

Global investment in T&D infrastructure is set to rise by 4.3 % CAGR between 2018 and 2028, and will reach \$355.1 billion by 2028



Global investment and the future market for T&D equipment

A bright future even allowing for the odd brown out along the way

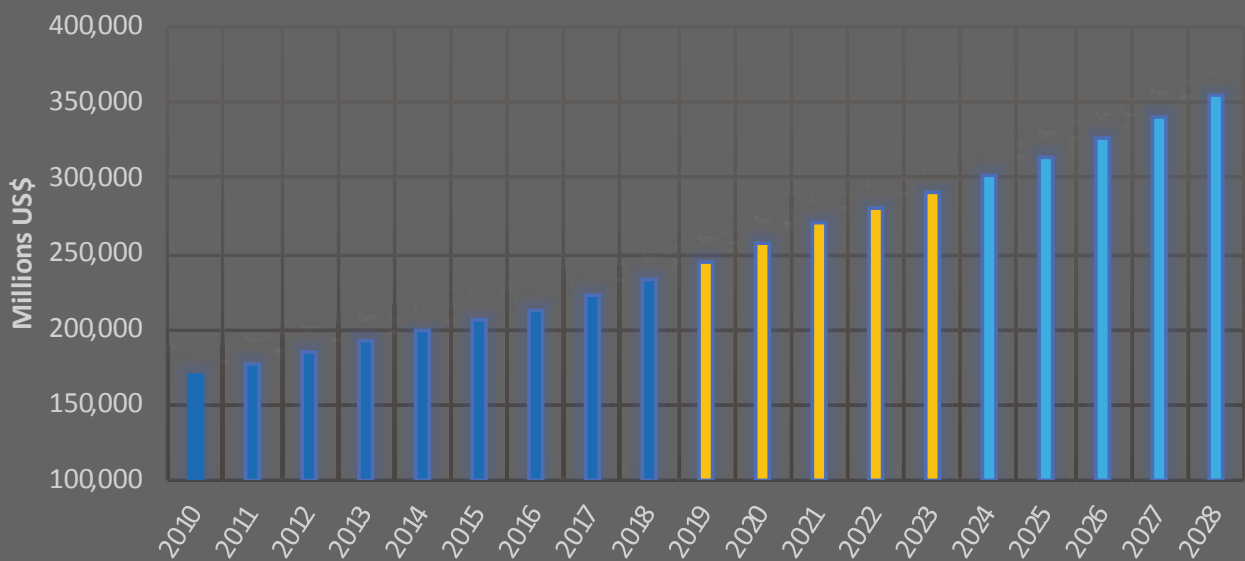
Global investment in T&D infrastructure is set to rise by 4.3 % CAGR between 2018 and 2028. Current

investment is calculated at \$232.9 billion and this will reach \$355.1 billion (constant 2018 US\$) by the year 2028.

Growth rates vary greatly from region to region. The region displaying fastest growth is the Indian Sub-continent with 7.1 % CAGR, Asia overall is forecasted



Global T&D Investment



Source: Goulden Reports Estimates

Figure 1. Global T&D investment 2010 to 2028

Table 1. Fastest growing regions 2018 to 2028

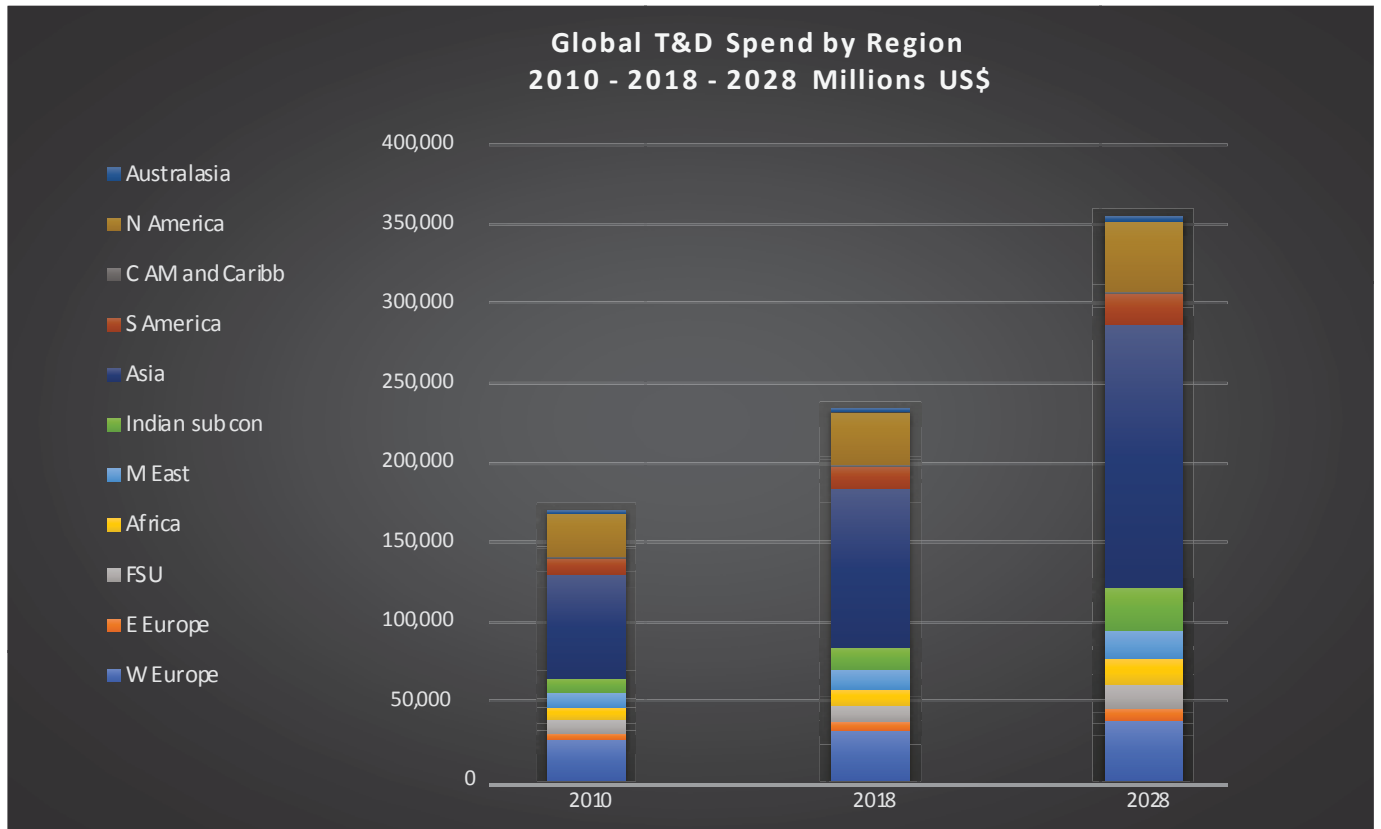
Region	CAGR 2010 to 2018	Region	CAGR 2018 to 2028
Asia	5.48 %	Indian sub con	7.07 %
Indian sub con	5.20 %	Asia	5.11 %
M East	4.29 %	Africa	4.73 %
E Europe	3.89 %	Australasia	4.46 %
S America	3.58 %	FSU	3.96 %
Africa	3.36 %	S America	3.73 %
W Europe	2.60 %	C AM and Caribbean	3.70 %
N America	2.41 %	M East	3.48 %
FSU	2.01 %	N America	3.11 %
C AM and Caribbean	0.57 %	E Europe	3.02 %
Australasia	-0.30 %	W Europe	1.93 %
Total	4.03 %	Total	4.30 %

Source: Goulden Reports Estimates

Japan and Indonesia will reach the \$10 billion level and five other Asian countries will be approaching \$5 billion p.a. spend

to grow at 5.1 %, North America at 3.1 % and the region with the lowest growth rate is Western Europe at 1.9 % CAGR. Other areas are forecasted to grow at between 3 % and 4.5 % CAGR with some very large variations in individual countries – some African countries will grow at rates of over 8 % and some in Asia at greater than 7 % albeit from relatively small bases.

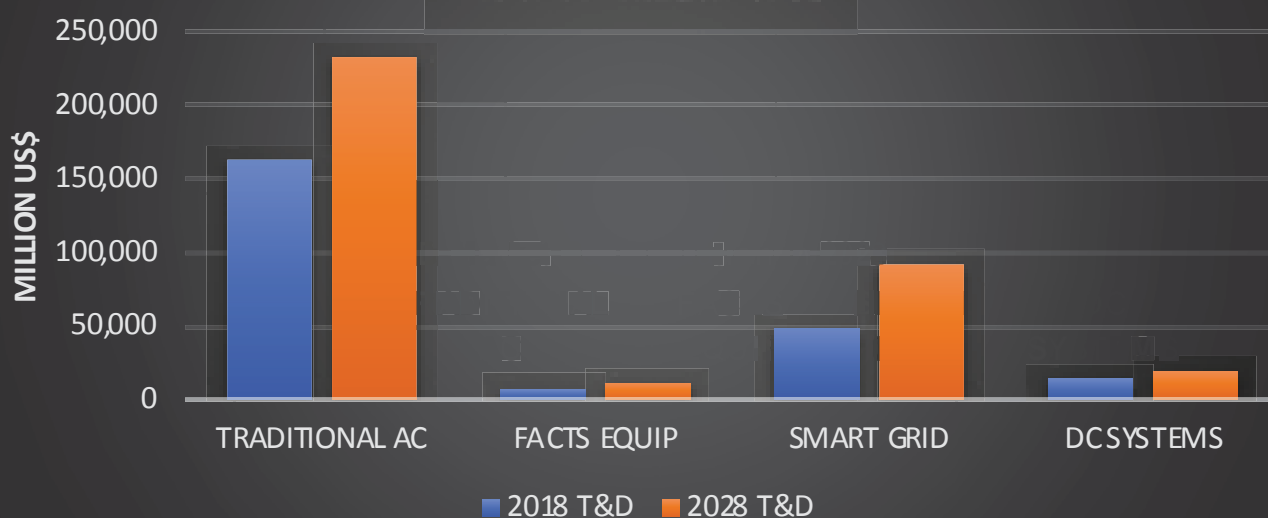
Currently the 18 countries of Asia account for some 43 % of the total global investment and with the growth rates expected they will increase their global market share to nearly 47 % in 2028. It has to be acknowledged that even though China accounts for two



Source: Goulden Reports Estimates

Figure 2. Global T&D spend by region

Global Grid Technology Trend 2018 to 2028



Source: Goulden Reports Estimates

Figure 3. T&D investment by technology

It is at this phase in the development that the implementation of smart grids begins to have a positive impact on T&D investments

thirds of that regional demand there are nevertheless two other countries – Japan and Indonesia, that will breach the \$10 billion level and five others that will be approaching \$5 billion p.a. spend.

From the standpoint of transmission and distribution development, the countries of the world can be broadly separated into three groups:

- Countries undergoing primary electrification development
- Countries reinforcing grids and networks
- Countries undergoing strategic re-development

Developing markets

Many countries in the developing world are still completing the installation of their transmission and distribution networks and there are multiple examples of countries with less than 100 % of the populous having access to electricity. Often these are small nations with high growth rates in very small markets but

there are two examples of large markets in this phase of development; India and Brazil with \$10 billion and \$6.7 billion respectively. Both countries are striving to complete electrification and in both the twin aims of expanding the grids to provide the electricity coverage of the entire country go hand in hand with the necessity to distribute supplies to consumers. In both of these countries the investment in transmission accounts for 35 % to 40 % of the total investment and the distribution investment consumes the lion's share of the funds. Each country recognises the benefits to economic development that result from a stable and secure electricity supply, yet both have struggled to find funding to implement these plans.

Reinforcing markets

Numerically, the largest cohort of countries currently fall into the second category listed above. Countries where the basic work has been done and the utility companies are investing

in securing supplies and turning the original radial development pattern of the T&D network into a true mesh type grid with the ability to supply an end user by multiple routes. This development may encompass decentralised generating facilities but is not caused by the change in generating mix. It is at this phase in development that the implementation of smart grids begins to have impact. Smart grid technology was originally developed as a cost-effective way of increasing grid capacity without the full cost of new construction.

It could be argued that the largest country to fall into this category is the USA. Lack of investment in grid reinforcement and connectivity resulted in some well documented power outages. Many estimates have been put forward as to the total spend that will be necessary to modernize the T&D network of the US and allow it to cope with the demands of decentralised generating facilities; the consensus appears to be that an average expenditure approaching \$30 billion p.a. will be necessary over the next decade and maybe up as far as 2040.

Re-aligning markets

Many of the countries in the Western Europe fall into the last of these three

An average expenditure approaching \$30 billion p.a. will be necessary over the next decade and maybe up as far as 2040 to modernize the T&D network of the US

categories and the principal driver of the transmission network development is the implementation of renewable generating capacity. Since the 1950's, the networks in countries such as France, Germany, Italy, Sweden and UK evolved grid structures that were based on large centralised power stations with bulk deliveries to large conurbations. With the advent of smaller decentralised and renewable generating units the demands on the networks have necessitated a basic restructuring of the grids and the way in which they are controlled. The overall CAGR for Western Europe as noted earlier is 1.9 % and the transmission investment in industrialised countries of that region outstrip this rate with typically; France 2.0 %, Germany 2.4 %, Norway 4.3 %, Spain 2.4 %, Sweden 3.8 % and the UK 2.7 %.

And then there is China. A market that is equal to 30 % of the global investment in transmission and distribution networks. Economic growth has slowed recently but the market is still expected to grow at 5.6 % CAGR to 2028. The necessity to invest in the grid is, of course, routed in the economic development of the country, but the development of HVDC systems and traditional AC grids operating at voltage levels exceeding 1 MV have been driven by these needs and the topography of the country. With fuel supplies in the west of the country and demand in the east of the country, it was either necessary to transport coal by rail across the country or increase the power carrying capacity of the east-west grid. To a large extent this has been the driver to both grid and technology development in China.

Grid technology

The estimated spend on T&D by technology will change over time and is illustrated in Figure 3. Despite the high profile of HVDC systems, clearly the majority of global investment during

the next ten years will continue to be based on traditional AC networks. That is not to say that DC is unimportant or an unattractive market, it will increase from \$15 billion in 2018 to over \$19 billion in 2028; however, it is still dwarfed by traditional systems. The growth of smart grid technology is the highest of all of these segments showing over 6.6 % CAGR to account for more than one third of all expenditure by 2028.

The spend on distribution networks is expected to grow at an even higher rate and will reach more than \$220 billion by 2028. In 2018, over 77 % of this was accounted for by traditional AC networks but by 2028 over 31 % of the investment will be accounted for by smart grid technology.

Future transformer demand

These trends are re-assuring for the manufacturers of transformers and other wound components used

in transmission and distribution networks. Dis-aggregating these total investment estimates reveals that in the order of two thirds of the investment value is accounted for by components and 22 % of that is spent on transformers – in 2018 a market worth nearly \$34 billion. These percentages vary from country to country and from year to year, but by 2028 the market will be worth over \$53 billion (at 2018 prices).

It is also interesting to note that these figures do not include other wound components used in FACTS systems which are by and large produced by the same manufacturers. This segment is notoriously difficult to enumerate but using a top down analysis, if the total value of this equipment is worth \$7 billion in 2018, the total accounted for by wound components must easily be \$2 billion worth. By 2028, these figures will be \$11.3 billion and \$3 billion respectively.

It is further reassuring that these estimates do not include GSU transformers. These will have added a further \$5.4 billion in 2018 (or a total in the order of 350 GVA of new and replacement capacity) and at current rates of growth an average of 398 GVA will be needed every year through to 2028.

By 2028 the transformers market will be worth over \$53 billion (at 2018 prices), not including GSU transformers and wound components used in FACTS systems which are by and large produced by the same manufacturers

Author



Steve Aubertin is the Managing Director of Goulden Reports and following a first career in electrical engineering has spent the last 30 years researching and reporting on the global market for electrical products in both published and in the form of tailored research for specific clients.