

Demand-side management in district heating and cooling

Final overview and conclusions from the Horizon 2020 STORM project



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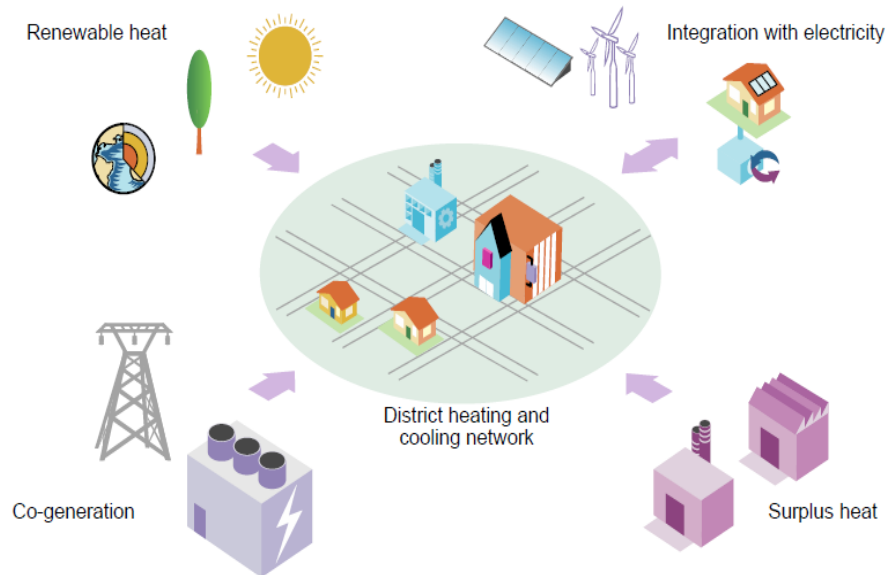
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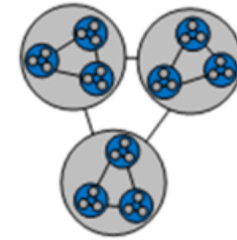
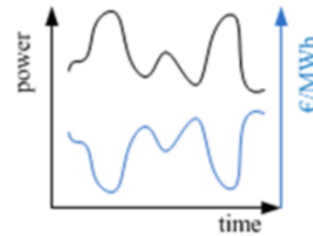
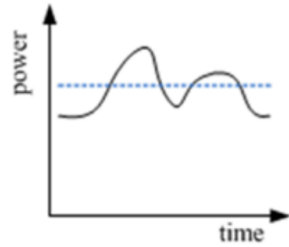


The STORM project (2015-2019, €2MEUR, Grant #649743)

- Balancing energy supply and demand in a district energy system
- Increasing the use of excess heat and renewable energy and boost energy efficiency at district level

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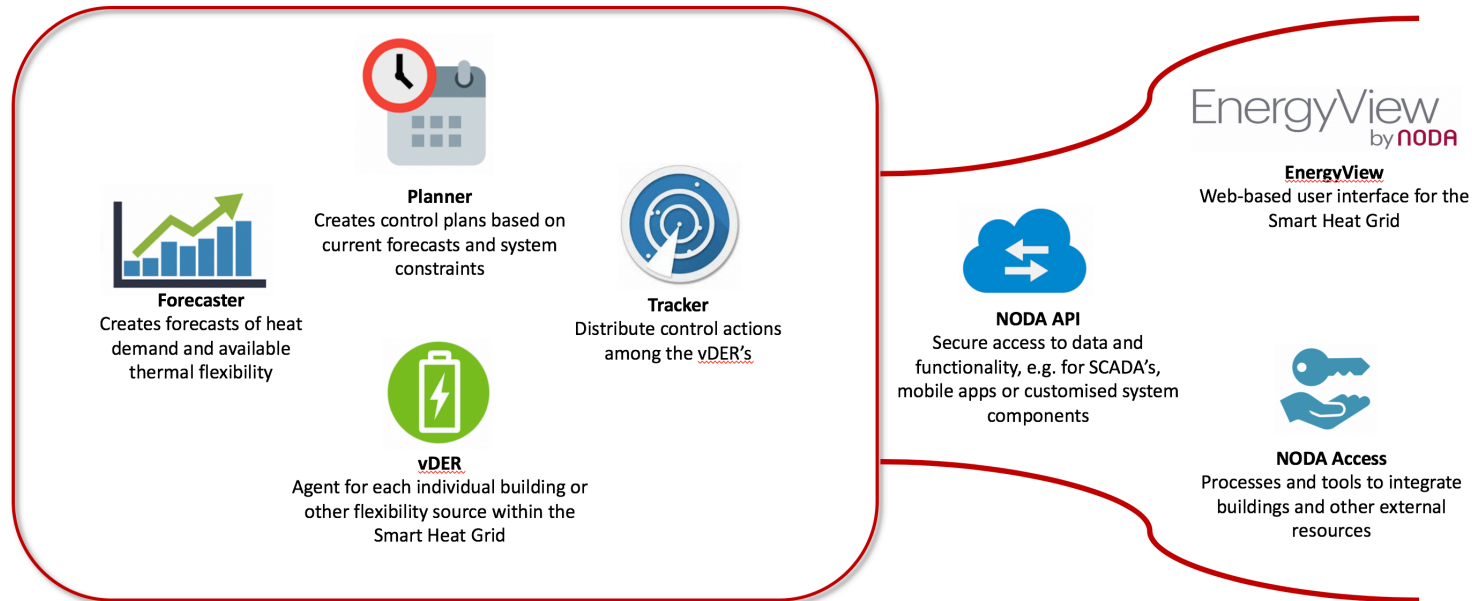
The STORM controller can be applied in different settings and contexts, using three different kinds of control strategies

- Peak shaving
- Market interaction
- Cell balancing

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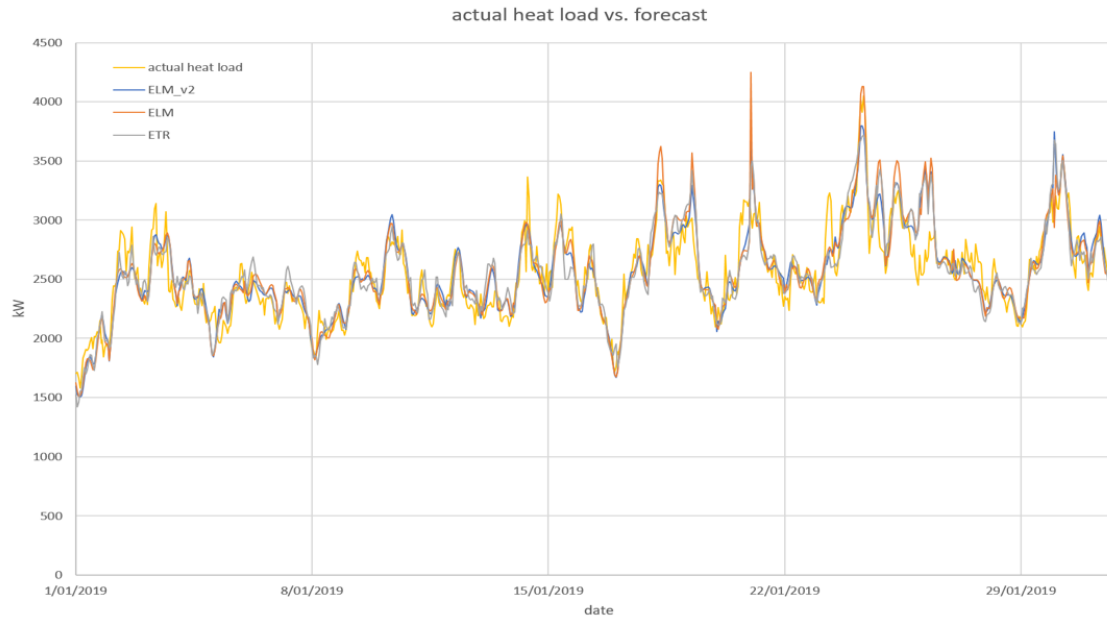


The STORM technology has been implemented in cloud-based infrastructure, using a modular architecture to ensure robustness and ease of scalability

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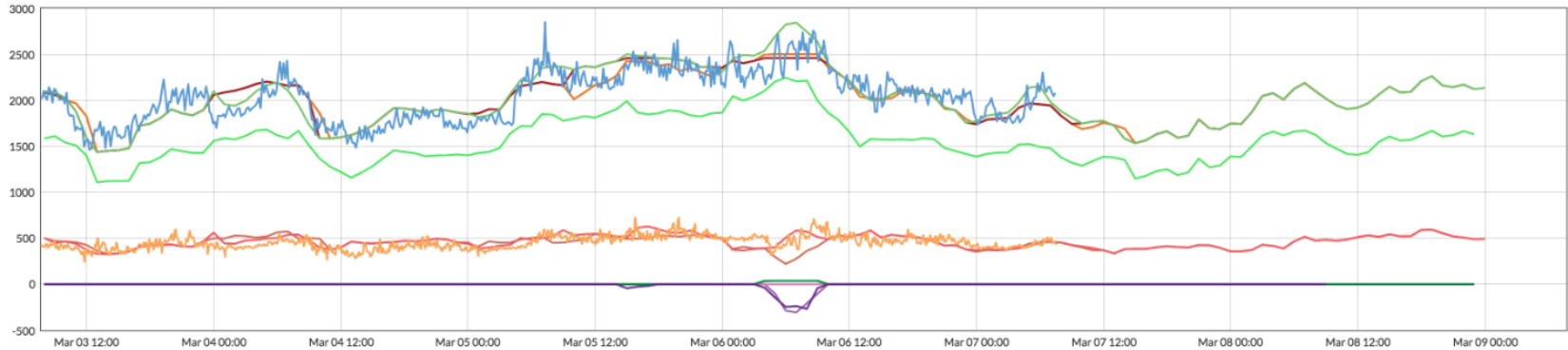


- Heat load forecast from tree-based regression, extreme learning and neural networks
 - Evaluation show good and consistent results in the Forecaster

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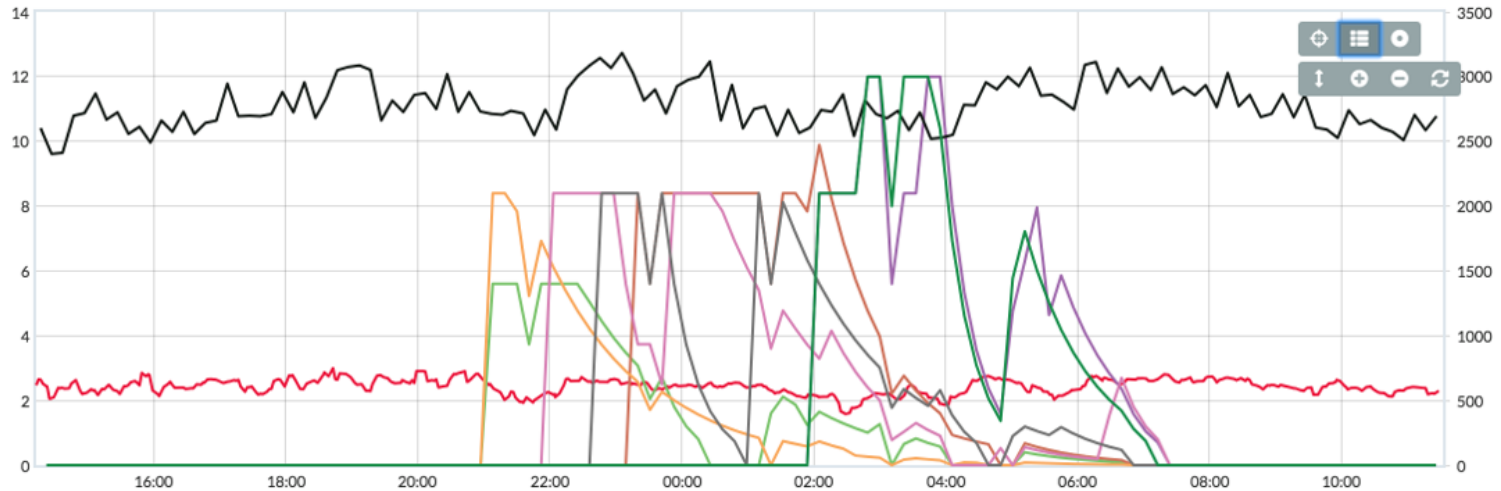


- The Planner is an optimiser that uses the forecasts to achieve goals relating to peak, market and cell balancing control strategies
- The optimisation is based on the alternating direction method of multipliers (ADMM)

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- The purpose of the Tracker is to track the control plan generated by the Planner
- The Tracker is a near real-time MPC controller using ADMM to distribute control actions among the connected buildings

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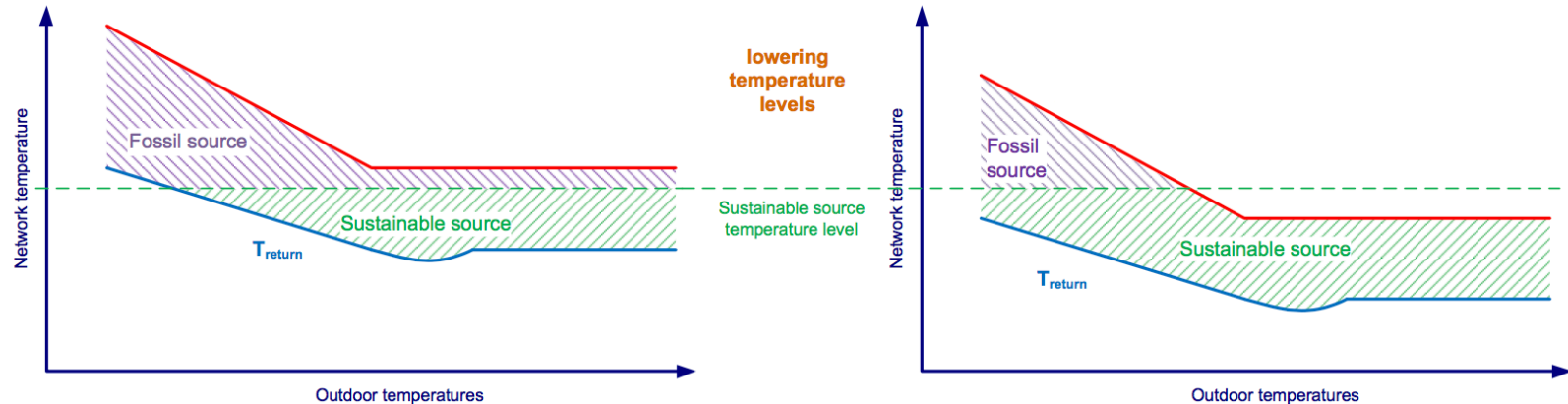


Demonstration results

- Växjö, Sweden
 - Long-term peak heat reduction of about 13%, which monthly maximum at 57% reductions given using peak management
- Heerlen, The Netherlands
 - Improved potential capacity of about 42% based on cell balancing
- Market interaction for CHP's reached a 15% increase in price efficiency
- For a more in-depth presentation of the results please see session 21 tomorrow



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- On a high level, STORM is about fast processes (hydraulics and power profiles)
- TEMPO is an on-going project relating to slower processes (temperatures and thermal distributions in the grid)
- Future work includes merging these concepts to a complete smart controller for district heating and cooling

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Thank you!
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