

Speaker of Socialist Republic of Viet Nam



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Work Experience 1996 – to present: Lecturer, Hanoi Civil Engineering University.
1991 – 1995: Director, VIAL Co. Ltd., Consulting firm in water and wastewater engineering.

Recently Assoc. Prof. Nguyen has been nominated as a Head of Science and Technology Department, Vietnam Association of Water Supply and Sewerage (VWSA).

He is also Vice President, Vietnam Association of Civil Engineering Environment (VACEE). VACEE is now focusing on promotion of Green Building Concept in Vietnam.

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Wastewater and Sludge Treatment, Current Status and Future Strategy in Vietnam

Osaka, July 2014



Assoc. Prof. Dr. Viet-Anh Nguyen

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•Head of Science and Technology Department, Vietnam Association of Water Supply and Sewerage (VWSA)

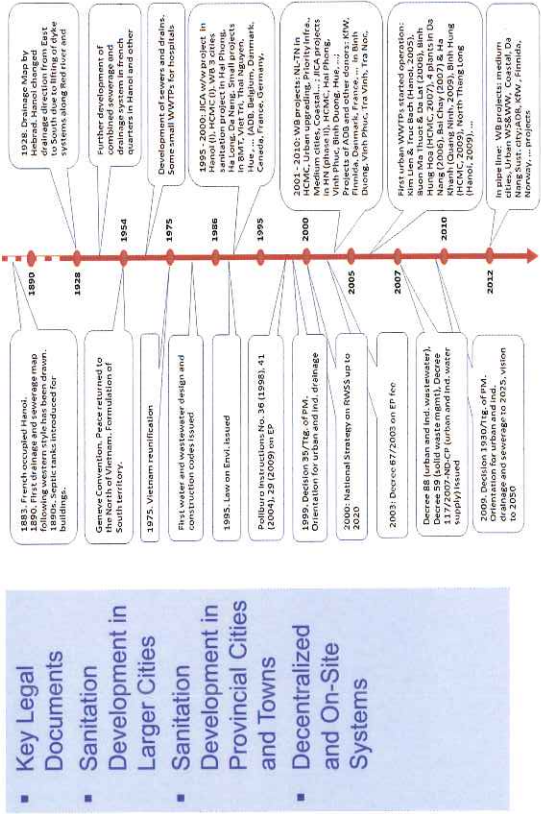
Content

1. Wastewater and sludge management in urban areas
2. Wastewater and sludge management in industrial areas
3. The way forward

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SECTOR DEVELOPMENT HISTORY



Wastewater management

- **USD 250 MILLION INVESTED ANNUALLY OVER THE PAST 10 YEARS**
- **20 MUNICIPAL WWTPs CURRENTLY IN OPERATION**
- **>30 MUNICIPAL WWTPs IN PLANNING/CONSTRUCTION**
- **94% OF URBAN POPULATION HAVE ACCESS TO HOUSEHOLD (HH) SANITATION**
- **90% OF HHs HAVE SEPTIC TANKS**
- **4% OF SEPTAGE DISPOSED SATISFACTORILY**
- **60% OF HHs HAVE ACCESS TO PIPED DRAINAGE/ SEWERAGE SYSTEMS**
- **10% OF COLLECTED DRAINAGE/ SEWERAGE TREATED BY CENTRALIZED WWTPS**

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Wastewater management

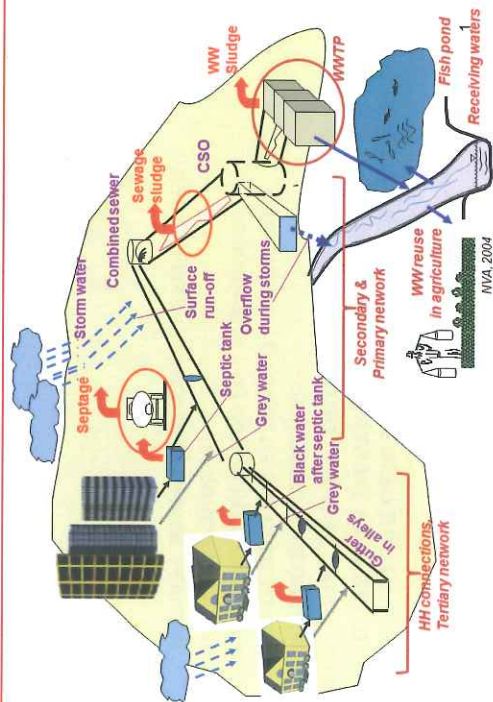
- **92% OF WW CONVEYED BY USE OF COMBINED SEWERAGE SYSTEMS (CSS)**
- **TREATMENT TECHNOLOGIES UTILIZED (among 13 surveyed)**
 - ACTIVATED SLUDGE (8)
 - ANAEROBIC PONDS (4)
 - AEROBIC PONDS/STAB. PONDS (1)
- **CHALLENGES:**
 - **LOW INFLUENT BOD (31 – 135 mg/l): Range of annual average flows, vs. 50 mg/l – NATIONAL CLASS “B” STANDARD FOR EFFLUENT BOD)**



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Wastewater management: CSS



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Wastewater management

- **8% OF WW CONVEYED BY USE OF SEPARATE SEWERAGE SYSTEMS (SSS)**
 - **358 mg/l - AVERAGE INFLUENT BOD AT WWTPs (Dalat and Buon Ma Thuot WWTPs data; 336 – 380 mg/l: Range of annual average flows)**
- **TREATMENT TECHNOLOGIES UTILIZED:**
 - ACTIVATED SLUDGE (2)
 - TRICKLING FILTERS (1)
 - STABILIZATION POND SYSTEM (1)
- **CHALLENGES:**
 - **HHC IS COMPULSORY, BUT DIFFICULT TO BE REALIZED**
 - **RESOURCE MOBILIZATION**
 - **DISCHARGE CONTROL, O&M**
 - **CHANGE OF MINDSET**



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Wastewater management

- **98% OF FUTURE GENERATED WW FLOW WILL BE CSS-BASED (28 of 31 WASTEWATER SYSTEMS)**
- **TREATMENT TECHNOLOGIES SELECTED**
 - **ACTIVATED SLUDGE (26)**
 - **CEPT/TRICKLING FILTERS (1) – WB-FUNDED**
 - **STABILIZATION PONDS (1) – ADB-FUNDED**
 - **AERATED PONDS (1)**
 - **PRIMARY SEDIMENTATION (2) – KFW-FUNDED**



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Sludge management

- **DREGGED SLUDGE FROM SEWERAGE AND DRAINAGE NETWORK**
- **SEWAGE SLUDGE FROM WWTP**



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SEPTAGE MANAGEMENT

- There is no effective fecal sludge management in place in Vietnam.
- Previous efforts have been short-lived or only seen as demonstration efforts.
- A suitable management scheme should be investigated.
- A planning with adequate resources allocation is required



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Drivers and barriers in Urban Wastewater

- A strong institutional and legal framework established;
- Awareness and demand from the public, intolerance of pollution increased;
- Need of household wastewater disposal;
- Access to sources of funding;
- Ownership (and capacity) of local authorities;
- Commitment to OPEX by local authorities

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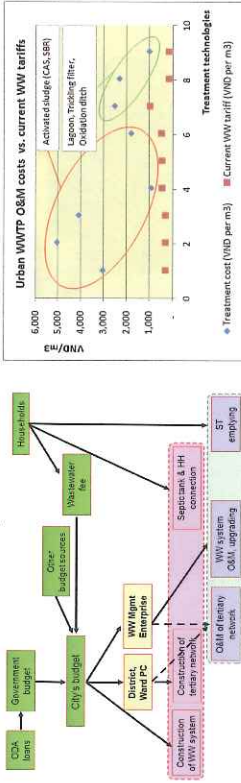
Drivers and Barriers in Urban Wastewater

- **Policy and legislations:**
 - Integrated approach, river basin management concept
 - Urban sanitation planning
 - Effluent standards
- **Technology selection:**
 - Centralized versus decentralized systems
 - CSS versus SSS
 - Appropriate WWTP technologies, Sludge management
- **Finance:**
 - Mobilization of funding sources
 - O&M Cost recovery
- **Management capacity:**
 - Household connections
 - O&M: Capacity of operators. Ownership of assets
 - IEC. Customers awareness

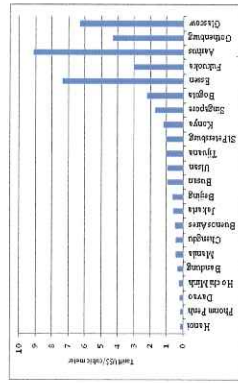
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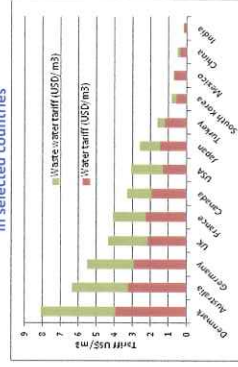
Urban WWTP O&M costs against WW tariffs



2012 water and wastewater tariffs in selected cities

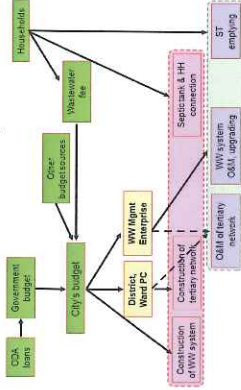


Average water and wastewater tariffs in selected countries



(Source: Global Water Intelligence (2012), EAP Sanitation review, WB, 2013, Vietnam Urban Wastewater-Review, 2013)

Source of funding for urban wastewater mgmt in Vietnam



2. Wastewater management in industrial areas

- Industrialization – modernization course started from 1991.
- By 2013, there 283 IZs have been established covering total area of 72,000 ha. Among which, 180 IZs are in operation, with 6,800 factories.
- Average coverage ratio: 65%.
- Industrial production value: USD 1.6 million/year per leased hectare.
- Jobs for 1.6 million people (direct) and 1.8 million people (indirect) (MPI, 2012).



Increasing pollution loads, raising conflicts

- Centralized WWTPs are at 118 IZs (67%).
- Percentage of enterprises discharging wastewater through Centralized WWTPs: 85% - 90%.
- Besides: thousands of Industrial Clusters and Individual Industries; 3,300 handicraft villages.
- Increasing pollution of air, water, soil environment, biodiversity.
- Other social, cultural problems.



Technical issues

- Common design concept:

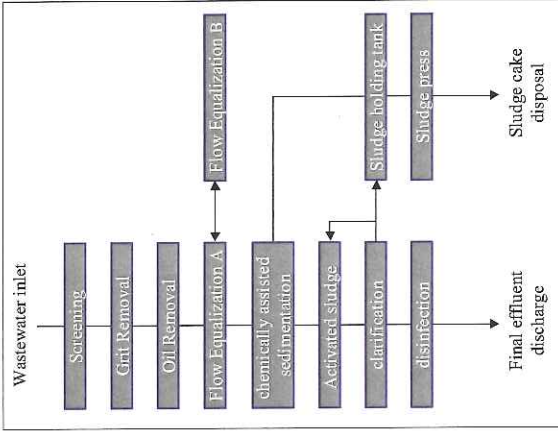
Screen, Grid, Oil separation - Flow equalization - Physico-chemical pre-treatment & Primary clarifier - Activated sludge - Secondary clarifier - Chlorine disinfection



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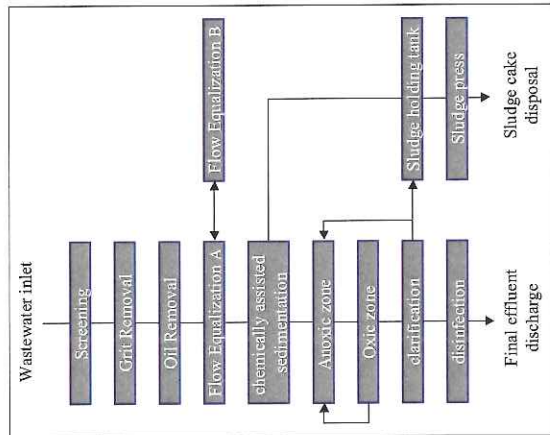
Representing flow chart for meeting Class B, QCVN 40:2011/BTNMT



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Representing flow chart for meeting Class A, QCVN 40:2011/BTNMT



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Issues in sludge management

- Lack of skilled human resources for WWTP O&M.
- Lack of incoming flow monitoring, leading to high risk of malfunction of the WWTP, especially when the tenants discharge hazardous compounds at the end of the shift, during night time.
- Cost recovery
- Failures of WWTP operation!
- Sludge transportation and disposal !
- Lack of Trainings and Awareness raising activities



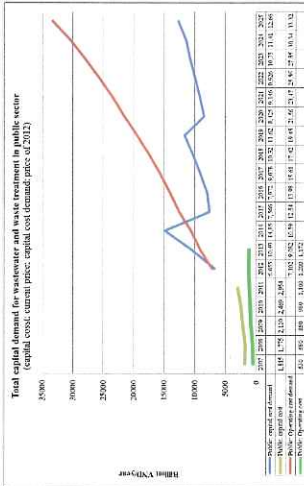
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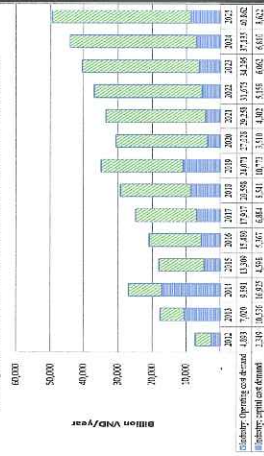
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Forecast: market demand in environmental industry



Source: Ho Cong Hoa, CIEM, 2013

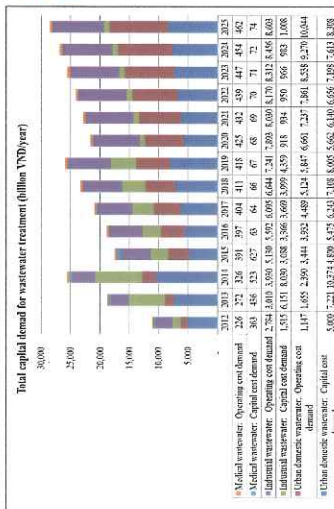
Total capital demand for wastewater and waste treatment in industrial sector



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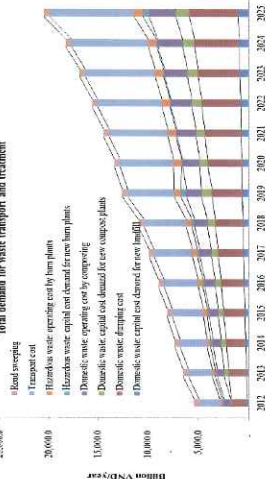
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Forecast: market demand in environmental industry



Source: Ho Cong Hoa, CIEM, 2013

Total demand for waste transport and treatment



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PPP in water industry

- Foreign investment, Private Investment**
- Da Phuoc Waste Treatment Complex
 - Phuong Thao MSW Treatment
 - Seraphin Waste Treatment Plant
 - Thang Long Waste Treatment Plant
- Water and wastewater system for Industrial Zones**

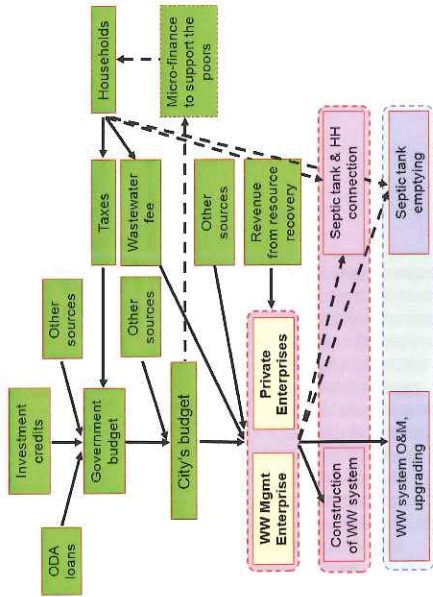
- Foreign Share holders**
- Song Da WTP
 - Kenh Dong WTP
 - etc

- BOT, BOO, DBL modes**
- Binh An BOT Water
 - Thu Duc BOO Water
 - Dong Tam BOO Water
 - Minh Duc DBL Water
 - etc

- BT projects**
- Yen So BT WWTP
 - etc



Recommended financing mechanisms for wastewater investment and O&M



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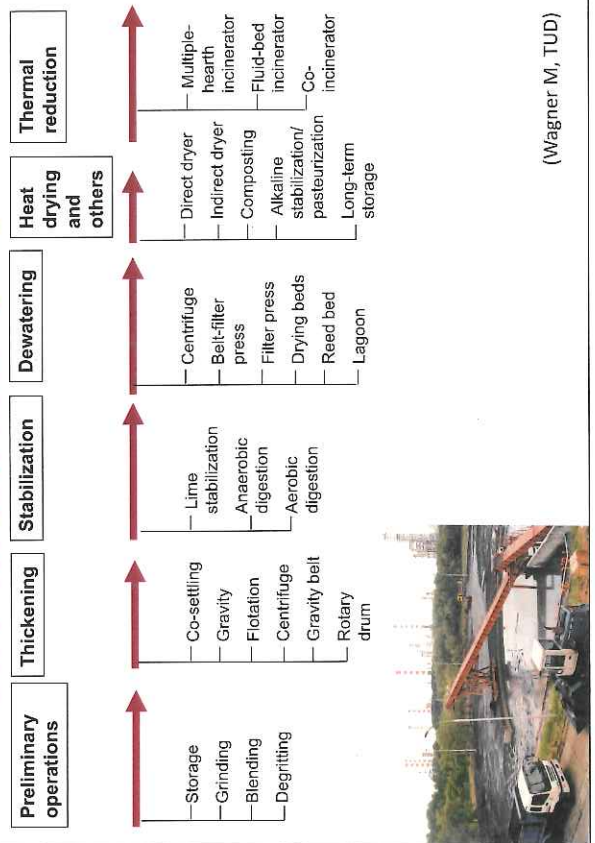
Some potential areas for cooperation

Wastewater management

- Appropriate WW treatment technologies for CSS
- Sludge handling, treatment, resource recovery
- Wastewater reclamation
- Small foot-print, energy saving wastewater treatment systems
- Flood prevention solutions. Sustainable urban drainage solutions.
- Industrial wastewater treatment, in conjunction with CP solutions
- Integrated tools of urban sanitation planning. Etc.

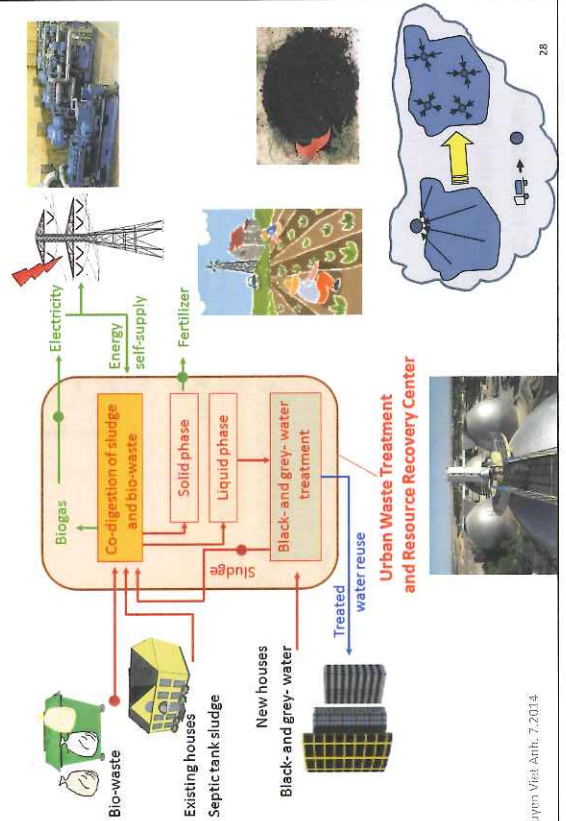
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WWTP sludge processing diagram



(Wagner M, TUD)

PROPOSED INTEGRATED URBAN WASTE MANAGEMENT SYSTEM



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XIN TRÂN TRỌNG CẢM ƠN

THANK YOU VERY MUCH



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