

Country-wide analysis of geothermal potential for railway switch point heaters

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Important switch points of the Swiss railway network have to be heated during the winter month. The heating prevents the switch points of freezing due to snow and meltwater. The freezing of switch points makes a proper functioning impossible and would lead to troubles in the very dense timetable of the railway network.

Currently 10'000 – 11'000 switch point heaters are operated in Switzerland. Either with electricity or gas. The Federal Office of Transport (FOT) was launching a preliminary study to quantify the potential of geothermal resources for switch heating within Switzerland. The perimeter of the study covered 80 % of the Swiss railway system and included the lowlands, the Jura and alpine regions.

Based on existing and provided geodata of the government (swisstopo), geothermal base maps of the cantons and the railway network, the potential of geothermally heated railway switches was derived using spatial intersections and analysis of the vector-based geodata.

In a first step, the *theoretical potential* of geothermally heated switches was derived. This step took the location of each individual switch and intersected it with the prohibition zone maps for borehole heat exchangers. Three classes of locations were resulting: i) theoretically possible location for geothermal heating, ii) handicapped locations and iii) impossible locations.

In a second step, the *technical potential* was evaluated. Each of the individual locations of potentially possible heating's were intersected using sensitivity buffers around *waterbodies, buildings, land ownership* and *railway lines*. The technical potential includes therefore all locations which are suitable regarding the regulation of water conservation and basic technical limitations (e.g. distance to buildings and railway sections.).

Based on the spatial analysis, around 50 percent of the Swiss railway switch point heaters could be technically heated by geothermal resources.

Main challenge of the project was the acquisition and homogenisation of the geodata of the different cantons and railway companies. Regarding to the federalistic system of Switzerland, many of the needed geodata (e.g. geothermal energy maps) are available in different data formats, different level of detail or varying attribution. Often, the data are not consistent at the border between different cantons. Additional and demanding operations for data homogenisation and examination had to be included in the workflow.

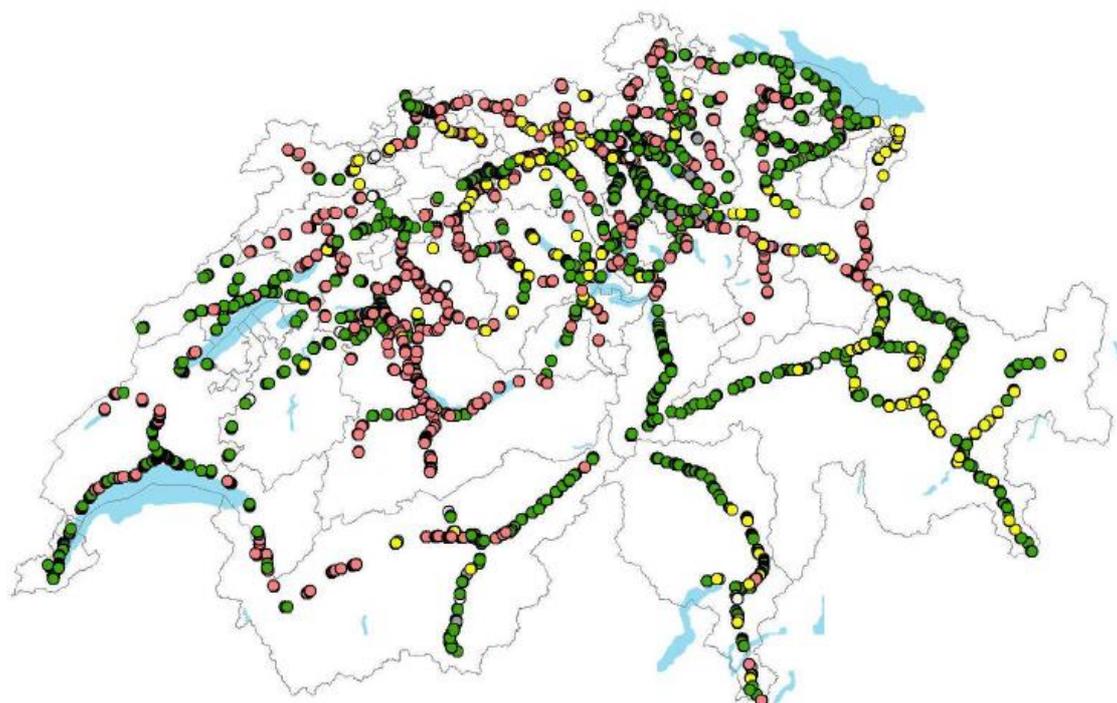


Figure 1. Map of the technical potential of railway switch point heaters (max. 50m distance from switch point to borehole and 3m distance to the centre of the railway tracks)