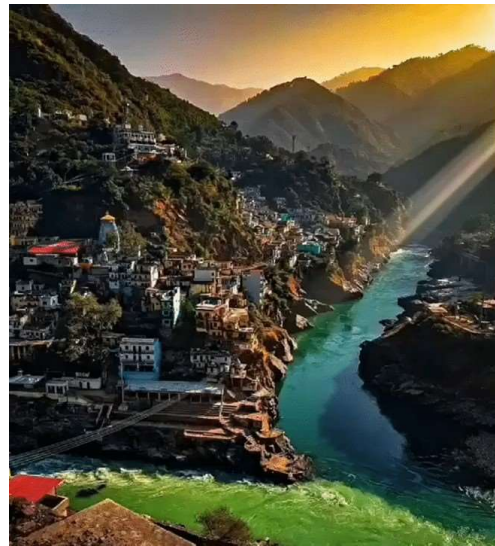


## 6.5. セミナーにおける発表資料

### 6.5.1. インド側 (NMC) のセミナー発表資料 (Current Status of Domestic Wastewater Treatment & Management (for centralized and decentralized treatment system) in India)



### Current Status of Domestic Wastewater Treatment & Management (for centralized and decentralized treatment system) in India

19<sup>th</sup> December 2023

### Key Government Schemes in Indian Water Sector

Historical moment for water management in India  
**Formation of Ministry of Jal Shakti in 2019,**  
 bringing all Major departments of the government dealing with water under the aegis of one Ministry

	NAMAMI GANGE	Smart City	Har Ghar Jal Jal Swachh Mission	PM Kisan SAUBHAAG Yojana	Swachh Bharat Mission 2.0	PM-KISAN
Implementation period	2014 - ongoing	2015 - 2020	2019 - 2024	2020 - 2026	2021-2026	2021 - 2026
Estimated budget (USD in Million)	4,000	3,000	50,000	790	17,000	8,000

Union Budget FY 2023-24, approx. **USD 12 Billion** allocated to Ministry of Jal Shakti

**CATCH THE RAIN** campaign in 2021 saw **4.8 million RWHS** created/ maintained at **USD 9 Bn**

Key schemes in sewage treatment – Namami Gange, SBM(G), AMRUT

Key Implementing Sources	Central government	State governments	International Financial Institutions
	<ul style="list-style-type: none"> <li>Ministry of Jal Shakti</li> <li>Ministry of Housing and Urban Affairs</li> <li>Ministry of Environment, Forest and Climate Change; others</li> </ul>	<ul style="list-style-type: none"> <li>State Urban development</li> <li>Rural water and sanitation departments</li> <li>PHED/ Municipal Corporations/ ULBs</li> </ul>	<ul style="list-style-type: none"> <li>JICA</li> <li>The World Bank Group</li> <li>Asian Development Bank</li> <li>DFID; others</li> </ul>

### Wastewater Generation & Wastewater Treatment Capacity in India

Status	Value	Notes
Sewage generation	72,368 MLD	Treatment capacity gap <b>40,527 MLD</b>
Installed treatment capacity	31,841 MLD	
Operational Treatment Capacity	26,869 MLD	Gap in actual Treatment <b>45,499 MLD</b>
Plants meeting environmental standards	12,200 MLD	Gap in Treatment quality Divergence from standards

The increasing Gap	Reasons
	➢ Treatment capacity has nearly doubled over the last 5-7 years, but the increase in urban population, industrialization and lack of adequate sewerage infrastructure in hilly regions has led to increase in gap between sewage generation and treatment capacity available.
	➢ While significant capacity has been created, but, there is still more left to be created.
	➢ Less than five percent (5%) of the treated wastewater is being reused.

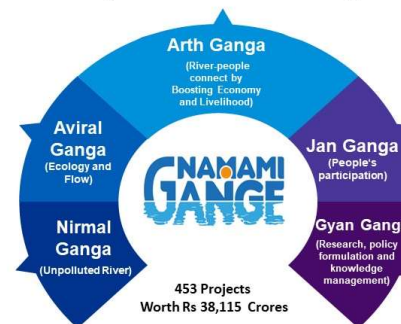
Source : Report on National Inventory of Sewage Treatment Plants in India by CPCB, 2021

### Namami Gange Programme

#### An integrated river rejuvenation mission for the Ganga River Basin

**VISION:** The Vision for Ganga Rejuvenation constitutes restoring the wholesomeness of the river defined in terms of ensuring "Aviral Dhara" (Continuous Flow)", "Nirmal Dhara" ("Unpolluted Flow"), Geologic and ecological integrity

#### Five pillars of Namami Gange



#### Components of the programme

Component	No of projects	Sanctioned Cost (Rs Cr)
Sewerage Infrastructure	197	31,444
Ghats and River front development	105	1,735
Solid waste management	12	295
Institutional Development	29	1,757
Research and public outreach	37	260
Biodiversity and Afforestation	51	763
Bioremediation	15	239
Rural sanitation	1	1,422
Others	7	200
<b>Total</b>	<b>454</b>	<b>38,115</b>

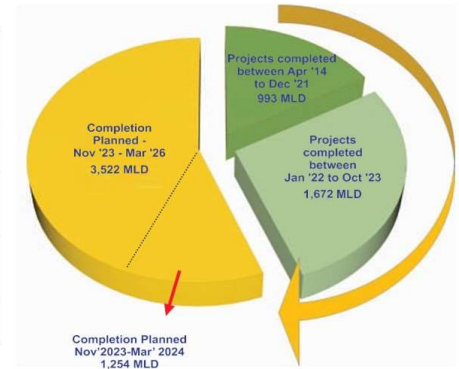
## Namami Gange at a Glance

S. No.	Type of Project	Name of State	Sanctioned					Completed		
			No of Projects	Capacity (MLD)	Network (km)	Cost (in Rs. Cr)	Expenditure (Rs. Cr)	No of projects	MLD Created/Rehabilitated	Network (km)
1	Sewerage Projects	Uttarakhand	42	244	208	1,717	767	36	165	175
		Uttar Pradesh	69	2,388	1,896	14,097	5,345	37	945	1,799
		Bihar	37	745	1,792	6,160	3,850	13	274	1,305
		Jharkhand	5	262	151	1,310	186	2	16	88
		West Bengal	28	899	982	4,834	1,742	11	379	859
		Haryana	2	145	41	218	218	2	145	52
		Delhi	9	1,268	37	1,951	1,812	7	704	36
		Himachal Pradesh	1	2	0	12	4	1	2	0
		Rajasthan	1	36	146	258	176	0	36	135
		Madhya Pradesh	2	219	20	604	0	0	0	0
Modular STP Decentralized	1	0	0	410	0	0	0	0		
		<b>Total</b>	<b>197</b>	<b>6,208</b>	<b>5,272</b>	<b>31,571</b>	<b>14,100</b>	<b>109</b>	<b>2,666</b>	<b>4,449</b>
3	River front, Ghats and Crematoria	105	--	--	1,735	1,212	79	--	--	
4	Solid Waste Management	12	--	--	295	192	9	--	--	
5	Institutional Development (Non-Infrastructure)	29	--	--	1,764	508	9	--	--	
6	Project Implementation Support, Research and Study Projects, Public Relations and Outreach	37	--	--	260	42	8	--	--	
7	Biodiversity, Afforestation and Bioremediation	86	--	--	1,003	477	40	--	--	
8	Other Projects	8	--	--	1,756	1,186	5	--	--	
		<b>Grand Total</b>	<b>454</b>	<b>6,187</b>	<b>5,254</b>	<b>38,384</b>	<b>16,834</b>	<b>259</b>	<b>2,666</b>	<b>4,449</b>

## Ganga River Basin- Project Details

Total capacity of 6,187 MLD (197 projects) is sanctioned under Namami Ganga up to October 2023

Time Period	Sewage Capacity Created/ to be Created (MLD)
Completed April 2014 – December 2021	993
Completed January 2022 – November 2023	1,672
Completion Planned December 2023 – March 2026	3,522
<b>Total</b>	<b>6,187</b>



Completion Planned Nov '23-Mar '24  
1,254 MLD

Total targeted capacity by Dec' 2026: 7,001 MLD  
(Including New Projects to be Sanctioned)

## Transformational Initiatives Under Namami Gange

### Governance for long-term sustainability of Sewerage Assets

#### Hybrid Annuity Based PPP model

- Used to undertake projects involving the construction of STPs and interception and diversion works, under the Namami Gange programme. A total of 33 projects in Ganga river basin towns/ cities have been sanctioned under HAM.



210 MLD STP Bhingawan, Kanpur



68 MLD STP, Jagjeetpur Haridwar

#### One city one operator model

- Shift towards a one-step solution for entire city
- Integration of new and existing sewerage treatment infrastructure under HAM model
- Single ownership and accountability for end-to-end operations
- Ensure continued performance for existing and new sewerage infrastructure



7

## Photos of Operational Nirmal Jal Kendras (NJKs)/STPs in Uttarakhand



Devprayag 1.40 MLD NJK (STP)



Rishikesh (Swargashram) 3 MLD NJK (STP)



Chorpani 7.5 MLD NJK (STP)



Chorpani, Muni Ki Reti 5 MLD NJK (STP)



Haridwar Sarai 18 MLD NJK (STP)



Srinagar 3.5 MLD NJK (STP)

## Photos of Operational Nirmal Jal Kendras (NJKs)/STPs in UP



Masani, Mathura 30 MLD NJK (STP)



Kodra , Prayagraj 25 MLD NJK (STP)



Rajapur , Prayagraj 90 MLD NJK (STP)



Ramanna , Varanasi 50 MLD NJK (STP)



Ramnagar , Varanasi 10 MLD NJK (STP)



Moradabad 58 MLD NJK (STP)

## Photos of Operational Nirmal Jal Kendras (NJKs)/STPs in Bihar



Beur, Patna 43MLD NJK (STP)



Karmalichak, Patna 37MLD NJK (STP)



Pahari, Patna 60MLD NJK (STP)



Maner, Patna 6.5MLD NJK (STP)



Chhapra 32MLD NJK (STP)

## Photos of Operational Nirmal Jal Kendras (NJKs)/STPs in W.Bengal



Barrackpore 24 MLD NJK (STP)



Halishahar 16 MLD NJK (STP)



Budge Budge 9.3 MLD NJK (STP)



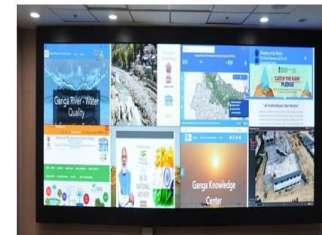
Kalyani 21 MLD NJK (STP)



Bhatpara 41 MLD NJK (STP)

## PRAYAG: Monitoring Centre at NMCG

- Inaugurated on 20<sup>th</sup> April 2023 by Hon'ble Minister of Jal Shakti, Government of India
- PRAYAG (Platform for Real time Analysis of Yamuna, Ganga and their tributaries) is a Real Time Monitoring Centre with on-line dashboards for planning and monitoring of project progress through real time feeds, river water quality, Performance of STPs, PMT Tool Dashboard, Ganga Districts Performance Monitoring System.



## Major Achievements of Namami Gange Program Launched in 2014

Notable Improvement in River Water Quality, increase in numbers of Gangetic Dolphins and other biodiversity indicators

97 Manual and 76 Real Time Water Quality Monitoring Stations (RTQMS) are operational for monitoring water quality



State	Polluted Stretches	Priority Category		Priority	Criteria
		2014-15	2022 (Jan to Sept)		
Uttarakhand	Haridwar to Sultanpur	V (4.2 - 5.8 mg/l BOD)	Not Polluted (< 3 mg/l BOD)	I	BOD > 30 mg/l
Uttar Pradesh	Kannauj to Varanasi	III (3.8 - 16.9 mg/l BOD)	V (2.5 - 4.7 mg/l BOD)	II	BOD : 20-30 mg/l
Bihar	Buxar to Bhagalpur	II (7.8 - 27 mg/l BOD)	Not Polluted (< 3 mg/l BOD)	III	BOD : 10-20 mg/l
West Bengal	Triveni to Diamond Harbour	V (3.1 - 5.8 mg/l BOD)	V (2.6 - 3.9 mg/l BOD)	IV	BOD : 6-10 mg/l
				V	BOD : 3-6 mg/l

In 2022, No Stretches of River Ganga in Priority I to IV Categories of pollution

## Achievements and Accolades



Namami Gange Mission: Recognized as one of the TOP TEN "World Restoration Flagship" by UN Decade



Recognized as one of the top 10 World Restoration Flagship initiatives on 13th December 2022 at Montreal, Canada during UN Conference Biological Diversity (COP 15)

DG, NMCG receiving the Award from Ms Natalia Alexeeva, UN Decade on Ecosystem Restoration

- 2021 - 2030 declared as the Decade on Ecosystem Restoration by UNGA, positioning restoration of ecosystems as a major nature-based solution for achieving SDGs & national priorities
- World Restoration Flagships of the UN Decade are the first, best, or most promising examples of largescale and long-term ecosystem restoration in any country or region
- Led by UNEP and FAO, it embodies 10 Restoration Principles of the UN Decade

Participation in UN Water Conference -2023



- The Only Indian entity to Organize a side event in the UN HQ during the UN Water conference- Namami Gange - "Namami Gange - An integrated & holistic approach towards Conservation & Rejuvenation of River Ganga and it's Ecosystem" was well attended
- Bilateral meetings held with 13 countries - Denmark, Egypt, European Union, France, Israel, Vietnam, Canada, Indonesia, United Kingdom, Singapore, UAE Japan and Bangladesh

14

## Achievements and Accolades



NAT-GEO Award



Meeting of EDs of World Bank in Agra



Meeting held in Agra on 5<sup>th</sup> August 2023:

As part of the visit of 12 Executive Directors (EDs) of World Bank, representing 100 countries, to see the transformational progress of India and some World Bank funded projects in India, a meeting was organized on 5 August, 2023 in Agra in which Director General, NMCG, Mr. G. Asok Kumar gave a detailed presentation. Mr. Auguste Kouame, Country Director, World Bank, India was also present on the occasion.

15

## Wastewater Generation & Wastewater Treatment Capacity in India

India's regulatory framework for wastewater treatment is evolving, with promising policies

### Current Laws & Regulations covering WWT

Environment (Protection) Act, 1986:	Water (Prevention & Control of Pollution) Act, 1974:
Environmental Impact Assessment Notification (2006):	Water Cess Act (1977):
Municipal Solid Waste (Management & Handling) Rules, 2000:	

### Existing Policies

<b>National Water Policy (2012)</b> mandates setting up of sewage treatment plants in all towns with a population exceeding 10,000
<b>Fecal Sludge and Septage Management FSSM (2017):</b> Recognizes synergies and potential for co-treatment options for sludge.
<b>National Framework for Safe use Treated Wastewater</b> Offers guidelines for the formulation of State reuse policy and intends to build appropriate market and economic models
<b>Power Tariff Policy of 2016</b> mandates utilization of treated water from STPs at thermal power plants.

### Efforts to bridge Gaps and Challenges

Coordination:	• Coordination challenges at various tiers causes uneven implementation which can be addressed by bringing together central and state level agencies
Integration:	• Untapped potential for wastewater reuse as a source for water bodies, groundwater recharge, and alternative water sources to be looked into

## Decentralised Wastewater Treatment in India: Towards a National Framework



Decentralized Wastewater Treatment (DWT) is gaining momentum across states

### National Water Policy (2012) Incentivizes

- Decentralised sewage treatment plants,
- Recycling and reuse of treated water
- *through planned tariff systems, and subsidized treatment of industrial effluents.*
- **Scope for Decentralised Solutions**
- The policy advocates Promotion of sanitation solutions that minimize water usage and treat wastewater at the source.

Several states including Karnataka, Kerala have taken steps towards adopting decentralised wastewater treatment solutions

### Towards a National Framework

- NMCG's experience with the Ganga River basin fosters a comprehensive perspective that considers social, environmental, and economic aspects with expertise in implementing wastewater treatment infrastructure.
- The National Mission for Clean Ganga has promoted decentralized solutions such as Jhokasou for the Ganga River.

NMCG possesses the institutional knowledge and experience to craft a comprehensive national framework for decentralized wastewater treatment across India.

## Few examples of Decentralised Treatment Technology Adopted Across India

Decentralized wastewater treatment systems (DEWATS) offer a promising alternative to traditional centralized systems in India, particularly for smaller communities and areas with limited infrastructure. Diversity of DEWATS systems in terms of industry sectors, cost structures, output quality is presented in the table below

City	Location/Sector	Technology	Key Features
Koraput, Odisha	Hospital	Constructed Wetlands (CWs)	Treats wastewater for reuse in irrigation, low maintenance.
Puducherry, Tamil Nadu	College campus	CWs	High-quality effluent for reuse, eco-friendly and sustainable.
Mumbai, Maharashtra	Slum areas	Septic Tanks with Biofilters	Reduces BOD and COD levels, improves sanitation.
Bangalore, Karnataka	Gated communities	Decentralized Wastewater Treatment Plants with Biofilters	Non-potable water reuse, affordable and efficient.
Gurgaon, Haryana	Residential complex	Membrane Bioreactors (MBRs)	Stringent discharge standards, high-quality effluent for landscaping.
Chennai, Tamil Nadu	Hospital	MBRs	Meets stringent discharge standards, advanced technology for complex wastewater.
Gandhinagar, Gujarat	Dairy farm	Anaerobic Digestion (AD)	Biogas generation for energy, nutrient-rich digestate for agriculture.
Pune, Maharashtra	Food processing industry	AD	Biogas for cooking fuel, reduces environmental pollution.
Darjeeling, West Bengal	Hill resort	Community-Managed CWs	Reduces pollution, improves water quality, community ownership.
Kodagu, Karnataka	Rural communities	Decentralized Treatment Plants (community-managed)	Improved sanitation and hygiene, empowers communities.

## Jokhasou Technology and its adoption in certain NMCG projects

Under Namami Gange Programme three project with a total capacity of 1.92 MLD on Jhokhasou Technology have been sanctioned in Udham Singh Nagar, Rudraprayag and Rishikesh district of Uttarakhand

S. No.	State	Town	No. of STPs	Capacity (MLD)	AA&ES Cost Rs. In (Cr)
1	Uttarakhand	Udham Singh Nagar	3	1.3	199.36
2		Gaurikund & Tilwada	5	0.32	23.37
3		Muni Ki Reti, Rishikesh	1	0.3	94.06
<b>Total</b>			<b>09</b>	<b>1.92</b>	<b>316.79</b>



## 6.5.2. 日本側環境省のセミナー発表資料 (Current Status of Domestic Wastewater Treatment and its Management for Centralized and Decentralized Treatment System in Japan)

### Current Status of Domestic Wastewater Treatment and its Management for Centralized and Decentralized Treatment System in Japan

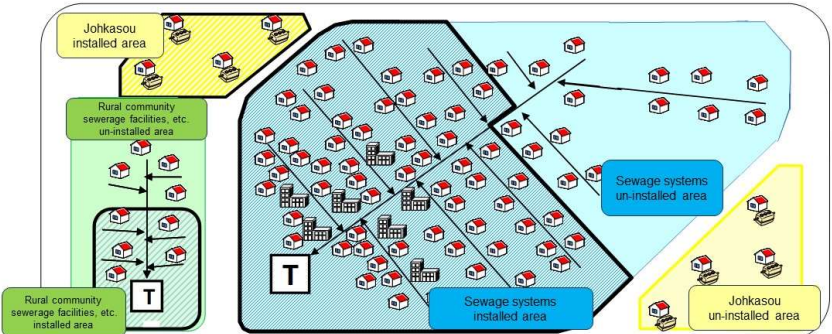
19<sup>th</sup> December, 2023

Mr. Ryoma SATO  
Section Chief, Office for Promotion of Johkasou

Office for Promotion of Johkasou  
Waste Management Division  
Environmental Regeneration and Material Cycles Bureau  
Ministry of the Environment  
Government of Japan

<https://www.env.go.jp/recycle/jokaso/>

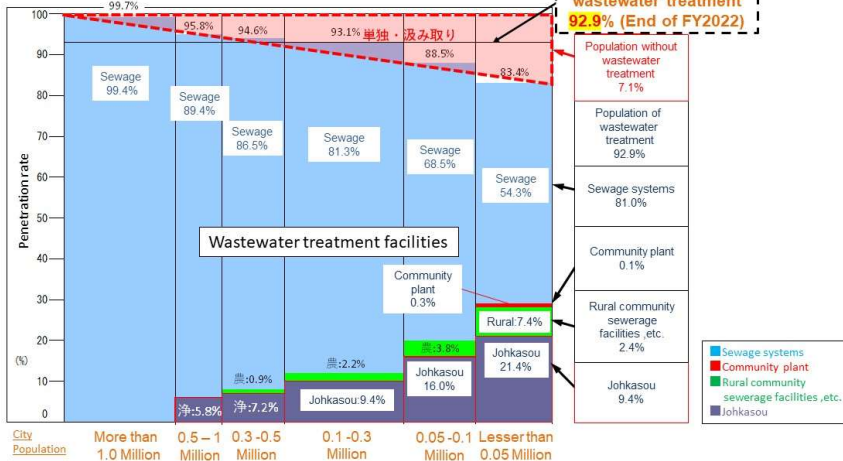
#### Domestic Wastewater Treatment Systems in Japan



- **Sewage Systems** : managed by the Ministry of Land, Infrastructure, Transport and Tourism
- **Rural community sewerage facilities, etc.**: managed by the Ministry of Agriculture, Forestry and Fisheries
- **Johkasou**: managed by the Ministry of the Environment

---

#### Trend of Johkasou's spread status by City size



**Population of wastewater treatment 92.9% (End of FY2022)**

Population without wastewater treatment 7.1%

Population of wastewater treatment 92.9%

Sewage systems 81.0%

Community plant 0.1%

Rural community sewerage facilities, etc. 2.4%

Johkasou 9.4%

#### Current situation of population served for treating domestic wastewater by different wastewater treatment facilities

Type of treatment facility	Population served (x1,000 people)	
	End of FY2022	End of FY2021
<b>Sewage systems</b>	<b>101,280 (81.0%)</b>	101,181 (80.6%)
<b>Rural community sewerage facilities</b> including Facilities for fishing villages, Facilities for forestry villages, Simple wastewater facilities	<b>3,018 (2.4%)</b>	3,103 (2.4%)
<b>Johkasou</b>	<b>11,784 (9.4%)</b>	11,758 (9.4%)
Municipal Johkasou Installation Program	825	831
Johkasou Installation and Maintenance Program	6,229	6,203
Other Johkasou	4,730	4,725
<b>Community plants, etc.</b>	<b>160 (0.1%)</b>	171 (0.1%)
<b>Total population served</b>	<b>116,242</b>	116,213
<b>Percentage of population served</b>	<b>92.9%</b>	92.6%
Total population	125,065	125,540
Total population not served	8,823	9,327
<b>Un-installed rate</b>	<b>7.1%</b>	7.4%

## Comparison of Sewage, Johkasou and Septic tank

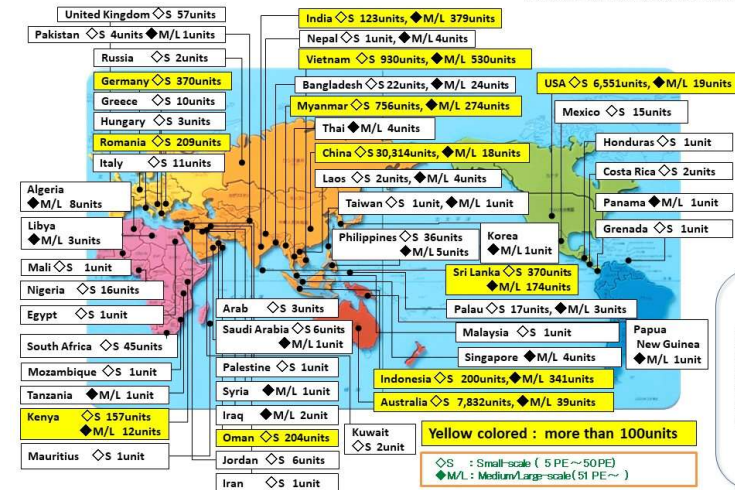
	Sewage (STP)*	Johkasou	Septic tank
Category	Centralized	Decentralized	Decentralized
Capacity(m3/day)	Large	Small to middle	Small
Application	City covering with pipeline network	For household, building, housing complex, community, hospital, school, public toilet, etc.	
Target		Black water & Gray water	Black water
Method		Aerobic (plus Anaerobic)	Anaerobic only
Treated water quality		- Good - BOD <20mg/L - Nitrogen & Phosphorous can be removed	- Poor, BOD = 100mg/L - Nitrogen and Phosphorous can't
Discharge	Clean discharge is discarded directly to the river, lake, sea and so-on.		- Dirty discharge is penetrated into ground - Gray water is discarded without treatment
Main body	Civil structure constructed at site	FRP manufactured in factory	Civil structure constructed at site
Maintenance works	Checking and adjustment, desludging, inspection, changing spare parts		Desludging only (every 3 to 5 years)
Total period for operation start	Long for planning, financing, construction		Short

\*STP: Sewage treatment plant

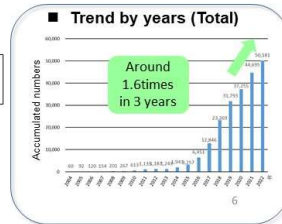
Johkasou can be recognized as a "prefabricated small scale sewage treatment plant" in wastewater management

## Installation records of Japanese Johkasou Overseas

As of the end of December 2022 (Total) by Johkasou System Association



● 2022 recent (Total)  
 Small size 48,325units  
 M/L size 1,856units  
 Total 50,181units  
 Total 51 countries



72



At Kikuchi Gorge, Kikuchi City, Kumamoto Prefecture



## (Reference) Information of Johkasou

- "Johkasou" is categorized as decentralized wastewater treatment system for domestic wastewater discharged by household, building and so-on.
- Johkasou have a combined purification structure capable of treating both night soil (black water) and miscellaneous wastewater (gray water)
- Johkasou attains high and stable performance as same as that of sewage treatment plant and it has been installed totally more than 3.9 million unit in Japan.



## 6.5.3. 日本側環境省のセミナー発表資料 (Legal System of Decentralized Domestic Wastewater Treatment Management in Japan including the Johkasou Act)

### Legal System of Decentralized Domestic Wastewater Treatment Management in Japan including the Johkasou Act

19<sup>th</sup> December, 2023

Mr. Ryoma SATO  
Section Chief, Office for Promotion of Johkasou

Office for Promotion of Johkasou  
Waste Management Division  
Environmental Regeneration and Material Cycles Bureau  
Ministry of the Environment  
Government of JAPAN

<https://www.env.go.jp/recycle/jokaso/>

**Overall concept of water environment improvement and related legal framework**

**Target**

- Establishment of Environmental Quality Standards of Pollution **[Basic Environment Law]**

**Industrial Wastewater Measures**

- Establishment of Wastewater Standards **[Water Pollution Prevention Act]**  
Nationwide uniform standards
- Stricter regulation on Wastewater Standards  
Regulations on business operators **[Water Pollution Prevention Act]**  
Notification, measuring and recording of wastewater, on-site inspection  
→ Penalties, improvement orders and other administrative guidances
- Investments, human resource developments, etc. for pollution prevention

**Domestic Wastewater Measures**

- Sewerage System Establishment [Sewerage Law]**
- Installation of Johkasou [Johkasou Act] etc.**

**National Government**

- Vision
- Law & Regulations
- Technical Standards
- National Subsidies

**Sharing Responsibility**

**Local Government**

- Treatment Master plan and its implementation
- Ordinance
- Construction, Operation and Management of sewerage facilities
- Advice and guidance on Johkasou operation and maintenance

**Johkasou Act**

**Outline of Articles and its jurisdiction in Johkasou Act**

**■ Purpose**

- Strengthen **regulations** of manufacturing, installation, operation, maintenance and desludging of Johkasou.
- Provides **qualifications** for Johkasou installation workers and operators
- Provides **registration** systems for Johkasou installation vendors and maintenance vendors
- Provide **licensing** systems for desludging vendors

Promotion of domestic wastewater treatment by Johkasou for conservation of water quality in public water area, preservation of the living environment and improvement of public health

**■ Definition**

- Johkasou is the decentralized wastewater treatment facility that can treat both **black water** and **grey water** from household, building and so on and discharge effluent comply with effluent standards.
- Johkasou should be installed when installing a flush toilet under the Building Standard Law, unless the wastewater is discharged to sewerage systems.

**■ Related Laws**

**Johkasou Act**

Enacted in 1983

→

**Enforcement Ordinance**

Define the scale of Johkasou which need Johkasou Operators etc.

→

**Enforcement Regulations**

Define the period of inspection, desludging or the technical standard of desludging etc.

Ministry of the Environment (MOE)

General provisions (articles 1–4):  
Purpose/definitions

Ministry of Land, Infrastructure, Transportation and Tourism (MLIT)

Johkasou installation (articles 5–7)

Johkasou operations/maintenance (articles 8–12)

Approval for johkasou desludging vendors (articles 35–41)

(Articles on wastewater treatment and desludging)

Johkasou operators (articles 45–47)

Registration of maintenance and inspection vendors (article 48)

(Articles on construction standards)

Approval for types of johkasou (articles 13–20)

Registration for johkasou construction vendors (articles 21–34)

Johkasou Installation Workers (articles 42–44)

Miscellaneous provisions (articles 49–58)

Penalties (articles 59–68)

73

2

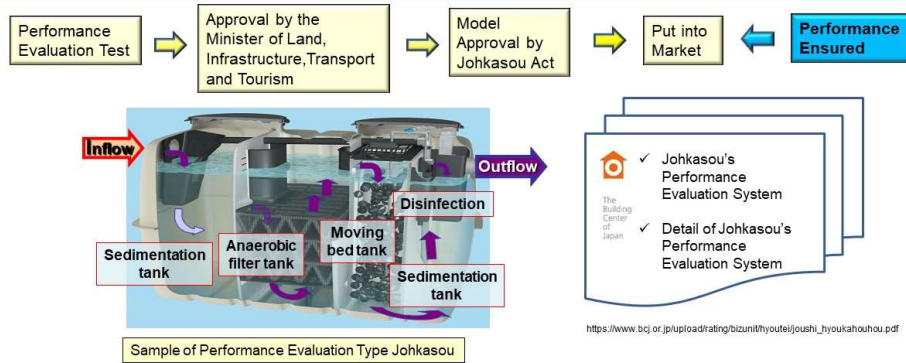
3

4



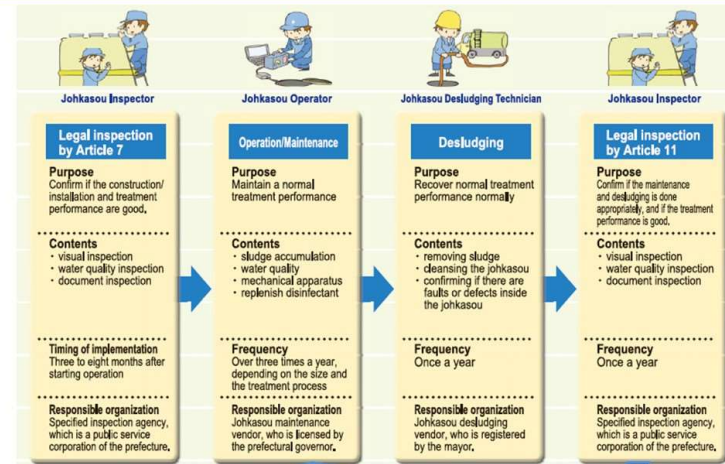
## Approval process for types of Johkasou (Johkasou Act, Article 13)

- Parties intending to manufacture Johkasou in production plants shall obtain approval from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) for the type of Johkasou to be manufactured (does apply to test manufacturing)
- This process is suitable to Performance Evaluation System



5

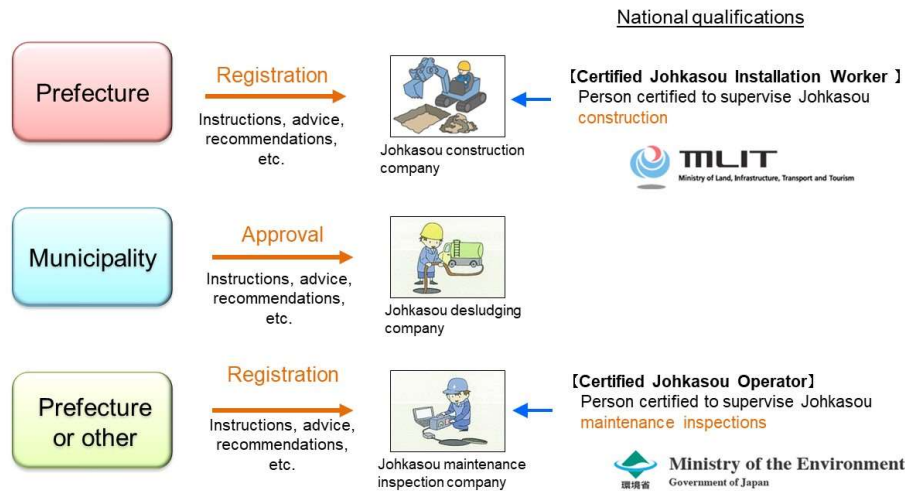
## Inspection and Maintenance of Johkasou



MOEJ "Night Soil Treatment and Decentralized Wastewater Treatment System in Japan"

6

## Registration process and qualifications system



7

## Training courses for Johkasou technicians

- Johkasou technicians should acquire extensive knowledge on not only wastewater treatment/johkasou, but also water environment conservation and public health.
- Curriculums for johkasou operator and johkasou installation worker are as shown below.

Johkasou Operator by Article 45	Johkasou Installation Worker by Article 42
<ul style="list-style-type: none"> <li>Fundamental of johkasou 8 H</li> <li>Laws and regulations related with johkasou 4 H</li> <li>Structure and function of johkasou 22 H</li> <li>Introduction to installation of johkasou 4 H</li> <li>Operation and maintenance of johkasou 30 H</li> <li>Water quality management of johkasou 10 H</li> <li>Introduction to desludging of johkasou 2 H</li> </ul>	<ul style="list-style-type: none"> <li>Fundamental of johkasou 8 H</li> <li>Laws and regulations related with johkasou 3 H</li> <li>Structure and function of johkasou 15 H</li> <li>Management of johkasou installation 8 H</li> <li>Introduction to O&amp;M and desludging of johkasou 3 H</li> </ul>
<b>Total 80 Hours</b>	<b>Total 37 Hours</b>
<b>(13 Days)</b>	<b>(5 Days)</b>
<b>+Test 2 Hours</b>	<b>+Test 2 Hours</b>

8

6.5.4. JECES のセミナー発表資料 (Operation and maintenance, cleaning, inspection, license and sludge management for Johkasou)

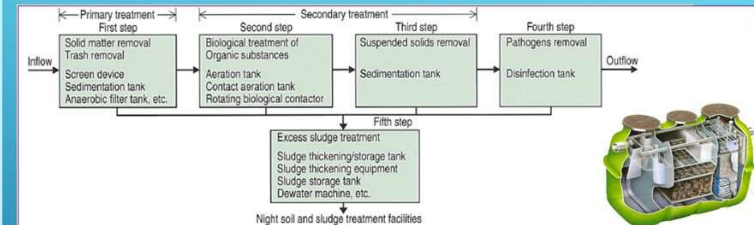
# OPERATION AND MAINTENANCE OF JOHKASOU SYSTEM IN JAPAN

Shinhi Kumokawa Ph.D

Center for International Cooperation of Johkasou System  
Japan Education Center of Environmental Sanitation (JECES)

1

## WHY O&M INSPECTIONS OF JOHKASOU ARE NEEDED?



Device/equipment in johkasou	
Primary treatment (1 <sup>st</sup> step)	Sedimentation tank, Anaerobic filter tank, Slit screen, Aerated screen, Grit chamber, Bar screen, Flow equalization tank,
Secondary treatment 2 <sup>nd</sup> step	Contact aeration tank, moving bed tank, aeration tank,
3 <sup>rd</sup> step	Sedimentation tank
4 <sup>th</sup> step	Disinfection tank
5 <sup>th</sup> step	Sludge thickening/storage tank, sludge storage tank,
Mechanics	Electromagnetic blower, Control panel, mechanical blower, pump,

2

## DEFINITION OF JOHKASOU O&M

Operations concerning to inspecting, maintaining and repairing johkasou (Johkasou Act, Article 2-3)



- Prevent loss of unit function and device breakdown
- Maintain normal treatment performance
- Promote proper regular desludging



3

## DEFINITION OF JOHKASOU DESLUDGING

Desludging involves extracting the generated sludge and scum from johkasou and conditioning sludge in the tank, as well as cleaning tanks and auxiliary equipment. (Johkasou Act, Article 2-4)



Recover/reset treatment performance of johkasou by removing sludge regularly

4

## TECHNICAL STANDARDS FOR JOHKASOU O&M

- **Technical standard for operation and maintenance (Article 2, Ordinance for Enforcement of Johkasou Act)**  
This standard stipulates maintenance items and adjustment/repair items that must be carried out during operation and maintenance for every johkasou and the auxiliary device.
- **Technical standard for desludging (Article 3, Ordinance for Enforcement of Johkasou Act)**  
Desludging standards stipulate items to be carried out for each unit and auxiliary device during desludging (e.g. methods for drawing out sludge)
- **Guidelines for johkasou operation and maintenance (Official notice)**  
These guidelines are issued by the Ministry of the Environment as specific policies for operations and maintenance technicians. They are designed to ensure that operation and maintenance as well as desludging are carried out optimally and in line with the specific characteristics of each treatment process.

5

## GUIDELINES FOR JOHKASOU O&M

- **Technical standard for johkasou O&M, (1984, Johkasou Act)**
  - Guideline for O&M of Tandoku-shori johkasou (2000)
  - Guideline for O&M of small-scale johkasou (1993)
  - Guideline for O&M of medium/large-scale johkasou (2000)
  - Guideline for O&M of N/P removal type johkasou (2000)
  - Guideline for O&M of Membrane johkasou (2000)
- **Technical standard for johkasou desludging (1984, Johkasou Act)**

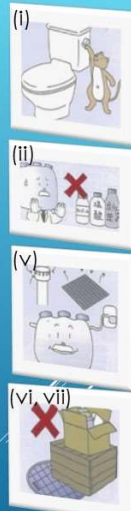


## ORDINANCE FOR ENFORCEMENT OF JOHKASOU ACT

### (Rule of Using)

**Article 1** Rules of using johkasou under the provisions prescribed in Article 3 paragraph 3 of Johkasou Act (hereinafter referred to as "Act") shall be as follows.

- (i) Water amount for flushing toilet shall be appropriate.
- (ii) Materials like insecticide, detergent, deodorant, fatty, disposable diaper, sanitary goods etc. which interfering with the normal functioning of johkasou, shall not be flowed.
- (iii) abbr.
- (iv) Industrial wastewater, rain water and other special wastewaters shall not be flowed into johkasou.
- (v) Johkasou with electric equipment shall not be turned the power supply off.
- (vi) The top or around of johkasou shall has no structural object that may interfere with operation, maintenance and desludging of johkasou.
- (vii) The top of johkasou shall not be loaded which may interfere with its normal functioning.
- (viii) The opening part of aerator shall not be blocked.
- (ix) When the failure or malfunction is found in the johkasou, it should be notified to the johkasou manager immediately.



7

## O&M FREQUENCY OF JOHKASOU

(Article 6-2, Ordinance for Enforcement of Johkasou Act)

Treatment process	Type/size of johkasou	Frequency
<ul style="list-style-type: none"> <li>● Separation-contact aeration process</li> <li>● Anaerobic filter-contact aeration process</li> <li>● Denitrification type anaerobic filter-contact aeration process</li> </ul>	1. Johkasou with a size <b>less than 20 PE</b>	<b>4 month</b>
	2. Johkasou with a size <b>more than 21 PE and less than 50 PE</b>	<b>3 month</b>
<ul style="list-style-type: none"> <li>● Activated sludge process</li> </ul>	( <b>&gt; 100PE</b> )	<b>1 week</b>
<ul style="list-style-type: none"> <li>● Rotating biological contactor process</li> <li>● Contact aeration process</li> <li>● Tricking filter process</li> </ul>	1. Johkasou with sand filter device, activated carbon adsorption device or flocculation tank ( <b>&gt; 50PE</b> )	<b>1 week</b>
	2. Johkasou with screen and flow equalization chamber ( <b>&gt; 50PE</b> )	<b>2 week</b>
	3. Other Johkasou ( <b>&gt; 50PE</b> ) (without screen equipment, etc.)	<b>3 month</b>

8

Inspecting wastewater flow  
汚水の流れの点検

Measuring transparency  
透明度測定

Checking remaining disinfectant  
薬剤残量確認

Measuring deposited sludge  
汚泥堆積状態の確認

Blower inspection  
送風機の確認

Explaining inspection results  
説明

Creating maintenance inspection report  
点検報告書の作成

Measuring circulating water volume  
循環水量の確認

### An Example of johkasou O&M

9




Measurement of residual chlorine

### Check the water quality onsite (pH, DO, NO<sub>2</sub>, residual chlorine)

10

pH  
pH meter

DO  
DO meter

NH<sub>4</sub>, NO<sub>2</sub>, NO<sub>3</sub>

NH<sub>4</sub>, NO<sub>2</sub>, NO<sub>3</sub> portable testing unit

NH<sub>4</sub>, NO<sub>2</sub>, NO<sub>3</sub> test paper

11

Preparation work

Drawing sludge out of the 1<sup>st</sup>-room of anaerobic filter tank  
嫌気ろ槽第1室汚泥の引き出し

Drawing sludge out of the 2<sup>nd</sup>-room of anaerobic filter tank  
嫌気ろ槽第2室汚泥の引き出し

Reporting the results of desludging to the owner  
所有者への説明

Filling the tanks with water  
水張り作業状況

Cleaning the tank  
管内の清掃作業状況

### An examples of johkasou desludging

12

# Structure and performance of FujiClean system

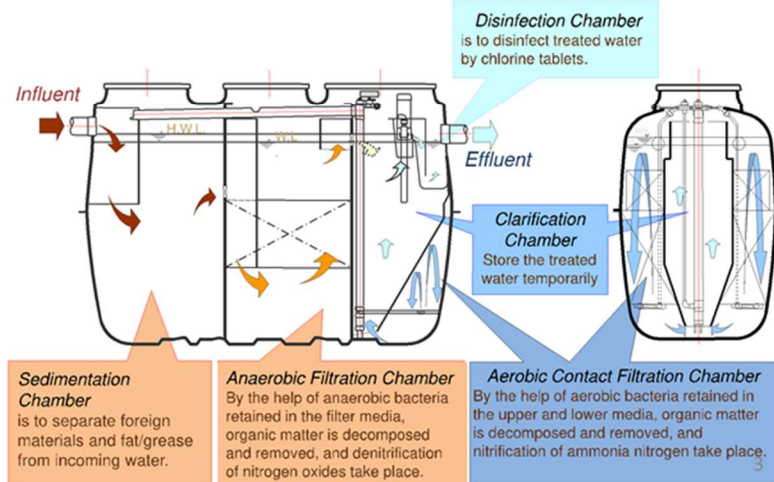
2023.12.19

Yosuke Tabata



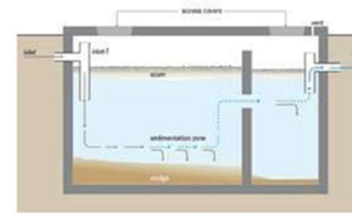
1

## Structure & Function



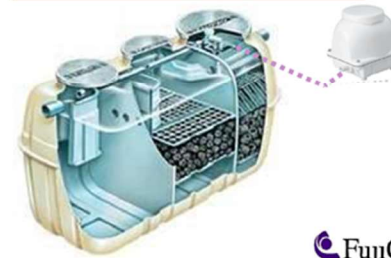
3

## Septic tanks or FujiClean systems



Septic tanks only have sedimentation chamber to remove some parts of organic matter.

**Effluent BOD: 60-150 mg/L**



FujiClean systems have anaerobic and aerobic biological treatment processes.

**Effluent BOD: 10-20 mg/L**



2

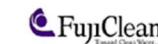
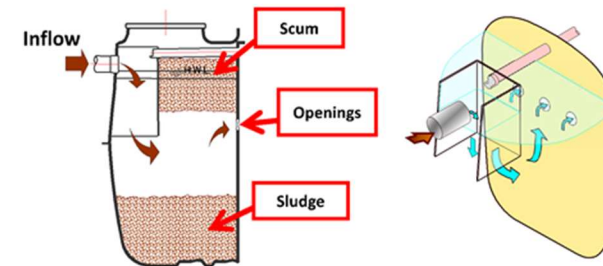
## Sedimentation Chamber

**Function**

Separate and accumulate foreign materials, solids and oil/grease.

**Feature**

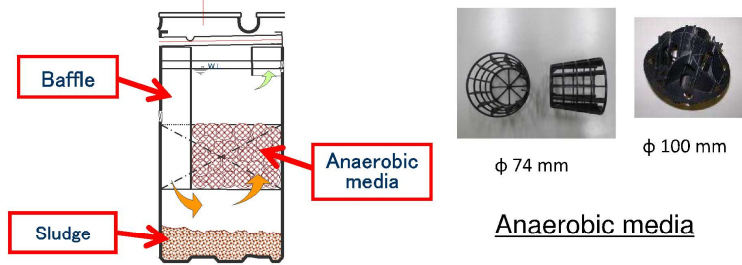
Horizontal water flow prevents flowing up of accumulated sludge.



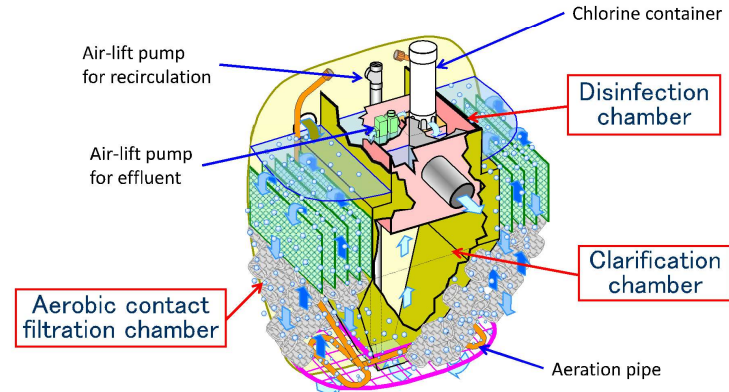
4

## Anaerobic Filtration Chamber

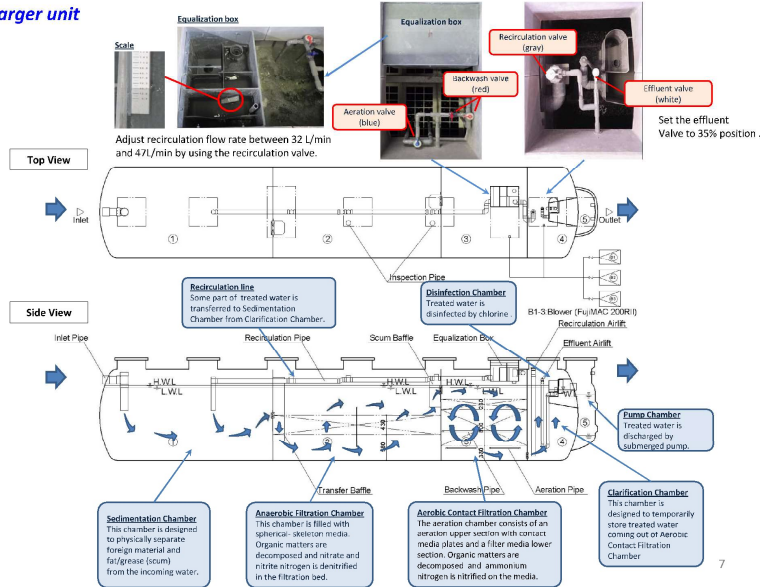
- Function** Separation and accumulation of solids, decompose of organic matter and denitrification take place.
- Feature** Anaerobic media is used to enhance and stabilize anaerobic treatment performance.



## Secondary Treatment Process

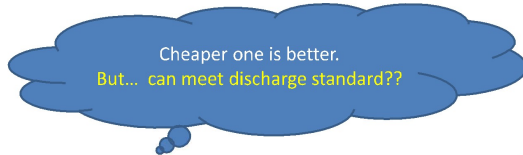


### Larger unit



How to secure treatment performance at fields

## Which system do you want to buy?



## Conditions for performance testing

		Japan	Australia	The U.S.	EU (Germany)
Testing Conditions	Number of sites	6 (indoor)	(outdoor)	10 (outdoor)	50 (outdoor)
	Wastewater	Actual + Artificial	Actual	Actual	Actual
	Temp. control	20°C, 13°C	No	No	No
	Start-up duration	Max. 8 weeks	Max. 8 weeks	Max. 3 weeks	Decide by
	Testing duration	Min. 8 weeks	34 weeks	26 weeks	38 weeks
	Peak inflow	Every day	Yes (as stress testing)	No	Every week @ Normal Testing
	Stress testing	Yes	Yes	Yes	Yes

## Influent and effluent criteria for the testing

		Japan	Australia	The U.S.	EU (Germany)
Inflow quantity (L/day)		1,000 for 5 PE ~ (Person Equivalent)	1,200 for 8 PE ~	Decide by manufacturer	Decide by manufacturer
Inflow (mg/L)	BOD	180~220	150~750	100~300	Ave. 350
	SS	145~175	150~750	100~350	Ave. 420
	T-N	40~50	20~150	35~70	Ave. 70
Effluent Criteria (mg/L)	BOD	20, 15, 10, 5	20, 10	<C-BOD> Monthly Ave: 25 Weekly Ave: 40	The effluent quality resulted in the testing is certified.
	SS	20, 15, 10, 5	30, 10	Monthly Ave: 30 Weekly Ave: 45	
	T-N	20, 15, 10, 5	15 (Nutrient Removal Type)	Removal rate $\geq$ 50%	

Thank you!

# JIS ESTIMATION OF POPULATION FOR JOHKASOU

## 浄化槽の人員算定(JIS A 3302-2000)

JSA(Johkasou System Association)  
KJS(KUBOTA JOHKASOU SYSTEM)  
Yoshito Kitai

2023/12/19

### JIS A 3302-2000

Estimation of population for Johkasou

1 P.E. = 200L/day, 40g BOD/day, BOD 200mg/L

Large categories(Detail categories(No.of equation))

1. Public hall (Theater, etc. (3))
2. Residence (Apartment, etc. (6))
3. Accomodation(Hotel Motel, etc. (4))
4. Medical facility (Clinic, etc. (5))
5. Shop( Shop,Restaurant, Café etc. (6))
6. Amusement facilities (Disco, Amusement Park etc. (13))
7. Parking (Highway rest area, gas station etc. (7))
8. School (Elementary school, Collage,Library, etc. (3))
9. Office (with canteen, without canteen. (2))
10. Workshop (facity, Laboratory, etc. with canteen, without canteen(2))
- 11.Others (Public toilet, etc. (6))

Total 11 large categories, (Detail categories 57 equations)

3

### JIS A 3302-2000

Estimation of population for Johkasou (Decentralized STP)

1. Prescribe standards for calculating the number of people of the Johkasou based on the purpose of the building.

(建築物の用途別による浄化槽の処理対象人員算定基準について規定する)

2. The criteria for calculating the number of people of the Johkasou are as shown on the table. Specified in total 11 large categories, 57 equations. Reference values for water volume per calculation unit and BOD and influent time is also shown. Discharging time is required for Eq. tank design. However, if the regulations clearly do not match the actual situation, the number of personnel may be increased or decreased. (建築物の用途別による浄化槽の処理対象人員算定基準は、表の通りとする。

Total 11 large categories, 57 equationsで規定する。算定単位当たり水量、BODそれから排水時間も参考値で示されています。排水時間は調整槽の大きさの設計が必要です。

ただし、規定が明らかに実情にそぐわない場合は、人員を増減できる。)

3. If the same building has two or more different uses, each calculated by adding the term for building use.

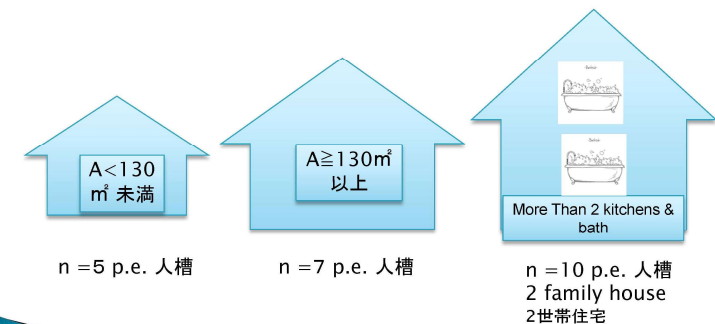
(同一の建築物に2つ以上の異なった建築用途がある場合は、それぞれの建築用途の項を加算して算定する。)

2

## 2. 1.Residence 住宅

### [Equation]

If total floor area A (m2) <130m2 , Johkasou capacity (P.E.) shall be 5 P.E.



4



## 2.2. Apartment 共同住宅

### ▶ Apartment 共同住宅

【Equation】

Johkasou Capacity (P.E.)  $n = 0.05 \times A$  (p.e.)  
(A (m<sup>2</sup>) : total floor area)

Ex. If one house A=50 m<sup>2</sup> and 150 houses 戸  
 $n = 0.05 \times 50 = 2.5$  p.e. < 3.5 p.e  
then  $n = 3.5$  and

Total  $n = 3.5 \times 150 = 525$  p.e. 人槽

- $Q = 0.2\text{m}^3/\text{p.e.}/\text{d} \times 525 \text{ p.e.}$
- $= 105 \text{ m}^3/\text{d}$
- **BOD=200mg/L**



5

## 4. Medical Facilities 医療施設関係

### Example

Large hospitals with commercial kitchens or laundry facilities

【Equation】

B(beds)<300:  $n = 8 \times B$  (p.e.)

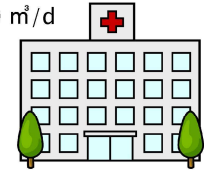
B(beds)≥300:  $n = 11.43 \times (B - 300) + 2.400$  (p.e.)

Ex. If B=100 beds

$n = 8 \times 100 = 800$  p.e. 人槽

$Q = 0.125\text{m}^3/\text{p.e.}/\text{d} \times 800 \text{ p.e.} = 100 \text{ m}^3/\text{d}$

BOD=320mg/L



6

## 5. Shop 店舗関連

### ① Shop/market 店舗、マーケット

【Equation】

Johkasou capacity (P.E.)  $n = 0.075 \times A$   
(A (m<sup>2</sup>) : total floor area)

### ② Restaurant(General) 飲食店(一般)

【Equation】

Johkasou capacity (P.E.)  $n = 0.72 \times A$

Ex. 1,000m<sup>2</sup> Restaurant レストラン

$n = 0.72 \times 1000 = 720$  p.e 人槽

$Q = 0.18\text{m}^3/\text{p.e.}/\text{d} \times 720 \text{ p.e.} = 129.6 \rightarrow 130 \text{ m}^3/\text{d}$

BOD = 220mg/L



7

## 9. Office 事務所関連

Office with kitchen 事務所

【Equation】

(With kitchen 厨房施設有り)

Johkasou capacity (P.E.)  $n = 0.075 \times A$

(A (m<sup>2</sup>) : total floor area)

(Without kitchen 厨房施設無し)

Johkasou capacity (P.E.)  $n = 0.06 \times A$

Ex. 400m<sup>2</sup> with kitchen

$n = 0.075 \times 400 = 30$  p.e. 人槽

$Q = 0.2\text{m}^3/\text{p.e.}/\text{d} \times 30 \text{ p.e.} = 6 \text{ m}^3/\text{d}$

BOD=200mg/L



8

## 10. Workshop 作業場関係

Factory, laboratory 工場、研究所(厨房施設有り)

(With kitchen 厨房施設有り)

【Equation】

Johkasou capacity (P.E.)  $n = 0.75 \times P$

( P : Full number (person)※定員 )

(Without kitchen 厨房施設無し)

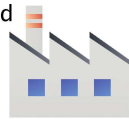
Johkasou capacity (P.E.)  $n = 0.3 \times P$

Ex. P=100 persons with kitchen 厨房有

$n = 0.75 \times 100 = 75$  p.e. 人槽

$Q = 0.133 \text{ m}^3/\text{p.e.}/\text{d} \times 75 \text{ p.e.} = 10 \text{ m}^3/\text{d}$

BOD=300mg/L



9

## 11. Others その他施設

Ex. Public Toilet 公衆便所

【Equation】

Johkasou capacity (P.E.)  $n = 16 \times C$

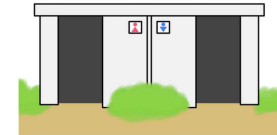
( C : Number of lavatory basin 総便器数 )

Ex. C=10 Public toilet 便器10個の公衆便所

$n = 16 \times 10 = 160$  p.e. 人槽(24m<sup>3</sup>/日)

$Q = 2.4 \text{ m}^3/\text{set}/\text{d} \times 10 \text{ sets} = 24 \text{ m}^3/\text{d}$

BOD = 260mg/L



10

## Application Overseas

海外での適応

●The JIS calculation standards are determined statistically based on survey (took several years for dozens of JSA companies) data such as drainage volume, number of population, and total floor area for actual construction purposes in Japan. It is reviewed and revised from time to time in response to changes in lifestyle.

JISの算定基準は、日本での実際の建築用途の排水量、使用人員、延べ床面積などの調査データ(JSA数十社で数年かかった)から統計的に定めているもの。時折生活様式の変化などに合わせ、見直し改定が行われている。

●When overseas, estimation of population should be done according to the lifestyle of the country.

海外では、その国の生活様式に合わせた算定を行うことが望ましい

11

# Johkasou - Installation



## OUTLINE

- Legal frame work of Johkasou installation
- Johkasou installation works

### Legal Framework for Johkasou Installation

3

The following items are listed in the Johkasou Act with regard to installation

#### Notification

Submit a notification of Johkasou installation to the competent authorities prior to construction

#### Installation

- Construction can only be performed by a business office registered in the prefecture that has jurisdiction over the area where the installation work is to be performed
- Installation or supervision by a national qualified Johkasou installer



### Johkasou Installation Flow

4

1	<b>Prior On-Site Survey</b>	Check installation location and delivery route
2	<b>Application for installation</b>	Submit notification of Johkasou installation
3	<b>Temporay work</b>	Site preparation
4	<b>Excavation</b>	Excavate to required depth
5	<b>Foundation</b>	Make a reinforced concrete slab
6	<b>Installation</b>	Install Johkasou on the base slab
7	<b>Filling water</b>	Fill the Johkasou with water
8	<b>Backfilling</b>	Backfill around Johkasou with sand
9	<b>Piping work</b>	Connect each piping
10	<b>Electrical work</b>	Install blower, pump, control panel and so on
11	<b>Upper concrete work</b>	Make a RC slab on Johkasou
12	<b>Trial operation</b>	Check Johkasou and equipment function
13	<b>Cleaning &amp; Handover</b>	Explain Johkasou to users



## Johkasou Installation - Prior On-Site Survey 5

**Purpose** To check the site conditions prior to Johkasou installation and ensure smooth installation

- Check Point**
- Sufficient area to install a Johkasou
  - Location and depth of inlet pipe
  - Treated water discharge point
  - Existing pipe and cable location
  - Ground water level
  - Special installation or not
  - Johkasou delivery route
  - Electricity and tap water availability
  - Blower and control panel location
  - Maintenance workability



## Johkasou Installation – Application for Installation 6

**Purpose** Ensure that Johkasou is properly install  
Ensure Johkasou model, capacity, install date and builder

- Documents**
- Notification of installation of a Johkasou
  - Notification of change of Johkasou
  - Johkasou card
  - Johkasou use start-up report
  - Johkasou owner change report
  - Notification of discontinued use of Johkasou
  - Notification of Johkasou out of use
  - Notification of Johkasou re-use start-up
  - Technical operator change report

浄化槽設置届出書

東京都知事 殿

設置者(申請者) 氏名  
住所(設置場所) 〒東京都千代田区千代田 千代田区千代田1-1-1  
電話番号

設置場所(設置場所) 〒東京都千代田区千代田 千代田区千代田1-1-1  
設置場所(設置場所) 〒東京都千代田区千代田 千代田区千代田1-1-1

1. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
2. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
3. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
4. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
5. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
6. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
7. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
8. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
9. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
10. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
11. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
12. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
13. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
14. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
15. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
16. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
17. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
18. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
19. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)
20. 設置場所(設置場所)	設置場所(設置場所)	設置場所(設置場所)

東京都千代田区千代田 千代田区千代田1-1-1  
設置場所(設置場所) 〒東京都千代田区千代田 千代田区千代田1-1-1  
設置場所(設置場所) 〒東京都千代田区千代田 千代田区千代田1-1-1

[https://www.kankyo.metro.tokyo.lg.jp/resource/general\\_waste/septic\\_tank/septic\\_tank\\_law.html](https://www.kankyo.metro.tokyo.lg.jp/resource/general_waste/septic_tank/septic_tank_law.html)



## Johkasou Installation – Temporay work 7

**Purpose** Prepare site for excavation can be done without problems  
Measure and determine the area to be excavated

- Description**
- Clearing the ground before installation
  - Decide where to install Johkasou
  - External inspection of the Johkasou



## Johkasou Installation – Excavation 8

**Purpose** For underground installation, excavate as per the drawing  
Underground installation allows for effective use of space

- Description**
- Excavate to the depth required in drawing
  - Use retaining walls if necessary
  - Use submersible pump if groundwater spring



- Point**
- Excavate about 5 cm larger than the size of the bottom slab to make it easier to work on



## Johkasou Installation – Foundation 1

9

**Purpose** Use rubble stones to harden the foundation

### Description

Make sure it has the necessary square footage  
Place rubble stones of unequal size  
Fill in the gaps with sand  
Stamp them sufficiently with a rammer



### Point

Thickness shall be in accordance to drawing  
Usually 100 mm or 150 mm (T-0)

PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Installation

11

**Purpose** Install Johkasou on base slab

### Description

Visual inspection of Johkasou  
Clean base slab (small stones, etc.)  
Lift Johkasou according to the manual  
Place Johkasou in the center of base slab  
Check Johkasou is installed horizontally  
Install wire to prevent raising by groundwater



PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Foundation 2

10

**Purpose** To install Johkasou horizontally  
Prevent Johkasou from being raised by groundwater

### Description

Place concrete 50mm thick on the rubble stone according to the drawing  
Make a temporary framework with the specific dimensions  
Rebar arrangement according to the drawings  
Install anchors according to the drawing  
Cast concrete with surface tolerance of  $\pm 2.5\text{mm}/1\text{m}$



PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Filling Water

12

**Purpose** To protect Johkasou from soil pressure  
To prevent the Johkasou from shifting during backfilling

### Description

Check Johkasou is secured with wires  
Fill Johkasou with tap water  
Make sure Johkasou is not leaking water



PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Backfilling

13

**Purpose** Protects Johkasou from UV light  
Fill in gaps for easier maintenance

### Description

Ensure Johkasou is filled with water  
Ensure backfill sand is free of stones and gravel  
Cover Johkasou to prevent sand from getting in  
Backfill and water tightening in three steps



PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Piping Work

14

**Purpose** Connect inflow pipe, effluent pipe  
Connect blower and Johkasou

### Description

Connect the inflow pipe and Johkasou  
Connect the effluent pipe and Johkasou  
Connect the blower and Johkasou with piping  
Air pipes shall be 10m in length and within 5 bends  
Install an exhaust pipe for surrounding area  
Install pipe supports if necessary



PROJECT CHANGE  
Daiiki  
AXIS

### Point

Be careful not to allow sand to enter the piping  
Check drawings for piping sizes and install

## Johkasou Installation – Electrical work

15

**Purpose** Install blower, pump, control panels...

### Description

Install a blower in a well-ventilated place  
Avoid direct sunlight on the blower  
Blower should be installed on flat concrete  
Provide grounding works as required



### Point

Air piping should be kept as sand-free as possible  
The platform for the blower should be about 200mm higher than the GL.  
Use header pipes if there is more than one blower

PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Upper Concrete Work

16

**Purpose** To prevent rainwater from entering the tank  
For easier maintenance works

### Description

Cast upper slab in same procedure as base slab  
Note that the reinforcement is different from the base slab



PROJECT CHANGE  
Daiiki  
AXIS

## Johkasou Installation – Trial Operation

17

**Purpose** Check for proper operation through a trial operation

### Description

- Check piping joint condition
- Check for air leakage
- Check if moving bed medias are moving well
- Check there is no difference in water level
- Check if the circulation volume can be set



DAIKI  
**AXIS**

## Johkasou Installation – Cleaning & Handover

18

**Purpose** Clean around Johkasou and Hand over the Johkasou to its user

### Description

- Clean up sand and trash
- Report to the user that the construction has been completed
- Inform users about proper use of Johkasou and precautions to be taken



DAIKI  
**AXIS**

## Johkasou Installation Reference

19

### Underground installation



### Half underground installation



### Above ground installation



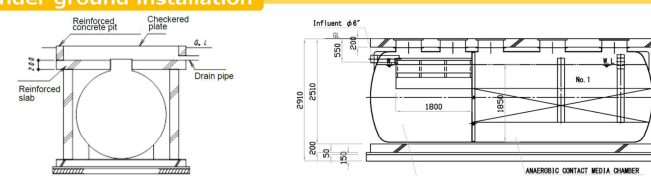
DAIKI  
**AXIS**

## References of Special Installation

20

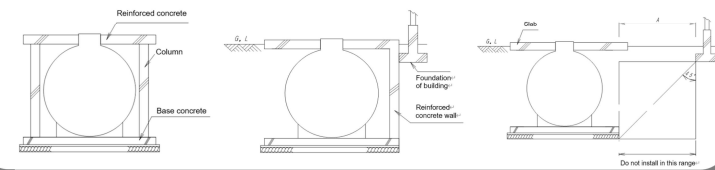
### Under ground installation

Inlet pipe position is lower



### Special installation

Load carrying capacity



DAIKI  
**AXIS**

Above ground	Under ground
Short construction period	Easy maintenance
Save the cost of construction	Utilization of space
Possible to relocate in the future	Ultraviolet no effect

We can chose some installation due to the site condition.

