Pilot 4. Budapest – Final retrofit status

Pal Kiss (Thermowatt)

Heat4COOL project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 723925

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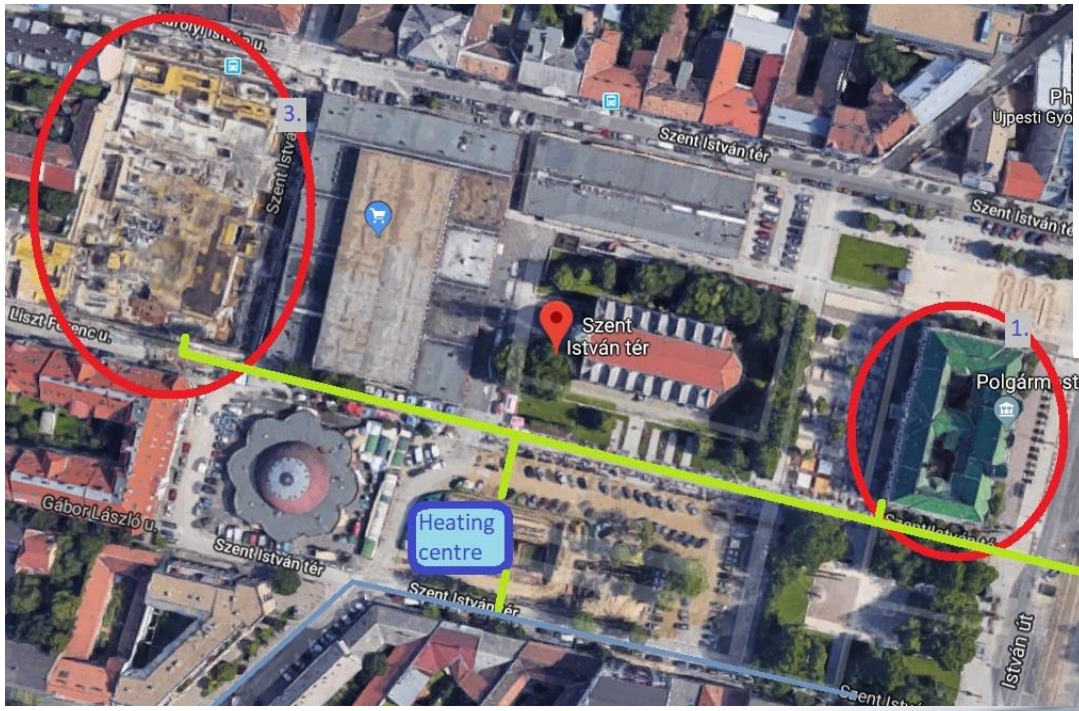
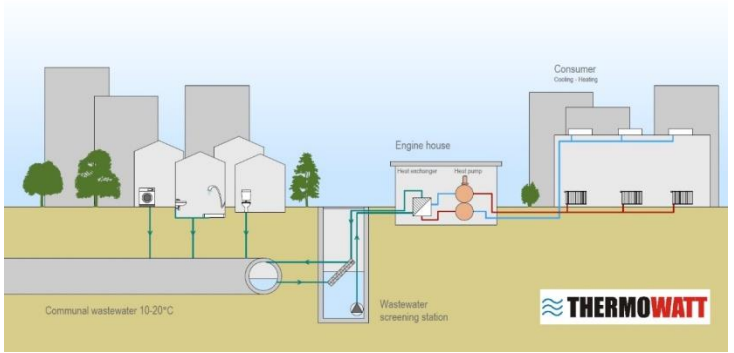
Demo 4 – Budapest, Hungary

- Technology: DHC complemented by HP and thermal energy recovery from municipal wastewater
- District system circuit: 3 buildings (*~12 500 m2*) to be connected to one new common supply network





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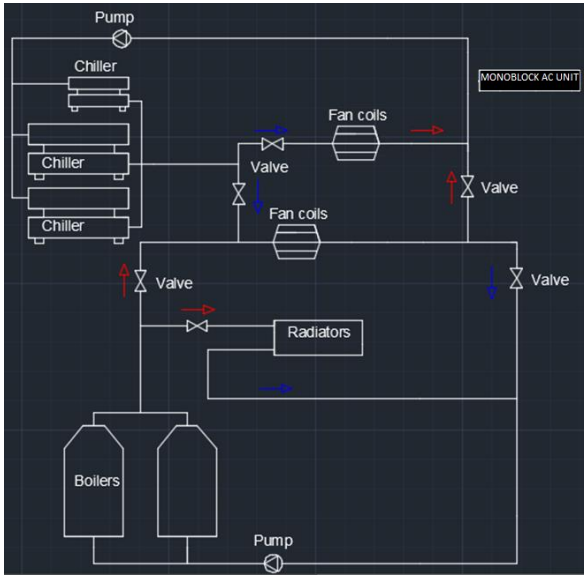
3 Buildings & system to retrofit

- Mayor's Office and Government Window (2600m2+1900m2)
  - public buildings – municipality administration (offices, meeting rooms)
  - separate thermal energy supply systems
  - system to redeem:
    natural gas boilers, electric chillers
- New Market Hall and Conference Centre (8000m2)
  - multi-purpose commercial building (market hall, conference centre, theatre, offices)
  - new construction: operating since end of 2018



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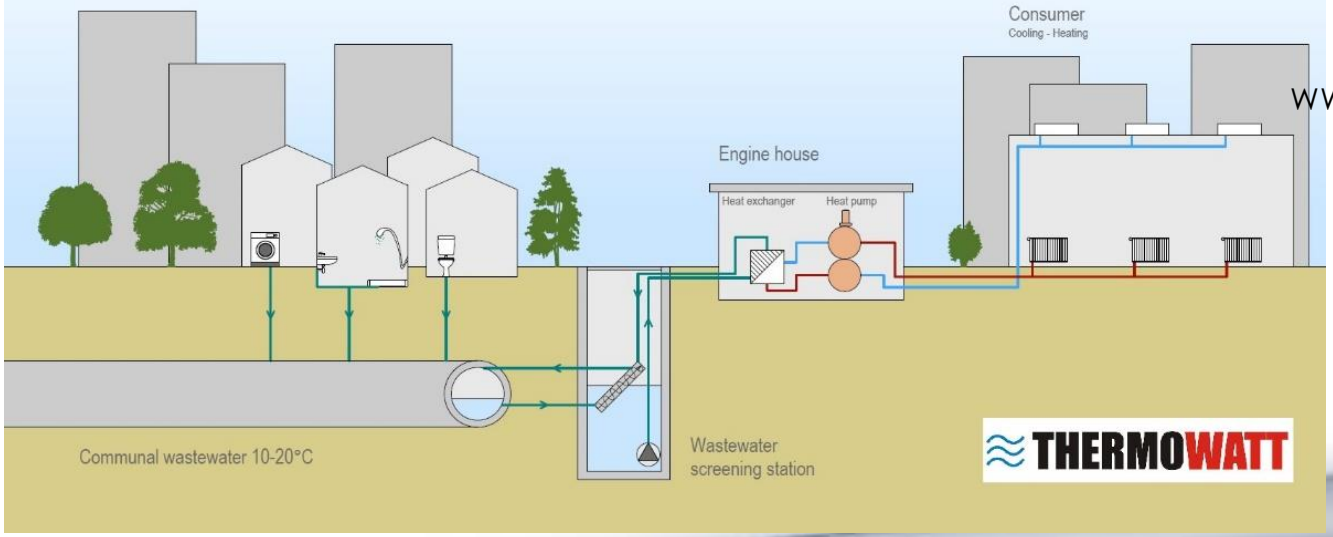
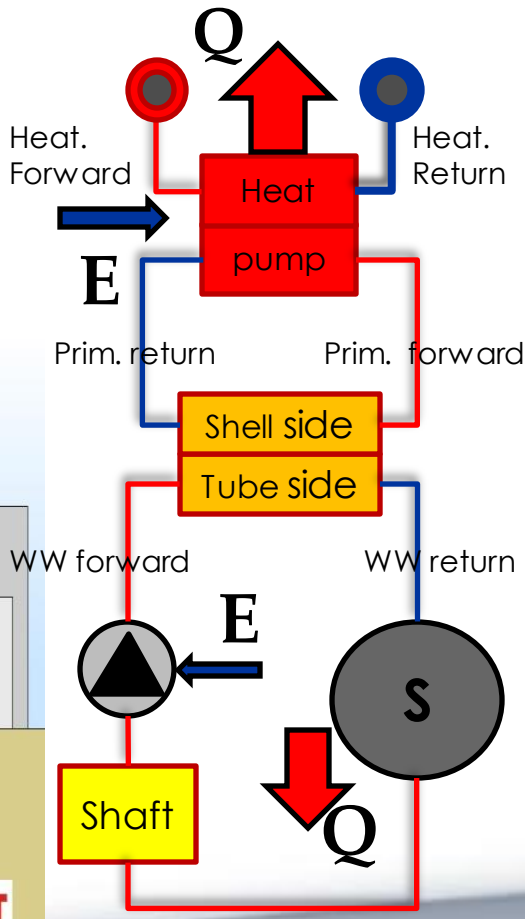
Technology: sewage heat recovery

- Renewable energy source: sewage heat = ideal resource for HP
- Large supply structure → District compatibility
- Heating and cooling energy with same system
- Compact size, underground placement option
- Simple remote O&M
- High energy saving potential





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Demo 4 – Budapest: Configuration

Unique configuration:
Base system +
H4C Innovations

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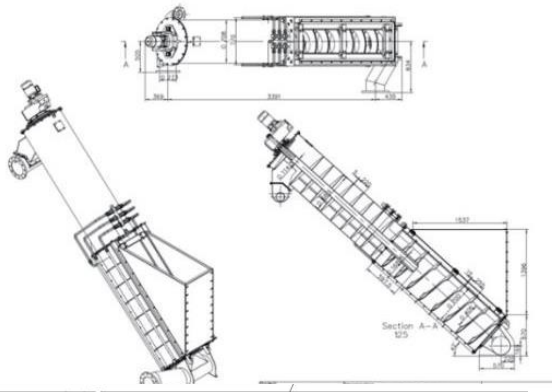
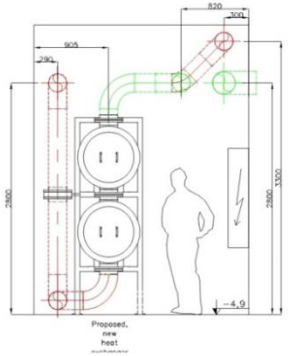
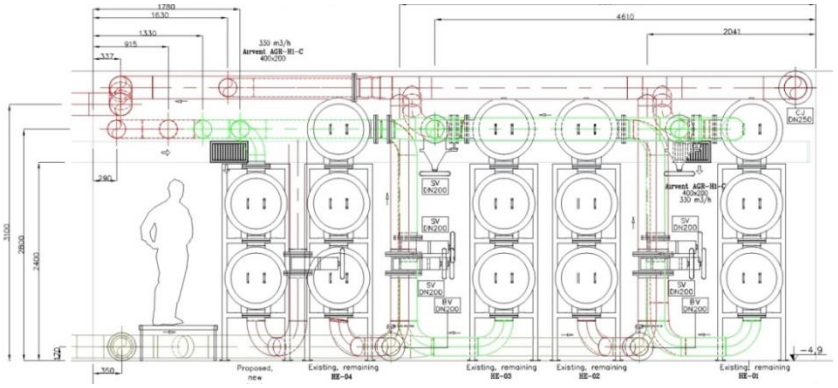
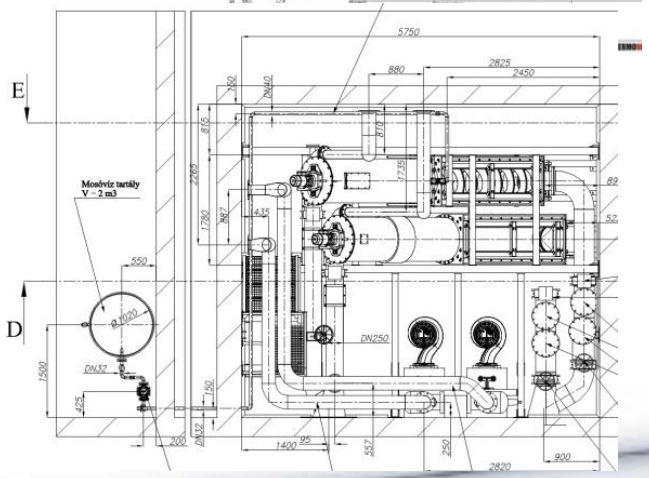
H4C Project innovations implemented

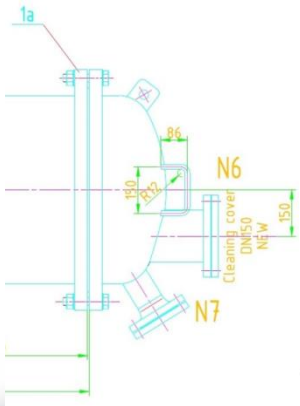
- Innovative heat exchanger units (2xA2, 2xB2 – up to 750kW)
- New fine screen with built-in washer (250m3/h) developed
- Optimising HX maintenance for efficiency gain and system security (design elements, new cleaning methods)

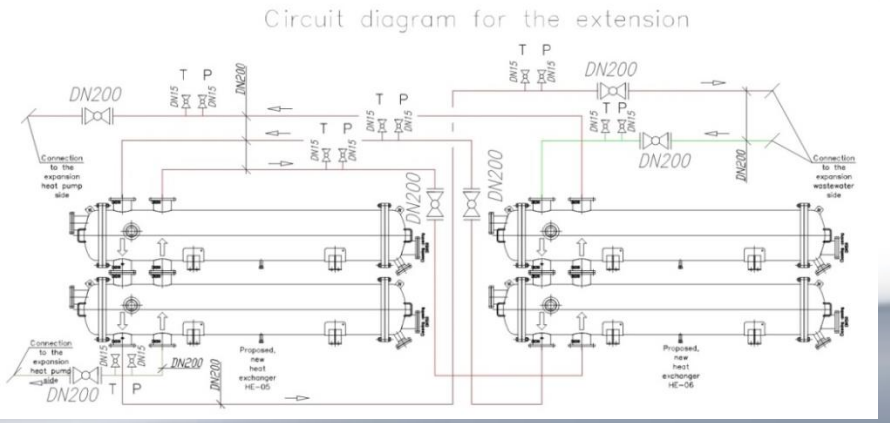












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Implementation Timetable - Status

- Engineering Designs, O&M Manual, Guidelines: **M16-M24-M26**
- Completion of prototypes' manufacturing: **M26-M27**
- Execution of Retrofitting Plan @Demo 4: **M28-M31-M36**
  - Preparation (permits, communication, negotiation with subcontractors..) M28-M30
  - Prototype HEX installation & Prototype Fine Screen installation ***M30-M31***
  - Automation and system fine tuning works: setup of control cabinet, sensor and monitoring, SCADA extension and new station installation ***M30-M35***
  - Tests commissioning, handover ***M35;*** Final fine tuning and adaptations ***M35-M36***
- Start of Demo site/prototype operation: **1st October 2019 (M37)**

Retrofitting status - Subsystem commissioning	Status
New Heat exchangers and connecting pipelines	Completed
New screening unit and connecting pipelines	Completed
New screen washing system	Completed
Wastewater pump and connecting pipelines	Completed
Monitoring and control (SCADA) system	Completed

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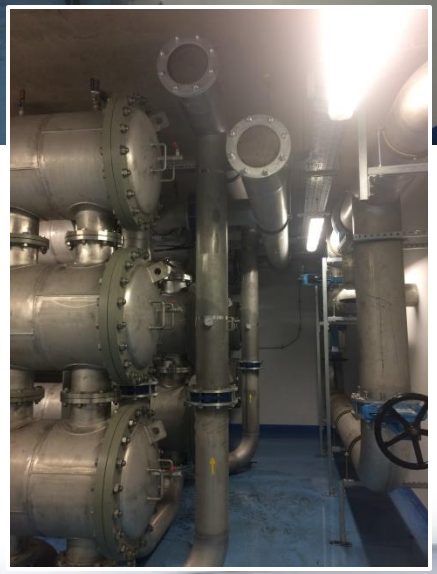
Retrofitting Status -1

- Heat Exchanger room pre-installation



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Retrofitting Status -1

- New HEXs installation

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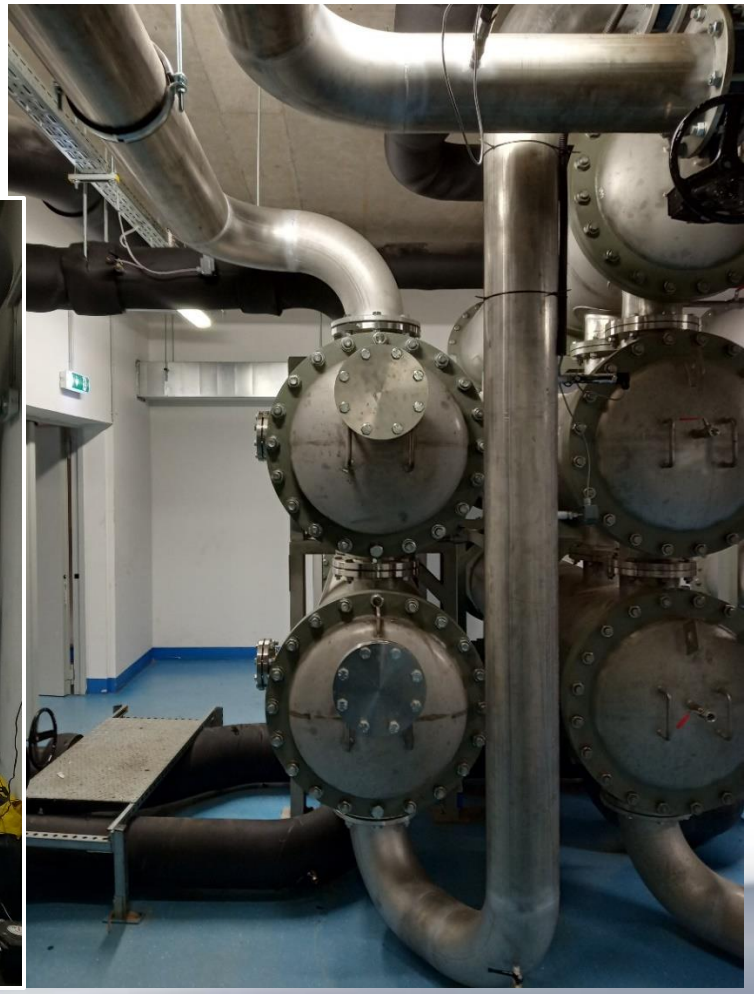
Retrofitting Status -1

- Innovative 2x2 HEXs installed



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Retrofitting Status -2

- Screening room pre-installation

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Retrofitting Status -2

- New Fine Screen installation

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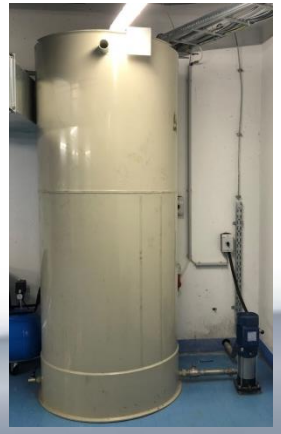
Retrofitting Status -2

- New Screen in shaft



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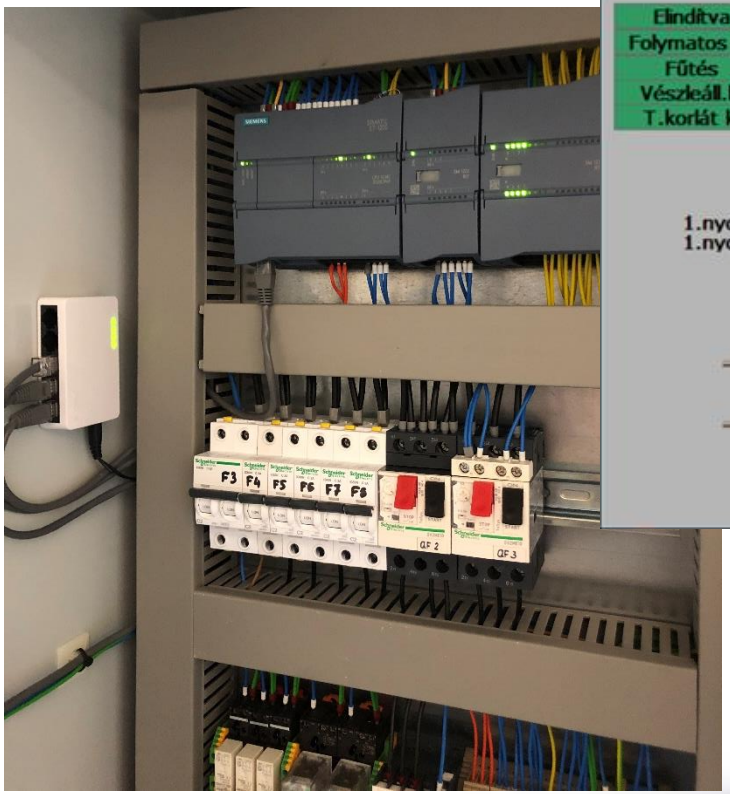
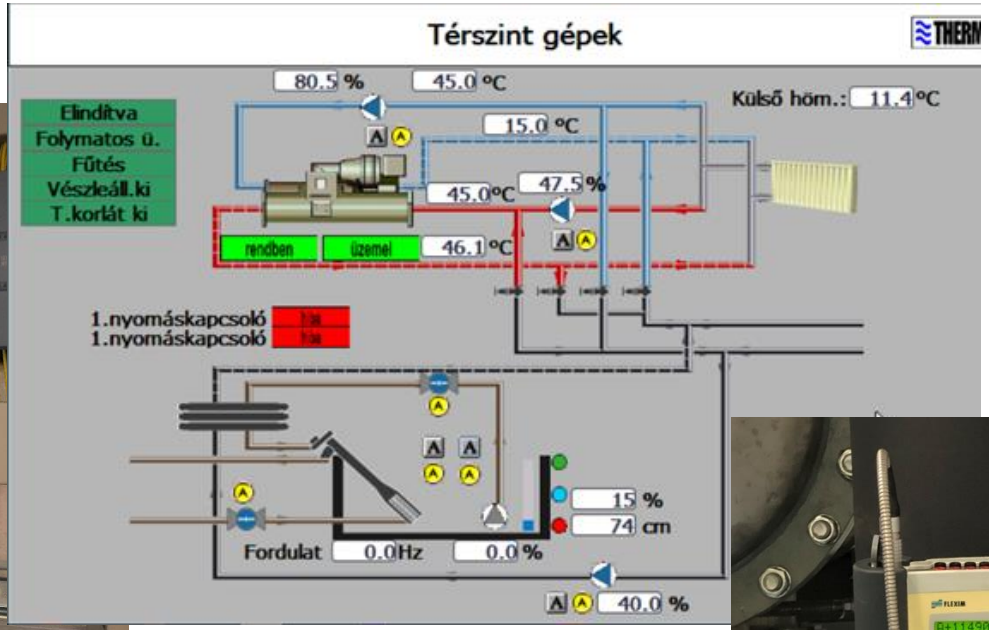
SCADA, Monitoring Data collection

- Monitoring data collection for H4C: 10/2019 – 03/2021 *

→ Remote Monitoring to be maintained as part of the long term O&M services





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Deviations of Budget

Main deviation: Subcontracting (implementation costs)

- Implementation costs – **3rd party subcontracting**:
  - Planned in project budget (after amendment): € 218,000
  - Foreseen after final production-, implementation plans (rep. in D6.2): € 236,896
  - Claimed in 2nd Periodic Report: € 229,642
    → increase of € 11,642 // *BUT decrease of € 7,254*
- Implementation costs – **Consumables**:
  - Planned at amendment: € 32,000
  - Foreseen after finalisation of plans: € 33,874 → Claimed € 34,781
- *SUBTOTAL Demo installation costs:*
  - *€ 250,000 // € 270,770 // € 264,423*

Deviation of **PMs** of WP6 for THW (M1-54): planned 12 // real 18.7

- Delays, design amendment necessities (with budget optimisation purposes), lengthy negotiations, prolonged installation (automation, SCADA setting, fine tunings)
- Recovery from flood damage – management of works, assessment, repairs, restarting the system with trial runs and reinstallation of monitoring
- Site operation supervising and monitoring work requiring more workhours then anticipated – during long term operation of demo site (over 12 months)

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Lessons learnt

- Collaboration and working with Municipality as the consumer requires attention: advantages (authority) vs. complicated administration (red tape, tendering obligations)
- Retrofit project:
  - Space availability – important and restrictive, multiple replanning is probable
- Budget deviations:
  - budget to set upon final implementation designs (labour-intensity of works, higher production cost of single elements - prototypes)
  - cost of investment highly dependent on the changes of EUR exchange rate (cost of stainless steel)
- Safety measures against flood: most vulnerable part of the safety system is the electrical power supply → advised to install a safety system completely independent from the power supply
- H&C backup possibilities: in district system constructions designing backup for the district circuit via old systems still in place

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Positive Impacts

- With normal utilisation and average circumstances PE reduction could reach 30%
- Elimination of fossil energy

- 1st example of district structure of sewage utilisation system works very well
  - Also expansion could be easily concluded; better utilisation/or sizing could result in higher total PE reduction
  - Systems potential for district installation is demonstrated, optimal implementation circumstances outlined

- Municipality is very cooperative in this green solution – good example

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Thank you

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