Second-Life Batteries – an economic opportunity?

Stefan Bahamonde, CEO
July 1st 2021, Zürich

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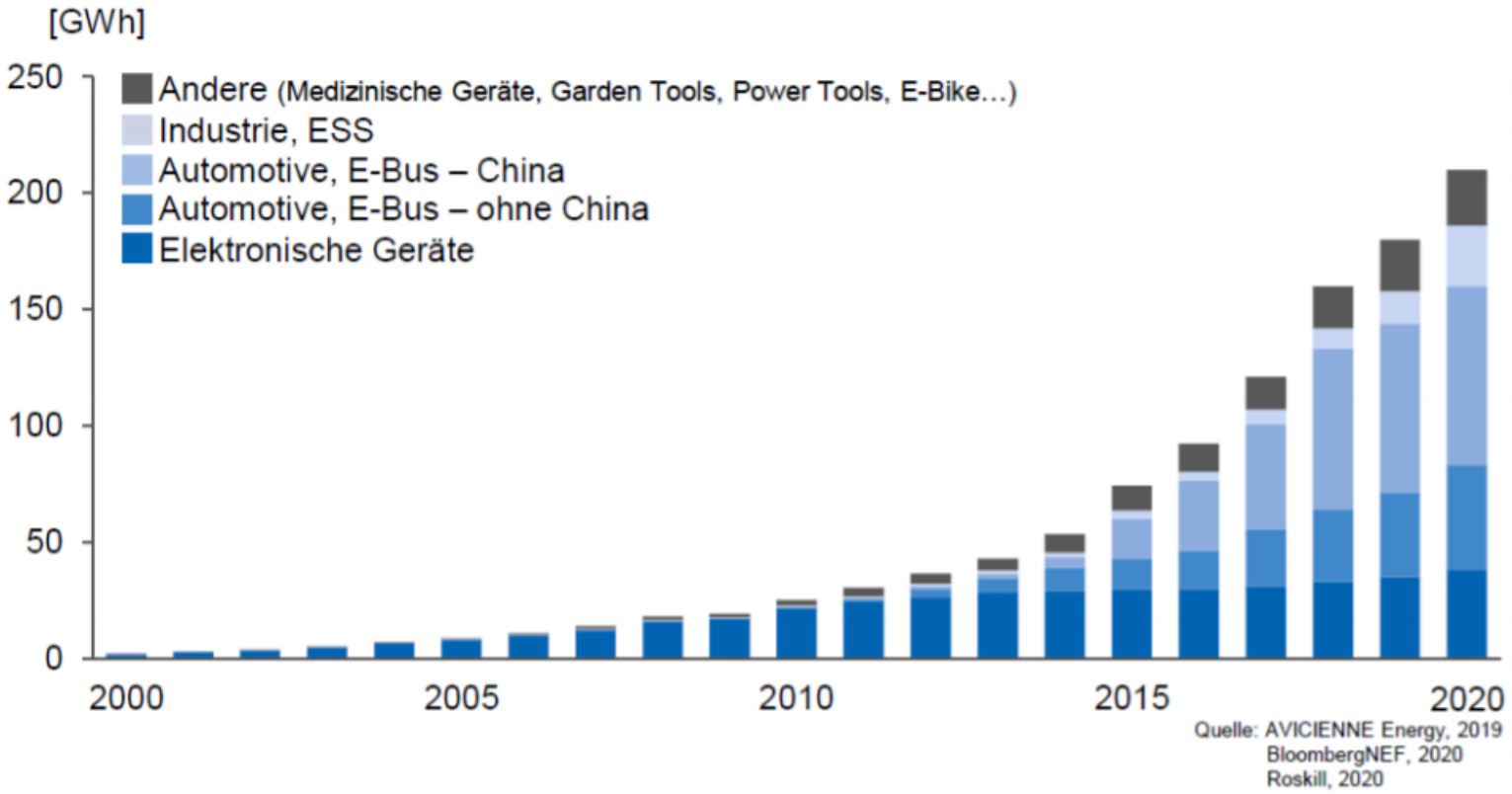
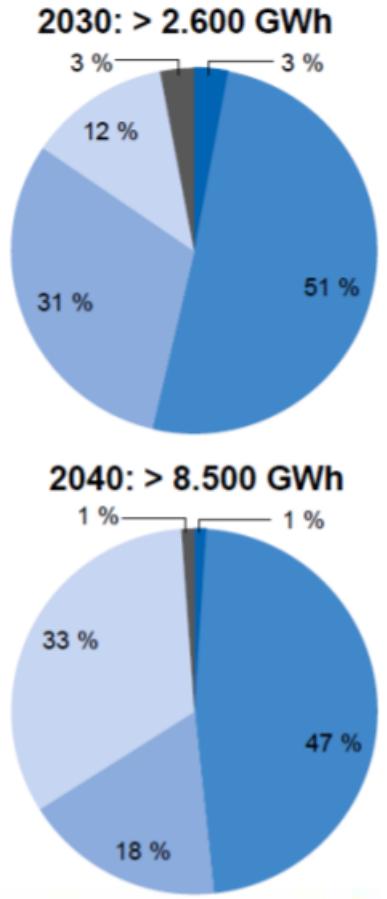
Lithium Ion Battery Global Market





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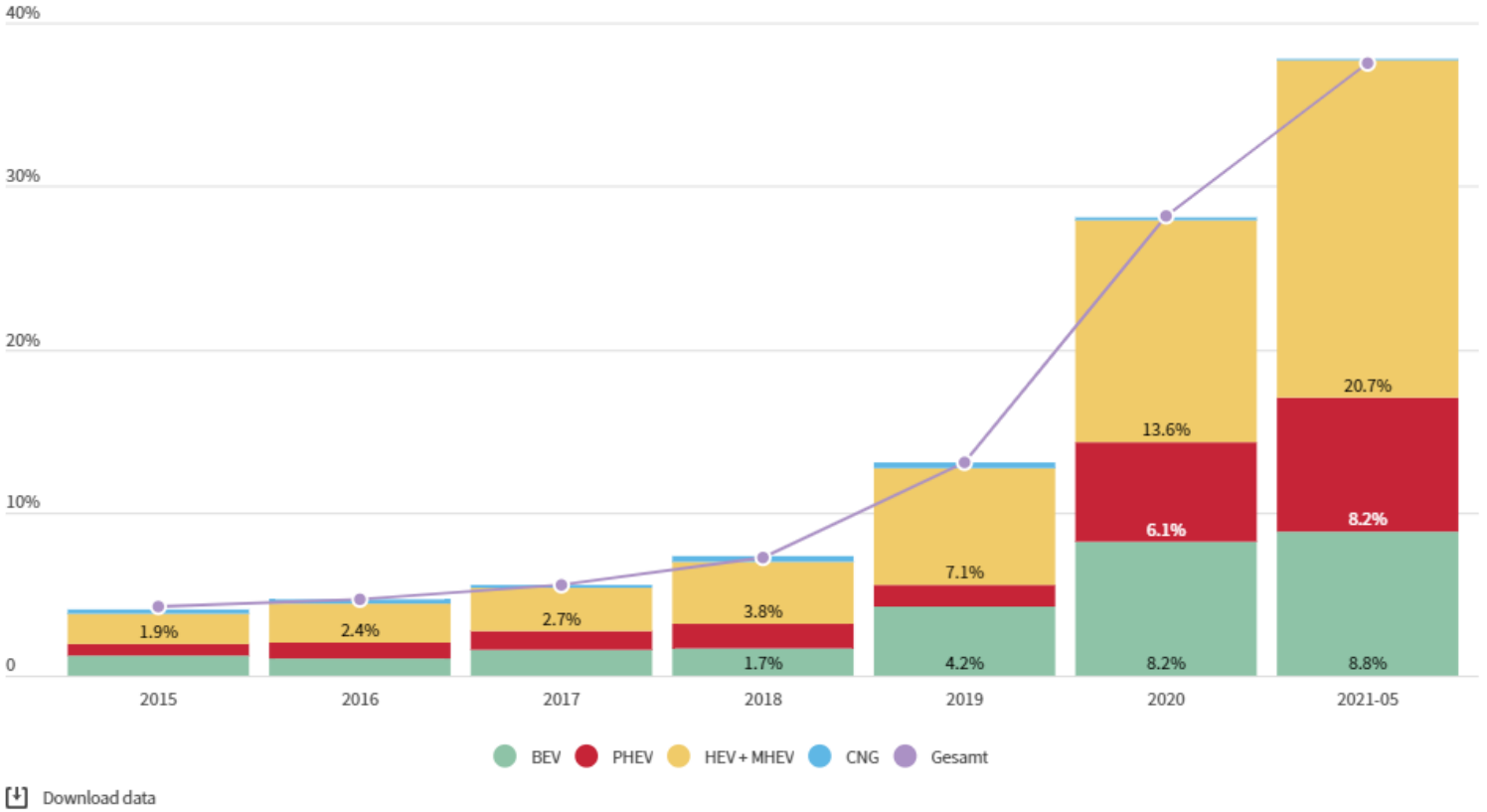
Swiss Market

Market Share of EV's in CH



Download data

BEV: Batterie-elektrische Fahrzeuge / véhicules électriques à batterie
PHEV: Plug-in-Hybrid-Fahrzeuge mit externer Lademöglichkeit / véhicules hybrides rechargeable avec option de charge externe
HEV: (Mild-)Hybrid-Fahrzeuge ohne externe Lademöglichkeit / véhicules hybrides (légers) sans option de charge externe
CNG: Erdgas-/Biogas-Fahrzeuge / véhicules au gaz (nature)

Source: auto-schweiz

Expected amount EoL batteries:

2030: ˜ 3'500 tons (˜700 MWh)

2035: ˜10'000 tons (˜ 2.0 GWh)

2040: ˜ 20'000 tons (˜ 4.0 GWh)

Source: own calculations

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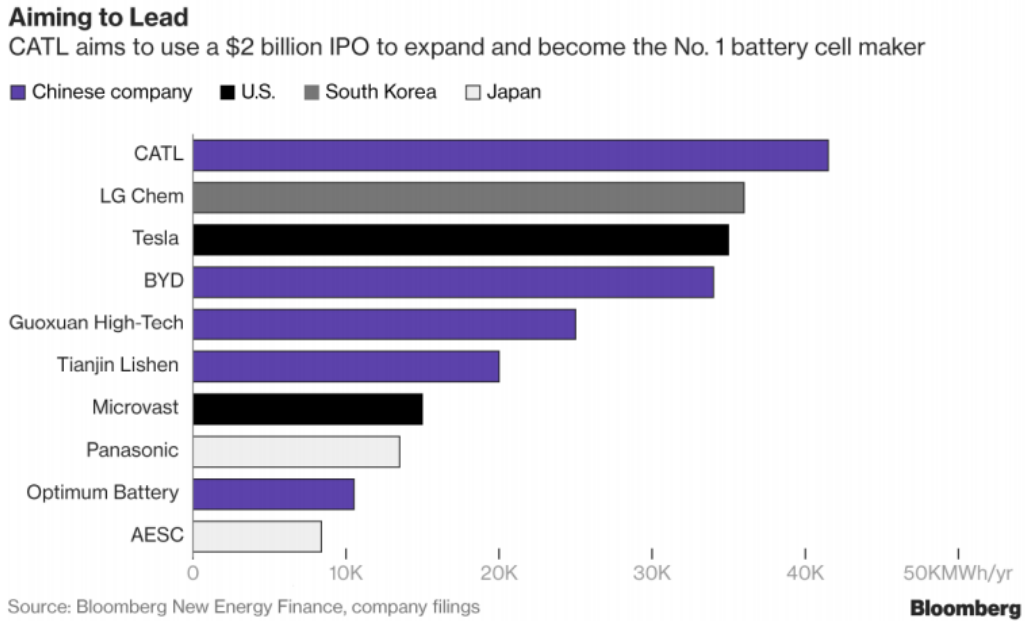
Price Development for Lithium Battery Systems 2010-2020



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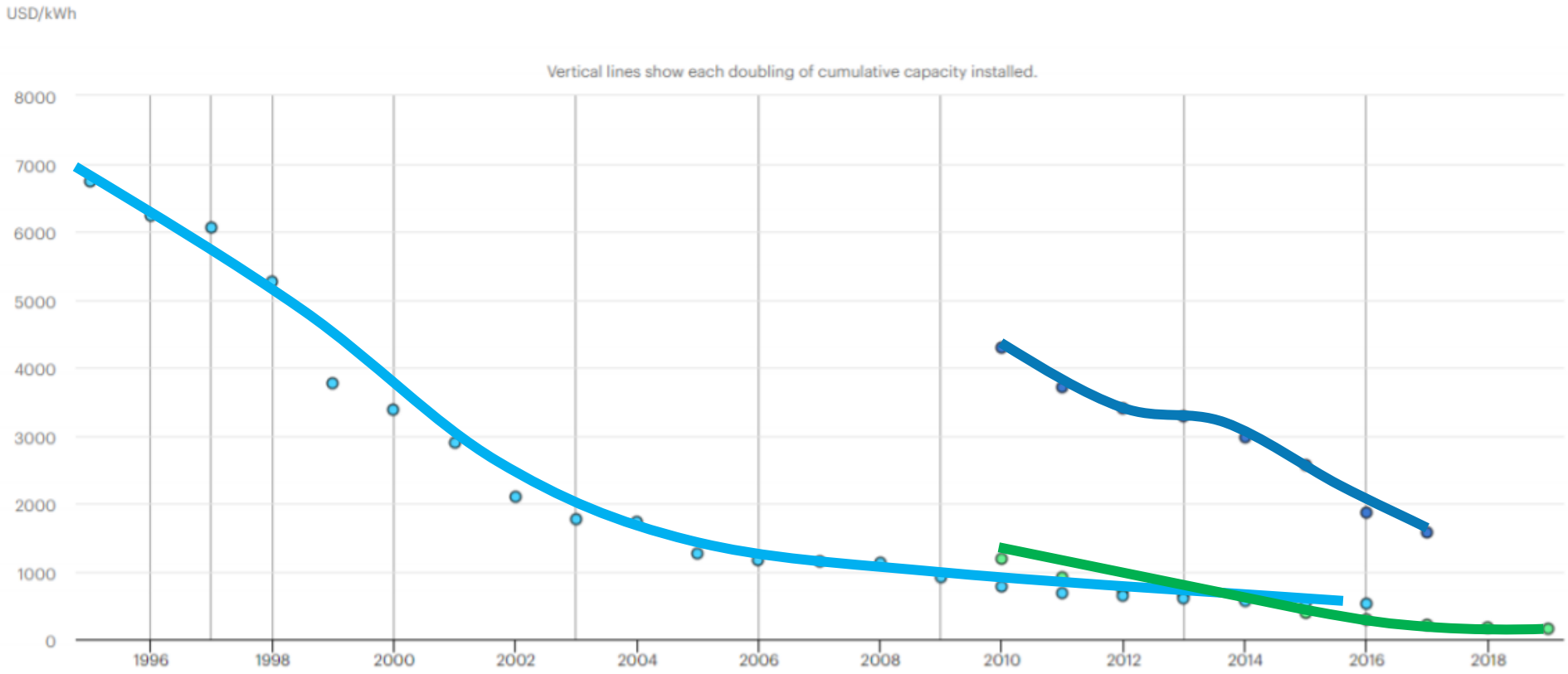
Price Development for Lithium Ion Battery 1995-2019



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Second Life Battery Potential

- End of life: 80% of rated battery capacity (ISO 12405-1/2)

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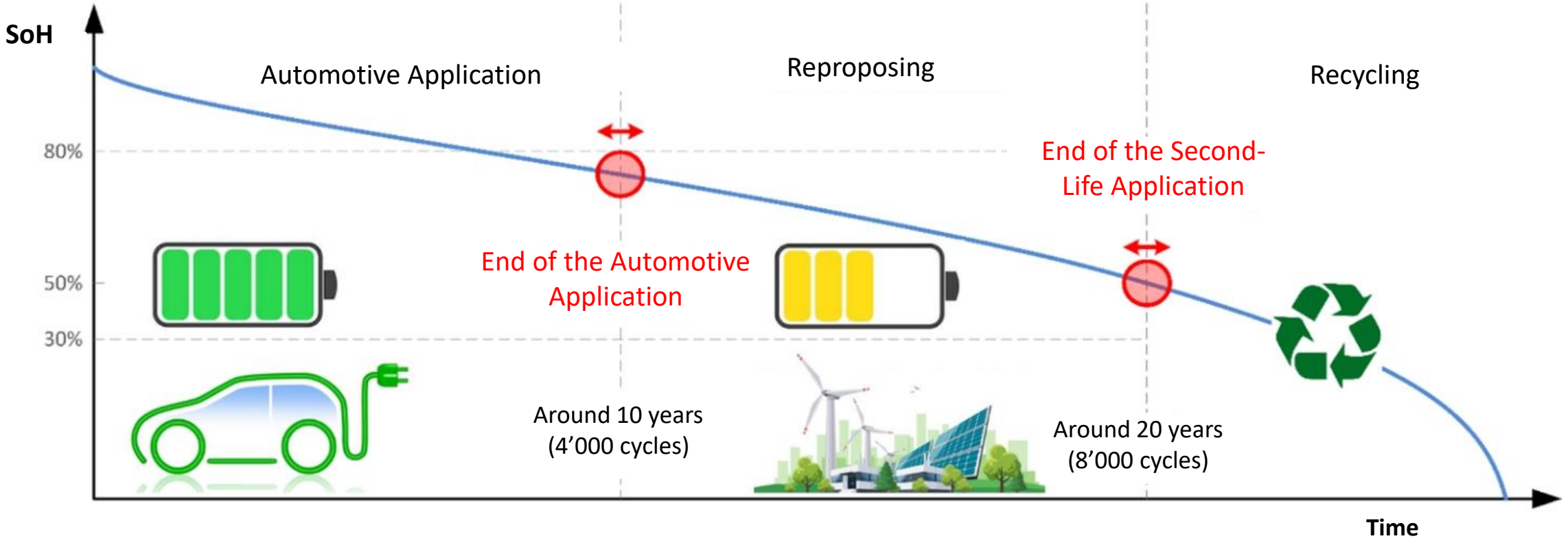
End of First Life - Start of Second-life



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Players

- **Vattenfall, BMW** and **Bosch:** test electricity storage in Hamburg:
  - 2 MW, 2.8 MWh energy storage system
- **Renault-Nissan Alliance**
  - 100 MWh battery storage project using its second-life EV batteries.
- **Mercedes Benz-Energy**
  - 1000 batteries with a total capacity of 13 MWh

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Examples of Second-Life Batteries

Mobiles Battery System

- 330 kWh Kapazität
- 318 kVA Leistung
- BMW i3 High Voltage Lithium-Ion Batteries
- Standardisierter 10 ft Container
- Remote Monitoring

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2.5kWh – 25kWh

35kWh – 500kWh

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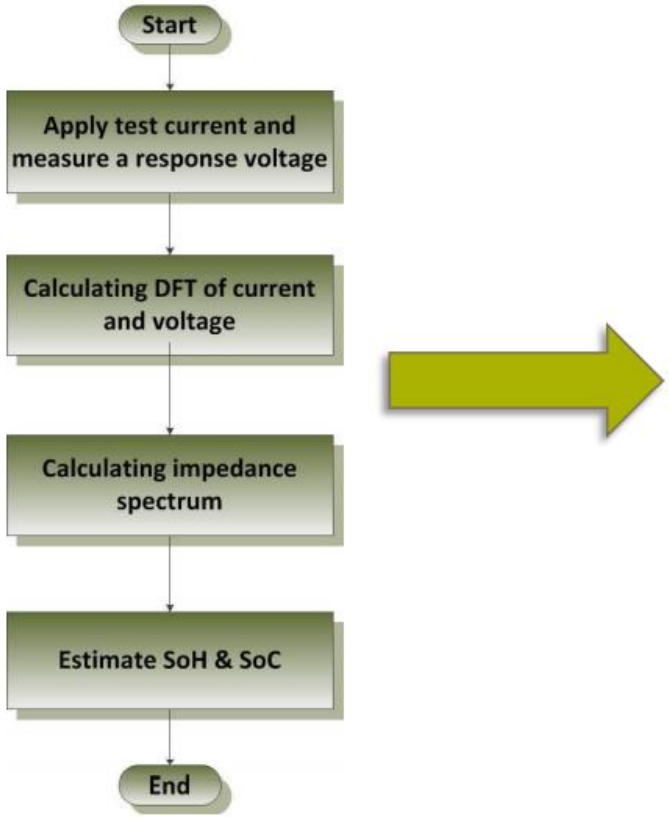
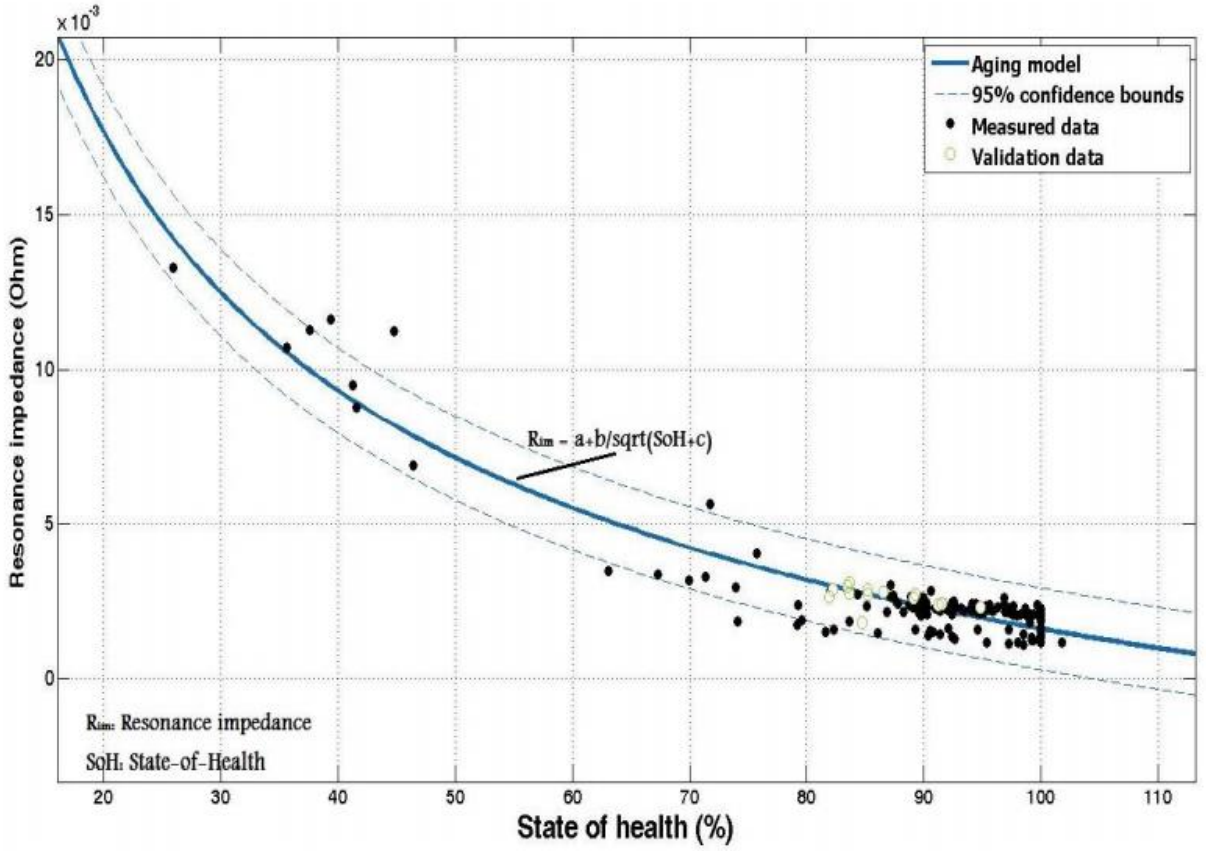
Barriers: Novel and Robust State of Health Estimation





Source: Vrije Universiteit Brussel

➢ **Will there be an international standard?**

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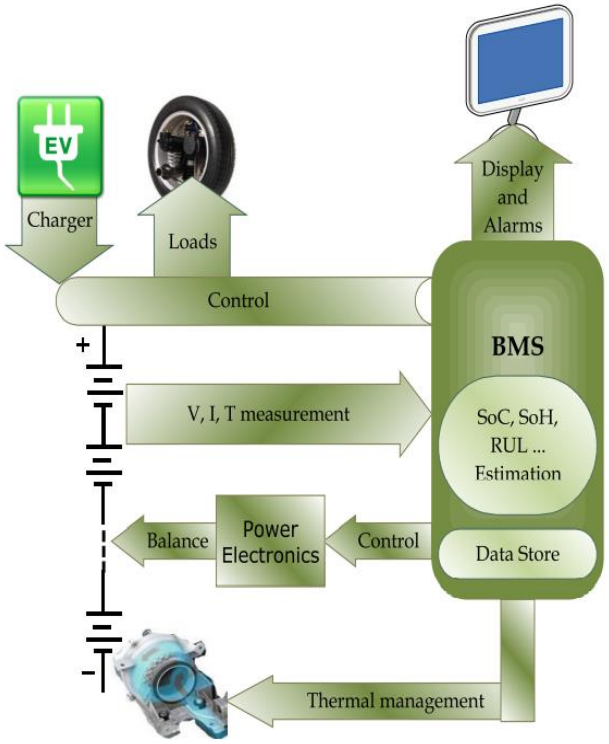
Barriers: Battery Management System



- **BMS also designed for Second-Life?**

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