Rychlodobíjecí infrastruktura
Vývoj a trendy

ABB Product Group Electric Vehicle Charging Infrastructure
## Trendy
Větší baterie, větší dojezd a větší nabíjecí výkony

<table>
<thead>
<tr>
<th>Year</th>
<th>Mass market EV’s</th>
<th>Premium EV’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>~140 km 24 kWh</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>&gt;180 km &gt;30 kWh</td>
<td>&gt;450 km &gt;80 kWh</td>
</tr>
<tr>
<td>2013</td>
<td>&gt;250 km &gt;40 kWh</td>
<td>&gt;70 kWh</td>
</tr>
<tr>
<td>2014</td>
<td>&gt;400 km &gt;70 kWh</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>&gt;450 km &gt;80 kWh</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>2021</td>
<td>&gt;450 km &gt;80 kWh</td>
<td></td>
</tr>
</tbody>
</table>

### Charging Locations
- **50 kW**: Charging on the road 150-300 kW
- **3-20 kW**: Charging at commercial locations 50 kW
- **3-6 kW AC**: Charging at home / office 10-20 kW
Trendy
Větší baterie, větší dojezd a větší nabíjecí výkony

On the roads

2016
2017
2018
2019, 2020, ...

DC high-power charging
CCS high-power (≥300 kW @400/800V)

DC fast charging
CCS (50 kW @400V)

AC fast charging
(43 kW)

AC charging
(22 kW)

AC charging
(11 kW)
ABB high power charger system

150-350 kW, up to 920V, liquid cooled charging cables

Ultra high output current capability (350 A – 700A)

Wide voltage range 200 – 920V DC

Flexible charging cables Advanced liquid cooling system

Prototype stadium now

General remarks on high power CCS:
- IEC standard takes until 2018
- CE certification of charger and cooled cable depends on standards
- VDE application rule is fastest way
- CHAdeMO: also working on high power version
Premium long range EV’s from 2018 / 2019

- Audi & Porsche long range premium EV’s
- > 450 km “real” driving range
- 150-300 kW charging
- Charger must also supply 800V cars
- CCS standards change required
Roadmapa v EU
2020 většina EV na silnicích s DC dojížením do 50kW

2015
Global trend
The year to secure the best locations for your charging network

>150 kW
to charge premium EVs with 400 km range on long distance corridors

50 kW
to charge mainstream EVs along highways, in city centers, at commercial locations, etc

2015  2020
The next 5 years, 50 kW chargers will be needed to support mainstream EVs, which will be complemented with high power corridors for premium EVs starting 2017
Současnost: Multi-standard DC stanice Terra53/23
## Highway segment

**CCS / Multi-standard chargers (50kW)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration</th>
<th>DC Power</th>
<th>AC Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terra 53 CT</td>
<td>DC+AC Highway Charger</td>
<td>50kW DC CCS-2</td>
<td>22kW AC</td>
</tr>
<tr>
<td>Terra 53 CG</td>
<td>DC+AC Highway Charger</td>
<td>50kW DC CCS-2</td>
<td>43kW AC</td>
</tr>
<tr>
<td>Terra 53 CJ</td>
<td>DC Highway Charger</td>
<td>50kW DC CCS-2</td>
<td>50kW DC CHAdeMO</td>
</tr>
<tr>
<td>Terra 53 CJS</td>
<td>DC + AC Highway Charger</td>
<td>50kW DC CCS-2</td>
<td>50kW DC CHAdeMO</td>
</tr>
<tr>
<td>Terra 53 CJT</td>
<td>DC+AC Highway Charger</td>
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<td>50kW DC CHAdeMO</td>
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</table>

NEW !! CCS on left side
Digital integration of an ABB EV charger

### Customer Benefits

- Minimize investments in own IT infrastructure and SW solutions
- Predictable cost based on SaaS model
- High uptime due to reliable connectivity
- Reduced operational cost
  - lean network operation
  - less on-site delegations
  - fast time to repair
- Fully scalable setup that can adapt to changing requirements
### Komplexní portfolio SW produktů

#### Web tools
*To quickly gain insight and manage a charger*

<table>
<thead>
<tr>
<th>Driver Care</th>
<th>Payment</th>
<th>Helios (Service)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal solution to support a small sized charger network.</td>
<td>Web tool to manage the device settings, check transaction status and create the mandatory revenue overview</td>
<td>Necessary tool for service engineers to provide support &amp; maintenance</td>
</tr>
<tr>
<td>Supportive tool for customer driver care centers for large commercial networks</td>
<td>Used by CPO’s</td>
<td>Can be combined with all other products*</td>
</tr>
<tr>
<td></td>
<td>Required for the payment device</td>
<td>Only applicable for the payment device</td>
</tr>
<tr>
<td></td>
<td>Can be combined with all other products.</td>
<td></td>
</tr>
</tbody>
</table>

*Access mgmt of OCPP is leading*

#### API
*To integrate chargers with an IT system*

<table>
<thead>
<tr>
<th>OCPP API</th>
<th>Service API</th>
<th>D/R API</th>
</tr>
</thead>
<tbody>
<tr>
<td>The industry standard API for access management and charge details</td>
<td>Providing technical status information of a charger</td>
<td>Demand/Response API for controlling the input power of the charger</td>
</tr>
<tr>
<td>To integrate chargers with a CPO’s back-office system</td>
<td>To integrate chargers with a CPO’s back-office system</td>
<td>To integrate chargers with an energy management system</td>
</tr>
<tr>
<td>Available via the Internet or as local interface</td>
<td>Available via the Internet.</td>
<td>Available via the Internet.</td>
</tr>
</tbody>
</table>

#### Connection
*Solutions to improve connection performance & security*

<table>
<thead>
<tr>
<th>Multi Network SIM</th>
<th>VPN</th>
</tr>
</thead>
<tbody>
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<td>Mobile connection that can make use of different mobile networks to reach the highest possible uptime.</td>
<td>To increase security of the connection to the customer/partner back-office</td>
</tr>
<tr>
<td>Available in EU on request</td>
<td>IT departments that require VPN</td>
</tr>
<tr>
<td>CPO’s operating a commercial network</td>
<td>Can be combined with all other products.</td>
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| Connection Solutions to improve connection performance & security |
|-------------------|-----|
| Mobile connection that can make use of different mobile networks to reach the highest possible uptime. | To increase security of the connection to the customer/partner back-office |
| Available in EU on request | IT departments that require VPN |
| CPO’s operating a commercial network | Can be combined with all other products. |

Offering details available in the next slides
ABB ensures integration between charger and IT-systems
### Akceptace klasických platebních karet

**Platební terminály**

<table>
<thead>
<tr>
<th>Supported Countries</th>
<th>Main features</th>
</tr>
</thead>
</table>
| Australia, Austria, Belarus, Belgium, Brazil, Canada, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, USA | • Payment via credit card and NFC  
• Low operational and transactional costs  
• Field upgrade for any Terra 53 and Terra 23  
• Payment upfront per charging session  
• Automatic cancellation of payment in case of problems during first minutes of charging  
• Operator control via ABB Web modules  
  • Setting price per outlet  
  • Transaction overview (successful and canceled ones)  
• Default RFID functionality can be maintained |

**Target date:** from H2-2017 with HW1.1 onwards.
Terminál CCV

- Main features
  - Payment via credit card and NFC
  - No PIN code entry
  - Support of low value transactions
  - Low operational and transactional cost
  - Field upgrade for any Terra 53 and Terra 23
  - Default RFID functionality remains available
  - Payment upfront per charging session

- Operator control via ABB “Web Solution Payment”
  - Automatic cancellation in case of problems during first minutes of charging (time can be set)
  - Setting price per outlet
  - Transaction overview

for: Austria, Belgium, Cyprus, Czech Republic, France, Germany, Hungary, Ireland, Italy, Lichtenstein, Luxembourg, NL, Poland, Switzerland, UK, Slovakia, Slovenia, Sweden
Terminál Nayax

- Main features
  - Payment via credit card and NFC
  - No PIN code entry
  - Support of low value transactions
  - Low operational and transactional cost
  - Field upgrade for any Terra 53 and Terra 23 (only on HW 1.1)
  - Default RFID functionality remains available
  - Payment upfront per charging session
- Operator control via ABB “Web Solution Payment”
  - Automatic cancellation in case of problems during first minutes of charging (time can be set)
  - Setting price per outlet
  - Transaction overview

Color on charger is black instead of yellow

From H2-2017 (target date) with HW 1.1 available in: Australia, Belarus, Brazil, Costa Rica, Canada, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Greece, Hungary, Iceland, Israel, Latvia, Lithuania, Malta, Mexico, Romania, Russia, Slovakia, Slovenia, South Africa, Thailand, Turkey, United Kingdom, USA

Also expected in Q1-2017:
CE-certification of actual HW 1.0 with the NAYAX terminal
Dobíjení elektrobusů MHD

ABB Global Product Group Electric Vehicle Charging Infrastructure
Co je cílem?

- Postupně nahradit v MHD klasické autobusy, s:
  - minimálním zásahem do městské infrastruktury
  - minimálními TCO náklady
  - narůstajícím počtem vozidel poroste efektivita resp. ekonomika celého řešení
  - minimálním vlivem na standartní resp. zavedené jízdní řády (nabíjení na konečné 4-6 min)
  - nezávislostí na jednom výrobci elektrobusů resp. nabíjecí infrastruktury (standartizace)
Běžná elektrobusová linka MHD
Typické řešení: nabíjení 4-6 min. na konečných zastávkách

Lines
<1 hour (<20km)

Battery in bus
20..100 kWh (~15-80km)

Charge power
150-300 kW
4-6 min.

Konečná A
-300 kW
-Automated connection
-4-6 min. charging

Konečná B
-300 kW
-Automated connection
-4-6 min. charging
Group of European electric bus manufacturers agrees on an open interface for charging

European bus manufacturers Irizar, Solaris, VDL and Volvo have agreed to ensure the interoperability of electric buses with charging infrastructure provided by ABB, Heliox and Siemens. The objective is to ensure an open interface between electric buses and charging infrastructure and to facilitate the introduction of electric bus systems in:

- Depot charging = CCS-2 connector (DC 20-150kW)
- Opportunity charging v1 = Inverted pantograph with DC
- Opportunity charging v2 = Pantograph on bus
Podpora OPPcharge (otočeného panto) rychle roste
Opportunity charging
Spolehlivé - Modulární - Standartizované

- Automated connection system
- High power DC transfer to bus
- Wireless communication to bus
- Based on
  - EN/IEC 61851-23
  - ISO/IEC 15118
- OPPcharge compatible

- Industrial quality power cabinet
- 150kW, 300kW & 450 kW modular
- Redundancy per each 150kW module
- 200-920 V_{DC}
- Galvanic isolation
- Remote management
Standartní ABB instalace OPPcharge
Řešení s OPPcharge, panto součástí infrastruktury
Různé modifikace dle přání zákazníka
Mobilní provedení - testování u zákazníka
Zákazník si může sám prověřit kvalitu a spolehlivost
Mobilní provedení - testování u zákazníka
Zákazník si může sám prověřit kvalitu a spolehlivost
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Power and productivity for a better world™