

FACTS



# ABB Technology Guide

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# What is FACTS?

Flexible Alternating Current Transmission Systems (FACTS) is a generic term for a group of technologies that increase the transmission capacity of the electricity network, maintain or improve voltage stability and grid reliability and reduce overall power losses.



## The background and technology

FACTS consists of two main technologies: series compensation and dynamic shunt compensation.

Series compensation was invented by ABB in 1950. It made possible the world's first 400 kilovolt (kV) transmission in 1952 by resolving the issue of how to transmit power over long distances. The solution lay in making the distance between the power-generation plant and the end-users of electricity seem shorter, in an electrical sense. As a result, power can be transmitted at levels considerably higher than the natural loading of the transmission lines.

Dynamic shunt compensation is a technology that uses high-power semiconductors to automatically adjust the voltage level in a specific area of the power system if necessary. This helps avoid sudden surges and improves the stability of the grid.

## FACTS and energy efficiency

Electricity is lost during transmission and losses can be minimized by increasing the voltage. FACTS technologies provide a fast and effective way of increasing the capacity of electrical grids by offering remedies for voltage and stability issues and allow the transmission system to run more efficiently.

FACTS therefore enables more power to reach consumers with minimum impact on the environment and at a fraction of the cost compared with the alternative of building new transmission lines or power plants.

Building a new overhead transmission line takes several years and has a huge impact on the environment, whereas a FACTS installation requires no or limited access to new land and is normally in service 12 to 18 months after a contract is awarded to the supplier.

China, for instance, increased capacity by 40 percent on a transmission corridor into Beijing in 2004 by using series compensation, one of the FACTS technologies. The increase helped the Chinese capital meet the demands of its rapid expansion ahead of the Olympic Games in 2008.

In Sweden, eight 400 kilovolt (kV) systems equipped with FACTS transport electrical energy from the north, where hydropower is generated, to the south, where it is used. An additional four 400 kV transmission systems would be necessary if FACTS were not used on the existing systems.



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