



Investment or Operations Control?

Managing precipitation peaks in the
wastewater network by SCADA

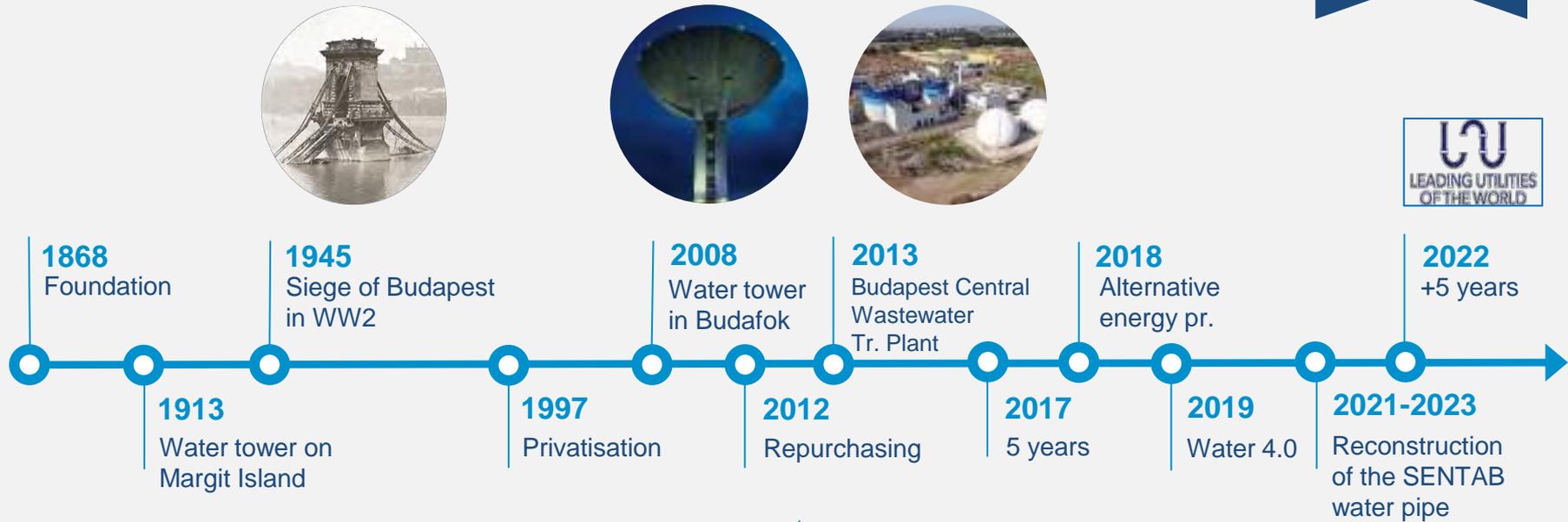
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Operation control engineers, Budapest Waterworks

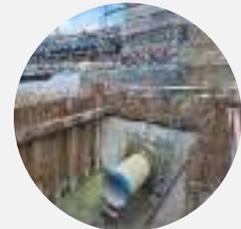


History

150+ years
operational
experience



Continuous
water supply
without
interruption



Key Indicators of the Company 2024

Drinking water

- **2** water treatment plants
- **7200 km** water network
- **1 million m³** daily capacity
- **756** wells

Sewage

- **7** treatment plants
- **95 million m³/year** treatment
- **373 000 m³** daily capacity
- **840 km** sewer network

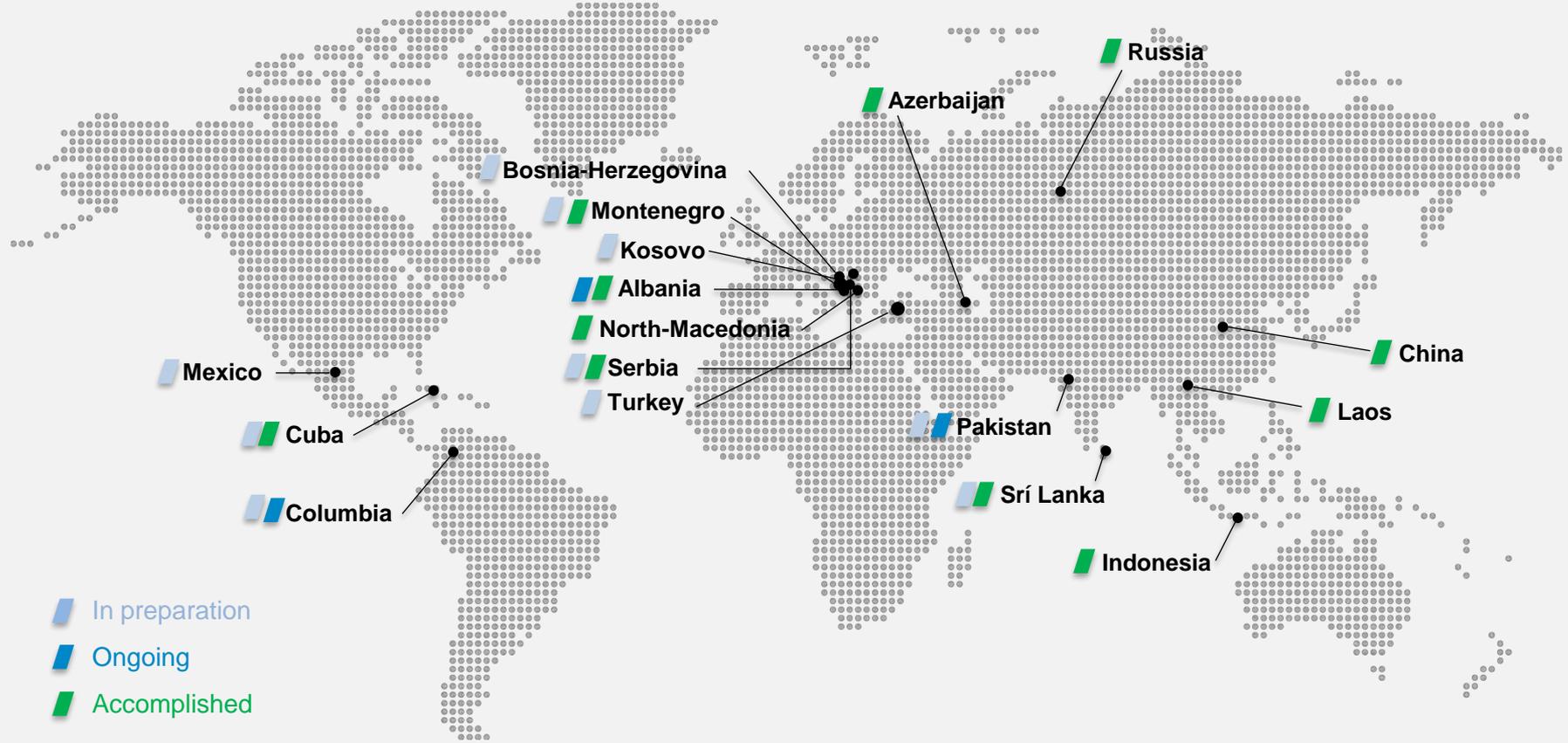
Clients & Headcount

- **2,5 million**
user equivalent
- **1408**
number of employees

Income (2024)

- **163 million USD** total revenue
- **108 million USD** potable water
- **27 million USD** wastewater
- **28 million USD** export and other

International Projects



-  In preparation
-  Ongoing
-  Accomplished

Motivation

! Design ≠ current operational reality

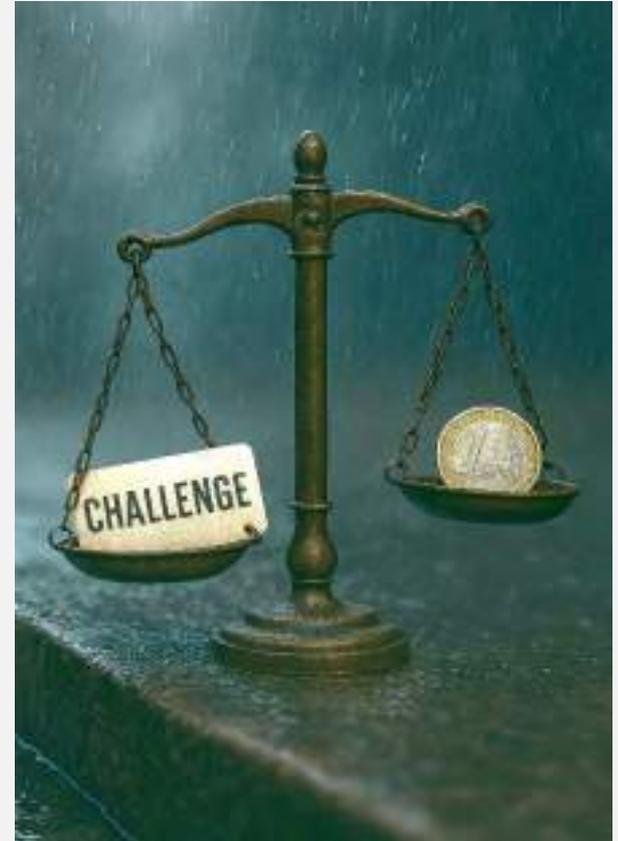
Shifts in domestic and industrial water use
Increasing load of the current systems
Hydraulic overload and overflow risks

! Climate change & aging infrastructure

Decreasing annual rainfall, storm intensity

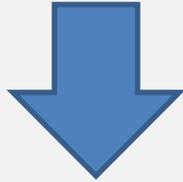
! Need for smarter, low-cost operation

Financing – limited CAPEX
Smarter operation = sustainable improvement



Operational Optimization Concepts

- Local or network-level flow control
- SCADA/PLC fine-tuning of booster stations
- Delaying load peaks to balance inflow



More time till investment will be unavoidable



Case Studies – the Related Sewage Systems

Waste water removal

#1. and #2.

- 40,000 inhabitants, growing
- Poor rainwater drainage
- Overloaded collection mains and WWTP
- **Aim: scheduling, load control**

#3.

- 3,000 inhabitants, hilly
- Poor rainwater drainage
- Overflow problems at some lower points
- **Aim: ensuring time**



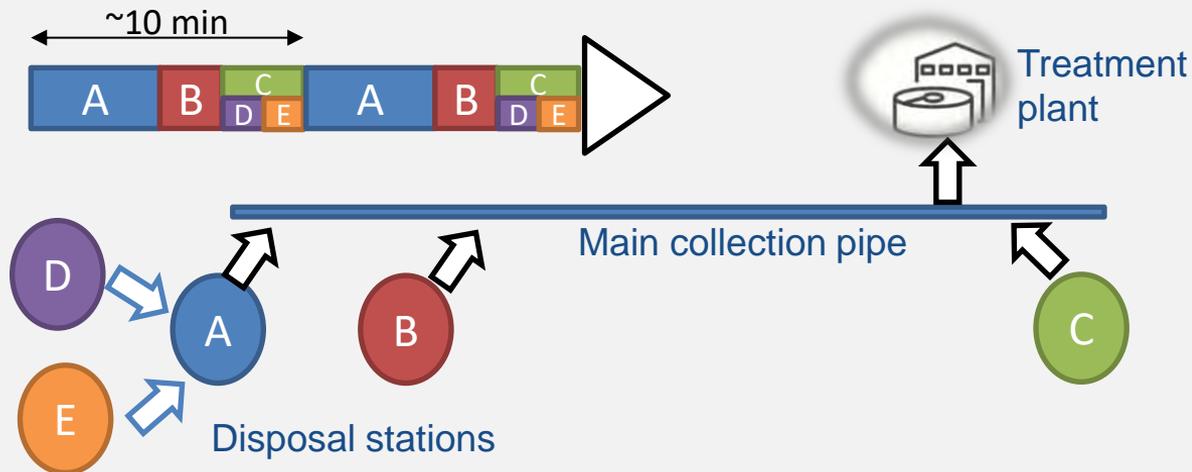
Case Study #1 – Scheduling via Timeframes

Aim: Balancing the load on the main and the WWTP

(for dry days, 2018)

Local operation control: each station has its own time window for pumping the collected wastewater; taking into account the transport capacity, the characteristics of the collection zone

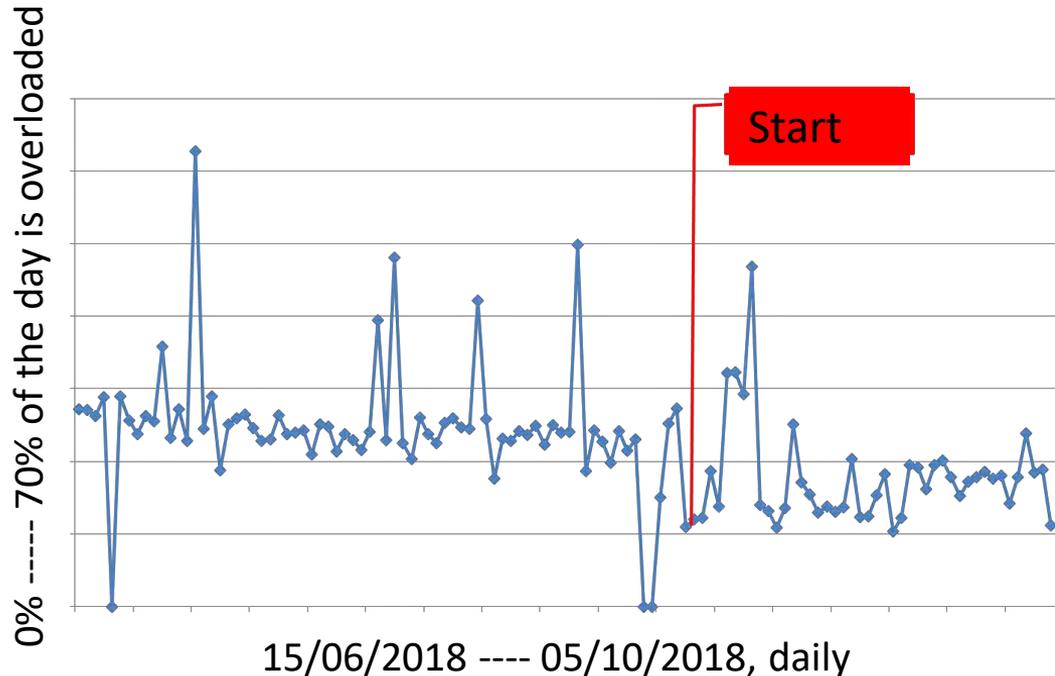
Dedicated timeframes for default pumping



Case Study #1 – Scheduling via Timeframes

Nominal hydraulic load of the treatment plant is 300 m³/h.

The ratio of overloaded time: 25% → 16% (in dry periods)



- + Really simple function
- + Local PLC programming needed (in-house)
- + Based on evaluation of normal operation
- + More stable flow
- Time sync is important
- Higher number of switching
- Only for dry periods

Small effect – but for **free!**

Case Study #2 – Water Retention

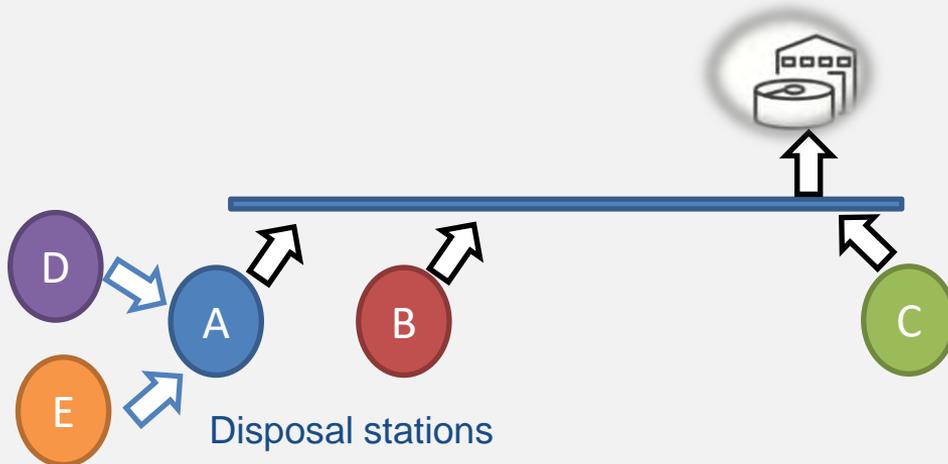
Aim: Reducing peak intensities, more continuous operation

(for the rainy hours, 2025)

Regulation on the receiving system by the biggest pumps

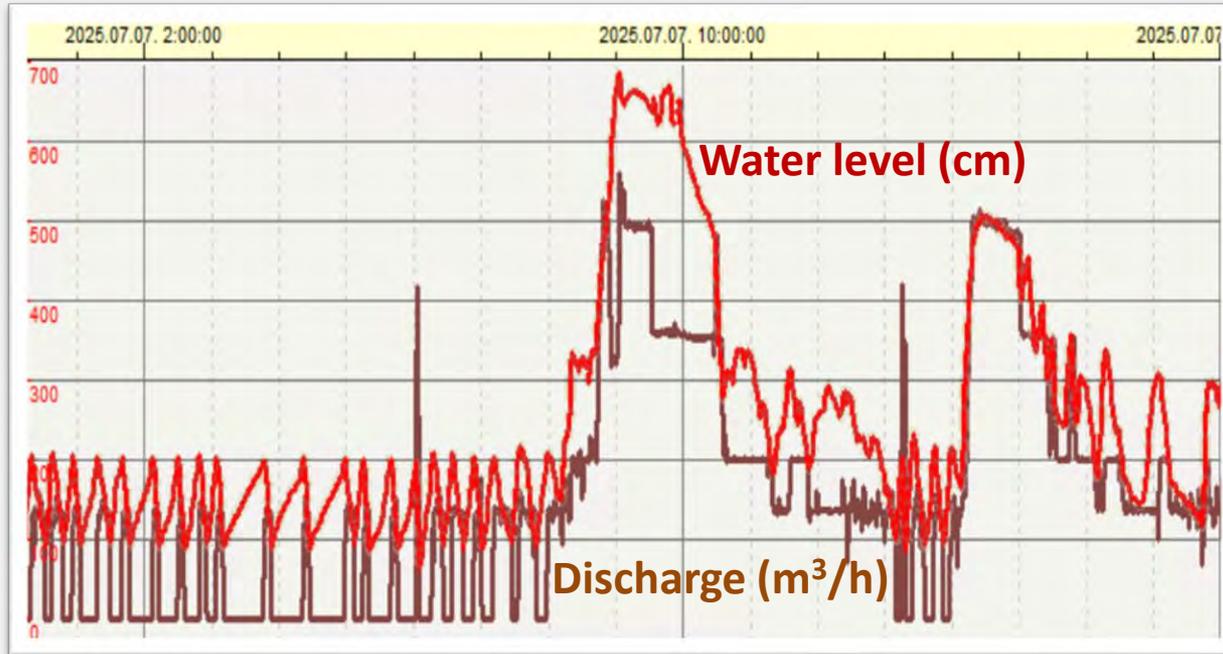
Locally controlled pump operation at the upstream station

Design the suitable tank capacity (wet well, grit trap and gravity collection network)



Case Study #2 – Water Retention

Flow control and cutting peaks
Delayed runoff, no outflow



- + Simple function
- + Lower head losses
- + Periodic flushing
- + Continuous flow to the WWTP
- Investment: disposal station reconstruction

Stability, without WWTP intensification!

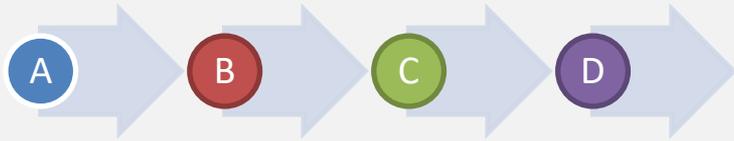
Case Study #3 – Load Balancing

Aim: Ensuring time for intervention

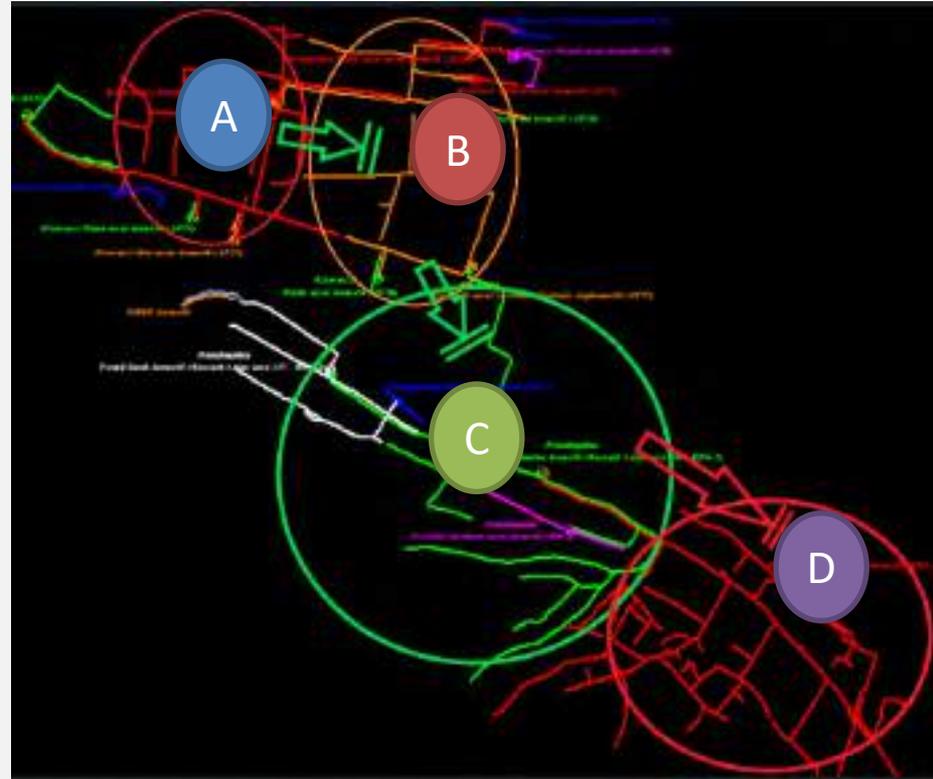
(2025)

For handling pumping station outages or storm water inflow

Provides additional time

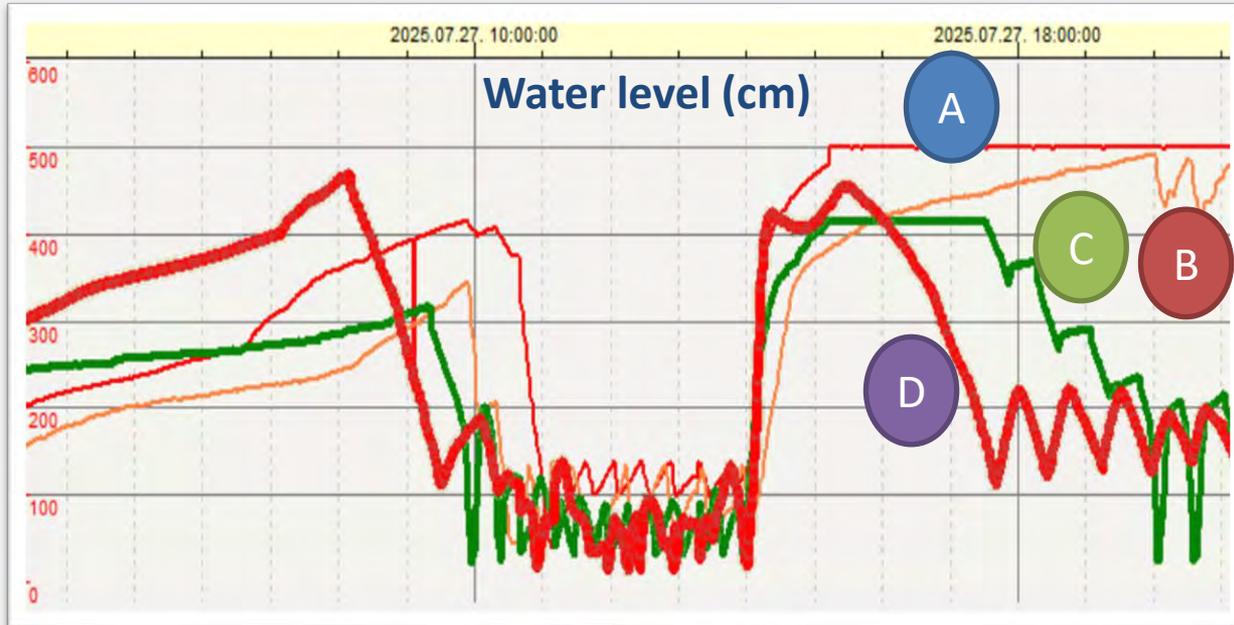


- D – station is overloaded
→ C – restricted
- C – station is overloaded
→ B – restricted
- B – station is overloaded
→ A – restricted



Case Study #3 – Load Balancing

Utilizing the storage capacity of upstream disposal stations
Provides additional time and less overflow in protected zones



- + Local PLC programming needed (in-house)
- + Based on the topology
- + Enough time for intervention
- Need communication stability
- Higher sedimentation

Small effect – also for free!

Lessons and Learnings

- Adapt operations to new climate patterns
- SCADA offers flexible low-cost optimization
- Cooperation and monitoring are key
- Smart operation is the new investment
- Operators can achieve resilience without reconstruction

Results:



Technical

Balanced
load



Environmental

Reduced
contamination risk



Economic

Efficiency
gains

Conclusions & Outlook

Goal: improving system performance without major investments

- Operations matters (almost) as much as investments.
- Climate change makes operation critical
- SCADA-based local strategies = realistic, scalable solutions
- Operators can achieve resilience

What we offer:
Tailor-made solutions

- Assessment / audit
- Development plans
- Evaluation and follow-up

Partnering for resilient operations. *We combine engineering expertise with practical tools to help utilities thrive in a changing climate.*

Thank You for Your Attention Faleminderit për vëmendjen



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BUDAPEST
WATERWORKS



Gold Standard for
Utility Performance

- Adapt operations to new climate patterns
- SCADA offers flexible low-cost optimization



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