Center of Competence – Energy Storage

Ueli Kramer (SBB) – Head of CoC
End of fossil fuels, 13.11.2019
Zuerich
Alternative drives
- SBB knows which drive can be used where and how in terms of TCO, resource efficiency, CO2 and user-friendliness (employee health).

Alternative fuels
- SBB knows whether and which applications of "alternative fuels" such as SynFuel, H2, etc. are in terms of TCO, resource efficiency and CO2 are favorable in perspective of the entire value-chain.

Management of energy storage systems
- SBB is in a position to use new renewable energies efficiently over all seasons and can keep the TCO of the overall system low through the efficient management and targeted installation of energy storage systems in the grid.
Our vision

*the entire SBB will use only renewable energies by 2040.*

We achieve this by:

- working directly with the experts in the individual divisions.
- Measures in the fields of action.

**Ambition**

Focus 1: Gas Shunting Switches
Focus 2: Building heatings
Focus 3: Diesel Traction
Focus 4: Road- and Special vehicles
Focus 5: Rental and Services
Over 10'000 systems spread over all fleets. No control, no reliability, heavy, old technology.

Noise and health of employee on the construction fields

Over 8000km overhead-lines and complex mesh at hotspots – expensive to maintain.

Over 46% of the SBB CO2 emission by diesel powered engines

Over 2200 cars powered by diesel
Some of the actual projects

Electrifying Tm III – gaining experience on components and in doing.

Developed a whole new system to fit needs and gaining experience

Exploring new tools and change management – human factor

Zero Emission maintenance – using Second-Life Li-Batteries

Self developed Second-Life storage for remote connectivity
The question about CO2 and technology comparison

Greenhouse gas emissions during the entire life cycle of different vehicle powertrain types in 2017 (left) and 2040 (right). „ICEV“: vehicle with combustion motor; „SNG“: Synthetic natural gas, here produced via electrolysis using the Swiss electricity mix and CO2 captured from ambient air. The Swiss electricity mix is assumed here for both the charging of batteries for battery electric vehicles and for the production of hydrogen for use in fuel cell vehicles. „Gas“ is a mix of 90% fossil natural gas and 10% biogas. Batteries and fuel cells are assumed to be replaced after 150’000 km (2017) and 200’000 km (2040).

Source: ETH -DISS. ETH NO: 25081
Why electric mobility will win – the disruptive change

Source: EPG/ETH Zurich, based on 2017 market numbers / Bloomberg
Aging and technology comparison ...

Source: www.teslaupdates.co / Battery University
What does it mean for the grid, having lots of batteries?

By 2040 SBB is going to have around 340 MWh installed batteries.

According to simulations: 240 MW available as a virtual power-plant!

Main questions are

➢ How and when to charge?
➢ Using for grid regulation or not?
➢ Control and connectivity as well as maintenance and second-life approaches …
Thanks
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