External point of view from Distribution Network Operator: Balancing changing market with more renewable and more need for storage; possible roles for railway
Working together towards a sustainable future
Alliander, a Dutch energy grid company

Customers
- Customers: 3 million
- In 144 municipalities and 5 provinces
- Availability of energy: 99.99%
- Installed smart meters: 1.6 million
- Customers feeding energy to the grid: 144,200

Employees
- Employees: 5,755
- Employee satisfaction 70%

Financial
- Revenu: € 1.7 billion annually
- Investments: € 844 million in 2019

Governance
- Publicly owned
Organigram
Alliander in the energy chain
Similar drives energy grid company and railway company

- Both infrastructure managers
- Both ProRail and Alliander are *public parties* in the Netherlands
  - Alliander's shareholders are 100% local governments
- Safety is top priority
- Reliability crucial
Challenge due to the energy transition

Present grid

Power generation

Transport

Distribution

Use
Challenge due to the energy transition
From present grid to tomorrow's grid

Some cases

• All the cases mentioned are meant to inspire
• So: imagine that there are no legal or technical barriers

• Cases:
  → Wind
  → Solar
  → Storage
Windturbines in Deil

- Betuweroute
- 4 windturbines
- Nearest Substation but limited capacity
- Nearest Substation with capacity
Solar panels, fictitious

Room for PV panels 1 – 10 MW

Railway line

Mid Voltage 100 kW

Mid Voltage 100 kW

Mid Voltage 250 kW
Charging electric busses through a battery pack

- Busstations are often located near railway stations
- To improve the air quality in city centres electric busses are introduced.
- Other transport modalities also tend to electrification (cars, scooters, bicycles)
- Large electric capacity is required
- Charging busses through batteries spreads the required grid capacity
- Battery packs as a storing interface create new opportunity's:
  - Storing regenerated braking energy
  - Charging via the overhead contact lines
- ProRail is studying the concept.

Artist impression bus platform with electric charging facility
Finally

- Rail companies and a DSO have similar backgrounds and social and environmental goals
- Our electrical infrastructures will have to improve and innovate
- There are chances for synergy
- A further exploration is useful
- We *might* face some legal and technical challenges

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