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Artikel: Investment projects of the "Kraftwerk Oberhasli AG" KWO : a stony path through the Grimsel granite

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Investment Projects of the «Kraftwerke Oberhasli AG» KWO – A stony path through the Grimsel Granite

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1. KWO: Facts and Figures

The Kraftwerke Oberhasli AG, KWO, was founded in 1925 as a limited company by the Bernese Power Plants Ltd., BKW. In 1932 the first power plant Handeck 1 was completed. Seven more construction stages followed until 1982 and in 1999 the new investment program «KWO plus» was launched.

Today, 50% of the share capital is held by the BKW and 16 $^2/_3$% each by the cities of Berne, Basel and Zurich. The energy produced by the KWO is provided solely to its shareholders who purchase the electricity at production costs. KWO is not operating in the energy trading market. The annual electricity production of the KWO is 2'300 GWhrs, the installed capacity 1'140 MW or 8.4% of the hydroelectric capacity in Switzerland. Different qualities of electricity and system services are provided such as basic load, peak and reserve energy, pumped storage, regulating energy and black start.

Besides the energy production, KWO also operates touristic activities in the Grimsel region such as hotels, cable cars, visitor's service and the partnership KWO-Oberhasli which supports and strengthens the local economy. Another associated business is Grimsel Hydro, a turbine fabrication where turbines, valves and other steel parts are maintained and repaired for the KWO's own plants and external customers. KWO is entrenched in the region and provides nearly 300 full-time jobs and apprenticeships in a rural area.

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2. Hydroelectricity in the Grimsel and Susten area

The catchment area of the KWO covers the Aare and Gadmen valleys in the Bernese Alps from the watersheds at the Grimsel and Susten passes down to Innertkirchen. The Grimsel-Susten area provides ideal conditions for the use of hydroelectrical potential. The area has abundant rainfall, large glaciers, high drops in altitude over short distances, large natural basins for storage lakes and granite as a solid ground for construction.

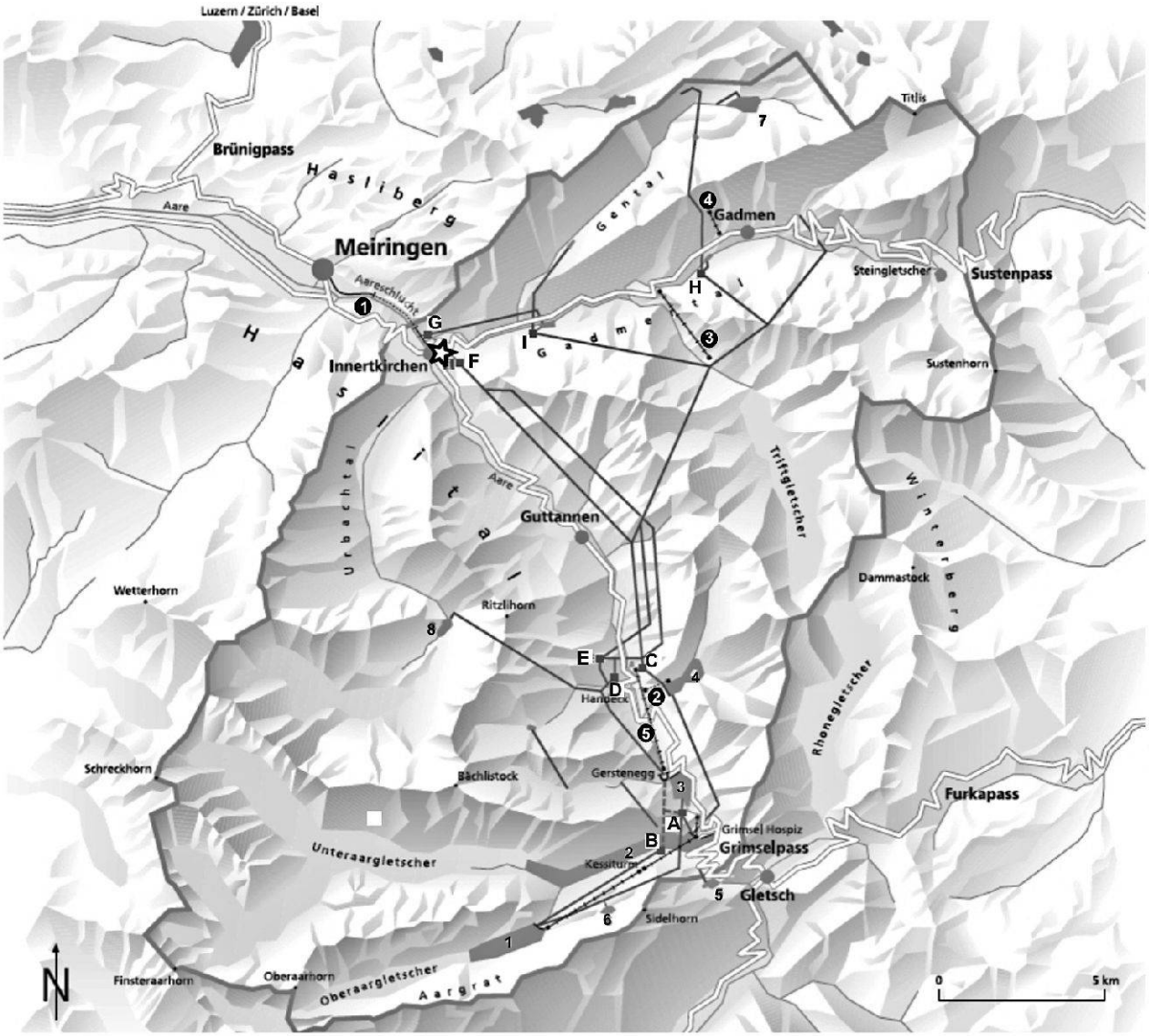
The natural water inflow amounts to 700 million m^3 per year. This water can be stored in 8 storage lakes with a total storage capacity of 200 million m^3. The installations further include 140 km of tunnels and 9 power plants. Due to the gradual growth of the plants in 7 expansion phases the water conveyance system today is very branched and complex and offers high flexibility in the operation of the plants in the Gadmen and Aare valleys.

3. «KWO plus» Investment Program

The goal of the «KWO plus» extension program is to upgrade the existing plants to increase the production of peak and regulating energy and to increase water storage for energy reserves at times of high demand. The main projects are independent of each other and can be realised separately. At the same time, the existing machines will be refurbished and modernized. The «KWO plus» masterplan includes investments of nearly 1 billion CHF and an increase of the installed capacity of 840 MW.

Up to date two projects have been realised – the upgrading of the «Grimsel 1» power plant with the installation of a new turbine and generator and the 10 km long parallel water tunnel from the Handeck power plant to Innertkirchen.

The key project of «KWO plus» is the enlargement of Lake Grimsel with the heightening of the two dams by 23 m. Shortly after the completion of the dams in 1935 it became apparent, that the storage capacity of 95 million m³ was too small compared to the natural water inflow of 200 million m³ per year. Furthermore, 90% of the water inflow occurs during the four summer months and has to be processed immediately or it is lost. With the



- KRAFTWERKE
  - A Grimsel 1
  - B Grimsel 2
  - C Handeck 1
  - D Handeck 2
  - E Handeck 3
  - F Innertkirchen 1
  - G Innertkirchen 2
  - H Fuhren
  - I Hopflauenen
- SEEN
  - 1 Oberaarsee
  - 2 Grimselsee
  - 3 Räterichsbodensee
  - 4 Gelmersee
  - 5 Totensee
  - 6 Trübtensee
  - 7 Engstlensee
  - 8 Mattenalpsee
- BAHNEN
  - ❶ Meiringen-Innertkirchen-Bahn (MIB)
  - ❷ Gelmerbahn
  - ❸ Triftbahn
  - ❹ Tällibahn
  - ❺ Luftseilbahn Handeck-Gerstenegg
- Konzessionsgebiet
- Wasserführende Stollen
- Zugangsstollen Kraftwerke Grimsel 1+2
- ☆ FIRMENSITZ

Fig. 1: Catchment area of the KWO.

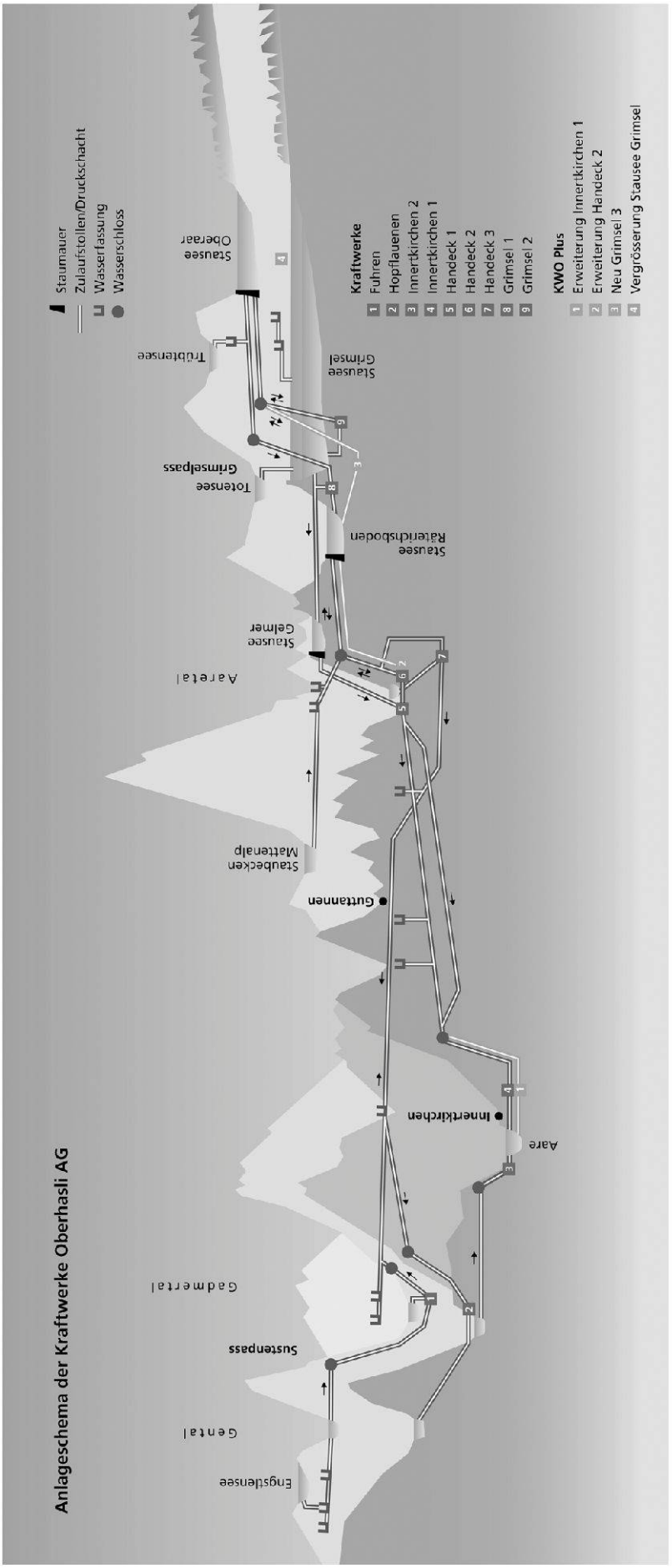


Fig. 2: Longitudinal section through the hydroelectric scheme with the main projects of «KWO plus».

heightening of the dams, the storage capacity can be increased to 170 million m^3 enabling electricity to be produced more flexibly and according to demand. Lake Grimsel would become Switzerland's second largest energy reservoir filled by natural water inflows.

What is the status of the project? In March 2007 the authorities of the Canton Berne granted a building permit for the enlargement of Lake Grimsel. An appeal was submitted by several environmental organisations against this permit. It took the administrative tribunal one year to decide that the building permit was not sufficient and a new concession would be necessary. KWO filed an appeal against this verdict to the federal court which was subsequently rejected in February 2009, i.e. two years after the building permit had been granted. In its statement the federal court interpreted the existing concession in such a restrictive way that all main projects of «KWO plus» will now require a new concession. KWO had to accept this verdict and decided to submit three concession applications for the main projects of «KWO plus», namely the enlargement of Lake Grimsel, the upgrade of the power plants «Handeck 2» and «Innertkirchen 1» with new waterways and two additional turbines and the new pumped storage plant «Grimsel 3» between Lake Oberaar and Lake Räterichsboden.

The Bernese cantonal government announced that it strongly supports an expeditious realisation of these projects as they are fully in line with its energy strategy. It further proposed to mediate a team in which all interest groups are involved. The aim being to involve all members in a dialogue concerning the projects and environmental aspects in order to reach a common consensus. The first meeting of the group was held in July 2009. Bi-monthly meetings are planned until the concession applications are handed in during the second half of 2010. It is anticipated, that the approval process will then take approximately two years.

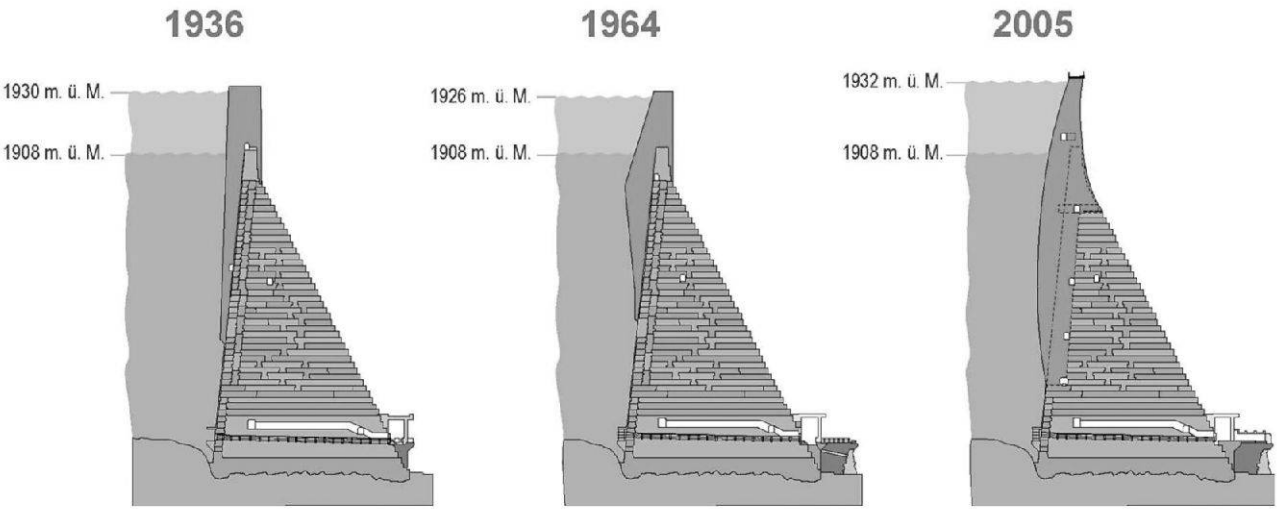


Fig. 3: The enlargement of Lake Grimsel is an old idea. The first project in 1936 was stopped due to other expansions in the catchment area. A second project in 1964 was withdrawn in favour of the investments in nuclear power plants.