



ČEZ ESCO

# DEMAND SIDE MANAGEMENT

## VALUING FLEXIBILITY OF ELECTRICITY CONSUMPTION

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# DEMAND SIDE MANAGEMENT – AGENDA

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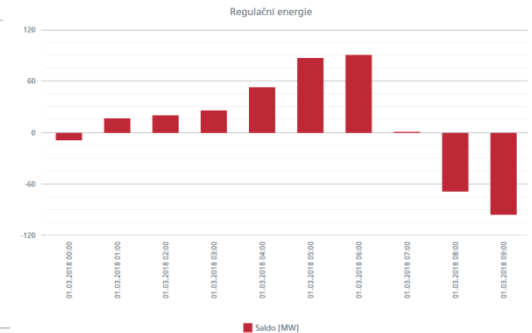
- ❑ **Short-term Electricity Markets and Imbalance Settlement**
- ❑ What is Demand Side Management (DSM)
- ❑ Valuing Flexibility for DSM

- ❑ EU Unbundling has created 4 different roles:
  - ❑ Electricity Producer (competition between „some“ producers)
  - ❑ Transmission System Operator (TSO: state-regulated monopoly, responsible for grid stability)
  - ❑ Electricity Distribution (private concessions, responsible for electricity measurement)
  - ❑ Electricity Retailer (competition between „lots of“ retailers)
- ❑ Producers and Retailers can operate at different markets
  - ❑ SPOT Market = Day-ahead market (most liquid), each hour gets a unique price
  - ❑ Intraday Market (closes 2 hours before H, subject to bid-ask spread)
  - ❑ Yet, real productions and consumptions may differ from sold ones (Imbalances)
  - ❑ Need of Imbalances Settlement
  - ❑ Producers and Retailers are said „Balance Responsible Parties“ (BRP)

# ELECTRICITY MARKETS AND IMBALANCE SETTLEMENT



- ❑ Grid stability: *at every moment, production = consumption*
  - ❑ Electricity is not intrinsically storable in the grid
  - ❑ TSO calls *Regulation Energy* to balance the grid



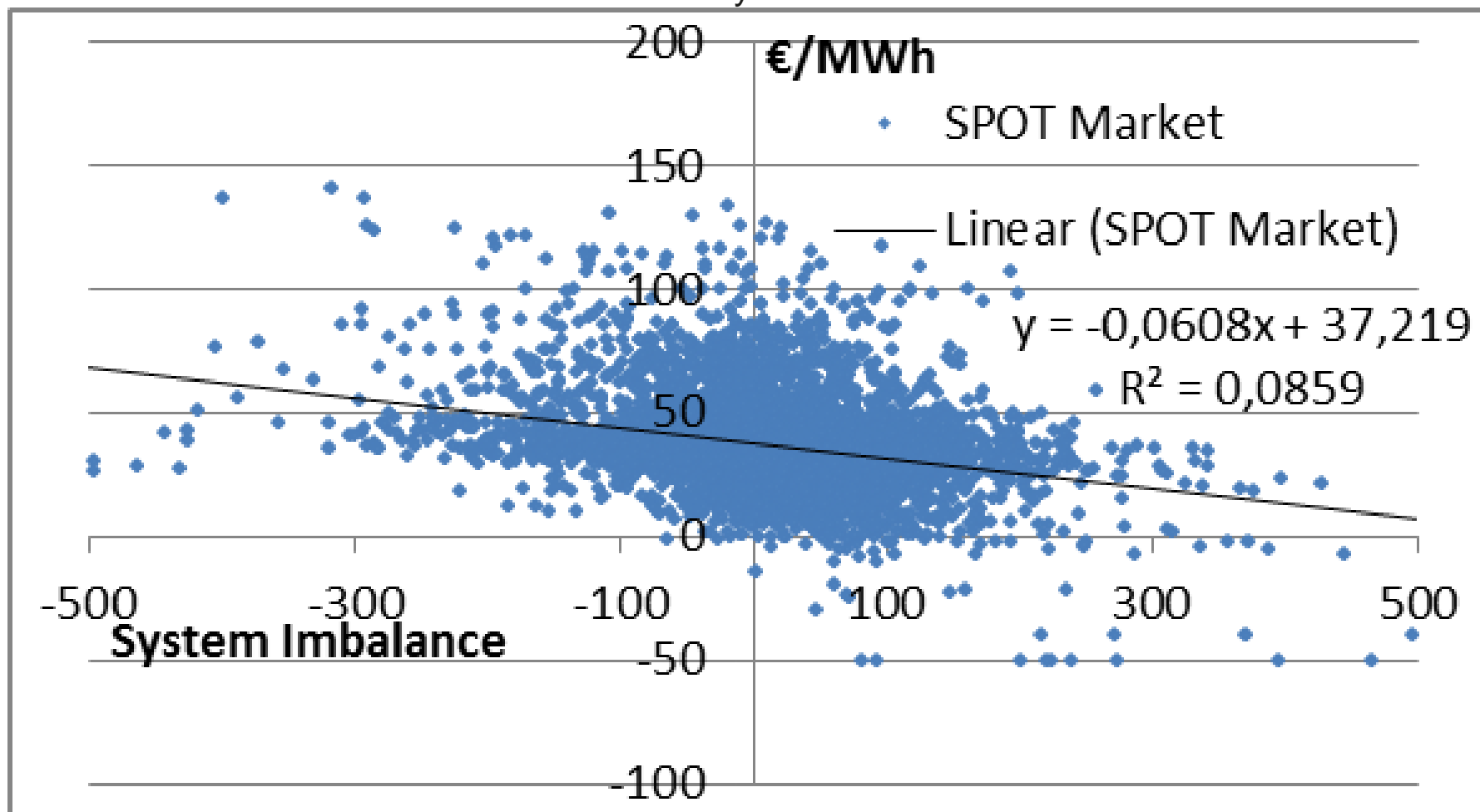
REGULAČNÍ ENERGIE



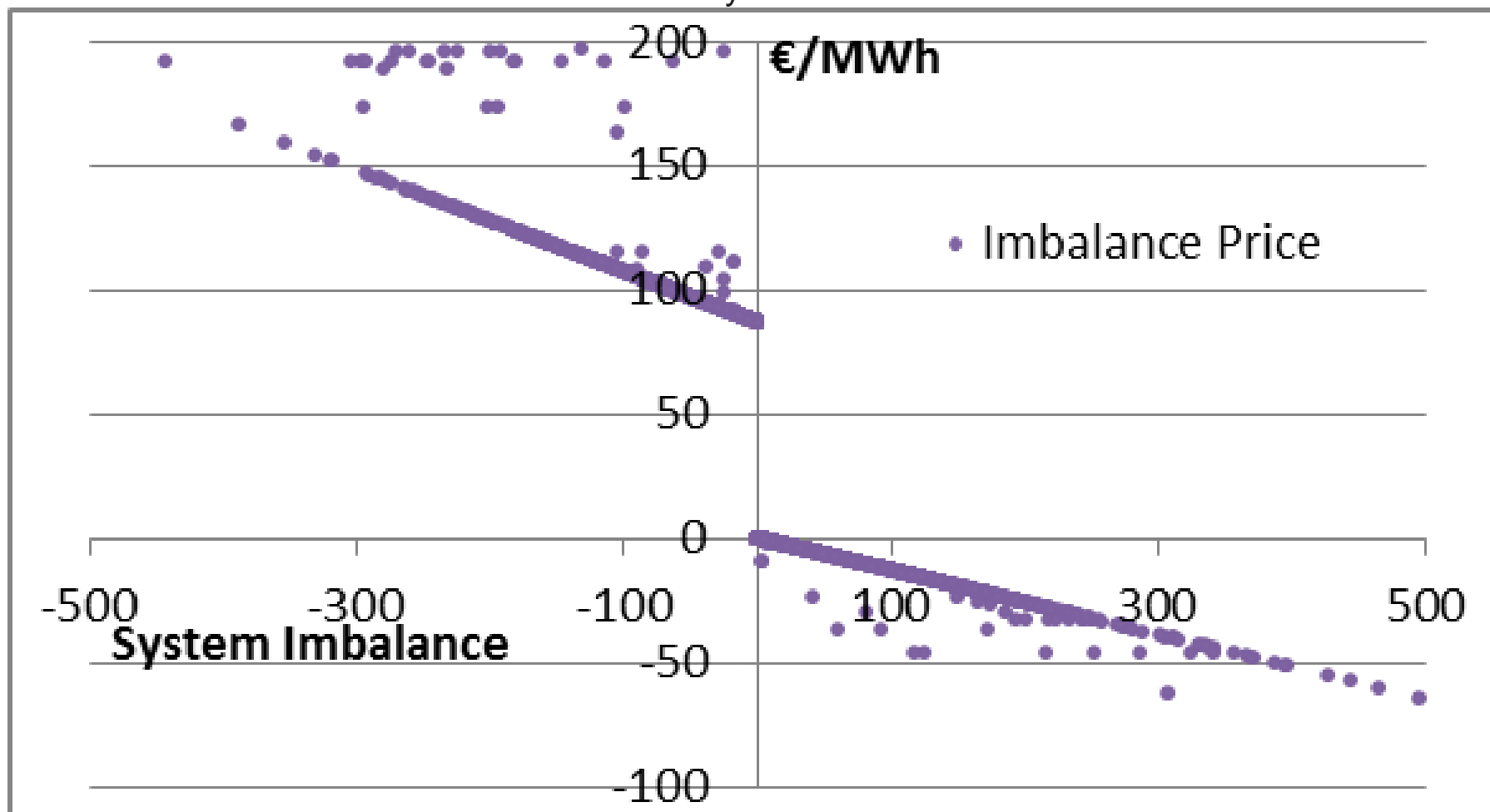
- ❑ Regulation Energy (RE) is bought from *Service providers* (another electricity market...)
  - ❑ Average RE is about 60 MWh/h, 90 MWm/m
  - ❑ Cost of Regulation Energy must be covered by Imbalance Settlement, thus:
- ❑ System Imbalance = sum of all BRP's Imbalances at a given time granularity (1h)
  - ❑ If BRP has same Imbalance direction than system, it must be penalized
  - ❑ If BRP has Imbalance direction against system, it might be rewarded
- ❑ *Imbalance costs represent between 1% and 2% of power sales*



Correlation between SPOT Market and System Imbalance

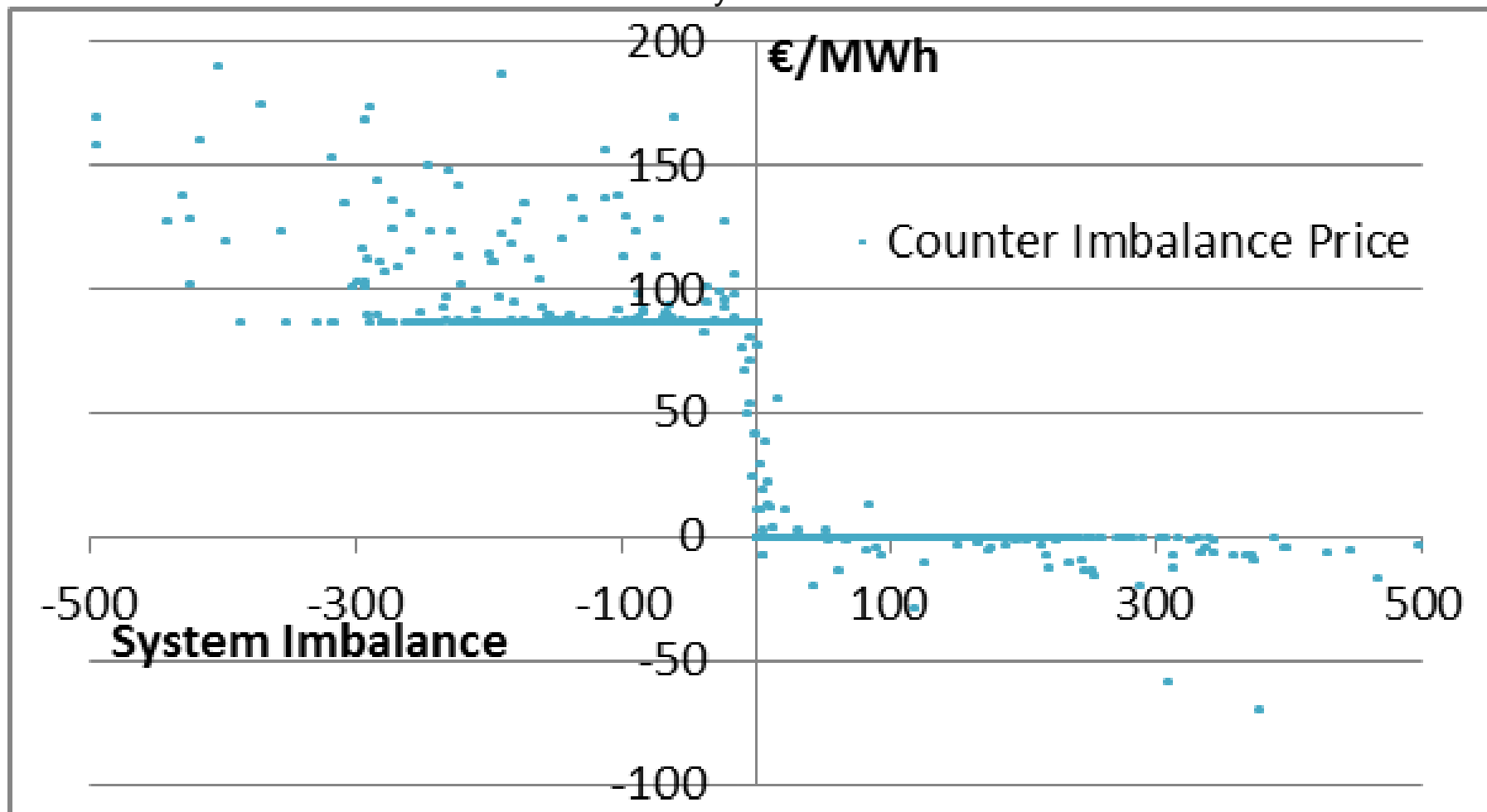


## □ Czech Penalties for BRPs that worsen System Imbalance

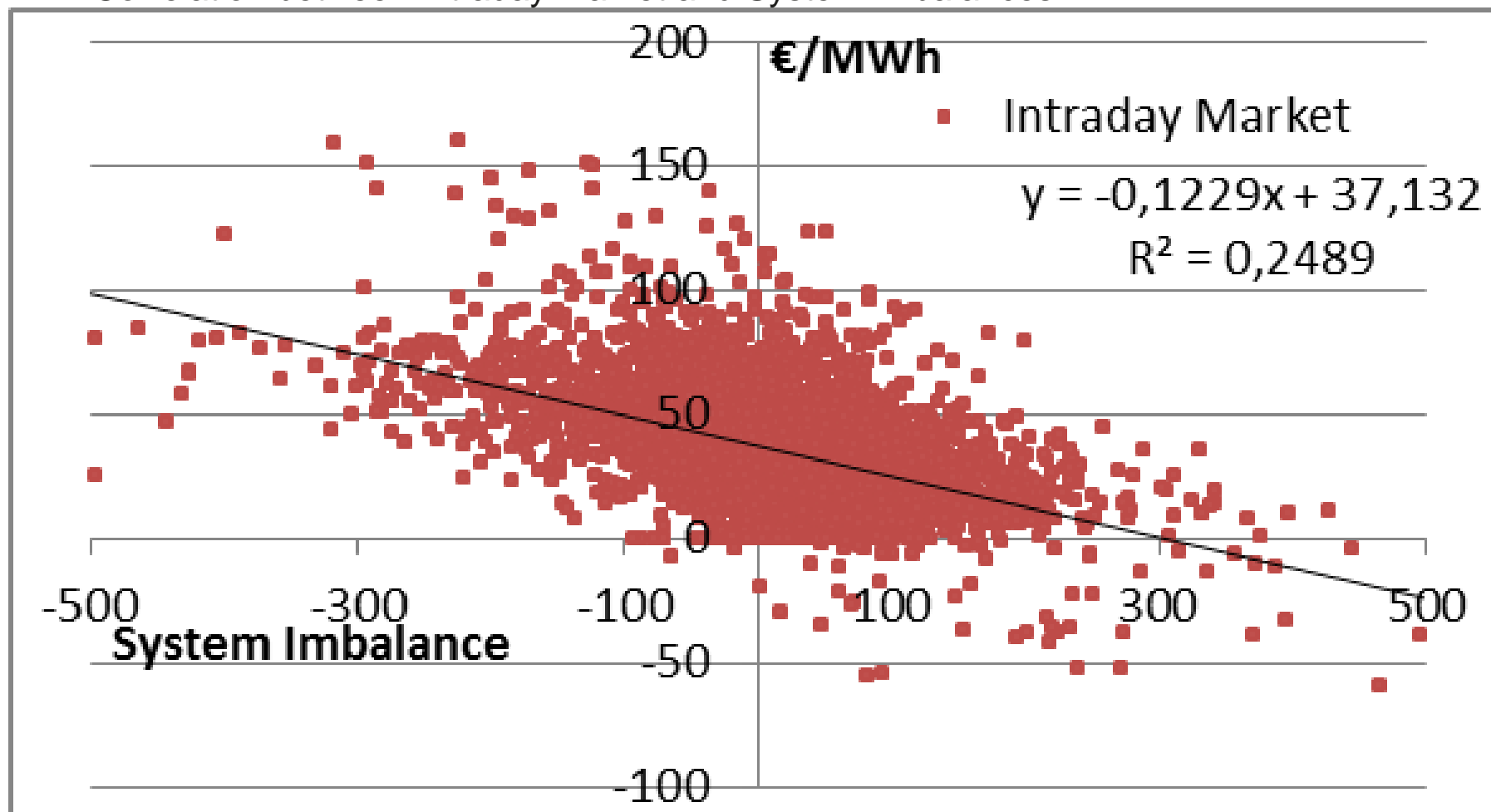




□ Czech Rewards for BRPs that reduce System Imbalance

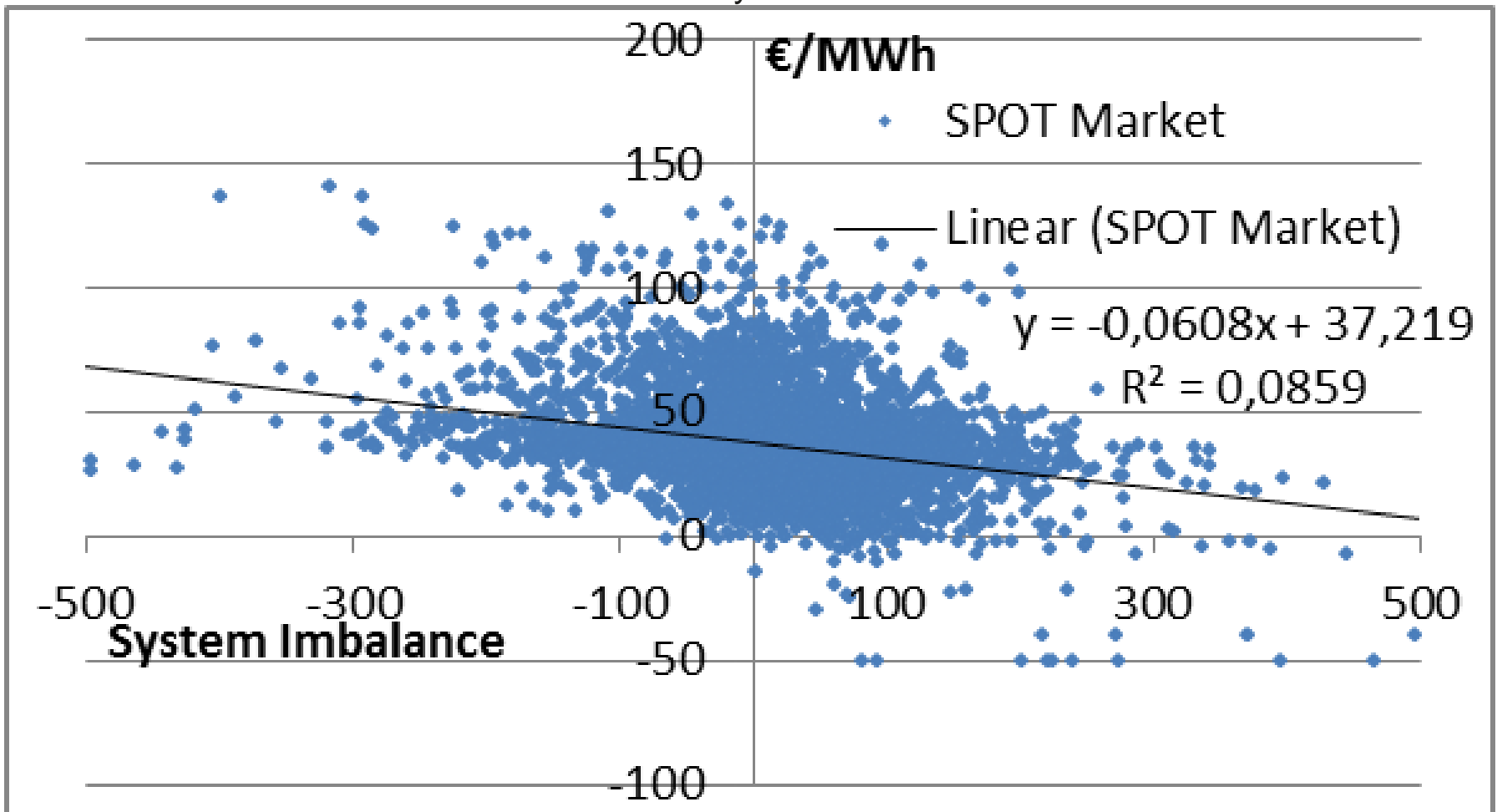


## Correlation between Intraday Market and System Imbalances





Correlation between SPOT Market and System Imbalance



# DEMAND SIDE MANAGEMENT – AGENDA

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- ❑ Short-term Electricity Markets and Imbalance Settlement
- ❑ **What is Demand Side Management (DSM)**
- ❑ Valuing Flexibility for DSM

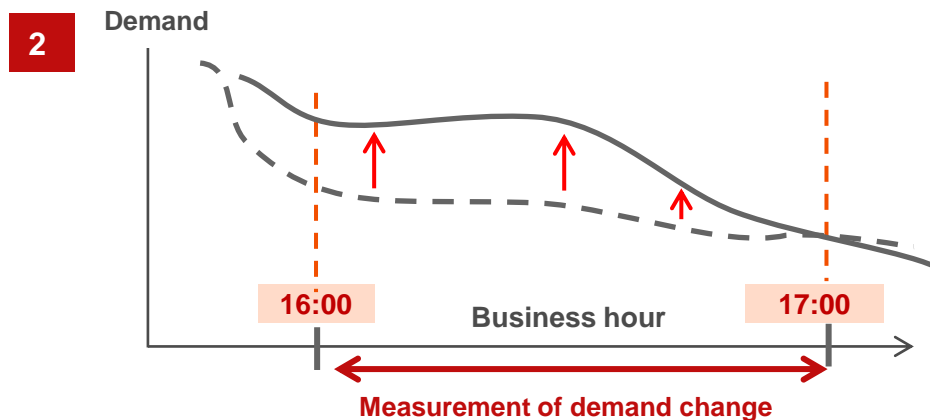
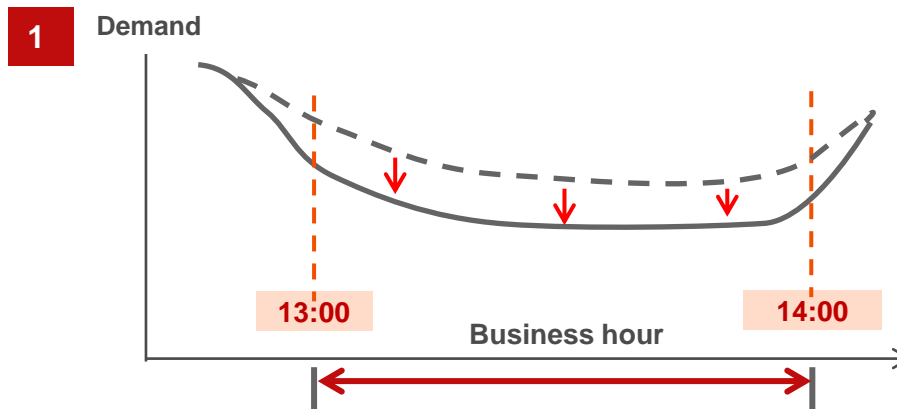
# WHAT IS DSM OR CUSTOMER FLEXIBILITY?



# DSM IS CONSCIOUS DECREASE OR INCREASE IN CUSTOMERS ENERGY DEMAND IN A PARTICULAR BUSINESS HOUR



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--- Planned demand      — Real demand



Product is suitable for all  
ČEZ ESCO customers

**Each customer has some  
flexibility! We can find it.**

It is not necessary to  
change energy  
consumption in whole hour.  
**15 minutes is sufficient!**

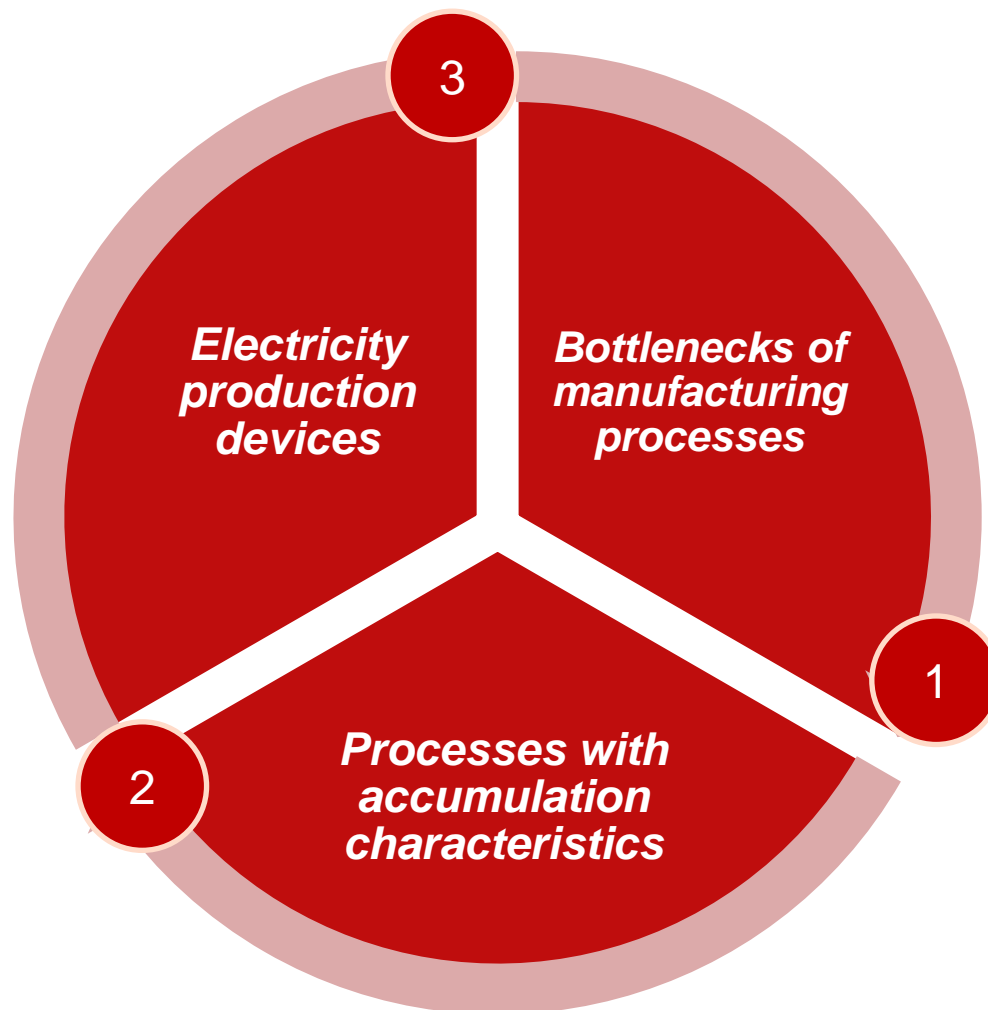
# WHERE TO FIND FLEXIBILITY?



TOGETHER WITH CUSTOMER WE CAN  
FIND THE FLEXIBILITY IN...



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# DEMAND SIDE MANAGEMENT – AGENDA

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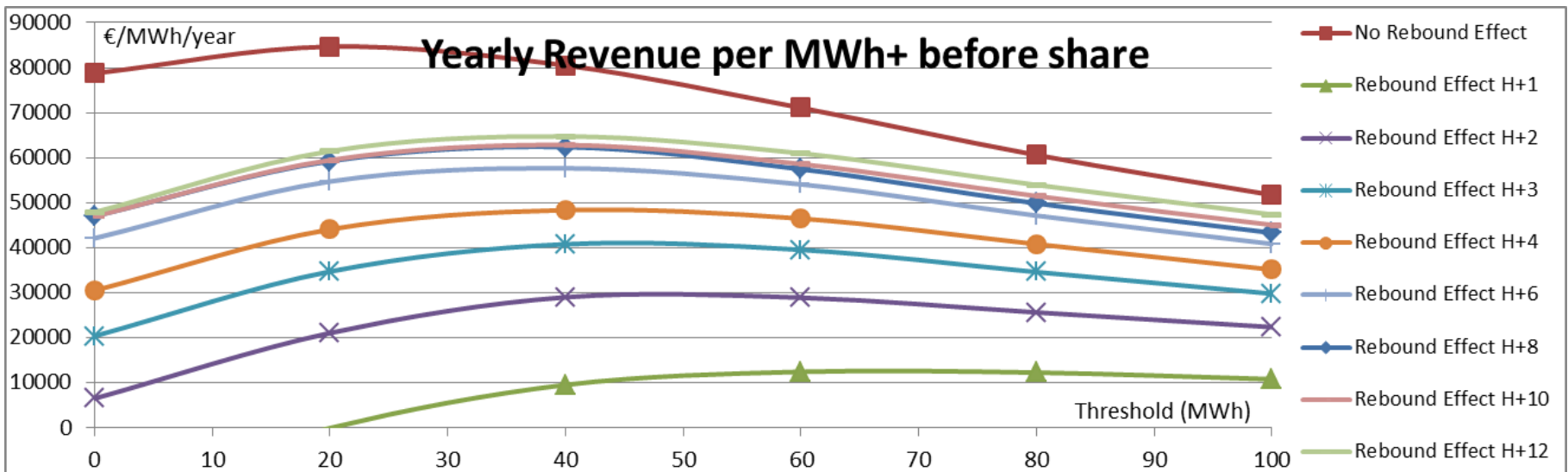
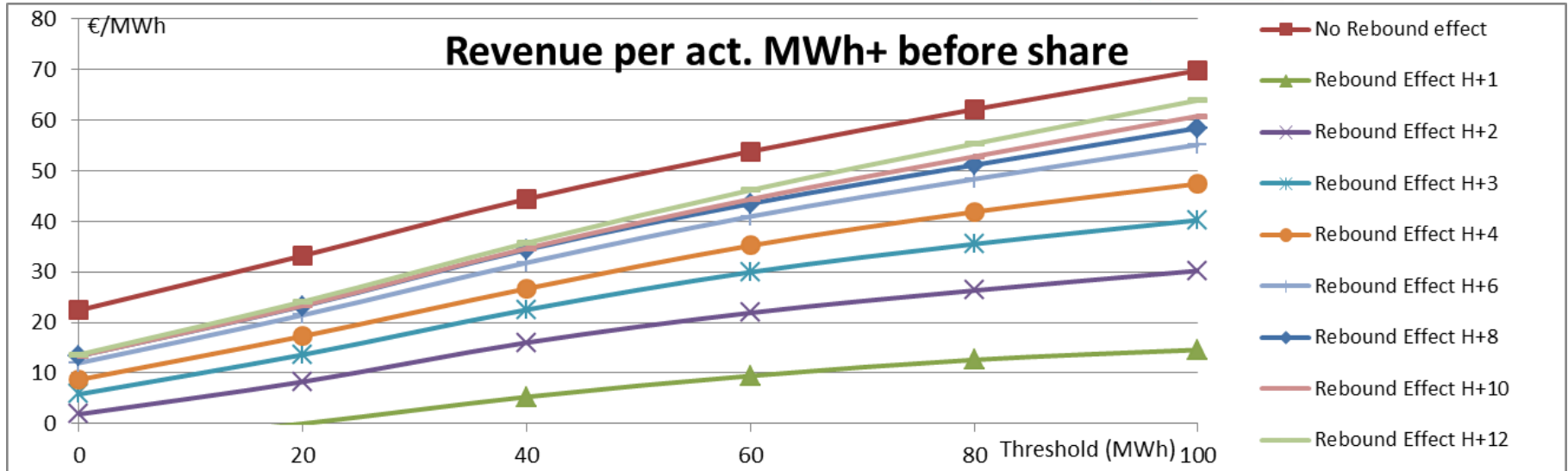
- ❑ Short-term Electricity Markets and Imbalance Settlement
- ❑ What is Demand Side Management (DSM)
- ❑ **Valuing Flexibility for DSM**

- ❑ **2 Possibilities to value DSM:**
  - ❑ Selling high quality Flexibility to TSO (Transmission System Operator):
    - ❑ TSO needs some guarantees that the system is fully dispatchable whenever it wants to
    - ❑ Some TSO accept DSM aggregators (Energypool in France, Next Kraftwerke in Germany...)
    - ❑ Go to Ancillary Services Market
  - ❑ Selling low-quality Flexibility to the electricity supplier (Balance Responsible Party)
    - ❑ Flexibility is then used to reduce BRP's own Imbalances (and Penalties)
    - ❑ Aggregator needs a Predictive Imbalance model in order to activate flexibility in advance
- ❑ Here I present the later case within Czech context



- ❑ **How „dispatch-able“ is the flexible device?**
  
- ❑ On Demand (we ask, customer confirms the order or not)
  - ❑ Payment per activated MWh (Profit-share 50%/50%, or fixed payment)
    - ❑ Fixed payment reduces the volume of calls
    - ❑ Delayed rebound effect increases the value of flexibility

# VALUING FLEXIBILITY FOR DSM

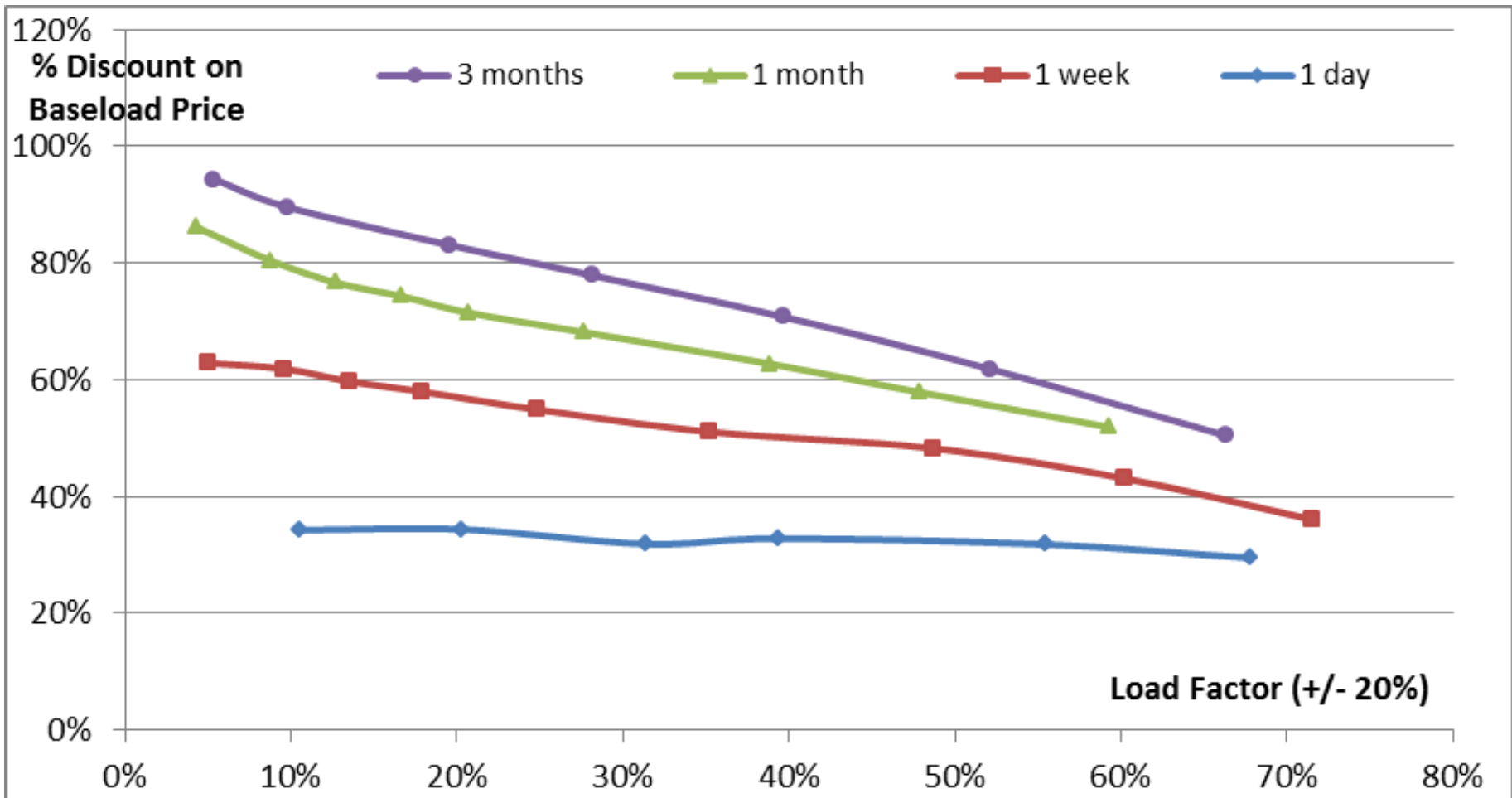


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    - ❑ Delayed rebound effect increases the value of flexibility
  
- ❑ Remotely controlable (customer gives a set of constraints to respect, we operate), i.e:
  - ❑ Device (pumps) must run 50% of time, +/- 10% over a given period
  - ❑ Period is 1 day (or 1 week, 1 month...)
  
- ❑ Payment as a discount on consumed electricity (for that particular device)

# VALUING FLEXIBILITY FOR DSM



□ Payment as a discount on consumed electricity (for that particular device)



- ❑ Imbalances represent some % of power costs (without distribution charges, taxes...)
- ❑ Yet, since margins are small, saving some Imbalance costs may be crucial for the supplier
  
- ❑ Need to find reliable customers willing to accept the management instructions
  - ❑ *Car manufacturers won't stop their production 1h*
- ❑ Best customers are those who have a small internal production unit on site

*DSM or SSM? (Demand or Supply Side Management)*

## BACK-UP SLIDES

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# CZECH ELECTRICITY MIX



9,3 GW  
Average  
Production

