

Power Grids

Lifelines of the Energy Turnaround

Reliable, low-loss power grids and strong power storage systems – in order to achieve a successful energy turnaround, new, effective power supply systems are needed. The implementation of the Paris Climate Agreement does not only require the worldwide transition from fossil fuels such as coal or oil to renewable energies such as solar, wind or hydroelectric power. Alongside the transformation of power generation, massive investments must also be made in the expansion and conversion of power grids and their digitalisation. After "renewable energies", "power grids" are the second largest promotional area of KfW Development Bank – with an ever increasing tendency. The main client for this is the Federal Ministry for Economic Cooperation and Development (BMZ).

Context

The modernisation and expansion of the power grids are of central importance in order to meet the rising demand for electricity but international climate targets as well – not only in Germany, but worldwide. In many developing countries and emerging market economies, obsolete and inefficient grids lead to high power losses and outages and hamper economic growth and development.

Up to now, the grid infrastructure has been dominated by centrally located large-scale power plants that generate electricity from coal or gas and feed it into the transmission grid. For a climate-friendly transition from fossil fuels to renewable energies, however, decentralised, smaller and medium-sized generation plants are also being built that feed their electricity directly into the distribution grid. What is also needed are flexible supply

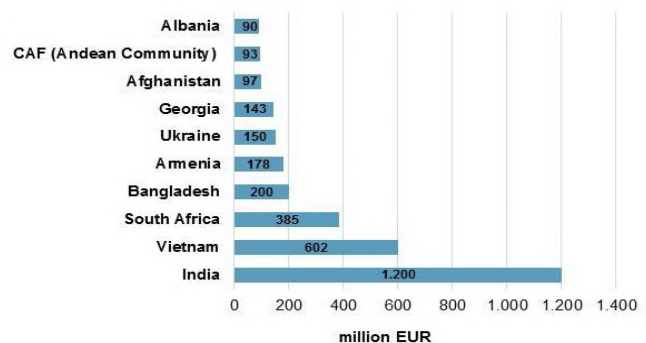
systems and a robust grid infrastructure that can absorb fluctuations in the amount of electricity fed into the grid. Cross-country transmission lines are also very helpful for the integration of variable solar and wind power feed-in as energy mix and meteorological conditions differ from country to country. In addition, electricity storage facilities are gaining in importance.

In order to reduce high technical losses and automate grid control countries must invest extensively in modernisation. At a global scale, these investments have risen to around USD 300 billion between 2012 and 2018. Investments in renewable energies are increasingly being borne by the private sector, and in most countries power grids are in public hands.

The KfW development approach

Smart technologies play a prominent role in the monitoring and control of power grids as they enable the safe absorption of fluctuating power generation from wind power, solar energy, or run-of-river hydroelectric power. Smart regulated and controlled power grids contribute to the stability of the grid and guarantee the security of supply – an indispensable prerequisite for many production processes and industrial plants.

Commitments for power grids 2014-2018 according to TOP 10 countries



Source: own data

The automated control of networks can – unlike human intervention – react to fluctuations in the power supply at all voltage levels within milliseconds. This requires digital communication at all voltage levels – i.e. high, medium and low voltage – so that the systems can regulate themselves, react, switch on and off at any time.

From 2014 to 2018, the "Networks Promotion Area" accounted for commitments of EUR 3,673 million within KfW's climate protection financing activities. This corresponds to a good fifth (21%) of all climate protection financing provided by KfW Development Bank. The BMZ is the main client with 98% of the commitments. More than half of the commitments (53%) were financed by the German Climate and Technology Initiative (DKTI). The aim of this initiative is to accelerate the dissemination of modern climate and environmental technologies.

KfW Development Bank supports countries in reducing their share of coal-fired electricity. Such as India, for example, which today still has a coal-fired share of almost 70% but is pursuing an ambitious climate protection policy and has received most of KfW's commitments for investments in its transmission and distribution grids. Or South Africa, whose coal-fired electricity share to date is over 80%, but which wants to greatly increase the share of renewable energies. In several partner countries, the financing of grid-connected battery storage is being examined. With their very fast responsiveness, they are particularly well suited to supporting grid stability.



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Power lines in India. In order to prevent bottlenecks in the grid, many thousands of kilometres are to follow Source: KfW Group, photographer: Walter Klotz

India – Green Energy Corridors

By 2030, renewable energies are expected to account for 40% of India's electricity generation. However, about 60% of the potential of sun, wind and water is concentrated in seven of India's 29 states. In order to transport this sustainably generated electricity to where it is most urgently needed – to the economically strong and populous centers – the Indian government is increasingly relying on new grids, transmission lines and transformer stations. However, the accelerated expansion of renewable energies is also creating bottlenecks in India's heavily loaded electricity grid, mainly because of the great geographical distance between electricity production and consumption. The Indian government therefore wants to build up "green energy corridors" to supplement the existing grids and balance out regional differences. KfW Development Bank is planning to commit EUR 1.4 billion for the project in India – one of the largest promotional sums in its history. This will create more than 7,500 kilometres of new power lines and more than 165 transformer stations – and enable the networks to transport electricity for three million people. So far, loans in excess of EUR 1 billion have been signed.