

Research Status Update (WP7)

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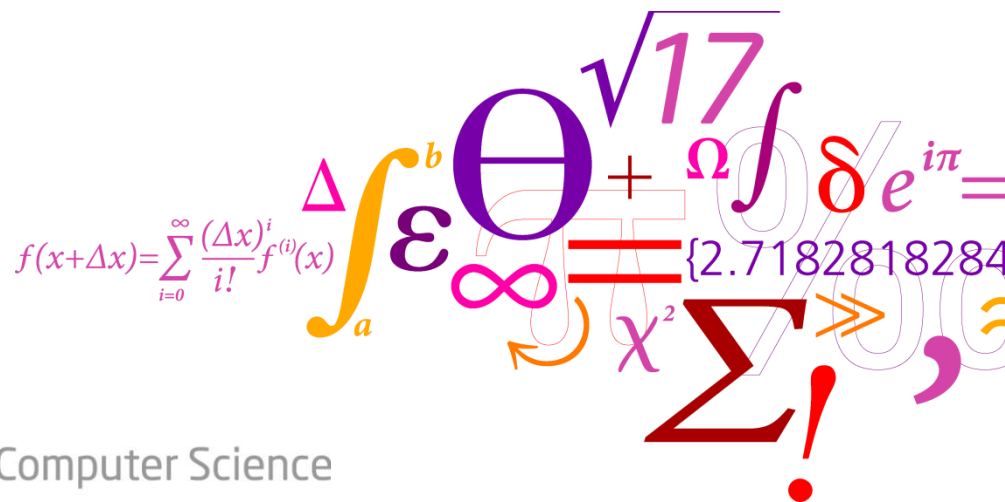
Anna Hellmers

Maria G. Nielsen

DTU Compute, 22nd April 2015

DTU Compute

Department of Applied Mathematics and Computer Science



Ongoing and Future Work (22/10/2014)

- Production of three peer-reviewed articles (ongoing)
 - *Commitment and Dispatch of Heat and Power Units via Affinely Adjustable Robust Optimization* (Zugno, Morales, Madsen)
 - *Assessing the Role of Heat Pumps and Electrical Boilers in the Danish Heat and Power Systems* (Nielsen, Zugno, Morales, Madsen)
 - *Portfolio Operation Strategies for Wind Farms and CHP Plants in a Dual-Price Balancing Market* (Hellmers, Zugno, Morales, Skajaa)

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Submitted to European Journal of Operational Research!

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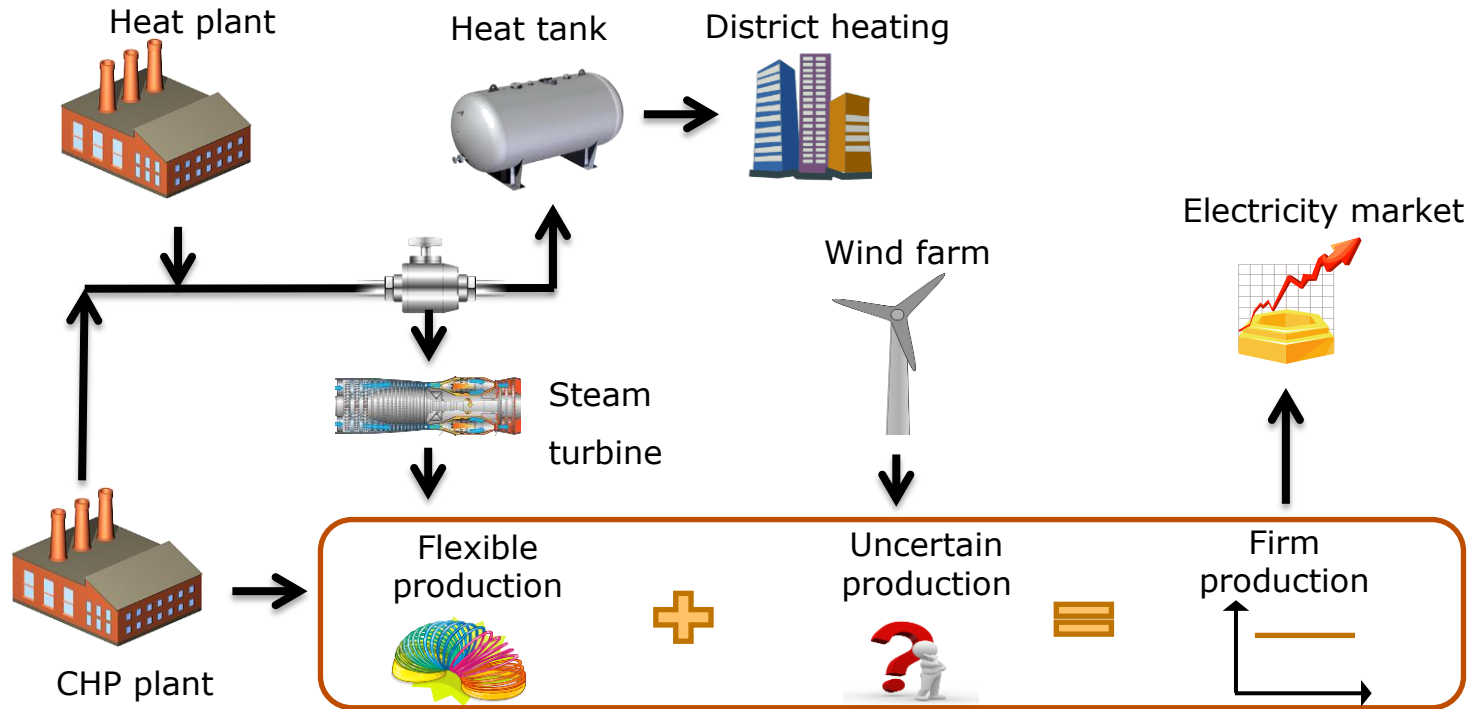
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Setup and Research Question



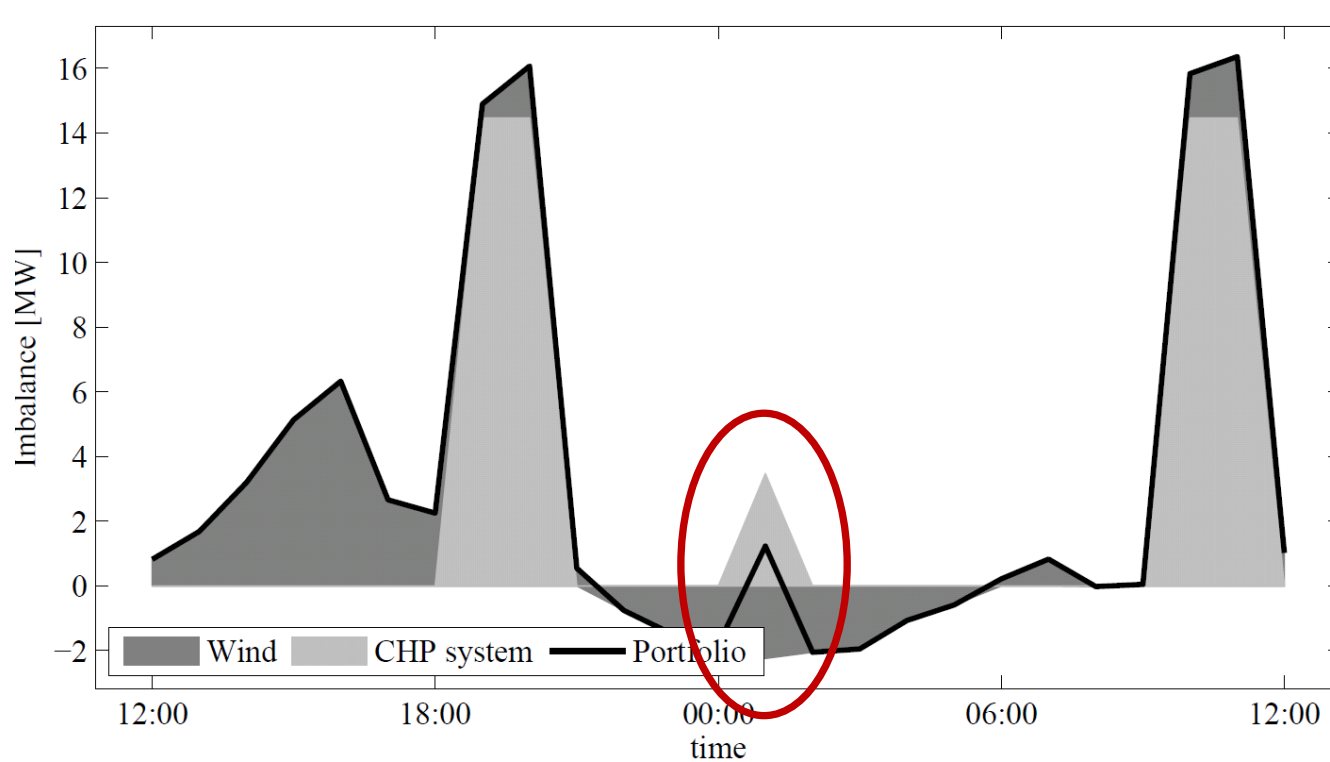
- Can joint trading of wind/CHP plants power output **reduce** the overall **imbalance** and **improve profits** for the portfolio?

A Realistic Case-Study

- Real data for heat/power system (DONG Energy)
- State-of-the-art forecast for uncertainty
 - Wind power production
 - Heat demand
 - Power prices (day-ahead/balancing)
- Realistic rolling-horizon approach with hourly forecast update
- Historical data used in evaluation

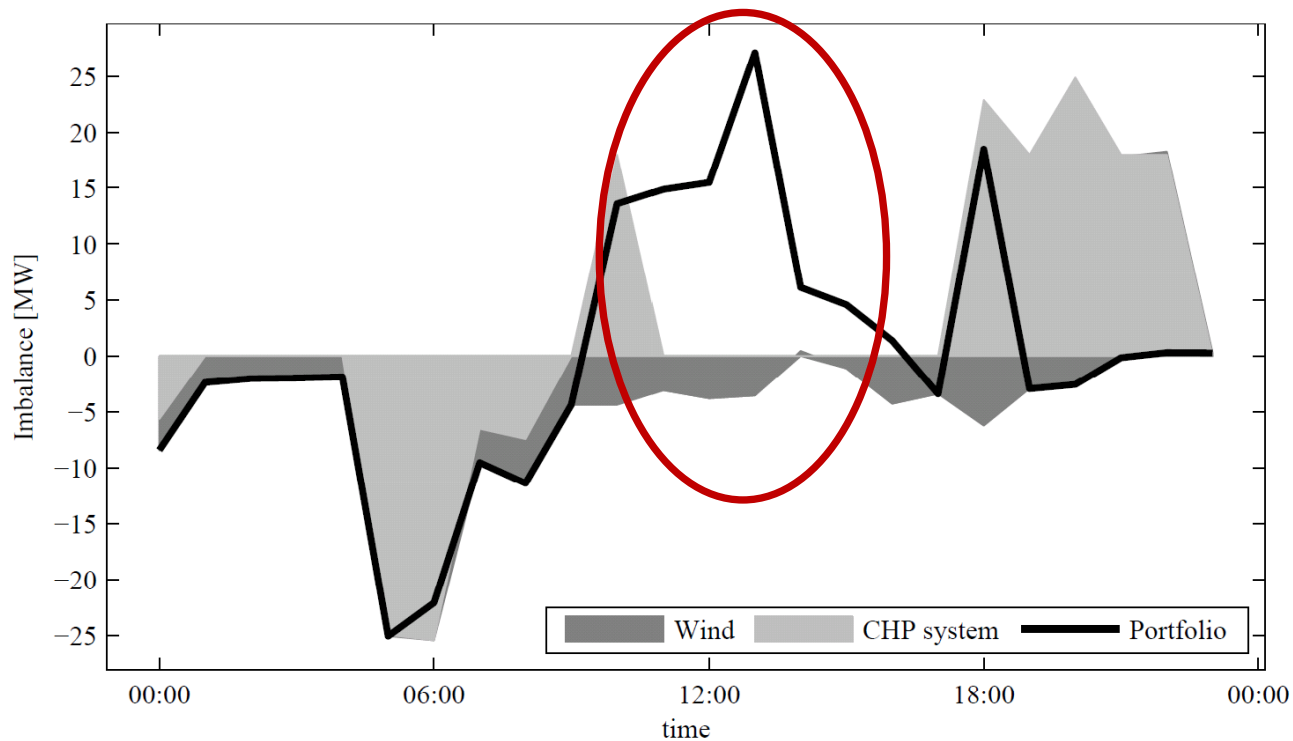
Setup that mimics the real operation of the system!

Reducing Imbalances (1)



Imbalances in opposite direction cancel out: improvement from **setup**

Reducing Imbalances (2)



Very costly regulation for wind: CHP output is increased.
Improvement from **optimization**

Profit Improvement

Operation Mode	Profit (m€)			
	Feb-May	Jun-Aug	Sep-Dec	Total
Independent	5.04	3.16	4.48	12.67
Portfolio	5.08	3.18	4.49	12.74

Joint operation of the CHP and wind power production systems results in financial improvement

WP7 Input/Output Matrix

<p>Input</p>	<ul style="list-style-type: none"> • Scenario configurations for energy systems • Production unit data (different technologies) • Consumption data (flexible?)
<p>Output</p>	<ul style="list-style-type: none"> • Aggregation models for flexible resources • Operational models (commitment/dispatch) • Tactical optimization (mid-term procurement)
<p>Additional information required</p>	