# The GOES Chronicle:
## Everything Grain Oriented

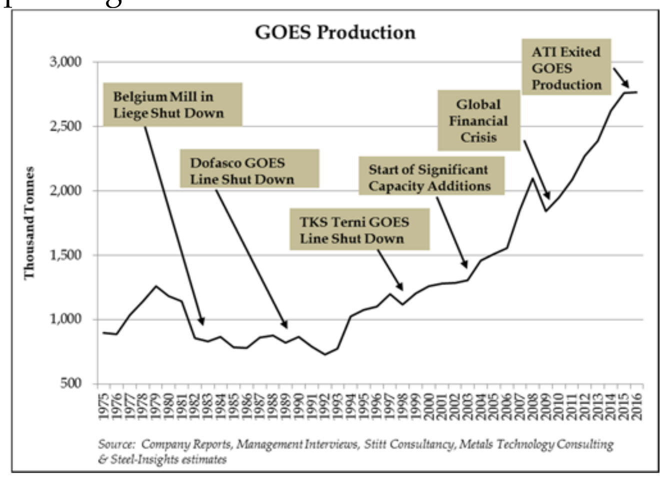
Issue 1

## GOES Barriers To Entry Breached

The Grain Oriented Electrical Steel (GOES) market has undergone a tectonic shift with regard to production in the past decade.  The market has historically been supplied through a controlled group of companies protected from outside producers by the substantial barriers to entry of:  a) difficult to obtain technical operating know-how that was strictly disseminated through licensing by the product developers (technology owners); and b) the high capital cost for the required equipment resulting in an environment where capacity was added only intermittently and old obsolete production lines were eliminated relatively responsively.

That all changed in the past decade which has seen a 77% increase in GOES production and an 84% increase in GOES capacity as the production operating hurdles have been overcome due to: a) information migration (quite possibly not legally); and b) new production practices that have made the process more forgiving, and thus the production has become; c) less cost prohibitive; and d) more attainable.  Products that in the past required decades to perfect acceptable market quality for the higher grades are now being produced in mills less than a decade old. The changing operating process has resulted in significant pressure to what used to be substantial margins for the premium, highest quality

*continued on page two*




### GOES Trade Has Remained Flat While Global Production Is Up 85%


## NAFTA GOES Pricing Breaks Out

In a divergence to historical relationships, NAFTA GOES pricing in 2013 failed to drop as dramatically (down just 10%) as the trend in other global markets (down 22%-29%) and then had a stronger recovery in 2014 (up 8%) while other markets had only a moderate (up 1%-6%) positive improvement.  This led to a significant 21% NAFTA GOES price drop in 2016 while the other global markets sustained only a moderate

*continued on page three*

STEEL-INSIGHTS®, LLC
*Metals, Mining & Manufacturing Strategic Consulting*

December 2017
Becky E. Hites (917) 862-6557
becky.hites@steel-insights.com

products and profitability has become less guaranteed even in the face of a consistently growing market from a demand perspective. Old obsolete lines have lingered in the marketplace as owners have been reluctant to accept the new reality that the equipment that cost them millions is no longer competitive and, thus, has lost any residual value as the markets have shifted to new suppliers who can produce similar quality products at a materially lower cost.

The new production process has also resulted in a change to how products are marketed with many suppliers consolidating thickness categories and magnetic property ranges into more "standardized" offerings with a targeted magnetic loss per thickness category as the need to sell multiple inferior products has been reduced (or eliminated) with the improved repeatability targeting their best magnetic property per thickness. As a consequence, in some instances "higher grade" (high permeability-HB) products are being sold in the standard grade (regular grain oriented-RGO) categories as some producers have chosen to streamline their production into a single process to reduce cost.

**GOES Consumption Year-To-Year Change**

| | | | |
|---|---|---|---|
| 2007 | 12.0% | 2012 | 8.5% |
| 2008 | 10.4% | 2013 | 8.0% |
| 2009 | -10.4% | 2014 | 6.6% |
| 2010 | 4.7% | 2015 | 4.1% |
| 2011 | 9.7% | 2016 | 3.0% |

***Source:** Company Reports, Management Interviews, Stitt Consultancy, Metals Technology Consulting & Steel-Insights estimates*

The market has also experienced a dramatic change on the demand side as convergent economic growth globally and the emergence of the "developing worlds" as global participants resulted in consistent electricity usage growth which required increasing power production and distribution of that power to the market. In the decade from 1980 to 1990, the GOES industry recorded six down years and in the decade from 1990 to 2000, the industry recorded three down years. Growing global electricity demand and massive developing world infrastructure investment has resulted in steadily expanding consumption of electrical steels. From 2000 to 2016, the industry has experienced only one down year and that was in 2009 following the global financial meltdown and subsequent global economic seizure.

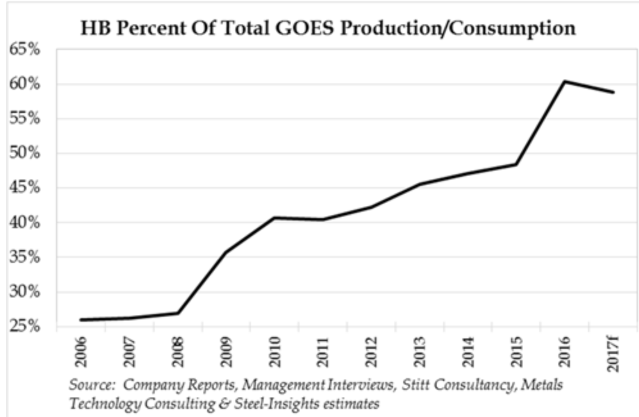
In tandem with this shift to continuous market expansion, and in part driven by increasing transformer efficiency standards in the USA and Europe, but facilitated by the migration of technology allowing more ubiquitous production of HB and at more competitive pricing with traditional GOES products, has been an increase in use of higher performance (HB) electrical steel products which now account for about 60% of the market. From 2010 to 2015, the percentage of HB consumption (assuming no annual in transit inventory change) increased gradually from 41% of the total to 48% but in 2016 surged as the Chinese became more aggressive exporters of the products and the premium between RGO and HB for the 0.23 mm thickness remained at historically low levels. *(Note: The HB percentage drops slightly in 2017 due to two new RGO entrants to the marketplace.)*



*continued on page three*

GOES BARRIERS continued from page two

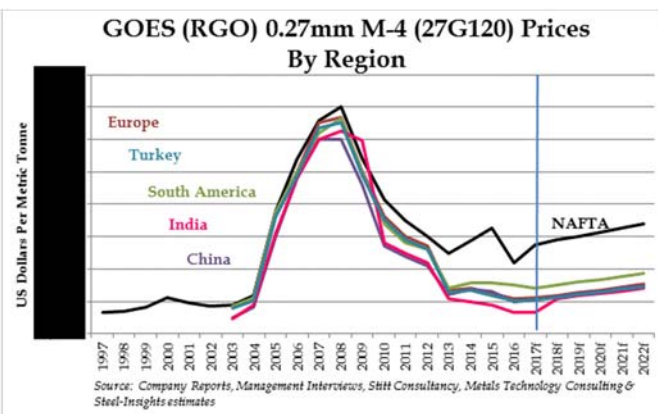
Supply of HB requires investment in modern equipment supported by dedicated research and development efforts. New market entrants (in China and South Korea) have invested heavily to produce the increasingly demanding HB products that have historically been the domain of the product developers (in the USA and Japan) abandoning the conventional RGO products and are being rewarded with increasing market acceptance.




With the evolution in the mills' ability to control the production process, there has also been a shift in demand for product thicknesses. For RGO products, the market in the past few years has shifted from 50% 0.27 mm to almost 70% as many producers have consolidated their offerings of 0.30 mm into a single "thicker" category. There has also been an increase in RGO 0.23 mm products to 20% of the mix from less than 10% and will likely continue to expand to 30%. For HB products, the market has historically been 50%-55% 0.23 mm which has expanded to about 70%-75% and we believe will continue to expand to 75%-80%.

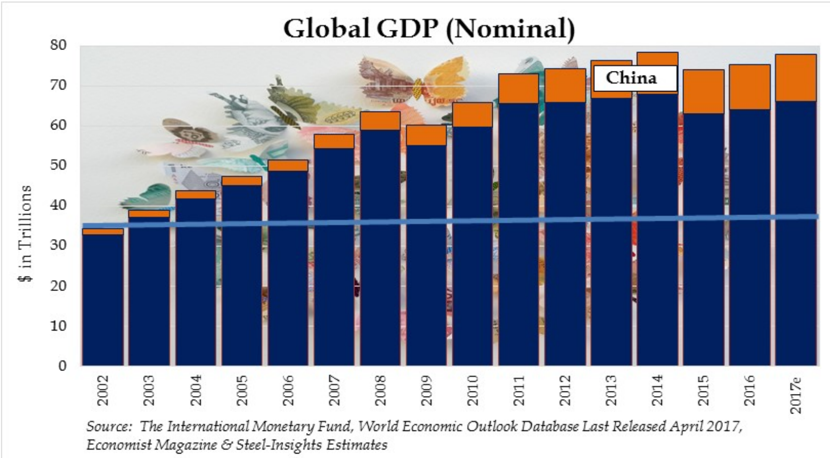
NAFTA GOES PRICING continued from page one

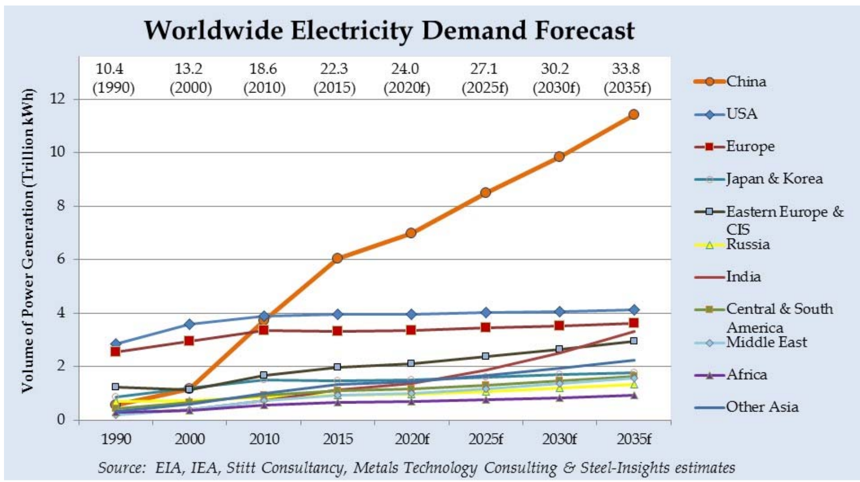
2%-9% drop that began in 2015 (down 0.3%-4.4%). While the trend has once again come into alignment with all markets posting positive price gains in 2017, there remains a gap between the NAFTA and rest of world markets that didn't exist in the decade from 2003 to 2013 and isn't expected to be rectified in the near future. The attached chart shows the trend for regular grain oriented 0.27 millimeter M-4 (27G120) and while the trends in thinner RGO and hi-permeability products isn't exactly the same, they follow the same pattern.

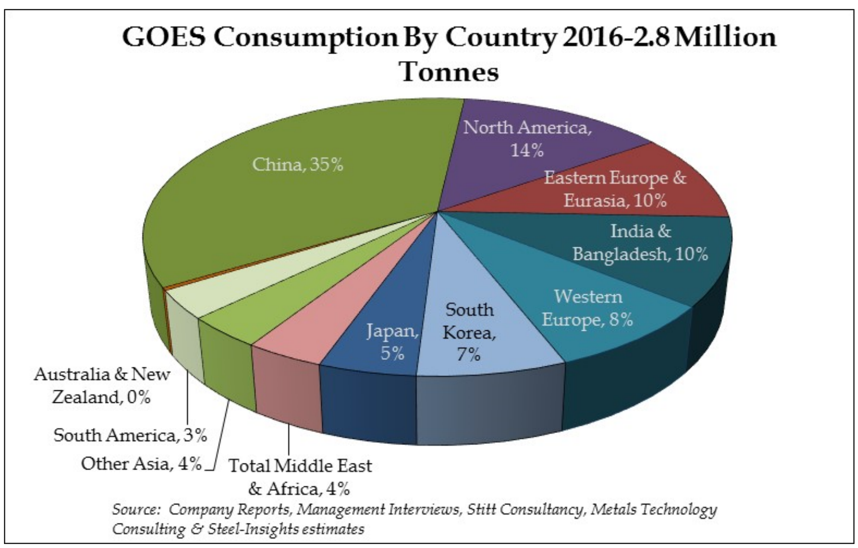



Steel-Insights, LLC is launching a new monthly publication "The GOES Chronicle" on an annual subscription basis for $2,000 per year. Additional GOES offerings include a price forecast product and a detailed industry analysis report. For further details, please contact Becky E. Hites at becky.hites@steel-insights.com.

# Industry Charts






STEEL-INSIGHTS®, LLC
*Metals, Mining & Manufacturing Strategic Consulting*