

# The power to change

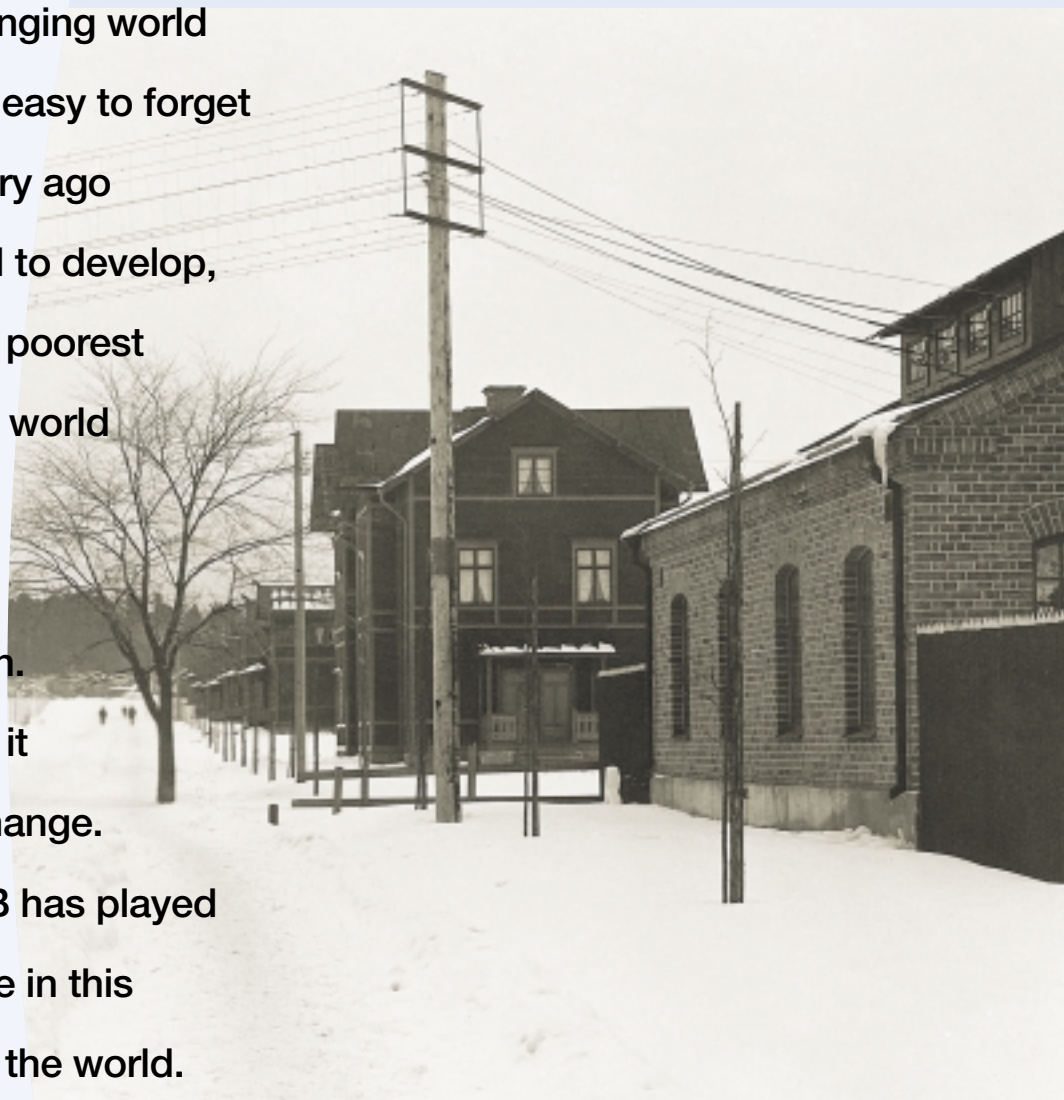


ABB Power Technologies, Power Systems Substations – World leader in power technology

**ABB**

# The power to change

In a rapidly changing world  
it is sometimes easy to forget  
history. A century ago  
Sweden started to develop,  
from one of the poorest  
countries in the world  
to a leading  
industrial,  
high-tech nation.  
Electricity gave it  
the power to change.  
Ever since, ABB has played  
a significant role in this  
change all over the world.



*Hällsjön: The 1893 Hällsjön project was the first ABB turnkey project in Sweden that relied on a 3-phase solution. The functional specifications were as follows: To produce electrical power from a waterfall, transfer it across a distance of 14 km [8.5 miles] to the Grängesberg mines, and install the equipment needed to pump out the mining water. The motivating factor behind this project was the increasing demand for iron ore worldwide.*

# The values you value most may be those that are least visible

Cities, municipalities, utilities, and companies all over the world have entrusted us with the task of delivering power transmission and distribution systems that meet the challenges of tomorrow. Offering complete turnkey systems, tailored to your needs, we continue to develop the power to change. Our vision is to create long-term values. However, the values you value most may be those that are least visible.

## What time is money?

The life time of a power system covers several decades. But most of its qualities and features are determined during the fairly short planning and specification period. This is why we look forward to analyzing your needs pro-actively and in partnership with you – by taking the time to think, you save money in the long run.

## Early involvement

When you involve us early in your plans, we are able to analyze your needs in terms of functions, rather than in terms of technical details. In this way, you can take advantage of our capacity to develop innovative and cost-effective technical solutions. The sooner we understand your needs, the sooner we will be able to meet them.

## Optimal up-time

Our dialogue will lead to fewer failures, low maintenance needs, and smooth operations at all levels. Those who depend on reliable power transmission and distribution will benefit from optimal up-time and a minimal risk of losing production capacity.

## Life-time economy

As an experienced, trustworthy and responsible partner, we can provide power technology that improves the earning potential of your investment and reduces life-cycle costs. Our responsibility covers the entire life of the project, from idea to phase-out, and includes environmental considerations and life-cycle analysis.

## Fast, safe delivery

Fast delivery is also an important factor. For every month that we are able to move your operational phase forward, your finances benefit.



# What makes **the difference?**

Know-how is based on learning – and learning is based on cooperation and communication.

For over a century, we have been, working together with skilled, competent customers all over the world.

Although our cultures, values, and visions may differ, these customers regard us as an honest, thoughtful partner, one who is easy to cooperate with and always available whenever and wherever needed.

# What does synergy mean?

You have a right to expect highly reliable, energy-efficient power systems from a world leader in power technology. You should also expect superior engineering know-how and a technical edge. But synergy means more than that. What more can we do to exceed your expectations?

## **We set the standards**

As creative problem-solvers we offer power systems designed with a wide range of high quality components, which not only fulfill national standards but also set and change world standards.

## **Easy to use**

To insure safe, reliable operations, we are always careful to implement ease-of-use into our system designs, operational documents, maintenance, and training programs.

## **Compatibility**

Should you need to upgrade any part of your system in the future, you will find our compatibility feature indispensable – or you may need to upgrade more than you expected.

## **Scalability**

Furthermore, compatibility means scalability – the flexibility to grow with changing needs, while making optimal use of your initial investment.

## **Exceeding your customers' expectations**

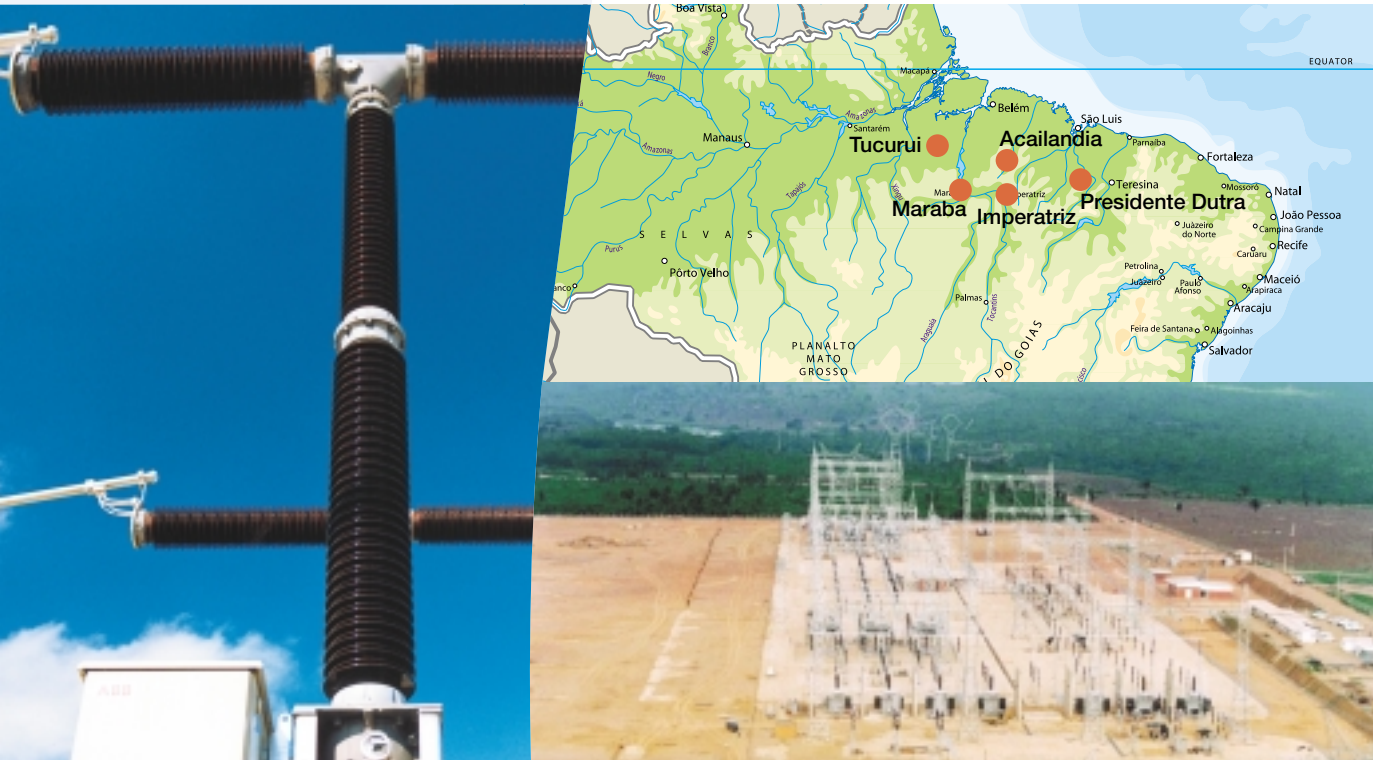
By placing our extensive international business understanding, branch experience, and operational process know-how at your disposal, we can help you exceed your customers' expectations. When we achieve this, we will be close to exceeding your expectations.

## Ask our **customers...**

...customers who trust us. They know that we always do our best and never give up, whether our solutions are based on proven technology or cutting-edge innovations.

# A simple solution to a complex problem

Brazil – Interconnection Norte-Nordeste, 500 kV.



**Interconnection Norte-Nordeste:** A large-scale high voltage turnkey project in the remote areas in northern Brazil represents a complex task. Completing it in less than 22 months, despite the often severe weather conditions, was a challenge, but we succeeded – thanks to our extensive technical expertise, long experience with local conditions, and unique ability to form strong customer relations.

## The highest possible availability

In Brazil, the largest power transmission projects are released as concessions. For the winning concessionaire this means a commitment to construct, operate, and maintain the project for 30 years. The projects are measured on availability – and the penalties for interruptions are substantial. Hence, our client needed a solution with the highest possible availability. To improve the client's finances, we were also asked to cut the delivery time against a bonus.

## Where is the simplicity?

Although we often find simple, innovative solutions to complex technical problems, the simplicity in this case was not only related to technology. Above all, it was related to the client's confidence in our capacity to take full responsibility for this complex project. Our turnkey solution meant less trouble and fewer risks for the client, from both short and long-term perspectives.

*The complete turnkey project Interconnection Norte-Nordeste in Brazil includes 924 km [574 miles] of transmission lines, one new 500 kV substation, extension of four existing substations, four banks of series capacitors, and several locally manufactured shunt reactors. Every integrated part is of the highest standard and compatible with all the others, as well as with the existing grid. Through ABB's optimized high-availability solution the interconnection secures a stable power supply to the growing industry in northeast Brazil.*

# A unexpected, invisible solution

Sweden, Västerås – Mälarenergi, Station CM, 130 kV.



**Urban – Mälarenergi:** The new substation in Västerås was the first of its kind in the world. It is a compact, safe AIS substation – and almost invisible. If you go looking for it, you will not find a huge space, crowded with transformers, switching components, and overhead lines. Instead, you will see a small building, containing the entire substation. Its name is Urban – perfectly suited to its use.

## One of our most radical innovations

What Mälarenergi initially asked for was an upgrade and extension of the old substation to meet the fast-growing need for an available, cost-efficient power supply from the expanding city. Instead we offered Urban, which at the time was one of our most radical innovations. In addition to providing a very profitable solution from a life-cycle perspective, Urban also saved valuable space in the immediate vicinity of the city.

## Space reduced by 80 percent

Today, ABB has delivered Urban to many cities around the world. The ever-increasing demands for reliable power distribution in modern cities, together with rising real estate prices, and aesthetic considerations have paved the way for success. Saving up to 80 percent in space – from the size of a football field to a modest garden, Urban can be built to fit the surrounding architecture.

*Urban is an indoor substation concept of up to 170 kV, based on cutting-edge power technology. The compact modular design integrates several functions in every module, thus reducing the number of internal interfaces and facilitating operation and maintenance. The enclosed design means safe operation. As it provides shelter from poor weather and other environmental hazards, the enclosure enhances reliability and prolongs the substation's life.*

# A solution tailored to many needs

Libya, El Shahara – AGIP Oil Company Ltd., Grand Magreb, power distribution system for new oil field.



**AGIP Grand Magreb:** In the middle of the Libyan desert, 1,000 km [621 miles] from the Mediterranean coast, there was no electric power available when the new Elephant oil field concession was to be developed. Power had to be produced on-site and distributed over vast areas to oil wells, pumps, and processing plants for at least the next 25 years.

## Far-reaching experience

The power companies that entered the competition for this contract faced considerable challenges. ABB was chosen to manage them. With our far-reaching experience from the oil and gas industry and our excellent reputation from earlier assignments in the Libyan desert, we were well-prepared to take care of this particular project.

## Safe delivery of safe products

Every power project requires thorough planning and quality assurance – but at a remote oil-field in the desert, these factors become even more important. A missing piece could delay the project. The complicated transportation requirements also required an open, intensive dialogue with the customer, so that we could be sure to meet all needs. One of the most prominent demands in the oil business is product safety. One spark from a faulty component can result in catastrophe.

*Starting with an initial, overall design study of power flows, loads, availability, and safety, the Elephant field turnkey project included two 145 kV substations, several satellite substations (33/11/0.4 kV), power and distribution transformers, relay and control systems, high and low voltage equipment, and 75 km [46 miles] of overhead lines. The assignment also incorporated installation supervision and commissioning. When the financing and the decision to go ahead were cleared, time was of the essence if we were to begin production as soon as possible.*

# A solution based on **close cooperation**

Sweden, Hemsjö – Svenska Kraftnät, Retrofit of 400 kV station.



**Hemsjö – Svenska Kraftnät:** The 400 kV substation in Hemsjö was a weak but very important link in the power transmission network of southern Sweden. A busbar fault or breaker failure would take out the entire substation. To minimize future outages, an upgrade was necessary. Thanks to the retrofit, the station will be able to operate for at least 15 years without the need for maintenance on the primary circuit.

#### **The best solution at the lowest price**

“ABB offered the best solution from technical, environmental, and economical points of view,” says Per Kvarnefalk, Svenska Kraftnät’s project manager. Since all the installation work had to be carried out with a minimum of outages, we worked very closely with the customer throughout the entire project, from the initial analysis to energizing of the substation.

#### **Connecting the past and the future**

Retrofit is the ABB way of connecting the past and the future. When we use existing infrastructures and assets and upgrade them with compatible new technology, we add new value to the current investment. The results are prolonged life, increased reliability, enhanced capacity, and reduced maintenance and outage costs.

*The retrofit of the Hemsjö 400 kV substation was a turnkey project, which included changing the single line diagram from single plus transfer to double breaker configuration. All high-voltage equipment was replaced, and the breaking and disconnecting functions were integrated into the same apparatus, while the existing busbar was re-used. Therefore, the terminal towers remained in place, resulting in considerable savings for the customer. The retrofit also included a new control room, with state-of-the-art control and protection equipment.*

# Precious energy

In every part of the world today, it is necessary to strive for sustainable operations in a responsible way.

The needless waste of energy is a needless waste of resources, as is the misuse of production capacity and finance capital.

Precious energy calls for a careful analysis of your investment.

# What you **really need**

When you examine long-term earnings and savings, you can see that investment and life-cycle costs are two sides of the same coin. An equally far-reaching question is whether the investment will accomplish what you really need – or merely what you ask for?

Do we know your needs better than you do yourself? Are we that presumptuous? Far from it. But we have the skill and know-how to ask in-depth questions about your needs and requirements. The reason we ask these questions is simply because we care. Your most successful and competitive power system will be based on functional specifications, derived from mutual understanding and shared values.



*“Long, far-reaching experience and never-ending innovative capacity have carried ABB to the forefront. One of the major factors behind this development is our ability to form trusting partnerships. We are known for our honesty, sense of responsibility, and cooperativeness. Listening attentively to our customers and learning about their needs have probably taught us more than anything else in the world.”*

## The power to change **the future**

History is the foundation for the future. We will be honored and pleased to share it with you, in a partnership that will give us the power to change our common future.

**ABB** ([www.abb.com](http://www.abb.com)) is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering their environmental impact. The ABB Group of companies operates in around 100 countries and employs about 113,000 people.

**ABB** is the world's no. 1 in power technologies, providing utilities, industries and channel partners with access to a rich portfolio of technologies for power transmission and distribution as well as power plant automation. The Power Technologies division employs 39,000 people.



**ABB Power Technologies, Power Systems**

SE-721 82 Västerås, Sweden

Phone: +46 21 32 50 00

Fax: +46 21 18 38 40

[www.abb.com](http://www.abb.com)