Electric shunting locomotive with battery energy storage for operation without catenary

**The challenge**
Shunting operations are often performed using diesel locomotives, although these tasks mostly take place beneath catenary. The reason for this is usually the «last mile», for example catenary-free tracks at a plant entrance, which cannot be accessed by electric locomotives. Diesel locomotives are more expensive regarding energy and maintenance costs and are mostly operated in idle mode. Because of noise, air and soil pollution their use is undesirable especially in populated areas and in tunnels.

**Aim of the project**
The aim of our project was to prove the technical and commercial feasibility of the integration of accumulator cells into an electric shunting locomotive of type 1063 of the Austrian Federal Railways (ÖBB).

**Procedure**
In a first step the boundary conditions, interfaces and the underlying load collective were determined in order to compile the technical specification for the accumulator.

Subsequently, the best fitting accumulator technology was identified. After the analysis of existing documents and an inspection of a locomotive in use, an integration concept and an electric schematic diagram were established and the available space was modeled in the CAD-system.

**Results and findings**
In the project, the most suitable accumulator technology for rolling stock applications was determined. It was shown that state of the art batteries can fulfill the special requirements of rolling stock but are therefore very expensive: The entire life cycle costs are dominated by the cost of the batteries.

Another important finding of our project was that there is a huge difference between the theoretical performance parameters of accumulators like energy- and power-density and the actual values shown in practical applications.

In a nutshell one can say: The future belongs to hybrid solutions!