



Global Transmission & Distribution Report



Ed 9- 2010

**The T&D Report Ed 9 2010/11
&
The T&D Database Ed 9 2010/11**

Introduction

The ABS estimate of the total T&D equipment market in 2009 was US\$104 billion (in 2009 \$) for the nine segments, including all products and systems. Total capital expenditure including labour and all other finance and construction elements was US\$184 billion. We have revised the estimate for 2008 slightly for several countries and substantially for China, in the light of data now available but not at the time of the previous estimates. China is now a very important part of the market and requires special attention because it can distort understanding of demand.

Chinese demand is now so large that it has an enormous impact on the global market size. In 2008 it accounted for 27% of the total of global capital T&D expenditure, 31% in 2009 but in 2010 shrunk to 24%. The total capex of State Grid of China and Southern Power Grid Company of China amounted to RMB 336 billion in 2008, leaped to RMB 393 billion in 2009 but dropped by 20% in 2010.

The over-riding need for investment in transmission systems which have been starved of funds for years, the drive for energy efficiency and fiscal stimulus programmes in many countries have so far kept the market reasonably buoyant. The time frame has been advanced to 2015, with transmission and distribution lines lengths and transformer capacity recorded historically from 1970 to 2009, and forecast to 2015. Capex and T&D equipment demand are forecast annually to 2013. 2008 Figures have been revised due to global recessionary effects.

This report is an expansion of the previous editions in its analysis of the market, adding new categories. The following groups are contained in the report. Transformers, switchgear, cables, uninsulated lines, insulators and fittings, HV towers, sub-stations, meters, utility automation and power systems.

Report Scope

The report is a substantial document containing overall analysis of the transmission and distribution systems, chapters dealing with each of 183 individual countries and the detailed statistical tables of line lengths and system capacity. Capital expenditure and market sizes for 10 categories of T&D equipment and business service are sized and forecast for each year from 2009 to 2015.

The report contains the following information:

Over 115 network maps.

- A series of tables detailing the international interconnections which are enhancing access to generating capacity for many countries and optimising use of surplus capacity.
- The Power Pools now emerging around the world are outlined
- This new emphasis, assembling the network maps, information about the Power Pools and details of interconnections, enables a more comprehensive understanding of the process of interlinking national power systems globally.
- A detailed analysis of global transmission and distribution networks.
- The global transmission market is expanding not only internally but via linking the generating capacity of different countries
- The report examines this country by country and projects growth annually until 2015
- A voltage analysis is provided where possible
- The report also looks at markets for transmission and distribution equipment examining total capital expenditure and sizes individual markets for 8 categories of equipment and business service

The markets are defined in 2 categories:

- A broader market of \$104 billion for all products in 2009, equipment and services, with total capex of \$184 billion including construction, installation and finance costs
- A smaller more concentrated market for high tech products and added-value services excluding cables and lines, which is estimated at \$70 billion in 2009
- The report contains a detailed section for each country examining the T&D industry, its structure, its size and the entities involved in it, up-dated to 2008

The most important finding of this edition of the ABS T&D Report is the extent to which the T&D market is now recovering and repositioning itself after the first onslaught of the global financial crisis. There are ups and downs but overall the T&D companies have reported good performances so far. T&D has not suffered to the extent that generation and renewables have. This is partly due to the high backlog resulting from the boom in orders during the last two years in countries like China, the Middle East and India, which resulted in significantly increased levels of capital expenditure on T&D in 2006 and 2007. In the previous report we predicted that this optimistic outlook would continue for another five years. We have to admit that, in common with everyone else whom we have consulted, we simply do not know what is going to happen, however, so far the market has been stronger than some pessimists predicted.

The years 2006 and 2007 were significant for the world T&D. There was a real surge in business from 2005/06 to 2007/08 driven by development in China and other developing markets. At the same time there have been increases in transmission capital expenditure allocations in all of the large mature countries for replacement of aging assets. In China a very large budget (\$153 billion including some smaller regional power grids) was allocated over the five years of the 11th Five-Year Plan (2006-2010) to the two large grid companies, the State Grid Corporation and Southern Power Grid but this has been increased with the fiscal stimulus of 2009/2010. The combined T&D capital expenditure of the five major European countries (France, Germany, Italy, Spain, UK), the USA, and the BRIC countries (China, India, Russia, Brazil) accounts for two thirds of global T&D capex very consistently, fluctuating between 64% and 67% annually from 2009 to 2015.

It has now been recognised that large amounts of the transmission and distribution infrastructure have now reached their design lives of around 40 years of age or exceeded it and in mature countries the emphasis has shifted from new installations to maintaining and replacing the existing aging assets. There remains the need to expand transmission capacity to cope with increased inter-country exchanges of power and wind power capacity in regions distant from load centres. In many industrialised countries there is a backlog of under-investment to make up. There was a new emphasis on refurbishment and retrofit instead of replacement. This remains the case but budgets have been made available for increased expenditure on capital replacement. There is increasing concern that while managing the assets is an efficient and cost effective way of extracting maximum value from the assets, much of the infrastructure may be reaching a “point of no return” where replacement is inevitable.

On other side of the world, for different reasons there has been a massive surge in T&D capex in China and to a lesser extent in India. This started with the realisation that a Soviet style emphasis on generation to the exclusion of T&D had created wasteful imbalances in the system and has been re-emphasised by the Chinese government fiscal stimulus programme.

The industry is dominated by a handful of large companies, each of which has a strong presence in the mature, traditional markets in the industrialised countries. Investment in the T&D segment of the electrical industry has been sluggish for some years because of new and increasing competitive cost pressures due to market liberalisation. The industrialised countries are all faced with the problem of aging infrastructural assets to some degree or another, and this has reached such a point that late in 2005 operators and regulators changed tack and higher levels of capital expenditure investment were sanctioned, on average rising 24% to 30% by 2008 and to be continued for some years. At the same time, for different reasons, there was a huge surge in authorised T&D investment in the BRIC countries. The industry leaders have long been present in China and to a lesser extent in India but are now intensifying their efforts there and some are even talking about a strategic shift in the centre of gravity of their activities from Europe and the US to China.

The Database

- The tables in the Excel database include further analysis of voltage levels in individual countries.

NETWORK DATA

Transmission line lengths km

1. Installed line lengths km 1970-2015 (5 yrs)
2. Installed line lengths km 2009-2014(1 yr)
3. Annual new and 40 year old line lengths km 2009-2014 (1 yr)

Distribution line lengths km

4. Installed line lengths km 1970-2015 (5 yrs)
5. Installed line lengths km 2009-2014 (1 yr)
6. Annual new and 40 year old line lengths km 2009-2014 (1 yr)

System capacity MVA

7. Installed capacity MVA 1970-2015 (5 yrs)
8. Installed capacity MVA 2009-2014 (1 yr)

Voltage levels and underground/overhead lines

9. Analysis of voltage levels of T&D lines by km (snapshot)
10. Analysis of underground/overhead lines by voltage and km

MARKET DATA

Market forecasts (\$2009) annually from 2009 to 2014

11. T&D capital expenditure (including construction, labour, direct cost and finance)
12. Total T&D equipment market
13. Power and distribution transformers
14. Switchgear markets
15. Sub-stations
16. HV insulated cables
17. Overhead lines
18. Insulators, bushings and fittings



19. EHV transmission towers

20. Utility automation

21. Power systems (products sold in packages as systems)

22. Meters

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8.1 Azerbaijan

Table 8.3. *ESI Characteristics in Azerbaijan*

Electrical industry - Totally controlled by Azerenergy
TSO - Azerenergy
DNOs - 4
Bakuelectricshebeke SC
Bayramlyelectricshebeke SC
Gandjaelectricshebeke SC
Sumgayitelectricshebeke SC
Consumption
Industry – 48%, Residential – 21%, Other – 21%
International trading pool - Trans Caucasian Power Pool
Customers - 1,080,000
Transmission line length (110kV and over) – 9,921 km
Distribution line length – 96,518 km

The electricity industry is controlled by the state-owned company Azerenergy SC. The power system is characterised by uneven geographical distribution of load. More than 50% of the country's consumers are concentrated in the East of the country which therefore requires considerable power transfers through grids. The power system is capable of working in parallel within the framework of CIS joint power network through 500-330 kV transmission lines. The main internal system consists of 220-330-500 kV grids.

In 1996 Azerenergy was transferred into a state-owned, closed, joint-stock company, with a five year programme for privatisation after the company's outstanding debts were paid. A privatisation attempt of 16 distribution networks failed in 2000, with bids received for only 4 networks: Gusar, Shamkir, Mingachevir, and Sheki.

Each of the distribution companies has been opened to foreign investors via joint stock companies.

Transmission

Azerenergy SC owns all of the high voltage transmission lines in Azerbaijan and also controls dispatch of the high voltage grid. The company controls a transmission system of about 14,000 km with 2,800 km at 500, 330, and 220 kV and 2,800 km at 110 kV. There are 37 high-voltage substations with transforming capacity of 13,501 MVA.

Distribution

The country's distribution system has 5,418 km of 35 kV line, 31,043 km at 6-20 kV and 57,212 km of low-voltage line and cable.

Power distribution within Azerbaijan is handled by five regional joint stock companies, Bakuelectricshebeke SC, Nakhchivan, Ali Bayramlyelectricshebeke SC (south),

Gandjaelectricshebeke SC (west), and Sumgayitelectricshebeke SC (north), each of which purchases electricity wholesale from Azerenergy for resale. Each of these four regional companies has a distribution monopoly in its territory and the autonomous region of Nakhchivan also has its own separate electricity distribution network.

Azerbaijan has transferred the management of these four regional distributors via long-term concession agreements to private investors, with the Baku and Sumgayit distribution networks now operated by Barmek, a Turkish firm, and the Ganja and Ali Bayramli distribution networks operated by Factory Electric Facilities Production, an Azeri firm. Expected outside investment resulting from these transfers will enable much needed modernisation and upgrades to the networks, but the regional companies still face a financial challenge because of continuing problems with customers not paying their bills.

Interconnections

Azerbaijan is reasonably well interconnected with its neighbours. There are connections to the Dagestan grid in Russia at 330 and 110 kV, with Georgia at 330, 35, and 10 kV, with Iran at 230 and 132 kV, and with Turkey at 154 and 34.5 kV. The 216 km, 500 kV Mukhranis connection with Georgia has been dismantled. Four connections with Armenia (1 X 330 kV, 2 X 220 kV, and 2 X 110 kV) are all damaged and de-energised.

In March 2001, a 60 km, 230 kV line was completed between Imishli, an Azeri town 75 km west of Ali-Bayramli, and Parsabad in Iran. There is also a 132 kV line from Azerbaijan to Iran's Araz power plant. Azerenerji has a seasonal electricity exchange agreement with Iran's Gilan Province.

Under an EU-funded TACIS programme initiative designed to create a unified regional energy system, Azerbaijan, Georgia, and Turkey signed an agreement in May 1999 to rebuild the 500 kV line between Azerbaijan and Georgia and to construct other facilities to upgrade the connections between the power grids of the three countries. Increased electricity trade with Iran and Turkey is anticipated.

System Up-grades and Modernisation

In February 2005, the World Bank and the Azeri government were to meet on a US\$48 million loan for the "Electricity Transmission System" project. According to reports, the government had not yet provided needed technical information required for project start-up. In May 2005, the World Bank and its affiliate the International Bank for Reconstruction and Development (IBRD) were expected to act on loan.

There are three main components, an upgrade to the Azerenerji dispatch and power management systems, network rehabilitation, and management assistance. For the first component, Azerenergy will acquire a SCADA/EMS system, upgrade its telecommunications systems, and overhaul power station metering and control equipment. On the transmission network, the main projects are increasing transformer capacity at four high-voltage

substations, rehabilitation of 12 transmission line segments, and rehabilitation work on four additional substations. Finally, the loan is designed to provide technical assistance to Azerenerji in preparation for future restructuring energy sector. There are numerous tasks including a network stability study, revaluation of Azerenerji assets, audits, a new grid code, and system cost studies.

In July 2004, Azerenerji and Siemens signed an US\$11 million contract for implementation of the second phase of the transmission system rehabilitation funded by KfW. This includes installing the SCADA system and modernising the dispatch centre as well as work on substations and transmission lines. Project activities were due to get underway in the spring of 2005.

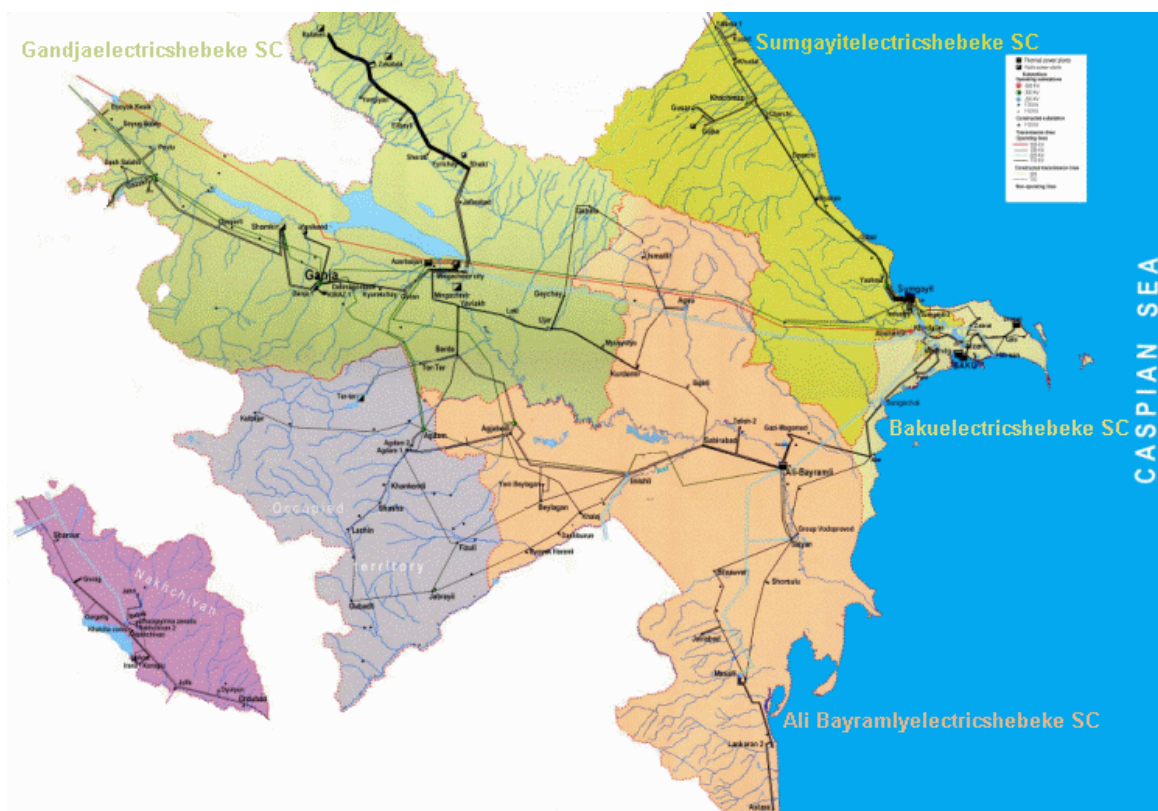


Figure 8.3. Azerbaijan's Transmission network

Source: Azerenergy

Table 8.4. Intereconnections

Georgia	500 kV, 330 kV, 35 kV, and 10 kV
Turkey	154 kV and 34.5 kV
Iran	230 kV, 132 kV, and 10.5 kV

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