Session 3
Semicentralised Supply and Treatment Systems
Integrated Infrastructure Solutions for Urban Areas of Tomorrow

Speaker:
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Overview

- Challenges of fast growing urban regions
- The Alternative: The Semicentralized Approach
- Reuse and Recovery
  - not only a matter of natural resource efficiency
- Advantages of the Semicentralized Approach
- Challenges and Fundamentals
- Summary and Conclusions
Challenges of fast growing urban regions

New Infrastructure Solutions needed

- **Needs** for supply and sanitation systems
  - reduce fresh water demand → enable water reuse
  - low cost, low energy demand (energy self-sufficient ??)
  - ensuring high hygienic quality standards for potable and process water
  - reliable and robust
  - minimizing unaccounted water losses
  - adjusted growth
  - modular structure of supply and treatment units
  - "autarchic" suburbs / quarters
  - synergy between supply and treatment units

Conventional centralized supply and treatment systems as well as household based de-central sanitation can not fulfil these needs
Consequences: The Semicentralized Approach

A matter of Scale

1. Water reuse fosters decentralization
   • minimizing energy demand for pumping
   • minimizing capex for sewer and pipe systems
   • minimizing water losses

2. Energy recovery fosters decentralization
   • e.g. heat recovery from greywater (showers, laundry,...)

3. Fulfilling high quality standards fosters professional operation
   ➞ rather semi-central as de-central

4. Energy self sufficiency fosters combined treatment of water and (organic) waste

The Semicentralized Approach – integrated treatment on district level

• Integrated Semicentralized Systems therefore
  • focus on smaller,
  • more compact units

• Each district has its own Semicentralized Supply and Treatment Centre (STC)
  • integrated approach,
  • focussing material flow-based management,
  • utilizing synergy effects and re-use potentials
The Semicentralized Approach – Saving Potentials and further Advantages

- Implementation Strategies for Semicentralized Systems
  - Possible for new development areas
  - As well as for partly integration in existing structures (the example of Hanoi)
The Semicentralized Approach
Case Study Qingdao

Water Reuse
- not only a matter of natural resource efficiency
Energy Recovery
- not only a matter of natural resource efficiency

Advantages in Technology

- **technical feasible** with proven technologies
- **saves > 30 % of fresh water** resource
- **saves energy** as energy demand for reuse water ranges about 0.3 kWh/m³ compared to 3 to 4 kWh/m³ for desalination of seawater
- combined treatment of sewage sludge and (organic) waste gains more **electric energy** than needed to operate facility
- **heat recovery** from greywater technical feasible
“non technical” advantages

- more flexible to cope with changes
  - faster realisation → less risks
  - reduced overall cost
  - energy self-sufficiency → operation
  - planning and operation are more reliable (reduced probability of economical disaster)
  - less vulnerable to external catastrophes
    - floods,
    - earthquake
    - shut down of electricity
    - terroristic attacks

Obstacles

- The integrated approach
  - Does not reflect the organisational structures in politics, administration ….
  - and even in financing
  - interdisciplinary thinking, negotiating and acting is not common at all

- Prices, cost, fees
  - Onsite treatment results in cost e.g. for greywater
  - Cost are competitive, but not necessarily with subsidised freshwater cost

- Ownership
  - Treatment facilities within private territory

- References
  - New concepts need references, but
    No one will be first, No one will take that “risk”
  - Financers ask for references ("We will finance only proven technology")
Obstacles

- **Funding**
  - Research funds only for lab scale and pilot plants
  - References / Large scale implementation not to be funded or (co-)financed by BMBF nor by KFW or other banks

- **Open tendering**
  - Usually not for integrated approaches
  - Not feasible for innovations
  - Not feasible for reference plants
  - Banks tend to be conservative in means of requiring large numbers of references

- **Financing institutions**
  - Prefer few large objects rather than large amount of smaller objects
    - Rather centralized than decentralized approach
  - Insist on references

The Qingdao Case

- Research in cooperation with Qingdao Tech University
- Piloting finished (some components still under investigation)
- Feasibility study completed
  - together with
    - Municipality of Qingdao
    - ITT Water & Wastewater
    - Passavant-Roediger
    - Kocks Consultant
- Test field area for a real scale test (20,000 capita) identified
- Implementation trapped in net of
  - open tendering
  - missing references
  - funding and financing
  - competence

Nice concept, but implementation failed??
Summary and Conclusions

- Urban growth brings up new challenges in infrastructure planning
- New challenges require infrastructure systems
- Water and energy recovery in conjunction with professional operation fosters semi-centralized infrastructure
- Integrated Semicentralized Systems offer higher resource efficiency
  - Water savings of about 30% and more
  - Energy self-sufficient operation (treatment)
  - Potentials of heat recovery
- Implementation of integrated infrastructure Systems pre-failed as long as thinking, administration, operation and financing is sectorized ??

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Thank you for your attention!

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