



Active Power Management of Photovoltaic Systems – State of the Art and Technical Solutions

Key Messages

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Key Messages



- Active power management of photovoltaic systems (e.g. curtailment) is a powerful grid integration measure. The energy loss due to curtailment is typically little compared to the increase of the PV hosting capacity.
- Curtailment can be implemented in various ways, with today's PV systems accommodating many of these methods. The choice of method should align with the specific application for optimal results.
- The value of electrical energy is zero when it is not needed and cannot be stored. Therefore, curtailed energy usually has a low market value.
- Communication systems are becoming more and more relevant.

Purpose of this Report



- Present methods for active power management / curtailment
- Discuss purposes / advantages / disadvantages of these methods
- If curtailment is needed at all is out of scope for this report

Use Cases



- Comply with transmission grid constraints (capacity constraints)
- Comply with distribution grid constraints
 - Voltage constraints
 - Capacity constraints
- Comply with grid connection constraints
- Collaborative grid optimisation
- Provide positive and negative control power / energy
- Limit over-frequency
- Energy / flexibility market participation
- Increase capacity factor

Active Power Management Landscape



Static Methods

- PCE sizing
- Constant PCE power limitation

Dynamic Methods

- Local dynamic power curtailment
- Frequency droop control
- Voltage droop control (volt-watt)
- Power limitation according to a signal from the DSO
- Power limitation according to a signal from the TSO
- Aggregated PV power curtailment
- Optimisation-Based Curtailment Approaches in Grid Planning and Operation