

# Introduction of a portable toilet system improving sanitation in heavily populated low-income and flood-prone areas

14<sup>th</sup> January 2021

- **A system pilot study with MOEJ is under tested in Palembang.**
- **The study shows the system is viable for Indonesia society.**

MOEJ: Ministry of Environment Japan

# About LIXIL Corporation

• **LIXIL is developing low-cost sanitary toilet for low-income area as a leading company of bathroom ware.**

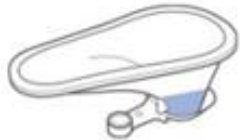
- LIXIL is one of the biggest bathroom ware manufacturers with INAX, American Standard and Grohe brands in the world.



- LIXIL is also promoting the spread of SATO toilet pan for pit latrine to improve sanitation of low income segment in the world.



Pour flush after business



Flapper opens by weight of water and feces.



After flush, closed flapper shuts odor and insects.



# Current condition of toilet in low income area

- **Low cost sanitary toilets is priority for low income and densely populated areas, where sewage network is not viable.**

- Approximately 10 - 40% of household in low income area in Indonesia has no toilet and release their human feces into water environment.
- Existing wastewater treatment system in Indonesia, such as septic tank, IPAL Komunal or centralized sewage system, are difficult to apply in low income area because of following special condition.



<Low land with flood>

Any existing wastewater treatment system is difficult to apply to low income area because the area is covered by flood water in rainy season.



<Narrow and complex road>

Roads in slow income area are narrow and complex. Vacuum car for wastewater collection cannot go inside and access to household.



<Lack of understanding>

Inhabitant in low income area has less idea to care water environment, caused by lack of understanding, and has not enough money for installing septic tank.

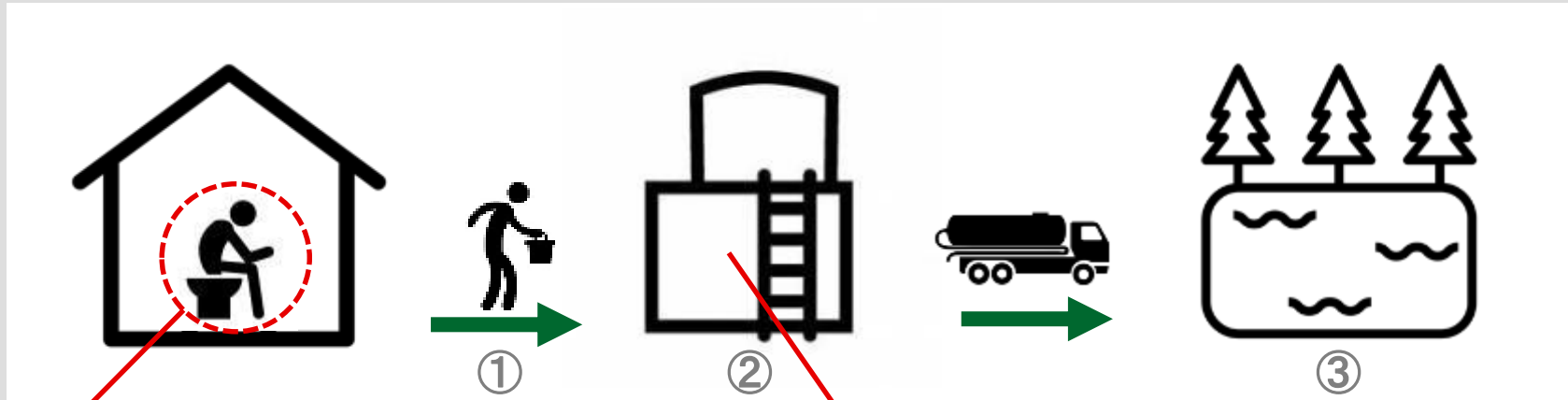
# Solution for low income area : PTS (Portable Toilet System)

- **Portable toilet, as a commodity, supported by a waste collection and treatment system, is a potential viable solution.**

- Considering hard condition in low income area, the best solution is to separate human feces away from the area and transfer to appropriate treatment facility.

## <Concept of PTS>

- ① Wastewater container is transported from household to station by operator.
- ② A vacuum truck suck and transport wastewater at sludge treatment facility.
- ③ Wastewater is adequately treated.



A toilet with a wastewater container is installed in each household.

A wastewater collection facility (Station) is installed in each community.

Collected human feces are treated in sludge treatment facility.

# Components of PTS: Toilet (Target price : <120K IDR)

- **Portable toilet is a simple product made in factory.**
- **It requires no electric or water tap.**
- **Household can set easily and maintain by themselves.**

Flush nozzle



Bidet shower



<Why not squat style ?>

- Squat style is the most popular in Indonesia. So, our first demo toilet was squat style. However, the amount of rinsing water was too much and container became full easily. To reduce rinsing water, we introduced “flush and bidet shower by hand pump” function. This function is only applicable to sitting type toilet. Through pilot test, we understood sitting type toilet is acceptable to people. Also, we got comment that sitting type is friendly to elderly.

# Components of PTS: Station (Target price : <24M IDR)

- **“Waste collection station” is a compact (mobile) facility.**
- **It doesn't require heavy labor, unsanitary work and electricity.**
- **Once a week collection would be necessary for a household.**



Fresh water tank

Container installing unit

Handle for washing container

Wastewater storage tank

Drain hose



## <Function of the Station (wastewater collection facility)>

- Transferring wastewater from container without contamination
- Storing wastewater
- Washing inside of container by fresh water with semi-automatic operation

## <Special feature of the Station>

- Hygienical
- Systematic (short operation time)
- Mobile (on truck)
- No electrical components

# Pilot Test Photos in Palembang (Feb 2020)

- A Pilot test was done with Palembang City for 25 house holds for three weeks. The city operated the mobile 'Station'
- Collected waste was treated at City's existing treatment plant.



Toilet installation



Transport by user



Toilet installation



Transport by user



Transport by operator



Station



Collection by operator



Station

# Toilet User Interview in Pilot Test (Feb 2020)

- Interview of 25 household shows 'Satisfaction' in all parameters.
- User wish to pay 150K (Toilet) , 25K IDR per month (Service).

Items		Area 1	Area 2
General info	Age	40.8	52.5
User	On average how many people daily use the toilet in your family ?	3.7	3.9
Operability	Seat and Seat Cover	4.1	4.2
	Shutter	4.0	4.2
	Pumping for Bowl Flushing and Bidet Shower	4.1	4.0
	Valve switching for Bowl Flushing and Bidet Shower	4.1	4.0
	Water Refilling	4.2	4.2
	Detaching the container	4.0	4.0
Cleanliness	Odor	4.2	4.3
	Insects	4.3	4.3
	Dirt around the Bowl	3.9	4.0
	Dirt around the Seat	4.1	4.0
	Dirt around the Shutter	4.1	4.2
	Dirt around the Shower Nozzle	4.0	4.0
Size	Hight and Plane Size of the Seat	4.2	4.2
	Bowl	4.2	4.2
Comfortability	Is Flush enough to clean the bowl ?	YES 15/15	YES 10/10
	Is Bidet Shower enough to wash your body ?	YES 10/15	YES 10/10
Careability	Is this toilet easy to clean?	YES 15/15	YES 10/10
Safety	Have you ever felt danger ?	YES 0/15	YES 0/10
General	Are you willing to continue using this toilet ?	YES 15/15	YES 10/10
	Do you have any other requests for improvement ?	YES 0/15	YES 0/10
Toilet Price	How much is your suitable price to buy this toilet ?	196,000	93,500
Service Price	How much is your suitable price as station usage fee ?	13,333	7,500
	How much is your suitable price as container collection fee ?	11,667	11,250

5 Excellent  
↔ 1 Poor



# Profit and loss analysis for operation

- **Estimated : Toilet product cost: 120K IDR /unit,**  
**Service operation cost 25K IDR/month/Household**
- **A small addition to the service fee will be benefit the operator.**

- 150K IDR of toilet price survey covers product cost of 120K IDR.
- Operation cost balance of 25K IDR/month/household can be estimated as break even.

## Revenue

Monthly service charge

$25 \text{ K IDR/Month/HH} \times 100\text{HH} = 2,500 \text{ K IDR/Month}$

## Expenditure (Station Cost ※)

Depreciation (For 10 years)

$24 \text{ M IDR} / 120\text{Month} = 200 \text{ K IDR/Month}$

## Expenditure (Operators Wage ※)

Container collection, Station Maintenance

$1,000 \text{ K IDR/Person/Month} \times 2\text{P} = 2,000 \text{ K IDR/Month}$

## Expenditure (Vacuum Track)

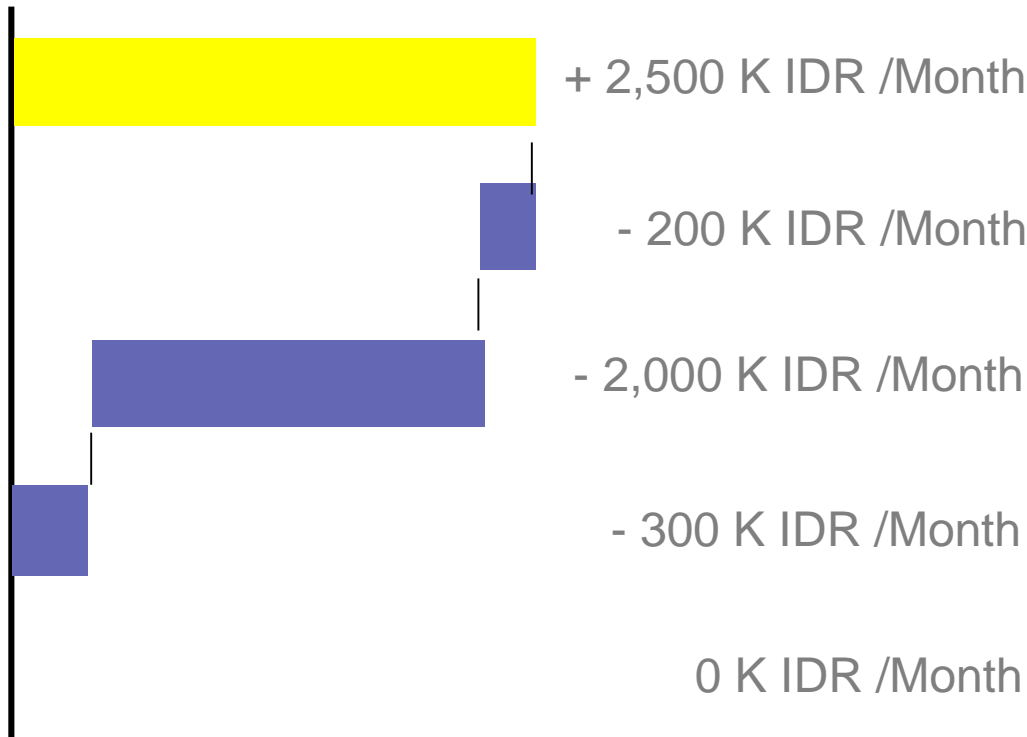
Desludge (Waste Volume 2L/HH/D)

$6\text{m}^3/100\text{HH/Month} \times 100\text{HH} \times 500 \text{ IDR/m}^3$

$= 300 \text{ K IDR/Month}$

## Balance

0 K IDR /Month

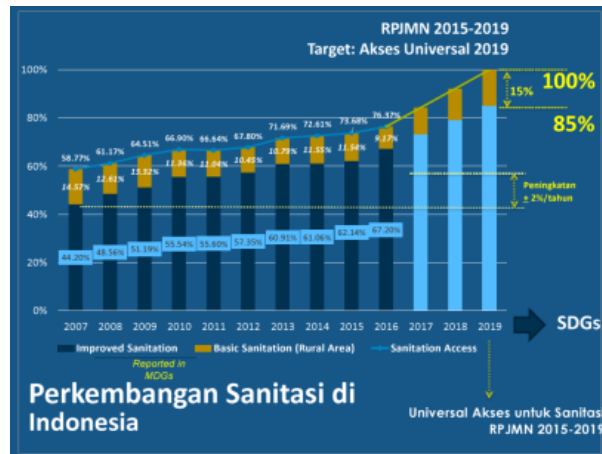


# Contributions to people and government

- **It gives huge benefits for people and their government.**
- Privacy protection and enhancing quality of life (QOL)
  - People in low income area don't need to borrow neighbor's toilet nor defecate above river anymore.
- Improving water environment and reducing risk of disease
  - Contamination by human feces causes diarrheal disease and parasitosis. Risk of these disease would be reduced.
- Creating new local employment
  - People can be hired as operators or related activities.
- Accelerating the sanitation program (national action of 100-0-100).



Children swimming in a river



Source: PUPR presentation

<b>AGENDA NASIONAL 100-0-100</b> <b>RENCANA PEMBANGUNAN JANGKA MENENGAH NASIONAL 2015-2019</b>	<b>SPM 85% : Peningkatan Akses Sanitasi Layak</b> ✓ 85% SPALD-S ✓ 15% SPALD-T	<b>15% Akses Sanitasi Dasar:</b> Untuk daerah pedesaan dengan kepadatan rendah dan sanitasi yang kurang memadai
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National target for sanitation

# The way forward

## IMPORTANT FINDINGS of the pilot test

- Public sector can provide a set of products to community, or subsidies the household to purchase them, much less cost than installing conventional sewage system.
  - Once they have products, they maintain them and enjoy sanitary / clean environment.
- LIXIL has been looking for possible partners operating projects.  
(Low income area community, NGO, Government, Private sector)

### Ideal Business Model



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