ISO15118 STANDARDIZATION AND MARKET INTRODUCTION

VECTOR EMOBILITY ENGINEERING DAY, STUTTGART
27.04.2017, M. SCHWAIGER/BMW

BMW GROUP
EV MARKET AND ISO15118.

AGENDA.

1. Charging Communication and ISO15118
2. EV Market Europe
3. Charging Infrastructure in Europe
4. CharIN - the Charging Interface Initiative
EV MARKET AND ISO15118.
CHARGING COMMUNICATION INTRODUCTION.

- **EV**
  - Charging communication
- **EVSE**
  - Third party communication
- **Secondary actors**
  - OEM
  - E-Mobility Operator
  - Fleet Operator
  - Energy Provider
  - ...

**Today**
- No infrastructure information available
- No direct charging information available

**Tomorrow**
- Infrastructure information available
- Charging information available

**ISO 15118**
- Data

ISO 15118 is a key enabler for realizing new prospective business models
EV MARKET AND ISO15118.
CHARGING COMMUNICATION USE-CASES.

- Additional charging details
- Entertainment & social media
- Car services
  ... 
- Convenient
- Fine positioning
- Secure wireless communication & safe technology
- Charging transparency
- Planning security
- Overload protection
- Optimized charging
- Fleet charging
- Local optimization
- Grid optimization
- Fleet charging
- DC fast charging for busses
- Fine positioning
- Secure wireless communication
- Charging transparency
- Planning security
DIN SPEC 70121 was published in 2012 (updated 2014) and allows simple DC charging.

ISO15118 adds additional features and charging methods

<table>
<thead>
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<th>DC</th>
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ISO 15118 serves all use cases to enable seamless introduction of EVs
## EV MARKET AND ISO15118.

### DOCUMENT TIMELINE.

<table>
<thead>
<tr>
<th>Year</th>
<th>ISO 15118-1 Ed2</th>
<th>ISO 15118-2 Ed2</th>
<th>ISO 15118-3 Ed1</th>
<th>ISO 15118-4 Ed1</th>
<th>ISO 15118-5 Ed1</th>
<th>ISO 15118-8 Ed1</th>
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</table>

- **ISO 15118-1 Ed2**
  - General information & use-case definition
- **ISO 15118-2 Ed2**
  - Protocol definition & OSI-layer requirements
- **ISO 15118-3 Ed1**
  - Wired physical & data link layer requirements (PLC)
- **ISO 15118-4 Ed1**
  - Conformance Test Protocol and Messages
- **ISO 15118-5 Ed1**
  - Conformance Test Physical and data link layer
- **ISO 15118-8 Ed1**
  - Physical layer for wireless communication

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*IS015118-1 Ed1 IS published in 04/2013*
*IS015118-2 Ed1 IS published in 03/2014*
*IS015118-3 Ed1 IS published in 05/2015*

**Ed1 of ISO15118 is available for HW and SW implementation**
EV MARKET AND ISO15118.

TEST EVENTS.

18-19.11.2016: Testival at KSGI/Korea
International participants, ECUs, vehicles and charging stations tested in round robin

22-23.06.17: Testival at Vedecom in Versailles/FR
International participants, ECUs, vehicles and charging stations tested in round robin

Further Information:
http://www.testing-symposium.net/

Next Test Event: 06/2017 in France
EV MARKET AND ISO15118.
TOTAL EV SALES IN 2015.

Source: http://www.transportenvironment.org
EV MARKET AND ISO15118.
CUMULATIVE SALES OF PLUG-IN CARS IN EUROPE (BEV, PHEV AND REEV).

Source: http://www.transportenvironment.org
EV MARKET AND ISO15118.
EV LEADING COUNTRIES.

Source: http://www.transportenvironment.org

Norway and Netherlands leading Europe for sales, fiscal support and infrastructure of EV

EU western countries following

EU eastern countries behind
EV MARKET AND ISO15118.

# OF PUBLIC DC CCS CHARGER IN EUROPE.

# of Installed chargers

Massive rollout of Combined Charging System DC charger in Europe ongoing

Source: http://ccs-map.eu/stats/
EV MARKET AND ISO15118.
PUBLIC DC CCS CHARGER AND EV SALES IN EUROPE PER COUNTRY.

### Public DC CCS Charger in Europe

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### EV Sales in Europe

#### Top-15 Countries 2016 Vs 2015

- **Norway**: 30,000 (33% change)
- **UK**: 10,000 (33% change)
- **France**: 7,000 (27% change)
- **Germany**: 6,000 (16% change)
- **Netherlands**: 4,000
- **Sweden**: 20,000 (51% change)
- **Belgium**: 7,000 (147% change)
- **Switzerland**: 5,000
- **Austria**: 2,000 (86% change)
- **Spain**: 2,000 (54% change)
- **Italy**: 2,000 (32% change)
- **Portugal**: 2,000 (48% change)
- **Denmark**: 3,000 (70% change)
- **Finland**: 1,000 (119% change)
- **Iceland**: 1,000 (110% change)

#### Source:
- [ccs-map.eu/stats](http://ccs-map.eu/stats)
- [www.ev-volumes.com](http://www.ev-volumes.com)

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**UK has highest number of DC CCS charger in EU**

**Norway has highest % of charger on population**
EV MARKET AND ISO15118.
DC CCS CHARGING STATION ROLLOUT EUROPE.

>2600 DC CCS charger installed in Europe and more to come …

Source: http://ccs-map.eu
EV MARKET AND ISO15118.
EV AND INFRASTRUCTURE SUMMARY.

The key for EV success is **RIP**

- **R**ange – must be high
- **I**nfrastructure – must be wide spread and high power
- **P**rice – must be comparable to combustion engine vehicles

The Solution is
EV MARKET AND ISO15118.
THE CHARGING INTERFACE INITIATIVE – CHARIN E.V.

Develop and promote the Combined Charging System (CCS)

Founded in 2015
http://www.charinev.org

We present the Charging Interface Initiative association (CharIN), which was recently founded to develop and promote the Combined Charging System (CCS).
EV MARKET AND ISO15118.
CHARIN E.V STRUCTURE.
### EV MARKET AND ISO15118.
**CHARIN E.V DOCUMENTS.**

#### CCS 1.0 Specification

<table>
<thead>
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<th>Sequence Phase</th>
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**Combined Charging System 1.0 Specification - CCS 1.0**

**Content Overview**

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Purpose of document</th>
<th>Overview</th>
<th>Validity of Document</th>
<th>Description of CCS</th>
<th>General</th>
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</thead>
</table>

1. Purpose of document ................................................................. 2
1.1 Overview ..................................................................................... 3
1.2 Validity of Document ................................................................. 3
2. Description of CCS ......................................................................... 4
2.1 General ......................................................................................... 4

#### CCS Design Guide

![Combined Charging System Diagram]

- **Supply Station**
  - Communication
  - High Level (PLC)
  - Low Level (Pilot)
- **Vehicle**
  - Communication
  - High Level (PLC)
  - Low Level (Pilot)

- **DC Power Unit (including Charge Controller)**
  - PE
  - PP
  - CP

- ** HV System (including Battery)**

- **Isolation Monitor**

- **Lock**
- **Lock Monitor**

- **Disabling Device**

- **EV sends Pre-Charge Request, which contains both requested d.c. current <2A (maximum inrush current) and requested DC voltage.**

CharIn providing key documents for Combined Charging System
EV MARKET AND ISO15118.
CCS ROADMAP.

Home  Metropolitan / Highway  Long distance highway

min/100 km

~ 21 min*  <10 min*  <4 min*

50 kW  150 kW  350 kW

* with consumption of 12.7 kWh/100 km

CCS next level offers more flexibility in mobility

Everyone's welcome to join CharIN
THANK YOU.