A Swedish DSO Perspective
- Grid related obstacles and opportunities in PV integration

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PV installations at E.ON Elnät

- We foresee a great increase in PV volumes, following the Danish case
The role of the DSO – our given mission

- Grid tariffs
- Connection fees

Enabling the transition into future energy system

The most optimal resource allocation for integrating PV
- Grid reinforcements
- Internal resources
Market barriers to PV integration

- The market is not ready for a rapid increase in PV production: 250 MW → 2.5 MW → 2.5 kW
- Large volumes require short lead times… reinforcement needs?
- 1-phase and 3-phase installations

Technical barriers PV integration

- New loads and new ways of utilizing the existing grid have implications on voltage levels, phase imbalances, reactive power, protection relay control…

- Our identified solution is a national industry standard:
  - 3-phase installations below 17 kW are free
  - 1-phase installations exceeding "2 kW" pay a flat connection fee
Regulatory barriers to PV integration

- A flat connection fee could optimize resource allocation in PV integration

- In conflict with the demand of the regulator; use of the actual cost related to the reinforcement

- Example: 4 kW of one-phase PV trigger a reinforcement need. The solution is a new transformer which increases the capacity with 200 kW. The customer will only pay for 4 kW. The next customer will pay for 0 kW since the transformer was already changed.
  - Collectivization of costs, everyone pays for *unnecessary investments*
  - A waiting game for the first installation → slows development down

Summary

- Very low volumes today but expecting rapid increase

- DSO will be the enabler

- The most optimal resource allocation

- 1-phase restrictions could be a key but likely to require change in regulatory direction

- Need to learn from international experiences