HUBJECT

IN PARTNERSHIP WITH

Plug&Charge Multi-Contract Handling

Handling of multiple contracts with Plug&Charge based on ISO 15118-2 and -20

Plug&Charge is now!

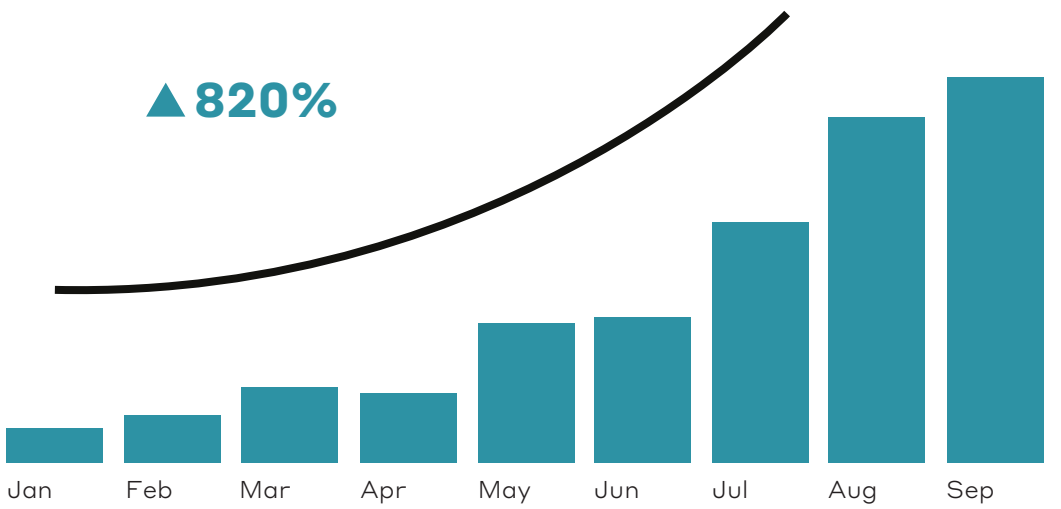
Executive Summary

- Plug&Charge with ISO 15118 is set for mass adoption in 2022
- CPO network are growing: major EV players now implementing and offering Plug&Charge
- Multiple contracts per vehicle possible, despite ISO 15118-2:2014 limitations
- EV-OEMs enable customers to choose and install any MO/EMP contracts

Plug&Charge based on ISO 15118 is currently in the mass adoption phase. It offers a seamless charging experience for electric vehicle drivers. Charging cards and cumbersome apps are unnecessary at Plug&Charge enabled charging stations.

Customers can easily find them using route planning and navigation systems. As a result, forward-looking vehicle manufacturers (OEMs) are now implementing Plug&Charge for their customers.

Growth in Plug&Charge Charging Sessions 2021

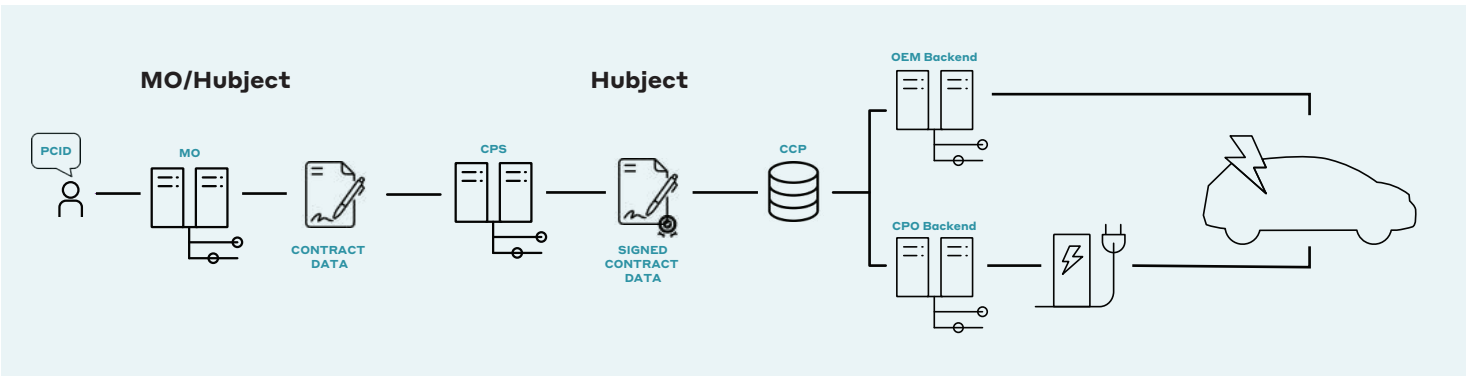


One primary concern of existing Mobility Operators (MO/EMPs) is the lack of control on the installed contract in the vehicle. As the OEM is needed as part of the installation, there could be benefits for MO/EMPs that have a relationship with the OEM.

This article clarifies the situation and outlines the possibilities for independent MO/EMPs. Firstly, it's essential to understand the difference in contract handling between the two ISO 15118 versions. The ISO 15118-2 from 2014 defines how one contract can be installed into a vehicle, whereas the new ISO 15118-20 enables multiple contracts to be installed. This new version is expected to be released before the end of 2021, although market adoption will take years.

It's crucial to know that this doesn't automatically mean that the current ISO 15118-2 framework cannot handle multiple contracts. Creating multiple contracts for one vehicle (one PCID) is possible with the Hubject Plug&Charge Ecosystem, the only available Plug&Charge Ecosystem on the market.

Each connected MO/EMP is allowed to create a Plug&Charge contract for every Plug&Charge ready vehicle in the ecosystem. The next question is how the contract is installed in the vehicle. In the graphic below, the two standard ways are outlined. Either the vehicle requests the contract at the charging station before the first charging session, or the OEM Backend gets the information about a new contract directly after publication to the Contract Certificate Pool (CCP).



Contract Installation via OEM Backend

As previously stated, the CCP can already hold multiple contracts for one vehicle ID (PCID). Let's start by focusing on the installation via the OEM Backend, where the vehicle has an online connection to the OEM, and online updates in the car are possible. Currently, each OEM in the Hubject's Plug&Charge ecosystem gets informed of new contracts in the CCP independently of the MO/EMP and its relationship to the OEM. The OEM can now ask the user for confirmation and consent to install the new contract via the OEM app or vehicle HMI. The OEM Backend will overwrite the previously installed contract. This is independent of the ISO 15118 version. The vehicle will either

overwrite the currently installed contract or add new contracts to the vehicle memory. All contracts are stored in the Hubject CCP, which means the user could always switch contracts. We see that OEMs want to allow users to freely choose their contracts in the vehicle. Although, the OEM may offer the customer a contract that can be installed during the vehicle enrollment, switching the provider is easily possible in most implementations.

Contract installation via CPO backend

The second option is to install a contract into a vehicle over the charge point (EVSE) and CPO-Backend. If no contract is installed in the EV, the vehicle requests the available contract at the EVSE. The EVSE forwards that request to the CPO Backend, which then delivers it to the CCP. If there are multiple contracts in the CCP, the decision on which contract needs to be sent to the vehicle is necessary. Here, simple logic helps. The user can create a contract at any Plug&Charge MO/EMP. After creating a contract, the user can decide if this should be the default contract for the chosen vehicle.

The default setting information will be forwarded to the CCP and stored. In the following contract installation request of the vehicle, the answer is now clear – it's the new default contract.

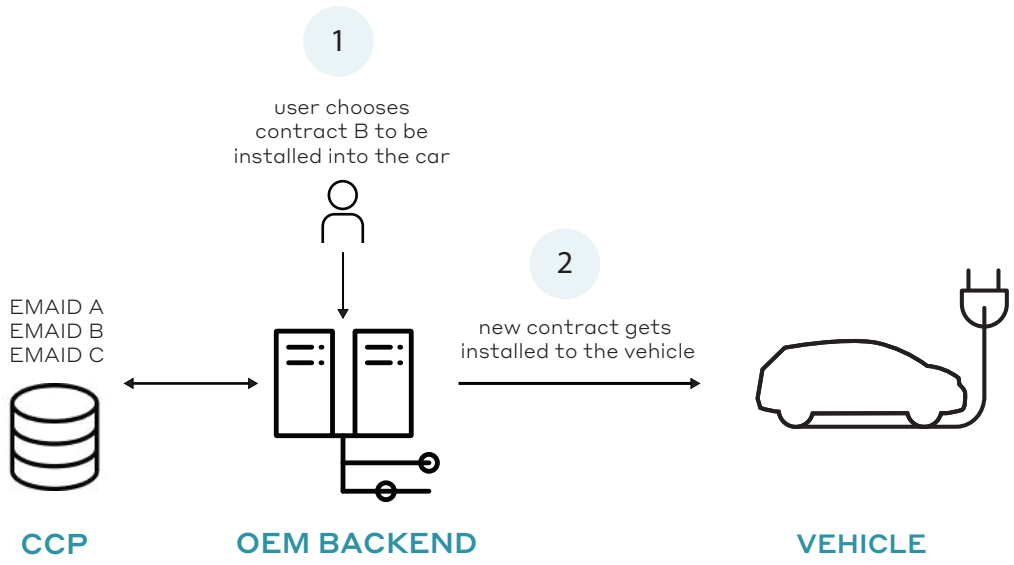
For this option, two preconditions must be met – the OEM must offer installation over the EVSE, and the user must have the opportunity to delete the installed contract.

Summary

- Creation of multiple contracts for one vehicle is already possible in the Hubject Plug&Charge ecosystem
- There are two ways in installing a contract into the vehicle - both allows switching between multiple contracts

OEM Backend

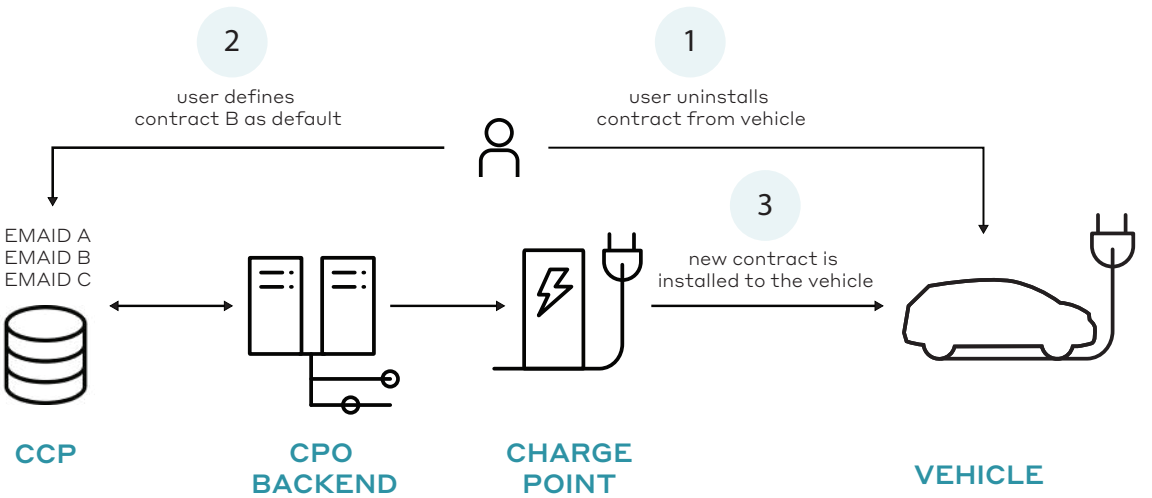
- MO/EMP provides a new Contract Certificate to the Hubject CCP
- OEM gets informed by the CCP about new contracts for the EV
- OEM gets consent from user/owner to install new contract
- OEM overwrites contract in EV



Installation over Charging Station

- MO/EMP provides a new Contract Certificate to the Hubject CCP
- User sets new contract as new default over OEM App or MO/EMP
- New Contract B will be defined as default contract in CCP
- User deletes contract from the vehicle
- New contract gets installed into the vehicle in the next charging session

CPO Backend



Some OEMs already allow one or even both methods today. The OEM needs to follow some simple rules to establish an open and fair market.

Deletion of Contracts

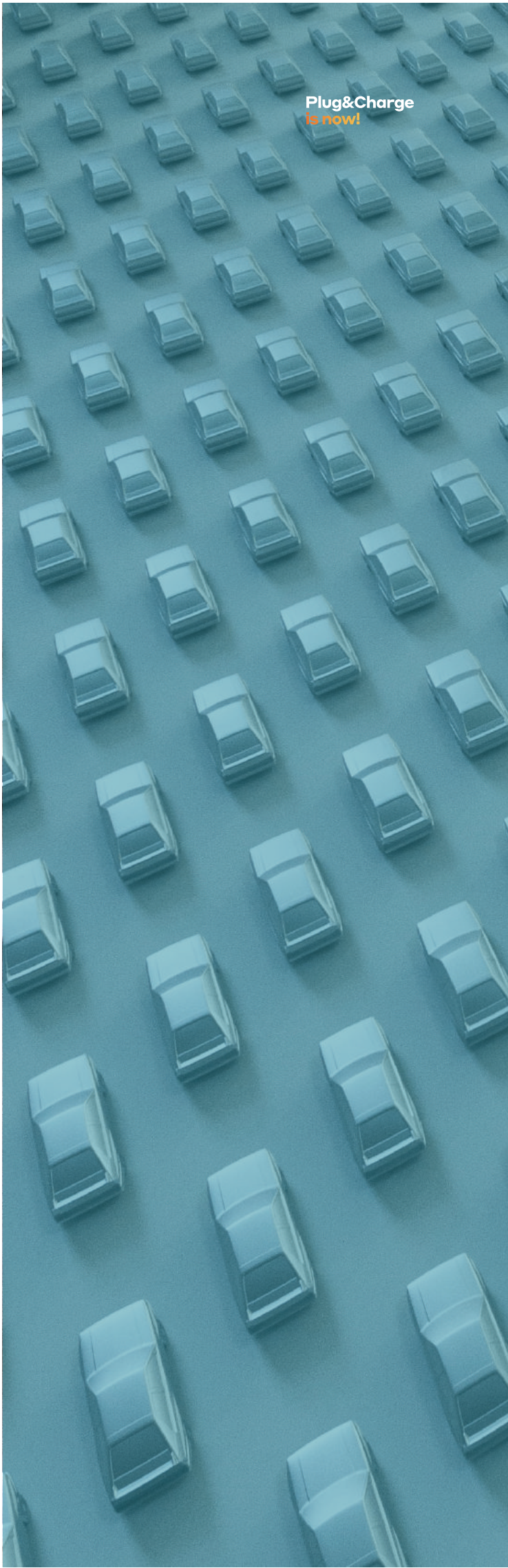
Deletion of installed contracts must be possible

Installation of Contracts

Neutral installation of any contracts of the OEM Backend or the charging station must be possible

Challenges

Contract installation/switching requires the vehicle owners consent. If the consent is not validated by the OEM, the vehicle ownership needs to be validated via the MO/EMP. As there is no standard, the user would need to present the MO/EMP e.g. the official vehicle registration. The information provided by the vehicle owner, would need to be forwarded to the Hubject Plug&Charge Ecosystem to confirm the new default contract. This complex validation process would be needed for each contract installation/switch.



Market Overview

VW Group

- Porsche Taycan offers Plug&Charge since 2020 - supports installation of third-party MO/EMP contracts via charging station.
- Volkswagen ID models will offer Plug&Charge in 2022 - supports third-party MO/EMP contracts via OEM Backend

Testimonials

Martin Roemheld
Head of eMobility Services
at Volkswagen AG

The Volkswagen ID. family and all future platforms will support Plug&Charge in 2022 – the customer can setup any provider‘s charging contract in his vehicle and therefore charge comfortably and automatically.

HUBJECT

Christian Hahn
CEO at Hubject GmbH

As Hubject we believe in open collaboration and therefore we are very pleased to partner with VW to support the mass introduction of Plug&Charge. EV drivers need to be able to charge seamlessly and choose their mobility operator without being tied to cards or apps. We firmly believe in a fair and neutral EV charging market, and the introduction of multiple contract processing will help expanding it.

Next steps for CPO

Check CPO-Backend

- Connection to Plug&Charge Ecosystem
- OCPP 1.6* (extended for PnC) or OCPP 2.0.1

Check Charging Stations (EVSE)

- OCPP 1.6* (extended for PnC) or OCPP 2.0.1
- ISO 15118 with usecase Plug&Charge
- Certificate Handling (Storing of key and certificate material securely)

Next steps for EMP

- Connection to The Plug&Charge Ecosystem
- Extending User Interface for customers

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Acronyms

EMP – Electro Mobility Provider

MO – Mobility Operator (same as EMP)

CPO – Charge Point Operator

OEM – Original Equipment Manufacturer (here Vehicle Manufacturer)

CCP – Contract Certificate Pool

EVSE - Electric Vehicle Supply Equipment (Charging Station)

PCID – Provisioning Certificate ID (Vehicle ID)

EMAID – e-Mobility Account Identifier (Contract ID)

BEV – Battery Electric Vehicle

EV – Electric Vehicle

About Hubject

Hubject simplifies the charging of electric vehicles. Through its eRoaming platform intercharge, the eMobility specialist connects Charge Point Operators (CPOs) and eMobility Service Providers (EMPs) to provide standardised access to charging infrastructure regardless of any network. Hubject has established the world's largest cross-provider charging network for electric vehicles by connecting CPO networks encompassing over 400,000 connected charging points and more than 1,000 B2B partners across 52 countries and four continents.

In addition, Hubject is a trusted consulting partner in the eMobility market, advising automotive manufacturers, charging providers, and other EV-related businesses looking to launch eMobility services or implement Plug&Charge using ISO 15118. In essence, Hubject promotes eMobility and its advancement worldwide. Founded in 2012, Hubject is a joint venture of the BMW Group, Bosch, Mercedes-Benz, EnBW, Enel X, E.ON, Siemens and the Volkswagen Group. Hubject's headquarters is located in Berlin, with subsidiaries in Los Angeles and Shanghai.

HUBJECT— Heading for the future.

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