SUSTAINABLE ENERGY

Hydropower accounts for approximately 20% of worldwide electricity production. It is as of today one of the only proven and efficient means of storing energy on a large scale thanks to storage as well as pumped-storage hydro technology. In conjunction with conventional or renewable power generation and thanks to its flexibility and reliability, hydropower offers major advantages for the regulation of interconnected power grids.

UNIQUE ASSETS

Since every hydropower scheme is unique, the multidisciplinary, holistic approach of the BG Group allows to build a team of leading specialists and experts for all technical, environmental and social aspects relevant to your hydro project. From strategic development to operation, we accompany you at every stage:

- Strategic development
- Financing mechanism
- Concept study
- Feasibility and detailed design
- Tendering
- Construction
- Operation
- Renewal of hydropower concessions
- Due diligence

Safety of the public at large is a key aspect of the BG Group’s services. Our competences in this area range from classical seismic structural analysis or hydraulic dam break analysis to sophisticated detailed, quantitative risk assessment and the elaboration of emergency contingency plans.

The BG Group also takes part in the Energy Project Facilitator (EPF) in Africa, created in association with R20 and Alpiq. The EPF undertakes technical, social, environmental, legal and economical feasibility studies, thus converting potential renewable energy projects into bankable investment opportunities.

WORLD-CLASS REFERENCES

From the high head scheme Cleuson-Dixence with a gross head of 1’883 m and an installed capacity of 1269 MW (423 MW per Pelton unit) to the new construction of the Chéliff dam in Algeria, or the small urban hydropower plant of Seyon (235 kW), the BG Group’s competence has a proven track record for the complete range of hydropower and dam projects.

CUTTING-EDGE TECHNOLOGY

The BG Group optimises its engineering solutions through the use of 3D computational and design tools as well as the best available modelling techniques. The BG Group actively collaborates with the Swiss Federal Institutes of Technology of Lausanne and Zurich to be at the forefront in applying tomorrow’s technologies. During construction, our engineers benefit from first-hand experience with the latest materials and techniques. Furthermore, many of the BG Group’s specialist engineers are lecturers in well-known universities in Europe, transferring skills and expertise to tomorrow’s engineers.
HYDROPOWER PLANTS

COMPLETE HEPP
New hydropower plant Rhone-Oberwald near the source of the Rhone river including a bottom water intake, desilting basin, lined pressure shaft, powerhouse cavern. Gross head 278 m, flow 5.7 m³/s, installed power 12.4 MW, 2 Pelton turbines, annual generation 40 GWh/a.

PUMPED- STORAGE PLANT
Design and construction of the new underground powerhouse of the Nant de Drance pumped-storage hydroelectric scheme. Powerhouse cavern dimensions: 194 m x 32 m x 52 m, 6 variable-speed pump-turbines (900 MW total). Flow 360 m³/s, gross head 275 m.

HIGH-HEAD SCHEME
Rehabilitation of the Cleuson-Dixence hydropower plant steel-lined pressure shaft. Design and construction of a bypass shaft and gallery. The Cleuson-Dixence scheme has a gross head of 1'883 m and its 3 Pelton turbines generate an installed power of 3 x 423 MW.

HYDROPOWER PLANT EXTENSION
Extension of the existing Lavey plant on the Rhone river in Switzerland by a fourth Kaplan unit, including a new water intake, pressure tunnel, surge shaft and extension of the existing powerhouse cavern. Gross head 42 m, discharge 75 m³/s, installed power 28 MW, annual generation 75 GWh.

SMALL HYDROPOWER PLANTS (SHPPS)

HIGH-ALTITUDE SMALL HYDRO
New high mountain SHPP Delise on 2025 masl with an installed power of 2 MW and a gross head of 157 m. Cast iron penstock design and construction on a very steep mountain side under challenging natural conditions. Project developed with BIM.

SHPP IN URBAN ENVIRONMENT
New Seyon aval SHPP on the Seyon river in the city of Neuchâtel in Switzerland. Integration into the existing cityscape. Construction works under very difficult access conditions and stringent constraints as to flood management. Flow 1.4 m³/s, gross head 20 m, installed power 235 kW.

SHPP IN RURAL ENVIRONMENT
Feasibility study of the SHPP Lomé in Cameroon. The plant located in a rural environment will supply clean energy into the isolated network and thereby replace existing fossil power generation.

SHPPS IN DRINKING WATER SUPPLY SYSTEM
Construction of the two SHPPs Abu Alanda in Jordan. The two schemes are integrated into a new drinking-water transfer project with a 35-km-long water pipeline. Gross head 180-200 m, total installed power 2 MW.

DAMS

EXPERT ASSESSMENTS
Swiss federal expert assessment for the annual inspection of the Arnon dam. Seismic verification of the embankment dam built in 1958 on the Tschärzisbach river in the canton of Bern. Crest length 140 m. Reservoir volume 10.3 M m³.

DAM RISK ANALYSIS
Detailed risk analysis on the Verbois dam. Height 34 m, crest length 410 m, reservoir volume 13 M m³: quantitative risk analysis using fault-tree analysis and Monte-Carlo methods. Sensitivity analysis, improvement of dam operation and safety and flood risk management.

OWNER’S ENGINEER
BG brought its expertise during the construction of the Cheïff dam in Algeria: embankment dam (height 48 m, crest length 440 m, volume 443'000 m³). Pumping station. Concrete gravity flood spillway with four gates (spillway capacity 6'700 m³/s).

SEISMIC VERIFICATION OF DAMS
Seismic verification of the Day concrete gravity dam and the tulip spillway tower, both built in the canton of Vaud (Switzerland). Height 32 m, crest length 100 m. Analysis of the spillway capacity.
HYDROPOWER

The BG Group accompanies clients through every stage of their project’s development, from site identification to commissioning and operation of hydropower schemes.

HYDROELECTRIC POTENTIAL
Strategy for the development of hydropower in the canton of Neuchâtel, in Switzerland. The potential on wastewater as well as drinking water networks is also assessed, as is the potential for pumped-storage.

HEPP CONCESSION RENEWAL
Renewal of the concessions of the Barberine hydropower plants of the Swiss Federal Railways (SBB). Installed capacity 173 MW. Hydrological study, technical due diligence and investment plan for the next concession period. Solutions for environmental negotiations and compensations.

FINANCIAL STUDIES

RESEARCH & DEVELOPMENT
Research and development centre in the field of hydropower in Bhutan. Strategic study for the definition of the terms of reference, the definition of services, the elaboration of the business plan as well as the implementation roadmap. Design of the laboratories and definition of capacity building plan.

HYDRAULIC MODELLING
1D, 2D or 3D modelling represent a powerful tool for decision making. Free surface flows, pressurised flow, transient regimes or complex flow conditions can be simulated numerically in 3D thanks to the experience and creativity of our specialists.

DAM BREAK STUDIES
Hydraulic dam break modelling is carried out using 1D or 2D numerical simulation tools in order to determine the propagation hydrograph, the height and speed of the dam break wave, submergence times and zones at risk.

RISK ANALYSIS
Risk analysis, fault tree and sensitivity analysis, technical and financial optimisation of dams and hydropower projects. Improvement of safety and operation, decision making and residual risk management.

STRUCTURAL MODELLING
3D modelling of concrete dams, embankment dams and appurtenant structures using finite element methods for structural analysis (non-linear behaviour of materials, seismic analysis), identifying structural deficiencies and defining required rehabilitation measures.

NUMERICAL STUDIES