

Presentation of charging infrastructure suppliers

HITACHI-ABB Power Grids

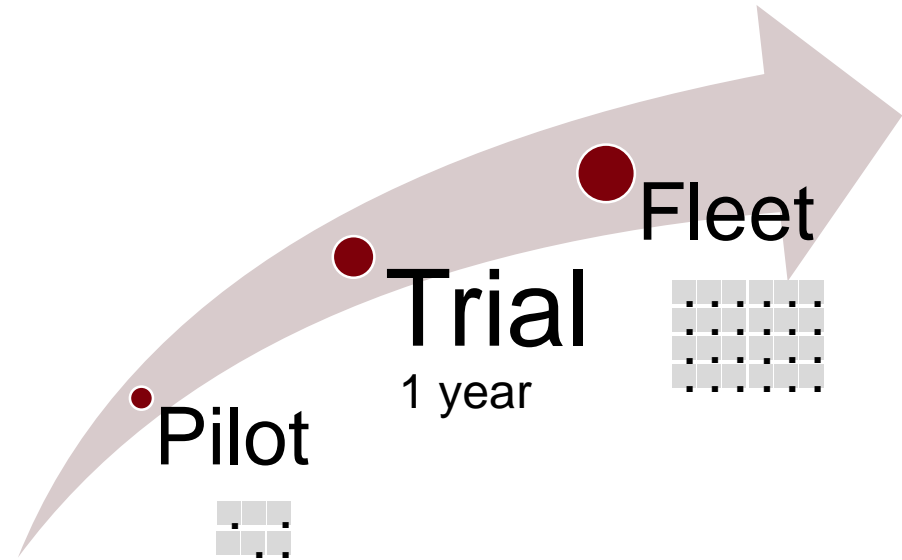
Alexandre McCraw – eMobility Sales Manager

Ruter #

Planning for Fleet infrastructure

- Small scale pilots test
 - battery range (climate, topography, route length)
 - collecting feedback (driver, passenger)
 - simple charging infrastructure and limited power
- Scaling up infrastructure for fleets
 - Requires upgrade of grid connection
 - Should consider physical space and layout of the infrastructure
 - Managing charging demand overnight from cost and schedule perspective

Common Approach by Operator to eMobility



Fleets are the first true trial for charging infrastructure

Three main inputs to size a large-scale EV charging project



1) What is the available power?



2) What is the fleet size?

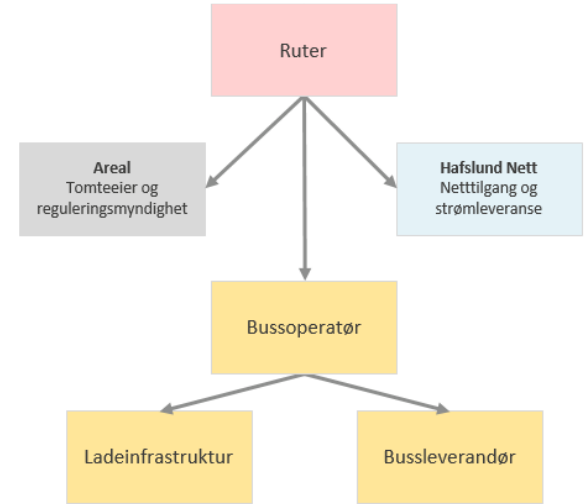
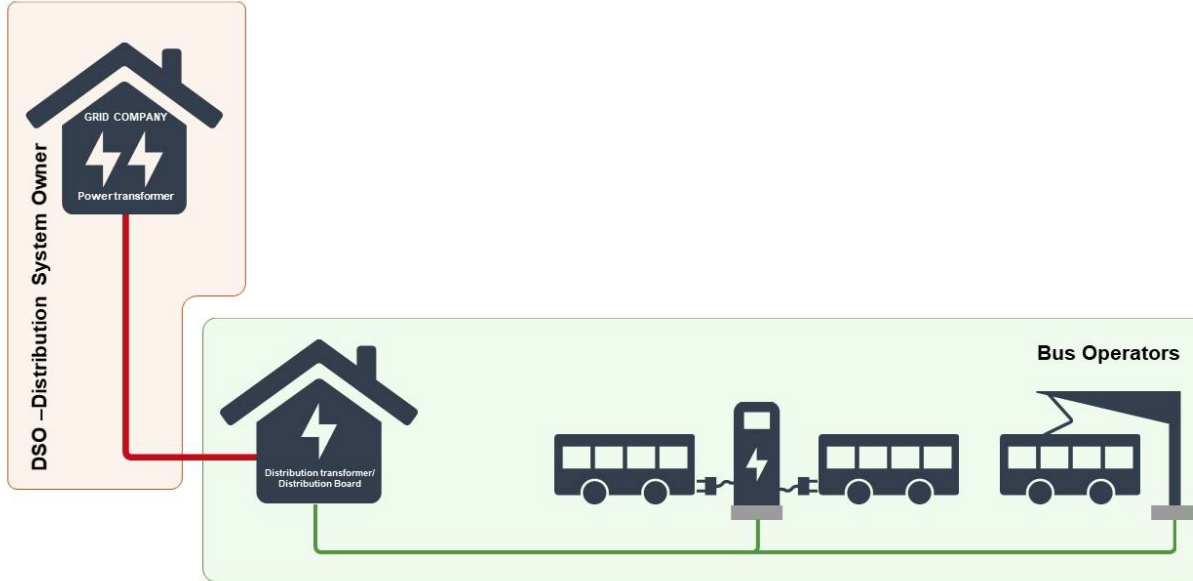


3) What is the EV interface?





In this scenario: The Bus Operators has the incentive to find the optimum solution

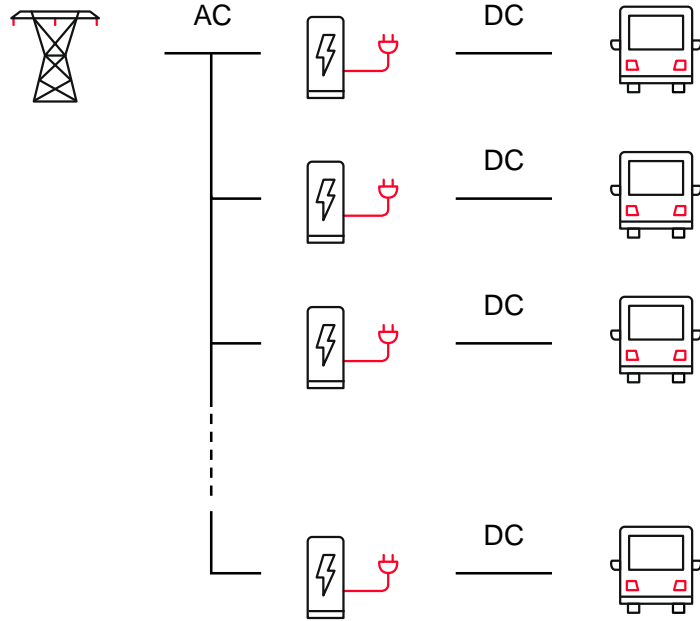


Ruter's business model for e-buses and charging infrastructure the RFI's case study

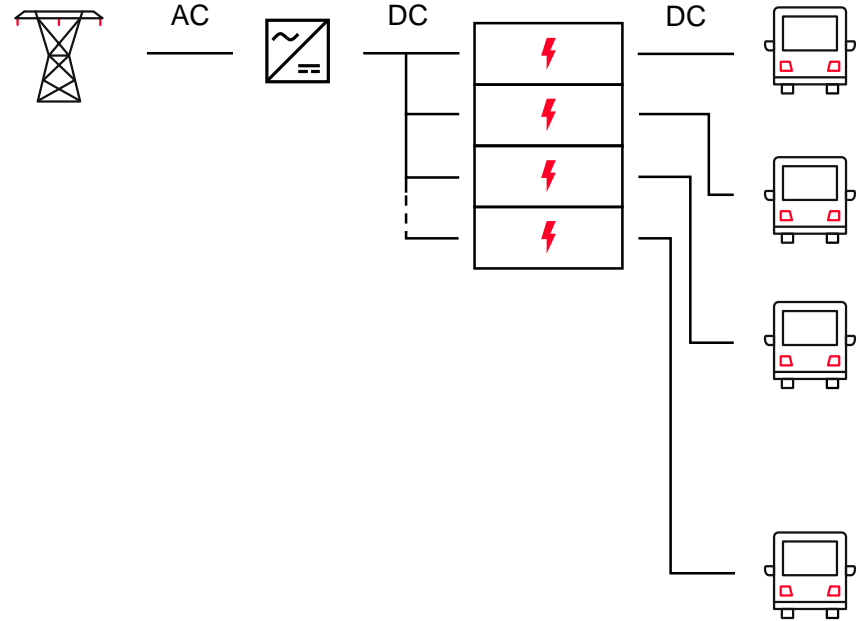
Grid-eMotion™ Fleet

What's new? | DC Distribution

AC

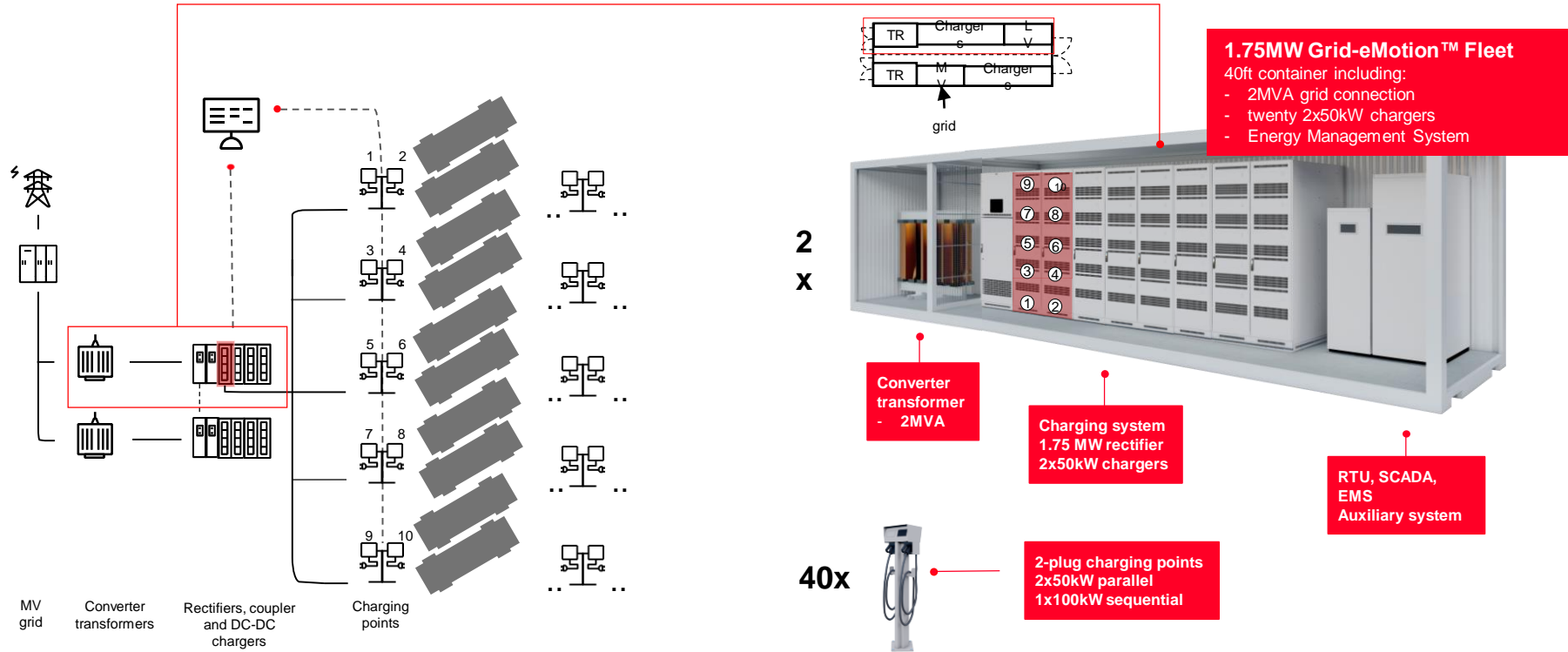


DC



Grid-eMotion™ Fleet

Example: Electrifying 80 buses with two 40ft containers



4MVA grid connection, 50kW parallel, up to 100kW sequential charging

Questions asked in the RFI

1. Can your company provide solutions with an 11kV (10 400V) high voltage interface?
Yes
2. Regarding the above question, what is your desired system voltage on the secondary side of the transformer?
Our solution requires a rectifier transformer and not a distribution transformer. It is then connected to a bulk DC rectifier.
3. How many transformers do you estimate are needed for powering 168 articulated buses and how should they be placed on this facility? See the attached site plan (can also be distributed in a dwg.-format)
We recommend not combining more than 3.3MW of power for each transformer.
4. Ruter have estimated an installed power of 15 MW as a worst case for providing 168 city busses with power. How can your company contribute to lower power usage? The Norwegian grid fees have a “power tariff” part. This “power tariff” uses the highest energy used in a single hour throughout the month today, the day in the future. This means that the system should both decrease the maximum installed power, and the maximum energy consumed per hour.
Our eMesh EMS software can manage finding the right tariff and time to charge, while our PowerStore BESS solution can help by storing energy from lower tariff periods. As was used in our Skagerak Stadium project.

About the project

- **Project name:** Skagerak Arena
- **Location:** Norway, Skien
- **Customer:** Skagerak Energi
- **Completion date:** 2019

Solution

- 5,700 m² of solar modules, with a nominal power of 800 kWp
- PowerStore BESS with 1 MWh Capacity
- e-mesh Control
- e-mesh EMS energy management system

Customer benefits

- Optimal integration of renewables and energy management with advanced grid automation
- Optimal use of renewable (PV) assets even when sun light is low
- Reduced energy import and peak load cost
- Availability of locally produced electricity to the surrounding neighborhoods



[Press Release](#)

optimized energy management solution for the arena and the residential district by using weather, load and energy forecast to predict power network behaviors and requirement

Questions asked in the RFI

5. The bus depot might be used for only five years. How can your company build this facility so that the equipment can be reused for bus depots on other locations?

Our solution is designed to be placed in pre-fabricated ehouses according to the needs of the present and future site

6. What are your solutions requirements with regards to extent of civil work?

We require only basic foundations for the e-house and pantograph support structure. Cables may be placed above ground on cable tray.

7. How can your company provide the bus operators with “Driftsleder” – Responsibilities for management for high voltage facilities according to Norwegian regulations in FSE §6?

Hitachi-ABB Power Grids has agreements with local companies that confirm to the needed requirements.



**“The mobility industry
is truly experiencing
a revolution and we are
excited to drive it”**

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