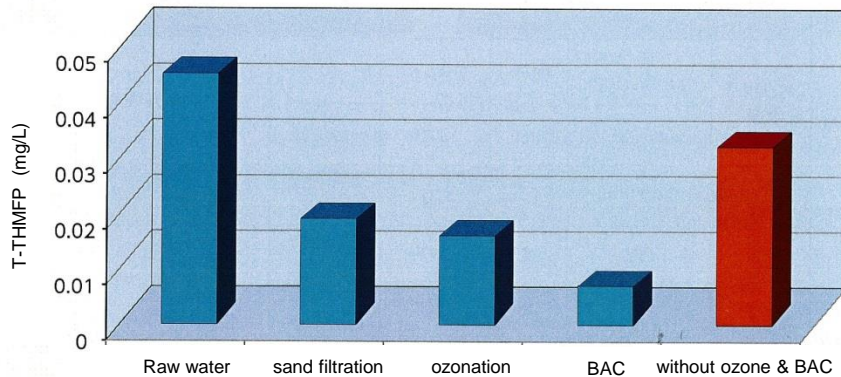
## for Sewage water treatment



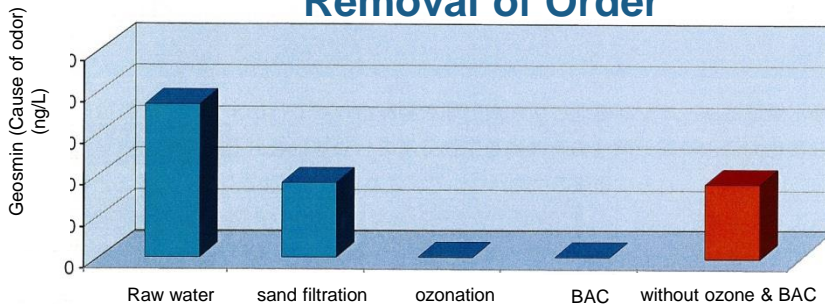
- Disinfection
- Improvement of odor, color

### Examples

#### Removal of THMs

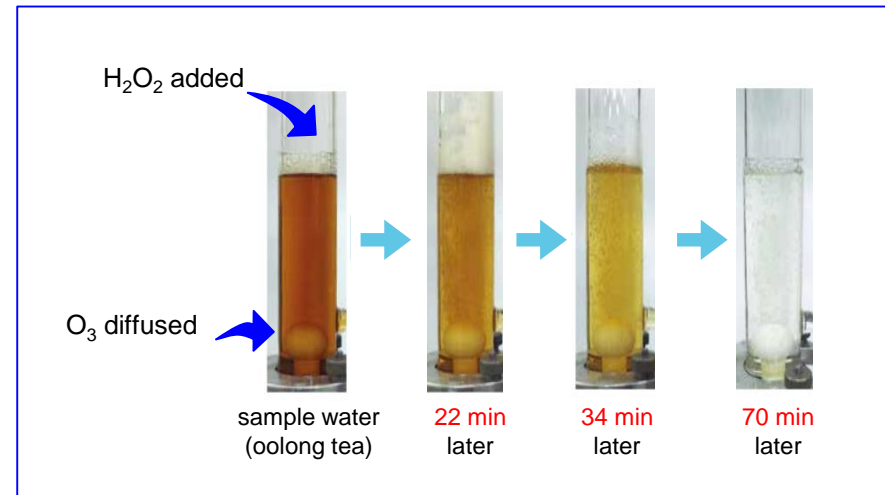


#### Removal of Order



From the article “高度浄水処理の導入に向けて” written by JAPAN OZONE ASSOCIATION

#### Removal of Color



- Ozone is effective in removing COD, SS and color from raw water.
- Whereas increasing O<sub>3</sub> dosage decreases COD value, it increases BOD value. This is because COD becomes biodegradable substances through ozonation. Installation of activated carbon posterior to ozone results in high-level removal of BOD .



# 2-2 High value of THMs in the drinking water of Ganga downstream

Due to cancer risk, THMs are restricted in US, EU and Japan

## 1 ) Trihalomethanes' standard in US, EU, Japan and India

	USEPA [mg/L]	EU [mg/L]	Japan [mg/L]	India [mg/L]
Chloroform	-	-	0.06	0.2
Bromodichloromethane	-	-	0.03	0.06
Dibromochloromethane	-	-	0.1	0.1
Bromoform	-	-	0.09	0.1
Total Trihalomethanes	<b>0.08</b>	<b>0.1</b>	<b>0.1</b>	-

## 2 ) Average trihalomethanes (THM s ) value of WTP in the downstream

No.	Water Treatment Plant	THMs Concentration.(mg/L)
1.	Subernrekha WTP. Ranchi	0.357
2.	ADDA WTP, Durgapur	0.362
3.	IGWTP, Kolkata	0.523
4.	MAITHON WTP, Maithon	0.536
5.	MADA WTP, Dhanbad	0.569
6.	BTPS WTP, Bokaro	0.594
7.	CTPS WTP, Chandrapura	0.566
8.	TISCO WTP, Jamadoba	0.413

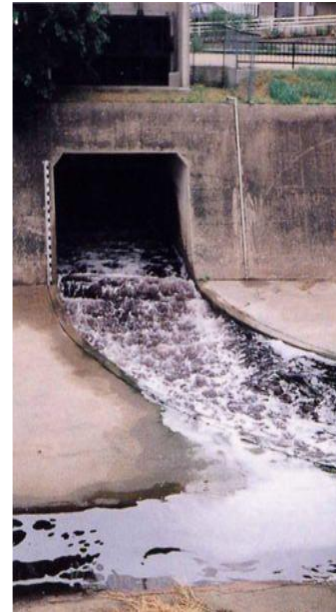
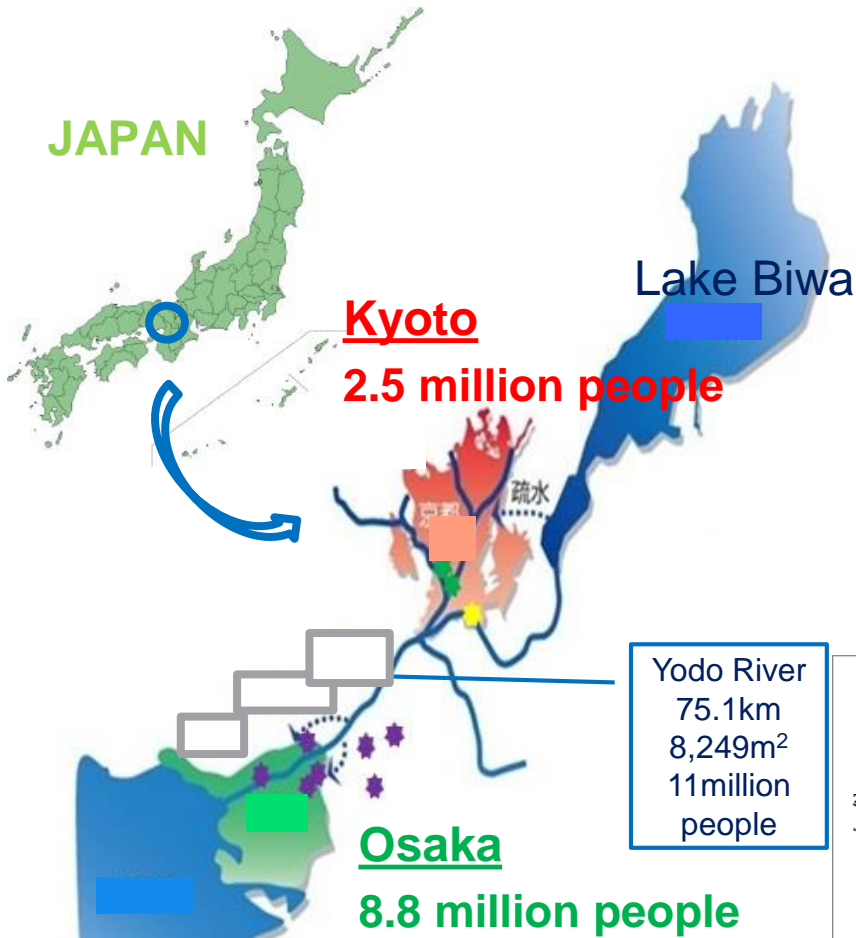


from Journal of Environmental Health Science & Engineering 2014,  
(<http://www.ijehse.com/content/12/1/73>)

✳Average lifetime cancer risk for total THMs through ingestion  
route in all water supply is about 318 times and 260 times for male  
from Drinking water quality by WaterAid ([www.wateraid.org](http://www.wateraid.org))

# 2-3 Solution : Case of Kyoto and Osaka, Japan

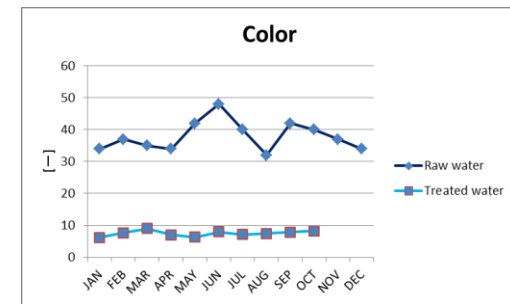
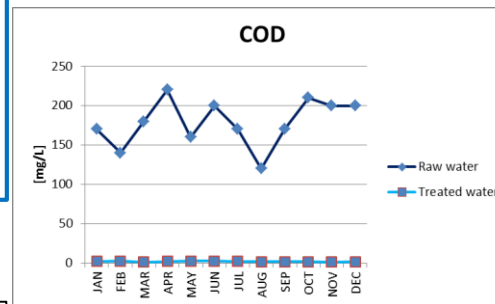
## Ozonation at upstream STP and Ozonation at downstream WTP



Without ozone



With ozone



★ The **swage** advanced treatment by **ozone**

★ The advanced **water treatment** with **ozone**

※ From the website of Kyoto city Water Works Bureau

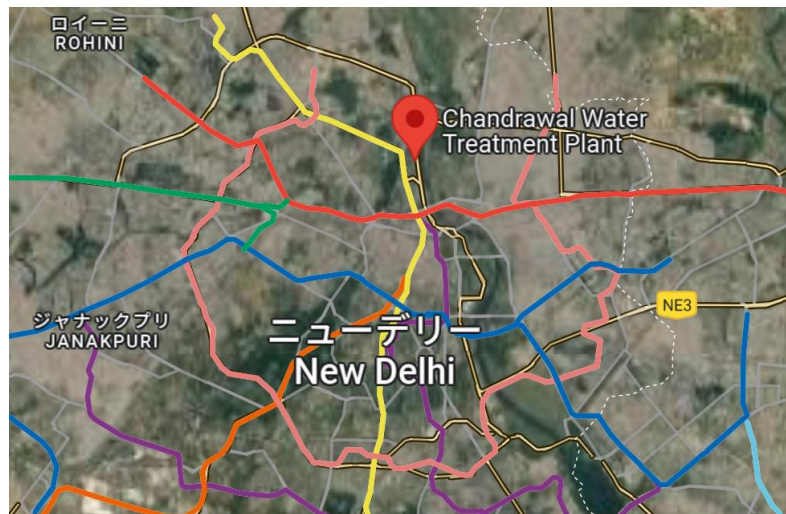
# 2-4 India Largest Ozonation plant, Chandrawal WTP, DJB

## Project Outline

End User	Delhi Jal Board
Fund	JICA
Prime Contractor	L&T
WTP Capacity	477MLD
Ozone Capacity	31kg/hr x 3 (2D-1S)
Make	Toshiba, Japan



Construction work is going on.  
The above : Ozone Contact Tank  
The left : Ozone Building



Ozone Generators are under manufacturing in Toshiba Fuchu factory in Tokyo, Japan.  
It will be dispatched in April, 2023

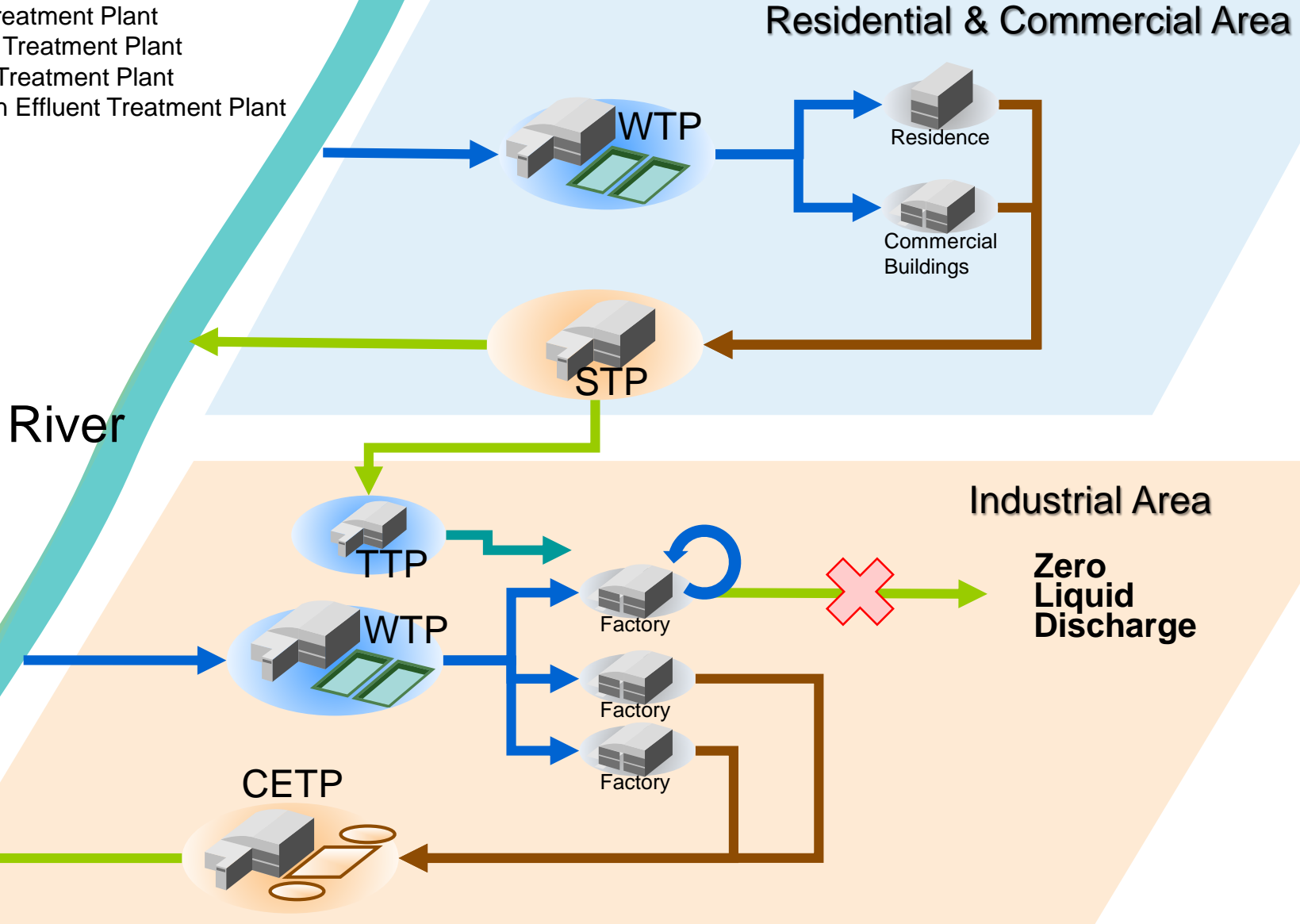
# 03

## **ZLD Solution - TOSHIBA High pH RO System**

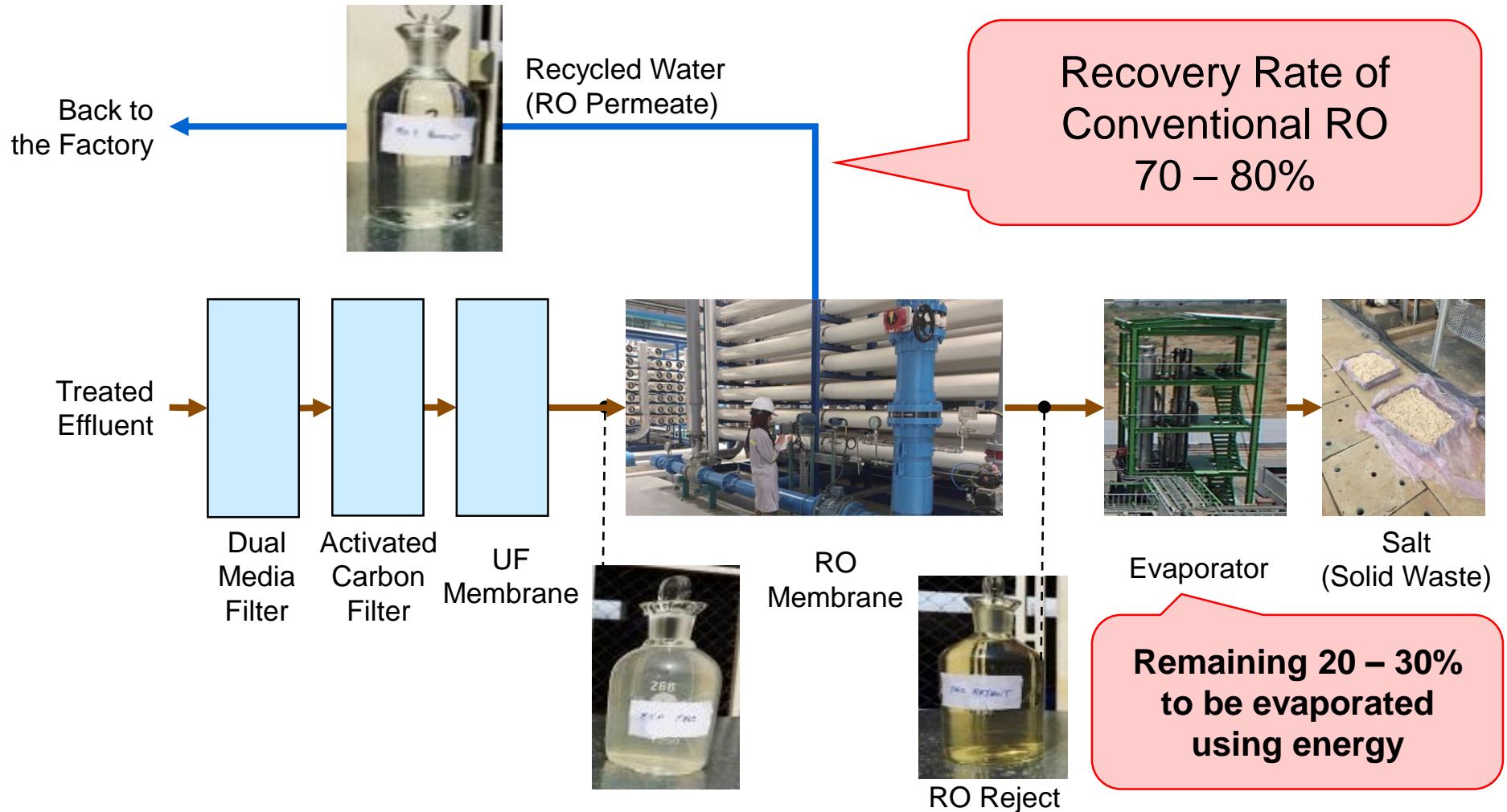
ZLD: Zero Liquid Discharge

# 3-1 Water Circulation System

WTP : Water Treatment Plant  
STP : Sewage Treatment Plant  
TTP : Tertiary Treatment Plant  
CETP : Common Effluent Treatment Plant



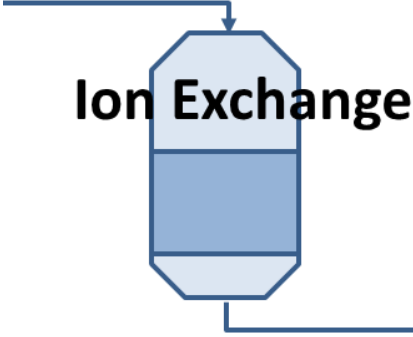
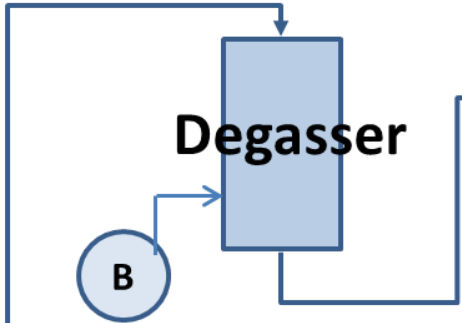
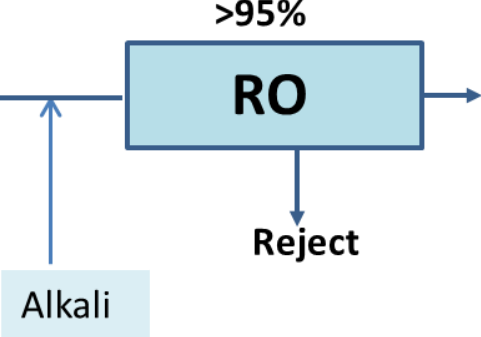
# 3-2 Typical Effluent Recycling System (ZLD)



Enhancing recovery rate saves ENERGY and OPEX  
Not only increases WATER RESOURCE

# 3-3 Toshiba High pH RO System

High pH System enables to recover more than 95% water

 <p><b>Ion Exchange</b></p>	 <p><b>Degasser</b></p>	 <p><b>RO</b></p> <p><b>Alkali</b></p> <p><b>&gt;95%</b></p> <p><b>Reject</b></p>
<p>Hardness Removal (Softening)</p>	<p>Alkalinity Removal</p>	<p>High pH RO Operation</p>
<p>Lime/Caustic Clarifier or Ion Exchange System</p>	<p>Degasser Tower or Degassing Membrane</p>	<p>More than pH 8.5 (Preferably 10 to 11)</p>
<p>To remove Ca, Mg and other heavy metals, which potentially cause scaling in RO</p> <p><b>Solve Issue ① Hardness Scaling</b></p>	<p>To remove Carbonic Acid which is a cause of Carbonate salt scaling in RO</p> <p><b>Solve Issue ① Hardness Scaling</b></p>	<p>To improve Silica solubility, to prevent adsorption of organics on RO, to inactivate bacteria, to increase zeta potential between membrane and particles</p> <p><b>Solve Issue</b></p> <ul style="list-style-type: none"> <li>② Silica Scaling</li> <li>③ Organic Fouling</li> <li>④ Biofouling</li> </ul>

# 3-4 OPEX – Example of Textile plant

## General Assumption

- 1.85MLD Textile Plant
- 300 day/year, ATFD is operated for 100 days/yr for Toshiba High pH RO System
- Electricity: Rs 10/kWh, Steam at 6 kg/cm<sup>2</sup>: Rs 1.6/kg

## ■ High pH RO System (Evaporator/ATFD and Solar pond)

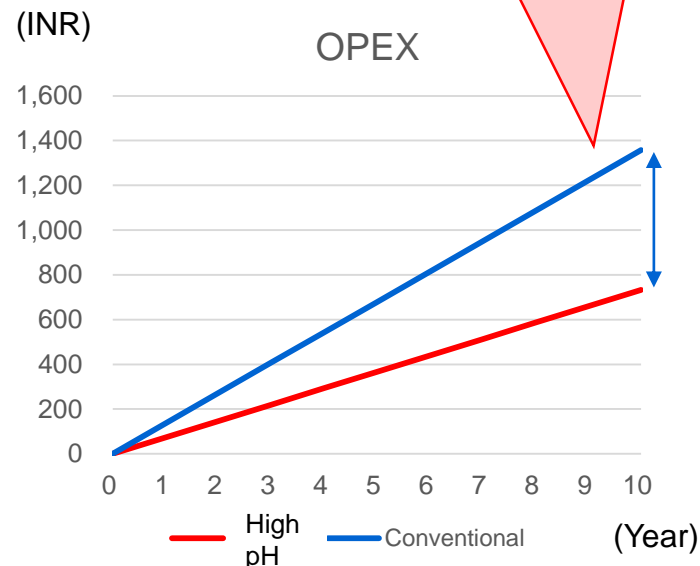
	Rs/day	mil Rs/yr
Electricity	102,000	29.7
Steam	56,000	15.6
Chemical	92,000	27.7
<b>Total</b>	<b>250,000</b>	<b>73.3</b>
		<b>132 Rs/m<sup>3</sup></b>

## ■ Conventional RO (Evaporator/ATFD)

	Rs/day	mil Rs/yr
Electricity	145,000	43.6
Steam	225,000	67.5
Chemical	82,000	24.7
<b>Total</b>	<b>452,000</b>	<b>135.8</b>
		<b>245 Rs/m<sup>3</sup></b>

**<Cost Saving>**

**625 Mn INR for  
10yrs**





# 04

## **Energy saving type Organic Wastewater Treatment - AT-BC System**

# 4-1 Understanding

- ✓ Although the requirement has been relaxed by the latest environment rules, NGT recommends more stringent standard including T-N and T-P reduction.
- ✓ Even existing plants are also recommended to modify within 7 years by NGT.
- ✓ Currently, most of the new STP construction projects comply with NGT recommendation level treatment.

Name		Environment Rules	CPHEEO Manual	Revised (Draft)	Revised	NGT Recommendation
Establishment		1986	2013	2015	2017	2019
Classification		Law	Guideline	Law	Law	Guideline
Parameter	BOD3	30 mg/L	10 mg/L	10 mg/L	20 mg/L	<b>10 mg/L</b>
	TSS	100 mg/L	10 mg/L	20 mg/L	50 mg/L	<b>20 mg/L</b>
	NH4-N	50 mg/L	–	5 mg/L	5 mg/L	–
	NO3-N	10 mg/L	–	–	–	–
	TKN	100 mg/L	–	–	–	–
	T-N	–	<b>10 mg/L</b>	<b>10 mg/L</b>	–	<b>10 mg/L</b>
	PO4-P	5 mg/L	–	–	–	–
	T-P	–	<b>2 mg/L</b>	–	–	<b>1 mg/L (to lake &amp; pond)</b>

India needs economical BNR solution

# 4-2 Technical Summary

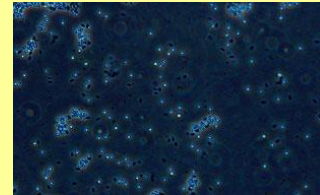
**AT-BC system** is one of the advanced wastewater treatment system. It was developed integrating and evolving activated sludge process and rotating biological contactor process.

Contactors in the AT-BC is **reticulated structure (meshed)**, it allows **high volume of Bacillus sp. to stick** and due to the high oxygen supply, and it enables effective removal of BOD and Nitrogen.

## What is Bacillus

Bacillus is a common soil bacterium, and can be found everywhere around us.

By putting and growing Bacillus in the aeration tank, they strongly remove COD, Oil & Grease, Nitrogen, etc. as well as BOD. Bacillus is coexisting with conventional activated sludge bacteria in the aeration tank, and will demonstrate outstanding functions and effects.



**【Bacillus】**



**Appearance of AT-BC**



**Reticulated structure**

# 4-3 Reference the System

**JPN**

Mainly to Food Factory 160 Nos. (2000~2018)

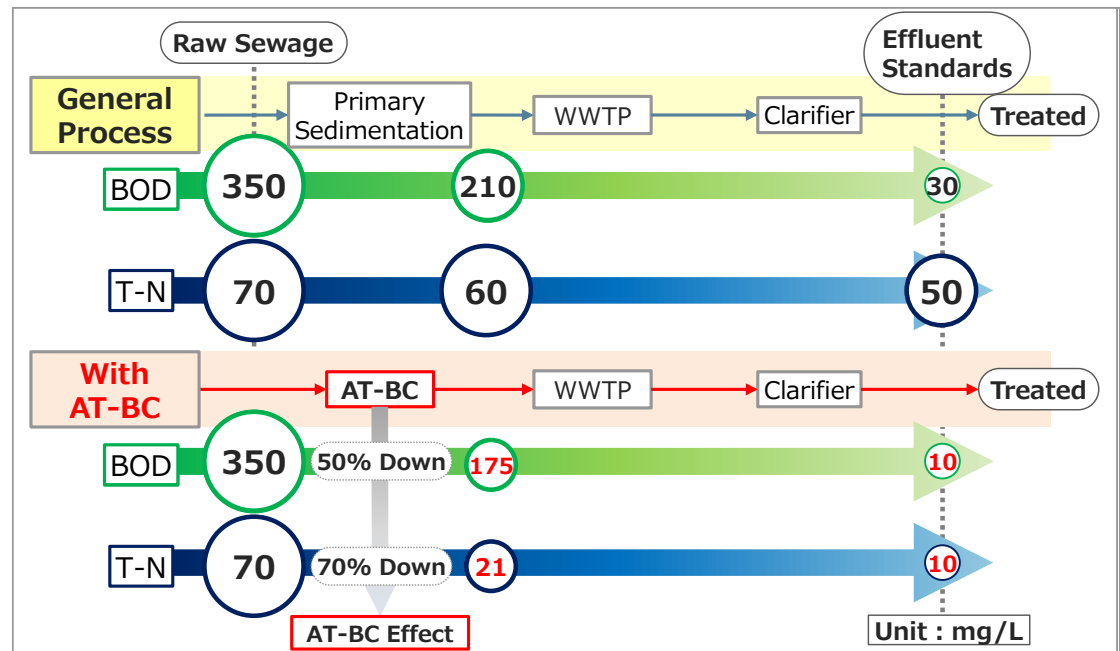
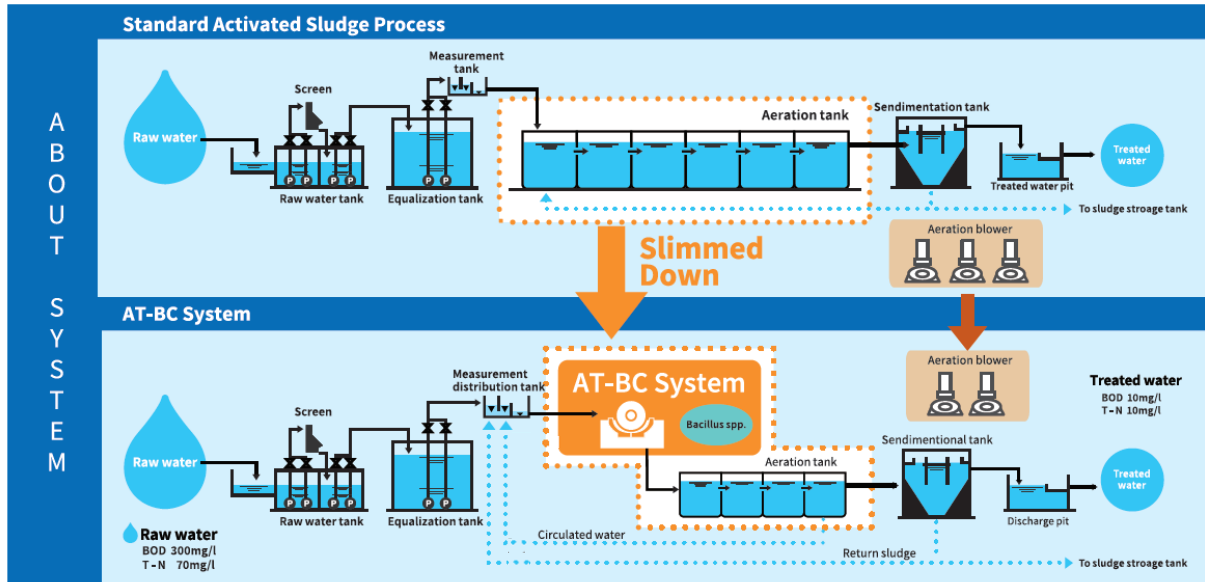
**KOR  
CHN**

To Sewage Treatment Plant ; 82 Nos. (2000~2007)  
To Sewage Treatment Plant ; 365 Nos. (2006~2018)

## <Reference of STP Projects>

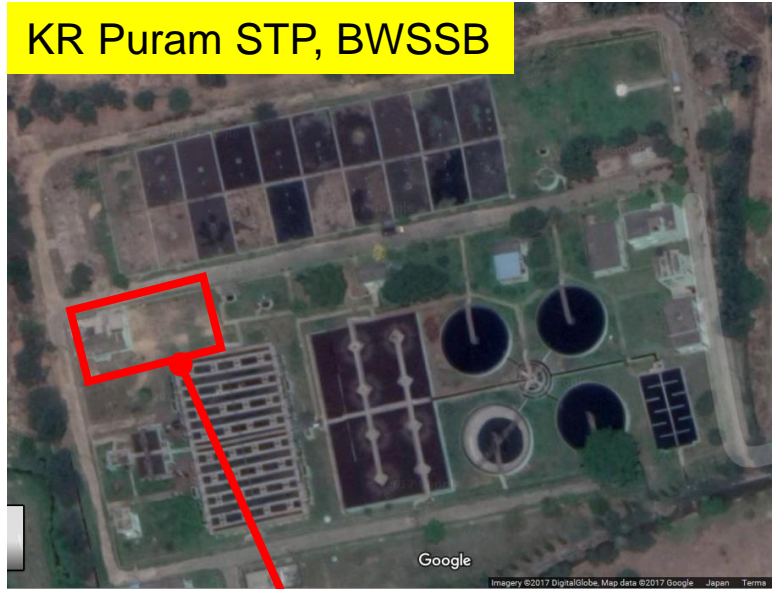
		Past Projects in China			
STP Location		Xianyang City, Shaanxi Province		Xining City, Qinghai Province	
Capacity		40MLD/Day		12MLD/Day	
Process		AT-BC + Bacillus sp.		AT-BC + Bacillus sp.	
Discharge to		River		River	
Water Quality (mg/L)		Inlet	Outlet	Inlet	Outlet
	BOD	260	10.0 以下	350	10.0 以下
	T-N	70	5.0 以下	65	5.0 以下
	T-P	8	0.5 以下	5	0.5 以下

# 4-4 Performance



# 4-5 1MLD JICA funded Pilot project in Bangalore

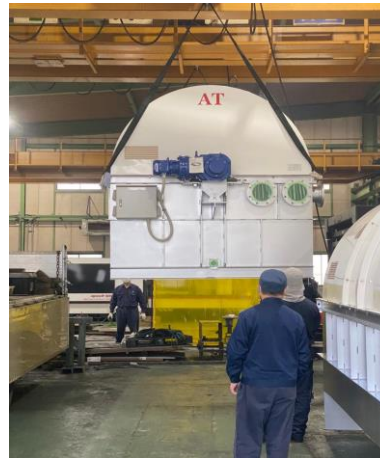
KR Puram STP, BWSSB



Construction work is going on.  
Completion : the end of Feb, 23.



Planned Construction Site



Equipment was manufactured  
in Japan and dispatched to  
India in Nov., 22.

# TOSHIBA

## **[CONTACT]**

### **Toshiba Water Solutions Private Limited**

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Sector-62, Gurgaon – 122 102, Haryana, INDIA

Tel: +91-124-6447000

Contact Person: Mr. Salesh Sharma, Head of Business Development - Domestic