Unlocking the hidden potential of electricity distribution grids
Overview

- Future developments
- Potential available capacity in current grid
- Analysis current grid capacity
- Unlocking this capacity
Future developments

On supply side

Need to increase (power) capacity

Or use current capacity better by applying more control?
Potential available capacity

HV: 50-220 kV
MV: 10-25 kV
MV-transmission
MV-distribution

Power available for flexible loads
Potential available capacity

HV: 50-220 kV
MV: 10-25 kV
MV-transmission
MV-distribution

Available energy capacity during off-peak periods

 tijd (h)

P (W)
Potential available capacity

MV-transmission: (n-1) criterion for reliability

MV-distribution: reconfiguring the network for improved reliability
Potential available capacity

HV: 50-220 kV
MV: 10-25 kV
MV-transmission

Available capacity due to reliability criterion
Analysis current grid capacity

**HV:** 50-220 kV

**MV:** 10-25 kV

**MV-networks in the province Limburg**

- One fifth of distribution networks of Enexis
- 29 HV/MV-substations
- 10 kV-voltage level
Analysis current grid capacity

average capacity
MV-transmission cable

average capacity
MV-distribution cable

64%

76%
Analysis current grid capacity

Load calculations for one MV-network

- one HV/MV-substation
- 228 cable-sections and 187 MV/LV-transformers
Analysis current grid capacity

- Situation 1: normal operation
- Situation 2: continuous loading, maximum load = peak load
- Situation 3: continuous loading using 50% of extra available capacity
Analysis current grid capacity

- Situation 1: normal operation
- Situation 2: continuous loading, maximum load = peak load
- Situation 3: continuous loading using 50% of extra available capacity

For situation 3: in 14 of the 228 cables and in 88 of the 187 transformers the current exceeds the nominal, continuously allowable current.
Analysis current grid capacity

• Great potential available in MV-transmission and MV-distribution cables.

• To use this surplus grid capacity some of these MV-cables and MV/LV-transformers must be upgraded. For MV/LV-transformers, the financial consequences of this are limited.
Unlocking capacity

Electric cars are coming up and add a large, but flexible load.

As part of the grid, the extra available capacity in the grid can be used to load them.
Unlocking capacity

- To use this capacity by flexible loads, Enexis introduces the
- to prevent extra peak load on top of current day-peak
- to monitor available capacity in the grid
- to match availability of sustainable power with demand of connected vehicles
Thank you!