Smart mobility for sustainable urban transportation

Electric bus charging infrastructure

Dodon Ramlie, Vice President Director, PT ABB Sakti Industri
Who are we...

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB’s success is driven by about 105,000 talented employees in over 100 countries.
ABB in Indonesia
Locally present for over three decades

>30 years strong local presence with ~500 employees

Solutions and systems at Indonesia’s second largest airport

Powering second largest port in Indonesia in Makassar, South Sulawesi

Increasing food safety, productivity, efficiency and greater flexibility with ABB robots for several food and beverage industries.

Protecting new airport rail systems of Soekarno-Hatta Airport Rail Link in Jakarta and LRT in Palembang.

Reducing motor downtime with ABB smart sensors in one of the world’s largest supplier of food and industrial raw materials.
Trends toward faster and faster charging times

As electric vehicles are used for longer distances, more frequent and quicker charging infrastructure is needed.

General

- The EV charging station needs can be easily understood in 4 sub groups
- Smaller power units like at home charging and destination charging are connected at low voltage levels (<1kV).
- Higher power units are usually a medium voltage connection. If the existing utility connection is not sufficient, a new Compact Secondary Substation should be added.
- Typically high power bus charging or fleet charging units require connection at the medium voltage level.

<table>
<thead>
<tr>
<th>DC charging platforms</th>
<th>Fast charging for cars 20-50 kW</th>
<th>High power for cars 150 - 350kW</th>
<th>E-bus charging 50-450 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway</td>
<td>DC high power charging, 10-20 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>DC or AC fast charging, 20 -90 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>DC or AC fast charging, 20-90 min or 8 hours workday destination charging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>AC or DC charging, 8 hours overnight destination charging</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ABB EV Charging Infrastructure

Connectivity
- Remote diagnostics, service, connection to payment, API's

Overnight Charging
- 3.7-22kW AC Wall box
- 24kW DC Wall box
- 50kW All-in-one
- 180 kW DC
- 100kW-150kW with sequential charging
- 150kW-350kW with liquid cooled cable
- 150kW-600kW with Automated Connection

Opportunity charging

Grid integration
- Compact substations, switchgear

Service & maintenance
- Global service, spareparts, maintenance & 3rd party training
ABB Electrification has the complete line of charging infrastructure solutions

Your one-stop shop for e-mobility infrastructure

- DC fast chargers
  - Terra systems
- E-bus chargers
  - HVC 150
- Energy storage
  - B.E.S.S.
- Electrical power
  - Integrated electrical and charging
- Electrical power
  - Electrical only
- Charging network software services
  - ABB Ability
- Components
  - DIN rail & distribution boards
  - Switchgear, switchboards
- Renewable integration
  - Solar, wind
Electric bus charging landscape

- **Overnight charging** (at the depot)
- **Opportunity charging** (on route or end stop)
Depot charging Layout
Electric bus charging landscape

Main features:
- Voltage range from 150-850 V
- Power range of 150-300-450-600 kW
- Safe and reliable fully automated connection

Overnight charging at Depot

Opportunity charging at Terminal

©ABB
June 30, 2021 | Slide 9
Choose the right equipment
Understanding bus / charger compatibility

**Power Level**

- Can the charger match the bus battery voltage?

- Is the charge rate too high/low for the application?

- Charging capabilities
  - Overhead charging capability is around 450 kW
  - Plug-in charging is around 150 kW

---

*Infrastructure*

850 VDC

Typical eBus 800-550V

Typical eTruck 850-600V

*Vehicle*

500 VDC

Typical eCar 450-200V

150 VDC

Typical 500V DCFC

HV charging systems 150-850 VDC
# HVC Product Portfolio

<table>
<thead>
<tr>
<th></th>
<th>24kW</th>
<th>50kW</th>
<th>100kW</th>
<th>150kW</th>
<th>300kW</th>
<th>450kW</th>
<th>600kW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC-Wallbox</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra 54HV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 100C 1-3 depot box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 150C 1-3 depot box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pantograph Down</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 150PD kit / HVC 150PD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 300PD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 450PD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 600PD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pantograph Up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra 54HV PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 100PU-S / HVC 100PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 150PU-S / HVC 150PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 300PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 450PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HVC 600PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electric bus charging landscape
Mobile charger
For demonstrations and Proof of Concept
Mobile charger
For demonstrations and Proof of Concept
Digital integration of an ABB EV charger
Dual Uplink Option – Combining direct OCPP with the benefits of the ABB EVCI platform

Benefits
Combine benefits of EVCI platform with direct OCPP setup
In case of a multi-brand network with AC and DC chargers, apply one OCPP connectivity model for all chargers in the network

Details
Available on HPC, on Terra 53/54 and on DC-Wallbox
Only for OCPP 1.6 (using JSON via websockets)
Both communication channels use the same internet connection (either SIM or Ethernet) to send data to the two different end points
The IT setup for dual-uplink is more complicated for the operator than in a “platform-to-platform” setup using the internet based OCPP API:
- Customer needs to ensure scalability of the IT platform (number of connected chargers)
- Customer must manage/monitor the websocket and the M2M communication to ensure OCPP communication
- Customer must implement redundancy & failover mechanisms for live maintenance on own platform and gateway
Same commercial model as in cloud to cloud setup (Charger Connect plus OCPP API)
## EVI Global Service

### Service concept

<table>
<thead>
<tr>
<th><strong>Global Technical Support</strong></th>
<th><strong>Local Service ABB</strong></th>
<th><strong>Owner, Operator and Service Partner</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>network operation center</strong></td>
<td><strong>Global Technical Support</strong></td>
<td><strong>User and Charger Support</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Local Technical Support</strong></td>
<td><strong>Support all driver and charger related cases with ABB web modules and APIs</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Responsible for SLA</strong></td>
<td><strong>Escalate cases to Local Service ABB</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Support all charger related cases with ABB web Modules</strong></td>
<td><strong>Tools:</strong> Driver Care, Charger Care, OCPP and APIs</td>
</tr>
<tr>
<td></td>
<td><strong>Escalate cases to GTS</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Tools:</strong> Helios</td>
<td></td>
</tr>
</tbody>
</table>

Global Technical Support

- Develop solutions and offers based on experience from 8,500+ chargers serviced worldwide
- Support all escalated cases with ABB web Modules
- Located in The Netherlands

Local Technical Support

- Responsible for SLA
- Support all charger related cases with ABB web Modules
- Escalate cases to GTS
- **Tools:** Helios

Owner, Operator and Service Partner

- User and Charger Support
- Support all driver and charger related cases with ABB web modules and APIs
- Escalate cases to Local Service ABB
- **Tools:** Driver Care, Charger Care, OCPP and APIs
Providing access to a charger
Via RFID cards and/or Mobile phone APPs

ABB provides the commands (like start/stop charger) and information (like progress) for the App.
ABB does not build the App, nor provides RFID cards

ABB ensures integration between charger and IT-systems
Moving towards emission reduction for Indonesian transport sector

Broad track record of electric vehicle infrastructure projects across the country

BPPT Serpong

ABB delivered Terra 24 CJG DC charging station to be installed at National Laboratory for Energy Conservation Technology, Serpong. The charging unit is a cost-effective multi-outlet solution to charge both AC and DC cars in 30 to 120 minutes. It receives almost 25 percent of its power from renewable solar sources.

PLN Disjaya head office

ABB supplied Terra 54 of 50 KW, installed at the head office of PLN Distribution Unit of Jakarta. The charging unit is a cost-effective multi-outlet solution to charge both AC and DC cars in 30 to 120 minutes.

Verde Two Apartment

ABB delivered EVLunic AC wallbox, installed at Verde Two apartment in Jakarta and considered as one of the first apartments in Indonesia with electric vehicle charging infrastructure as part of facility for their residents.
Moving towards emission reduction for Indonesian transport sector

Broad track record of electric vehicle infrastructure projects across the country

WTC office complex

One of the first of fast charging stations at the heart of Jakarta’s business district - WTC office complex - where ABB’s Indonesian head office is located.

Petrol stations in Jakarta

ABB has deployed its Terra 54 DC (Direct Current) 50kW fast chargers one of the world’s largest energy suppliers. The chargers are compatible with most electric vehicles and has been certified to perform optimally within the environment of a petrol station.

R&D center

ABB Terra AC wallbox were installed at the research center of one the leading Japan’s premium car manufacturers in the north Jakarta.

Terra AC wallbox provides a high quality and cost-effective electric vehicle charging point.