Grid-eMotion™
Overview
Hitachi Energy
Advancing a sustainable energy future for all
Hitachi Energy
Advancing a sustainable Energy Future

Headquarters in Zurich, Switzerland

Four Business Units

- Services
- Software & Automation
- Systems
- Products

Geographies

- Asia, Middle East & Africa
- Americas
- Europe

Customers

- Transport & Infrastructure
- Industry
- Utilities

Offering

- Services
- Software & Automation
- Systems
- Products

- Grid Automation
- High Voltage Products
- Grid Integration
- Transformers

38,000 employees

90+ countries with 200 offices

~250 years’ heritage combined

5,500 sales employees & field engineers

2,000 engineers & scientists in R&D
Hitachi Energy
Our journey continues

Start of the new journey and building up collaboration and synergies

Social value  Environmental value  Economic value

Fully leveraging the synergies (digital, technology, broader portfolio)

Transforming program

2018  2019  2020  2021...  ...2024

Power Up transformation program
DD, Carve Out and Build-up

Continuous improvements

COVID-19 disruption

Digital Transformation (REIWA)
Optimization & simplification
Joint Synergies

Transition  Stabilize  Accelerate
Hitachi Energy – eMobility
Market and Positioning
**Hitachi Energy – eMobility**
Sustainability drives the transformation towards a new mobility ecosystem

| 01 | Sustainability | Increased awareness of climate change, CO₂ footprint reduction and its social impact driving a global net-zero society and the need for decarbonization |
| 02 | Policy & Regulation | Government commitments towards electrical transportation and shift from fossil-based to renewable power generation – acceleration packages post COVID-19 |
| 03 | Economy | Conversion towards electrification to improve energy efficiency and to reduce Total Cost of Ownership (TCO) amid reducing dependence on the oil market and lowering exposure to oil price volatility |
| 04 | Operation | Innovative digital solutions and power electronics offer an opportunity to transform traditional operations into future-proven solutions |

**Our Value Proposition**
We accelerate the future of smart mobility with revolutionary EV charging solutions. By decarbonizing the transport sector we contribute to a cleaner, healthier and more affordable future for everyone.

**Our Core Customer**
We provide grid-to-plug solutions for public transportation and commercial vehicles. Our customers are transport infrastructure companies, that provide clean and efficient electrified commuting services and OEMs that use our solutions to enhance their offering.

**Our Competences**
We specialise in developing, delivering and servicing core technology packages for eMobility applications across all continents leveraging our expertise in power electronics products and system projects. We deliver added value through our digital platform and services.
Hitachi Energy – eMobility
Coupling of the Energy and Mobility sectors is around the corner

\[\text{e-Mobility will need a lot of clean electricity \ldots} \]

- **100 millions**¹
  - EV (cars, buses, trucks, trains, etc.) in our roads and tracks by 2030

- **500 TWh**¹
  - Yearly electricity needs to power all EVs by 2030

\[\text{... and scales of projects is growing} \]

** Until today **

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Energy Services / ESCO</th>
<th>Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Mobility</td>
<td>Grid-eMotion™</td>
</tr>
</tbody>
</table>

** Going forward **

<table>
<thead>
<tr>
<th>Industry</th>
<th>Until today</th>
<th>Going forward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few, ~ # cities with EV operating</td>
<td>Many</td>
<td></td>
</tr>
<tr>
<td>1-10, ~ # EV per project</td>
<td>100-1’000</td>
<td></td>
</tr>
<tr>
<td>1-10, ~ # EV chargers per project</td>
<td>100-1’000</td>
<td></td>
</tr>
<tr>
<td>0.1-10, ~ MW power grid connection</td>
<td>10-100</td>
<td></td>
</tr>
</tbody>
</table>

![Diagram](image)

**e-Mobility is about the leading the energy-mobility nexus**

**e-Mobility will scale-up with the convergence of mobility actors and energy systems experts**
**Hitachi Energy – eMobility**

**Offering Portfolio**

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**Grid-eMotion™ Fleet**

Large-scale EV charging

Grid integration projects at depots and terminals involving conventional or prefabricated substations including transformers, switchgear, rectifiers, chargers, pantographs, auxiliaries, smart digital or service solutions.

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**Grid-eMotion™ Flash**

Flash-charging on-route

World’s fastest flash-charging connection technology that lets cities reduce the environmental pollution of their transit systems without affecting passenger capacity or journey times.

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**Grid-eMotion™ Rail**

Battery-powered trains

Charging stations for battery-powered trains in DC and AC. Our solutions are designed for urban, suburban, regional train and people mover segments.

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✓ indicates firm future release – to be discussed for project on a case-to-case basis
Hitachi Energy – eMobility
Grid-eMotion™ positioning

<table>
<thead>
<tr>
<th>Small scale</th>
<th>Medium scale</th>
<th>Large scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1MW charging ... &lt;10 charging points</td>
<td>1-2 MW charging ... 10-20 charging points</td>
<td>2+ MW charging ... &gt;20 charging points</td>
</tr>
</tbody>
</table>

- Historically driven by home and work chargers, with power scale-up over time
- Primarily driven by Commercial fleets & Transit with centralized charging system approach
- Move towards comprehensive charging hubs including integrated digital platform, energy storage, local power production and mega-watt charging (MCS)

- **22 kW – AC and DC charging**
  - Up to 350 kW – DC mainly DC Fast Charging (CCS)
  - Up to 4.5 MW – DC only Megawatt Charging (MCS)

### Key Points:
- **7kW**
- **22 kW AC**
- **22 kW**
- **50 kW**
- **180kW**
- **360kW**

**Hitachi Energy**

**Grid-eMotion™** positioning

3rd parties legacy standalone approaches

Most compact and configurable “grid-to-plug” and “data-to-analytics” charging system

Energy Management

Remote Management

Charging System

Up to 350 kW – DC mainly DC Fast Charging (CCS)

Up to 4.5 MW – DC only Megawatt Charging (MCS)
Hitachi Energy – eMobility
Large-scale charging solution

Grid-eMotion™ Fleet
Most compact and configurable “grid-to-plug” and “data-to-analytics” charging system

Grid-eMotion™ Fleet
Large-scale centralized charging at depot / terminals

Grid-eMotion™ Flash
Ultra-fast and high-power charging on-route

Charging System
- In-Door or Out-Door with 75kW-750kW charger
- Rectifier

Battery Management
- Stationary Energy Storage
- BESS

Energy Management
- Remote monitoring and services
- Smart charging
- Microgrid (eMesh™)

Grid Connection
- MV switchgear
- Rectifier Transformer
- Auxiliary System

Fleet/Asset Management
- Vehicle Dispatch
- Traffic Control
- Infrastructure Mngt
- Maintenance

Utilities
- Energy Services / ESCO

Digital
- Public Transport / Transit
- Commercial & Industrial Fleets
- Public Charge Parks

Energy
- Mobility

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Energy
- Mobility
Hitachi Energy – eMobility
Charging strategies for different e-bus fleet operations

Overnight charging at depot
- Significant footprint required
- HV or MV substation needed
- Large batteries
- Long downtime to recharge
- Usually small e-buses
- Usually charging via plug
- Interoperable with all bus and truck OEMs
- Space needed at terminals
- Typically, 12m or 18m e-buses
- Available on PontoUp
- Available on PontoDown
- Interoperable with few bus OEMs

Opportunity charging at terminals
- Light and spread infrastructure
- Light batteries
- No downtime to recharge
- High frequency/capacity lines
- Best suited to big e-buses and Bus Rapid Transit (BRT)

Flash-charging at some stops
- Grid-eMotion™ Flash

Overnight charging at depot
- Grid-eMotion™ Fleet

50kW-150kW (plug)
150kW-600kW (pantograph)
Hitachi Energy – eMobility

Grid-eMotion™ Flash
Why flash-charging?

- Simpler interface
- Reduced time to charge
- Reduced fleet downtime
- Reduced chargers’ occupancy at terminals/depot
- Increased utilization of charging terminals
- Higher charger power density
- Easier integration of wayside energy storage
Best conditions for Flash charging

- **Short stopping time**
  - High frequency lines where a lot of people need to be transported e.g. BRT

- **High energy consumption**
  - High capacity buses
  - High auxiliary consumption for cooling or heating
  - Long or uphill routes
The Grid-eMotion™ Plan is a web-based software tool for optimising the design of the e-bus system based on:

- Energy consumption for both traction and auxiliary
- Battery life data
- Route data
- Traffic simulation

The tool provides an optimised system design:

- Optimal battery dimensioning
- Optimal selection and placement of chargers
- Detailed information on energy consumption
- Speed and line profile, traction, auxiliary, charging power and energy profiles
The concept to reduce time to start charging down to 1s

**Grid-eMotion™ Fleet**
with OppCharge

- Off-board Charger
- ~35s
- Battery
- Drivetrain by-passed

**Grid-eMotion™ Flash**
with extra DC-DC

- Controlled rectifier
- 1s
- Battery
- Additional charger

**Grid-eMotion™ Flash**
with automatic switching

- Controlled rectifier
- 1s
- Battery
- Drivetrain as charger

Smart robotic pantograph

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**What**

- The flash-charging concept uses a stabilised voltage source to provide a simpler interface to the vehicle.
- The drivetrain automatically switches from delivering power to the wheels (DC/AC) to charging the batteries (DC/DC).
- There is no need to wait while communication is established, the charging process starts right away.
• 4 contacts (+, -, CP and PE)
• The system is still “floating” so even in the event of a single failure it poses no danger of electrical shock
• The overhead receptacle (or the socket) is only energised when the bus is connected
• The earth is the first to connect and the last to break
• The earth between the bus and the charger, the insulation between positive and earth as well as negative to earth are continuously monitored
**Hitachi Energy offering**

Charging solutions up to 1MW based on flash-charging technology developed for bus rapid transit (BRT) high capacity lines
- Full containerised
- Grid connection
- Network management, SCADA, EAM
- Earthing system
- Charging poles
- Grid compliance (harmonics, insulation coordination, RAMS, EMC)
- Installation and site commissioning
- End-user approval

**Smart robotic pantograph**
- Less than 1s to connect (suitable for charging at stops)
- 1000A permanently

**Flash-charging stations**

At bus terminal or stops with MV
- MV connection
- Converter stations up to 1MW
- Up to 1000VDC connection

Optional at bus stops with LV
- LV connection
- Wayside Energy Storage System

**Flash-charging station with ESS**
Light infrastructure at depot
Hitachi Energy – eMobility
Grid-eMotion™ Fleet
Grid-eMotion™ Fleet
From single to bulk AC/DC power conversion

**Single AC/DC units**

- Each charger has its own AC/DC power converter cabinet fed from LV
- For EV fleets requiring MV connection, voltage needs to step down in LV
- Large AC distribution board required
- Good approach for projects requiring few fast chargers (pilot project)

**AC/DC bulk conversion**

- DC/DC converters are withdrawable racks to ease maintenance & scaleup
- Direct connection to MV is up to 3 MW transformer blocks for better efficiency
- Only DC cabling to EV dispensers
- Future-proofed for large scale with reduced footprint & complexity

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**Grid-eMotion™ Fleet**

**From single to bulk AC/DC power conversion**

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Modular solution – high reliability

**Charging modules can easily be racked in and out**

- Front side of modules with handle and rails
- Fixed back panel with contacts

**Main power unit of the rectifier is also rackable**

- Movable rig for easy replacement of diodes
Grid-eMotion™ Fleet
Configurable indoor and outdoor delivery

Indoor

Configurable delivery of standalone core components

- Remote condition monitoring features
- Predefined smart charging engines that comply to industry standard (OCPP, VDV, Modbus, OpenADR)
- Interoperable interfaces with EV fleet telematics, scheduling and asset management

Outdoor

Configurable plug-and-play delivery of “Grid-to-Plug” charging box

.. Delivered with all-in-one digital platform
Grid-eMotion Fleet Indoor Product Line-up

1 Converter transformer

**Type:** Dry Type
**Application:** 12 pulses
**Power:** 1.2 MVA to 3.3 MVA
**Primary voltage:** 400 VAC to 42kV
**Primary taps:** +/-2 x 2.5%
**Secondary voltage:** 2 x 530 VAC
**Frequency:** 50 +/-1% Hz
**Number of phases:** 3
**Vector group:** Dy11d0
**Cooling:** AN
**Duty cycle:** 100% continuously
**Standards:** IEC 60076-11, EN 50163

1 Rectifier

**Type:** Diode/Thyristor
**Configuration:** 12 pulse
**Power:** 1 MW to 3 MW
**Input:** 530 VAC
**Output:** 750 VDC
**Max Perm Voltage:** 900 VDC
**Insulation Voltage:** 2500 VDC
**Overvoltage Category:** C03
**Standards:** IEC 60146, EN 50163

5 DC cabinets

**Rated Power:** 10 outputs of 100 kW, 5 outputs of 200 kW
**Rated Input Voltage:** 750 VDC
**Input Voltage Range:** 600 ÷ 750 VDC
**Rated Output Voltage:** 650 VDC
**Output Voltage Range:** 150 ÷ 1000 VDC
**Cooling:** AF
**Overvoltage Category:** C03
**Standards:** IEC 61851-1, IEC 61851-23

12 Double-plug CCS2 wall boxes

**Type:** CCS2
**Plugs:** Two
**Rated Current:** 125 A, 250 A
**Voltage Range:** 150 ÷ 1000 VDC
**Base dimensions:** 300x300 mm
**Height:** 1620 mm
**Standards:** IEC 61851-23
**Status indicators:** Status indicators
**Accessories:** Hook for cable management
**Optional:** RFID for user authentication
Grid-eMotion™ Fleet
Outdoor solution (1MW box)
Grid-eMotion™ Fleet
Outdoor solution (1MW box)

- Back end platform
- Edge controller
- Transformer
- Rectifier
- 10 DC-DC converters
- LVAC grid

- one vehicle up to 200 kW
- two vehicles up to 100 kW
- 5 double pedestals
Grid-eMotion™ Fleet
Outdoor configurations (LV grid-connection)

**Up to 10 charging points**

- LV → [Diagram]
- **Up to 10 EVs simultaneously**

<table>
<thead>
<tr>
<th>Grid voltage</th>
<th>LV&lt;sub&gt;AC&lt;/sub&gt;</th>
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<tbody>
<tr>
<td>Transformer</td>
<td>1200 kVA</td>
</tr>
<tr>
<td>Rectifier</td>
<td>1000 kW</td>
</tr>
<tr>
<td>DC Cabinets</td>
<td>2</td>
</tr>
<tr>
<td>DC-DC modules</td>
<td>10 x 100 kW</td>
</tr>
<tr>
<td>Dimensions</td>
<td>5.8 x 2.0 x 2.5 [m]</td>
</tr>
</tbody>
</table>

**Up to 15 charging points**

- LV → [Diagram]
- **Up to 15 EVs simultaneously**

<table>
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<tr>
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<th>LV&lt;sub&gt;AC&lt;/sub&gt;</th>
</tr>
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<tbody>
<tr>
<td>Transformer</td>
<td>1600 kVA</td>
</tr>
<tr>
<td>Rectifier</td>
<td>1500 kW</td>
</tr>
<tr>
<td>DC Cabinets</td>
<td>3</td>
</tr>
<tr>
<td>DC-DC modules</td>
<td>15 x 100 kW</td>
</tr>
<tr>
<td>Dimensions</td>
<td>6.65 x 2.0 x 2.5 [m]</td>
</tr>
</tbody>
</table>

**Up to 20 charging points**

- LV → [Diagram]
- **Up to 20 EVs simultaneously**

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<tr>
<td>Rectifier</td>
<td>1500 kW</td>
</tr>
<tr>
<td>DC Cabinets</td>
<td>4</td>
</tr>
<tr>
<td>DC-DC modules</td>
<td>20 x 100 kW (*)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>7.5 x 2.0 x 2.5 [m]</td>
</tr>
</tbody>
</table>

(*) included smart charging to limit the peak demand
Grid-eMotion™ Fleet
Outdoor configurations (MV grid-connection)

Rectifier transformer and MV switchgear in a separate e-house

| Grid voltage | MV | Transformer | 2.3 MVA | 2.8 MVA | 2.5 MVA |
| Rectifier | 2 MW | 2 MW | 2.5 MW | 2.25 MW |
| DC Cabinets | 4 | 5 | 6 |
| DC-DC modules | 20 x 100 kW | 25 x 100 kW | 30 x 75 kW |
| Dimensions (*) | 5.9 x 2.0 x 2.5 [m] | 6.8 x 2.0 x 2.5 [m] | 7.6 x 2.0 x 2.5 [m] |

2023+
(*) e-house excluded
Grid-eMotion™ Fleet
Charging Interfaces

CCS wall mounted box (up to 300 A)

Panto DOWN on route (up to 1000 A)

Panto UP on route (up to 1000 A)

CCS cable reel box (up to 300 A)

Panto DOWN depot (up to 400 A)

Panto UP depot (up to 400 A)
Design, engineering, fabrication and supply, installation and commissioning of charging infrastructure for a depot charging infrastructure, comprising:

- Fully enclosed building with following equipment
- 50 kVA transformer for auxiliary power
- 12kV rated, 1250 kVA rectifier transformer
- 1000 kW rectifier
- 4 x DC-DC charging cabinets with 18 modules of 75 kW
- 5 x Dual plug charging stations with parallel and sequential charging up to 150kW
- 3 CCS Wallbox charging plugs for 150kW charging

The contract included establishing interoperability for Volvo buses.
Västerås, Sweden
Design, engineering, fabrication and supply, installation supervision and commissioning of charging infrastructure for a depot charging infrastructure, comprising:

- 11 kV switchgear
- 50 kVA transformer for auxiliary power
- 2 MVA rectifier transformer Dd0y11
- 1750 kW rectifier
- 6 x DC-DC charging modules of 75 kW (racked power module)
- 11 x Dual plug charging stations with parallel and sequential charging

The contract included establishing interoperability for ADL/BYD Enviro400 buses.

In phase 1, 22 buses will be charged using the charging infrastructure at the depot. Also included is a two-year service contract for the charging infrastructure.

Phase 2, Will enable the remaining 8 modules of Phase 1 as well as add another 22 modules providing 18 additional charging points.
London, United Kingdom
Design, engineering, fabrication and supply, installation and commissioning of charging infrastructure for a depot charging infrastructure at the Britz and Cicero depot.

- 4 charging systems Grid-eMotion™ Fleet containers (2 in each depot) including:
  - Medium voltage grid connection
  - 12kV switchgear
  - 14 x charging points of 75 kW, CCS2 charging stations
  - 12kV rated, 1250 kVA rectifier transformer
  - 1000 kW rectifier
  - 3 x DC-DC charging cabinets with 14 modules of 75 kW
  - Single and Dual plug charging stations
Berlin, Germany
Hitachi Energy – eMobility

General Setup

Supply Grid-eMotion suite of products and solutions globally

To Hitachi Energy regional entities (e.g. HBU NAM)

To external customers on specific cases

GCoC eMobility Manager
André Burdet

Finance and Controlling¹
Sofia Zetterlund

HR¹
Andrea Lauener

Quality¹
Thomas Hoffmann

HSE¹
Rene Ernst

SCM¹
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Contract Management¹
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Operation
Roberto Cameroni

R&D
Michel Mansour

Sales & Tendering
Sergey Rumyantsev

Production
Olivier Frantz

Engineering
Subrat-Kumar Behera

Service
Olivier Frantz

Product Management GPQS
Luigi Lonoce

Product Management SS
Caroline Gustafsson

Product Specialist
Johan Malmström

Product Specialist
Javier Iglesias

PGGI Transport Segment
Bruce Warner
Hitachi Energy – eMobility
Leveraging a global Installed Base

- **Quebec**
  - Grid-eMotion Fleet™
  - 6x 100kW Charger
  - Start Operation in 2022

- **Berlin**
  - Grid-eMotion Fleet™
  - 56x 75kW Charger
  - Start Operation in 2022

- **Berlin**
  - Grid-eMotion Fleet™
  - 18x 75kW Charger
  - Started Operation in 2022

- **London (Brixton)**
  - Grid-eMotion Fleet™
  - 30x 100kW Charger
  - Started Operation in 2021

- **Chennai**
  - Grid-eMotion Fleet&Flash™
  - 1x 50kW Depot Charger
  - 1x 400kW Fast Charger
  - Start Operation in 2022

- **Geneva**
  - Grid-eMotion Flash™
  - 3x 430kW terminal chargers
  - 12x 600kW fast chargers
  - 4x 50kW depot chargers
  - Started Operation in 2018

- **Nantes**
  - Grid-eMotion Flash™
  - 12x 600kW Charger
  - Started Operation in 2019

- **Brisbane**
  - Grid-eMotion Fleet&Flash™
  - 15x 600kW Charger
  - 60x 50kW Charger
  - Started Pilot Operating in 2022
  - Start Operation in 2023

- **Västerås**
  - Grid-eMotion Fleet™
  - 18x 75kW Charger
  - Started Operation in 2022

- **Xiamen**
  - Grid-eMotion Flash™
  - 18m Bus from KingLong
  - Started Operation in 2020
Hitachi Energy – eMobility
Meeting the highest standards across the value chain

Selection of top-quality components

In-depth engineered solutions

Highest reliability starting in our factories

Unparalleled expertise in power connection

Modularity for easy scale up

Simplest integration into existing mobility
Simple and user friendly charging points with minimal space requirements

Modularity allowing for lean installation and maintenance as well as future scale up requirements
Grid-eMotion™
Digital
Peace of mind for your equipment – Our integrated customer experience

With Grid-eMotion™ Connect you get access to your equipment (in real-time and historical) and to Hitachi Energy global expertise. The platform is prepared for EMS integration to provide a seamless experience.
**Features:**

- **Charger(s)**
  - Location
  - Status
  - Power
  - Charger Type
  - Charger manufacturer
- **Connector status**
- **Alerts and fault codes**
- **Energy consumption and Uptime reports**

**Data collection & visualization**
- Visualized on web portal
- Data stored on cloud
- From assets on site

**Remote access**
- Remote control of assets
- Quick troubleshooting
- Through VPN

**Notifications and alarms**
- Based on equipment data

**Trends and reports**
- Of operating parameters, power equipment and chargers

**Grid-eMotion™**
Remote monitoring

- **Single log-on**
- **Multi-site map**
- **Site list**
- **Single component overview**
- **Alarms per equipment**
- **Document library**

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Grid-eMotion™
Smart Charging

Features:

• Smart Charging
• Pre-conditioning
• Load Balancing
• Priority Charging
• EV SOC Management
• Connected Vehicle
  • ID, SOC, Remaining range
• Transaction History and In-depth Transaction analysis
• Charging Controls
  • Remote Start/stop transactions
  • Remote soft/hard reset

Load balancing
  • Set maximum peak load and distribute load
  • Manage SoC for vehicles
  • Integration of BESS, renewables and V2G

Charging scheduling and control
  • Schedule optimization
  • Custom parameters and scheduling logic
  • Controllable through HMI

Interfacing to other systems
  • Connection to depot management, telematics
  • Essential for fleet operators
  • Flexible integration through APIs

Pre-conditioning
  • Prepare vehicles ahead of its use
  • Valuable function for overnight charging
  • Customizable according to customer’s needs

Reporting and notifications
  • Easy access to data and reports
  • Alerts on important alarms and events
  • Essential for long-term optimization

Forecasting
  • Day-ahead optimization
  • Energy price forecasting
  • Asset failure prediction
- Smart Charging module can be connected to several fleet management solutions via VDV463

- The Remote Monitoring portal is the main interface connecting the smart charging module as well as MQTT signals from the charging infrastructure

- Further integrations needs to be assessed and evaluated with specific digital platform of the operator

- Typical questions to be addressed:
  - FleetInsight APIs available?
  - Which system talks to which user?
  - Fleet: face/app to driver? Eg for reservation, delays, status, …
  - Fuel Billing: Smart Charging transactions are sent to this one
  - Telematics might supply arrival time from charge planning
Grid-eMotion™
Service Concept
<table>
<thead>
<tr>
<th>Solutions</th>
<th>Grid-eMotion™ Charger Monitoring Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>Rapid Response +</td>
</tr>
<tr>
<td></td>
<td>Agreed response time for corrective maintenance</td>
</tr>
<tr>
<td></td>
<td>High Quality</td>
</tr>
<tr>
<td></td>
<td>Faster communication process</td>
</tr>
<tr>
<td>Results</td>
<td>Well-informed maintenance decisions with live data</td>
</tr>
<tr>
<td></td>
<td>Efficient procurement, product support and mobilization to site</td>
</tr>
<tr>
<td></td>
<td>Higher reliability with preventive maintenance</td>
</tr>
<tr>
<td></td>
<td>Optimized maintenance spending</td>
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<tr>
<td></td>
<td>Early identification of problems</td>
</tr>
<tr>
<td></td>
<td>Failure mitigation</td>
</tr>
<tr>
<td></td>
<td>High quality of maintenance</td>
</tr>
<tr>
<td></td>
<td>Avoided cost of failure</td>
</tr>
<tr>
<td></td>
<td>Avoid unplanned outage</td>
</tr>
<tr>
<td></td>
<td>Lower TCO</td>
</tr>
</tbody>
</table>

**Grid-eMotion™ Charger Monitoring Platform**

<table>
<thead>
<tr>
<th>Performance optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximizing efficiency and use of energy with smart charging</td>
</tr>
</tbody>
</table>

**Rapid Response**
Fast and flexible service to maximize equipment availability

**Maintenance Excellence**
Knowledge and expertise to optimize and extend equipment life

**Solutions**
- Office hours or 24/7 response in 10 languages
- Agreed response time for corrective maintenance
- Rapid Response +
- Preventive Maintenance Execution
- Maintenance Excellence +
- Smart Charging via Charger Monitoring Portal
- Faster communication process
- Efficient procurement, product support and mobilization to site
- High Quality
- Higher reliability with preventive maintenance
- Well-informed maintenance decisions with live data
- Maximize operational efficiency with energy management capability of smart charging

**Benefits**
- Faster failure repairs
- Shorter unplanned outages
- Higher availability
- Optimized maintenance spending
- Early identification of problems
- Failure mitigation
- Higher quality of maintenance
- Avoided cost of failure
- Avoid unplanned outage
- Lower TCO

**Results**

**Type of agreements**
The service offerings for the Grid-eMotion products can be included under different types of SLAs such as commitment on response time and availability. Solutions such as OBC and XaaS can also be offered. We offer fixed/variable fees depending on needs.
The Rapid Response offering comes with a variety of levels to meet different customer needs. The levels are organized based on the response offering with Bronze, Silver, Gold and Platinum as options.

<table>
<thead>
<tr>
<th>1st line support*</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 h, 24/7</td>
<td>1 h, 24/7</td>
<td>1 h, 24/7</td>
<td>1 h, 24/7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd line support</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next business day</td>
<td>2 h, business hours</td>
<td>2 h, business hours</td>
<td>1 h, business hours</td>
</tr>
<tr>
<td>4 h, outside business hours</td>
<td>4 h, outside business hours</td>
<td>2 h, outside business hours</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd line support</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 day response</td>
<td>8 h response</td>
<td>4 h response</td>
<td>2 h response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mobilization time</th>
<th>Silver</th>
<th>Gold</th>
<th>Platinum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week on site</td>
<td>72 h on site</td>
<td>24 h on site</td>
<td>12 h on site</td>
</tr>
</tbody>
</table>

Support channels

### Definition 1st, 2nd and 3rd line support

<table>
<thead>
<tr>
<th>1st line</th>
<th>2nd line</th>
<th>3rd line</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diagnostic of error</td>
<td>• Analyse error</td>
<td>• Grid-eMotion factory experts</td>
</tr>
<tr>
<td>• Reset of charger</td>
<td>• Change spare parts</td>
<td>• Last escalation step</td>
</tr>
<tr>
<td>• Involvement of OEM support</td>
<td>• Issue analysis and verification</td>
<td></td>
</tr>
</tbody>
</table>

Tools and services to enable fast response

<table>
<thead>
<tr>
<th>Phone Support</th>
<th>Charger Monitoring Portal</th>
<th>Augmented Reality</th>
<th>On-site corrective maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the problem by calling our level 1 support.</td>
<td>For more thorough understanding, all of our support levels can reach your assets remotely.</td>
<td>With the use of augmented reality (AR) we can get a live visualization through the eyes of someone on site. The service can be used via our app and in any of our support levels.</td>
<td>Local Hitachi Energy or partners service engineers with right equipment and training respond to site within an agreed time-frame.</td>
</tr>
</tbody>
</table>
HITACHI
Inspire the Next