E-mobility at a tipping point
Elke Temme (SVP eMobility)
Stefan von Dobschütz (SVP eMobility)

21 November 2017 · innogy Credit Day
innogy is a leading charging solutions provider

Over 15,500 charging points in Europe have ‘innogy inside’

innogy’s smart charging coverage worldwide

Key facts & figures

15,500 charging points in over 20 countries

50,000 charging sessions per month

6,250 smart charging points connected

9,250 private charging solutions

---

As of 30 September 2017
Trusted by private and business customers

Growing customer base

We handle high expectations and requirements
We manage over 50,000 B2C customer accounts
We tailor our solutions to our customers’ needs and demands

Selected B2B key customers

>7
Automotive OEMs

160
Municipal utilities

1,000
B2B customers
innogy to electrify its own business fleet by 2018

<table>
<thead>
<tr>
<th>Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>innogy goes climate friendly</td>
</tr>
<tr>
<td>• Entire company fleet converted to electric and hybrid models</td>
</tr>
<tr>
<td>• Replacement of diesel and petrol engines to take place within four years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leading position</th>
</tr>
</thead>
<tbody>
<tr>
<td>• innogy electrifies 100% of its business fleet (1,000 vehicles)</td>
</tr>
<tr>
<td>• innogy becomes a showcase for intelligent fleet systems:</td>
</tr>
<tr>
<td>– Billing of charged energy at home</td>
</tr>
<tr>
<td>– Intelligent fleet management and charging systems for pool vehicles</td>
</tr>
<tr>
<td>– Load management on innogy sites</td>
</tr>
</tbody>
</table>
The outlook for e-mobility remains positive

Electric car sales will rise significantly in major regions

Note: Required EV sales to avoid non-compliance with CO2 regulations
Source: P3 Group – Sales Volume Simulation

- **NETHERLANDS**
  - CAGR +26%
  - 2017: 37k, 2020: 70k, 2025: 181k (in k units)

- **NORWAY**
  - CAGR +12%
  - 2017: 43k, 2020: 60k, 2025: 120k (in k units)

- **UNITED KINGDOM**
  - CAGR +33%
  - 2017: 53k, 2020: 132k, 2025: 525k (in k units)

- **GERMANY**
  - CAGR +37%
  - 2017: 52k, 2020: 175k, 2025: 650k (in k units)

- **UNITED STATES**
  - CAGR +39%
  - 2017: 189k, 2020: 608k, 2025: 2,609k (in k units)

- **CHINA**
  - CAGR +85%
  - 2017: 79k, 2020: 3,200k, 2025: 11,100k (in k units)
# Overview emission regulations

Countries and municipalities around the globe announced bans on conventional combustion engines and/or Diesel or set out targets

## § Snapshot: Countries with targets set out or bans in place

<table>
<thead>
<tr>
<th>Country</th>
<th>Target/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITED STATES</td>
<td>~150,000 new EVs in 2016; 2nd largest EV market worldwide; No federal policy, but at least eight states have set out goals and signed MoU</td>
</tr>
<tr>
<td>NORWAY</td>
<td>28.76%; Norway targets to phase out sales of new petrol and diesel cars by 2025</td>
</tr>
<tr>
<td>CHINA</td>
<td>1.37%; Largest EV market worldwide (~340,000; 40% of global sales); EV quota mandatory as of 2019, starting at 10%</td>
</tr>
<tr>
<td>INDIA</td>
<td>0.02%; Annual new vehicle registrations in 2016 were &gt;3 million, 5th largest market worldwide; India reportedly plans for all vehicle sold to be powered by electricity by 2030</td>
</tr>
</tbody>
</table>

## % Share of EVs new vehicle registrations

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORWAY</td>
<td>28.76%</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>0.91%</td>
</tr>
<tr>
<td>FRANCE</td>
<td>1.46%</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>6.93%</td>
</tr>
<tr>
<td>UK</td>
<td>1.41%</td>
</tr>
<tr>
<td>EU</td>
<td>1.44%</td>
</tr>
<tr>
<td>CHINA</td>
<td>1.37%</td>
</tr>
<tr>
<td>INDIA</td>
<td>0.02%</td>
</tr>
</tbody>
</table>

---

**Paris**: ICE vehicle ban by 2030; **London**: Diesel charge (additional to parking fees) introduced in 2017; **London**: Toxicity Charge (additional to Congestion Charge) for all ICE vehicles; **Copenhagen**: Plans for ban of new diesel vehicles by 2019
Established players are venturing into the market

Competition will rapidly increase as more and more competitors from various industries are entering the e-mobility market.

**Automotive OEMs**
Build up HPC infrastructure, offering 360° e-mobility solutions

**Oil Industry**
Starting cooperations to build-up charging infrastructure

**Utilities**
Offering 360° e-mobility solutions, full service supplier

**Hardware Supplier**
New competitors with high development and industrialization competence

**Infrastructure Providers**
Offering infrastructure relevant locations
OUR PURPOSE

We are the international, end-user centric technology enterprise for cutting edge e-mobility solutions.

Our solutions excel by being hassle-free, always available and sustainable.
Charging needs ...

@DC150+ Fast charging stations*

@home

@public

@semi-public
innogy operates in every area and is a central partner for e-mobility for all customers

@home
- fully integrated solutions for smart home and other applications
- main provider of wallboxes for home charging

@public parking
- capable of international roaming with more connected partners
- no more emission of CO$_2$ in cities and charging with green energy in every use-case

@semi-public parking
- customer-orientated IT backend with customisable user interface
- uniform and accurate billing process for all your charging stations and customers

@station
- enabler for long-distance travelling
- ultra-fast charging with 350kW possible

innogy SE · Credit Day · November 2017
innogy charging solutions

Our comprehensive product portfolio covers all charging use cases

@home  @semi-public  @public  @station

Customer journey

<table>
<thead>
<tr>
<th>kW</th>
<th>AC</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>22</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>50</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>150</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

eLine  eLine smart

innogy SE · Credit Day · November 2017; AC = Alternating current, DC = Direct current
Smart hardware and cutting edge backend remain the foundation for future value streams
Our IT system is the only one with legitimate billing

With increasing metering restrictions in the future, we are the only provider in the market running an IT system that enables kWh-based billing already today.

<table>
<thead>
<tr>
<th>50,000</th>
<th>6,250</th>
<th>in 20</th>
<th>24/7</th>
<th>99.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrated user accounts</td>
<td>Charge points connected to IT platform</td>
<td>countries currently in use</td>
<td>Professional customer support</td>
<td>System availability</td>
</tr>
</tbody>
</table>

- Detailed POI data
- Direct payment
- Remote access
- Customized tariff schemes
- Billing & payment options
- Access management

Smartphone app ‘eCharge’

IT platform ‘eOperate’

eMobility self-service portal

- Strong cyber security
- High scalability
- Load management
- Interoperability (OCPP)
- kWh-based billing
- Transaction clearing
Large number of value pools in the e-mobility charging infrastructure, energy services and electricity sales

The charging infrastructure value chain

Value chain steps

- HARDWARE SUPPLY
- INSTALLATION
- OPERATION & MAINTENANCE
- IT SERVICES
- ENERGY SERVICES
- ELECTRICITY SALES

Main value pools

- Development
- Customization
- Production
- Financial services
- Connection management
- Civil engineering
- Installation process
- Inspection service
- Full care pack
- Backend connection
- Authentication/billing
- Fleet management
- Grid integration
- Load management
- Energy+ (e.g. smart home)
- Data-driven services
- App
- Electricity sale (€/kWh, flat rate, time tariffs)
Why smart charging?

Smart charging in the future will not only focus on the ease of use and comfort for the customer but also on the objective to provide renewable energy.

Customer preference charging
- Plug & Charge
- Smart charging/load management
  - Value added services
  - Data analytics services
Example (I): Load management

With an increasing penetration of EVs, load management will become even more important

Business Model

Load management strategies

- Fixed
- First come, first served
- Optimised for renewables
- Optimised for individual loads
Example (II): Petrol station operators

Business Model

1. 100% green energy guaranteed
2. Reservation services
3. Integration into cashier systems
4. Billing & payment options
5. Ease of operation

innogy smart backend system

- Strong cyber security
- High scalability
- Ready to use

Interoperability
Proven reliability
Customer centricity
E-mobility fits well into the wider innogy strategy

Smart, connected and embedded in a holistic energy management

SMART ENERGY
- Solar/Wind power prediction
- Real-time supply & demand management

SMART BUILDING
- Dynamic power load strategies
- Solar & building energy storage integration

SMART CHARGING
- Certificate handling per ISO 15118
- Plug & charge
- Charging schedule & plan
- Individual customer tariffs

Cloud-based backend

innogy SE · Credit Day · November 2017; * EMS = Energy management system
We have a clear growth plan

Our overarching goal is to establish a comprehensive charging infrastructure network available for our customers throughout Europe and the US

Planned market presence

2016

2018

2020

Europe

US

China
Who’s next?

Vans and lorries
Thank you!