GRID SIMULATIONS

Workshop „hybrid-VPP4DSO“

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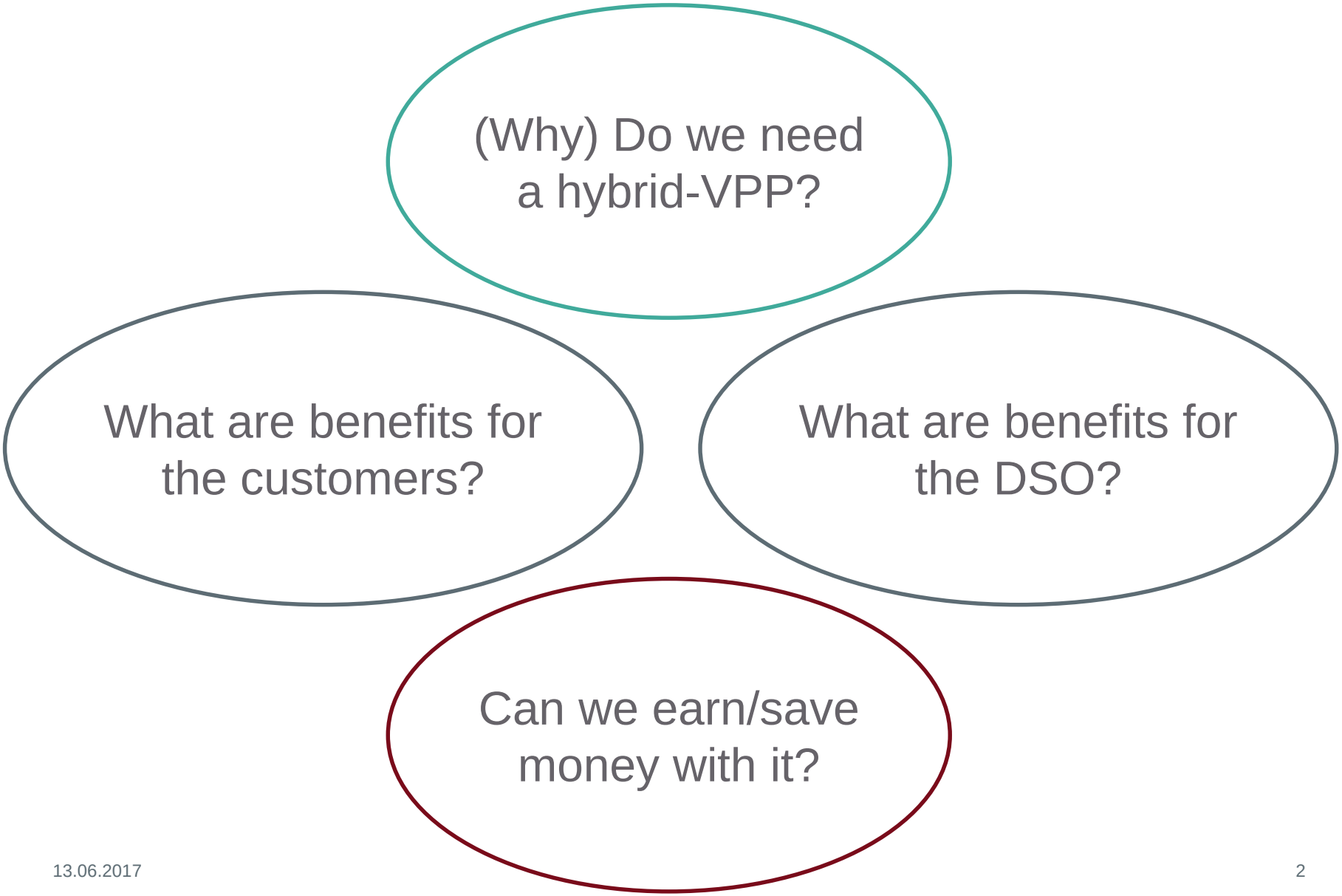
(Why) Do we need a hybrid-VPP?
What are benefits for the customers?
What are benefits for the DSO?
Can we earn/save money with it?

SIMULATED GRIDS

- 2 medium voltage grids in Slovenia (and 2 in Austria)
- Focus on regions that could profit from the use of a hybrid-VPP
- 2014, 2020, 2030
- Cables and overhead lines
- Focus on keeping the voltage limits

- Grid 1:
  - Urban
  - 10 kV-grid
  - 2014: mainly loads, some PV
  - 2030: 3 CHPs, 1 PV park

- Grid 2:
  - Rural
  - 20 kV-grid
  - 2014: CHPs, bio-fuel, PV
  - 2030: 2 CHPs, 1 wind park

FLEXIBILITY POOL

- Creation of a realistic hybrid-VPP
  - Interviews with industrial customers and power plant operators
  - Determine the available flexibility potential of the regions

- Resulting flexibility pool:
  - Loads:
    - Air condition of a large building
    - Industrial customer
  - Generators:
    - Backup power supply Diesel generators
    - CHPs
    - Bio-fuel power plants
    - Photovoltaic power plants
    - Wind power plant

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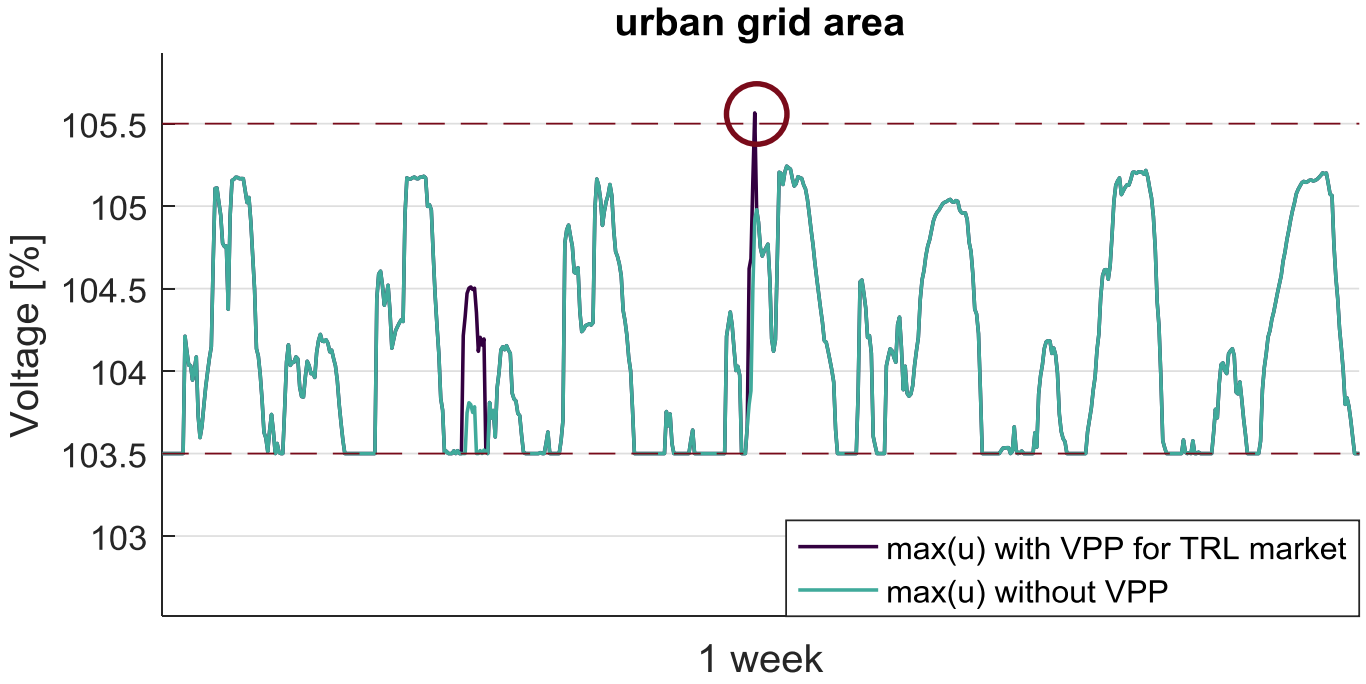
USE CASE (1A)

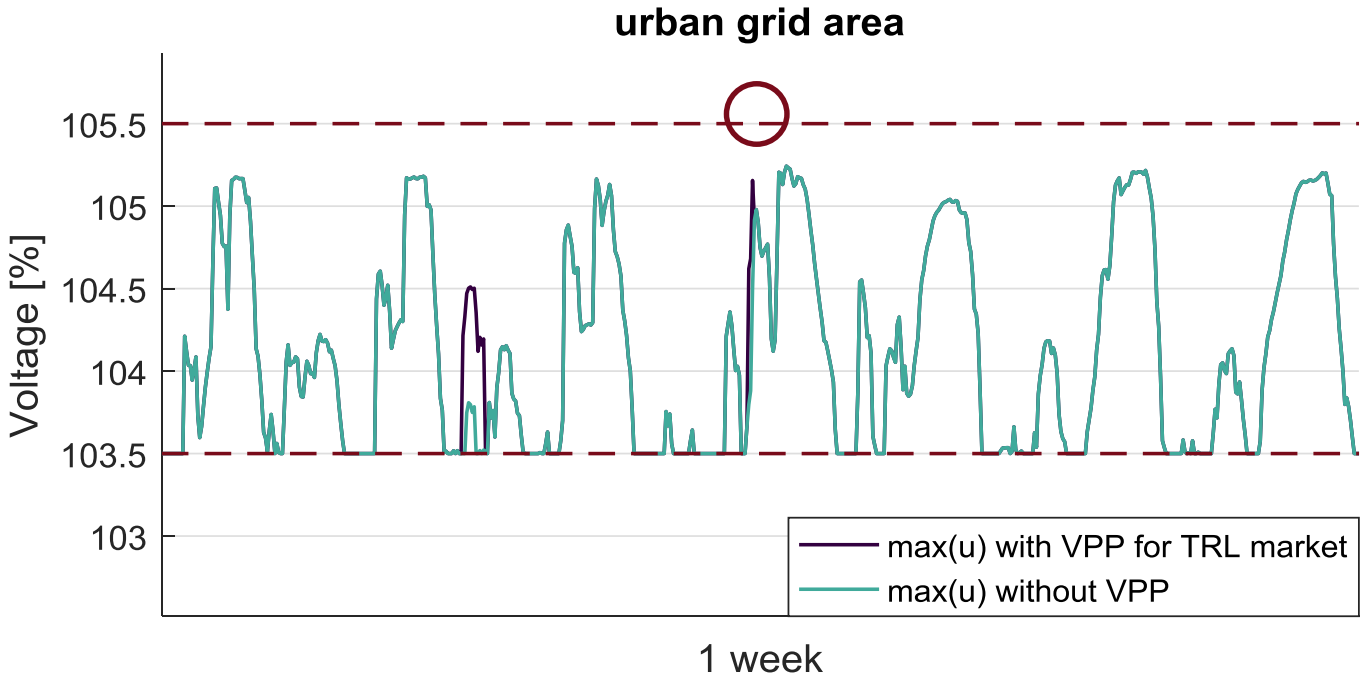
Participation in Flexibility markets



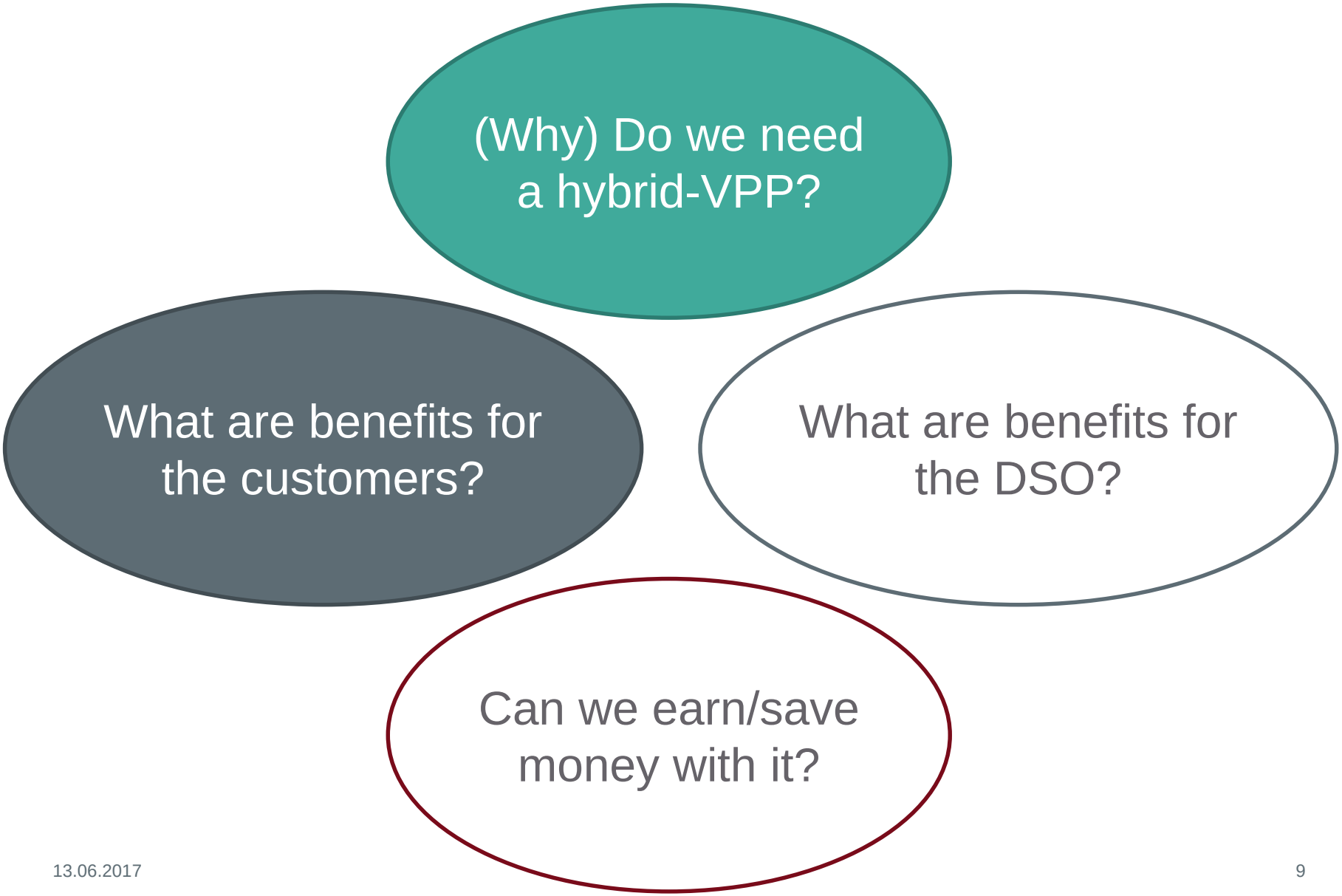
- The market participation of a VPP might intensify problems in critical grids
- The DSO can reject the participation on the balancing market if grid problems are to be expected.
- BUT: Grid problems often occur only during some times of the day/year

USE CASE (1B)

Participation in Flexibility markets considering restrictions from the distribution grid



- The hybrid-VPP can facilitate the market participation of VPPs in critical grids
- It is reasonable for VPPs to consider the current grid state, i.e. to form a hybrid-VPP.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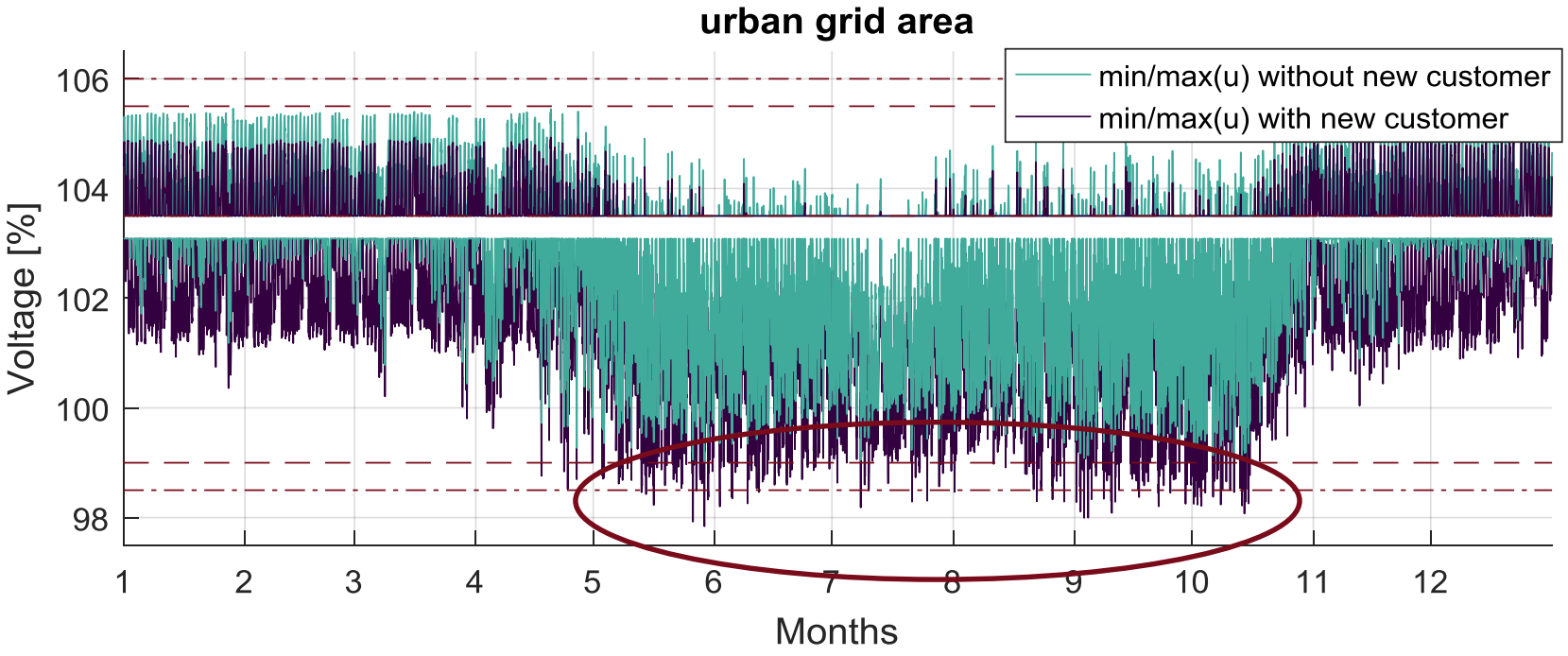
USE CASE (2A)

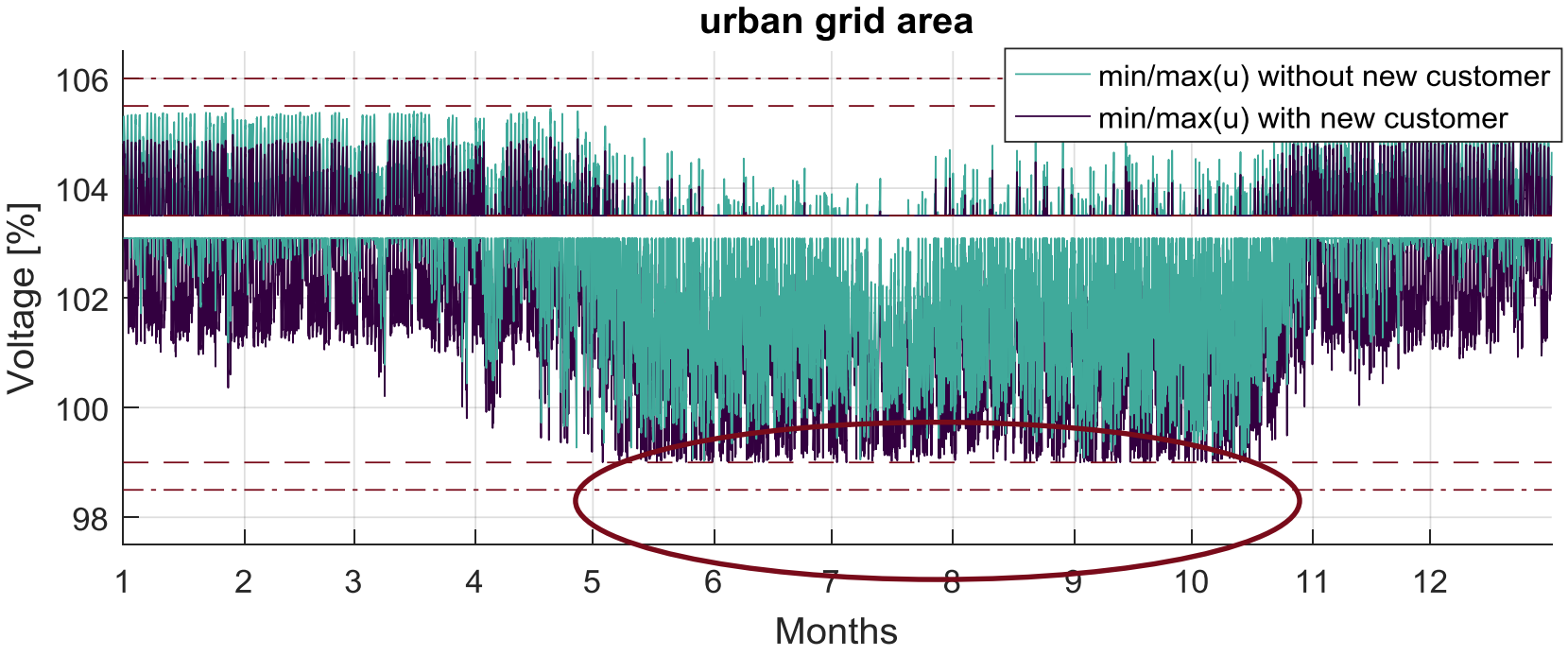
Minimizing grid connection costs for new consumers



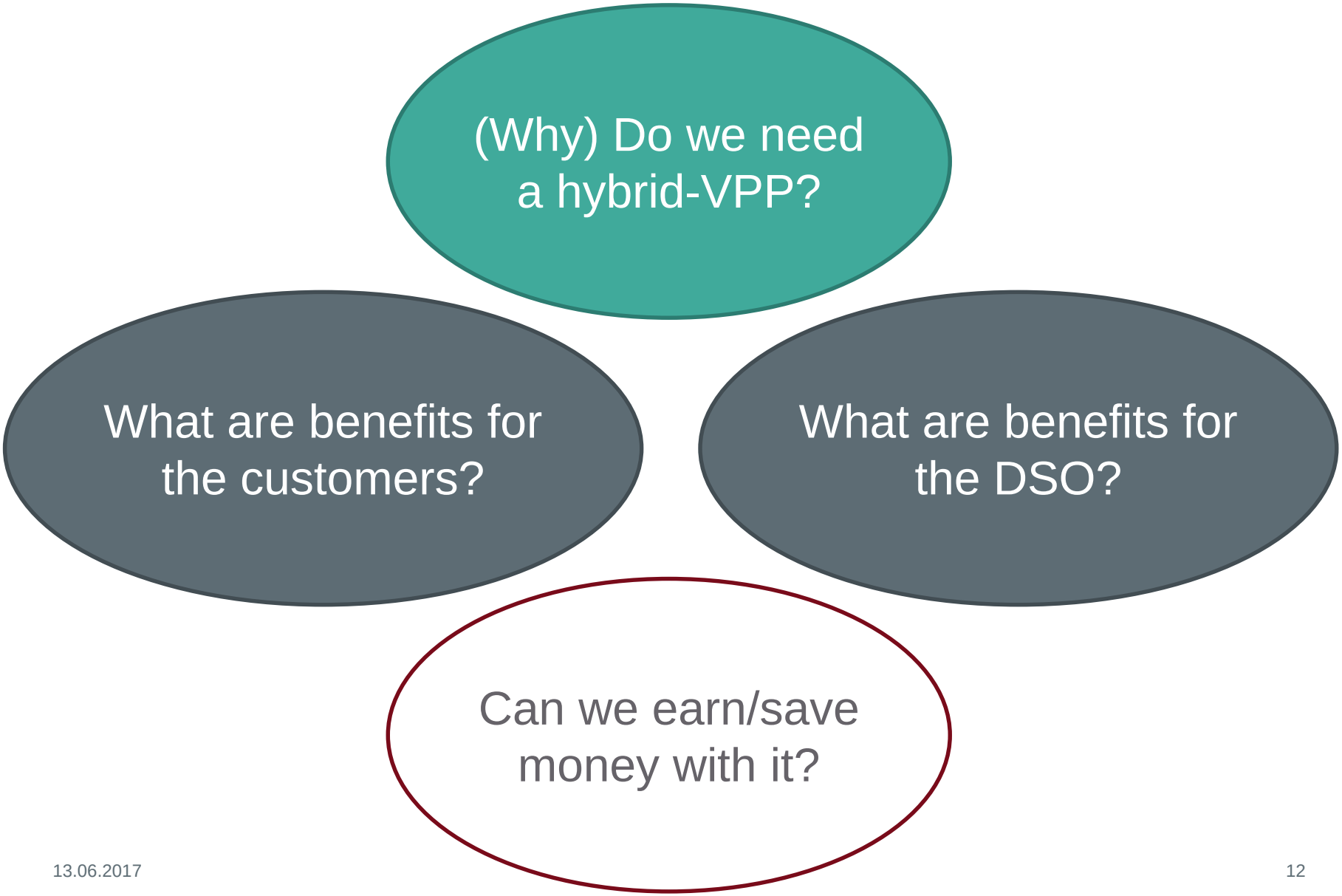
- New industrial customer wants to connect to the grid, but their load would cause under voltage problems
- Customer needs to invest into new grid infrastructure (a cable of 1.3 km)

USE CASE (2A)

Minimizing grid connection costs for new consumers



- Alternative: participate in the hybrid-VPP → cheaper grid connection
- Customer agrees curtail their consumption by 50% if needed.
- Additional benefit: market participation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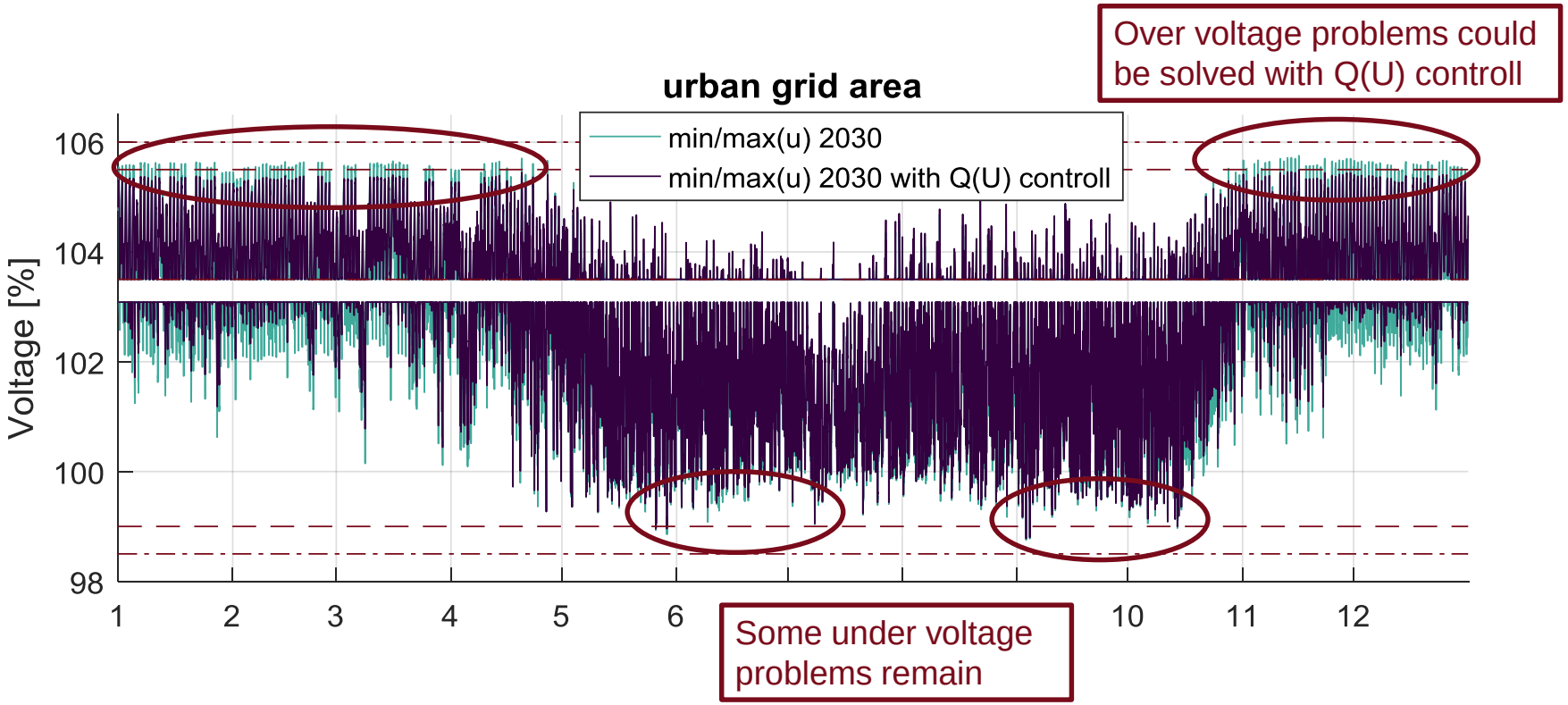
USE CASE (3A)

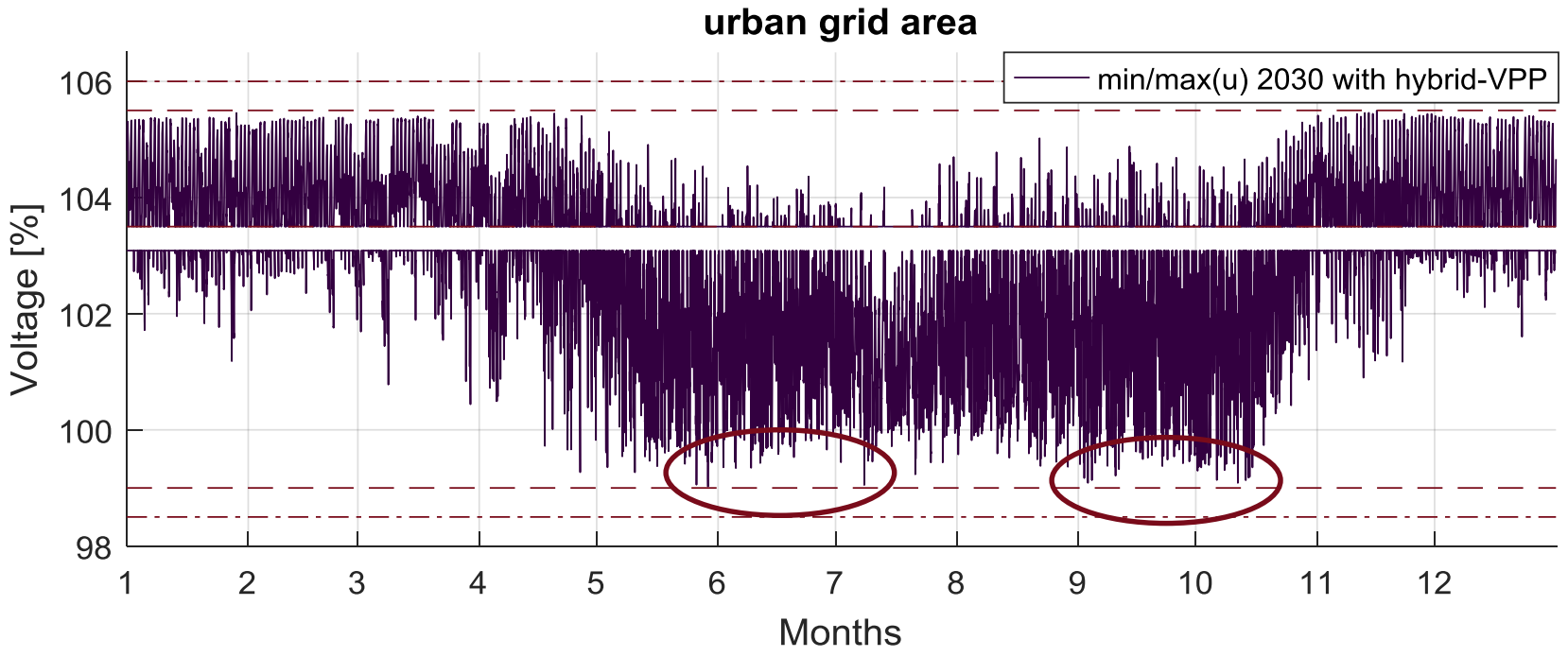
Optimizing the grid investments of the DSO



- Additional customers can result in the need for grid infrastructure investments to avoid voltage problems
- First measurement: Q(U) controll for all new generators

USE CASE (3A)

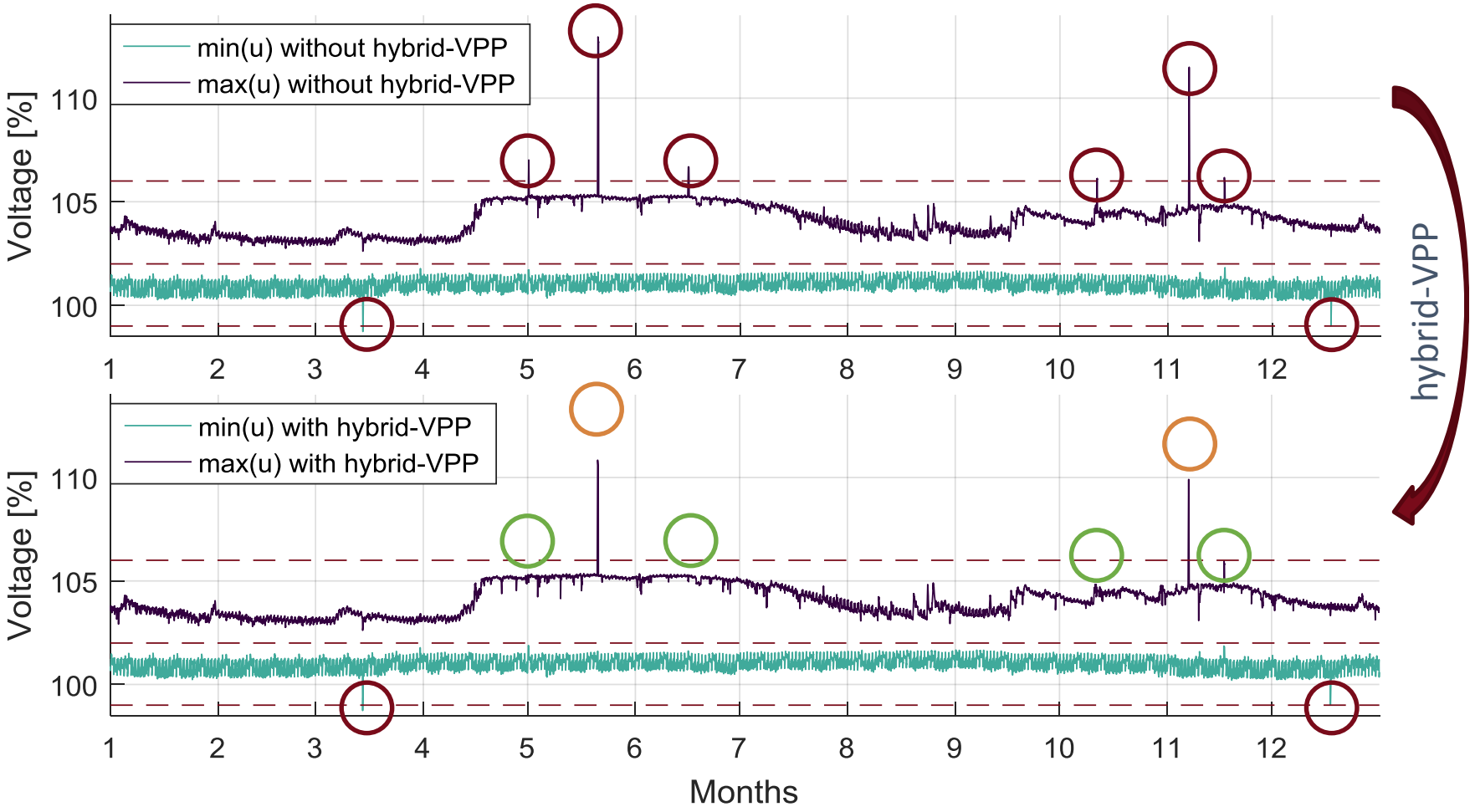
Optimizing the grid investments of the DSO

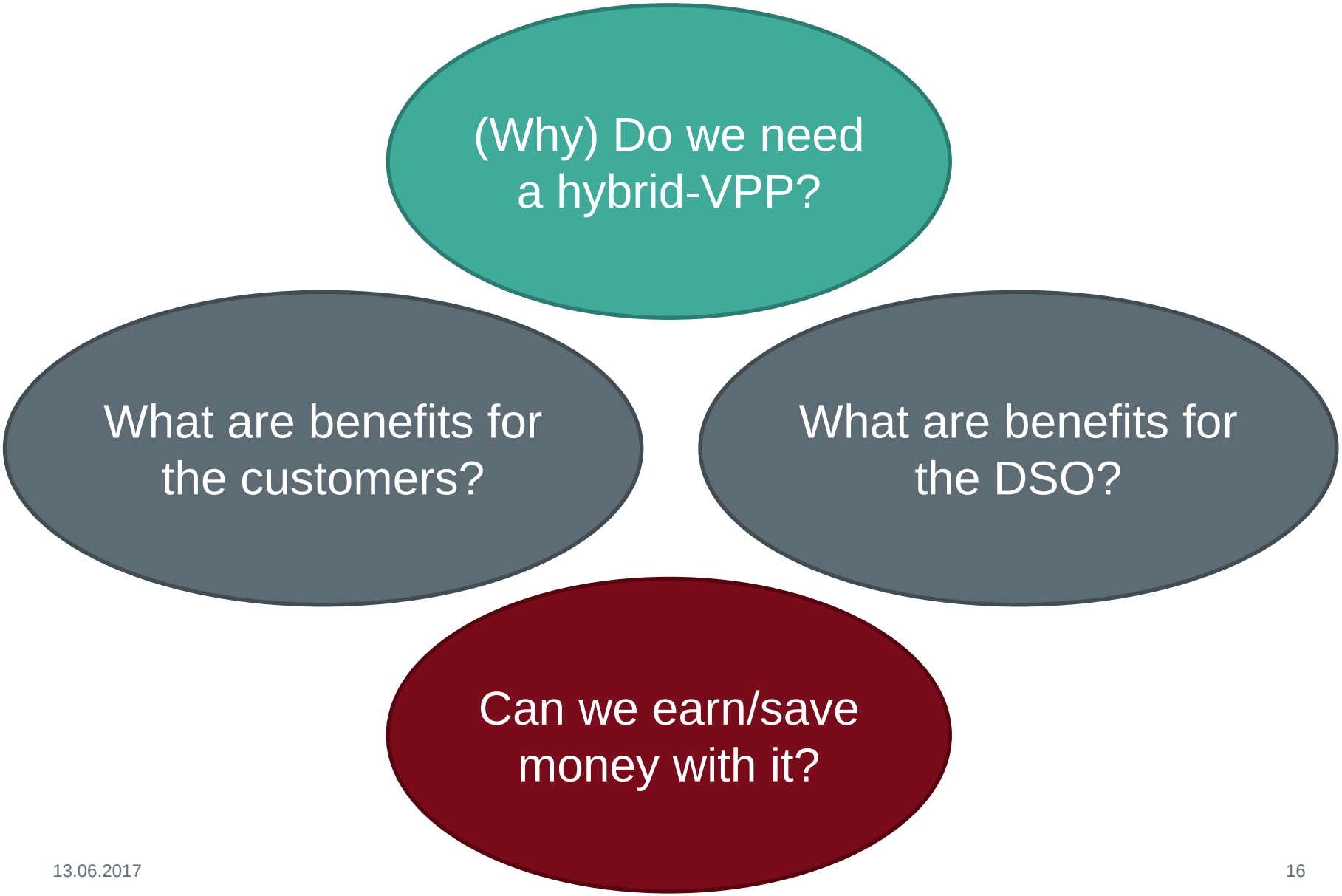


- The hybrid-VPP can help to minimize voltage band problems and thus to avoid or delay grid investments.

USE CASE (3B) - AUSTRIA

Supporting of DSO during maintenance and special switching states

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THANK YOU FOR YOUR ATTENTION!

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TOMORROW TODAY

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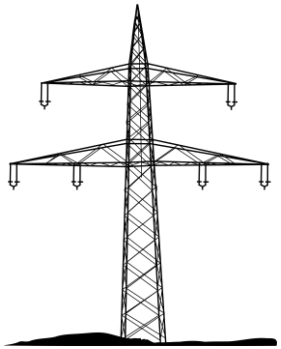
THE HYBRID-VPP CONCEPT



HYBRID VPP4DSO

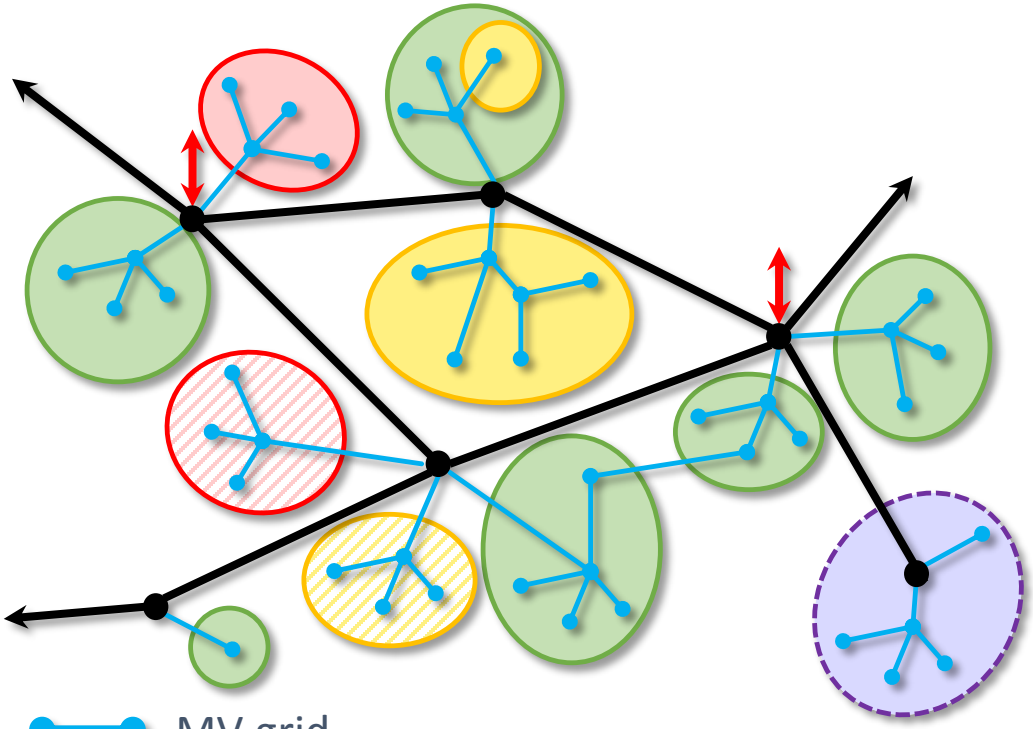
Borzen eex

SOUTH POOL EXAA Energy Exchange Austria

EPEX SPOT EUROPEAN POWER EXCHANGE

THE HYBRID-VPP CONCEPT

Exploiting synergies between grid operation of DSO and a market oriented VPP by application of a traffic light system:



MV grid
HV grid
HV connection towards other DSO(s)
Transformer to transmission grid

Noncritical:
all activations P↕ allowed

Semi-critical:
only P↓ allowed

Critical:
P↓ ordered by DSO

Semi-critical:
only P↑ allowed

Critical:
P↑ ordered by DSO

Highly critical:
no VPP-operation allowed

OVERVIEW OF THE USE CASES

- Market (VPP) driven use cases
  - (1a) Participation in Flexibility markets
  - (1b) Participation in Flexibility markets considering restrictions from distr. grid
  - (1c) Optimization of demand profiles to minimize costs of supply from energy only-markets (intraday, day ahead …)

- Customer driven use cases
  - (2a) Minimization of grid connection costs for new generators
  - (2b) Minimization of grid connection costs for new consumers

- Grid (DSO) driven use cases
  - (3a) Optimization of grid investments of DSO
  - (3b) Support of DSO during maintenance and special switching states under a quality regulation scheme