

Advantages of modifying the BDEW Traffic Light Concept for Local Flexibility Markets

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Structure

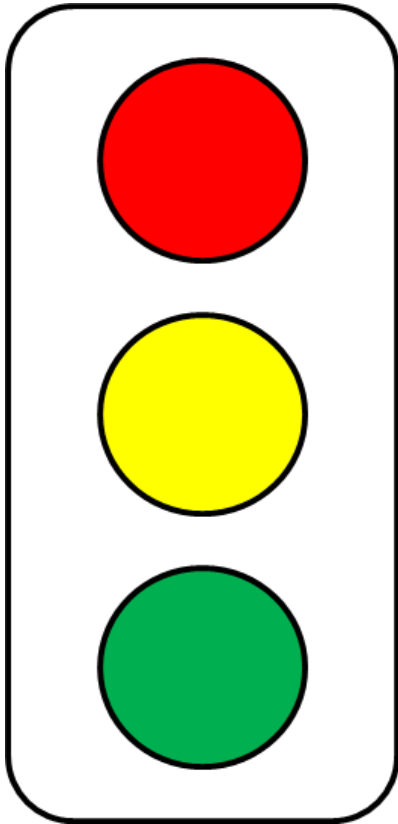
- Introduction
- Traffic Light Concept
- Reactive Power Control
- Simulation of one urban and one rural grid
- Conclusion



Introduction

- Rising share of renewable energy systems and large decentralized loads in distribution grids
 - Increasing number of critical grid states
- Distribution System Operator (DSO) has two opportunities
 - Conventional grid enhancement
 - **Use of flexibility**
- Local Flexibility Market (LFM) for the integration of prosumers
 - Based on the BDEW traffic light concept

Traffic Light Concept - BDEW



Regulated/grid-dominated area

The grid state is critical. The DSO intervenes in a controlling manner. Market activity is suspended.

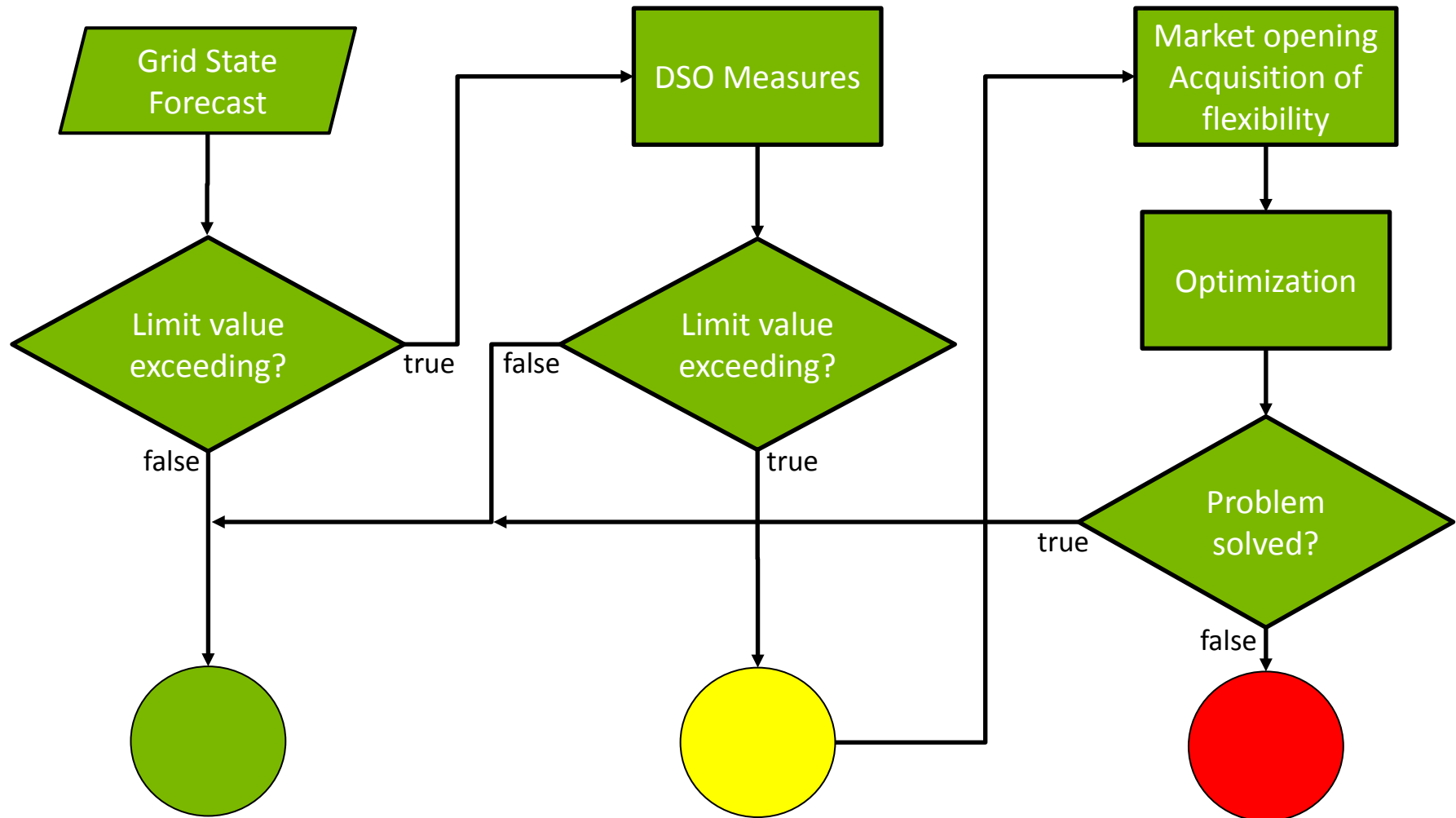
Grid-oriented area with market-driven processes

Depending on the grid situation, DSOs demand local and time-limited flexibility.

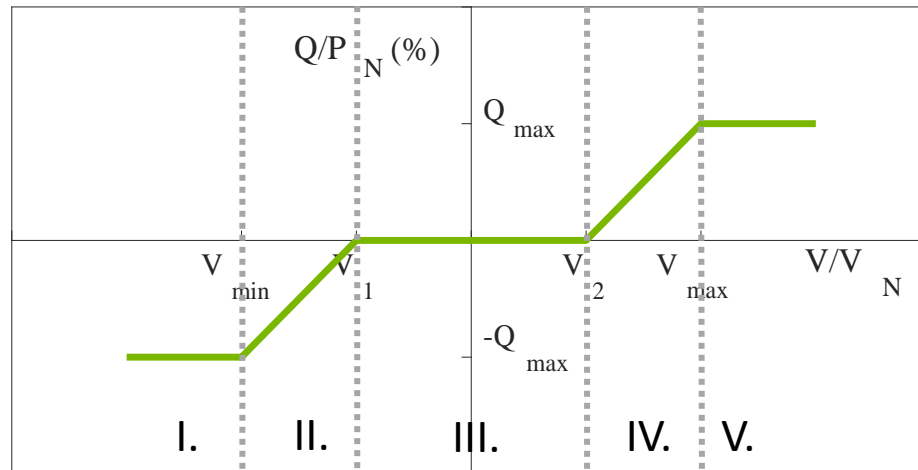
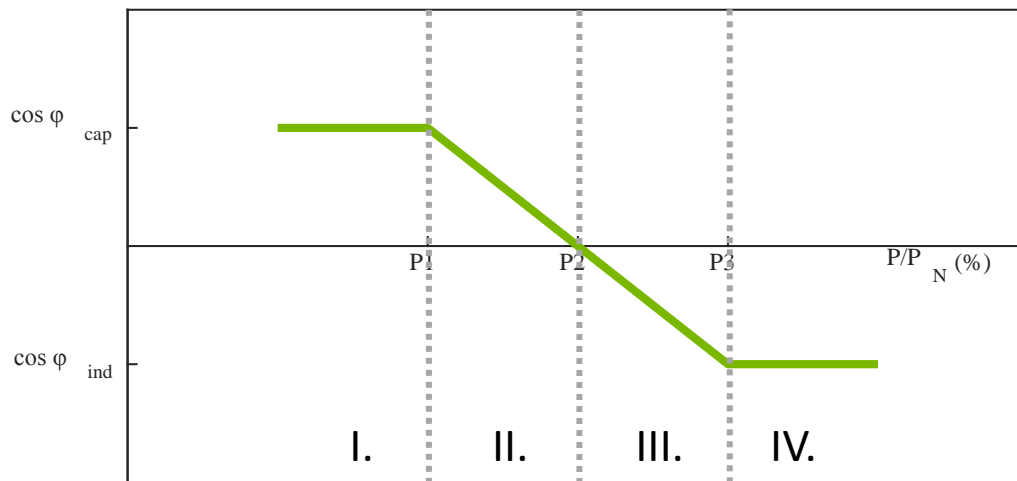
Market-driven sector (competition)

The grid status is not critical. All customers can act freely.

Traffic Light Concept – Phase Change



Reactive Power Control

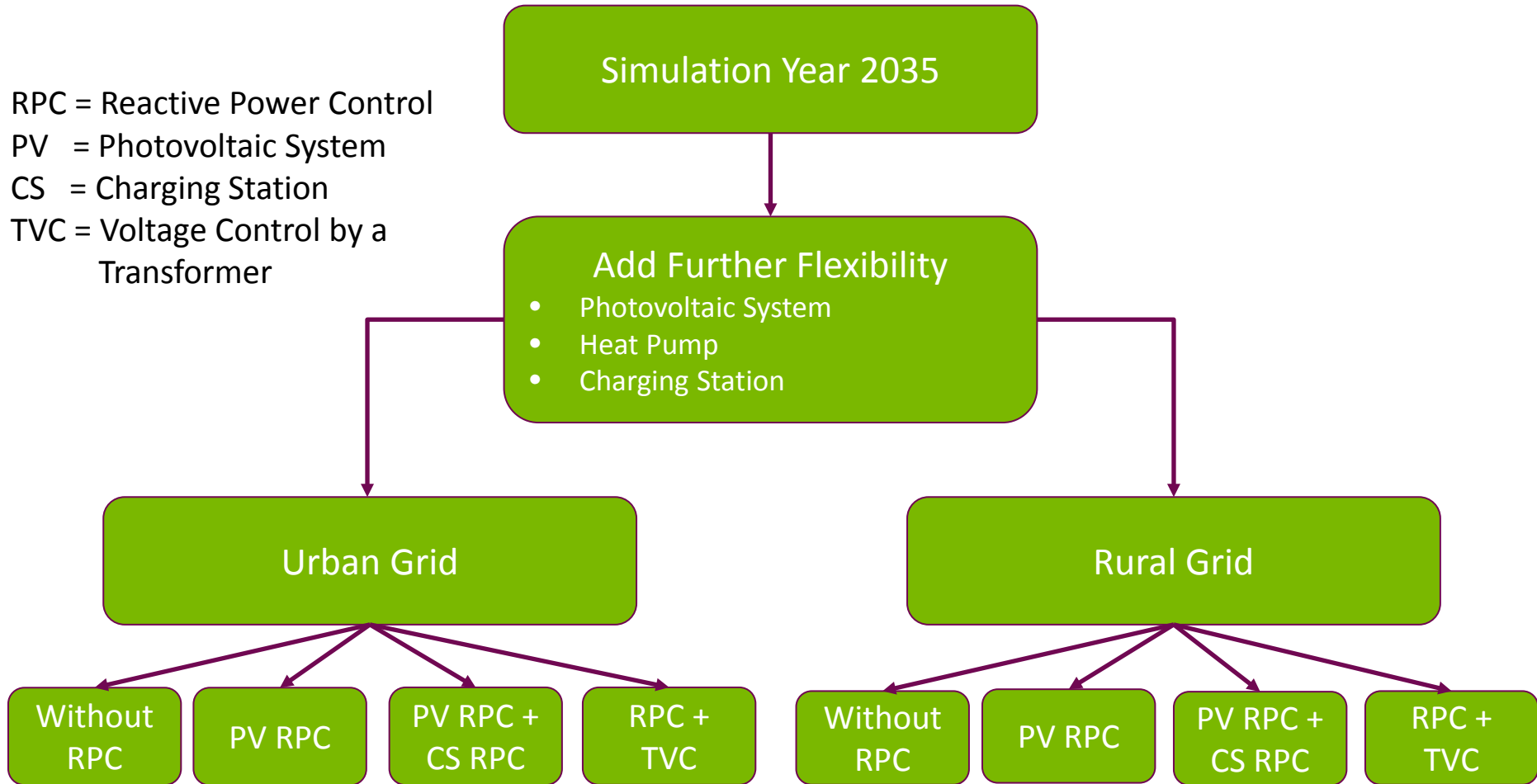


- max. $\cos \phi$ of 0.9
- $\cos \phi$ depends on the feed-in
- high feed-in leads to voltage increases
- further stress on cables due to reactive power

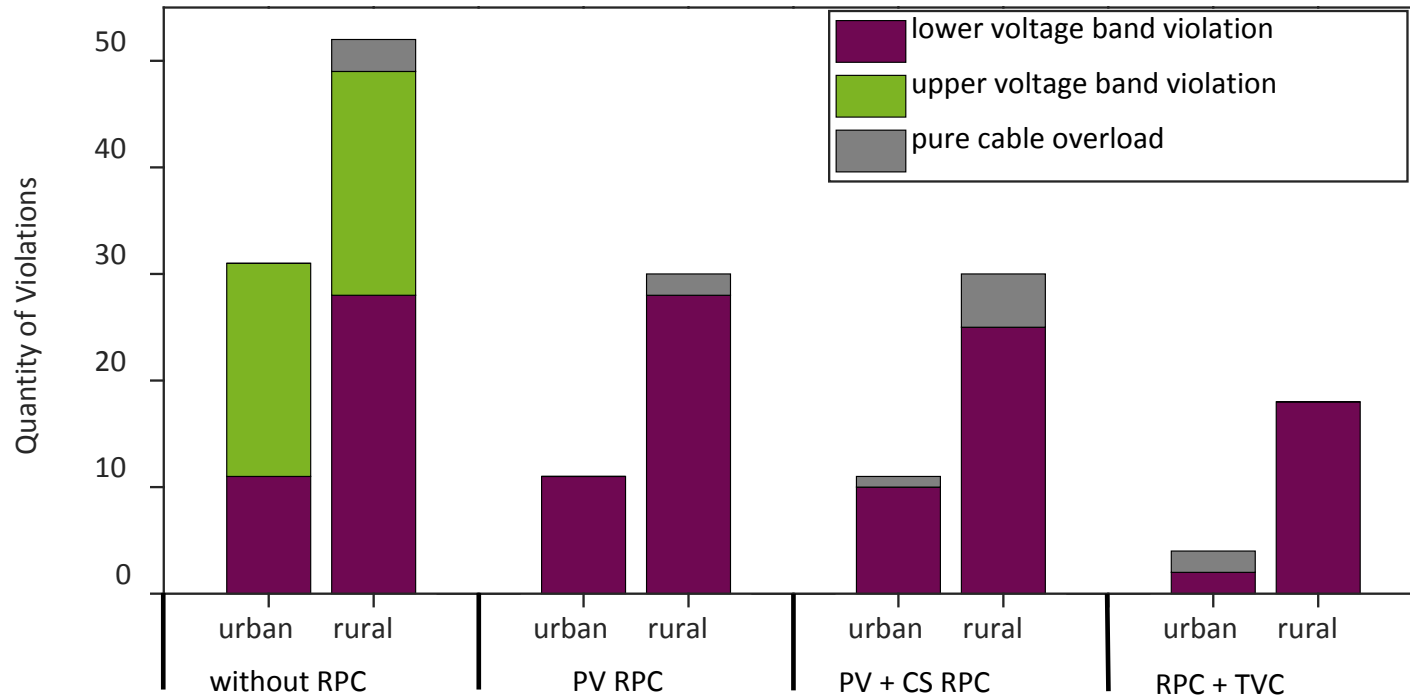
- Q depends on the voltage
- Voltage sensitive control
- Dead band \rightarrow no further reactive power
- less stress on cables due to reactive power

Simulation of one urban and one rural grid

RPC = Reactive Power Control
PV = Photovoltaic System
CS = Charging Station
TVC = Voltage Control by a
Transformer



Simulation Results – Quantity of Violations



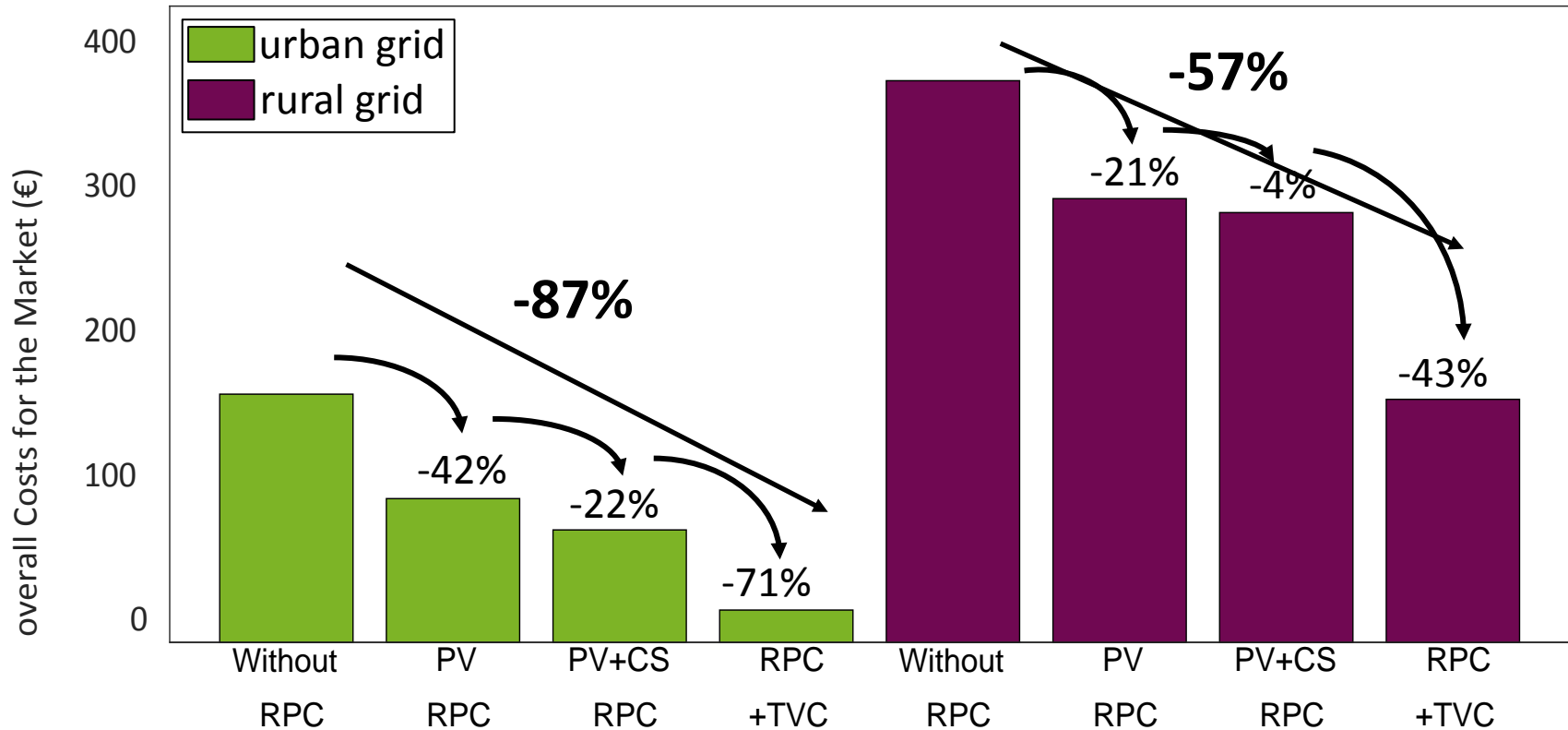
RPC: Reactive Power Control

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Simulation Results – Overall Costs



RPC = Reactive Power Control

PV = Photovoltaic System

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Conclusion

- Detailed description of the traffic light phase change
 - Cost reduction for LFM
- Use of DSO measures in the green phase
 - I. Possible avoidance of the yellow phase
 - II. Less flexibility required in the yellow phase
- Voltage control with RPC in single strands
 - Very effective for high feed-in
 - Less effective for high load

Thank you for your attention

