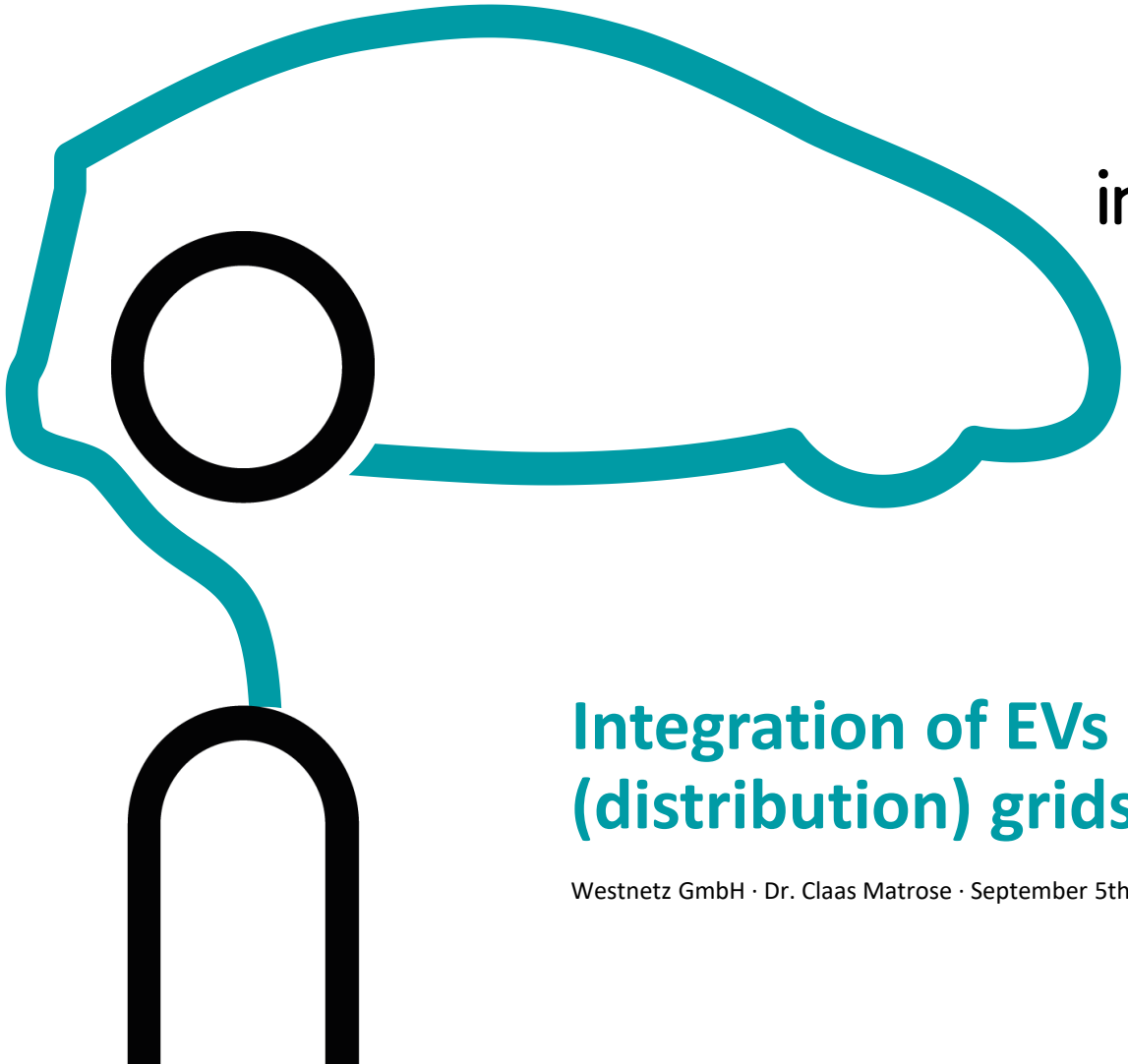
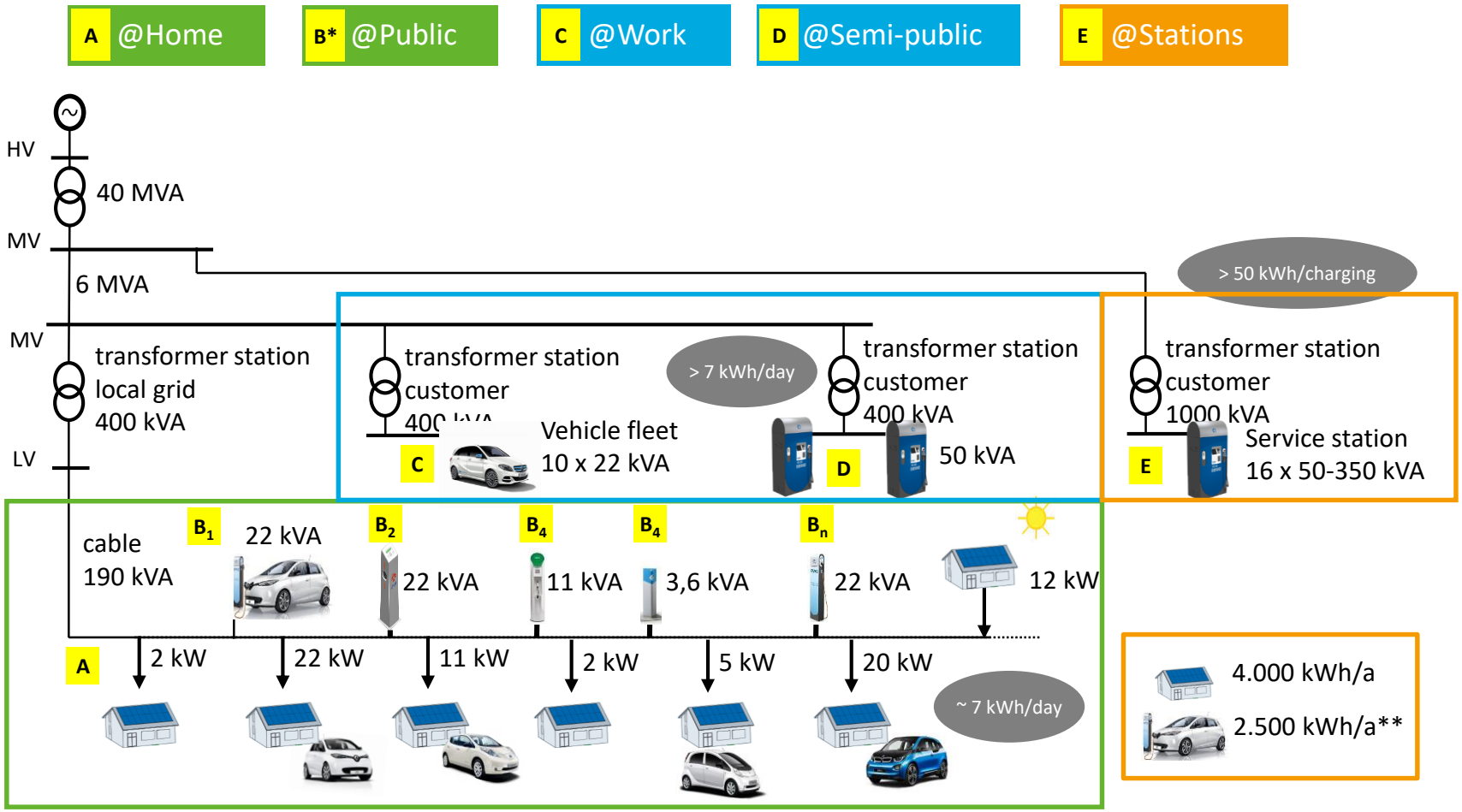


Integration of EVs into (distribution) grids

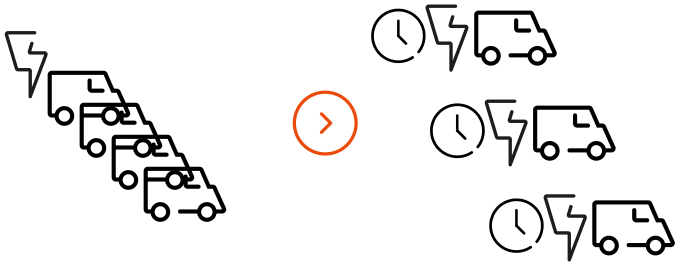
Westnetz GmbH · Dr. Claas Matrose · September 5th 2018

Desired charging power and location determine type (and costs) of connection



* Several different Charge Point Operators (CPO)
** Calculation basis: 12.500km/a 20kWh/100km

Main challenges – reasons for “smart charging“



Challenge #1: time-based dimension

Correlation of EV and (other) load in households?

Correlation of RES-E to EV charging?

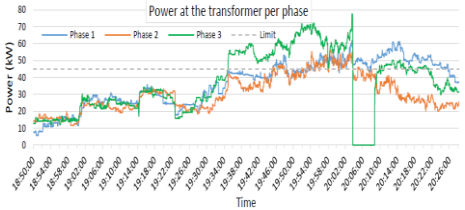
(charging in dark and windless periods)

Challenge #2: local dimension

rural grids (with lots of RES-E)
vs.
(sub-)urban grids (with lots of Evs)

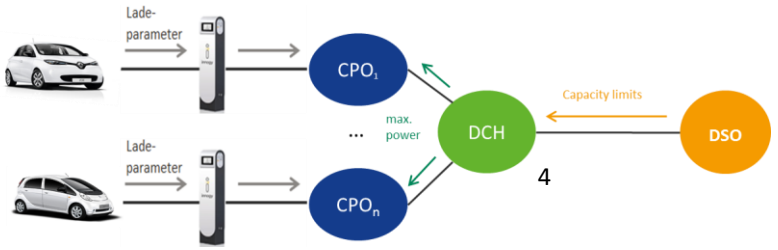
- Uncoordinated charging is a challenge regarding the “**power perspective**“.
- Additional energy consumption of all German vehicles (ca 135-175 TWh) means manageable challenges for the grids, as long as energy (and power) is transported considering (local) grid constraints

Different options possible for an effective and efficent integration of EVs



1. “Let´s see what happens“ –
   no control and transparency of EVs in low voltage grids;
   not an option, local black-outs will occur
2. “Copperplate-scenario” –
   building the grid for maximum peaks of loads (esp. EV);
   not an option, very expensive with up to 70 bn € reinforcement costs for the grids.
3. “static steering” –
   status quo, but does not optimally considers customers desires
   and fluctuations in RES-E generation

4. Local steering with technical connection regulations
   status quo; could be extended with P(U) regulations (or the like), but has an effect on energy management processes; important, but not “the silver bullet”.
5. New (regulatory and technical) solutions such as a “Demand clearing house”
   considers energy management processes and price signals (aggregator perspective) as well as grid limitations; currently R&D status, many CPO have to be considered for each DSO



For DSOs E-Mobility is an important topic of the future

The challenge of integrating e-Mobility into the grids is power, not energy

„Let´s see what happens“ is not an option

Maximizing the network expansion is neither a financial option nor possible to realize because of reasons of space

Innovations are required in order to an efficient and effective integration

We´ve developed technical solutions and verify them in different field tests

„Smart Charging“ reduces possible costs for network expansion