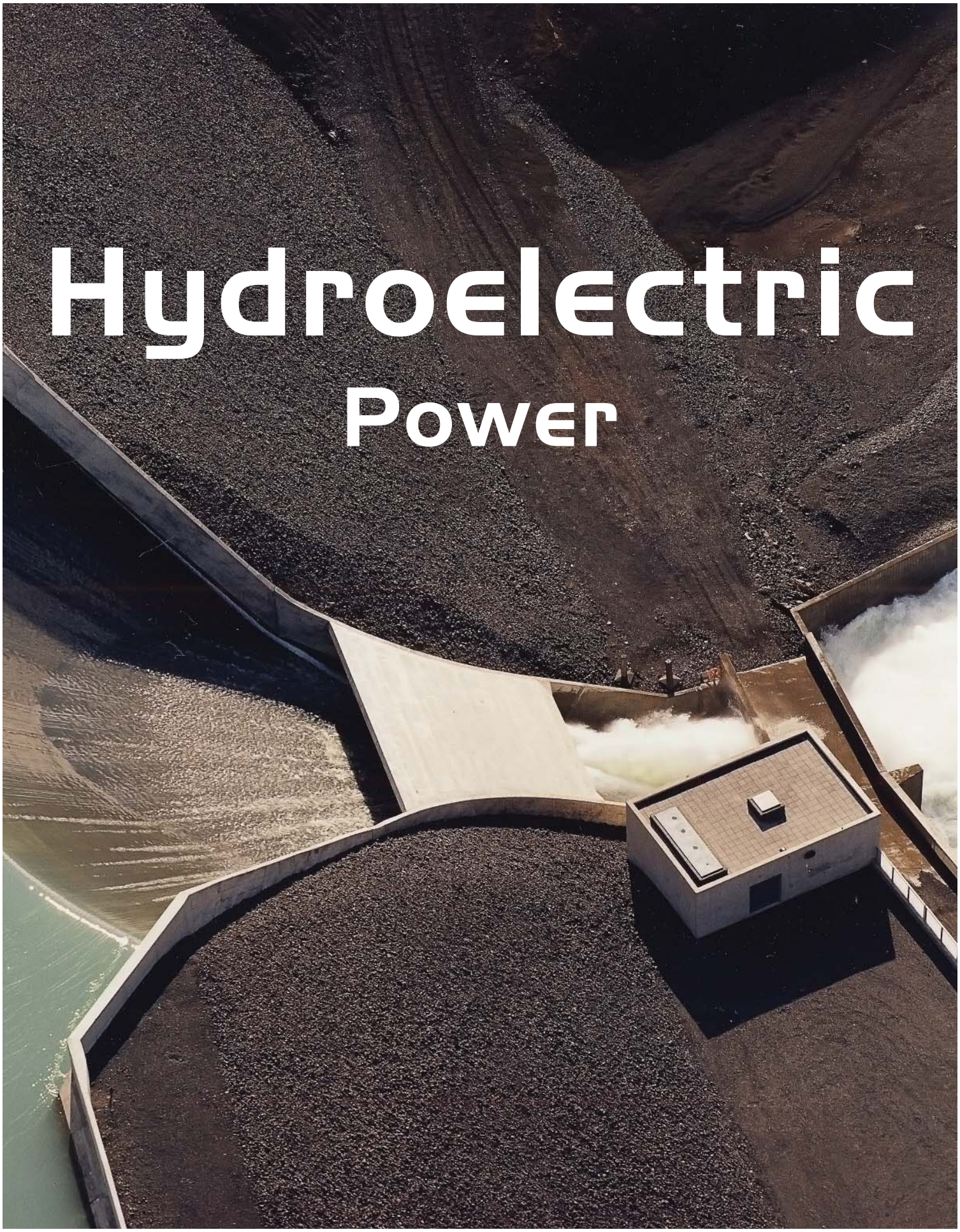
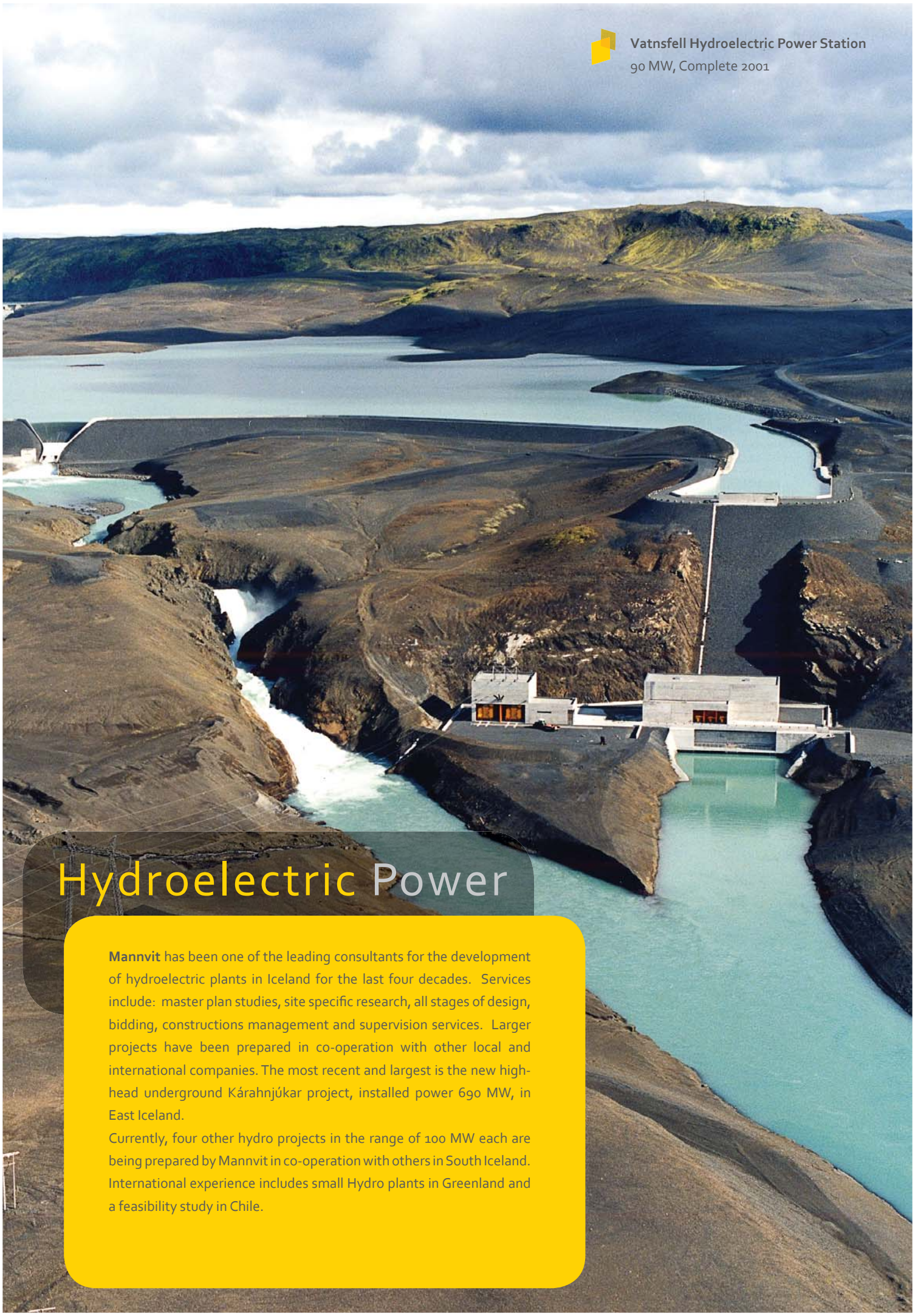
Hydroelectric Power



MANNVIT
ENGINEERING

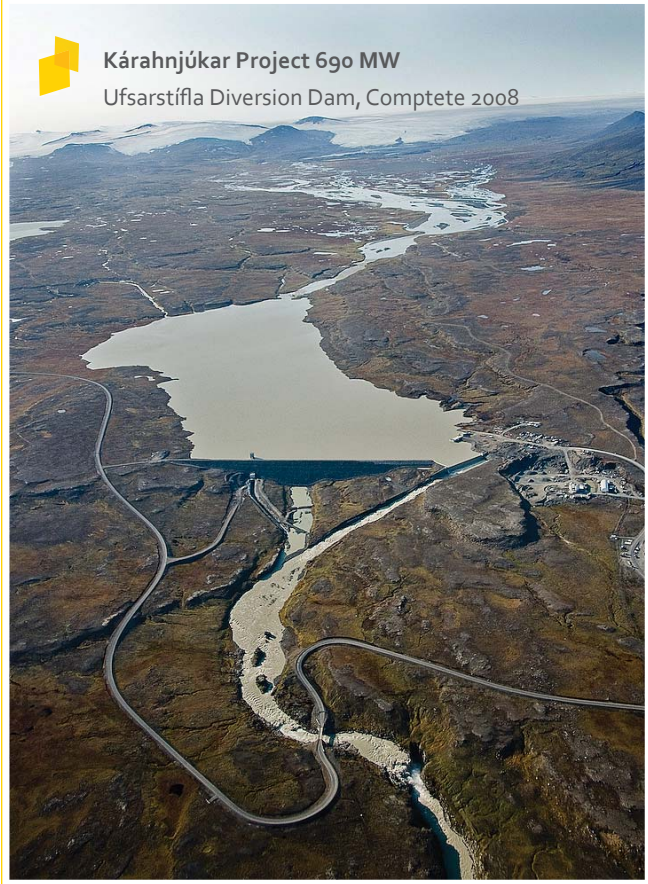


Vatnsfell Hydroelectric Power Station
90 MW, Complete 2001

Hydroelectric Power

Mannvit has been one of the leading consultants for the development of hydroelectric plants in Iceland for the last four decades. Services include: master plan studies, site specific research, all stages of design, bidding, constructions management and supervision services. Larger projects have been prepared in co-operation with other local and international companies. The most recent and largest is the new high-head underground Kárahnjúkar project, installed power 690 MW, in East Iceland.

Currently, four other hydro projects in the range of 100 MW each are being prepared by Mannvit in co-operation with others in South Iceland. International experience includes small Hydro plants in Greenland and a feasibility study in Chile.



Power Transmission

Since the early seventies, Mannvit has played a major role in all aspects of the high-voltage overhead transmission grid in Iceland.

Activities include:

- Preparation
- Planning
- Routing
- Cost estimating
- Foundation and tower design
- Bidding process
- Construction management

The majority of power carried in the transmission grid is delivered to power intensive industries with an extremely high demand for stable power delivery (e.g. the aluminium industry). Power delivery is based on redundant lines, and is designed for extreme wind loads, heavy icing, and even snow and mud avalanches. The major lines are designed as 400 kV lines, currently operated at 220 kV. The company has also provided specialized consulting for extreme conditions in Greenland.

Research

Geological, geotechnical, geodetical and hydrological research and analysis is a major basis for any power project. Mannvit has extensive experience and expertise across all of these fields and has supervised studies in these areas for numerous power projects. The company has also handled testing and quality control during construction of tunnels, dam sites and power stations. In addition, Mannvit operates its own laboratory for testing of construction materials, fills, aggregates, concrete, rock samples, etc. **Vatnaskil**, an affiliated company, is Icland's leading firm in numerical modelling for groundwater hydrology, river runoff and geothermal reservoir assessment as well as specialised hydraulics.

Environmental Impact Assessmant

Iceland introduced the Environmental Impact Assessment process into law in 1993, based on European Union directives. Since then Mannvit has been very active in this field of services, managing these processes for major projects. The work includes managing a variety of scientific research related to natural science, society as well as technical research, compiling of EIA reports and conducting consultations for the developer with stakeholders, institutions, NGOs and the general public. Projects include both hydroelectric and geothermal as well as power intensive industrial projects.

Mannvit Engineering

Mannvit Engineering of Iceland was founded in 1963 and now employs a staff of approximately 400. The company provides a broad range of engineering and technical research services. Since the early seventies, Mannvit has been active in the area of renewable energy and has been involved in the development of most power plants in Iceland, both hydroelectric and geothermal. Services for these projects range from research and other preparatory work to complete design and construction management. Services have also included active participation in the development of Iceland's high-voltage transmission grid - up to 400 kV with substations.

The Mannvit website

Mannvit's corporate web site, www.mannvit.com contains further information and project examples for hydroelectric and geothermal power plants and overhead high-voltage transmission lines as well as contact information.

MANNVIT

DEDICATED TO THE DEVELOPMENT OF GREEN ENERGY

Mannvit hf.

Grensásvegi 1
108 Reykjavík
Iceland

@: mannvit@mannvit.is
w: www.mannvit.com

t: +354 422 3000
f: +354 422 3001