

Strategy for electric bus and distribution grid in Swiss mountain region



When recently approached by the regional bus company Engadin Bus to help it shift its entire fleet from diesel to electric and other low-emission buses, EBP drafted a plan for the phased purchase of new vehicles until the year 2035. In parallel, we also coordinated the introduction of the necessary charging infrastructure with the local energy utility St. Moritz Energie.

The introduction of electric buses in towns and cities across Switzerland is expected to increase in the near future as more municipalities seek to reduce carbon emissions, lower noise pollution, and improve energy efficiency. In contrast to cities, however, Swiss mountain regions with their tourist economies face additional challenges when it comes to electrifying bus fleets:

- Steep mountain roads with greater total elevation gains
- Colder temperatures and icy conditions cause additional energy demand for heating and vehicle propulsion
- Seasonal tourism entails significant fluctuations in the demand for public transportation
- Charging infrastructure along bus routes (opportunity charging) is often distributed across multiple municipalities, serviced by multiple energy utilities

Determined to face these challenges, the transport operator Engadin Bus in the mountain region Oberengadin asked EBP to help it develop a plan for converting its bus fleet. The efforts are additionally supported and accompanied by the local energy utility St. Moritz Energie.

Client

Bus company, Energy utility, Swiss Federal Office of Transport (FOT)

Facts

Period	2020
Project Country	Switzerland
Number of buses (2018)	21
Number of bus stops	74
Annual passengers (2018)	2.29 million

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Analyzing charging infrastructures and fleet compositions

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To ascertain the best approach to converting the complex bus operations, EBP first completed an analysis of the existing fleet and bus routes. We also developed alternative fleet scenarios for various heating/air-conditioning solutions and various locations for charging stations. We determined the necessary fleet size and composition, the battery sizes and the charging infrastructure along the bus routes. In parallel, we joined forces with the Paul Scherrer Institute to carry out a lifecycle analysis (LCA) for public transport buses, which included comparisons of the environmental impact various types of propulsion systems (battery electric, hydrogen, hybrid and diesel) could have.

Target scenario for fleet and infrastructure procurement

Working together with Engadin Bus and St. Moritz Energie, we evaluated the scenarios based on their overall cost, environmental impact and feasibility of implementation. We then used our evaluation to determine a target scenario for the bus fleet and the charging infrastructure. Our client had particular interest in recommendations for the role of the local energy utility for planning, installation and operation of charging infrastructure.

With a target scenario in sight, EBP drafted a possible procurement plan for a partially electrified bus fleet and the charging infrastructure extending up to the year 2035. Finally, we harmonized all project results in a coherent and viable electric bus and distribution grid strategy for Oberengadin. This project was co-funded by the Swiss Federal Office of Transport (FOT). Its public final report (Project No.196) can be found here: bav.admin.ch

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