

Tackling the challenges of encouraging the use of next-generation energy on a global scale

In our modern world, it has become clear that energy problems must be tackled on a global scale. While the demand for energy still is on the rise, a plentiful supply is by no means assured. Finding ways to distribute energy more efficiently and utilizing alternative sources to fossil energy are therefore topics of vital importance.

From a base in Europe, where the use of renewable energy sources is progressing, the TDK Group participates in these efforts through its power capacitor business.



- 1 Málaga city in Spain expected to be one of smart cities
- 2 New factory for power capacitors in Málaga
- 3 View from inside new factory in Málaga



Minimizing energy losses during long-distance transmission of electrical energy

TDK not only offers a broad lineup of electronic components that help to improve energy efficiency, we are also actively involved in a variety of markets, such as automobiles and rail transport, digital home appliances including mobile phones and other mobile information devices, medical equipment, and more. Furthermore, energy systems for the generation and transmission of electrical power present new business opportunities through which we can contribute to society. The energy market is undergoing drastic changes on a global scale. Not only in the industrialized countries but also

in rapidly emerging markets such as China, India, and Brazil we are seeing a transition towards expanding the use of renewable energy sources including solar power and wind power.

Power companies the world over want to minimize the losses that occur during long-distance transmission of electrical energy, and are increasingly adopting HVDC (High-Voltage Direct Current) transmission systems to this end. A large advantage of the HVDC approach is superior transmission efficiency, with losses over a distance of 1,000 kilometers being as low as 3 percent. Compared to AC transmission systems that can have losses of 6 percent and more over the same distance, this is clearly a better solution. For example, compared to AC transmission HVDC can avoid losses of about 120 megawatts when 4,000 megawatts are to be transported, or enough electricity to power about 30,000 homes.

EPCOS brand power capacitors are expected to play an increasingly important role in stabilizing HVDC systems. In advanced multi-level voltage-sourced converter (VSC) HVDC systems, up to ten times more power capacitors are needed compared to conventional HVDC systems. Incorporated into VSC HVDC modules for use in converter stations, the capacitors serve to smooth high voltages in the several thousand volt range.

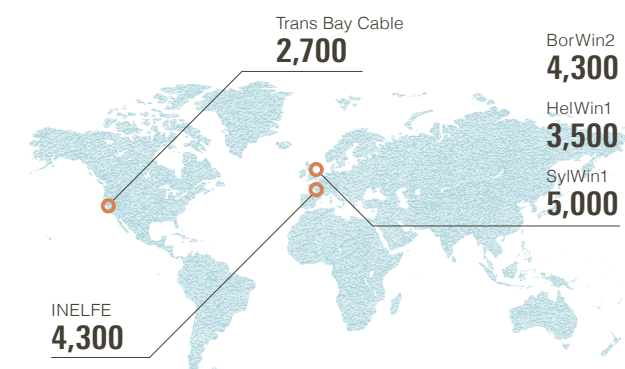


The TDK Group has contributed to several successful high profile projects in the growing VSC HVDC market. They include the Trans Bay project from 2008 (an HVDC link extending the length of the San Francisco Bay) and two major projects starting from 2010 to connect the North Sea wind farm projects BorWin 2 and HelWin 1. Most recently, we have supplied capacitors for the link project for the SylWin cluster of wind farms in the North Sea. For all of these projects which are undertaken by one of the largest electrical manufacturers in the world, EPCOS brand power capacitors were selected.

A further example is the INELFE project linking the power grids of France and Spain as part of a trans-European power transmission network. Power capacitors produced at a new plant in Málaga are to be used for this project.

In the near future, major wind power projects will be launched in locations such as the German Bight and off the east coast of England. In the long run, however, the focus of the energy business is likely to expand beyond Europe to other markets and projects. One such project could be Desertec, a concept to generate solar power and wind power in the desert regions of northern Africa.

VSC HVDC project map



Number of capacitors per project (approximate)

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Tackling the development of high-level products together with the customer



David Pelaez
Global head of research
FILM Business Group
EPCOS Electronic
Components S.A.

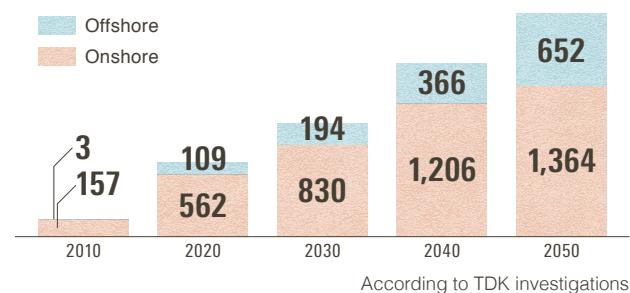
As the single source supplier to the electrical manufacturer mentioned earlier for conventional HVDC systems, the TDK Group was the preferred partner to address their new capacitor specifications already from the initial development phase of the latest and most advanced generation of HVDC technology. Already in 2005, an R&D team started to develop a special type of power capacitor (MKK HVDC capacitor) for the Trans Bay project in San Francisco, U.S.A.

The demands on these capacitors are extraordinarily high. Not only must they deliver an extremely long life expectancy of 40 years, they must also be able to handle very high energy levels and surge currents. For these reasons the MKK HVDC capacitors are some of the most thoroughly tested and qualified components in the TDK Group's product lineup.

"To develop successful products to such high customer expectations, you need a research and design team with excellent knowledge about the physics and electrical engineering of power electronics. The team must also be versed in layout and simulation and possess extensive practical knowledge in testing and qualification. In addition to the knowledge and experience of our own team, a key success factor in converting a specification into a layout and finally a reliable power capacitor is the close cooperation with the customer and joint developing and testing," comments David Pelaez of the FILM Business Group. "We are currently aiming to develop capacitors for further increased power levels and with more efficient heat dissipation. To achieve these goals, we are working very closely together with our customers."

Tackling difficult challenges in close and constant cooperation with the end user—this stance exemplifies how TDK contributes to solving important issues that face our modern society.

Wind power capacity projection on a global scale from 2010 to 2050 (GW)



Making optimum use of TDK's competency in a global framework

The continued improvement of energy efficiency will be one of the major goals pursued by TDK also in the near future. Power capacitors are widely used in power generation, power transmission, power conversion, as well as power quality and power factor correction. Application areas include mass transportation, cars and trucks, generation and distribution of renewable energy, power factor correction installations, industrial drives, medical equipment, and much more.

The rapidly growing number of offshore wind farms around the globe will accelerate the market for state-of-the-art VSC HVDC technology. Many large-scale projects are being drawn up, with China emerging as a major focus area besides Europe. The number of companies operating in the HVDC systems sector also is growing accordingly. Within this global trend, TDK can make use of its unique strengths, to contribute to the realization of a sustainable society.

TDK has extensive experience in R&D and manufacturing and has built close relations with key customers based on mutual trust. We have an outstanding track record and a comprehensive grasp of the large-scale project business. These advantages will allow us to maintain and expand our position as one of the world's leading manufacturers of power capacitors.

New factory for power capacitors in Málaga

Combining efficiency with environmental friendliness through cutting edge technology design



Francisco Lavado
Director of operations
FILM Business Group
EPCOS Electronic Components S.A.

Optimized manufacturing concept

Due to new applications and innovative products, customer requirements for reliability have reached an unprecedented level. In order to meet these needs, creating a manufacturing setup that is innovative and efficient has become a number one priority. Our new factory opened in Málaga in 2011 not only implements a significantly increased level of automation and lean manufacturing concepts, but also employs state-of-the-art methodologies for saving energy in production, reducing waste, and protecting the environment. I am especially happy that in the energy rating by LOMA INGENIERIA, the new facility has achieved a rank of "B" for its primary energy consumption, which means that it uses less than 60 kWh of energy per square meter and year. This is a benchmark for

low energy design of any kind of new building.

When we started to plan our new plant in Málaga, we realized that we had a unique opportunity to completely re-engineer the entire production flow. Even though this required enormous investments, we are certain that we will receive a good return on them. Customer feedback during visits to the Málaga factory has been overwhelming.

The layout of this facility sets the global benchmark in power capacitor manufacturing today. We are proud of our new plant. We understand that it is our task not only to provide world-class products to global markets, but also to enable and support our plants in Nashik, India, and Ningguo, China. These plants will also manufacture MKK HDVC power capacitors for the fast growing markets in these regions and support our customers there with the highest quality and reliability products for HVDC applications.

2012 CSR Activities Report

TDK has established the TDK Environmental Charter as our Group environment policy with the aim of contributing to sustainable development. The TDK Environmental Action 2020 set a goal for achieving carbon neutrality based on environmental activities centered on environmental contributions through products, which is a first in the electronic components industry and progress is being made.

【Achieving carbon neutrality—the TDK way】

CO₂ emissions (environmental load) due to manufacturer operations — (minus) reduction of CO₂ emissions through products (environmental contributions) ≤ zero

In order to reduce environmental load, TDK reinforced its priority energy-saving programs in China, which accounts for about half of TDK's CO₂ emissions.

With the aim of increasing environmental contributions, TDK also completed the quantification of the environmental contribution of some of its product families, and, in fiscal year 2013, TDK will work on the preparation of calculation standards and the quantification of environmental contribution for all other product families that are calculable.

Comments from the Expert

Shunsuke Managi

Ph.D., Associate Professor
Graduate School of
Environmental Studies
Tohoku University



Achieving symbiosis with the global environment will require that business enterprises address environmental issues such as climate change. New technologies and products will be needed to control emissions from numerous locations. In addition, as the prices of oil and other resources rise, especially in industries that use large amounts of resources, the efficient use of resources will lead to a competitive advantage.

The TDK Group has prepared a report that fully appreciates the need to secure a competitive advantage by anticipating these market changes. The development and spread of new power capacitors that minimize energy losses will lead to higher environmental efficiency in the value chain, an indicator of the ultimate added value of corporate activities. These measures will reduce the environmental load and environmental risks and can contribute to carrying out the TDK Environmental Action 2020 Policy. In addition, lower energy consumption will result in lower expenses. I look forward to TDK developing new growth area in the field of symbiosis with the global environment in the future.