EXECUTIVE SUMMARY

The purpose of this thesis is to determine the value of the Centralschweizer Kraftwerke AG's option to enlarge the Göscheneralp hydroelectric dam and to make recommendations regarding its exercise. As the standard net present value approach cannot capture the value of managerial flexibility which is given by the enlargement option, instead the concept of real option valuation was applied.

In a first step, the enlargement was thoroughly analyzed by commercial hydro plant optimization software and by a specially customized Matlab application. Based on the analysis, the value drivers of the project were concluded to be the annual margin power price, the margin price spread between winter and summer, climate change affecting the amount and distribution of inflow, the probability of the Muttenreuss diversion and the probability of the Göscheneralp concession renewal. The effects of these value drivers were captured by a linear model which allows calculating the expected annual added value of the dam enlargement for various economical, political and environmental scenarios. Given a pool of 210 price scenarios, the linear model was able to explain 68 percent of the commercial software's and 98 percent of the Matlab application's variation in added values. The winter-summer margin price spread was concluded to be the most influential and uncertain value driver.

In a second step, the dam enlargement project was evaluated based on the linear model of annual added values. The model was parameterized with an expected change in inflow of -10 percent until 2050 and the current perception of a 50 percent probability for the Muttenreuss diversion in 2020 and a 75 percent probability for the concession renewal in 2043. In addition, the model once was calibrated to match the commercial software's output and once to match the Matlab application's output for the added value of the dam enlargement. Given a project launch at the beginning of 2013, the net present value resulted in -0.7 million EUR for the Matlab application calibration and 0.1 million EUR for the commercial software calibration.

In order to evaluate the enlargement as a real option, the winter-summer margin price spread was modeled stochastically with a geometric Ornstein-Uhlenbeck (mean-reverting) process. As an external event, the national referendum on the construction of nuclear plants in 2013 was additionally factored in the process. Depending on the calibration of the process and the linear model, the value of the option to defer the launch of the project was revealed to be between 0.05 and 0.3 million EUR. For all scenarios, it is clearly and unambiguously optimal to wait for the outcome of the referendum in 2013 and then base the decision whether to exercise the option on the magnitude and trend of the winter-summer margin price spread.