OUR EXPERTISE:

- Project development
- Feasibility studies
- Guideline design
- Final design
- Tender design
- Construction design
- Construction supervision
- Commissioning
- Operation studies
- Rehabilitation

SPECIFIC STUDIES

- Strategic studies
- Expert assignments
- Numerical simulations
- Safety and risk assessments
- Dam break analyses

MULTIDISCIPLINARY APPROACH

- Hydrology
- River hydraulics and works
- Hydraulics structures
- Civil engineering
- Mechanical engineering
- Electrical engineering
- Environmental engineering
- Resettlement Action plan
- Geotechnical engineering and geology
- Building Information Modelling (BIM)

TYPES OF PLANTS

- Run-of-the-river
- Storage
- Pumped-storage
- Mini hydro

TYPES OF STRUCTURES

- Dams
- Water intakes
- Headrace tunnels
- Penstocks
- Pressure shafts
- Underground powerhouses

EQUIPMENT

- Turbine
- Generators
- Auxiliaries
- Valves, gates trash racks etc.
- Electrical equipment
- Monitoring and control systems

ENG驶ING BY THE BG GROUP, WORLDWIDE

HYDROPOWER SUCCESS

For over sixty years, the BG Group’s multidisciplinary teams have been designing innovative hydropower schemes, providing sustainable energy for the world of tomorrow and contributing to efficient water resources management.

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 reservoirs and pumped-storage technology. In addition, used 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
- Concept study
- Feasibility and detailed design
- Tendering
- Construction
- Operation

From the smallest hydropower unit to the largest pumped-storage scheme, from a small irrigation project to a large flood protection project or a water distribution network, the BG Group helps you to make the most of your hydroelectric potential while respecting the environment.

Safety of structural elements as well as of the public at large is a key aspect of the BG Group’s services. Our competences in this field 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 has experience in launching innovative financial mechanisms to support the development of renewable energy projects, as with the Energy Project Facilitator (EPF) in Africa, created in association with R20 and Alpiq. The EPF will undertake technical, social, environmental, legal and economical feasibility studies, thus converting potential projects into bankable investment opportunities.

Since many consultants and specialist engineers in the BG Group have a background in the hydropower industry (production, distribution, operation), we understand your needs and future challenges.

WORLD-CLASS REFERENCES

The BG Group is proud of its excellent references in the design and construction of new hydropower schemes and dams, the rehabilitation and upgrading of existing schemes of all sizes, as well as the relicensing of hydropower plants.

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-STOREAGE PLANT
Design and construction of the new underground powerhouse of the Nant de Drance pumped-storage hydro-electric 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 SCHEME
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 and 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.

DRINKING WATER SHPPS
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 with focus on failure of spillway gates. 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, flood risk management.

CONSTRUCTION OF A NEW DAM
Chéllif dam in Algeria: embankment dam (443'000 m³) and concrete gravity flood spillway with four gates. Height 48 m, crest length 440 m, spillway capacity 8'700 m³/s.

SEISMIC VERIFICATION OF DAMS
Seismic verification of the Day concrete gravity dam and the tulip spillway tower, both built in 1956 on the Orbe river in the canton of Vaud (Switzerland). Height 32 m, crest length 100 m.
STRATEGIC STUDIES

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.

CONCESSION RENEWAL OF HEPPS
Renewal of concessions for hydropower plants of the Swiss Federal Railways. Technical assessment of the situation and investment plan for the next concession period. Solutions for a negotiated approach and environmental compensations.

FINANCIAL STUDIES

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 engineers.

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.

PROBABILISTIC ANALYSES
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.

NUMERICAL MODELS
3D modelling of concrete and embankment dams using finite elements for the verification of structural safety, safety against instabilities, structural deficiencies, definition of qualitative paraseismic rehabilitation strategies.

FULL CONTACT INFORMATION FOR THE BG GROUP: www.bg-21.com/contact

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