

# Self-regulation of dispatchable loads for resilient microgrid supply with electric vehicles

## Motivation

- Yesterday: Dispatchable producers serving non-dispatchable consumers
- Frequency and voltage stability are essential to grid operation & energy trading
- Bundling of small load devices leads to high transaction costs if there is a need to verify a "proof of work" for each unit.
- Standardization can reduce transaction costs via a "proof of capability" approach.

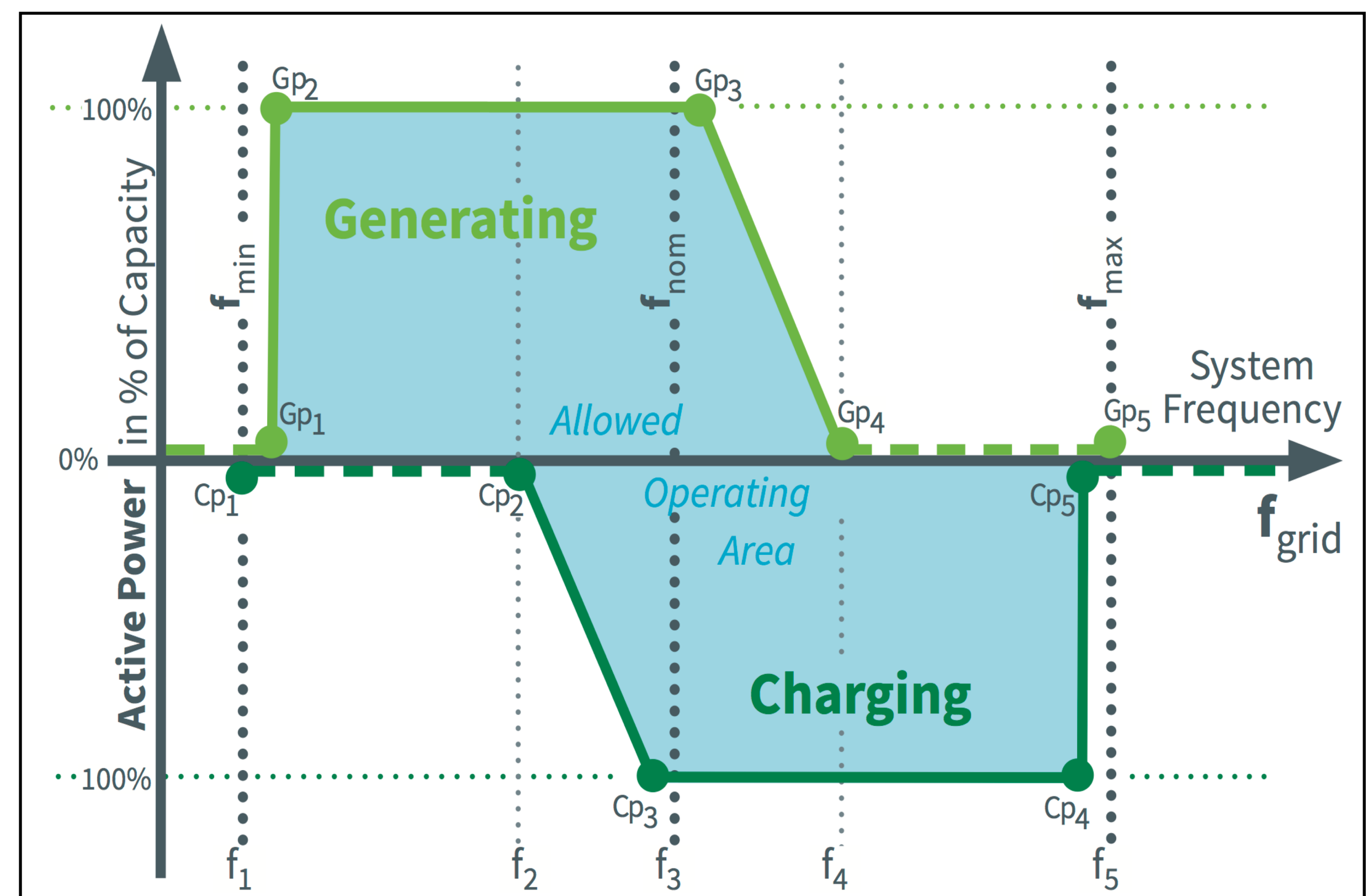


Fig. 1: Example of frequency-dependent behavior of an electrical energy storage system

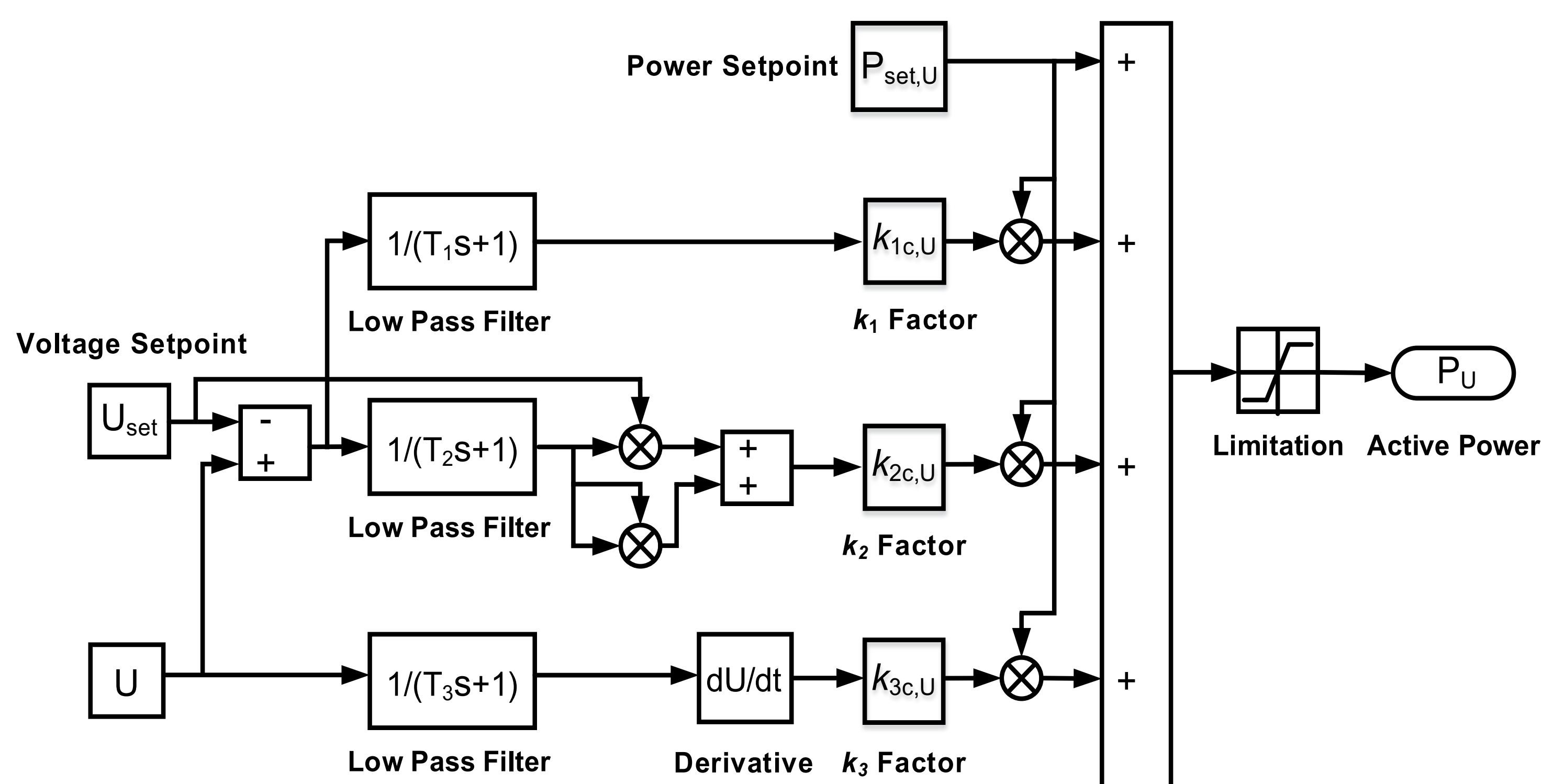


Fig. 2: Block diagram for voltage-dependent self-regulation (IEC TS 62898-3-3)

## EVs as emergency supply

- New IEC standardisation project TS 62898-3-6 based on self-regulation is in development
- Electric vehicles are mobile electrical energy storage systems by nature
- The dual use as both vehicle and storage can offer economical, ecological and structural advantages
- Grid-forming converters for bidirectional charging allow EVs to act as a back-up power supply
- Interoperability issues are avoided by applying simple droops for charging and discharging
- Active and reactive power will be covered

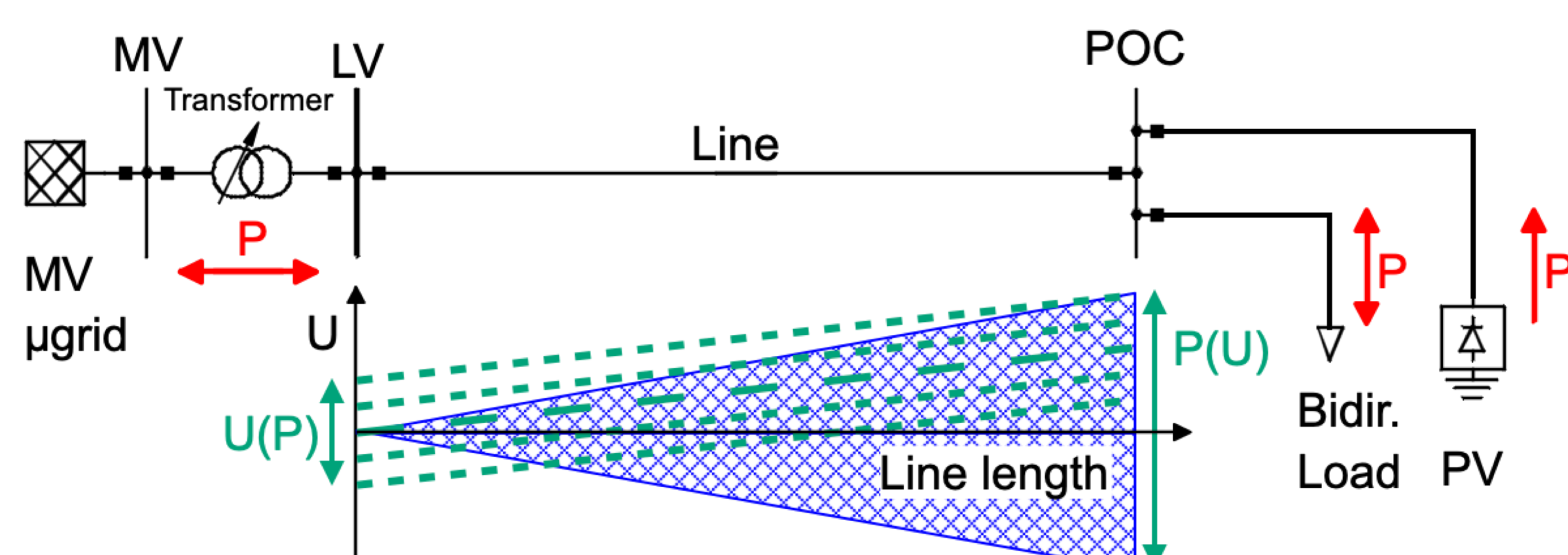


Fig. 3: Dimmer approach using self-regulation can be used in emergency and regular operating conditions

## Self-regulation of loads (SRL)

- Local control loop based on frequency & voltage at grid connection point
- Low-cost integration of flexibility without dedicated real-time communication
- Improved resilience and security of supply
- A solution to escape the complexity trap
- Less coordination effort for decentralized energy systems

## Quality standard for grid-friendly loads

- Not a mandatory connection requirement
- Multiple quality levels achievable
- Not only for microgrids but also interconnected grids
- Access to distributed flexibility resources
- Low-cost grid stabilizing services
- Automatic integration of non-dispatchable RES
- A SRL quality standard can be the basis for incentive schemes to exploit the flexibility potential (funding by e.g. grid operators, governments, and local utilities)

The quality standard IEC TS 62898-3-3 **Self-regulation of dispatchable loads** has been published in 2023-08.



Fig. 4: Example of a logo to simplify implementation of quality standards via a certification process