Optimal Purchase and Dispatch of Ancillary Services for Safe Power Balance Control

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Motivation of the thesis

- Power balance between generation and load has to be **controlled in real-time**

- Motivation of this work is to contribute to the **safe operation** of the transmission system and possibly **lower the costs** associated with the **power balance control**
 - Critical with presence of **renewable resources**

Result 1: Long-term optimal purchase of regulation reserves

- **One-year horizon**
- **Cost minimization task under constraints**
  - Constraints = safe power balance control
  - Annual costs approximately 8 billion CZK
- **Based on mixed-integer and linear programming (MILP)**
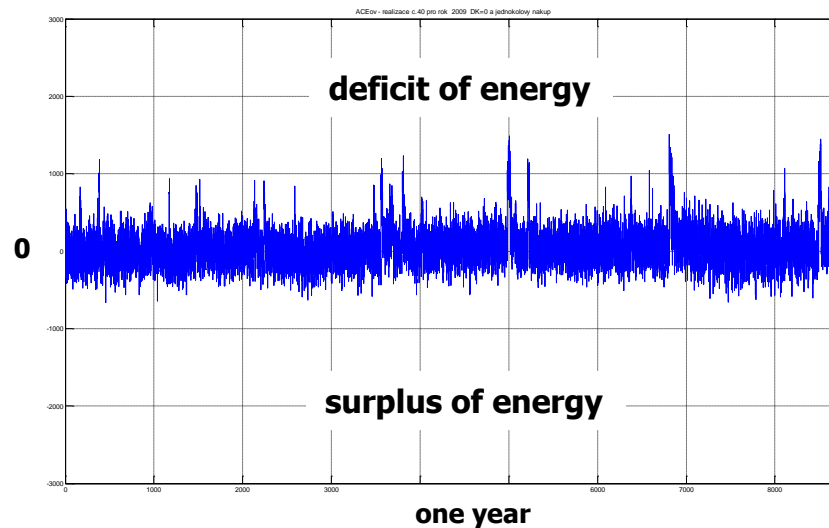
Result 2: Optimal short-term purchase of balancing energy

- Cost minimization task in uncertain scenarios
- Based on probabilistic approach
- In automatic operation at the ČEPS dispatch center
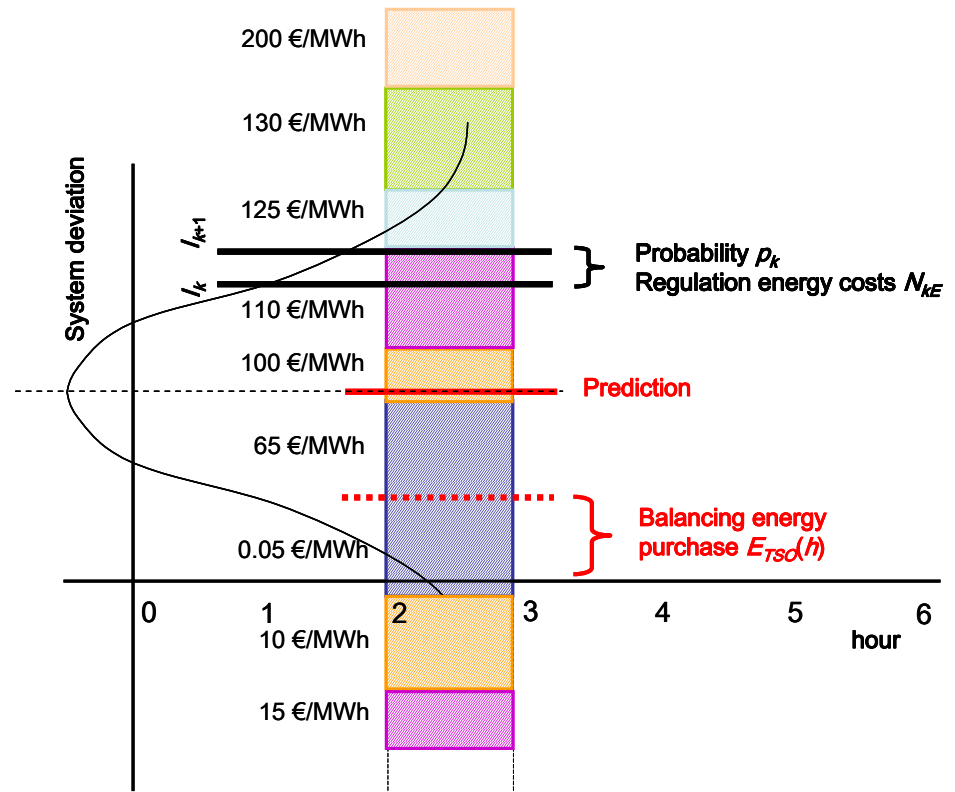
Character of the work

- Solve **difficult** real-life **industry-demanded problems** that have high **research potential**

- Use **advanced methods** of simulation, optimization …

- Results of the thesis **are used** by the Czech Transmission System Operator, ČEPS, a.s., to ensure safe power balance control

- Results **are published** in world-know international scientific journals

  - Havel, P. - Černý, V. - Horáček, P. - Fantík, J.: **Optimal Planning of Ancillary Services for Reliable Power Balance Control**. *IEEE Transactions on Power Systems*. 2008.