The GOES Chronicle:
Everything Grain Oriented

Issue 2

Electricity Consumption Drives Demand

"Electrical" steels gained their moniker from the fact that they are the "heart" of the generation, transmission, distribution and utilization of electrical power which, ultimately, is driven by economic activity. Transformers consume an estimated 90% plus of all GOES produced, thus the best indicator for determining future demand is expected electricity use.

Grain oriented electrical steels are mostly consumed by transformer manufacturers who produce transmission and distribution transformers to be used in the electricity power grid, making power utilities the ultimate customer. There is a significant usage of GOES by industry to power and control machinery and production facilities. However, it has been the utilities that are regulated by governments that have required and driven the need for more efficient grades of GOES.

When electricity is transported over distance, the electricity must be "consolidated" or transformed into a higher voltage to reduce losses and then stepped down or transformed to a lower voltage to be distributed throughout the consumption system.

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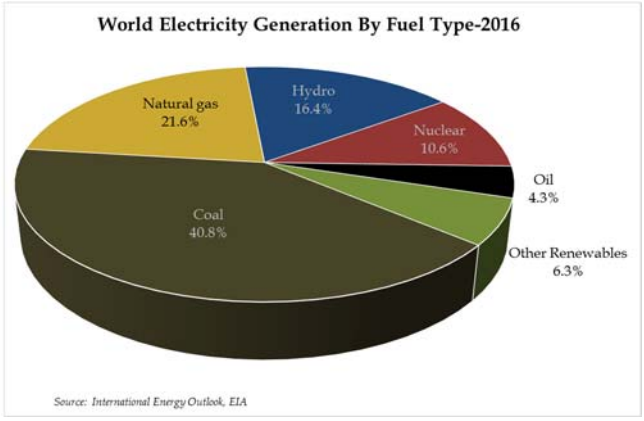
GOES Consumption Probably Won't Decline Due To Increasing Renewable Energy Sourcing, But Will Likely Evolve

The increasing bi-directional power flows and micro grid developments will change the way power is collected and distributed, but that won't necessarily mean a decrease in GOES consumption. In fact, we expect the relationship between power generation and the consumption of electrical steel to be maintained or perhaps even increase as multiple devices will be required to store and move the power.



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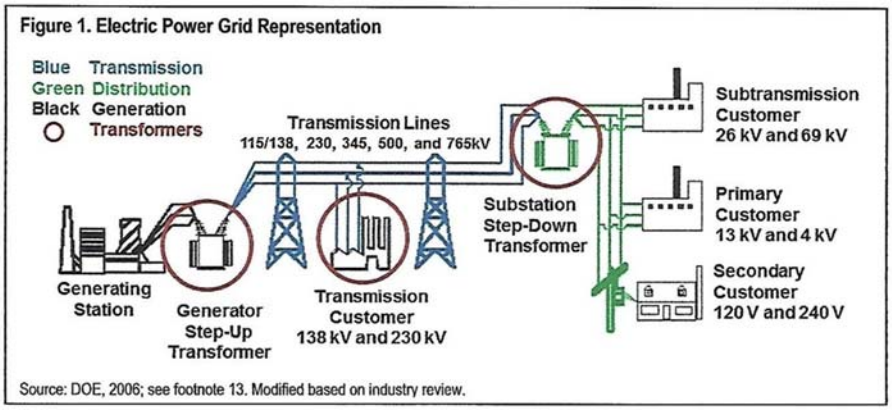
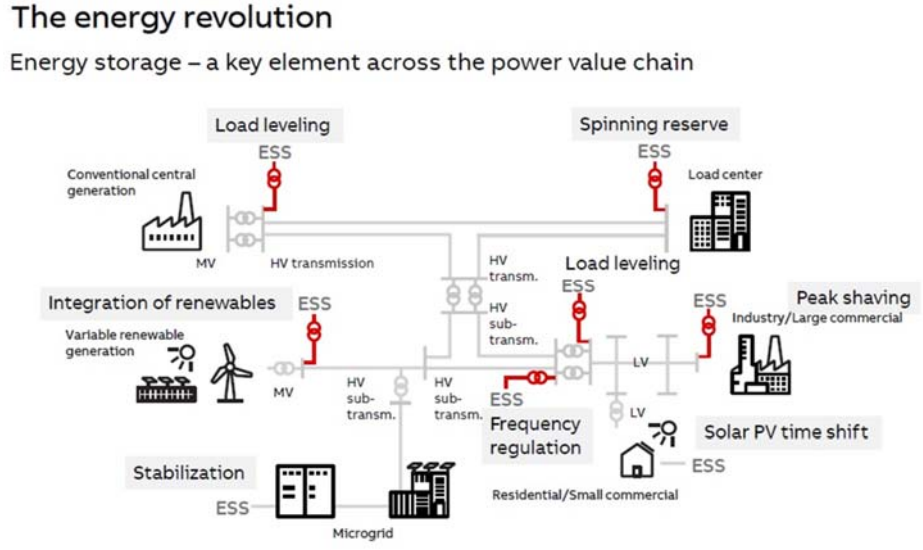
Regulated Efficiency Increasing To Eliminate Waste And Reduce CO2 Footprint



Many countries over the past decade have become increasingly focused on reducing the CO2 impact on the climate, both in the developed and developing worlds, and have sought to reduce the waste and inefficiencies in their electrical grids by requiring higher performing and less loss generating transformers. This has been accomplished through increasingly stringent energy efficiency standards that have required higher grade electrical steels be used in the construction of the transformer cores. In addition, long-distance ultra-high-voltage direct current (UHVDC) transmissions have been prioritized requiring specialty transformers.

Grid Decentralization Due To Power Generation Mix Changes

As electricity generation has expanded to include renewable sources such as wind and solar, which now account for over 6% of supply and are expected to exceed 10% by 2020, the collection and distribution of this new supply has resulted in decentralized micro grids. Energy storage, small grid stabilization, bi-directional power flow to absorb energy from individual home solar systems and ESS-based (energy storage system) frequency regulation utilizing a new technology that shifts away from the current method of controlling thermal power in favor of an instant charge and discharge system to balance generation with consumption have also been market technology drivers with regards to the shifting transformer requirements.



Source: ABB Investor Presentation, December 2016

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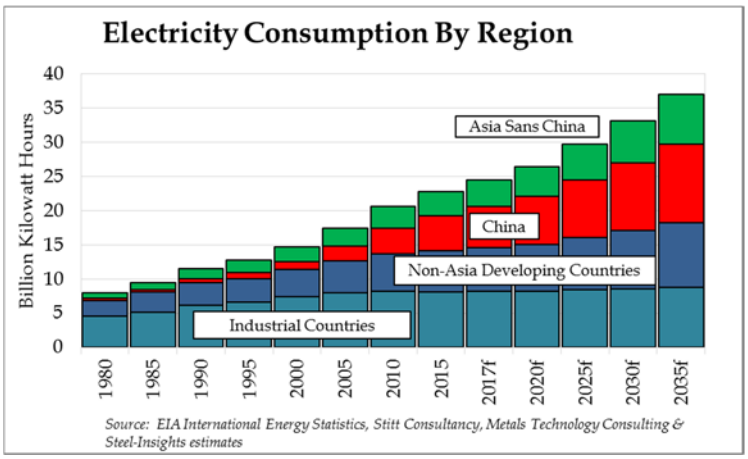
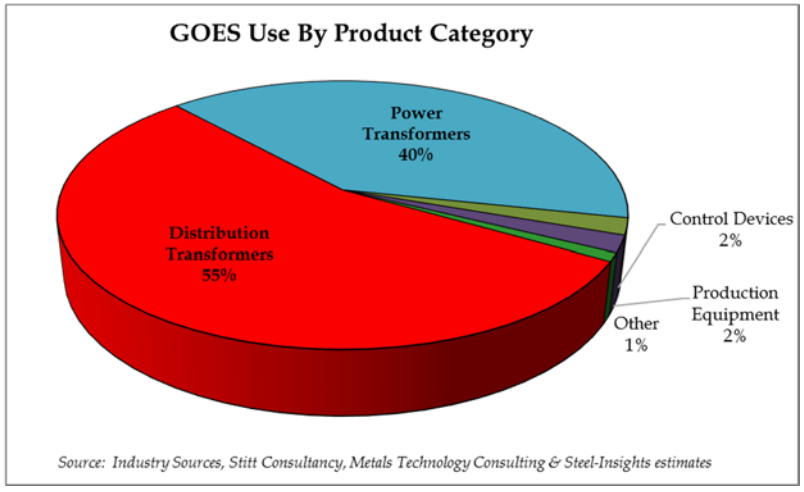
Electricity Consumption Growth Rate Accelerating

Global electricity consumption increased at a 2.7% compound annual growth rate (CAGR) from 2010 to 2014 (the last available data) according industry sources (the US Energy Information Administration (EIA)). The EIA (whom we consider to be as informed as anyone in the matter) is forecasting a 2.43% CAGR from 2014 to 2017, increasing to a 2.99% CAGR from 2017 to 2020, followed by a 3.09% CAGR from 2020 to 2025, and a 3.15% CAGR from 2025 to 2035.



Transformer Market Profile

The bulk of GOES industry consumption is split between transformers used to move or transmit power over long distances from the generation plant to the market (power transformers accounting for about 40-45%% of consumption) and transformers used in the distribution of the power to customers (distribution transformers accounting for about 55%-60% of global consumption). The split varies by region due to the make-up of the power grid, the geographical distances involved, and the type of residences being serviced by the electrical delivery system, i.e. single homes which require a delivery infrastructure versus apartment complexes where power distribution is centralized. When adding the 5% of the market that goes into control panels, production equipment and other applications, power transformers account for 40% of the total and distribution transformers account for 55% of total GOES consumption.



Steel-Insights, LLC's monthly publication "The GOES Chronicle" is available on an annual subscription basis for $2,000 per year. Additional GOES offerings include a price forecast product and a detailed industry analysis report. For further details, please contact Becky E. Hites at becky.hites@steel-insights.com.

Industry Charts