



Power Station
Construction

However much power you need
Our range in power station construction



Power Station Construction



At the Core of Construction. Worldwide.

Founded in 1965 as a small construction machine dealership, ALPINE is now one of the leading construction groups in Europe. Today, our name is synonymous with state-of-the-art know-how, extreme flexibility, tailor-made solutions and the use of the latest in material and equipment. We cover the entire spectrum of construction output with competence in every single sector and complete projects of any kind and size reliably and on time in more than 30 countries. In doing so, we are committed to each project as if it were the only project we had.

The classic construction activities are complemented by a number of services

in project administration, planning and financing. Our intensive commitment to R&D is to ensure the highest possible quality in future constructions and secure our leading position in construction procedures and material.

ALPINE's success is based on the motivation and qualification of our employees. High investments in training of employees and our above-average commitment in safety at work are witness that we take responsibility for our employees seriously. Responsibility for people also means responsibility for the environment. Part of our company culture is a careful use of natural resources.

PORTFOLIO ALPINE GROUP

- Bridge Construction
- Building Construction
- Energy
- Environmental Engineering
- Foundation Engineering
- Power Station Construction
- Railway Construction
- Road Construction
- Sports Facility Construction
- Underground Construction



Tsankov Kamak / BG

Type: Hydroelectric power plant
 Construction period: 2004 - 2010
 Contract value: € 379 million

04



HEPP Ermenek / TR

Type: Hydroelectric power plant
 Construction period: 2002 - 2009
 Contract value: € 156 million

05



Neurath / DE

Type: Brown coal-fired power pl.
 Construction period: 2006 - 2008
 Contract value: € 30 million

06



Hamm, Westphalia / DE

Type: Coal-fired power plant
 Construction period: 2008 - 2012
 Contract value: € 185 million

07

FURTHER REFERENCE PROJECTS

www.alpine.at

- Annabrücke / AT // Run-of-river/pondage power plant
- Kopswerk II, Baulos 3 / AT // Underground hydroel. p. pl.
- Shanxi Wanjiashai / CN // Underground hydroel. power pl.
- Salzburg / AT // Combined heat and power plant
- Lambach / AT // Storage power plant
- Ertan / CN // Hydropower Station
- Basochhu, Lower Stage / BT // Hydropower Station
- Nussdorf / DE // Hydropower Station
- Freudenau / AT // Hydropower Station
- Kellerberg / AT // Hydropower Station
- Paternion / AT // Hydropower Station
- Ferlach - Maria Rain / AT // Hydropower Station
- Bischofshofen / AT // Hydropower Station
- Datteln / DE // Coal-fired power plant
- Grafenrheinfeld / DE // Nuclear power plant
- Essenbach / DE // Nuclear power plant
- Karlsruhe / DE // Coal-fired power plant
- Moorburg / DE // Coal-fired power plant

Powering ahead

Increasing demand for energy is one of the greatest challenges of our time. As a future-oriented firm, ALPINE been active and successful in the construction of modern power plants for several years. Growing awareness of the need to protect the environment and the predicted climate change mean that new constructions and modernisation of existing plants is necessary.

It is exactly here that ALPINE is a valued and important partner because of its extensive experience, high level of commitment and the many innovations it has created for national and international clients. In the future, ALPINE will continue to focus its energies on making its mark in this field.

ALPINE IS A TECHNOLOGY PIONEER IN POWER PLANT CONSTRUCTION

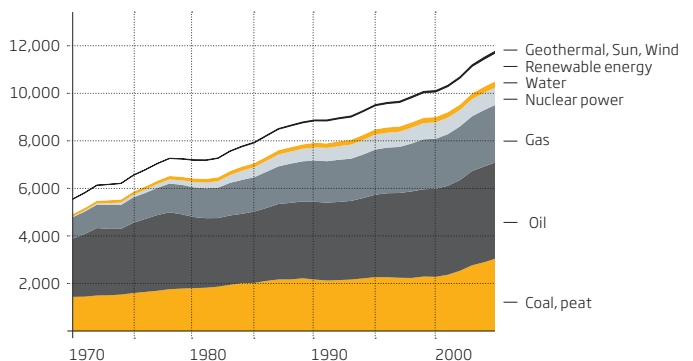
Due to the development of special processes, ALPINE has a technology lead of two to four years:

- ▶ An **innovative climbing formwork scaffolding** enables a 20 - 40 % reduction in construction time. Operational safety is also increased.
- ▶ An **acid-resistant high-performance concrete** avoids the need for a time-consuming and costly internal formwork coating for cooling towers.
- ▶ The operating principle of the **slip forming technique** developed by ALPINE is based on continuous lifting of a formwork structure while the usual concreting tasks such as sheeting, reinforcement, concrete pouring and aftertreatment are carried out at the same time.

EVEN MORE KNOW-HOW

- ▶ Damming very deep ravines
- ▶ Extensive sealing due to geological conditions
- ▶ River diversion by means of tunnel construction

GLOBAL PRIMARY POWER SUPPLY



Unit of measurement in **Mtoe** (Mega tonnes of oil equivalent)

Statistics excl. electricity trade · Source: OECD / International Energy Agency © 2008



Tsankov Kamak

The hydroelectric power plant is located in the Rhodopes, a mountain range on the border with Greece, and is part of the Vacha cascade. The entire construction of the power plant is technically very demanding. The project comprises the construction of the arch dam (135 m) with all the auxiliary structures such as the diversion tunnel and cofferdam

for the construction period. In addition, a turbine hall with return structures is being constructed in the river. The project also requires a new bypass road to be built and an 800 m long tunnel. A potential reduction in CO₂ emissions of approx. 200,000 t annually will make an important contribution to environmental protection.

ALPINE is the sole contractor and coordinates up to **1,200 workers** on the site at a time.

SPECIAL FEATURES

- ▶ ALPINE is undertaking all the construction work. This employs **around 1,200 workers from the region** with 600 working around the clock.
- ▶ In the Gashina valley an **area of 60,000 m²** has to be sealed due to the geological conditions.
- ▶ **River diversion** through an 800 m long tunnel
- ▶ A **road diversion** with a total length of 24 km is also being constructed, as are **access roads** and **production units** to cope with the required construction works.

HYDROELECTRIC POWER PLANT



BULGARIA

Construction work: **entire power plant**
 Dam: **double-curved concrete arch dam**,
 Height: **135 m**, Crest length: **457 m**
 Rated capacity: **2 x 40 MW**
 Annual power generation: **185 GWh**
 Construction period: **2004 - 2010**
 Contract value: **approx. € 379 million**





HEPP Ermenek

Lying above the (planned) Kayrektepe and (operational) Gezende power plants, HEPP Ermenek is the third and largest project of the group. The power plant was equipped with 2 Francis turbines each with an output of 160 MW. The annual energy production is calculated at 1,100 GWh.

ALPINE was building the turbine hall and all tunnel and shaft structures. During construction the river was diverted through two 6.5 m diameter tunnels. A tailrace channel provided the connection to the River Ermenek, which was significantly deepened in this area.

Tunnel construction machine with peak daily excavation performance of up to **62 m**

SPECIAL FEATURES

- ▶ Water intake: **8 km** long headrace tunnel, **600 m** long shallow inclined shaft and **500 m** long horizontal section
- ▶ **4 km** long diversion tunnel to the Ermenek headrace tunnel
- ▶ Excavation performance of tunnel construction machine with peak daily excavation performance of up to **62 m**
- ▶ The turbine hall will be built above ground. **L 56 m; W 32 m; H 41 m**
- ▶ The deep ravine was dammed with **270,000 m³** of material.

HYDROELECTRIC POWER PLANT



TURKEY

Construction work: **turbine hall, tunnel and shaft structures**

Dam: **Height 210 m, length 123 m**

Rated capacity: **2 x 160 MW**

Annual power generation: **1,100 GWh**

Construction period: **2002 - 2009**

Contract value: **approx. € 156 million**





Neurath

Two cooling towers were constructed in Grevenbroich close to the Neurath power plant for the new F and G generating units which are optimised for brown coal. Their extremely advanced design presented a completely new technical challenge. The climbing scaffolding developed specially for this, adjusted automatically to construction

progress and the shape of the cooling tower. The development and optimisation of a special acid-resistant high-performance concrete, put ALPINE at the technology forefront in current power plant construction and gives the company a two to four year technology lead in comparison with its competitors.

ALPINE **innovations** reduce construction time, increase safety for the workers and reduce costs.

INNOVATIVE CLIMBING SCAFFOLD

- ▶ The formwork scaffolding climbed in stages corresponding to the concreting process, in rings of around 120 cm height. Climbing the towers took place automatically using hydraulic cylinders, with the telescoping working platform adjusting to the hyperbolic shape of the cooling tower.
- ▶ This innovative special solution stands out due to a 20 - 40 % reduction in construction time in comparison with scaffolding systems available on the market and an accompanying increase in worker safety.

ACID-RESISTANT HIGH-PERFORMANCE CONCRETE

- ▶ Use was made of a special high-performance concrete with a new mixing technique, developed and optimised by ALPINE, making a costly internal coating of the cooling towers unnecessary. This saves six months during construction.
- ▶ It also dispenses with the need for recoating the cooling tower interiors every 15 years, thus avoiding an operational downtime of six months.

BROWN COAL-FIRED POWER PLANT



GERMANY

Construction work: **Cooling towers**

Natural draught cooling towers in climbing construction technique: **each 172 m in height**

Formwork area: **each 80,000 m²**

Acid-resistant high-performance concrete

Construction period: **2006 - 2008**

Contract value: **approx. € 30 million**





Hamm, Westphalia

The coal-fired power plant consists of two structurally similar power plant units and is being built on the existing power plant site owned by RWE Power in Hamm. ALPINE is carrying out all the excavation, concreting and finishing.

With an efficiency of around 46 %, the newplant will be amongst the most up-to-date and efficient coal-fired power plants in the world. The output will total 1,600 MW. The silos and stair towers in the turbine halls are prominent, rising to 120 m in height.

ALPINE's construction site logistics ensures that **completion dates are met.**

SPECIAL FEATURES

- ▶ The operating principle of this slip forming technique developed by ALPINE is based on **continuous vertically inclined lifting** of a formwork structure while the usual concreting tasks such as sheeting, reinforcement, concrete pouring and aftertreatment are carried out at the same time.
- ▶ Bulk concrete components up to **6,000 m³ per section**.
- ▶ All the material required is produced on the construction site using **two ALPINE mixing plants**.
- ▶ Turbine deck with **outstanding dimensional accuracy**.

COAL-FIRED POWER PLANT



GERMANY

Construction work: **Excavation, concreting and finishing work for approx. 40 main and auxiliary buildings**

Stair towers and silos in slip-form construction technique: **up to 120 m height**

Turbine houses with total gross volume: **450,000 m³**

Concrete paving: **255,000 m³**

Construction period: **2008 - 2012**

Contract value: **approx. € 185 million**



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