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**Enhancing Sanitation
in Vietnam through Decentralized Wastewater
Treatment Technology Transfer**

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1. INTRODUCTION

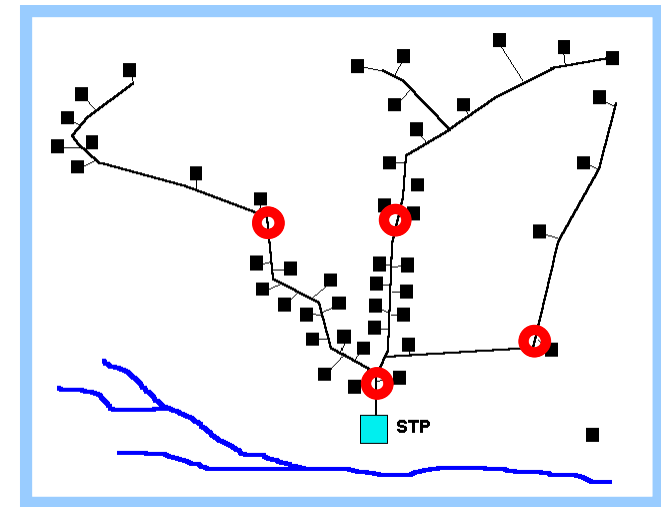
- **3/2010:** ~760 cities and towns, 30% of total population
- Improvement of sanitation systems for urban, peri-urban and rural areas in Vietnam is very challenging and becoming more and more crucial in this fast-developing country.
- In the large cities, 50-80% of households use septic tanks, 10-20% use pit latrines.
- In other cities (class 3-5), 20-50% use septic tanks, 30-50% use pit latrines or double vault latrines.
- **10%** of urban wastewater is treated.



- **The only way to go:** to implement low-cost DESA alternatives where local community, authorities and private sector are involved in decision making as well as in the exploitation process.

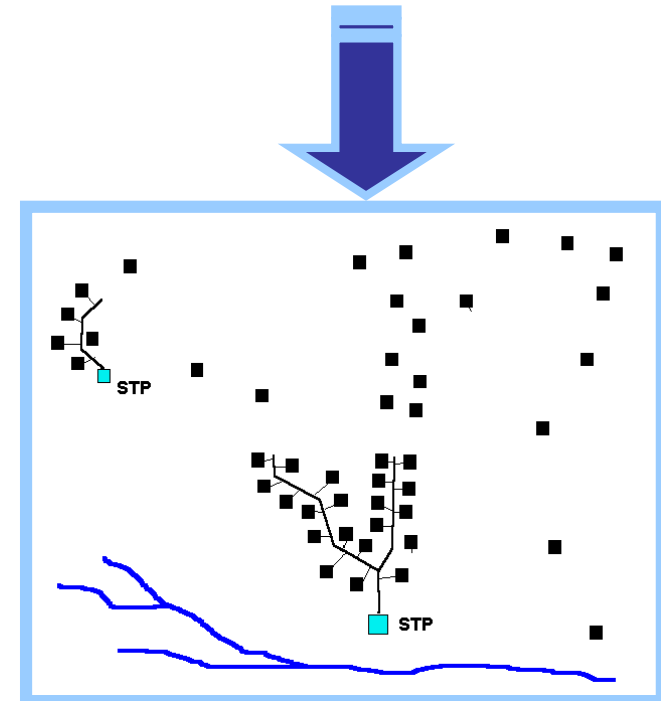
Conventional wastewater management

- ✓ Not affordable
- ✓ Big investment. Leakage.
- ✓ Difficult reuse
- ✓ Limited participation
- ✓ ...



Decentralized w/w management

- ✓ More affordable
- ✓ Less investment and O&M costs
- ✓ On-site reuse
- ✓ Encouraging participation
- ✓ Low-cost technologies
- ✓ Step-wise approach...



2. Government efforts, Cases of Technology transfer

Financial need for Sanitation in Vietnam

- Over last 20 years: USD 2 bio. have been invested for WS&S (not including household contribution). Among those: 80% is from ODA.
- Urban sanitation projects are gradually covering **centers of the cities and towns** of different categories (special, 1st, ..., 5th).
- Active donors: JICA, ADB, WB, AFD, Danida, Finnida, KfW and GTZ, Ausaid... Number of NGOs.

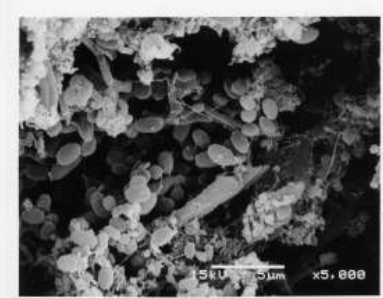
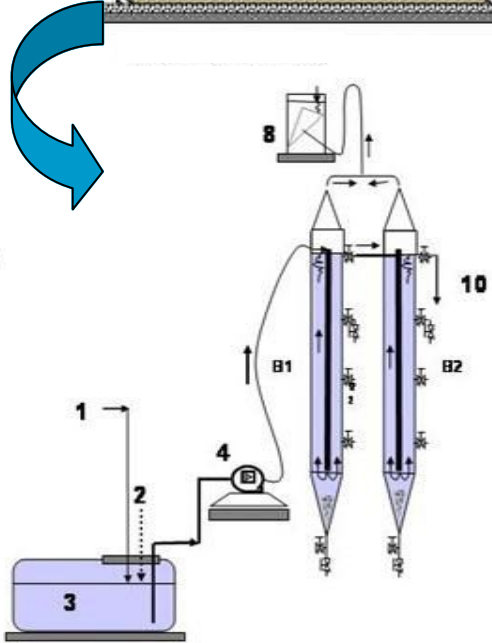
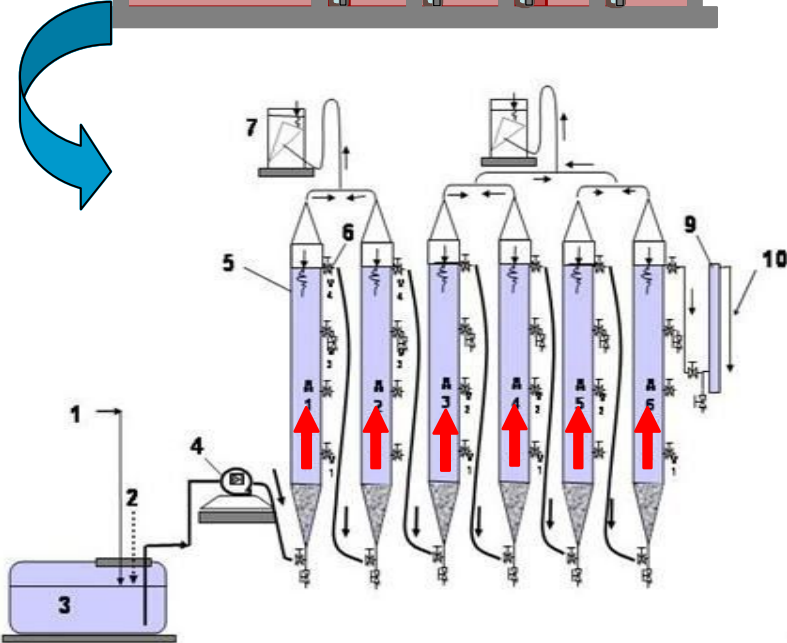
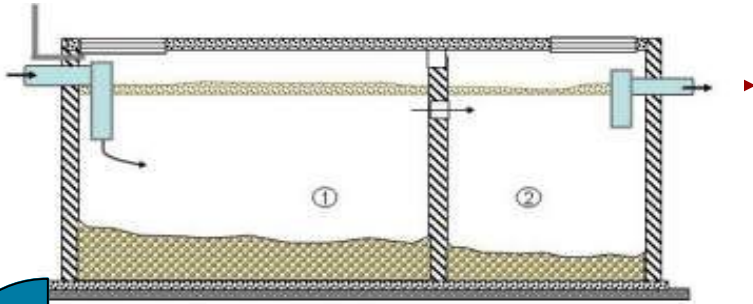
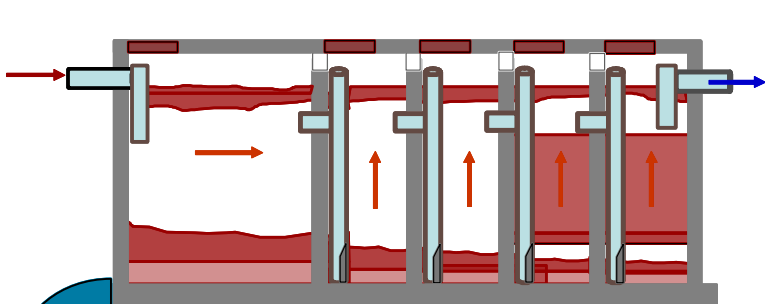
- Sanitation need for Urban + Rural Area (our calculation):

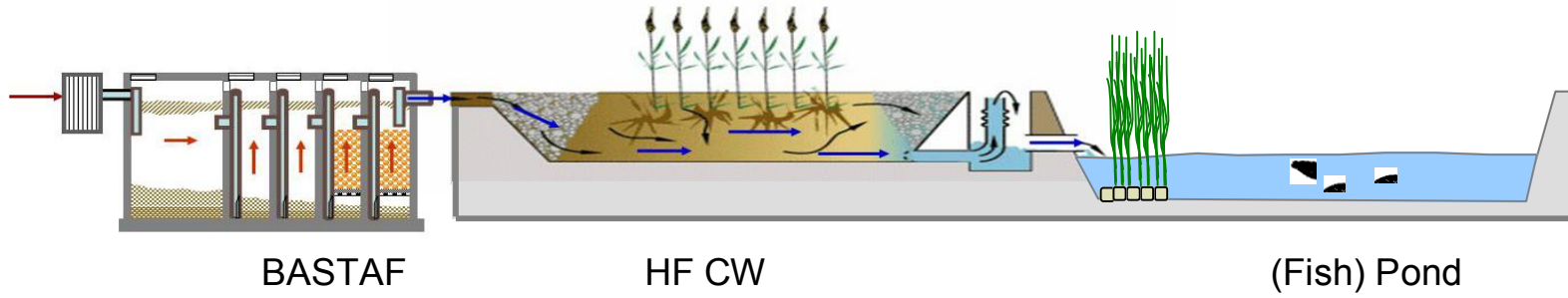
2010:	2,9	.	10,7	bio. USD
2020:	4,3	.	16,2	bio. USD

- Industries (MOIT's calculation):

2010 and beyond:	> 7,6	bio. USD
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Case 1. Baffled septic tank and anaerobic filter (BAST)





Hanoi –
new living quarter



Hanoi - village



Bac Ninh – living quarter



Bac Kan – small town



Hanoi - school



Hanoi –
office bldg.



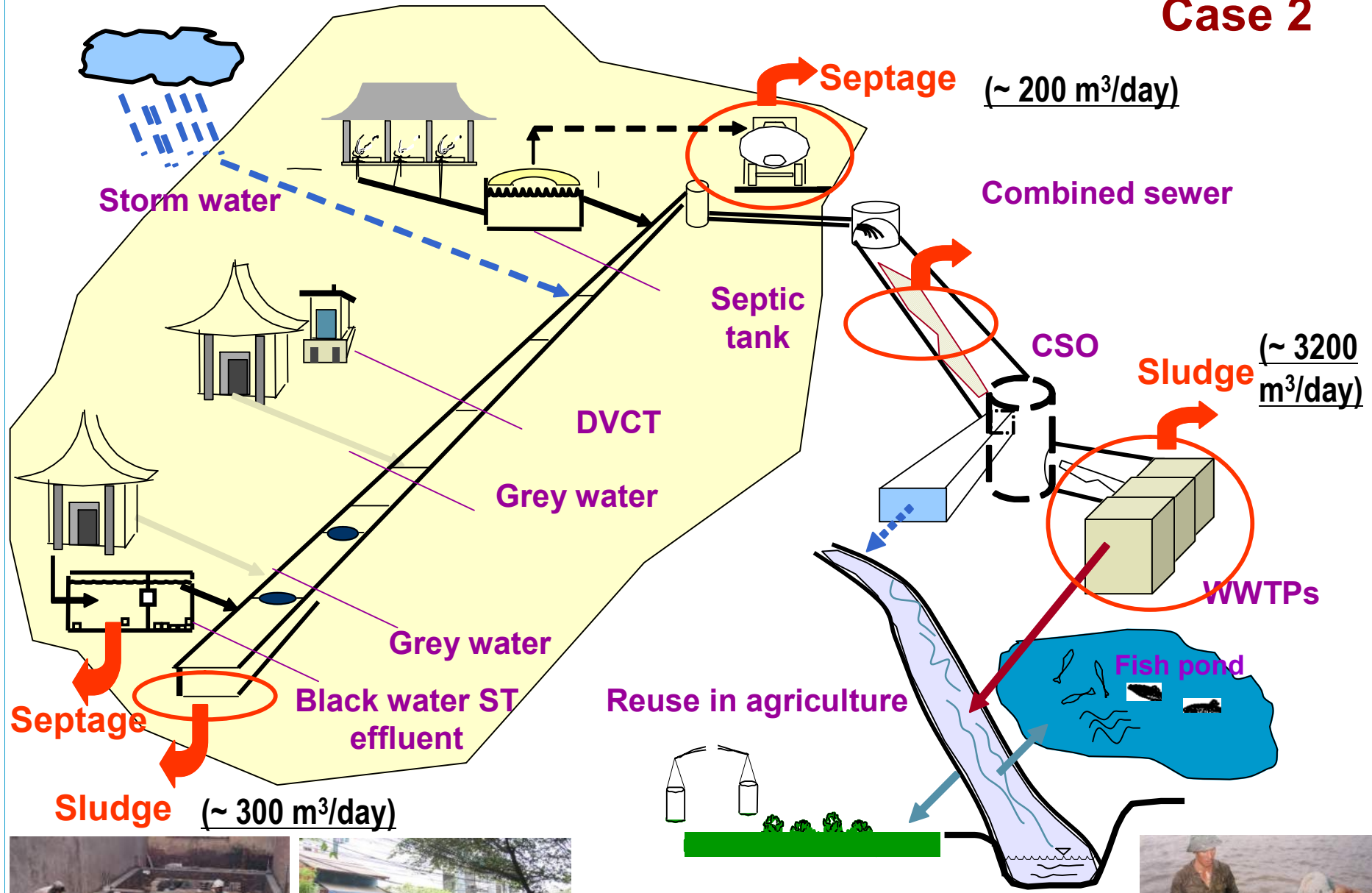
Hai Phong –
Island resort



Hanoi –
new apartment



Case 2



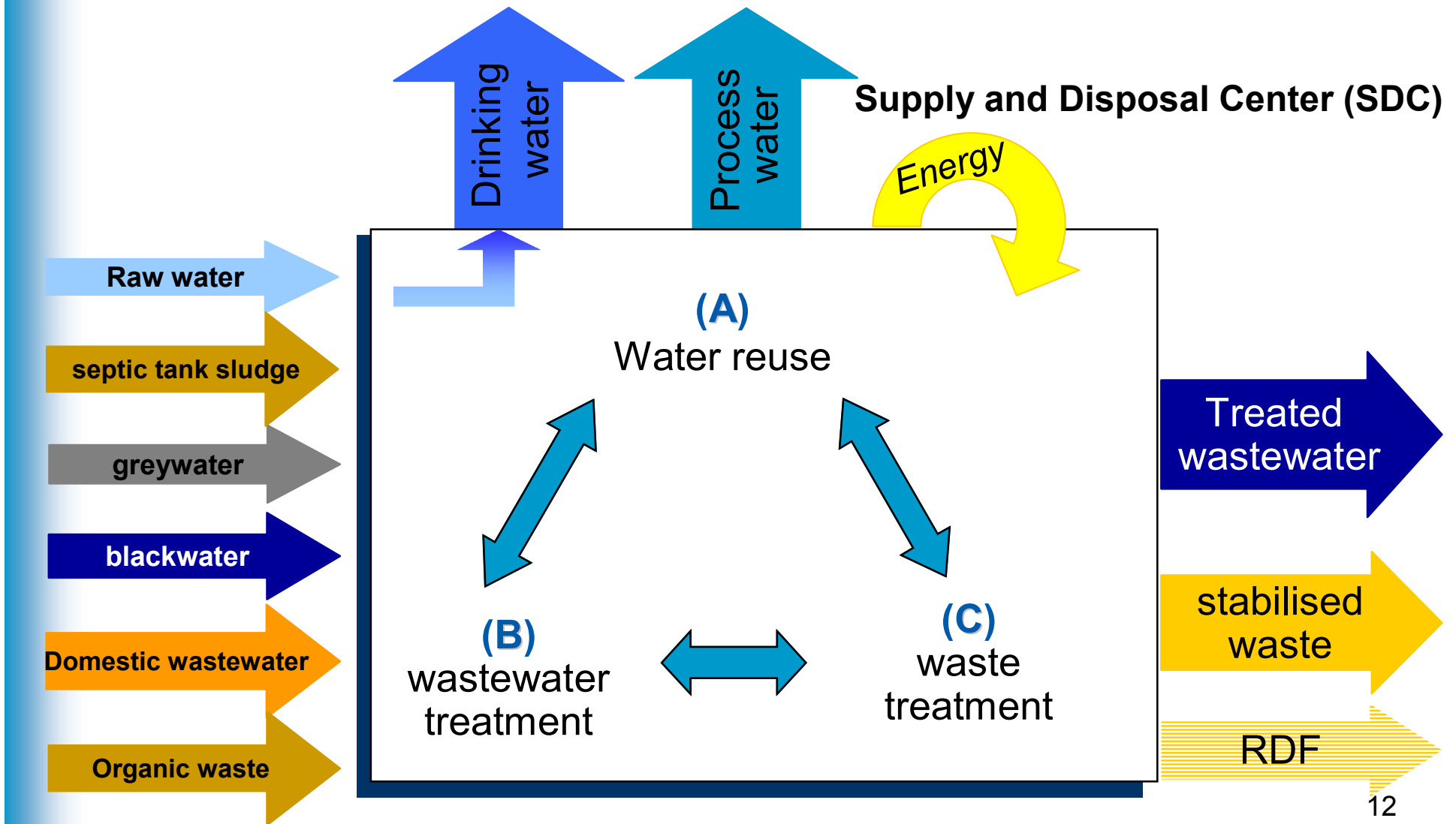


Solid waste management:

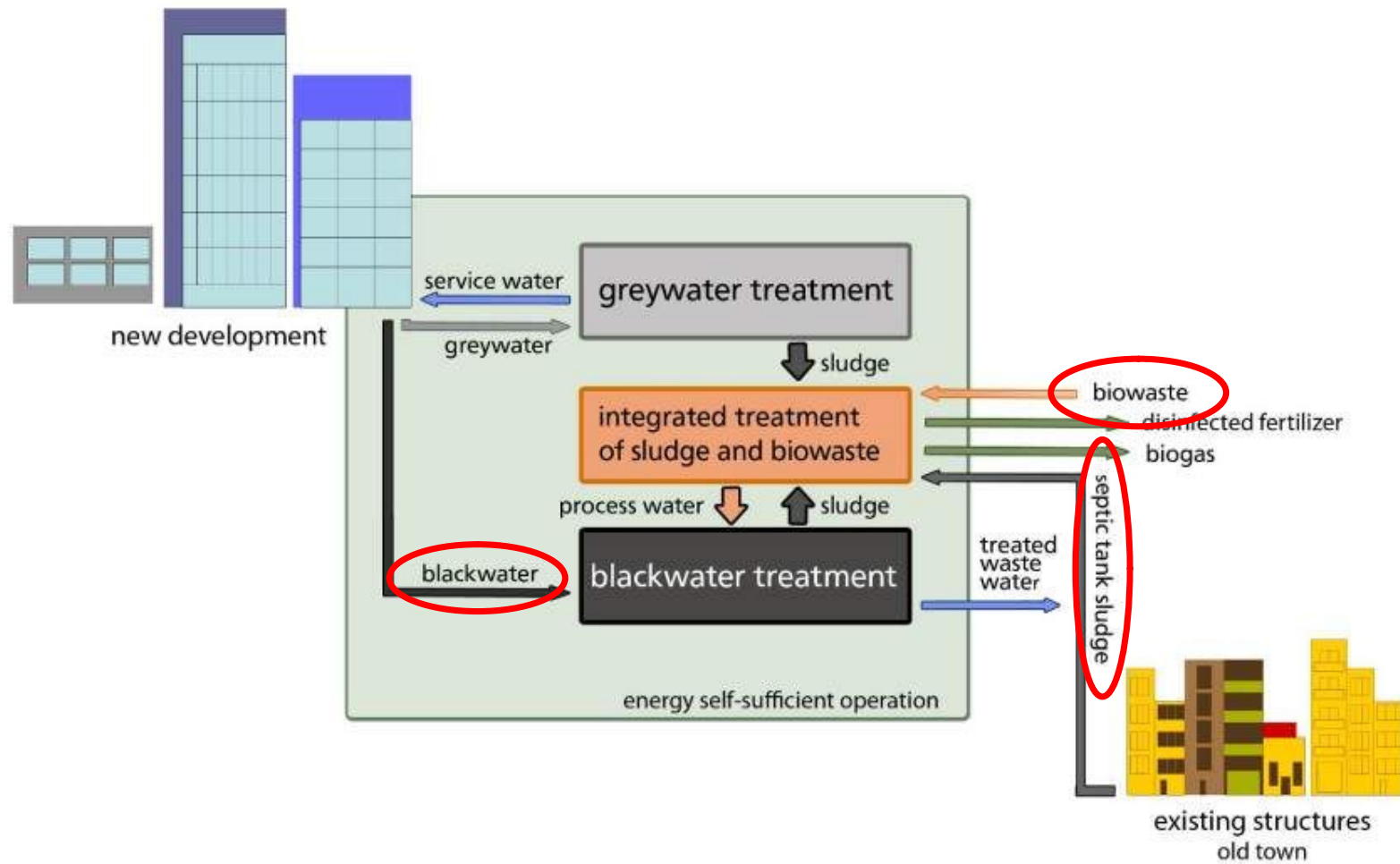
- total amount of solid waste generated: 1,500 – 1,600 tones/day.
- 85% of them is collected.

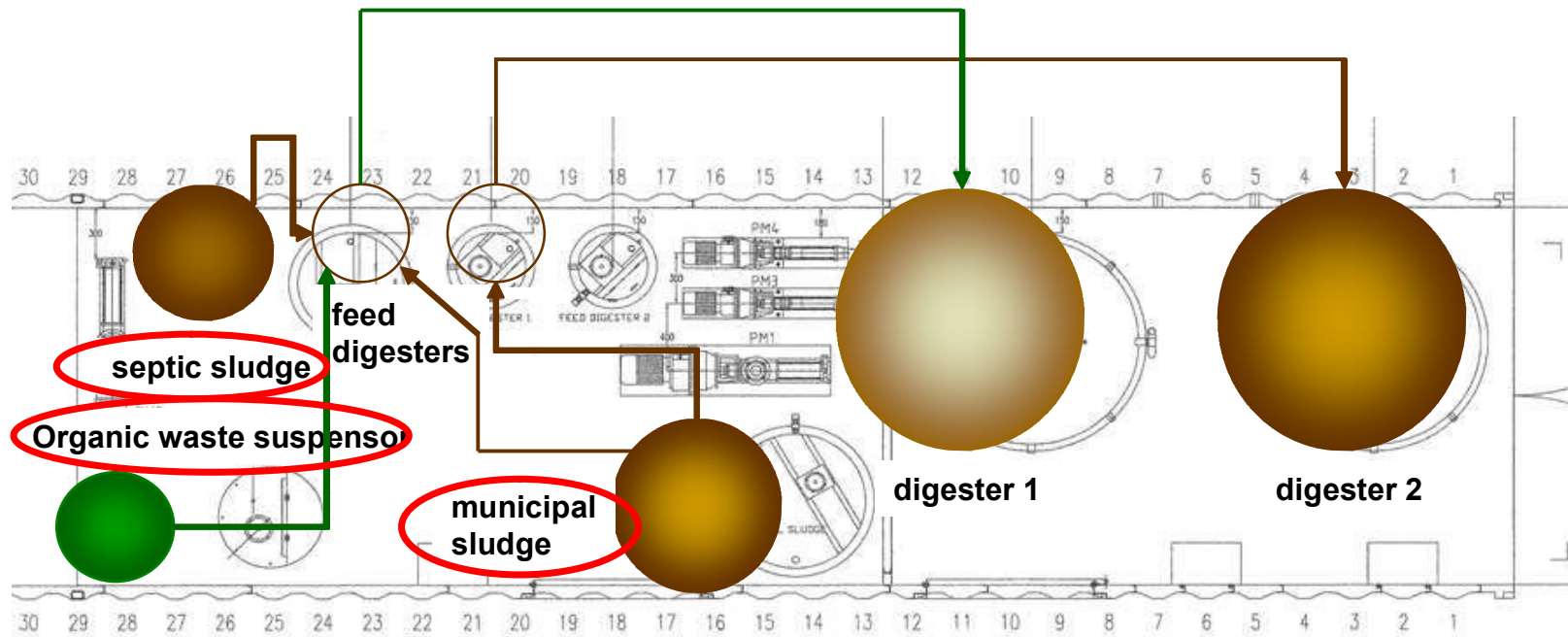


Solutions for Semicentralized Supply and Disposal Systems in Urban Areas. A Case Study in Hanoi, Vietnam



Solutions for Semicentralized Supply and Disposal Systems in Urban Areas. A Case Study in Hanoi, Vietnam





Failures



3. BARRIERS FOR TECHNOLOGY TRANSFER AND DISSEMINATION OF DECENTRALIZED SANITATION

- Institutional and managerial aspects
 - Lack of commitments.
 - Vietnamese environmental standards are still not fully developed.
 - Still some gaps and contradicting matters
 - Class B or C is applied within a city?
 - Value of some parameters do not comply with available and affordable technologies.
 - QCVN 14:2008: secondary treatment can allow to achieve column B for BOD, TSS.
 - However, for nutrients (N, P), pathogens: some additional (tertiary) treatment, high rate of flow return (A²O), strong disinfection is required.
 - This leads to inefficient expenses and no-equity among different wastewater dischargers.

▪Actors

- Designers:
 - **lack of data**, knowledge and experience, tightness of budget (e.g. to carry out pre-design fact-finding studies).
 - Design consultants do not get encouragement in low-cost options: the **design fee** is calculated based on the project construction cost percentage.
 - **Design quality and its appraisal** is also an issue especially in the remote areas.
 - Lack of **third-party testing and certifying** organization for the wastewater treatment technologies and equipment.
- Constructors: build according to a design approved by authorities.
 - Designers and constructors blame many of the operational problems to the owners.
- Owners: disrepair, lack of funds for O&M, insufficient training of operators.
 - Lacking of incentive measures does not encourage polluters to improve their situation.
- Studies by IESE, CENTEMA, Vietnam EPA: **weak environmental pollution control capacity at different, especially local levels.**

■ Technical aspects

- There are still very few decentralized technical options developed and applied.
- Systematic review has not been conducted:
 - DESA system performance, public acceptance, etc.
 - Balancing of investment, and O&M costs, including required space, manpower, energy and chemicals.
- After AD (mostly under-ground), polishing step (large space) is required.
 - Alternative options: Packaged system BASTAFAT, Jokashou, etc.



- **Technical aspects (cont.)**

- Collection of wastewater: little national and international experience in combined drains + septic tanks.
- Design guidelines are still lacking.
- Most of urban sanitation projects: neglect tertiary network.
- Most of rural sanitation projects: focus on on-site sanitation facilities.
- Environmental sanitation and infrastructure planning of the community is lacking.
- Environmental industry is still very weak. Lack of firms' capacity for R&D, marketing strategy, etc.
- Import of hi-tech products with "heavy armed" marketing campaigns are contributing to weaken this young industry.



- **Financial aspects**

- **Wastewater fees** is still very low in urban areas, and zero in rural areas (Decree 88...)
- **Private sector** is still not interested in this business.
 - No recovery for O&M and system upgrading
 - Lack of financial sustainability after construction works.

- **Social aspects**

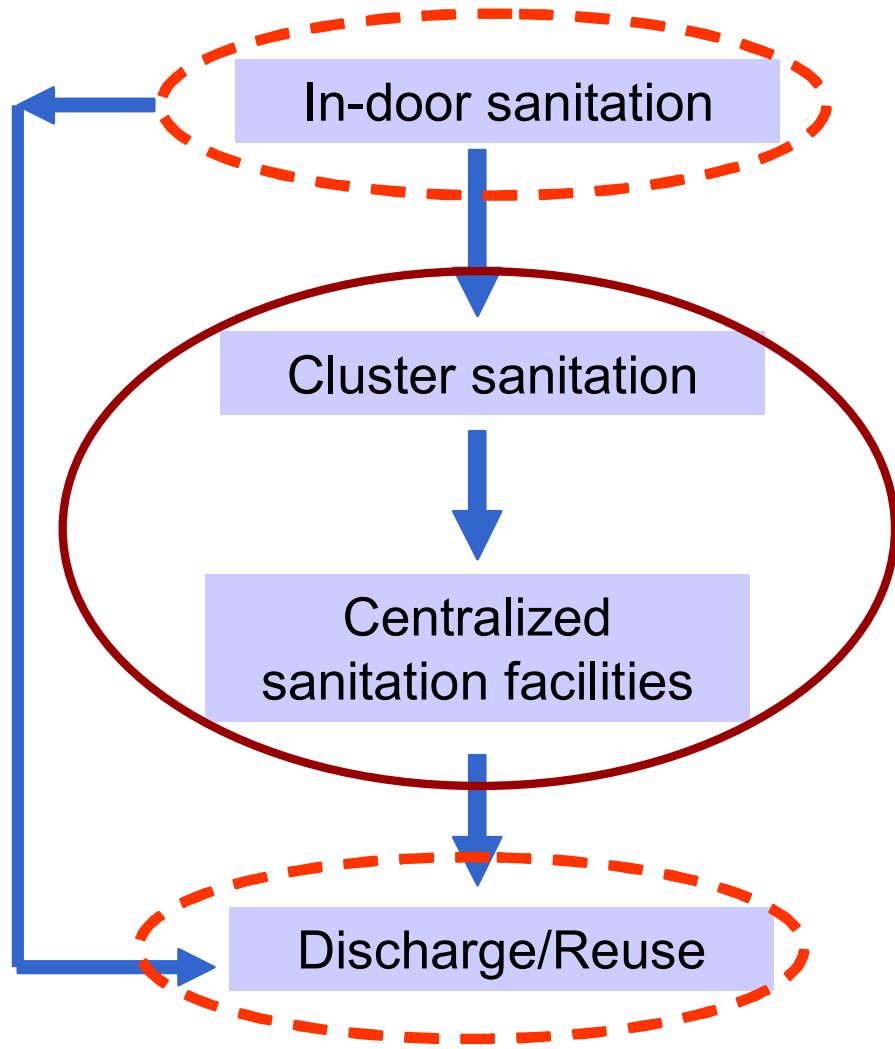
- Traditional acceptance of untreated wastewater disposal by most of people.
- Wastewater reuse attitudes of the public and policy makers hinder the adoption of wastewater treatment and safe reuse systems.
- **The main challenge is to create informed demand for improved sanitation.**

4. DISCUSSION & RECOMMENDATIONS

■ Institutional and managerial aspects

- For DESA dissemination: efforts in political advocacy, technical promotion and capacity building for all involved stakeholders should be continued.
- Effluent requirements should be further developed in accordance to the available technologies.
 - Step-wise approach in standard and code system establishment.
- Monitoring and inspection (by the local environmental protection agencies).
- DESA: environment for new ideas (technical solutions, managerial and financial approaches).
 - Government should create favour conditions for those new ideas to be developed and verified.
 - Suitable appraisal system of technologies and equipment.

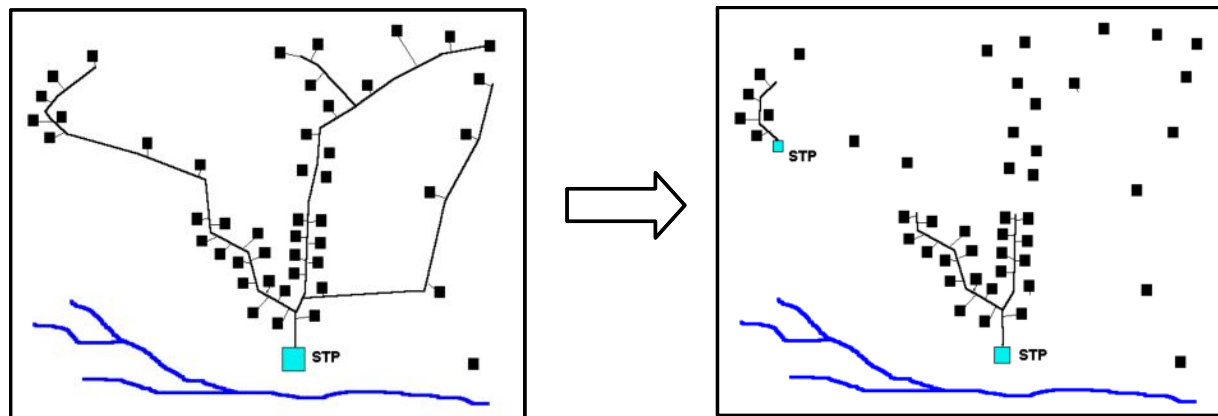
Sanitation has to be started from the household !



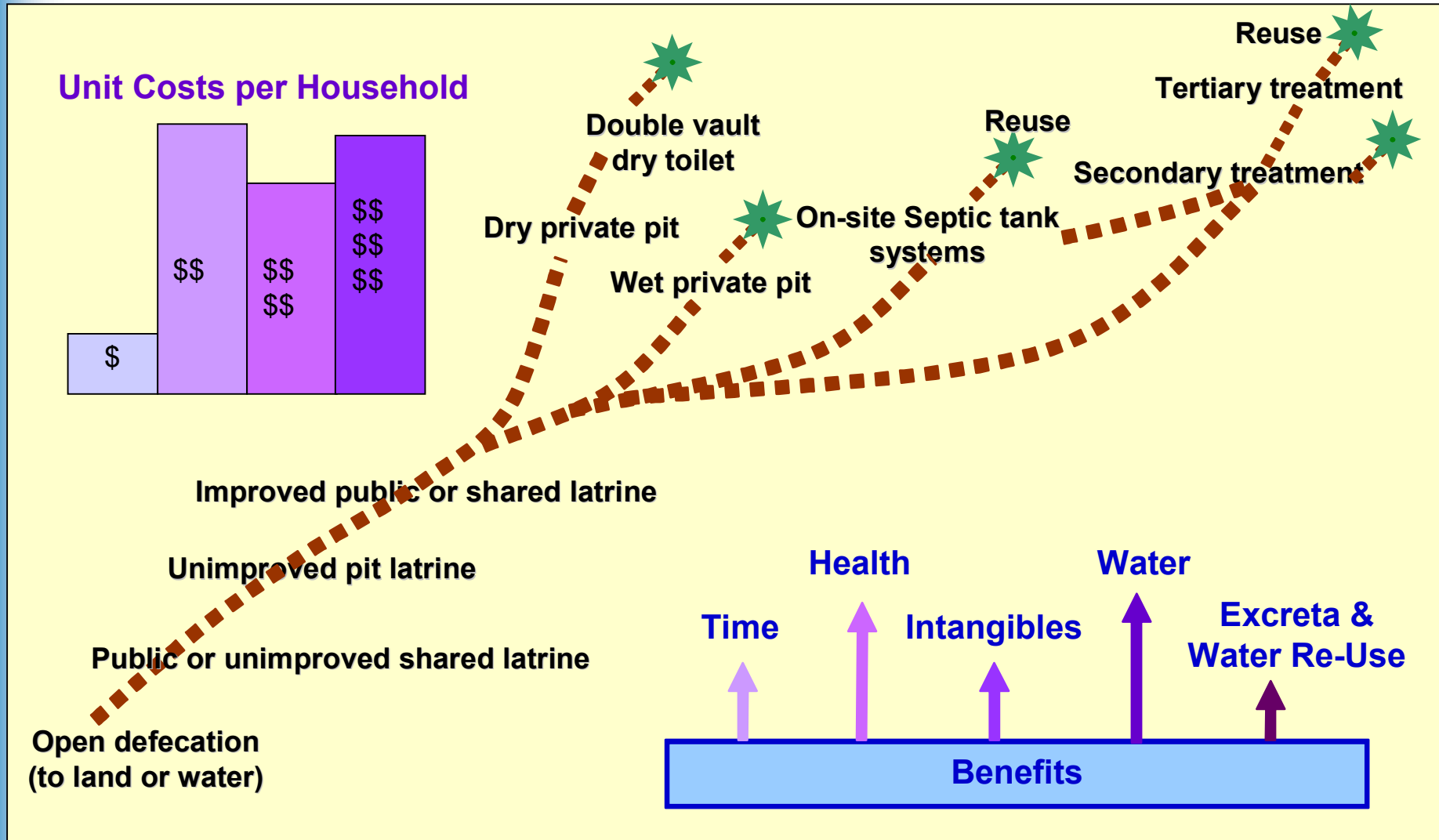
4. DISCUSSION & RECOMMENDATIONS (Cont.)

■ Technical aspects

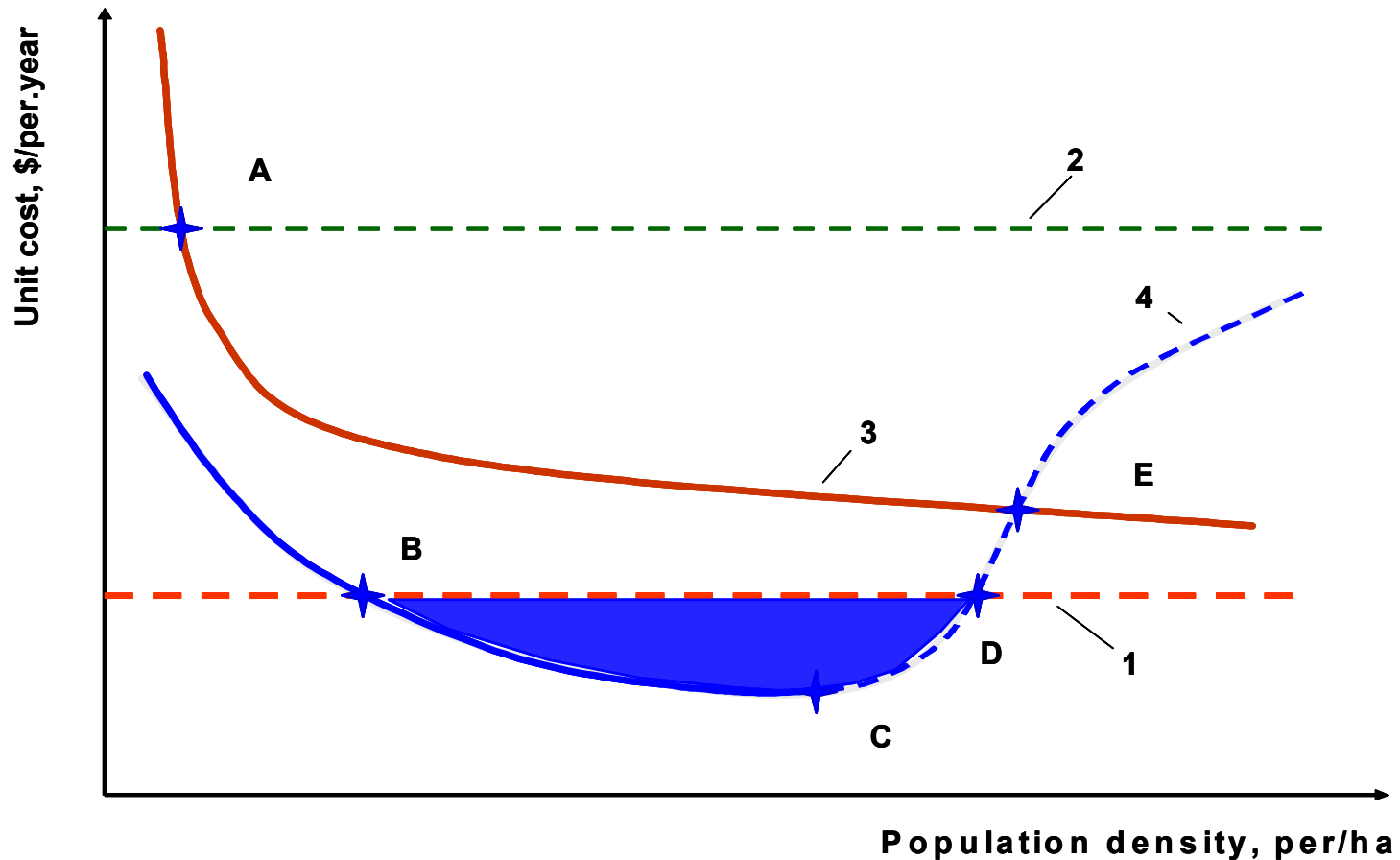
- Combination of different options
- Cost-benefit analysis of different sanitation options should be developed.
- We need information of unit costs of different sanitation options, in different local contexts



Technical options: "Sanitation tree"



Change of unit costs of sanitation options with different population densities



- Unit costs: investment + O&M expenses.
- 1, 2: low-tech and high-tech on-site sanitation facilities.
- 3: centralized systems
- 4: decentralized systems.
- BCD: Optimum zone for DESA application

4. DISCUSSION & RECOMMENDATIONS (Cont.)

- Updating of national codes and standards, technical guidelines.
- Capacity building
 - teaching curricula
 - short-term training courses
- Consideration of DESA approach from the early stages of the urban and rural infrastructure planning, IWRM.
- Crucial: to book adequate space, and to control construction ground level.
- Reuse should be considered in urban sanitation projects.

4. DISCUSSION & RECOMMENDATIONS (Cont.)

■ Financial aspects

- To mobilize different financial sources.
- Micro-financing
 - Revolving fund in urban areas
 - Micro-credit in rural areas
- In urban areas: costs of sanitation
 - ST & connection to sewer: 0.1 – 1%
 - toilet & bathroom: 0.3 – 5% of the total cost spent for the land and the building.
 - Understanding will certainly lead house owners to invest for their infrastructure early & reduce overall expenses.
 - & to pay for recovery of O&M expenses.

4. DISCUSSION & RECOMMENDATIONS (Cont.)

■ PSP in sanitation:

– Currently:

- pre-fabricated septic tanks and other sanitary wares,
- septic tank emptying service,
- solid waste collection – treatment – recycling – disposal.

– New models:

- BT project by Gamuda Berhad (\$300 mio. vs. 324 ha, \$1 bio)
- Hanoi city: Call for 45 city lakes restoration projects (\$80 mio.)



**Thank you very much
for your attention**

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