Charge & Drive
Part of Fortum’s vision for a cleaner world

Rami Syväri
Head of International Sales & Business Development
Fortum Charge & Drive
• Charge & Drive is fully owned by Fortum Corporation.
• One of the leading energy providers in the Nordic region, the Baltic states, and Russia.
• Listed on the Nasdaq OMX Helsinki since 1988
• Generation of electricity, sales of electricity and heat.
• Developing and investing in solar power, wave power, smart home solutions, and e-Mobility.

Key Figures 2016
• Sales EUR 3.6 bn
• Comparable operating profit EUR 0.64 bn
• Personnel 8108
1400 connected chargers
500 rapid chargers
13 countries
## Fast Charging: Corridors and Urban Pods

Charging power depends on use case & vehicle capability

<table>
<thead>
<tr>
<th>Long-term parking</th>
<th>Public charging</th>
<th>Highways / high frequency usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mainly 3.6 kW</td>
<td>• Retail</td>
<td>• 50 - 350kW</td>
</tr>
<tr>
<td>• Influenced by regulation on chargers &amp; parking lots</td>
<td>• Public administration</td>
<td>• Min. 300 kWh, preferably 500 kWh</td>
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<td>• EU directive: 10%</td>
<td>• 3.6 - 22kW (need-based)</td>
<td>• Max. today 1200 kWh</td>
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<td>• Cities (eg Helsinki): commitment required during land deals</td>
<td>• Balancing power</td>
<td>• Depends on the estimated stay</td>
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<tr>
<td>• Balancing power</td>
<td></td>
<td>• 100 kWh battery</td>
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<tr>
<td>• 200-300 kWh battery</td>
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</tbody>
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**Next generation EVs will be equipped with 150kW to 350-450kW & vary from 400V to 920V DC fast charging.**
Q: What does the customer want?
A: The network.

1. Corridors
2. Base network in populated areas
3. Redundancy in populated areas & base network over longer distances
4. Redundancy in longer distances
Learnings from early implementations

• Tesla built fast charging infrastructure to **sell cars**.
• This charging **infrastructure removed the purchase barrier**
  • Teslas became a viable for business, travel & holidays.
• However:
  • Tesla’s fast charging serves only 1 car brand.
  • So far, they have had no payment solution for charging.

• **Fast charging queues** already form on the weekends (Fri-Sun).
• Learnings from these are:
  • It is vital that HPC equipment & the car work well together.
  • Customer charging experience must be easy; the device functioning & reliable.
  • We still have work to do intuitive user interface design.

• Grid connections are the “X factor” in timeline / cost / possibility for a fast charging site.
• Fast charging should be exclusive for fast charging.
  • Provide other options for slower charging if there is a demand, or:
  • Use existing quick chargers (DC 50kw / AC (<22kw) chargers.)
Urban Pods in Norway
Med ladebrikke fra Fortum Charge & Drive har du tilgang til et av Nordens største lade nettverk.

Få oversikt over våre lader og bestill en brikke på fortum.no.
Thank you!

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