



Capability Statement

Hydropower Engineering

TABLE OF CONTENTS

1	GROUP PROFILE & PHILOSOPHY	1
2	PROFESSIONAL COMPETENCE IN HYDROPOWER ENGINEERING	2
3	FIELDS OF EXPERTISE	4
4	SERVICES	5
5	CONTACT AND REFERENCES	6



1 GROUP PROFILE & PHILOSOPHY

Group Profile

The ILF Group is an international engineering and consulting firm that has been helping its clients successfully execute technically demanding industrial and infrastructure projects for **more than 50 years**.

With **2,000 highly qualified employees** at more than **40 office locations** across five continents, the companies of the ILF Group have a strong regional presence.

This enables ILF to interact with clients and project parties on site. At the same time, close cooperation within the network of the ILF Group makes it possible to draw on international experts and make use of their special experience, processes, and tools.

The combination of local presence and international expertise ensures that client needs are met in the best possible way. The company is privately owned by the founding families and is therefore completely independent. It has no affiliation with manufacturers, suppliers, or financial institutions.

ILF's main **business areas** are:

- Energy & Climate Protection
- Water & Environment
- Transportation & Structures
- Oil, Gas & Industrial

Vision, Values & Beliefs

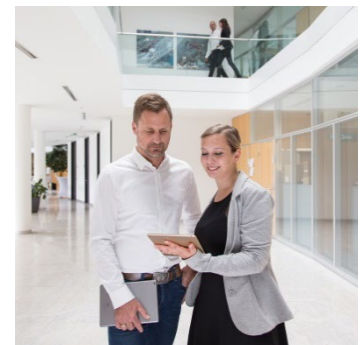
At ILF, we passionately devote our energy to pursuing the vision of **improving the global quality of life**. This is what drives us and makes us believe in our work.

We are motivated by our ambition to achieve **market leadership through quality**. This is why we focus on a structured approach to problem solving and constantly strive to improve. But above all, it is our great people that really make the difference. We truly believe in **respect, honesty, reliability** and **fairness** as a solid foundation for all our interactions.

We continue to spearhead **Engineering Excellence**. Our independence allows us to provide creative solutions while continuously acting in every client's best interest.



CEO Klaus Lässer



2 PROFESSIONAL COMPETENCE IN HYDROPOWER ENGINEERING

Introduction

The growing population and the ongoing endeavour to improve living standards are leading to an increase in global energy demand.

The limited availability of fossil fuel resources and environmental problems arising from the use of these resources make a transition to renewable energies imperative. In this regard hydropower stands out as particularly environmentally friendly, sustainable and economical in the long term.

ILF Consulting Engineers ranks among the leading design and consulting companies in hydropower engineering.

Project Highlights

- 1,400 MW – one of the largest pumped storage plants in Europe (Atdorf PSP, Germany)
- 1,000 MW – one of the largest pumped storage plants in Switzerland (Limmern PSP)
- 480 MW – one of the largest pumped storage plants in Austria (Limberg II PSP)
- 120 MW – one of the oldest pumped storage plants in Germany (Niederwartha PSP)
- 23-km-long pressure tunnel and power house in Prutz – for cross-border renewable energy generation in Austria and Switzerland (Gemeinschaftskraftwerk Inn Hydroelectric Project)
- 800+ m gross head (Palas Valley Hydropower Plant, Pakistan)
- Water pressure tunnel Ø 14.4 m – the world's largest hard rock TBM (Sir Adam Beck Hydroelectric Power Generating Complex, Niagara Tunnel Project)

Added Value

- **Extensive experience** – successful development and implementation of more than 130 hydropower projects in more than 100 countries around the globe in the last 30 years.



■ Diversified activities in various roles for different types of clients across the globe

- Public clients and energy suppliers
- Private clients and project developers
- Construction companies and/or contractors
- International banks and financial institutions

■ Comprehensive development of hydropower plants

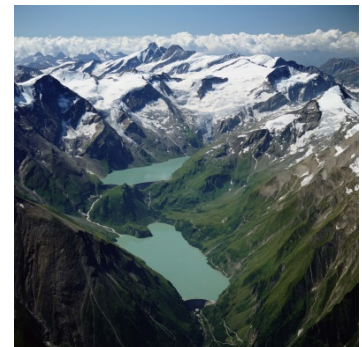
- New construction and/or rehabilitation of hydropower plants, as well as analysis of hydropower potential
- Design and implementation of run-of-river, diversion, storage and pumped storage plants
- Wide scope of projects with capacities ranging from a few MW to more than 1,000 MW

■ One-stop shop principle – interdisciplinary development of hydropower projects providing integrated solutions

- All fields covered by in-house experts (e.g.: hydrology, civil engineering, geotechnical engineering, tunnelling, geology, mechanical and electrical engineering, hydraulic steel structures, environmental engineering, etc.)
- Extensive staff resources with more than 100 experts in the hydropower sector and the option to adjust the size of project teams by drawing on the expert pool of the ILF Group of about 2,000 employees
- Consistent continuity and reliability of the involved project teams as well as great flexibility
- Close cooperation on special topics (e.g.: model tests) with universities and renowned international experts

■ Economic, efficient and top-quality projects

- Great quality awareness as well as continuous further development and innovation
- Standardised internal design processes to ensure top quality and efficiency of results
- End-to-end optimisation of projects (technical, environmental and economic aspects)
- Effective application of special software developed in-house (ILF Hydropower Plus, RENRisk, I-FLOW) for efficient steady state and transient hydraulic dimensioning, analysis and simulation as well as optimization of economic efficiency of plants taking into account their entire service life
- Optimum use of software tools such as HEC-RAS 1D, 2D, BASEMENT, NUMSTA3 (1D-CFD software), openFOAM (3D-CFD software), NEPLAN (power grid



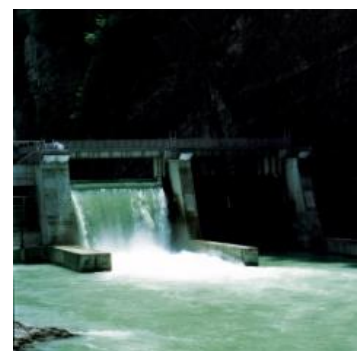
calculations), PrimTech (3D design and simulation software for substations and power grid connections) to fully satisfy client and project needs

- Ongoing project management of hydropower plants in the design and construction phase to accumulate extensive knowledge about the most important market players and prices
- Broad experience with project financing and in-depth knowledge of relevant standards and procedures

■ Focus on environmental aspects and approval conditions

- Early involvement of all stakeholders (authorities, environmental organisations, population, etc.) to optimize the chances of projects gaining acceptance and the likelihood of receiving authority approval
- Tailored support for clients during associated public relations activities
- Integrated design approach, taking account of technical, economic and environmental aspects to ensure overall project optimization
- Production of environmental and social impact studies in line with standard national and international specifications (e.g. Equator Principles, IFC guidelines, etc.)

■ Complete independence with no affiliation to construction companies, suppliers or financial institutions



3 FIELDS OF EXPERTISE

■ Hydropower plants

- Low-head plants
- High-head plants
- Run-of-river plants
- Storage plants
- Pumped storage plants
- Hybrid power plants (e.g. pumped storage combined with photovoltaic or wind energy systems)
- Gravity storage plants
- Drinking water power plants

■ Dams and weirs

■ River engineering works, flood protection structures



4 SERVICES

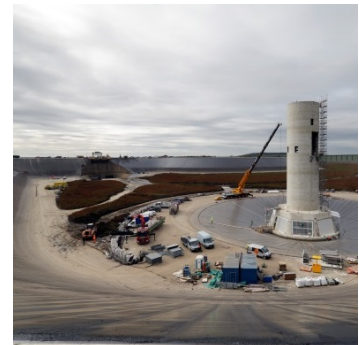
ILF renders all services required to successfully implement hydropower projects. These services include:

Project Services for Hydropower Plants

- Project management including project control
- Studies of alternatives for hydropower plants using ILF's special in-house software
- Conceptual design
- Feasibility studies
- Financial studies and analyses, tariff modelling, cost-benefit analyses
- Bankable feasibility studies
- Permit application design
- Basic design
- Preparation of tender documents (for different contract models such as FIDIC, DB/EPC, DBB, PPP, etc.)
- Detailed design
- Construction design
- Construction supervision
- Commissioning and support during operation
- As-built documentation

Technical Services for Hydropower Plants

- Hydropower and pumped storage potential studies and master plans to identify economically and ecologically feasible power plant sites for specified areas
- River management programs
- Hydrological analyses, sediment transport studies
- Natural hazard analyses (avalanches, rockfalls, debris flows, floods, etc.)
- Studies on reservoir sedimentation and flushing
- Steady state and transient hydraulic analyses
- Civil and structural engineering for dams and structures
- Tunnels, caverns and underground structures
- Geological and geotechnical consulting services
- Mechanical and electrical engineering
- Design of turbines, hydraulic steel structures, instrumentation and control equipment
- Environmental and social impact assessments and monitoring
- Landscape protection and nature conservation measures



5 CONTACT AND REFERENCES

Contact Person

ILF will be pleased to assist you with your projects and challenges.

Reinhard Fritzer

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Selected References

Please find attached a selection of ILF hydropower project references.

