

**The World Markets  
and  
Manufacturers of Transformers  
2008 - 2015**

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March 2008**

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# 1. INTRODUCTION

## 1.1 OBJECTIVES AND SCOPE

The objective of this report is to provide a concise overview of the world transformer market. The report gives an estimate of the volume and value of transformer consumption in each national market, broken down by product category. For the purposes of this report the categories of transformers have been defined as follows:

- Generator Transformers - defined as step-up transformers attached to power generation plants. The purpose of these transformers is to increase the voltage from alternator output to transmission level.
- Transmission Transformers - defined as transformers installed in transmission sub-stations. For the purposes of this report, Transmission Transformers are further defined as generally in developing markets having a power handling capacity equal to, or greater than, 5MVA and in industrialised countries nearer 10MVA. Also known as system transformers, the purpose of these transformers is to step-down the voltage from transmission levels to sub-transmission and distribution levels.
- Distribution Transformers - defined as transformers installed in distribution and consumer sub-stations. Distribution Transformers are further defined as generally having a power handling capacity of less than 5MVA.

These categories include all transformers with a power handling capacity exceeding 16kVA. Measuring transformers, instrument transformers or transformers for use in civil aircraft are not included in this report.

The scope for this report is world-wide - that is, every country having a significant transformer customer base. The report is designed to be used as a first line planning tool by companies interested in the global market for transformer products and as a screen on which to identify national markets worthy of further investigation.



## 1.2 METHODOLOGY

Data in the markets report is presented in both millions of US dollars and in terms of power capacity (MVA). The salient points of the methodology are as follows:-

- For the data presented in US dollars, the survey was based primarily on desk research, including a review of available published production and trade statistics. Import and export figures are calculated from national and United Nations' figures for 2006 - the most comprehensive and up-to-date statistics available. Market values are assumed to be equal to Production + (Imports - Exports). National production estimates are based on statistics provided by national governments and trade associations. Market sizes for 2007 are estimated by analysing a range of economic indicators together with trends in trade flow and the pattern of market size growth over the period 2000-2006.
- Market values for the period 2008 to 2015 have been estimated based on two separate methodologies. Firstly the past growth rate in market values for each country have been extrapolated and have been compared with general macro-economic indicators such as GDP, GDP growth and inputs to the value added for each economy. Secondly, the development of the electrical power system in each country has been studied to provide indications for future system growth, and hence transformer market growth.
- The future MVA demand for each country has been forecast using the following method. The current year-on-year growth in installed capacity for each country has been tracked for the last 40 years. The development over the last ten years has been used as the basis for establishing the new MVA of generator capacity in each country for the period 2005 to 2015. To this new capacity has been added the power station capacity that is necessary to replace redundant or retired plant. Typical rates for this are based on 2.5% of the installed capacity in 1970 and 1975, yielding an assumed plant life of approximately 40 years. The new and replacement generator MVA has then been used as the basis for calculating the transmission and distribution transformer MVA over the forecast period.
- Market values are at factory gate prices - they reflect the prices for the products by the importer and do not include trade mark-ups and installation costs. It should be noted that published classifications of products, especially with respect to trade statistics, are sometimes inaccurate, as products may be shipped under generic titles. It should also be noted that Goulden Reports chronicles shipments rather than contracts. A contract to supply goods over a number of years will not appear as a one-off event in a Goulden Report, but rather will be recorded from the trade statistics. The nature of the market means that demand within countries, especially developing ones, can fluctuate greatly from year to year as purchases are often made on a one-off basis rather than spread evenly over a number of years.
- Within national markets, where published figures were unavailable to us, the breakdown between different product categories is based on intelligence about the pattern of consumption in the country concerned. In these cases the breakdown is made from an estimate of the Total market size rather than the value of the entire market being calculated from the individual product categories.

Clients that have purchased previous editions of this report will notice several changes in the content and presentation of this edition. Firstly the contact directory, which was previously published as a separate report has now been incorporated in Section 4 of this report. The addition of a greater depth of information on market segmentation lead us to believe that one complete report covering markets and manufacturers would be more useful to purchasers.

Secondly as alluded to above this edition contains a more detailed analysis of the market in each country. Market data by value, by MVA, by insulation type, by size, by end use and forecasts through to 2015 by value and by MVA are all included in this report.

We have also changed the source of trade data that has been in this report. Previous editions have used the Standard International Classification system, revision 3 - SITC Rev 3; in this edition the Harmonised System HS2002 has been used. This has allowed a greater depth of analysis of international trade by type of transformer; however the two systems are not interchangeable and purchasers comparing figures from this edition with previous reports will notice changes in figures for years 2002 to 2006. As a generalisation the levels of trade shown in this report are lower than in previous editions, primarily at the lower end of the range of transformers. In order to exclude smaller, out of scope, industrial transformers from previous editions a calculation was made to assess the size of this segment; whereas the HS classification provides a much clearer definition which allows an accurate assessment of transformers greater than 16kVA (the minimum practical pole top size) to be made.

Figures for non-UN countries are based on data obtained from individual countries and are consequently not necessarily comparable with UN-derived information. Clearly the report is only as accurate as the information upon which it draws - the sources are regarded as being the best and most comprehensive available.

## 2. SUMMARY

- The global market for Transformers was valued at US\$29,117 million in 2007.
- The largest national market in 2007 was that of China, which was valued at US\$6,434 million and which accounted for 22% of the overall world market.
- The second largest national market was that of the USA (US\$5,282 million) followed by Japan (US\$2,520 million) Germany (US\$1,772 million), India (US\$1,628 million) and Russia (US\$1,072 million).
- The largest regional market for Transformers in 2007 was the Far East (US\$10,774 million) followed by North America (US\$6,236 million) and Western Europe (US\$4,764 million).
- The largest producer in 2007 was China, with production Totalling US\$5,616 million.
- Reported exports of Transformers Totalled US\$5,998 million in 2006.
- The largest exporter in 2006 was Mexico (US\$599 million), followed by Mexico (US\$555 million) and Italy (US\$431 million).
- The largest importer in 2006 was the USA (US\$1,214 million) followed by Russia (US\$290 million) and Germany (US\$253 million)
- World demand in 2007 is estimates to be 1,250,800 MVA. The largest regional demand is in the Far East with a requirement for 487,400 MVA; followed by the USA with 249,300 MVA and Western Europe with 181,200 MVA.
- In value terms the world market has grown by 15.8% cagr during the period 2002 to 2007, and 20.1% cagr during the period 2004 to 2007.
- The estimates future growth by value (2007 US dollars) is estimated to be a little over 17% to 2010 and 6% during the period 2010 to 2015.
- The growth in global demand for transformers during the period 2005 to 2008 is estimated to be 8.5% cagr, 15% cagr 2006 to 2010 and 6.5% 2010 to 2015.
- ABB and Siemens remain the leading manufacturers of Transformers, with a combined market share of just over 25%, (although they tend to have a strong European base to their sales). Siemens having surpassed Alstom as number 2 ranking following the acquisition of VA Tech. In North America, Waukesha, ABB, GE, Howard and Cooper are the dominant companies, whilst in the Far East several companies dominate the market. The position of the two Japanese groups is understated in Table 15 of this report because each partner in the two j.v.'s is reported separately.
- There have been a number of structural changes in the manufacturing base worldwide. In the last edition of this report it was noted that “*VA Tech have increased market share by*

*acquisition and organic growth and now have manufacturing in North and South America, China, France, Italy, UK and Austria. A major change in the market has been the acquisition by of VA Tech by Siemens; VA Tech seen to be a victim of their own success and in future editions of this report will probably be reported within the Siemens camp*". This is now the case. It was also noted in the last edition that *"Pauwels the largest specialist independent company left continues to innovate whilst riding out difficult market conditions in Europe."* It appears that this independent struggle has come to an end as Pauwels have joined forces with Crompton Greaves, in a merger that provides volume outside of Europe for Pauwels and a respected international arm for Crompton Greaves. The total world share of Crompton-Greaves is now over 2.5%.

- Finally, the previous Goulden Report on transformers in 2005 stated "China now DOES dominate the world scene. With a market of nearly \$6.5 billion China accounts for nearly one quarter of Total world demand. Export from China have increased from US\$82.7 million in 2004 to US\$235.7 million in 2006. The only declining feature of the Chinese market is imports, these have averaged US\$175 million each year 2004 to 2006 but in value terms have declined from US\$287 million in 2004 to US\$141 million in 2006.
- The dramatic increase in raw materials that have occurred in transformer oil, steel and copper have been a principal cause of the equally dramatic cagr figures that have been recorded during the period 2003 to 2007; nevertheless there have been some very encouraging volume increases and for the first time since the mid 1990's transformer manufacturers are making healthy returns on the capital employed in manufacturing the equipment.

## 2.1 SUMMARY TABLES

Table 1

### The Fastest Growing National Markets for Transformers 2002 - 2007 (US\$ Thousand)

| Country | Market Size 2007 | % Change<br>2002 - 2007 |
|---------|------------------|-------------------------|
|         |                  |                         |

Source: Goulden Reports and United Nations

Note: Only countries with market sizes greater than US\$20 million are included in this section. Smaller markets may display significantly larger percentage changes.

Table 2

**The Fastest Growing National Markets for Transformers  
2005 - 2007 (US\$ Thousand)**

| Country | Market Size 2007 | % Change<br>2005 - 2007 |
|---------|------------------|-------------------------|
|         |                  |                         |

Source: Goulden Reports and United Nations

Note: Only countries with market sizes greater than US\$20 million are included in this section. Smaller markets may display significantly larger percentage changes.

Table 3

**The Fastest Declining National Markets for Transformers  
2002 - 2007 (US\$ Thousand)**

| Country | Market Size 2007 | % Change<br>2002 – 2007 |
|---------|------------------|-------------------------|
|         |                  |                         |

Source: Goulden Reports and United Nations

Table 4

**The Fastest Declining National Markets for Transformers  
2005 - 2007 (US\$ Thousand)**

| Country | Market Size 2007 | % Change<br>2005 - 2007 |
|---------|------------------|-------------------------|
|         |                  |                         |

Source: Goulden Reports and United Nations

Table 5

**The Largest National Markets for Transformers 2007 (US\$ Million)**

| Country | Market Size 2007 |
|---------|------------------|
|         |                  |

Source: Goulden Reports and United Nations



### 3. THE WORLD MARKET

Table 6

The World Market for Transformers, by Region, 2002 - 2007 (US\$ Thousand)

| Region                 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|------------------------|------|------|------|------|------|------|
| Western Europe         |      |      |      |      |      |      |
| Eastern Europe         |      |      |      |      |      |      |
| Former USSR            |      |      |      |      |      |      |
| North Africa           |      |      |      |      |      |      |
| West Africa            |      |      |      |      |      |      |
| Central Africa         |      |      |      |      |      |      |
| East Africa            |      |      |      |      |      |      |
| Southern Africa        |      |      |      |      |      |      |
| Middle East            |      |      |      |      |      |      |
| South Asia             |      |      |      |      |      |      |
| Far East               |      |      |      |      |      |      |
| South America          |      |      |      |      |      |      |
| Cent. America & Carib. |      |      |      |      |      |      |
| North America          |      |      |      |      |      |      |
| Oceania                |      |      |      |      |      |      |
| <b>Total</b>           |      |      |      |      |      |      |

Source: Goulden Reports and United Nations

Table 7

**The World Market for Transformers, by Region, 2002/2007 (% Change)**

| <b>Region</b>                  | <b>2002/2003</b> | <b>2003/2004</b> | <b>2004/2005</b> | <b>2005/2006</b> | <b>2006/2007</b> | <b>cagr</b> |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|-------------|
| Western Europe                 |                  |                  |                  |                  |                  |             |
| Eastern Europe                 |                  |                  |                  |                  |                  |             |
| Former USSR                    |                  |                  |                  |                  |                  |             |
| North Africa                   |                  |                  |                  |                  |                  |             |
| West Africa                    |                  |                  |                  |                  |                  |             |
| Central Africa                 |                  |                  |                  |                  |                  |             |
| East Africa                    |                  |                  |                  |                  |                  |             |
| Southern Africa                |                  |                  |                  |                  |                  |             |
| Middle East                    |                  |                  |                  |                  |                  |             |
| South Asia                     |                  |                  |                  |                  |                  |             |
| Far East                       |                  |                  |                  |                  |                  |             |
| South America                  |                  |                  |                  |                  |                  |             |
| Central America &<br>Caribbean |                  |                  |                  |                  |                  |             |
| North America                  |                  |                  |                  |                  |                  |             |
| Oceania                        |                  |                  |                  |                  |                  |             |
| <b>Total</b>                   |                  |                  |                  |                  |                  |             |

Source: Goulden Reports and United Nations

Table 8

**The World Market for Transformers, by Region, by Function Type 2007 (US\$ Thousand)**

| <b>Region</b>             | <b>Generator</b> | <b>Transmission</b> | <b>Distribution</b> | <b>Of Which -<br/>Pole Top</b> | <b>Total</b> |
|---------------------------|------------------|---------------------|---------------------|--------------------------------|--------------|
| Western Europe            |                  |                     |                     |                                |              |
| Eastern Europe            |                  |                     |                     |                                |              |
| Former USSR               |                  |                     |                     |                                |              |
| North Africa              |                  |                     |                     |                                |              |
| West Africa               |                  |                     |                     |                                |              |
| Central Africa            |                  |                     |                     |                                |              |
| East Africa               |                  |                     |                     |                                |              |
| Southern Africa           |                  |                     |                     |                                |              |
| Middle East               |                  |                     |                     |                                |              |
| South Asia                |                  |                     |                     |                                |              |
| Far East                  |                  |                     |                     |                                |              |
| South America             |                  |                     |                     |                                |              |
| Cent. America & Caribbean |                  |                     |                     |                                |              |
| North America             |                  |                     |                     |                                |              |
| Oceania                   |                  |                     |                     |                                |              |
| <b>Total</b>              |                  |                     |                     |                                |              |

Source: Goulden Reports and United Nations

Table 9

**The World Market for Transformers, by Region, by Function Type 2007 (MVA)**

| <b>Region</b>          | <b>Generation Transformers</b> | <b>Transmission Transformers</b> | <b>Distribution Transformers</b> | <b>Total</b> |
|------------------------|--------------------------------|----------------------------------|----------------------------------|--------------|
| Western Europe         |                                |                                  |                                  |              |
| Eastern Europe         |                                |                                  |                                  |              |
| Former USSR            |                                |                                  |                                  |              |
| North Africa           |                                |                                  |                                  |              |
| West Africa            |                                |                                  |                                  |              |
| Central Africa         |                                |                                  |                                  |              |
| East Africa            |                                |                                  |                                  |              |
| Southern Africa        |                                |                                  |                                  |              |
| Middle East            |                                |                                  |                                  |              |
| South Asia             |                                |                                  |                                  |              |
| Far East               |                                |                                  |                                  |              |
| South America          |                                |                                  |                                  |              |
| Cent. America & Carib. |                                |                                  |                                  |              |
| North America          |                                |                                  |                                  |              |
| Oceania                |                                |                                  |                                  |              |
| <b>Total</b>           |                                |                                  |                                  |              |

Source: Goulden Reports and United Nations

Table 10

**The World Market for Transformers, by Region, by Insulation Type 2007 (US\$ Thousand)**

| <b>Region</b>          | <b>Oil Filled</b> | <b>Of Which<br/>Synthetic Fluid</b> | <b>Cast Resin &amp;<br/>Dry Types</b> | <b>Total</b> |
|------------------------|-------------------|-------------------------------------|---------------------------------------|--------------|
| Western Europe         |                   |                                     |                                       |              |
| Eastern Europe         |                   |                                     |                                       |              |
| Former USSR            |                   |                                     |                                       |              |
| North Africa           |                   |                                     |                                       |              |
| West Africa            |                   |                                     |                                       |              |
| Central Africa         |                   |                                     |                                       |              |
| East Africa            |                   |                                     |                                       |              |
| Southern Africa        |                   |                                     |                                       |              |
| Middle East            |                   |                                     |                                       |              |
| South Asia             |                   |                                     |                                       |              |
| Far East               |                   |                                     |                                       |              |
| South America          |                   |                                     |                                       |              |
| Cent. America & Carib. |                   |                                     |                                       |              |
| North America          |                   |                                     |                                       |              |
| Oceania                |                   |                                     |                                       |              |
| <b>Total</b>           |                   |                                     |                                       |              |

Source: Goulden Reports and United Nations

Table 11

## The World Market for Transformers, by Region, by Size of Transformer 2007 (US\$ Thousand)

| Region                | 5kVA to<br>50kVA | 50kVA to<br>500kVA | 500kVA to<br>5MVA | 5MVA to<br>50MVA | 50MVA to<br>150MVA | Over<br>150MVA |
|-----------------------|------------------|--------------------|-------------------|------------------|--------------------|----------------|
| Western Europe        |                  |                    |                   |                  |                    |                |
| Eastern Europe        |                  |                    |                   |                  |                    |                |
| Former USSR           |                  |                    |                   |                  |                    |                |
| North Africa          |                  |                    |                   |                  |                    |                |
| West Africa           |                  |                    |                   |                  |                    |                |
| Central Africa        |                  |                    |                   |                  |                    |                |
| East Africa           |                  |                    |                   |                  |                    |                |
| Southern Africa       |                  |                    |                   |                  |                    |                |
| Middle East           |                  |                    |                   |                  |                    |                |
| South Asia            |                  |                    |                   |                  |                    |                |
| Far East              |                  |                    |                   |                  |                    |                |
| South America         |                  |                    |                   |                  |                    |                |
| Cent. America & Carib |                  |                    |                   |                  |                    |                |
| North America         |                  |                    |                   |                  |                    |                |
| Oceania               |                  |                    |                   |                  |                    |                |
| <b>Total</b>          |                  |                    |                   |                  |                    |                |

Source: Goulden Reports and United Nations

Table 12

## The World Market for Transformers, by Region, by End Use Customer 2007 (US\$ Thousand)

| Region                 | Utility Organisations | Construction & Industry | Rail & Transport | Mining, Marine & Offshore | Total |
|------------------------|-----------------------|-------------------------|------------------|---------------------------|-------|
| Western Europe         |                       |                         |                  |                           |       |
| Eastern Europe         |                       |                         |                  |                           |       |
| Former USSR            |                       |                         |                  |                           |       |
| North Africa           |                       |                         |                  |                           |       |
| West Africa            |                       |                         |                  |                           |       |
| Central Africa         |                       |                         |                  |                           |       |
| East Africa            |                       |                         |                  |                           |       |
| Southern Africa        |                       |                         |                  |                           |       |
| Middle East            |                       |                         |                  |                           |       |
| South Asia             |                       |                         |                  |                           |       |
| Far East               |                       |                         |                  |                           |       |
| South America          |                       |                         |                  |                           |       |
| Cent. America & Carib. |                       |                         |                  |                           |       |
| North America          |                       |                         |                  |                           |       |
| Oceania                |                       |                         |                  |                           |       |
| <b>Total</b>           |                       |                         |                  |                           |       |

Source: Goulden Reports and United Nations



### 3.1 FORECAST WORLD MARKET 2010-2015

Table 13

The Forecast World Market for Transformers, by Region, 2008 - 2015 (US\$ Thousand)

| Region                 | 2008 | 2009 | 2010 | 2015 | Cagr 8-10 | Cagr 10-15 |
|------------------------|------|------|------|------|-----------|------------|
| Western Europe         |      |      |      |      |           |            |
| Eastern Europe         |      |      |      |      |           |            |
| Former USSR            |      |      |      |      |           |            |
| North Africa           |      |      |      |      |           |            |
| West Africa            |      |      |      |      |           |            |
| Central Africa         |      |      |      |      |           |            |
| East Africa            |      |      |      |      |           |            |
| Southern Africa        |      |      |      |      |           |            |
| Middle East            |      |      |      |      |           |            |
| South Asia             |      |      |      |      |           |            |
| Far East               |      |      |      |      |           |            |
| South America          |      |      |      |      |           |            |
| Cent. America & Carib. |      |      |      |      |           |            |
| North America          |      |      |      |      |           |            |
| Oceania                |      |      |      |      |           |            |
| <b>Total</b>           |      |      |      |      |           |            |

Source: Goulden Reports

Table 14

**The Forecast World Market for Transformers, by Region, 2008 - 2015 (MVA Demand)**

| Region                 | 2008 | 2009 | 2010 | 2015 | Cagr 8-10 | Cagr 10-15 |
|------------------------|------|------|------|------|-----------|------------|
| Western Europe         |      |      |      |      |           |            |
| Eastern Europe         |      |      |      |      |           |            |
| Former USSR            |      |      |      |      |           |            |
| North Africa           |      |      |      |      |           |            |
| West Africa            |      |      |      |      |           |            |
| Central Africa         |      |      |      |      |           |            |
| East Africa            |      |      |      |      |           |            |
| Southern Africa        |      |      |      |      |           |            |
| Middle East            |      |      |      |      |           |            |
| South Asia             |      |      |      |      |           |            |
| Far East               |      |      |      |      |           |            |
| South America          |      |      |      |      |           |            |
| Cent. America & Carib. |      |      |      |      |           |            |
| North America          |      |      |      |      |           |            |
| Oceania                |      |      |      |      |           |            |
| <b>Total</b>           |      |      |      |      |           |            |

Source: Goulden Reports

## 4. THE WORLD'S MAJOR TRANSFORMER MANUFACTURERS

The figures in this section are from published annual company reports and other official sources. The figures are, however, designed to serve as a general overview – inaccuracies may occur as a result of exchange rate fluctuations or insufficient primary data.

Table 15

Leading Manufacturers' Sales of Transformers 2007 (US\$ Thousand)

| Company          | Country     | Total Company Sales 2006 | Transformer Sales 2006 | Transformer % Of Sales 2006 | Estimated World Market Share % |
|------------------|-------------|--------------------------|------------------------|-----------------------------|--------------------------------|
| ABB              | Switzerland |                          |                        |                             |                                |
| Aichi            | Japan       |                          |                        |                             |                                |
| Alstom           | France      |                          |                        |                             |                                |
| BHEL             | India       |                          |                        |                             |                                |
| Cooper           | USA         |                          |                        |                             |                                |
| Crompton-Pauwels | Belgium     |                          |                        |                             |                                |
| Daihen           | Japan       |                          |                        |                             |                                |
| Fuji             | Japan       |                          |                        |                             |                                |
| GE               | USA         |                          |                        |                             |                                |
| Hitachi          | Japan       |                          |                        |                             |                                |
| Howard           | USA         |                          |                        |                             |                                |
| Kuhlman          | USA         |                          |                        |                             |                                |
| Meidensha        | Japan       |                          |                        |                             |                                |
| Mitsubishi       | Japan       |                          |                        |                             |                                |
| Nissin           | Japan       |                          |                        |                             |                                |
| Schneider        | France      |                          |                        |                             |                                |
| Siemens          | Germany     |                          |                        |                             |                                |
| Takaoka          | Japan       |                          |                        |                             |                                |
| Toshiba          | Japan       |                          |                        |                             |                                |
| Waukesha         | USA         |                          |                        |                             |                                |
| <b>Sub-Total</b> |             |                          |                        |                             |                                |
| Other            |             |                          |                        |                             |                                |
| <b>Total</b>     |             |                          |                        |                             |                                |

Source: Goulden Reports

Table 16

## Leading Manufacturers' Sales of Transformers, per Region, 2007 (US\$ Million)

| Company          | Western Europe | Eastern Europe<br>& Former USSR | Africa | Middle East |
|------------------|----------------|---------------------------------|--------|-------------|
| ABB              |                |                                 |        |             |
| Aichi            |                |                                 |        |             |
| Alstom           |                |                                 |        |             |
| BHEL             |                |                                 |        |             |
| Cooper           |                |                                 |        |             |
| Crompton-Pauwels |                |                                 |        |             |
| Daihen           |                |                                 |        |             |
| Fuji             |                |                                 |        |             |
| GE               |                |                                 |        |             |
| Hitachi          |                |                                 |        |             |
| Howard           |                |                                 |        |             |
| Kuhlman          |                |                                 |        |             |
| Meidensha        |                |                                 |        |             |
| Mitsubishi       |                |                                 |        |             |
| Nissin           |                |                                 |        |             |
| Schneider        |                |                                 |        |             |
| Siemens          |                |                                 |        |             |
| Takaoka          |                |                                 |        |             |
| Toshiba          |                |                                 |        |             |
| Waukesha         |                |                                 |        |             |
| <b>Sub-Total</b> |                |                                 |        |             |
| Other            |                |                                 |        |             |
| <b>Total</b>     |                |                                 |        |             |

continued...

Table 17

## Leading Manufacturers' Sales of Transformers, per Region, 2007 (US\$ Million) - continued

| Company          | Asia-Pacific | North America | South & Central America & Caribbean | Total |
|------------------|--------------|---------------|-------------------------------------|-------|
| ABB              |              |               |                                     |       |
| Aichi            |              |               |                                     |       |
| Alstom           |              |               |                                     |       |
| BHEL             |              |               |                                     |       |
| Cooper           |              |               |                                     |       |
| Crompton-Pauwels |              |               |                                     |       |
| Daihen           |              |               |                                     |       |
| Fuji             |              |               |                                     |       |
| GE               |              |               |                                     |       |
| Hitachi          |              |               |                                     |       |
| Howard           |              |               |                                     |       |
| Kuhlman          |              |               |                                     |       |
| Meidensha        |              |               |                                     |       |
| Mitsubishi       |              |               |                                     |       |
| Nissin           |              |               |                                     |       |
| Schneider        |              |               |                                     |       |
| Siemens          |              |               |                                     |       |
| Takaoka          |              |               |                                     |       |
| Toshiba          |              |               |                                     |       |
| Waukesha         |              |               |                                     |       |
| <b>Sub-Total</b> |              |               |                                     |       |
| Other            |              |               |                                     |       |
| <b>Total</b>     |              |               |                                     |       |

Source: Goulden Reports



## **4.1 TRANSFORMER INDUSTRY CONTACT DETAILS**