



# Development of Decentralized Wastewater Treatment Facilities as Public Works ~ Case Study from Japan ~

30<sup>th</sup> November, 2021

Dr. Johkasou



環境省

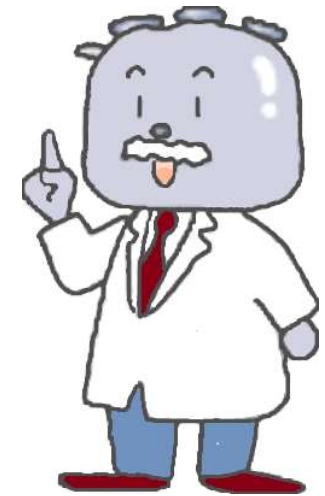
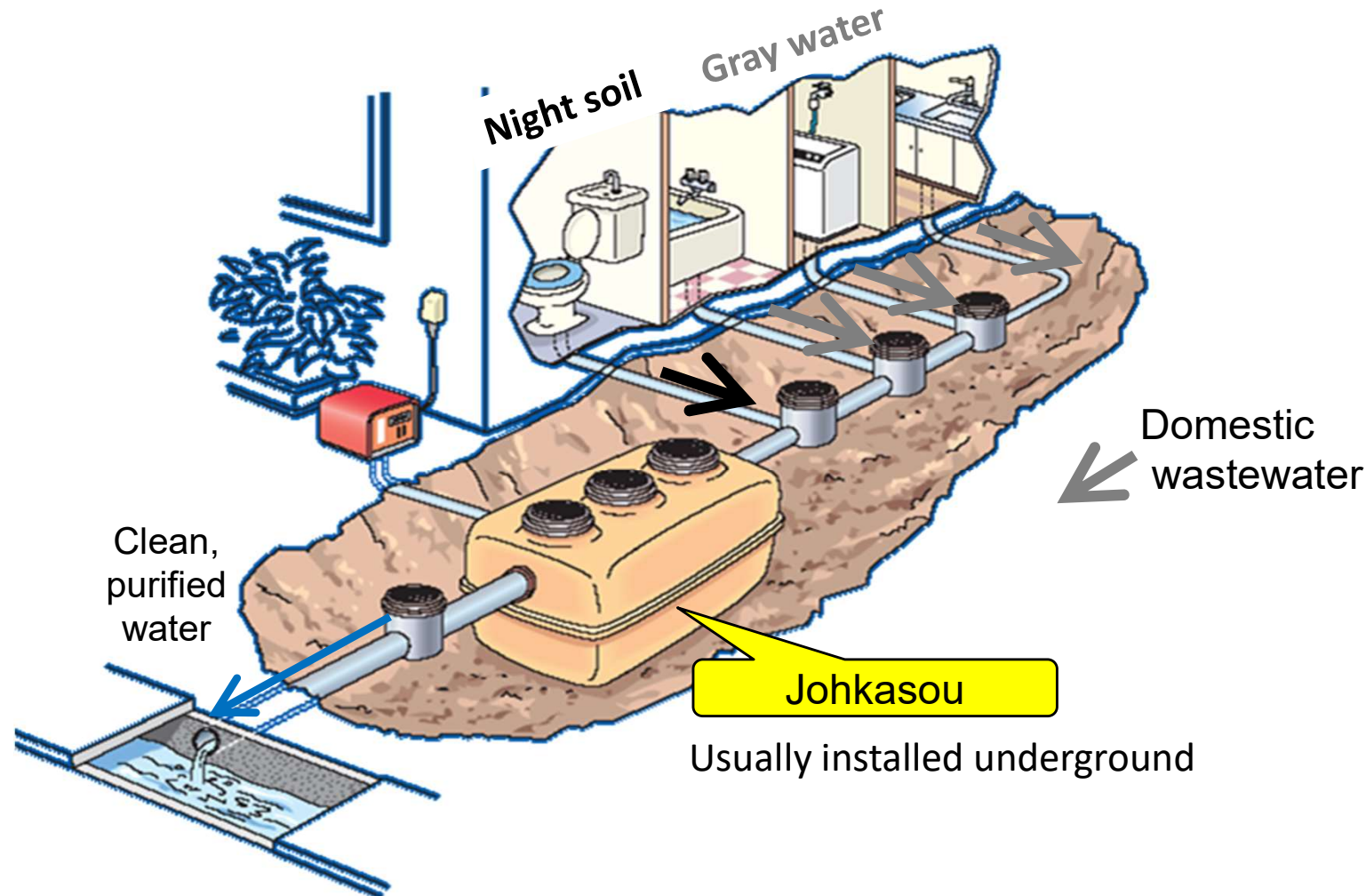
Ministry of the Environment  
Government of Japan

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

# General 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 domestic 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 3.8 million unit in Japan.

## Typical layout of small scale Johkasou setup for household



Dr. Johkasou

# History of Wastewater Treatment and Development of Measure in Japan

## ■ Water pollution in Japan during rapid economic growth



Sumida River (Tokyo) in '70s



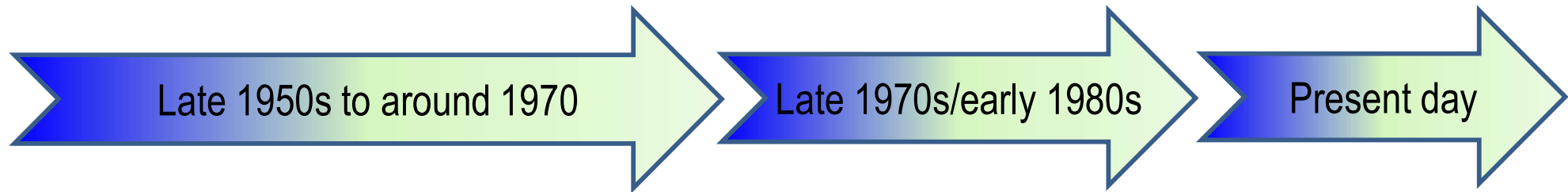
Dohkai Bay (Kitakyushu) in '60s



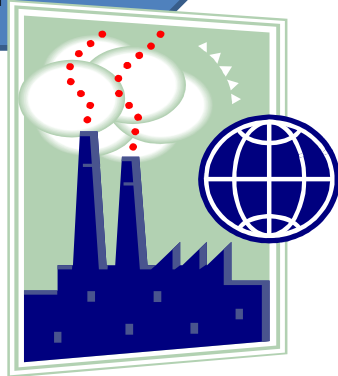
Chofu Weir, Tama River (Tokyo)  
in '70

# History of Wastewater Treatment and Development of Measures in Japan

## ■ Domestic wastewater issues and outcomes over time



Water pollution is an environmental problem



Domestic wastewater creates localized pollution

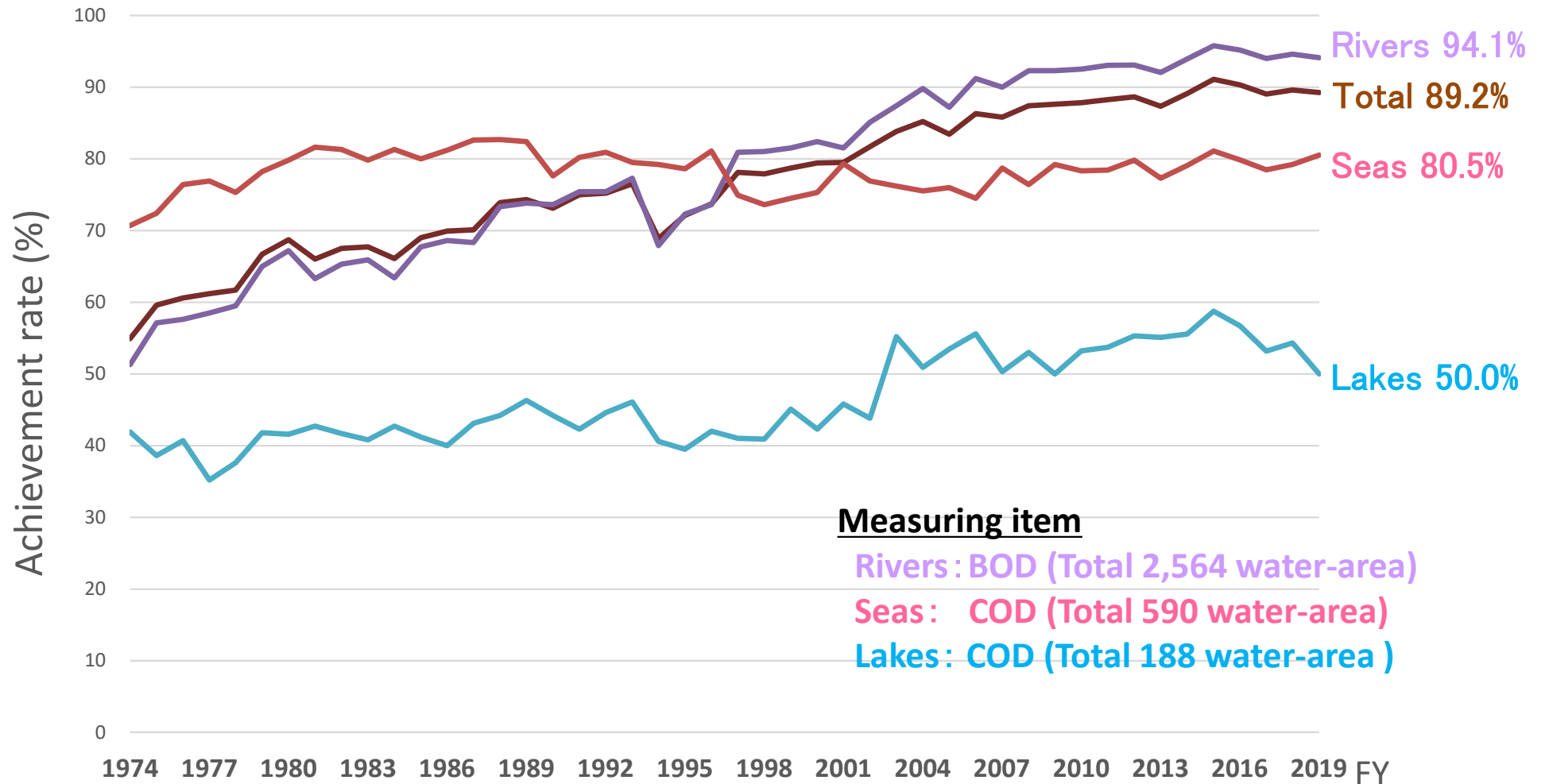


Widespread use of flush toilets

**Resolved by preventing the spread of contaminated water**

# History of Wastewater Treatment and Development of Measures in Japan

## Achievement of water quality standards related to domestic environmental standard



※Public waters water quality measurement results(2019)

# Current situation of Johkasou in Japan

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

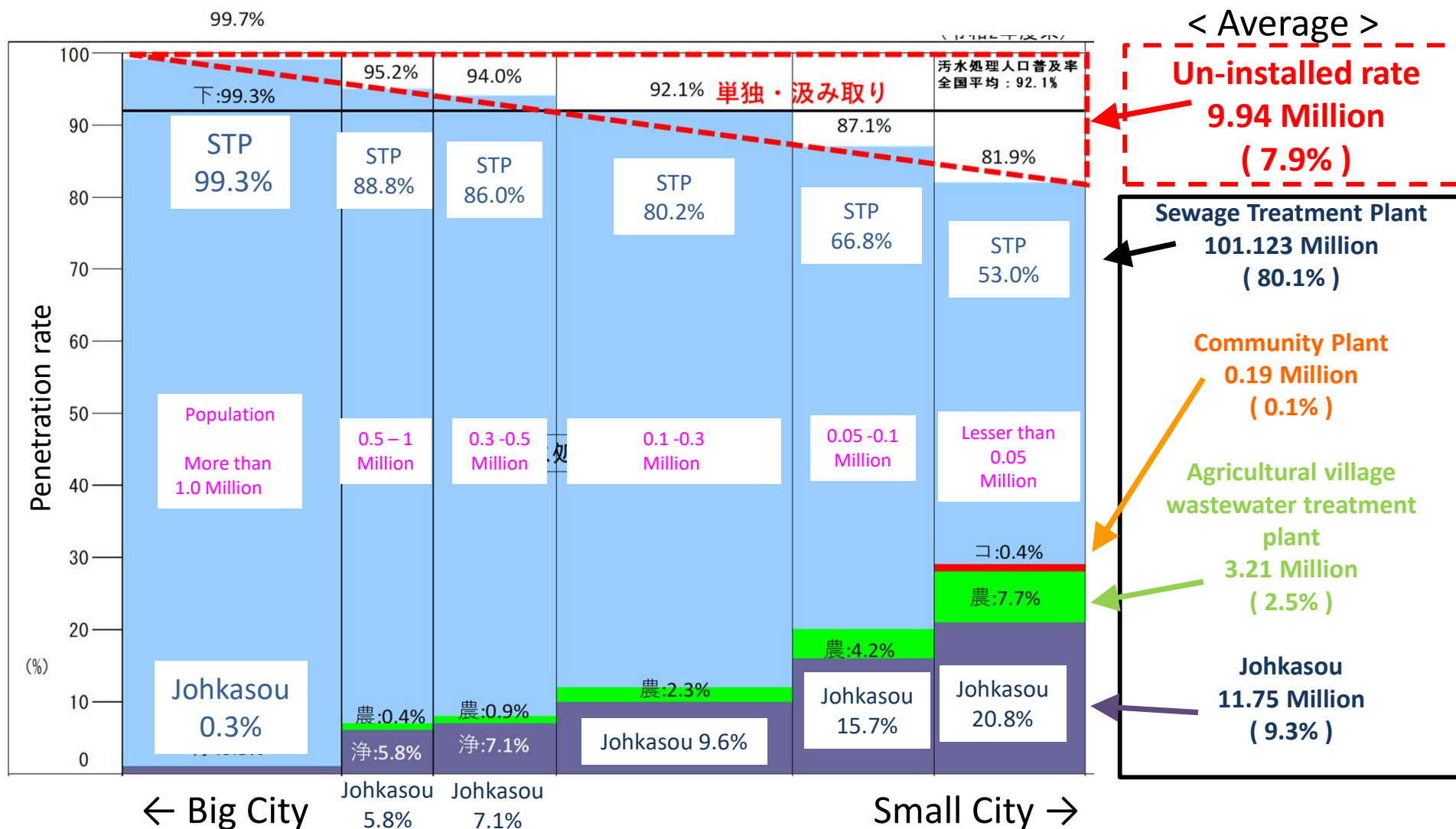
| Type of treatment facility   |   | Population served<br>(x 10,000 people) |               |
|--|---|--|---------------|
|  |   | End of FY2020                          | End of FY2019 |
| <b><u>Municipal sewage systems</u></b>   |   | <b><u>10,123(80.1%)</u></b>            | 10,113(79.7%) |
| Collective rural wastewater facilities, including<br>Facilities for fishing villages<br>Facilities for forestry villages<br>Simple wastewater facilities |   | <b>321(2.5%)</b>                       | 329(2.6%)     |
| <b><u>Johkasou</u></b>   |   | <b><u>1,175(9.3%)</u></b>              | 1,175(9.3%)   |
|  | Municipal Johkasou Installation Program       | <b>83</b>                              | 83            |
|  | Johkasou Installation and Maintenance Program | <b>618</b>                             | 615           |
|  | Other Johkasou                                | <b>474</b>                             | 477           |
| Community plants, etc.   |   | <b>19(0.2%)</b>                        | 20(0.2%)      |
| Total population served  |   | <b>11,637</b>                          | 11,636        |
| <b><u>Percentage of population served</u></b>  |   | <b><u>92.1%</u></b>                    | 91.7%         |
| Total population   |   | <b>12,631</b>                          | 12,684        |
| Total population not served  |   | <b>994</b>                             | 1,048         |
| <b><u>Un-installed rate</u></b>  |   | <b><u>7.9%</u></b>                     | <b>8.3%</b>   |



# Current Situation of Johkasou in Japan

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

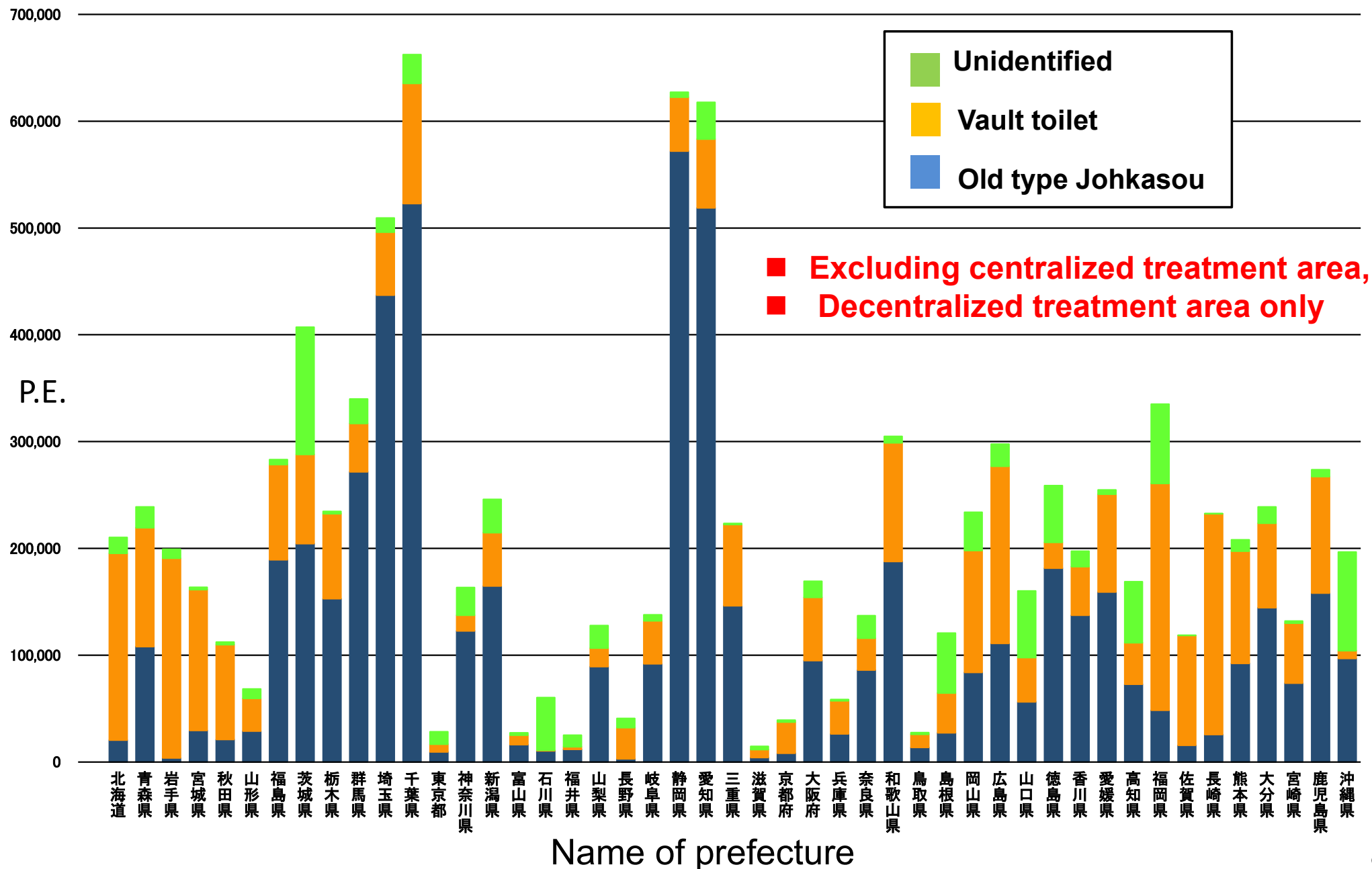
“Un-installed” means that , old-type-Johkasou has been installed or any type of wastewater treatment has not been installed.



Municipalities with a smaller population have higher un-installed rate of wastewater treatment system and higher installed rate of Johkasou

# Current situation of Jokasou in Japan

## Configuration of un-installed rate in each prefecture (End of FY 2020)





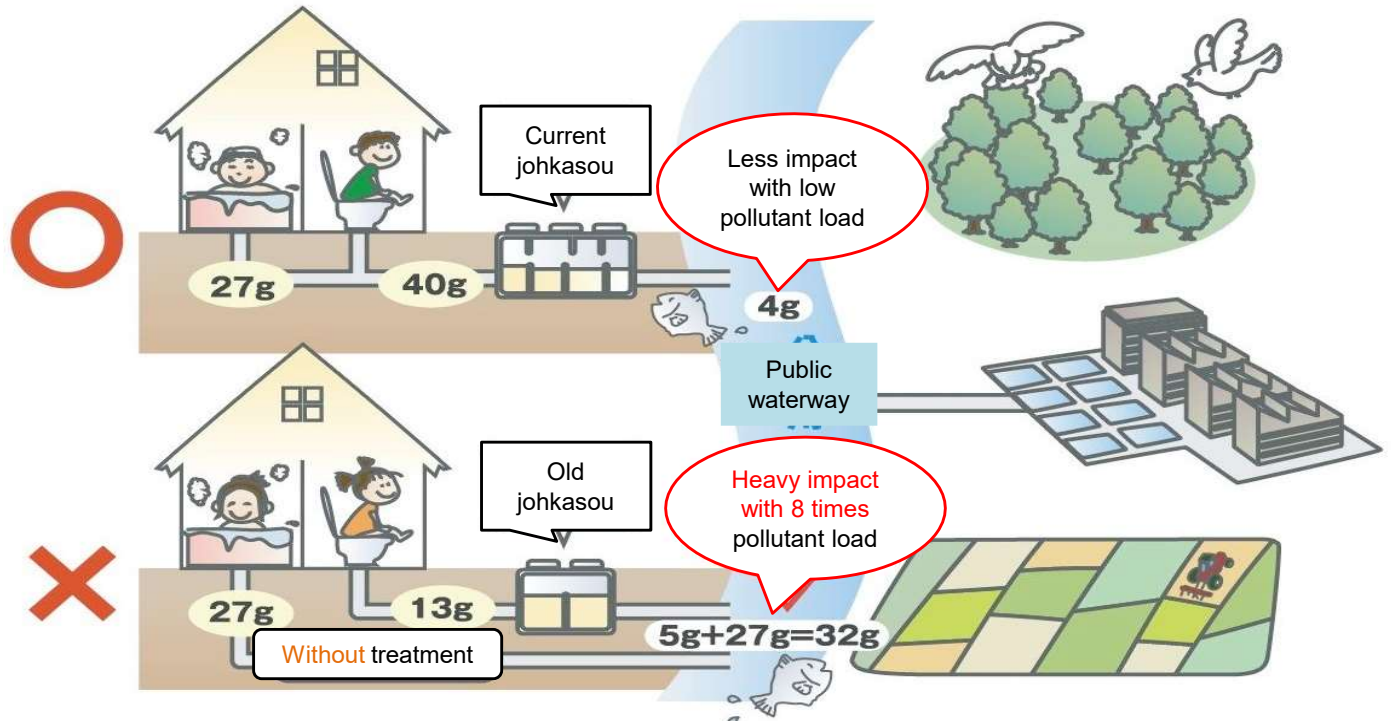
# History of Wastewater Treatment and Development of Measures

○ What is domestic wastewater?

**Domestic wastewater = Night soil (black water) + Gray water**

## ○ Current Johkasou

Both Night soil & Gray water  
Are treated.



## ✗ Old type Johkasou

Only Night soil is treated.

⇒ Heavy impact with 8 times

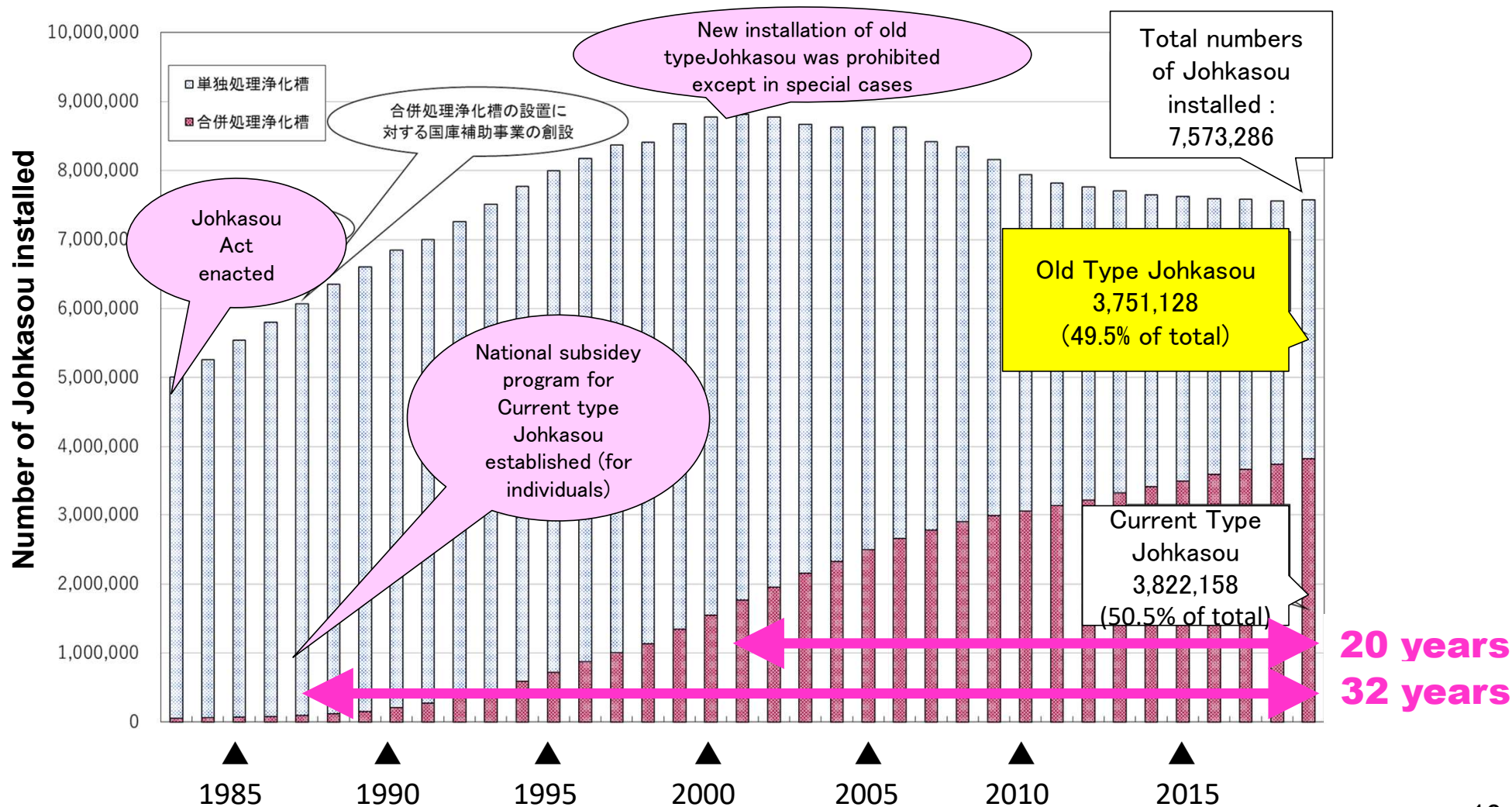
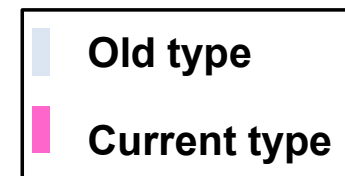
Discharge of untreated wastewater



# Current situation of Jokasou in Japan

## Configuration of old & current type Jokasou

- Though old type Jokasou was prohibited to install, approx. 3.8 million sets of old type Jokasou are still used in Japan.
- Encouraging the conversion to Current Type Jokasou is a big subject.



1. Conversion from old type Johkasou to new one

2. Installing Johkasou in a place  
where sewage system is not furnished



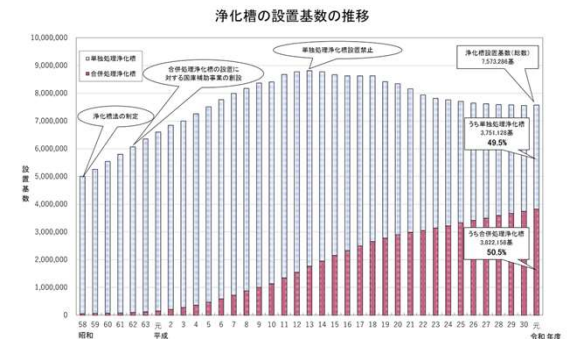
# Objective for accelerating the reduction of un-installed rate

## 1. Conversion from old type Johkasou to new one

### ■ Detail sequence for the conversion at site



### ■ Current status of the conversion:      ✓ Not so fast



### ■ Subject:

- ✓ No more incentive due to access to flush toilet
- ✓ Conversion cost for individual is not so cheap.

### ■ Counter measure:

- Law amendment
- Subsidy for installing Johkasou
- Additional subsidy for installing in-house piping works
- Furnishing and publishing the conversion manual
- Application of “Municipal installation project” scheme
- Application of Johkasou PFI project

# 1. Conversion from old type Johkasou to new one

## Counter Measure

### a) Law amendment:

| Year                | Item  |
|---------------------|---|
| 1960 to around 1980 | With increasing population of flush toilet, rapid installation of tandoku (old type) Johkasou to treat black water only   |
| 1983                | Johkasou Act enacted<br>(legislation introduced by a Diet member, came into force in 1985)  |
| 2000                | <b>Amendment: New installation of tandoku-shori (old type) Johkasou systems was prohibited</b>  |
| 2005                | <b>Amendment: Stricter water quality management systems introduced, defining water quality conservation targets</b>   |
| 2019                | <b>Amendment:</b> <ul style="list-style-type: none"><li>➤ <b>Strengthening the authority of prefectural governors for conversion from tandoku Johkasou (old type) to gappei Johkasou (current type)</b></li><li>➤ <b>Clarification for proceeding Johkasou installation as a public works</b></li><li>➤ <b>Others</b></li></ul> |

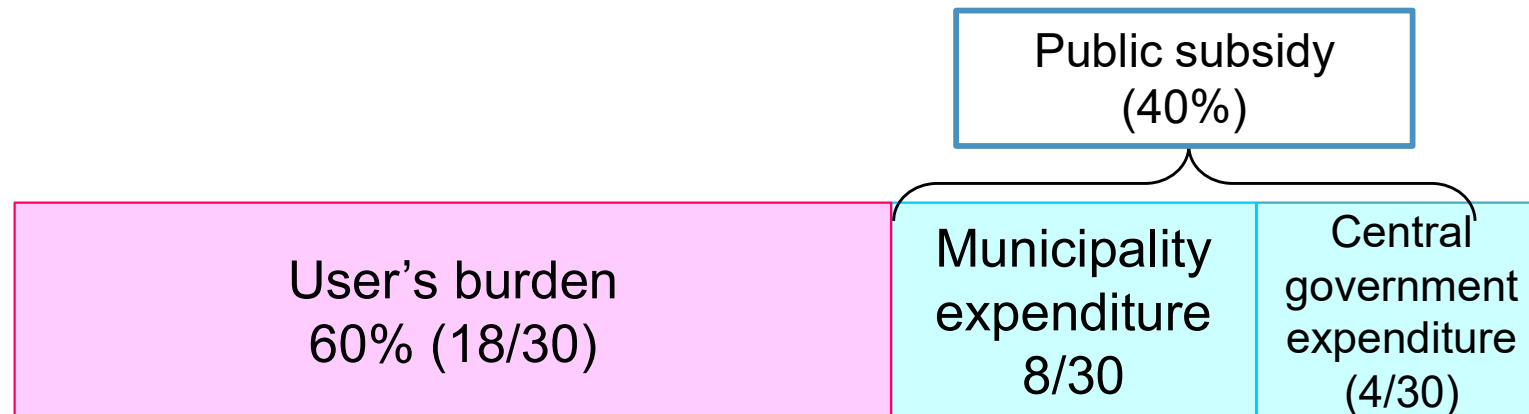
# 1. Conversion from old type Johkasou to new one

## Counter Measure

### b) Subsidy for installing Johkasou

## Subsidy for Johkasou private installation for house owner

- Subsidizes municipalities supporting their residents (private citizens) with current type Johkasou installation for Johkasou device fee and its installation fee



- Owner of Johkasou is responsible for operation and maintenance.

- Since 1987



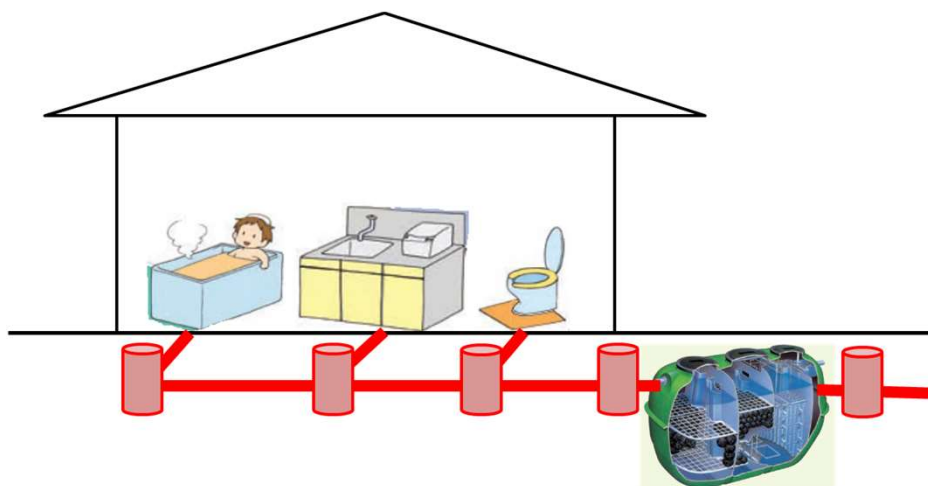
# 1. Conversion from old type Johkasou to new one

## Counter Measure

c) Additional subsidy for installing in-house piping works

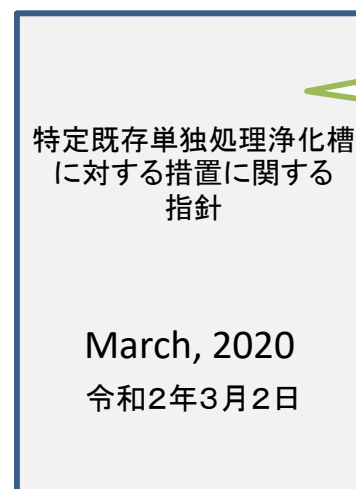
d) Furnishing the conversion manual

### c) Additional subsidy for installing in-house piping works



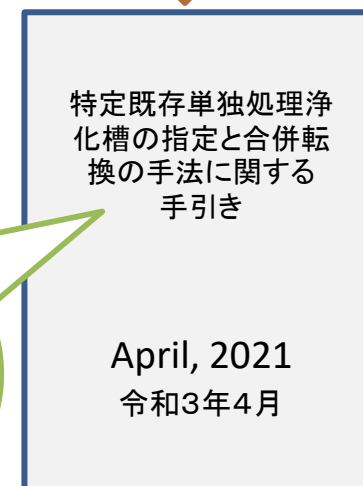
- Subsidizes municipalities supporting their residents (private citizens) for in-house piping work

### d) Furnishing the conversion manual



General  
guideline of  
judgement for  
conversion

In detail



Additional detail  
guidance for  
above general  
guideline by using  
flow-chart, figure,  
photo, etc..

# 1. Conversion from old type Johkasou to new one

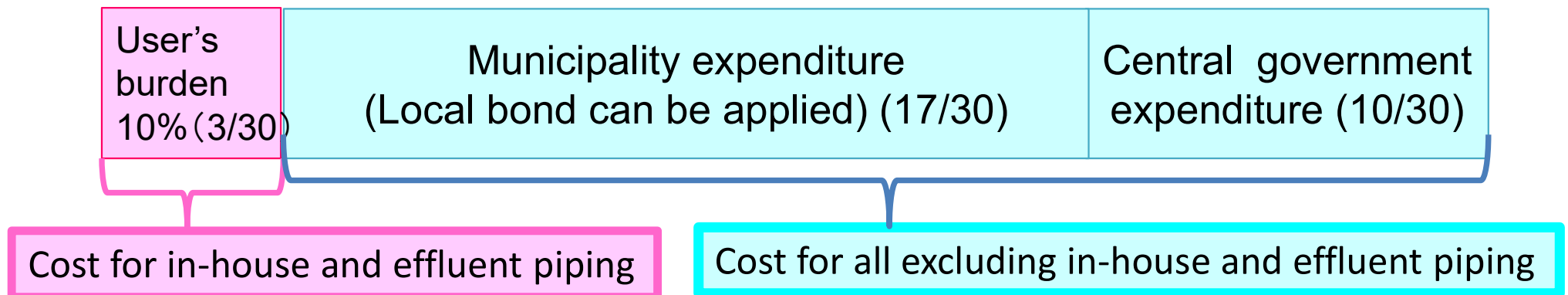
## Counter Measure

### e) Application of "Municipal installation project"

Ref: 300 projects as of 2016, total municipalities in Japan 1,718 as of 2021

## Johkasou Municipal Installation Project since 1994

- Municipal installs Johkasou as a public infrastructure like a Sewage treatment system and do O&M works with collecting fee from house owners.



- If applying this scheme, it would be more easier to convert old type Johkasou to current one due to municipality implement the conversion at once where many old type Johkasou are still remained.
- Disadvantage: Responsibility for finance and management would be a burden of Municipalities.

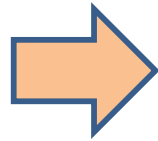
# 1. Conversion from old type Johkasou to new one

## Counter Measure

### ✓ f) Apprication of Johkasou PFI project

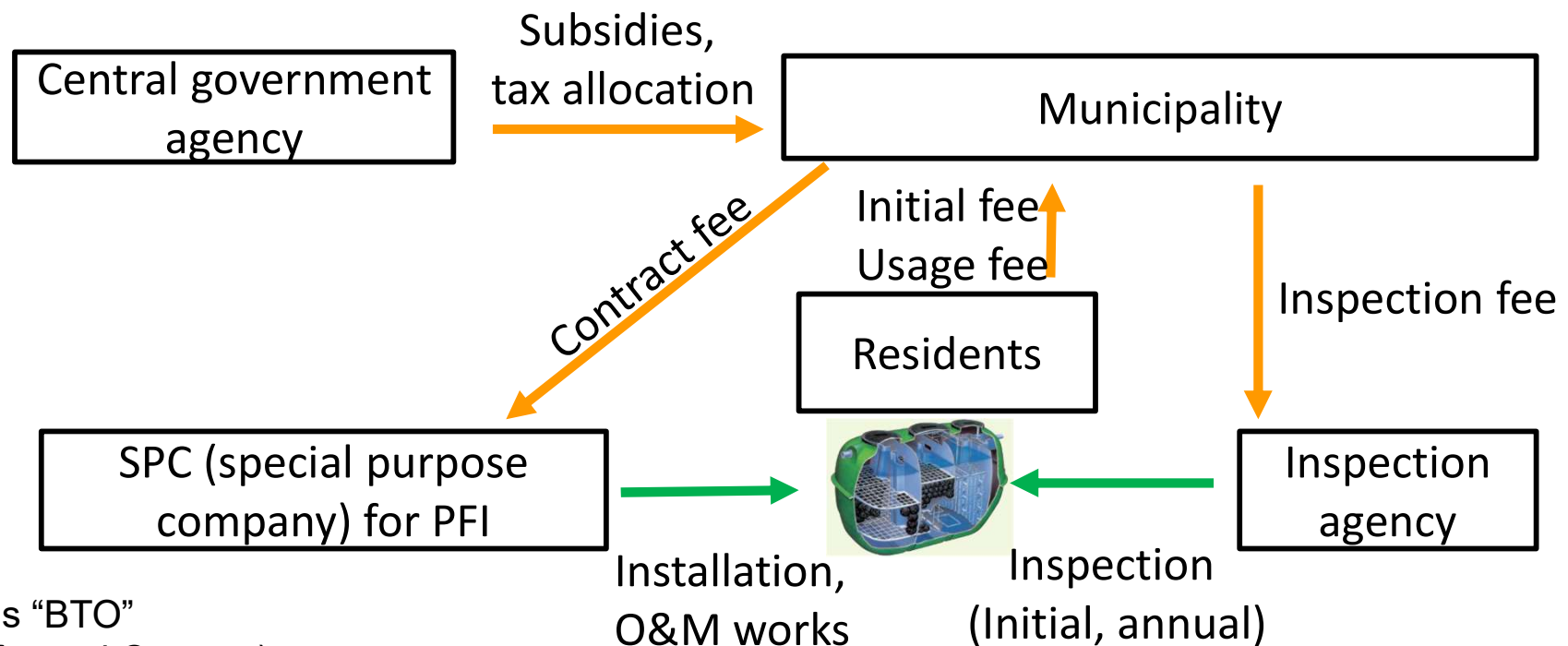
Disadvantage of Johkasou  
Municipal Installation

- Increase of financial burden on municipalities
- Increase of workload on municipalities without enough human-resource



Advantage of Johkasou PFI projects

- PFI operators are responsible for installation, operation and maintenance.
- Municipalities can utilize private financing, technology and know-how on business.
- Decrease of overall project cost and workload on municipalities, and improvement of residential services due to the bulk contract and implementation by private business.



Type of PFI is “BTO”  
(Built, Transfer and Operate)

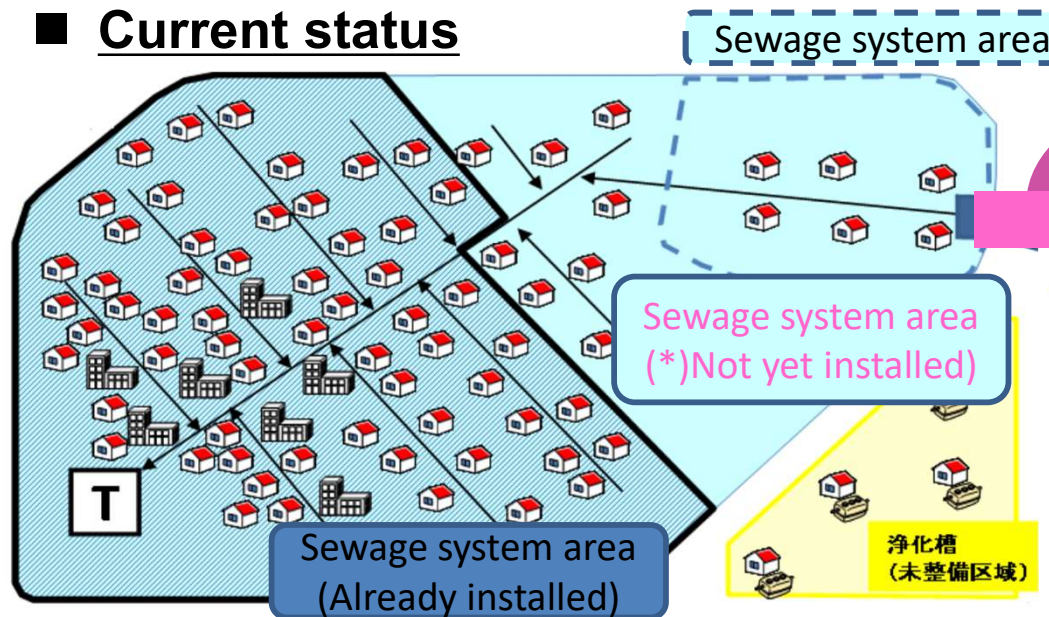
1. Conversion from old type Johkasou to new one

2. Installing Johkasou in a place  
where sewage system is not furnished

# Objective for accelerating the reduction of un-installed rate

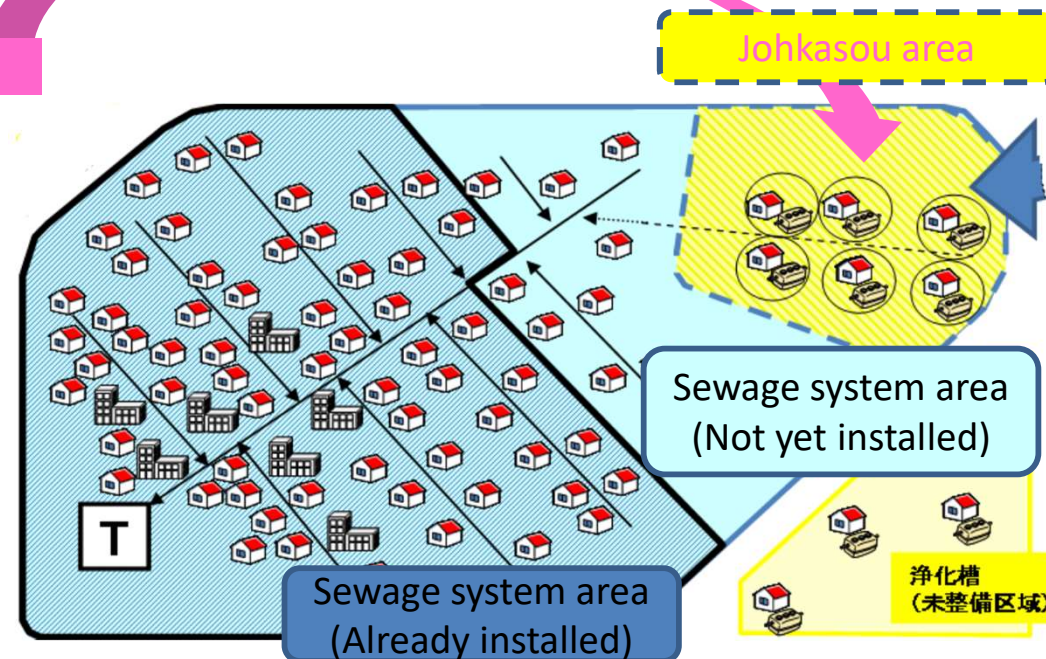
## 2. Installing Johkasou in a place where sewage system is not furnished

### ■ Current status



(\*) Not yet installed and more than 10 years would be needed for complete the Sewage system.

### ■ After optimization



### ■ Countermeasure:

g) Collaborating with Municipalities, Prefectures shall revise and optimize the area-plan for sustainable management of domestic wastewater. Then, some area would be changed from Sewage system area to Johkasou installation area.

(As of July 2020, 52 municipalities have optimized the area-plan)



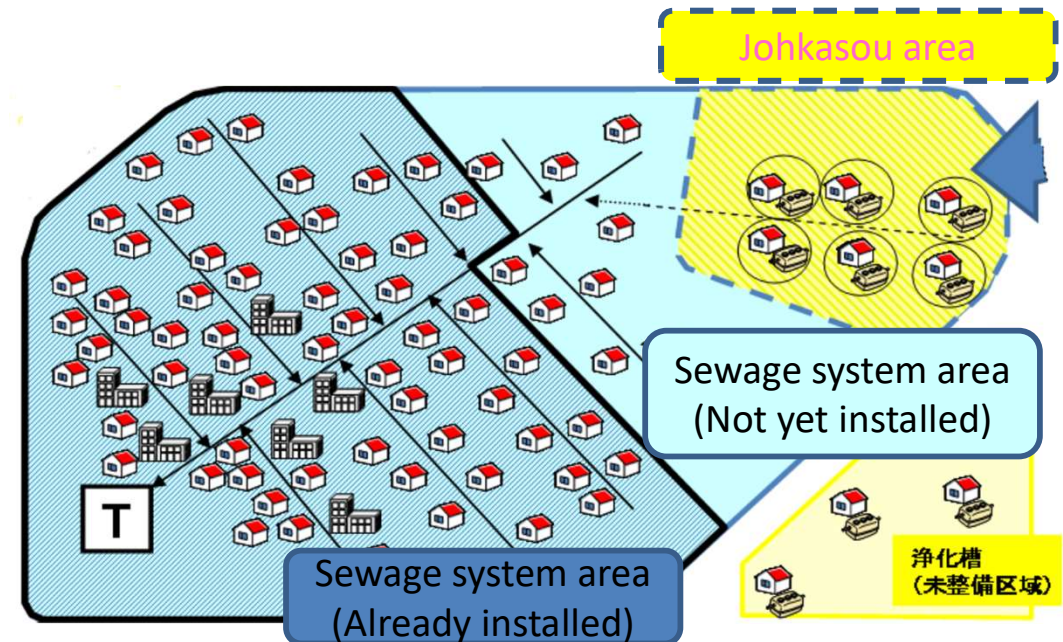
# Objective for accelerating the reduction of un-installed rate

## Counter Measure

### 2. Installing Johkasou in a place where sewage system is not furnished

#### ■ After Optimization of area plan

Same counter measures for accelerating Johkasou installation could be applied for revised Johkasou area



#### ■ Countermeasure: (Re-display)

- a) Law amendment
- b) Subsidy for installing Johkasou
- c) Additional subsidy for installing in-house piping works  
(for conversion )
- d) Furnishing and publishing the conversion manual
- e) Application of “Municipal installation project” scheme
- f) Application of Johkasou PFI project



THANK YOU FOR YOUR KIND ATTENTION.



At kikuchi gorge, Kikuchi City, Kumamoto Prefecture

