Challenge for Germany

Integration of e-Mobility In German Grid

Gains

- Increase of renewable resources
- CO_2 saving
- Saving on costs for energy storage
- New business model

Importance

- Decarbonization of transport system
- Grid flexibility
- Raising customer demand for EV
- Change in demand behavior

INTERNATIONAL
YOUTH FORUM
2018
ROSSETI

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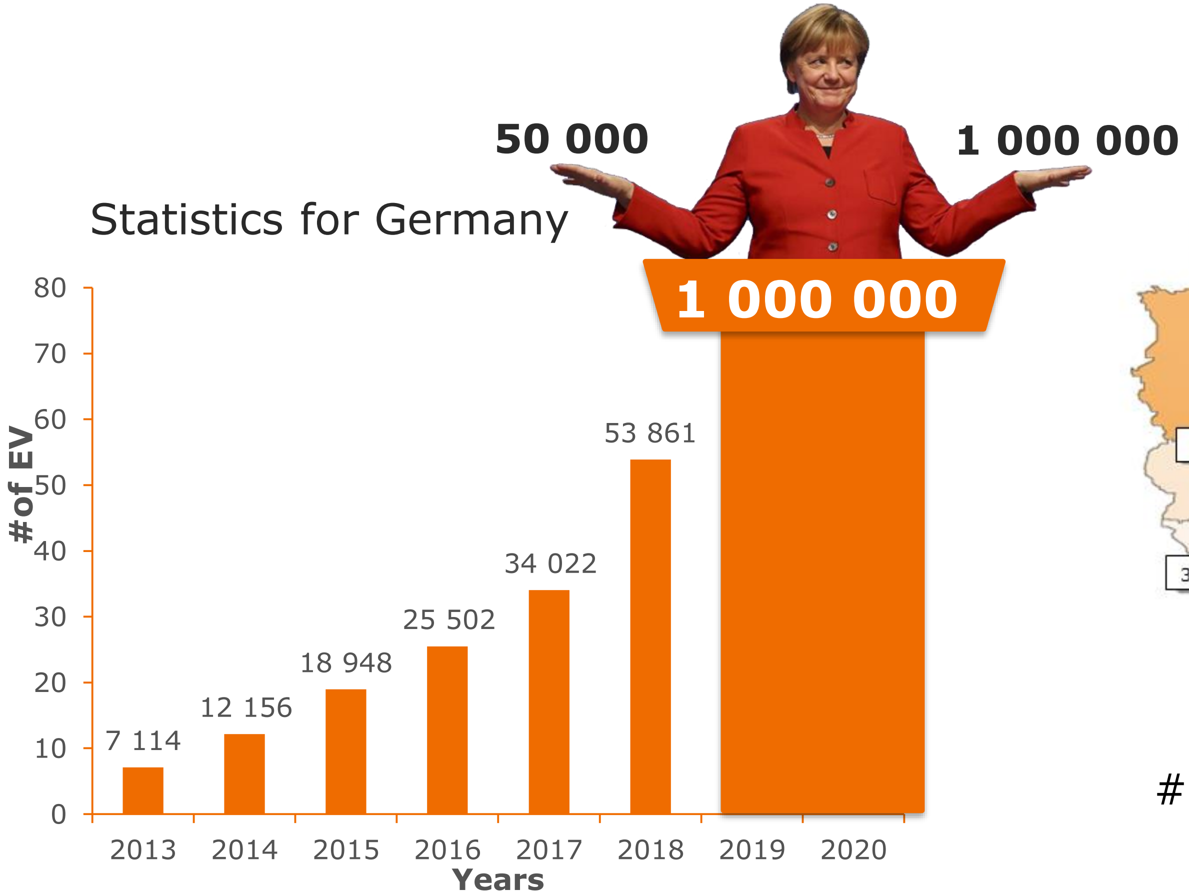
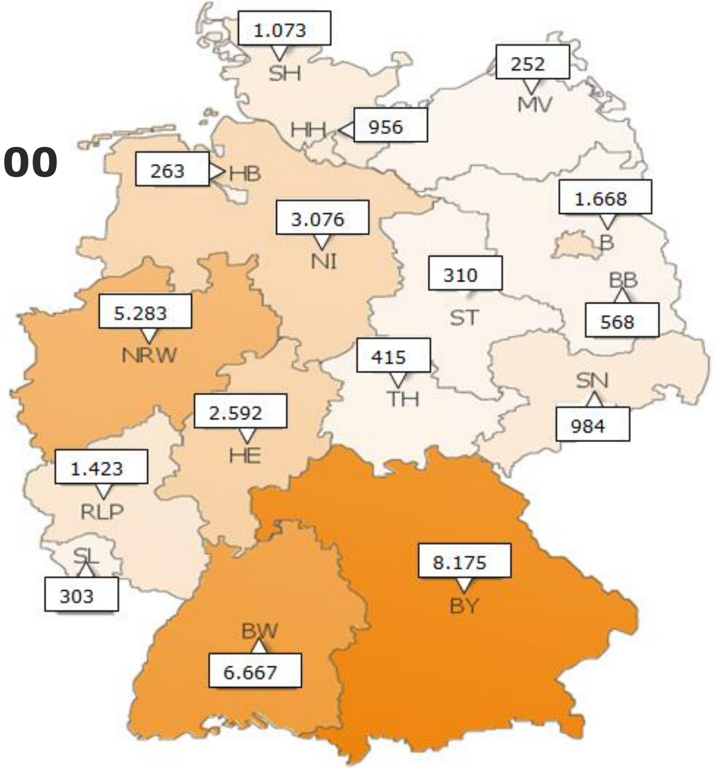
de-MOBILITY

Integration of e-Mobility In German Grid

Country challenge-provider: Germany

Forecast number of EV in Germany



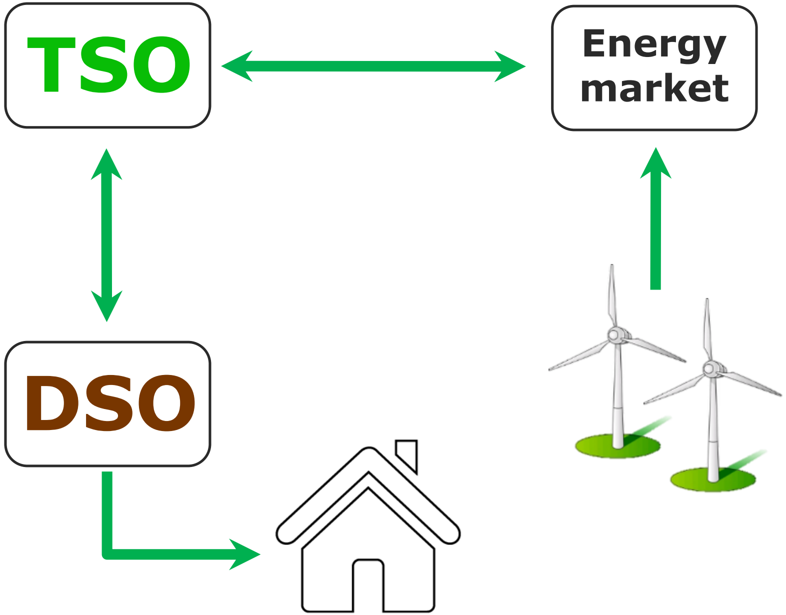


# of EVs in use in 2017

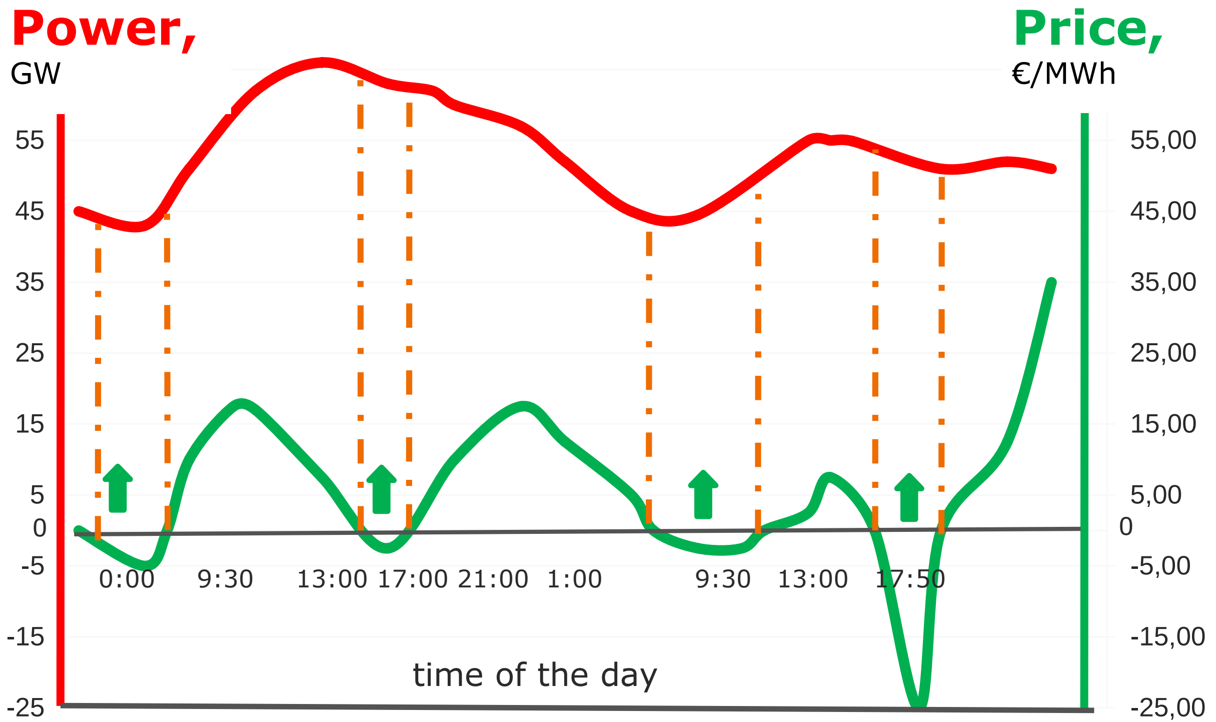
Current energy system interconnection

Maintenance areas of TSO

Grid = 4 TSO + 883 DSO

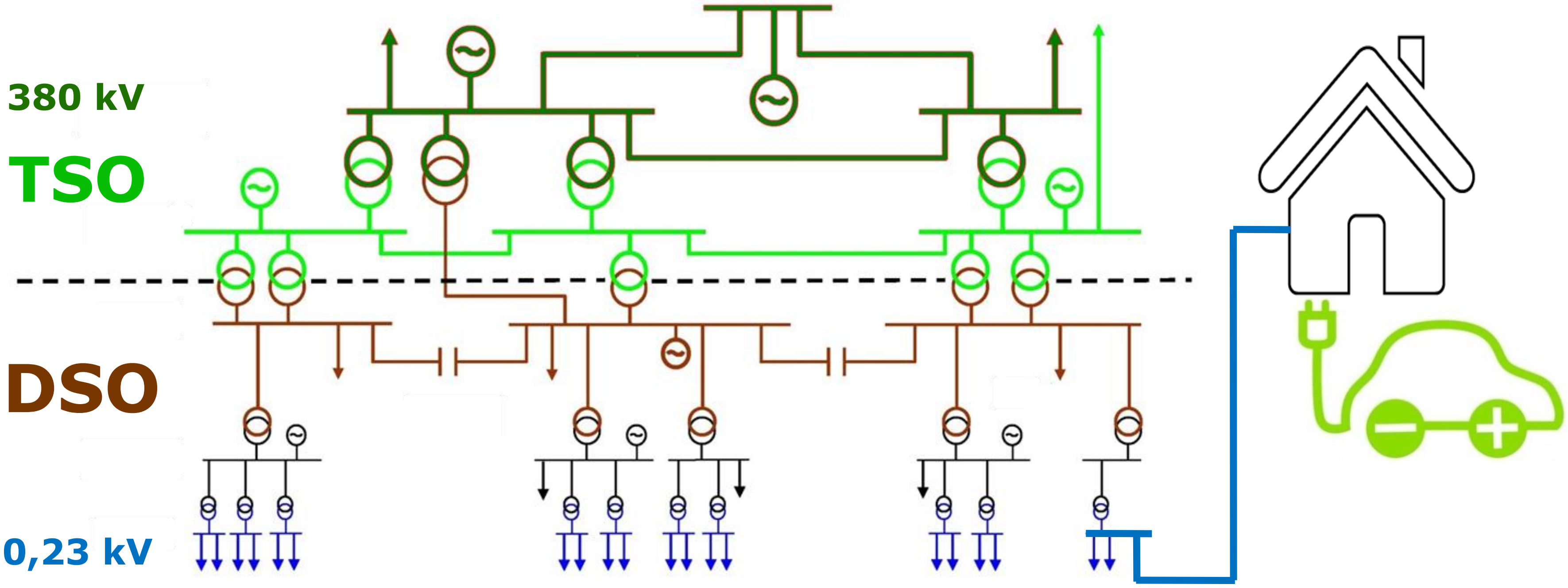


Daily prices of energy

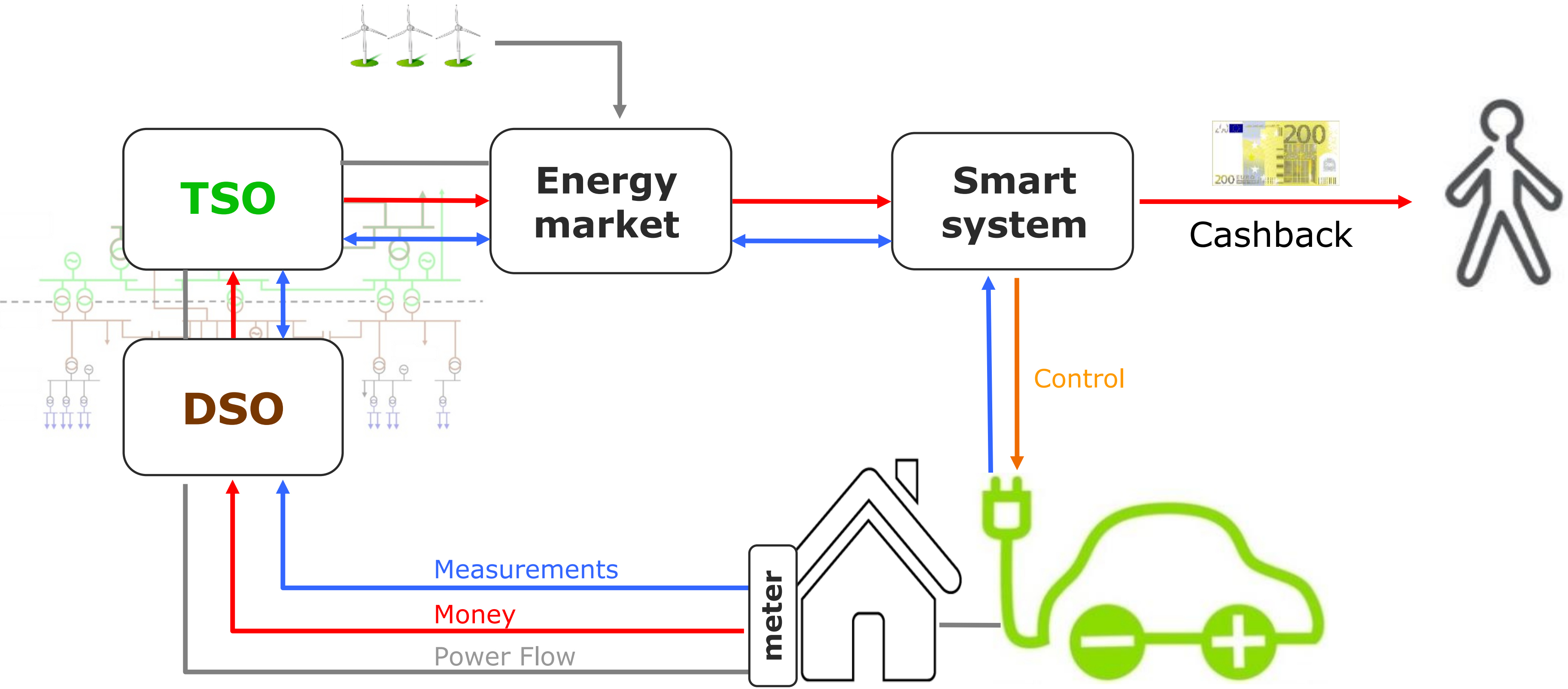


- Daily energy prices are changed every hour
- Prices can even been negative
- We propose charging EV at definite period with low prices
- We improve the load graph and reduce costs for energy system

Structure of electrical power supply



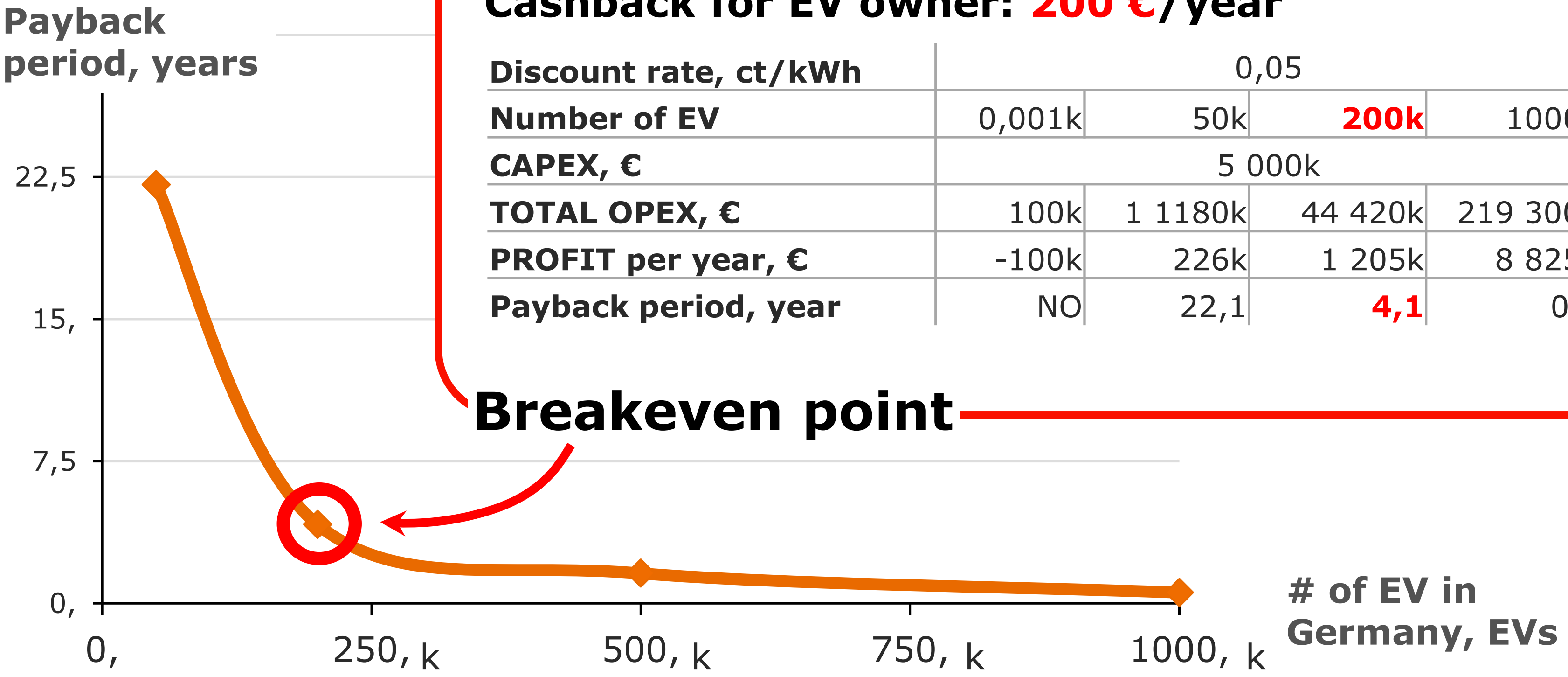
Structure of electrical power supply



Business model of project

Cashback for EV owner: 200 €/year

Discount rate, ct/kWh	0,05			
Number of EV	0,001k	50k	**200k**	1000k
CAPEX, €	5 000k			
TOTAL OPEX, €	100k	1 1180k	44 420k	219 300k
PROFIT per year, €	-100k	226k	1 205k	8 825k
Payback period, year	NO	22,1	**4,1**	0,6



Stakeholders

	Key Interests
EV owner 	Cashback 200 €
EV producer (Mercedes-Benz, BMW, Audi)	Sales growth
DSO (EnBW, e.on, RWE)	Load optimization
TSO (TRANSNET BW, 50hertz, TenneT, amprion)	Load optimization

Baden-Württemberg

What to do?

4 System maintenance

3 Connection of cars (contracts with car owners)

2 Technical part implementation

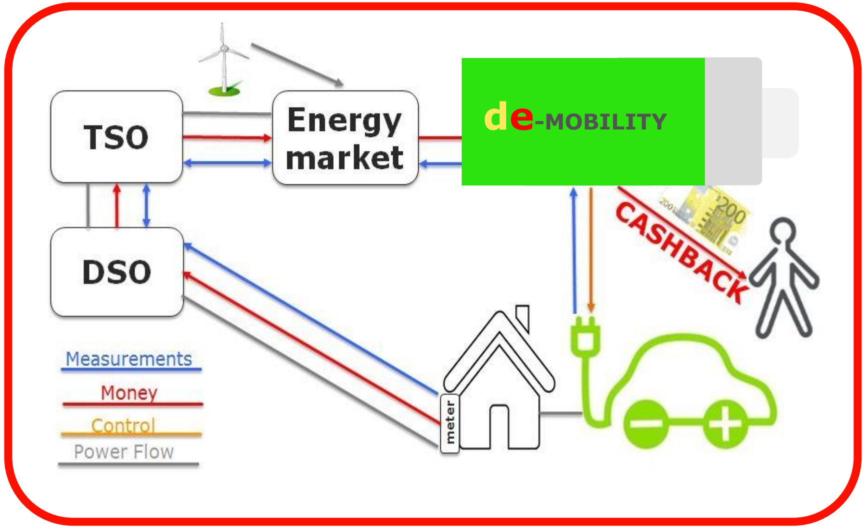
1 Contract with car producers (standardization of the charging station)

What's new?

Intelligent
Energy System

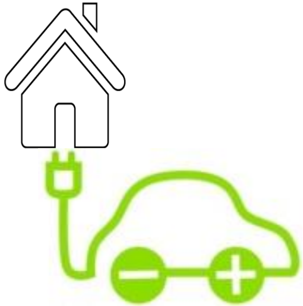
Intelligent
buildings

Intelligent integration

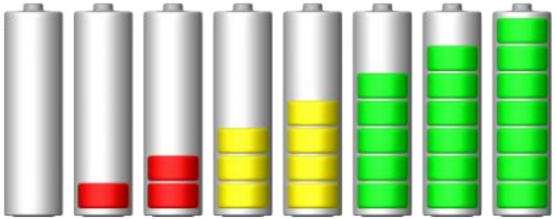


100 EV

200 000 EV



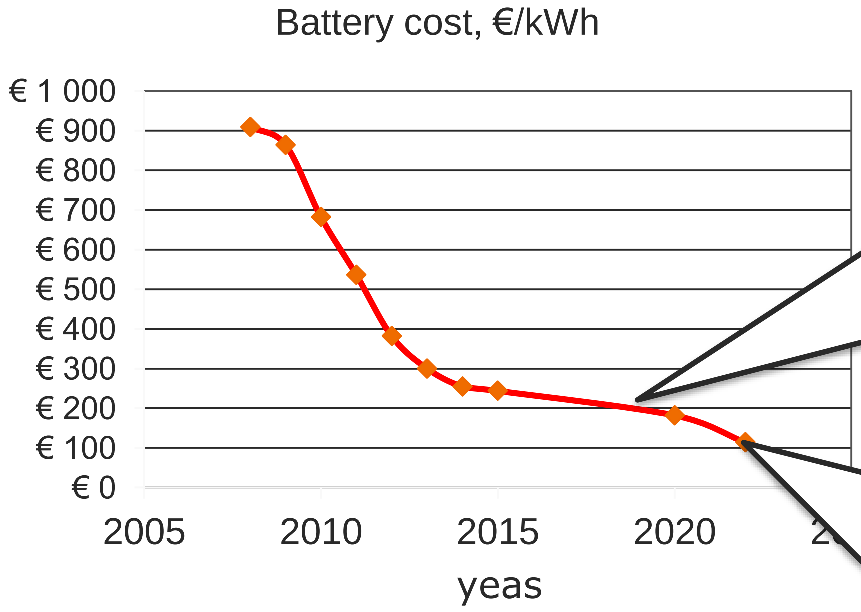
de-MOBILITY



Team
Belarus

Business model 2.0

Full charge/discharge once a day



1

Battery cost =200 €/kWh
Discount rate of electricity cost=9 ct/kWh
Charge/discharge cycles:
required number =2 222 cycles
max allowable number =1 500 cycles

Not working now

2

Battery cost =110 €/kWh
Discount rate of electricity cost=9 ct/kWh
Charge/discharge cycles:
required number =1 263 cycles
max allowable number =1 500 cycles

Interesting Business Model
Profit = 18% of battery coast in 4 years

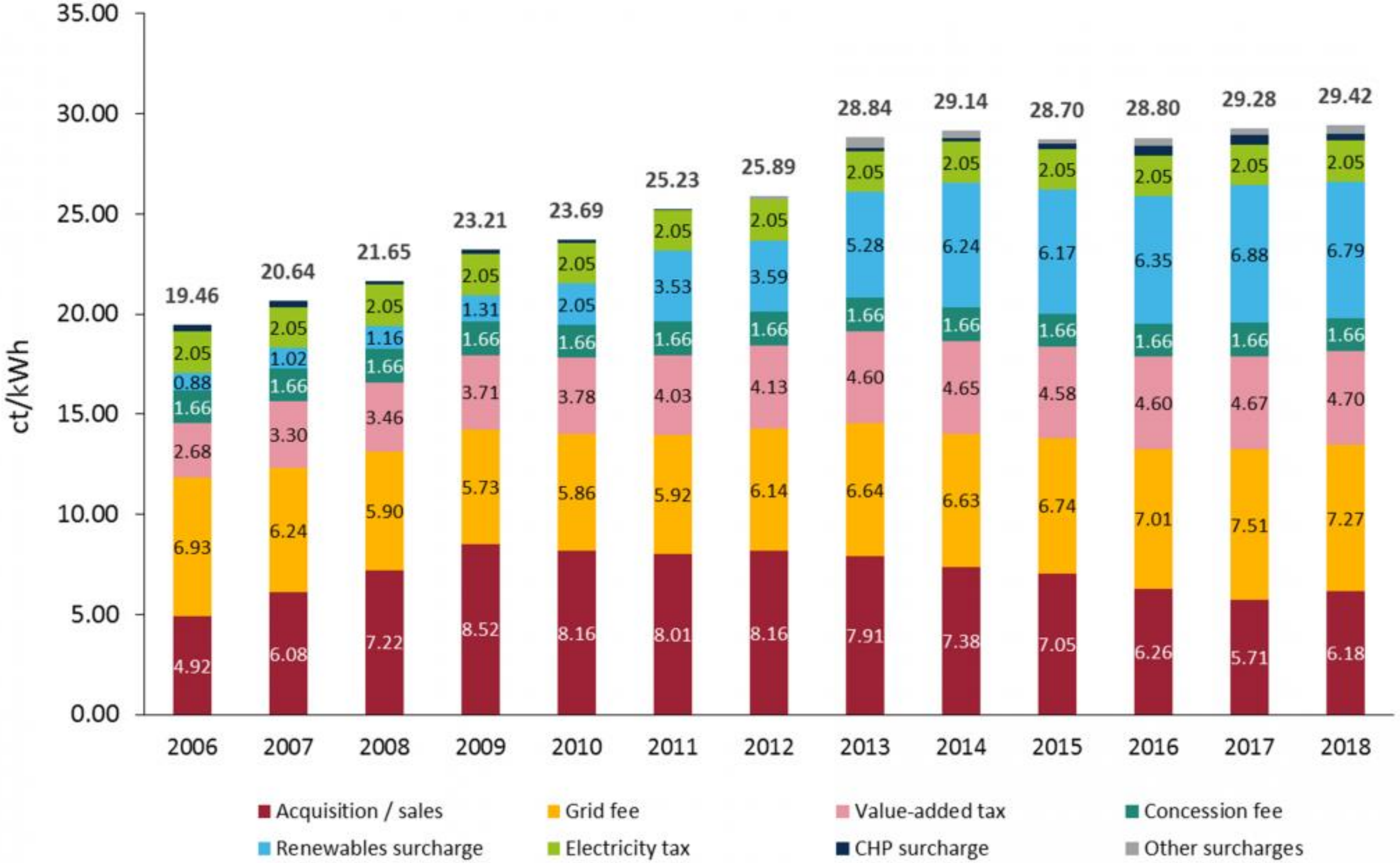
Values

Difference in the cost of electricity market, ct/kWh	0,05		
Number of EV	1	50000	1000000
Total price of consumption, € per day	0,625	31 250	625 000
per year	228,13	11 406 250	228 125 000
CAPEX	5 000 000	5 000 000	5 000 000
Data center OPEX, €	100 000	100 000	100 000
Cost communication channel OPEX, €	24	1 080 000	19 200 000
Cashback for EV owner, €	200	10 000 000	200 000 000
TOTAL OPEX, €	100 224	11 180 000	219 300 000
Profit per year, €	-99996	226 250	8 825 000
Payback period, year	NO	22,1	0,6

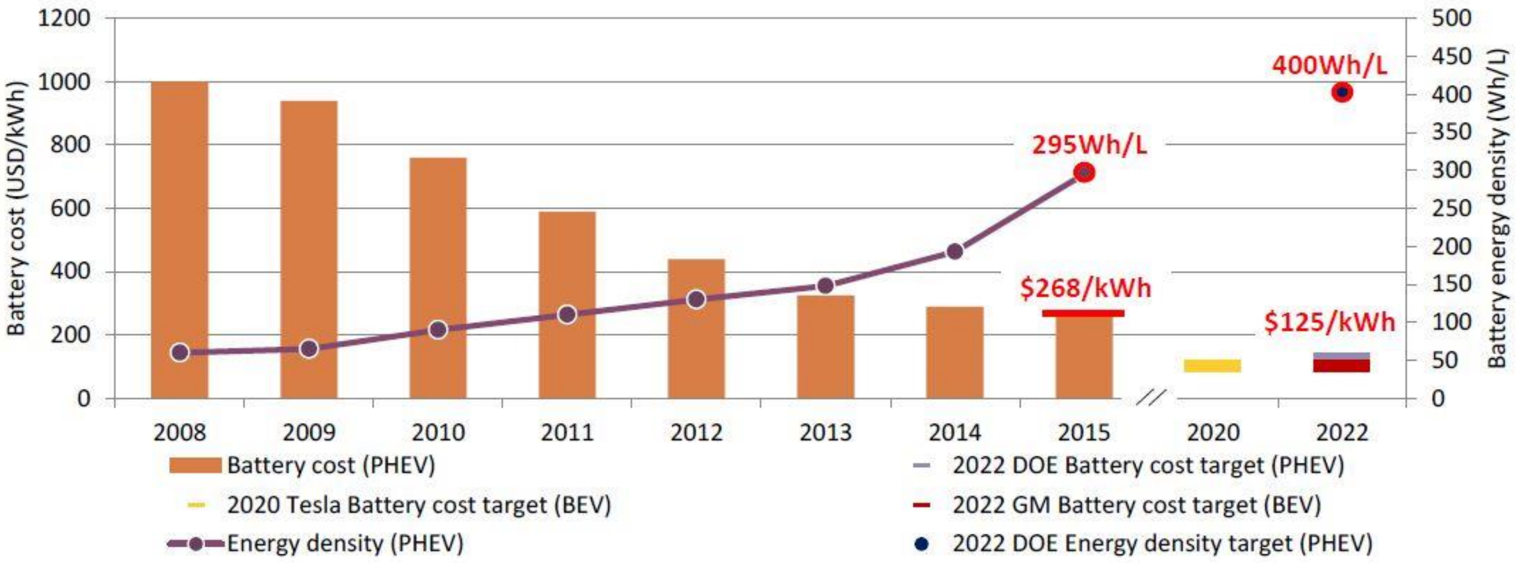
Charging time

Index	Value
Power of the charging station, kW	3,5
Minimum required time for charging, h	3,6
Average available charging time at Home at night, h	9
Average available charging time at Office in the parking lot, h	7
Total Average available charging time, h	16

Power price in ct/kWh for German household



Forecast for Battery Coast

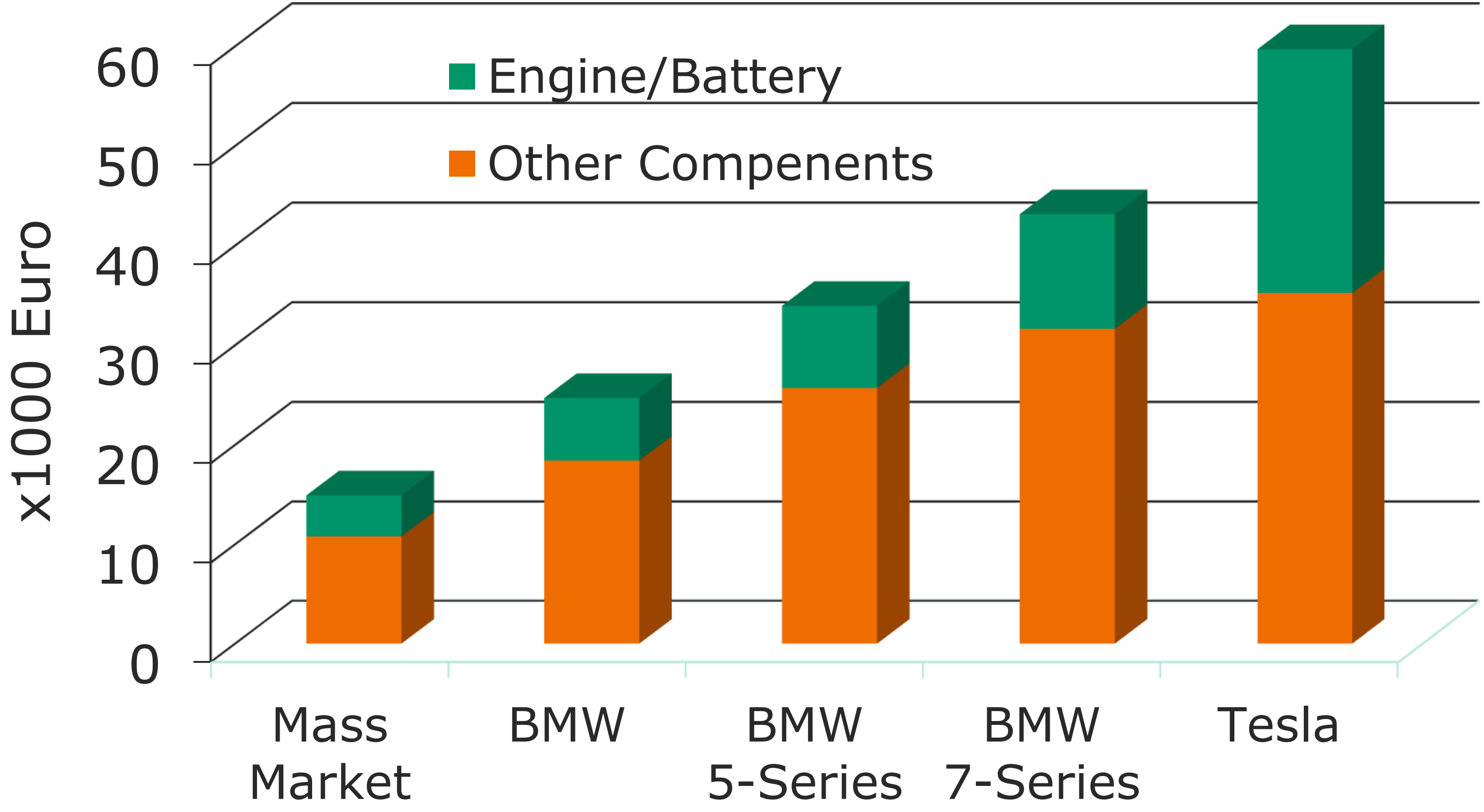


- PHEV battery costs:

  -73% in the past 7 years

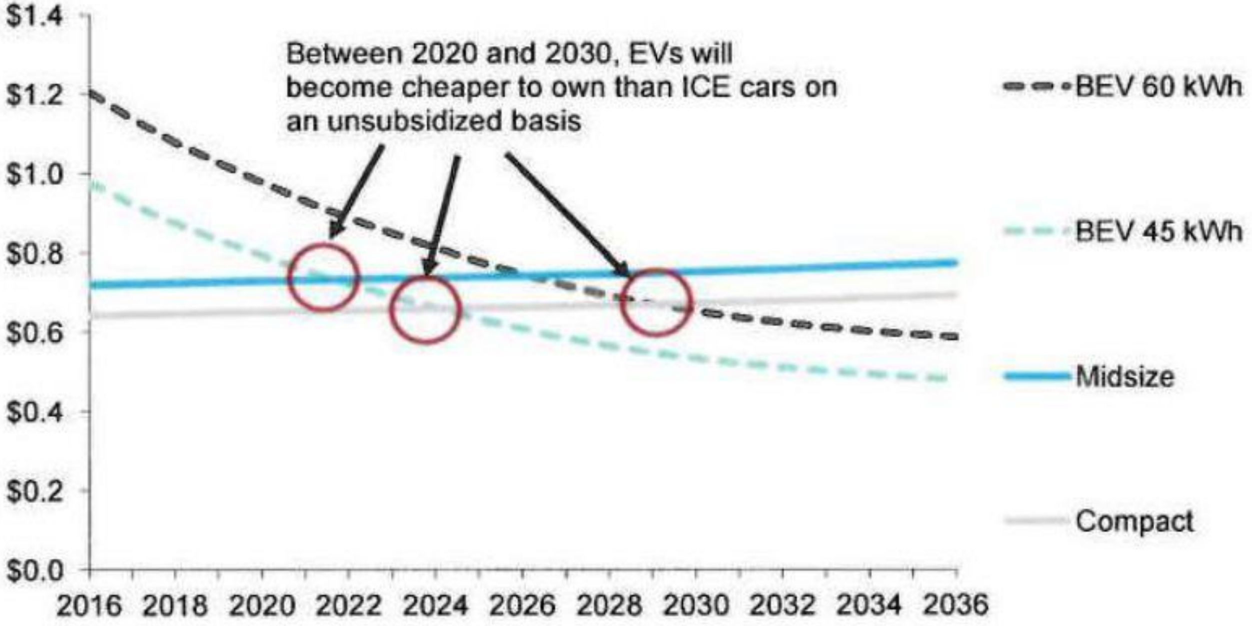
  -58% to go in the next 7 years
- ICE cost parity for 2020-2022?

Components of Car Cost



Forecast for EV

Global average unsubsidized total cost of ownership outlook of BEVs compared with internal combustion engine vehicles ($/mile)



Source: Bloomberg New Energy Finance. Note: Fuel costs use EIA's "low" reference crude oil price, rising from $50/barrel in 2015 to $75 in 2040.