Sonnenstrom mit System

IBC SOLAR

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E-MOBILITY & PV IN A NUTSHELL

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- Team leader Technical Applications Engineers at IBC SOLAR AG´s Solutions International department

- **Certified Surveyor for Photovoltaic Sytems (TÜV Rheinland)**
- Energy Efficiency Representive (TÜV Rheinland)

- IBC SOLAR´s international technical expertise since 2010
- Background in mechanical as well as electric engineering

WHAT CAR IS TO BE CHARGED?

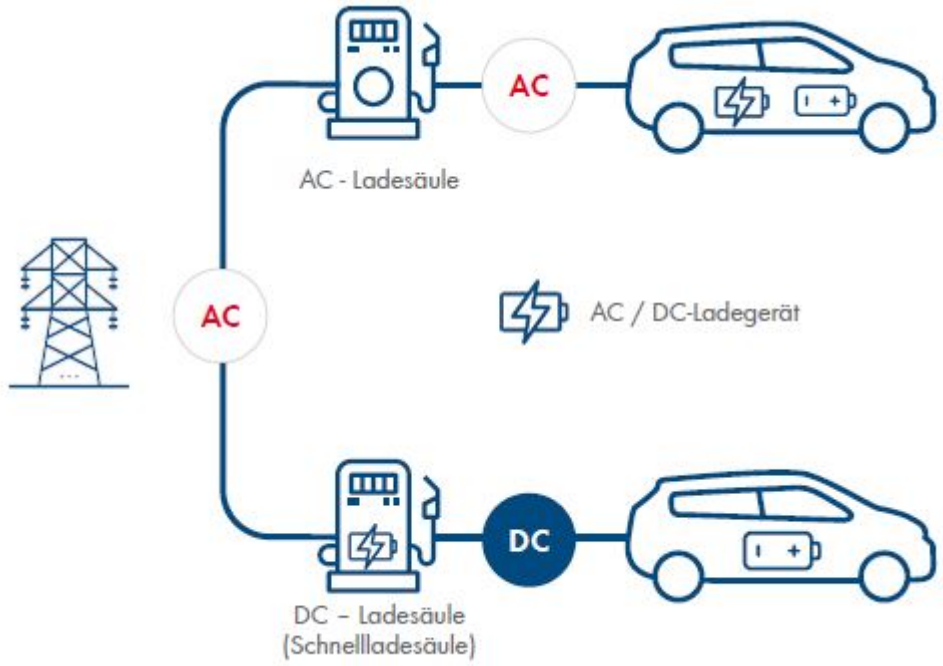
What cars we are talking about

- Up to now: Combustion engines
- Known from Formula 1: Hybrid cars
  - Charging at braking situations, no external charging
- **Plug-in Hybrids**
  - **Still with combustion engine, but external charging possible**
- Range Extended Electric Vehicles
  - E.g. BMW i3
- **Full electric cars**
- Fuel cell vehicles
  - Hydrogen used as fuel

WHAT CHARGING EQUIPMENT IS USED?

Different cars need different charging methods

- **AC- vs. DC-charging**



- **AC: Rectifier integrated in vehicle**
- **DC: Rectifier integrated in charging station**

Different cars need different charging methods

- **Charging modes according to IEC 61851-1**
- Mode 1: „Emergency charging“, typically 230V

- Mode 2: Mobile charging stations, 230V or 400V

- **Mode 3: Stationary charging stations (e.g. Wallboxes)**
- Mode 4: DC charging stations (e.g. Tesla)

Different cars need different charging methods

- **Charging connectors:**

- Type 1: Up to 7.4 kW AC (e.g. Mitsubishi iMiev)

- **Type 2: Up to 43 kW AC (most current cars)**

- **CSS (Combo2): Up to 350 kW DC (European standard)**

- CHAdeMO: Up to 150 kW DC (Japanese standard)

- Tesla Supercharger: Up to 120 kW DC (Tesla only)

HOW THE DRIVER WANTS TO CHARGE?

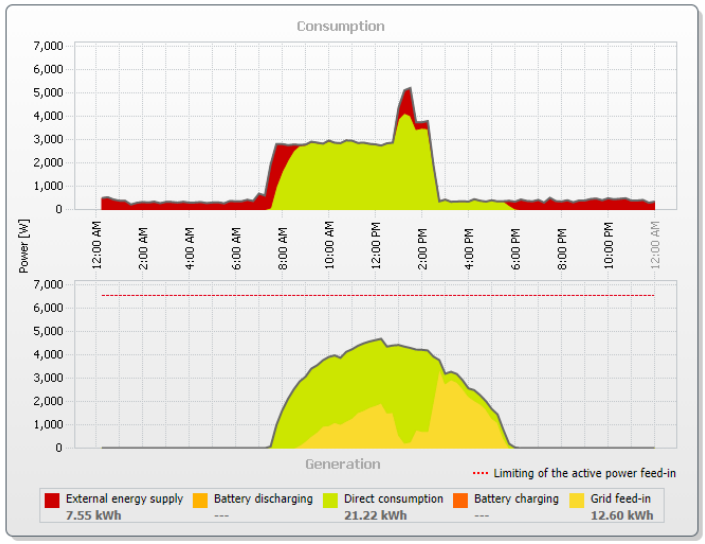
Charging and discharging behaviour

- „Fuel“ consumption is between 15 – 30 kWh per 100 km
- Common batteries range from (15) to 100 kWh, e.g. Nissan Leaf 45 kWh

- **Drivers tend to keep the battery as full as possible, no matter what time of day**

Charging and discharging behaviour

- 230V 16A 1ph: Charging power 3.6 kW -> 50 kWh means 14 hours charging
- **400V 16A 3 ph: Charging power 11 kW -> 50 kWh means 4.5 hours charging**
- 400V 32A 3 ph: Charging power 22 kW -> 50 kWh means 2 hours charging
- 150 kW DC: Charging power 150 kW -> 50 kWh means 20 minutes charging

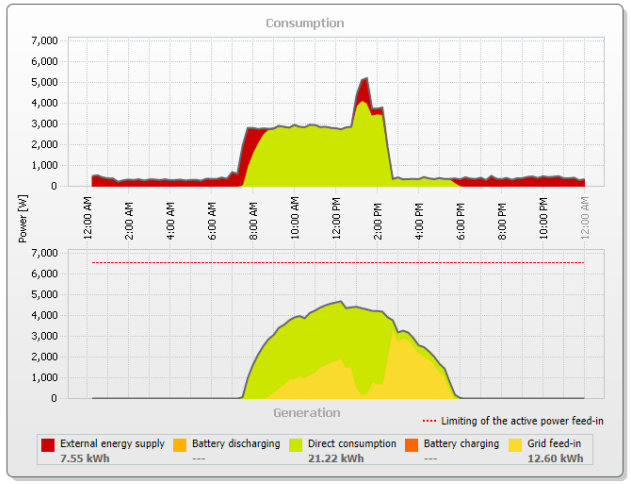


- 3 kW single phase charge only!
- 10 kWp PV in February (Germany)

WHERE DOES THE DRIVER CHARGE?

Where can you charge your car?

Essential question at decision for an electric car



At home

- Always available, combination with PV sometimes possible

At work

- Enough charging points available / how to access
- Energy management / infrastructure sufficient
- **Combination with PV often feasible**

In public

- Unclear availabilty & accessability
- Typically short charging periods possible only

IBC SOLAR PORTFOLIO

IBC SOLAR portfolio - SMA

SMA EV Charger 7.4/22

EVC7,4-1AC-10, EVC22-3AC-10

Functions
Intelligent charging modes (fast, PV-optimized, forecast-based)
Boost-function
Blackout protection
Automatic phase-switching*
Grid operator interface
Charging mode selected via rotary switch or app
Monitoring via SMA Energy app
SMA Smart Connected

Technical data

AC-power:	7,4/ 22 kW
Nominal voltage:	230/ 400 V
Nominal current:	32 A
Charging cable:	Type 2 5m
Nominal frequency:	50 Hz
Degree of protection:	IP 65
Weight:	8,0 kg
Dimensions (W/H/D):	460/ 357/ 122 mm
Ambient temperature:	-25 to +40 °C
Energy manager:	SHM 2.0

* only applies to EVC22-3AC-10

Expensive device, but fits perfectly in SMA family

IBC SOLAR portfolio - SMA

Forecast-based charging

When you enter the charging target (departure time, amount of electricity to be charged) in the SMA Energy app, the Sunny Home Manager intelligently schedules charging and performs it at minimum cost while ensuring that your car will be ready when you need it.

Expensive device, but fits perfectly in SMA family

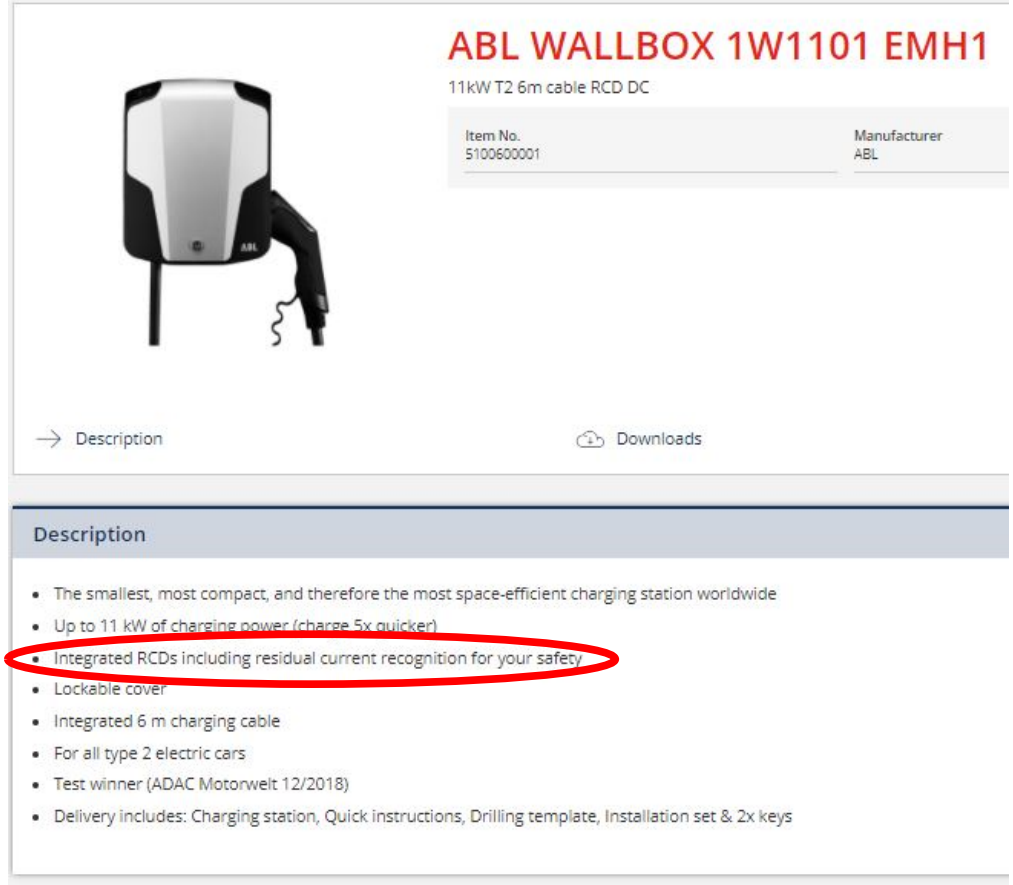
IBC SOLAR portfolio – Fronius

WATTPILOT GO 11 J	WATTPILOT GO 22 J	WATTPILOT HOME 11 J *
11 kW	22 kW	11 kW

- **Available from April**
- **Stationary and mobile versions**
- **No fixed cable**
- **RFID Card needed**

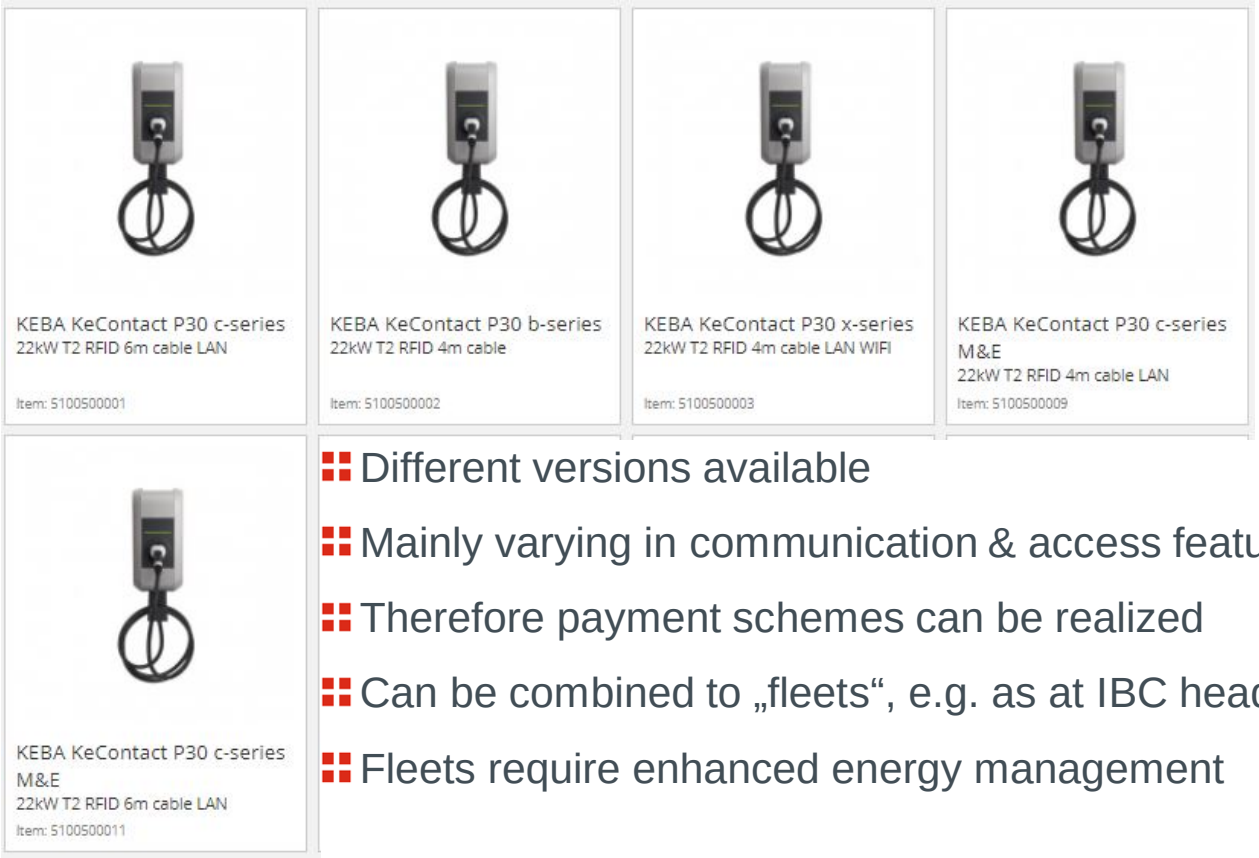
- **Expensive device (value for money), but fits in Fronius family**

IBC SOLAR portfolio - ABL



Cheap but dumb solution – fits perfectly to new German benefit scheme

IBC SOLAR portfolio - KEBA



- Different versions available
- Mainly varying in communication & access features
- Therefore payment schemes can be realized
- Can be combined to „fleets“, e.g. as at IBC headquarters
- Fleets require enhanced energy management

- **Medium price range, with scalable communication**

IBC SOLAR portfolio – DC chargers

- No solution off the shelf or in online shop
- Can be offered on request project related
- Technical services to be charged

- The high charging power demands both enhanced energy management and high-power infrastructure (i.e. **dedicated transformers**)
- Can be combined to „fleets“

- **High priced project-related solutions**

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