



Ministry of Natural  
Resources and  
Environment,  
Vietnam



Ministry of the  
Environment, Japan



Ministry of  
Construction,  
Vietnam



## 7<sup>th</sup> International Workshop on Decentralized Domestic Wastewater Treatment in Asia

# Current Situation and Technology Development of Decentralized Wastewater Treatment in Vietnam

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# Content

- **Current Situation of DWWM in Country**
- **Classification of DWWM models**
- **Status of Technology Development**
- **Discussions and Recommendations**

# Effluent standard: QCVN 14:2008/BTNMT

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No	Parameters	Column A <sup>(a)</sup>	Column B <sup>(b)</sup>
1	pH	5 - 9	5 – 9
2	BOD <sub>5</sub> (20°C), mg/l	30	50
3	TSS, mg/l	50	100
4	NH <sub>4</sub> -N, mg/l	5	10
5	NO <sub>3</sub> <sup>-</sup> , mg/l	30	50
6	PO <sub>4</sub> <sup>3-</sup> , mg/l	6	10
7	Total Coliforms, MPN/100 ml	3,000	5,000

*(a) - Maximum allowable values for wastewater discharged to water bodies serving domestic water supply purpose.*

*(b) - Maximum allowable values for wastewater discharged to water bodies serving another purposes (irrigation, water transport, etc.).*

**Reuse standard: Not yet  
(QCVN 08-MT:2015/BTNMT standard for surface water quality is used)**

# Classification of DWWM models

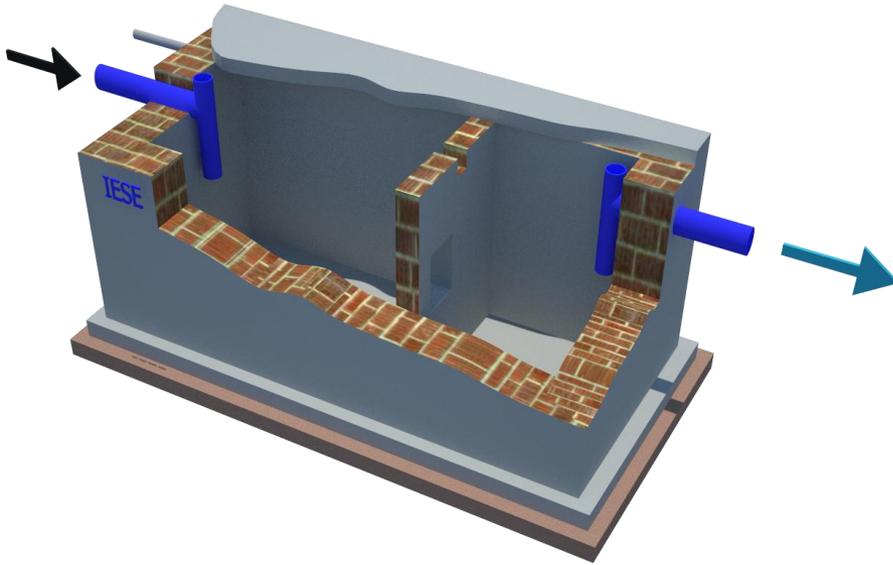
- **Group 1: on-site sanitation systems**
  - 1a. Low-cost on-site sanitation systems
  - 1b. Mechanized on-site sanitation systems
- **Group 2: Cluster DWWM systems**  
(With wastewater management scheme and wastewater collection network!)
  - 2a. Low-cost cluster wastewater treatment systems
  - 2b. Mechanized cluster wastewater treatment systems
- **Different ownership, sources of funding, modes of management, etc.**

# Recent situation of the wastewater treatment in Vietnam

	Centralized Wastewater Treatment system (Ex: Sewer system)	Middle scale or cluster type wastewater treatment system	Decentralized wastewater treatment system (Ex: Septic tank, johkasou, pit latrine)	Without any wastewater treatment
Definition of treatment system in Vietnam	<ul style="list-style-type: none"> <li>- HHS + Collection + WWTP for city scale serving basin or sub-basin catchment area</li> <li>- Septic tanks at HHS as preliminary treatment are in most cases</li> </ul>	<ul style="list-style-type: none"> <li>- Serving towns, townlets, development areas with sewers</li> </ul>	<ul style="list-style-type: none"> <li>- Non-sewered areas, or short distance sewer lines (resorts, individual apartments, shops, restaurants, hospitals, factories, etc)</li> </ul>	<ul style="list-style-type: none"> <li>- Sewered + direct discharge</li> <li>- Non-sewered areas</li> </ul>
Installed plants number	<ul style="list-style-type: none"> <li>- <u>60 WWTPs</u> in &gt;40 cities</li> </ul>	<ul style="list-style-type: none"> <li>- 10% of 4,000 urban development areas = <u>400 WWT stations (WWTS)</u> in paper, 50% of them are functioning in realty = <u>200 WWTS</u> such as 2 in Phu My Hung, 1 in Ecopark, 1 in Royal city, 1 in Dang Xa, etc</li> </ul>	<ul style="list-style-type: none"> <li>- Country: 90% of 13,600 medical points (hospitals, clinics, etc) = 12,250 WWTS, among which 35% are in good operation condition.</li> <li>- 1,000 WWTS in factories</li> <li>- 200 WWTS in restaurants, shops, resorts</li> <li>- 1,000 WWTS in hotels</li> <li>- <u>Total: 14,500 WWTS</u></li> <li>- <u>Besides: 25,000 systems</u> with Septic tanks only</li> <li>- Livestock farms: 400,000 m<sup>3</sup>/d x 30% with biogas digester</li> </ul>	
Number of population using each type of wastewater treatment systems	<ul style="list-style-type: none"> <li>- ~20% of urban population = <u>6.5 million</u> persons</li> </ul>	<ul style="list-style-type: none"> <li>- 200 WWTS x 50% of design capacity x 500 m<sup>3</sup>/d or 3,000 persons = <u>30,000 persons</u></li> <li>- Handcraft villages: just few</li> </ul>	<ul style="list-style-type: none"> <li>- Hospitals: <u>1,012,500</u> persons are served</li> <li>- Hotels, resorts: <u>1,260,000</u> p. served</li> <li>- Factories: <u>300,000</u> p.</li> </ul>	

\*Reference: figures are calculated by author based on various sources

# Group 1a. On-site sanitation systems: Septic tank



# Challenges with Group 1a, Septic tank

## Design:

- No official Design Standard (MOH: Manual only)
- Volume if not enough?
- No water proof?
- Some use house foundation to make tank wall
- “Not allowed” Infiltration chamber (soak pit)

## Build:

- No water proof
- No access for check and desludging
- No ventilation
- Misconnection (inlet, outlet, inside the tank)

## Operation:

- Septic tank is a property of household
- No desludging unless clogging
- Sludge management is not controlled
- Miss-use: hazardous waste

**BASTAFAT-F FOR 12 HIGH-CLASS VILLAS  
AT NCC MY DINH, HANOI**



**BASTAFAT-F FOR CAT BA ISLAND, HAI PHONG**



**GROUP 1B. MECHANIZED ON-SITE SANITATION SYSTEMS**

**BASTAFAT-F FOR ECO-RESORT  
DONG ANH, HANOI**



**BASTAFAT-F FOR HISTORICAL PLACE K9  
(DA CHONG, BA VI, HANOI)**



BASTAFAT-F FOR MEDICAL CENTER  
FOR DRUG EDICTS, YEN BAI PROVINCE



BASTAFAT-F FOR HISTORICAL PLACE K9  
(DA CHONG, BA VI, HANOI)



UV DISINFECTION CHAMBER, BASTAFAT-F

# Challenges with Group 1b, Mechanized on-site systems

## Design:

- No official Design Standard (MOH: Manual only)
- Available land for installation and monitoring

## Build:

- Quality assurance (tank materials, etc.)
- Floating risk
- Leaking risk

## Operation:

- Property of household, access for monitoring is limited
- Desludging and sludge management
- Miss-use: hazardous waste

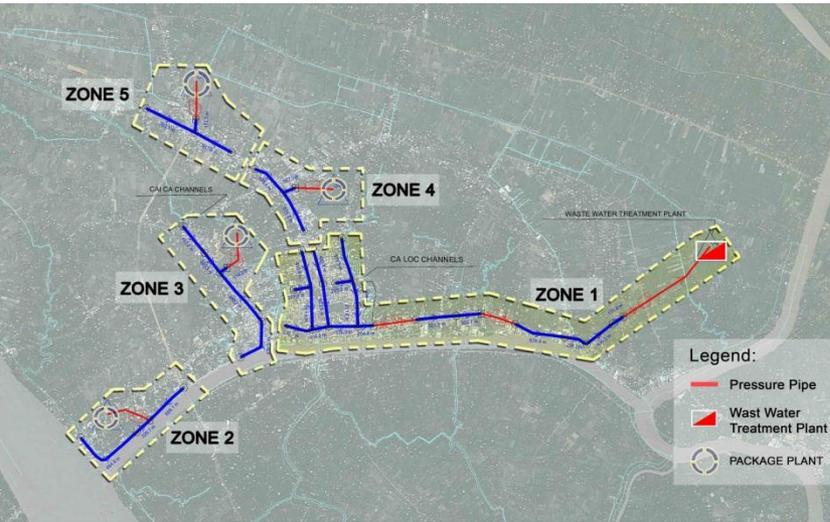
# Group 2: Cluster DWWM systems

## Wastewater management scheme and Wastewater collection network



# ADB (CDTA 7885-VIE) project, Support to Central and Local Governments to Implementation of Urban Environmental Improvement Programs

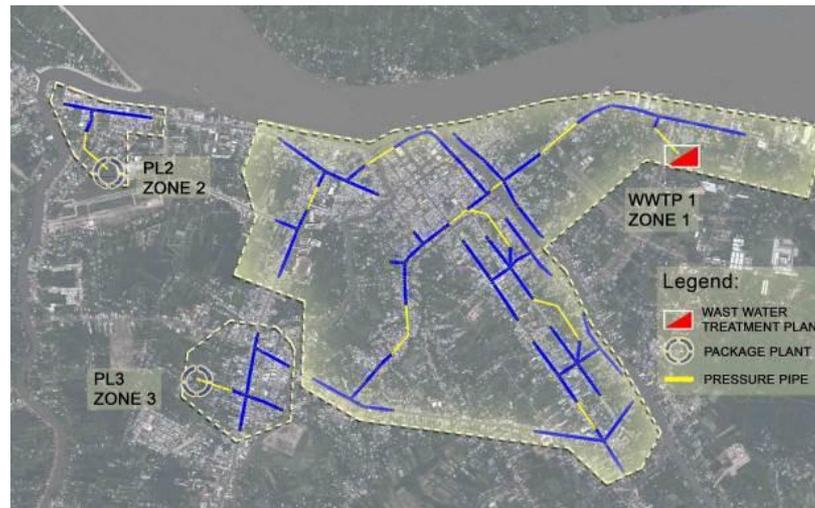
Ben Tre Option 2-Decentralized



Vinh Long- CSS Option 2-Decentralized



Vinh Long- CSS Option 3-Centralized/Decentralised





BASTAF for handcraft villages  
(food processing, livestock  
breeding, ...)



WWT for 100 HHs in Lim  
townlet, Bac Ninh prov.



WWTS Q = 100 m<sup>3</sup>/day, Vietnam Friendship Village,  
Tu Liem, Hanoi



BASTAF for 400 HHs, Xuan Mai townlet,  
Chuong My, HN



4 WWTS for 2,600 HHs, Cho Moi townlet,  
Bac Kan



WWTS for Minh Quan commune clinic, Yen Bai  
province



# Challenges with Group 2a, Low-cost wastewater treatment systems

## Design:

- Lack of Design Standard
- Vietnamese standard QCVN 14:2008/BTNMT, N, Coliforms: not achievable.
- Lack of adequate HH connection and wastewater collection components

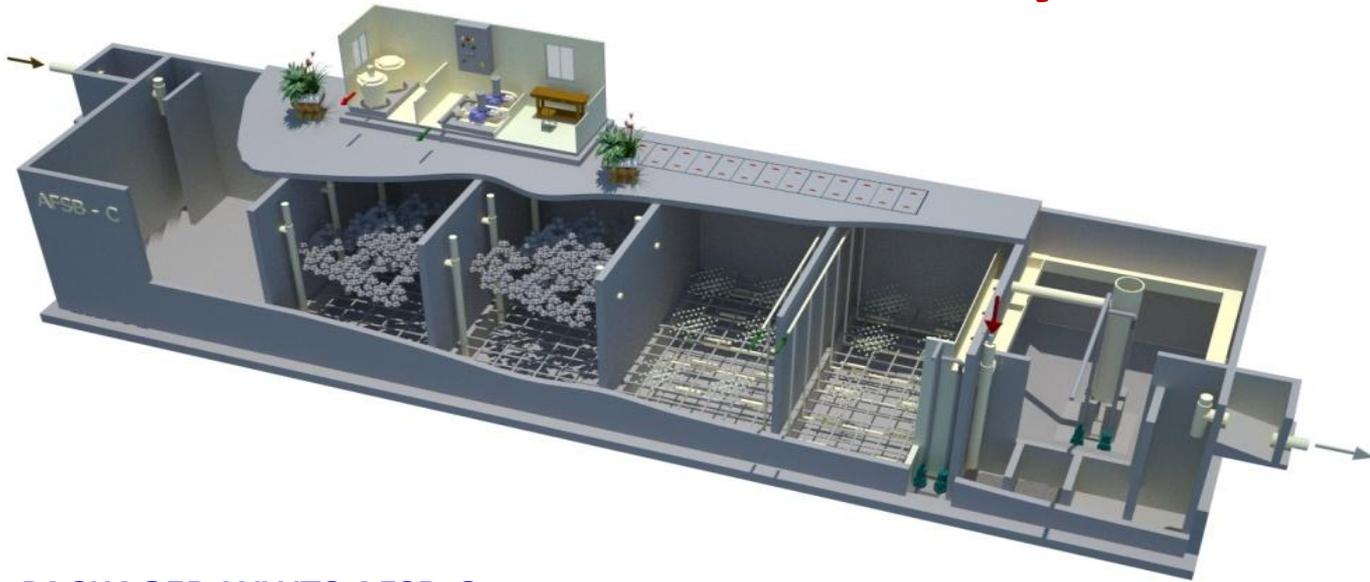
## Build:

- Quality of construction works
- Planning and phasing
- Start up difficulties

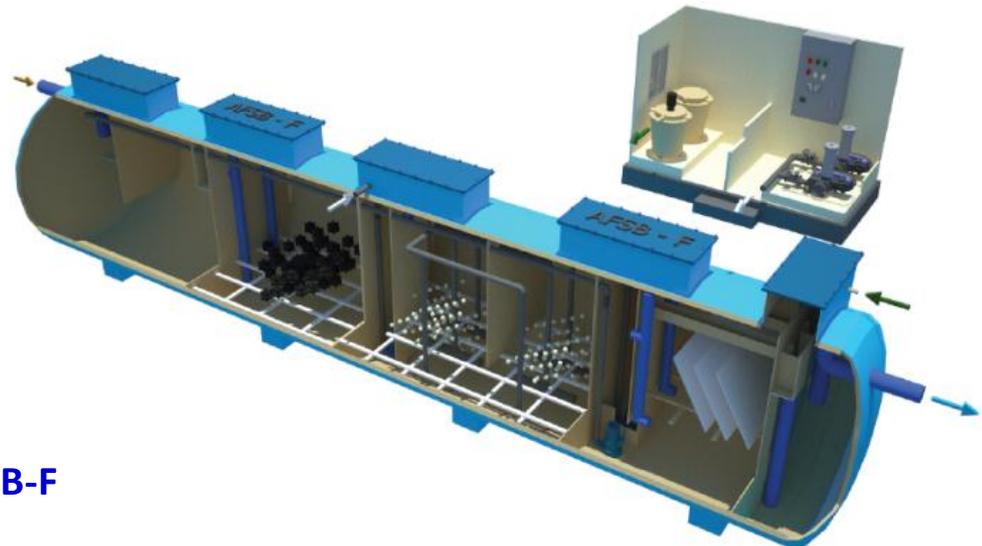
## Operation:

- Solids clogging
- Hydraulic loads
- No fund for O&M
- No clear solution for dredged sludge treatment and disposal
- Limited capacity of operators

# Group 2b. Mechanized wastewater treatment systems



PACKAGED WWTS AFSB-C



PACKAGED WWTS AFSB-F

# DWWM in urban areas



VIDB building, Hanoi



Ngo Thi Nham apartment,  
Ha Dong, Hanoi



Planning Palace,  
My Dinh, Hanoi



Pacific building, Hanoi  
35 FRP tanks



VCB bldg, Hanoi



Sofitel Plaza, Hanoi



PVN bldg, Hanoi

## AFSB-F at Vicostone Factory

## AFSB-F for Residential – Office Complex 12 Thuy Khue, Hanoi



# Challenges of Group 2b, Mechanized wastewater treatment systems

## Design:

- Lack of Design Standard
- QCVN 14:2008, N, Coliforms: not achievable.
- Lack of adequate wastewater collection component
- Double investment in urban areas
- Too shallow: limited aeration and settling efficiency
- Limited access, especially for underground tanks

## Build:

- “Small” thinking, not adequate attention for QA
- Quality of construction works: leaking, sinking, etc.
- FRP tanks: very different quality, not certified
- Start up
- Media wash-out

## Operation:

- Solids clogging
- No fund for O&M
- Odor control
- C/N ratio is too low
- No professional O&M team

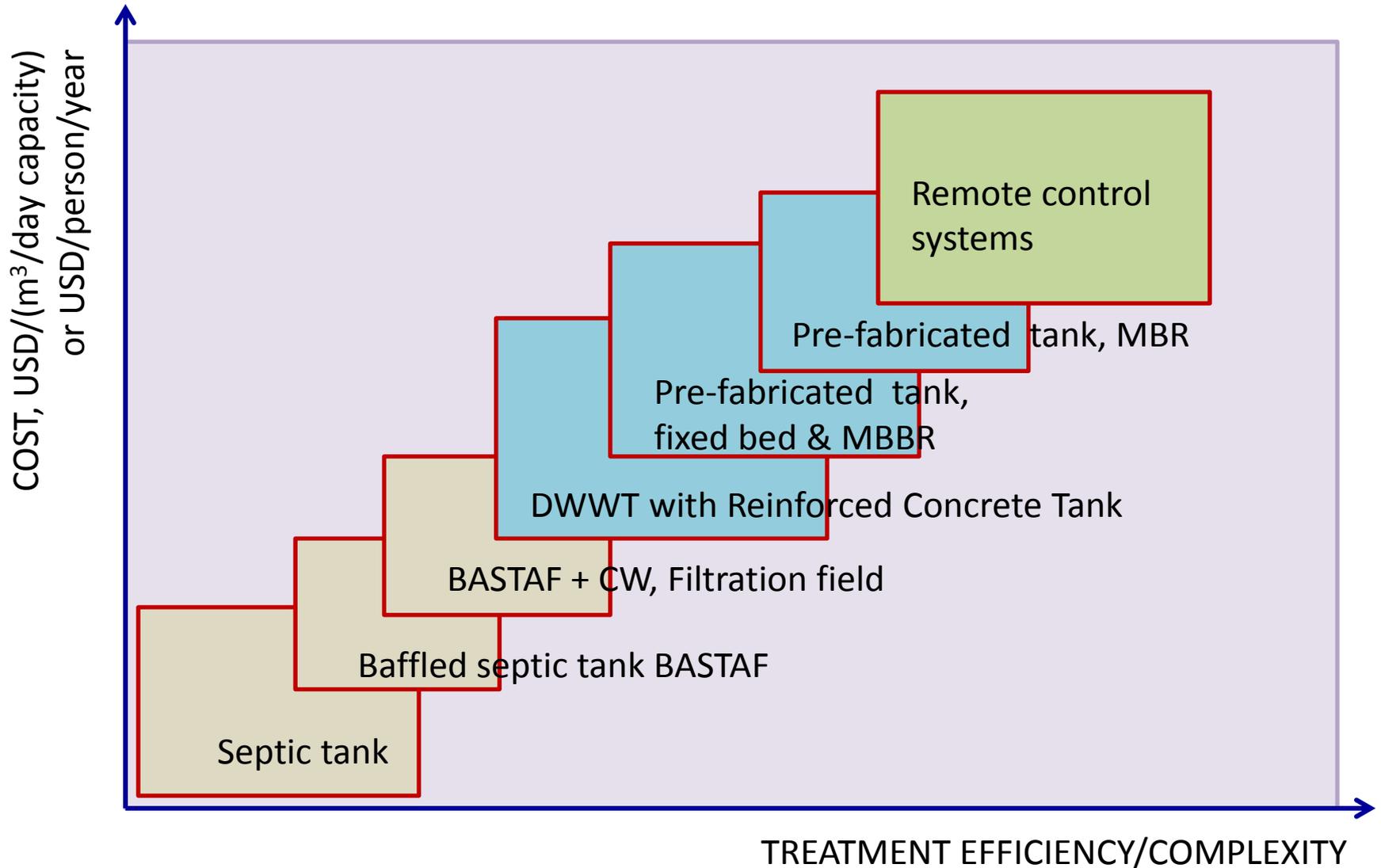
# FAECAL SLUDGE MANAGEMENT



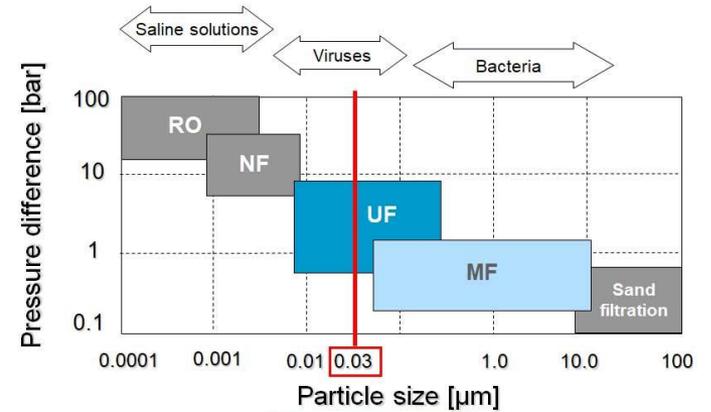
- One of key components of DWWM
- Poor management practice in most places
- Already mentioned in Decree 80 and some provincial regulations
- Resource recovery from sludge is potential, but sludge reuse Guidance is not yet available.



# TECHNOLOGY DEVELOPMENT



# TECHNOLOGY DEVELOPMENT



AO system with MF/UF Membrane



Source: GETECH Co.

**MBR technology**

# TECHNOLOGY DEVELOPMENT



**DWWT with Solar energy and remote (on-line) control**



**XÂY DỰNG ĐỈNH CAO**

**TRUNG TÂM ĐIỀU HÀNH HỆ THỐNG NĂNG LƯỢNG MẶT TRỜI** **SSOC™** **SolarBK**  
SOLAR SYSTEM OPERATION CENTER Green Energy Made Smarter

HT Lạc Núi Thái Đăng xuất

TRANG THÁI KẾT NỐI  
Thời gian chạy: 25/04/2019 15:44:23

TỔNG QUẢN HỆ THỐNG THỐNG KÊ

CÔNG SUẤT TỨC THỜI CỦA HỆ PV  
**126,71 w**

CÔNG SUẤT BƠM  
**0 w**

TRANG THÁI HOẠT ĐỘNG BƠM  
**Tắt**

THỜI GIAN HOẠT ĐỘNG BƠM  
**330,17 h**

**THÔNG TIN DỰ ÁN**  
NGHIÊN CỨU ĐỀ XUẤT GIẢI PHÁP XỬ LÝ CHẤT THẢI NHÀ TIÊU, NƯỚC THẢI SINH HOẠT VÀ CHẤT THẢI NHÀN THEO HƯỚNG YẾU SINH SẢN THẢI, KHÉP KÍN, PHÙ HỢP VỚI VÙNG HẢI ĐẢO (M&A, R205-12)  
Ngày lập báo: 10/7/2019  
Vị trí lắp đặt: Tỉnh Quảng Ninh, Việt Nam

29 °C  
2 m/s  
Bầu Trời Quảng Đông

# Discussions and Recommendations

- Integration of DWWM options into **urban planning** is needed
- **Design standards** are to be issued, where green concept should be encouraged (green design solutions, rainwater harvesting, wastewater reuse, etc.)
- **Effluent standards** are to be reviewed, especially on N, and pathogens removal in DWWM systems, and to avoid double investment
- **Testing and Certification** for technology, equipment, operation of w/w systems, sludge management services is needed
- **Household connection** should be compulsory. All components should be considered in a whole chain: HH facilities – collection network – wastewater treatment – disposal or reuse
- Professional **O&M service providers** are needed, on-site or outsourced. Branch of provincial sewerage and drainage company is one among options
- **Promotion center(s)** with strong networking is needed

**Thank you very much  
for your attention !**



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