



# Zero Emission Buildings Integrating Sustainable Technologies and Infrastructure Systems

## Sustainable Wastewater Management in Turkey Case Study

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# Outline



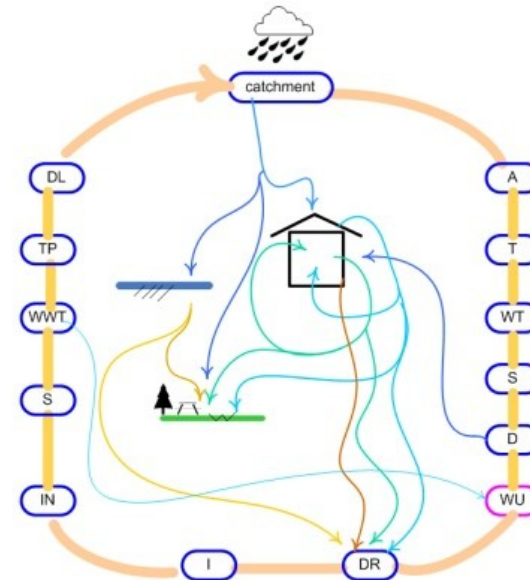
- Introduction, Concept,
- Pilot studies by TUBITAK to climate change impacts, water scarcity, RW and GW treatment-reuse,
- Technology options,
- Assessment (RW/GW)
- Case study
- Conclusions

# introduction

- Influences on water sources for Mediterranean basin;
  - growing population, increasing tourism,
  - rapid industrial developments, urbanization
  - climate change impacts
- lead development of improved adopted strategies,
- Istanbul relies on surface water resources (increases impacts/risks of climate change)
- Residential and commercial use is the biggest part (app. 60%) of total water demand in Istanbul (ISKI)
- Foreseen impacts
  - Regional temporary drought periods,
  - Extreme events (rainfall causing floods, more noticeable recently),

In addition to that,

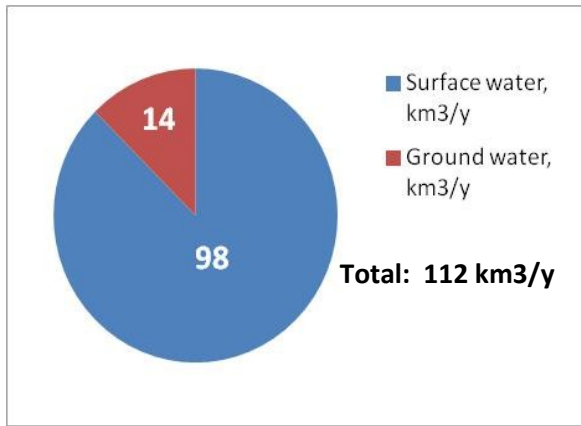
- Buildings responsible for 40% of Europe's total CO<sub>2</sub> emissions (EU),
- There is significant potential for improvement for GHG emissions in this sector,
- 20% CO<sub>2</sub> reduction target by 2020 (GE Building sustainable cities)



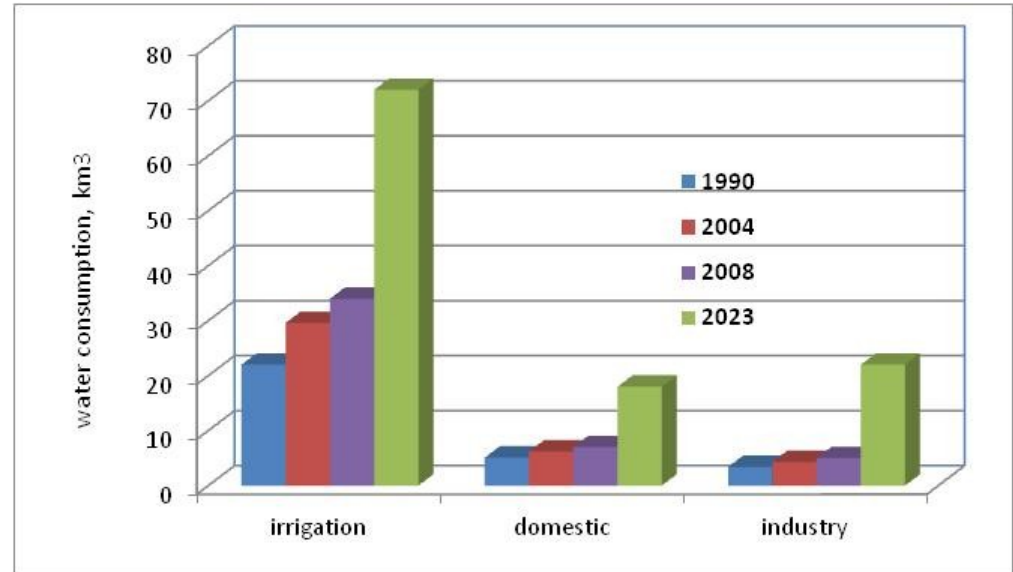
C: catchment, A: abstraction, T: transmission, WT: water treatment, S: storage, D: distribution, WU: water uses, DR: drainage, I: infiltration, IN: interception, S: sewage, WWT: wastewater treatment, TP: transport, DL: discharge



# water availability – consumption (Turkey)



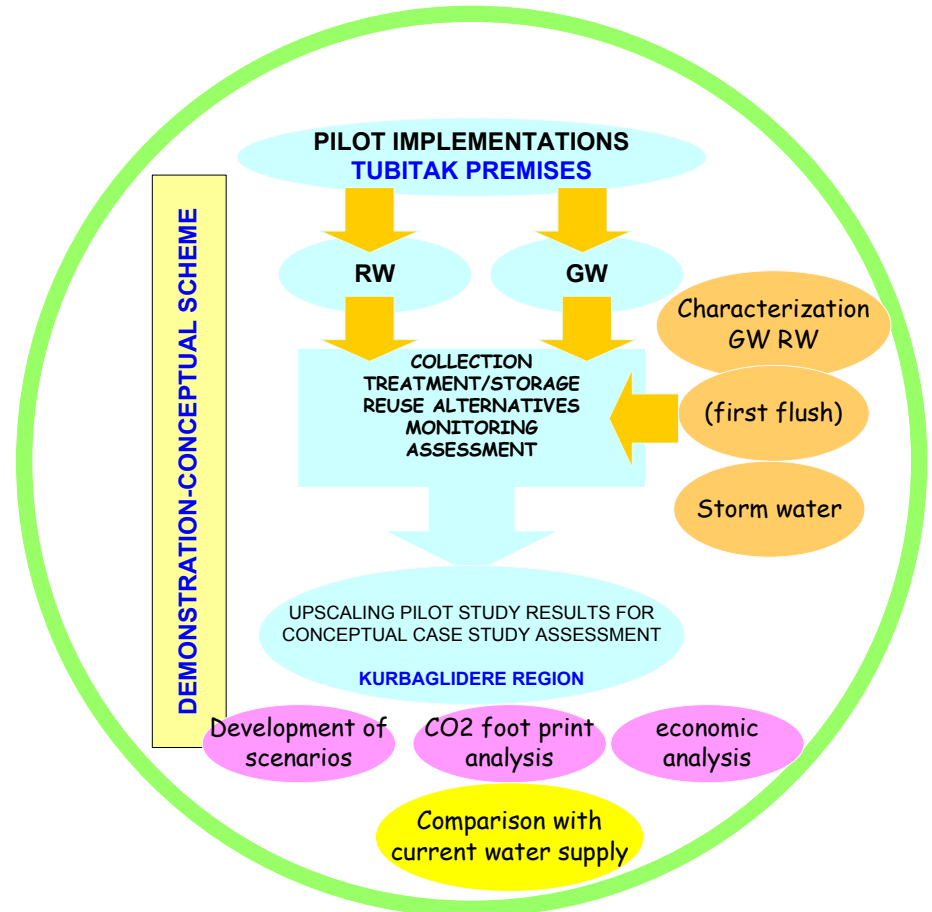
**renewable water resources  
(economic)**



**water consumption**

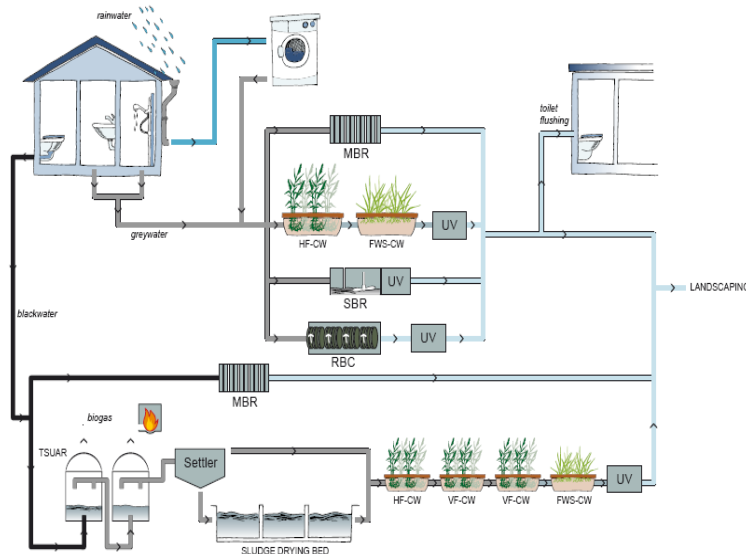
## proposed alternative approaches – pilot studies

- Goal → sustainable, green cities, contribute to mitigation of climate change impacts,
- Cycle approach concept vs linear systems for urban areas,
- Development of alternative economic sources,
- Implementations for existing urban systems and new urban developments,
- Essential to have diversification of water sources including RW and GW,
- DWW segregation into components, treatment and reuse separately → innovative approach to achieve resource management,
- Treated RW and GW are used mainly for toilet flushing and irrigation purposes.
- Combining energy recovery GW reuse, RWH may constitute partial solution for water scarcity / climate change impacts.

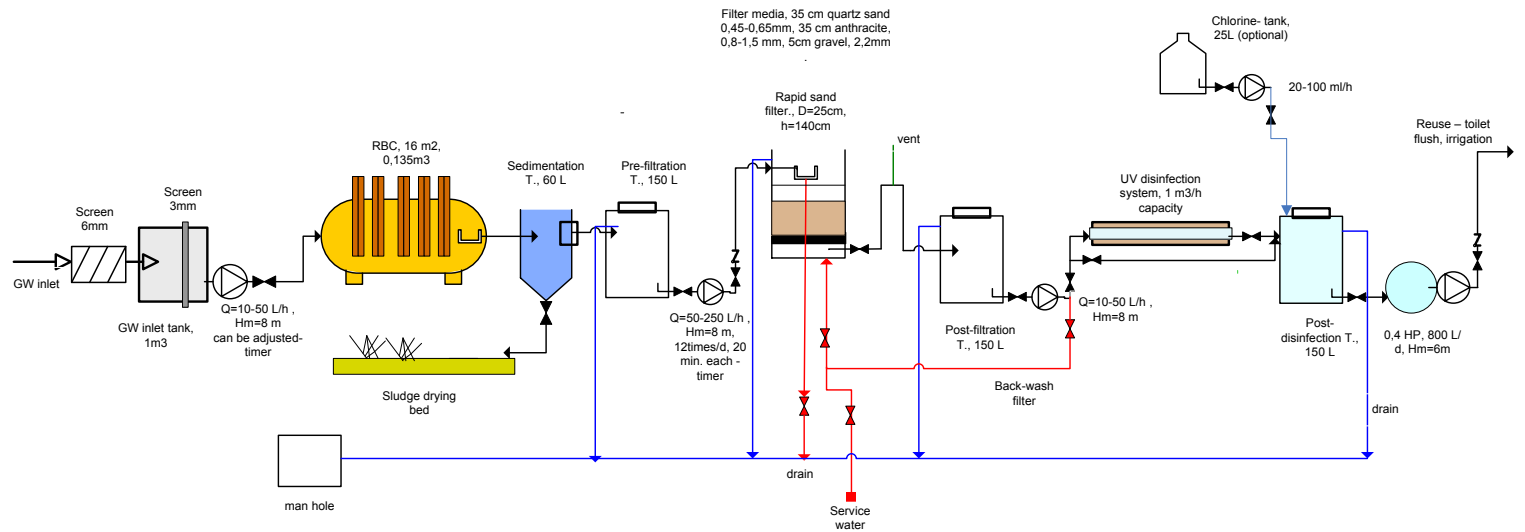


Pilot studies for urban RWH and GW management PREPARED ([www.prepared-fp7.eu](http://www.prepared-fp7.eu))

# Pilot plant – sustainable water management



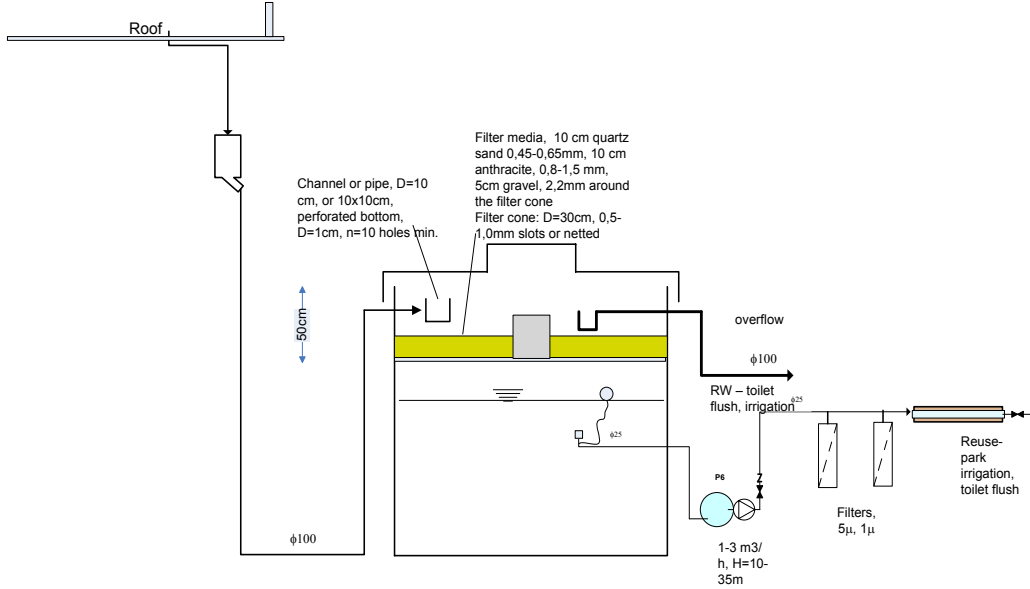
**Pilot plant technical options – sustainable water management – at MRC premisis**



**PREPARED PILOT – ISTANBUL GREY WATER TREATMENT AND REUSE OPTION**



### Rain water reuse – at MRC premises



### Rain water reuse – cartridge filters-UV, distribution pump



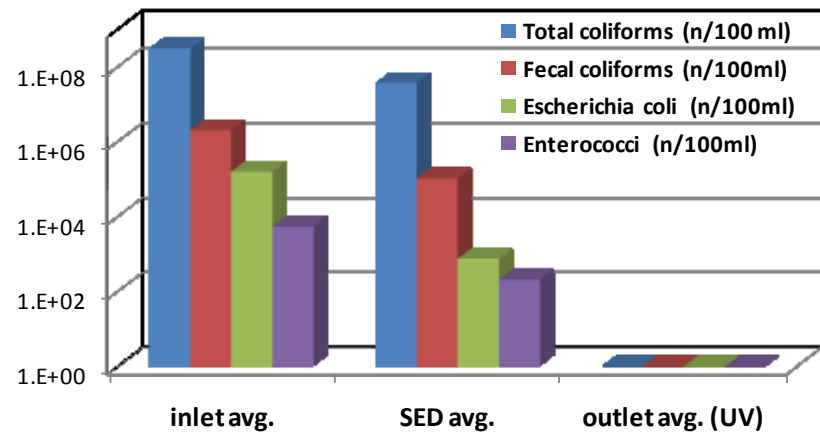
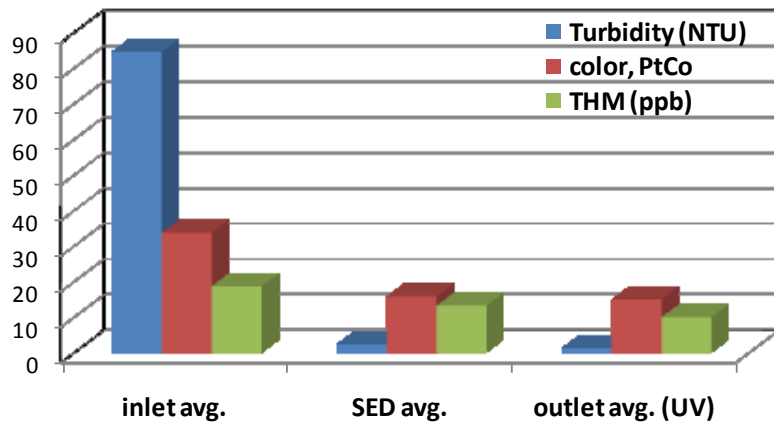
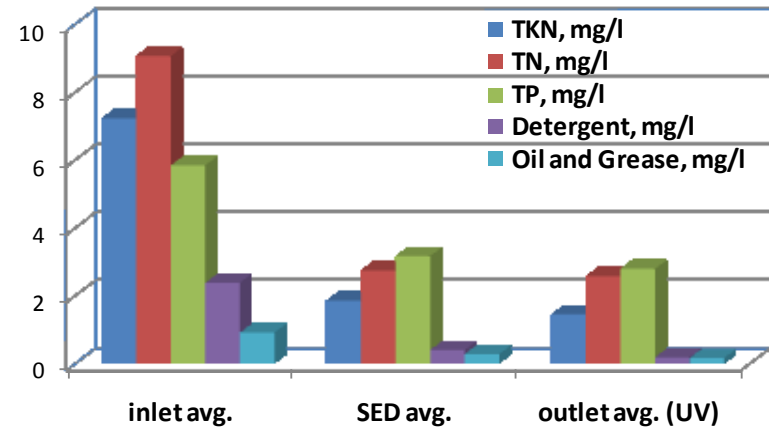
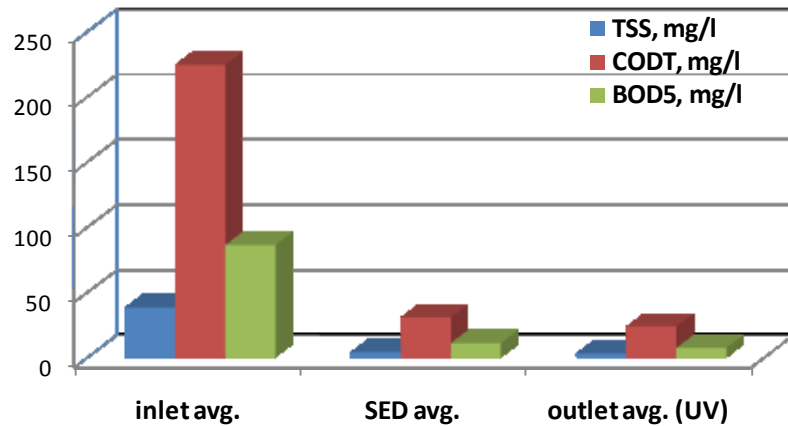
Grey water treatment reuse with RBC- at MRC premises



Rain water reuse – anthracite –sand filter, storage

# GW system operation performance

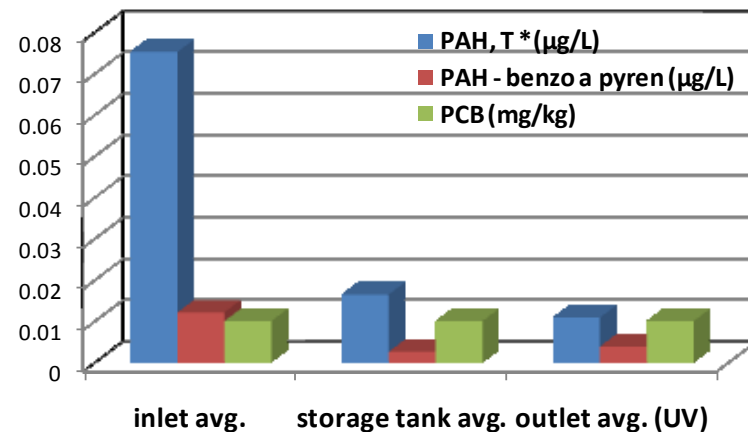
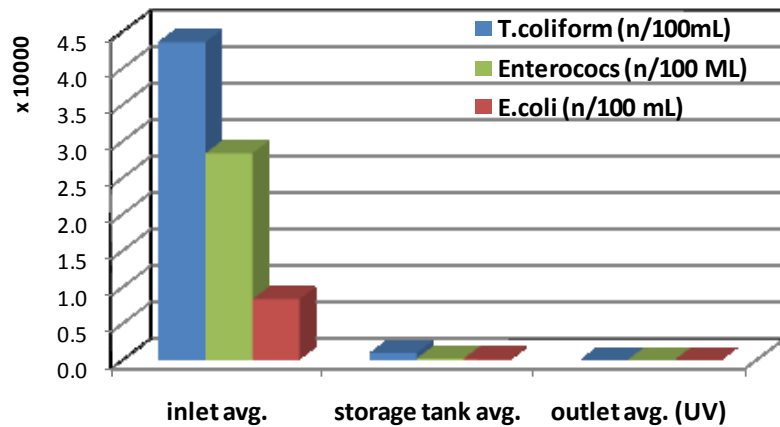
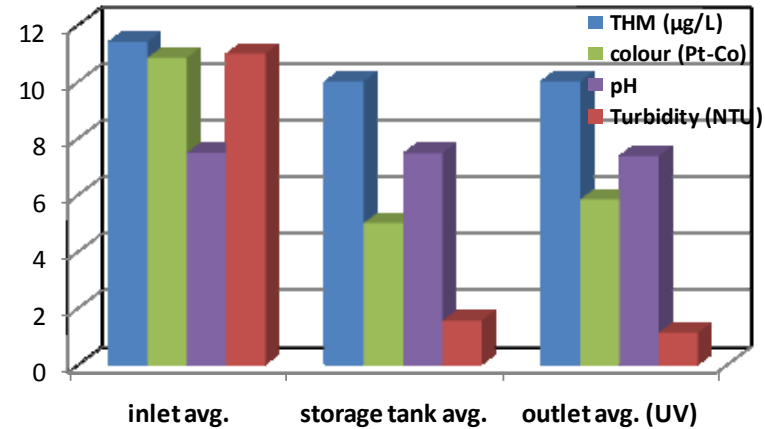
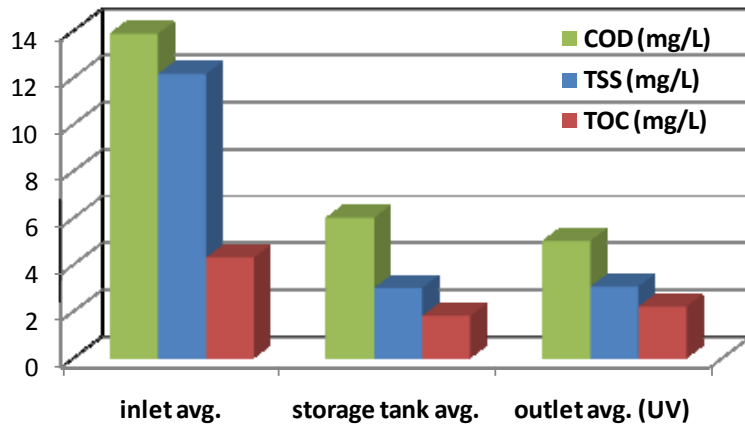
GW technologies employed:  
rotating biological contactor (RBC),  
multistage filtration, UV  
disinfection





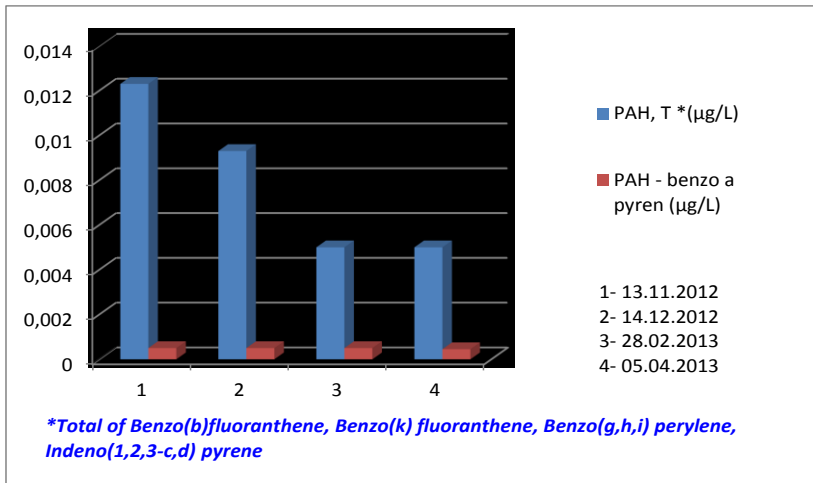
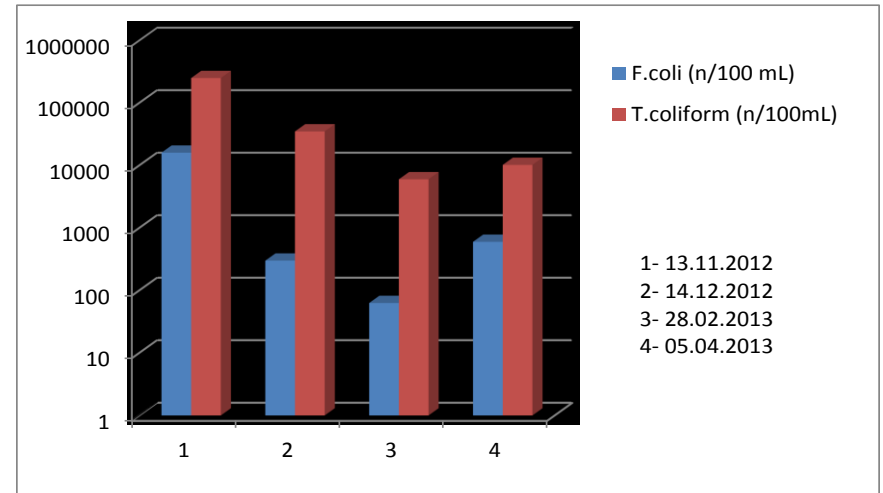
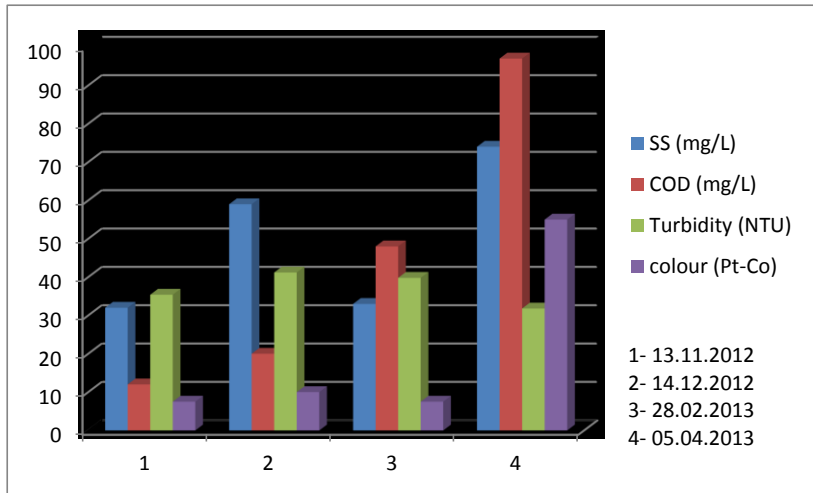
## RW system operation performance

The technologies used for RW studies are microfiltration, storage, sand-anthracite filtration, UV disinfection, cartridge filters

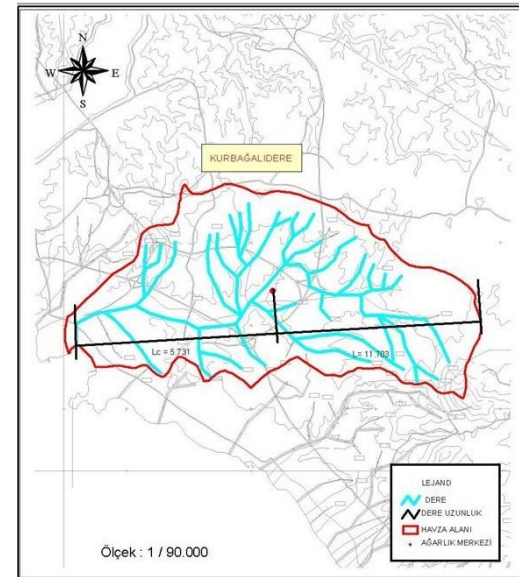


## Assessment of storm water quality

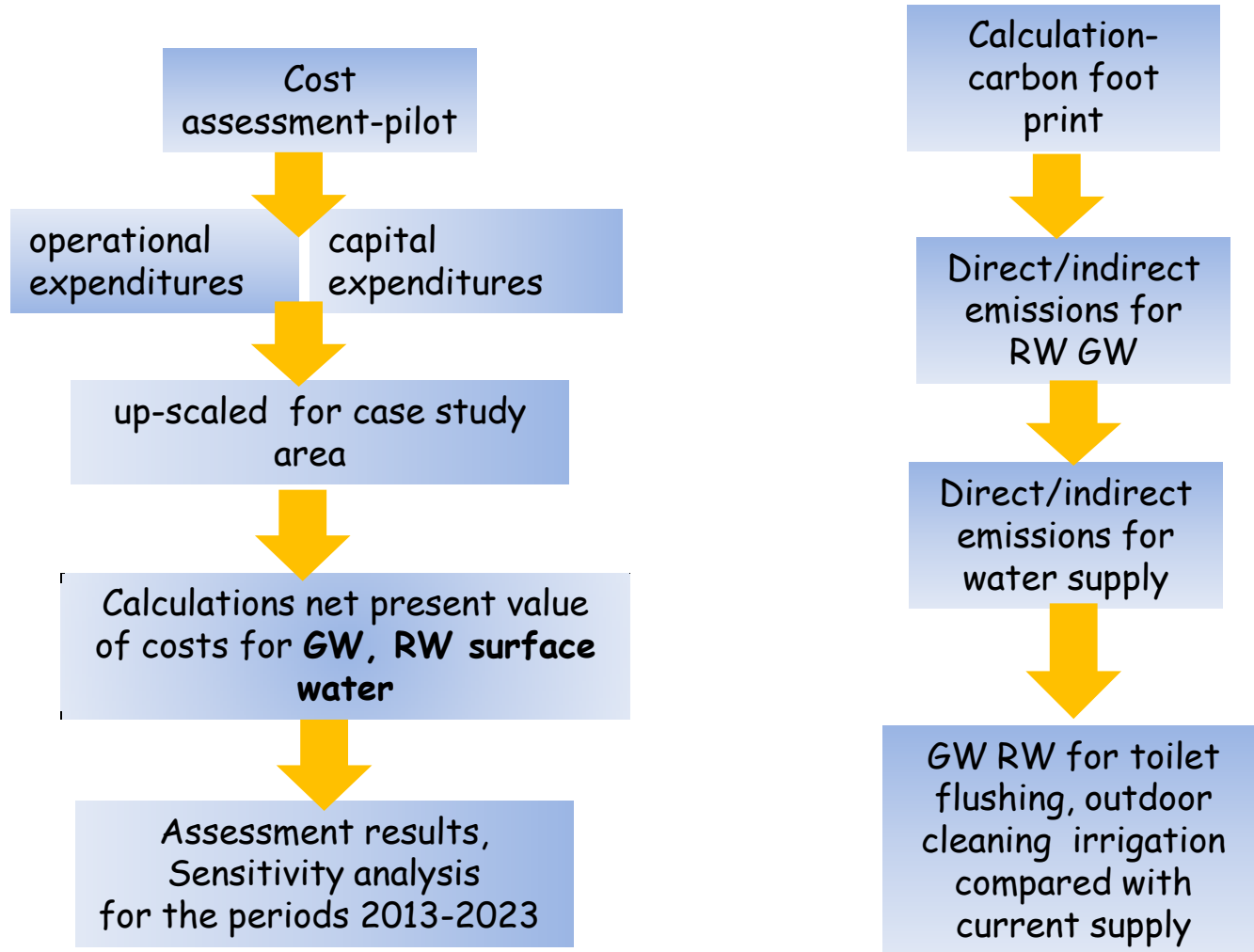
(samples collected from roads and paved areas in Kurbağlıdere Region in Istanbul)



### Case Study



## Feasibility and carbon foot-print assessment of storm water quality – case study



## Conclusions/achievements

- Valuation of methods highlighting conditions/limitations for Istanbul and applicable to other comparable urban areas,
- Determination of reliability of tested systems,
- Recommendations for potential solutions,
- Improvements in innovative water resources concepts may lead to sustainable zero emission building concept / greening cities
- Contribution to the public recognition for climate change - water related issues,
- Facilitation of up-scaling pilot scale results for larger settlements.

# THANKS

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