TESTING SYSTEM FOR DECENTRALIZED WASTEWATER TREATMENT IN INDONESIA

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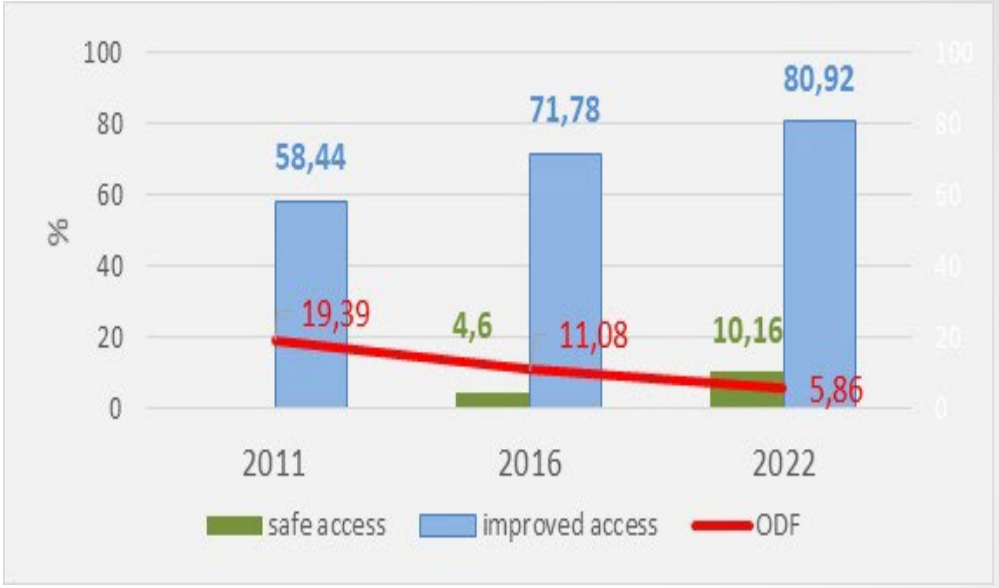
Decentralized wastewater treatment in

existing condition

- **The growth of wastewater infrastructure access in 2011-2022: ±2% per year**
- **Wastewater system: individual system (77,2%) and communal system (10,4%), centralized system (3%)**
- **Decrease of open defecation in 2011-2022: ±1,2% per year**

(Source: Indonesian Ministry of National Development Planning, 2023, Ministry of Public Works and Housing /PUPR, 2024)

wastewater access



About 9,29% desludging of decentralized wastewater to Fecal SludgeTreatment Plant (FSTP)

- Total 320 plants (in 38 province): 193 plants operated well, 79 plants not operated.
- Total 206 cities have no FTSP

NATIONAL TARGET OF DOMESTIC WASTEWATER INFRASTRUCTURE

Target in 2024

- **Improved access : 90% (80,92%)**
- **Safe access : 15 % (10,16%)**

Target 2030

- **Improved access :100%**
- **Safe access :15%**

2045

- Improved access: 100%
- **Safe access : 53,7% (87% of desentralized WWTP)**

President Instruction (Inpres) No. 1/2024 ; Acceleration of water supply and domestic wastewater service

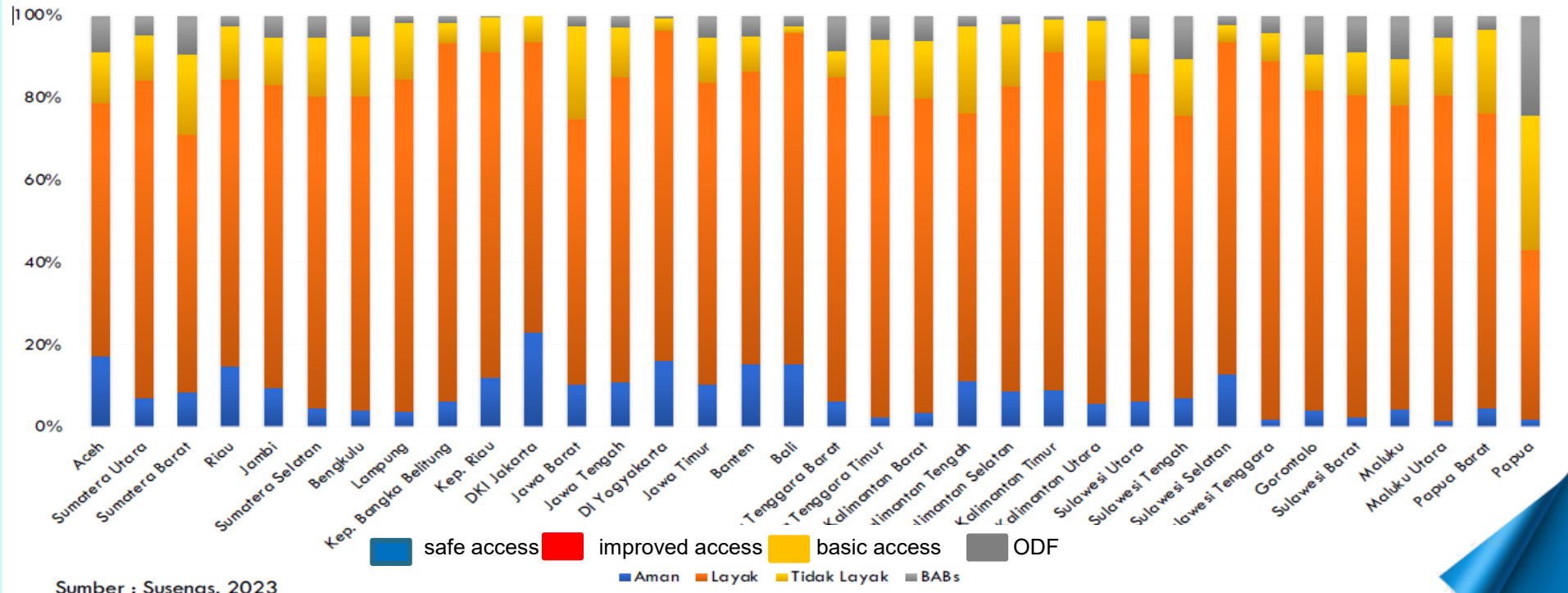
Target for 1.1 M household in 2024 (4,200,000 people)

- Individual/communal treatment
- Sewer system
- Septage transportation

LOCAL REGULATION AND WASTEWATER ACCESS

Local regulation → **126 cities from total 514 cities**

Wastewater access in 38 provinces



Sumber : Susenas, 2023

Effluent Standard of Domestic wastewater treatment

Parameter	Province				
	Jakarta No.122/2005	Middle Java No.5/2012	Yogjakarta No.7/2016	East Java N0.72/2013	South Sulawesi No.69/2013
pH	6-9	6-9	6-9	6-9	6-9
TSS (mg/L)	50	100	75	50	100
BOD_5 (mg/L)	50	100	75	30	75
COD (mg/L)	80		200	50	100
Oil Grease(mg/L)	10	10	10	10	5
Ammonia (mg/L)	10				5
Detergent (mg/L)	2		5		1
Coliform (MPN/100 ml)			10,000		

National standard : no.68/2016

pH	**6-9**
BOD	30 mg/L
COD	100 mg/L
TSS	30 mg/L
Oil & grease	5 mg/L
Ammonia	10 mg/L
Total Coliform	3000 /100 mL

TYPE OF DECENTRALIZED WASTEWATER TECHNOLOGY

- Individual system (4-5 capita)
  - pit latrine
  - Conventional septic tank
  - Prefabricated septic tank/biofilter tank
- Communal – onsite system (10-50 people)
  - Conventional septic tank
  - Prebaricated septic tank/biofilter tank
- Communal-offsite system (50-20,000 people)
  - Anaerobic Baffled reactor (10-250 people)
  - Biofilter tank
  - Rotating biological contactor
  - etc

Prefabricated septic tank/biofilter tank

Conventional system (concrete structure) –individual and communal

BACKGROUND OF TESTING BODY FORMATION IN MINISTRY PUPR FOR EVALUATION OF WASTEWATER TREATMENT PLANT

Organization:
-Inspection body in 2012-2019: research institute for human settlement, Bandung city
-Inspection body in 2020-now: sanitation technology division, Surabaya city
(inspector include the old inspection body)

The high demand of prefabricated wastewater tank and have vary quality of material tank and treatment process

Some prefabricated tank often face problems of effluent quality, leaking, tank material inappropriate treatment design/component

Mostly manufactures have no wastewater treatment expert, vary design criteria, regular material test, workshop limitation.

Ministry of Public works and housing /PUPR has responsibility for development, technology guideline/standard availability, training or facilitation of wastewater technology

EXISTING TESTING FOR DECENTRALIZED WASTEWATER PERFORMANCE

INSPECTION BODY (certified by national accreditation committee)

Existing testing- after product application

Manufacture proposal

Documnet evaluation: design, water quality, material, organization, etc

inspection in the field : treatment performance, workshop

Inspector analysis: design evaluation, laboratory analysis, recommendation

Certificate and inspection report, valid for 4 years

-Sell products in the market

-goverment procurement

Manufactures:
- -experience min.3 years
- - only for prefabricated tank
- - documents

Evaluation according to standard of technology, water quality, material

Inspection in the field

- Product application : one communal tank or min. 2 unit for individual tank
- inspected product as proposed design
- well operated plant
- composite water quality test: 3 to 5 days
- Workshop inspection: dimension, leaking test, production, organization, etc.

EXISTING TESTING FOR DECENTRALIZED WASTEWATER PERFORMANCE

BALAI TEKNOLOGI SANITASI
Sigap Melayani, Terus Berinovasi

- website http://103.154.122.42/layanan/inspeksi

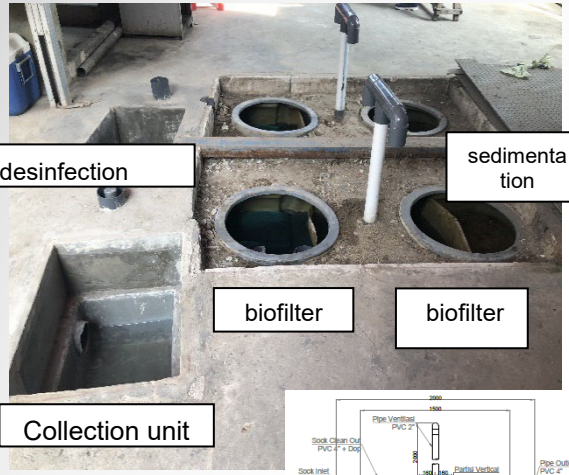
DOKUMENTASI INSPEKSI

Inspeksi Lapangan IPAL Individu (Tangki Septic)

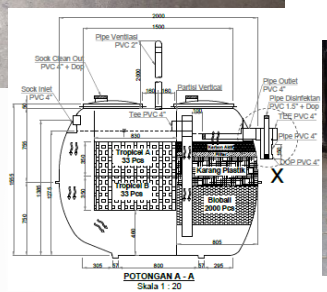
DAFTAR PRODUSEN IPAL TERSERTIFIKASI

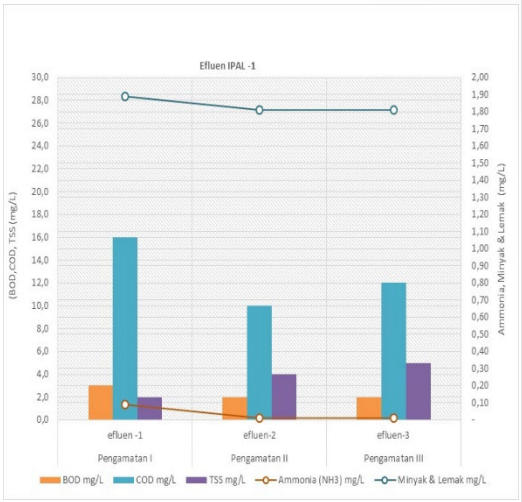
[redacted]	Bahan/ Konstruksi	Kapasitas	No. Sertifikat	Tahun	Masa berlaku	Sertifikasi Oleh
[redacted]	*Fiber Reinforced Plastic* (FRP)	1 m^3	001/STF/INSPEKSI-BTS/Ch/2022	2022	12 Juli 2022 – 12 Juli 2026	Balai Teknologi Sanitasi
[redacted]	*Polyethylene* (PE)	0,8 m^3	002/STF/INSPEKSI-BTS/Ch/2022	2022	19 Agustus 2022 – 19 Agustus 2026	Balai Teknologi Sanitasi
[redacted]	*Fiber Reinforced Plastic* (FRP)	50 KK	003/STF/INSPEKSI-BTS/Ch/2022	2022	19 Agustus 2022 – 19 Agustus 2026	Balai Teknologi Sanitasi
[redacted]	Baja dilapis *Fiber Reinforced Plastic* (FRP)	80 m^3/hari	001/STF/INSPEKSI-BTS/Ch/2021	2021	2 November 2021 - 2 November 2025	Balai Teknologi Sanitasi
[redacted]	*Polyethylene* (PE)	12 Orang	002/STF/INSPEKSI-BTS/Ch/2021	2021	15 November 2021 - 15 November 2025	Balai Teknologi Sanitasi
[redacted]	*Fiber Reinforced Plastic* (FRP)	3 x 100 m^3/hari	003/STF/INSPEKSI-BTS/Ch/2021	2021	23 Desember 2021 - 23 Desember 2025	Balai Teknologi Sanitasi
[redacted]	-	50 KK	003/Sert. Uji/PNBP/2020	2020	21 April 2020 – 20 April 2024	Puskim

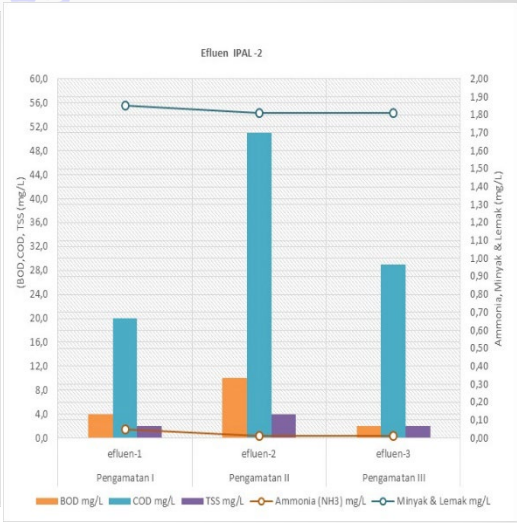
EFFLUENT QUALITY OF BIOFILTER TANK IN HOUSING AREAS



Testing of individual tank in the field



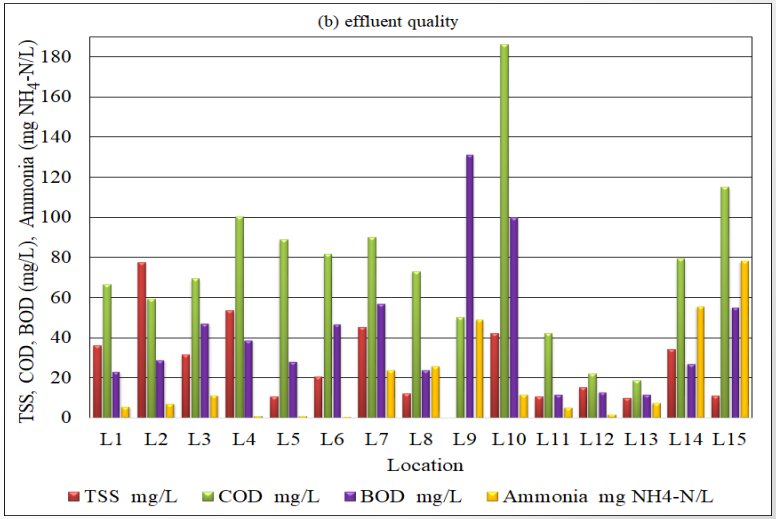




effluent quality of 15 communal tank (50 HH) every 6 months in 3 years

effluent index

a. skala 1 (>105): heavily polluted
b. skala 2 (85-105): moderately polluted
c. skala 3 (65-85): lightly polluted
d. skala 4 (< 65): meet standard



Background of national standard for improvement performance evaluation method

Existing test

- The existing performance test in the field application often influence by water supply availability, capacity, poor maintenance, environment disturbance
- The number of composite sample of water quality depend on nearest laboratory
- The need repeat water sampling and repair product in some cases

Manufacture

- some design or component of product is hard to change if some inspection result no meet criteria design while product had already applied widely

Field application

- Some certified product application have failure in installation, no meet effluent standard

The reliable testing method to achieve good quality of prepabrication tank

The performance of testing method should be developed based on the test period, wastewater characteristic, flow pattern, loading factor, materials and structures as well as periodic monitoring of production and application

All the products in the market/project must have a certificate which based on the result of the performance test

Manufacture will more capable in design, seeding process, easy for repair the product .

Indonesian National Standard (SNI) No. 9161:2023; method for performance testing of domestic wastewater treatment

ROLE AND OVERVIEW OF THE EXISTING AND RELIABLE TESTING SYSTEM

No	Criteria	Existing Testing Method (after application product)	Expected Testing Method (In the laboratory) according to SNI 9161/2023
1	Pra testing	Site preparation: Total user according to capacity, operated well, desludging, no flood, safe environment, etc.	Pratesting in laboratory max.12 weeks a. Product instalation at laboratory b. Operation by addition sludge artificial c. Operation at seeding stage
2	Capacity	Individual tank or communal tank	Individual tank or smallest product
3	Water quality sampling periode	3-5 days, composite every 3-4 hours (depend on laboratoty distance)	a.Daily monitoring: pH,T, b.Weekly monitoring: min. 10 weeks
4	Wastewater	real wastewater	Real and artificial wastewater
5	Testing at loading rate	Sampling at high and normal loading rate	Testing at normal, high and low loading rate: minimum 12 weeks
6	sludge	measurement of sludge high at every process unit	Performance measurement by artificial sludge

Real wastewater influent (but try to follow SNI 9163-2023)
Problems:
-water supply is often limited
-existing capacity doesn't match design

Wastewater influent (real & artificial)

	pH	BOD (mg/L)	COD (mg/L)	TSS (mg/L)	NH_4-N (mg/L)
Minimum	5,8	150	180	120	10
Average	7,2	200	420	160	27,5
Maximum	8,6	350	550	200	45

ROLE AND OVERVIEW OF THE EXISTING AND RELIABLE TESTING SYSTEM

No	Criteria	Existing Testing Method (after application product)	Expected Testing Method (In the laboratory) according to SNI
7	Tank structure	a.In workshop: dimension, thickness, composition, leaking test, pressure test b.In laboratory : sample material	In laboratory : sample material and test at full scale (leaking test, pressure test, loading test, pit test)
8	certificati on	Valid for 4 years at an inspected product has certain capacity or treatment process. Manufactures have apply often certification for vary capacity	Valid for certain design or treatment process at planned capacity

Test pit in Ministry PUPR

Leaking test in manufacture

FRP Material test in laboratory of Ministry PUPR

Test	Tank Material			
	concrete	FRP	Polyetilene	Steel
Water test	✓	✓	✓	✓
Vacuum test		✓	✓	✓
Pneumatik pressure test		✓	✓	✓
Pit test	✓	✓	✓	✓

Implementation situation for establishment the reliable testing center

Promote reliable testing method according to SNI 2023: to sanitation division, local government, university, research center

The pilot plant of performance testing facility had been developed in Bandung's Water company for standard validation.

The tank structure testing facility and laboratory developed in Ministry of PUPR to support research or special evaluation for some product.

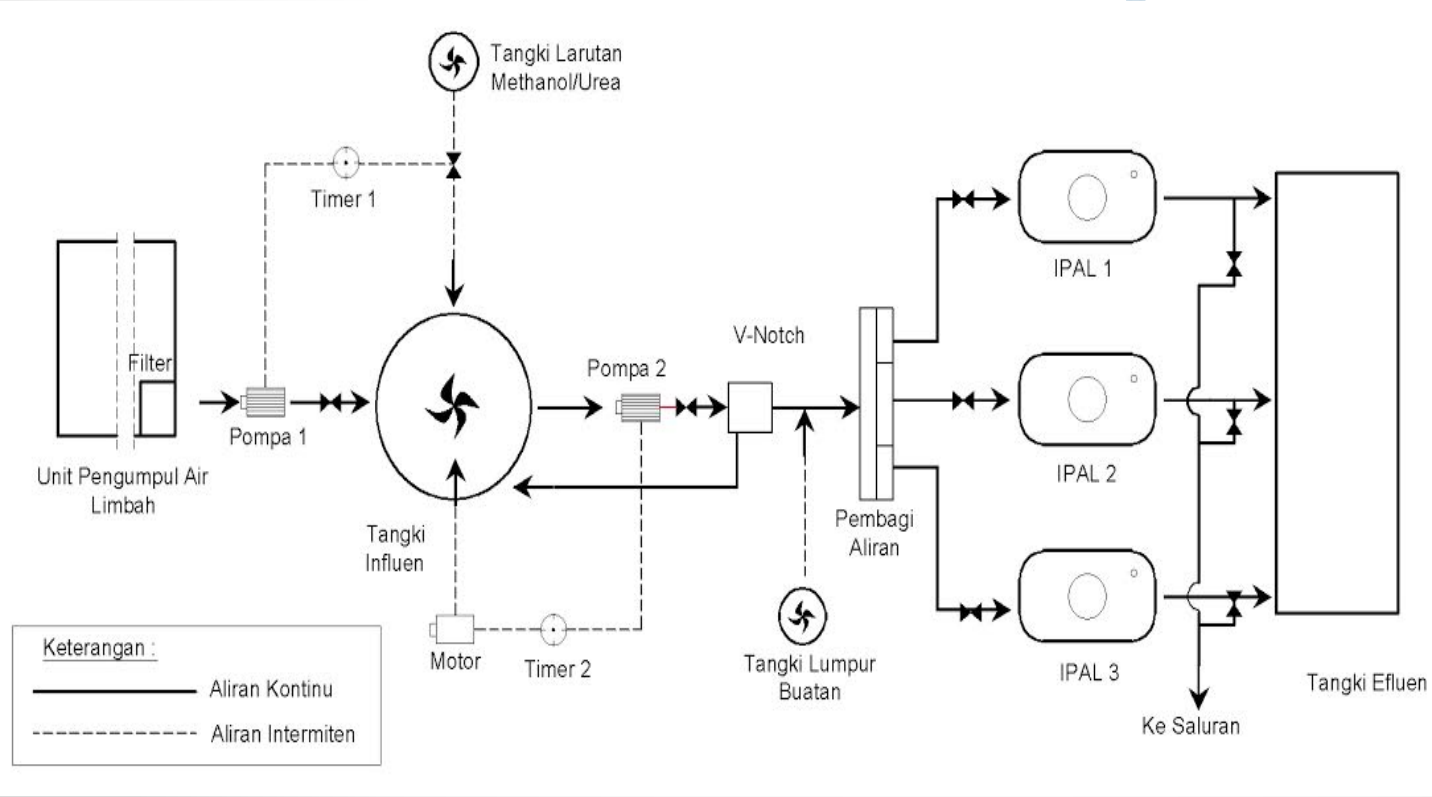
The existing testing body / inspection body have been applying some guideline in SNI 2023, eg. Raw water quality, structural tank test

The manufactures apply testing method for tank structure, such as leaking test, loading test according to SNI 2023

Implementation situation for establishment the reliable testing center

The pilot plant of performance testing facility had been developed in Bandung's Water company for standard validation.

Problems during pilot plant: cleaning rubbish in wastewater collection unit, instrumentation incapable of handling solids, wastewater mixed with rain water, less maintenance of sewer, manual monitoring, competent operator



Challenge for establishment a testing center

The establishment the reliable testing face challenges: vacumm activity during pandemic, ministry reorganization, priority on development basic laboratory and acceleration access of infrastructure

institutions are potential as testing center: Ministry'inpection body, Bandung's water company, Jakarta's wastewater company, university

The collaboration institution, competent human resources (often officials transfer, some will move to new capital city), laboratory facility.

The problem of locations alternative for wastewater source: collection unit, potential contribution of household industry, piping system

Setiabudi' centralized WWTP- Jakarta City (PD. PAL JAYA)

Gumuruh's centralized WWTP- Bandung City (water supply company)

WWTP in Multistorey building, Sumedang City (Bandung Institute of Technology))

WWTP in Multistorey building, Surabaya City (PUPR)

FUTURE SCHEME OF CERTIFICATION SYSTEM

Conformity Assessment Body

Assumption : product will follow same design during testing

Manufacture proposal

Document design process, drawing , water test, workshop,etc

Take a test of performance and material in the lab

Get certification by process type

1. Field Inspection
2. Workshop inspection

Inspection report , every 4 year

Manufacture of the product

-market

- Government project

Inspection body (PUPR, Environment Ministry)

CERTIFIED PRODUCT FOR SANITATION ACCESS PROGRAM

Target

- Increase impoved and safe access
- Contribution in decrease stunting
- Participatry approach for development
- Increase awareness in implementing clean and healty living behaviour (PHBS program)

Program – Infrastructure with community based (IBM)	• Individual, communal-onsite (2-10 HH), communal –offsite (min. capacity 175 people) • WWTP for Religious educational institution (min. capacity for 30 students)
Program- grant fund for onsite treatment	• Grant funds are incentives or stimulant funds for local governments had funding allocations for waste water
Program- President Instruction 2024 (155 cities/regency)	• Expansion of offsite system for districts/cities have WWTP with idle capacity • Development onsite treatment for districts/cities have fecal sludge treatment plant
Program-Spesific allocation Fund (for priority, slum area)	• Development of individual, communal system (5-10 HH); • Development communal WWTP min. capacity 50 HH

Selection of conventional or prepabricated tank (biofilter tank)

- Land availability (septic tank conventional need large area for infiltration field)
- Community aggreement
- Temporary employement creation for community
- Certified prefabricated tank for area are lack of water for concrete construction, skilled person, less material access

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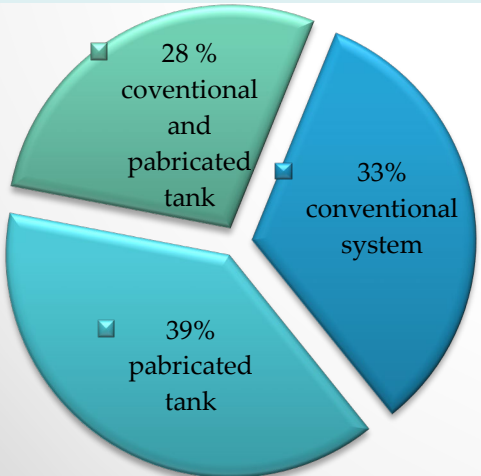
IMPLEMENTATION STRATEGY OF RELIABLE DECENTRALIZED WASTEWATER TESTING

Prevention of environmental degradation (institution and technical aspect)

- Encourage and maintain the commitment of local government or stakeholders in mainstreaming sanitation development in the regions
- Encourage the formation and strengthening of sanitation management institutions in the regions
- Local government conduct routine education of clean and healthy behaviour, community participation, technology standard
- Monitoring of technology application, scheduled desludging
- Convincing good prefabricated wastewater tank that have high performance, low cost instalation, small space, earthquike resistance, etc

Technology type applied by local government, 2022



In 2024: A total of 119 from 183 (67%) of local government in program socialization had used prefabricated tank

IMPLEMENTATION STRATEGY OF RELIABLE DECENTRALIZED WASTEWATER TESTING

Human resource advancement

- Capacity building in treatment design, application (both conventional/pabrication tank), tank material and structure
- Dissemination of existing inspection and reliable testing method for decentralized wastewater plant to local government, water company, private

Adaptation to national standard

- Multi stakeholder collaboration for testing center, development, guideline draftesting body (scope of work addition of existing inspection body)
- In existing inspection body: adopt some method as condition and encourage manufacture to have facility for pilot tank test
- Planning of wastewater source, human resources, laboratory, maintenance, monitoring
- Encourage for testing center formation or addition new work for existing inpection body, preparation of work instruction/quality guideline document, evaluation method

THANK YOU FOR YOUR ATTENTION