



FAT ALPHA

V A L U E I N V E S T I N G

Quantitative Methods + Qualitative Analysis = Superior Returns



CYPRUS
VALUE
INVESTOR
CONFERENCE

2018

FatAlpha is:

- Value investing approach
- Develop initially for my personal investment needs.
- Currently offered to investors via managed accounts.
- Operate under the regulatory umbrella of the **Cyprus Development Bank**.

The Approach

- **Quantitative value models used to screen for opportunities.**
 - Solves investment biases. Helps provide focus.
 - Factors used are based academic papers, books, and own research.
- **Fundamental analysis** is done on the model output.
- **Best opportunities** are invested in.
- *Logic: Market < Value Models < FatAlpha (Qualitative Overlay)*

FatAlpha Active Strategy :

Inception to September '18: **gross 190% vs 138% S&P 500** (19% vs 15% annually)



GRAFTech
International

Investment
Idea 2018



Basic Market Info in USD (September 21st)

- Enterprise Value: \$8.1 billion
- Market Cap: \$6.0 billion
- Market Price: \$20
- FY18E Sales: \$1.8 billion
- FY18E EBITDA: \$1.2 billion
- **FY18E EBITDA margin: 63.5%**
- FY18E FCF \$0.8 billion
- EV/EBITDA '18E 6.9x
- **EV/FCF '18E 9.7%**

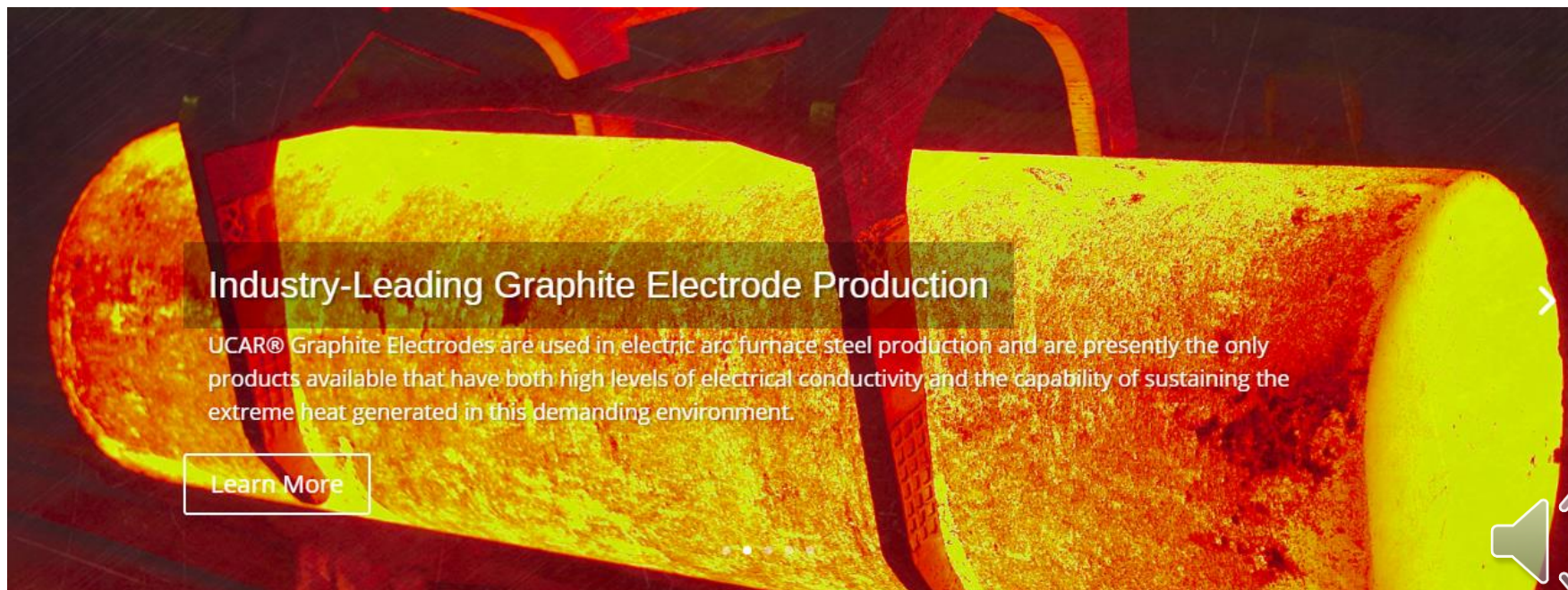
Caught your attention?

More Info (September 21st)

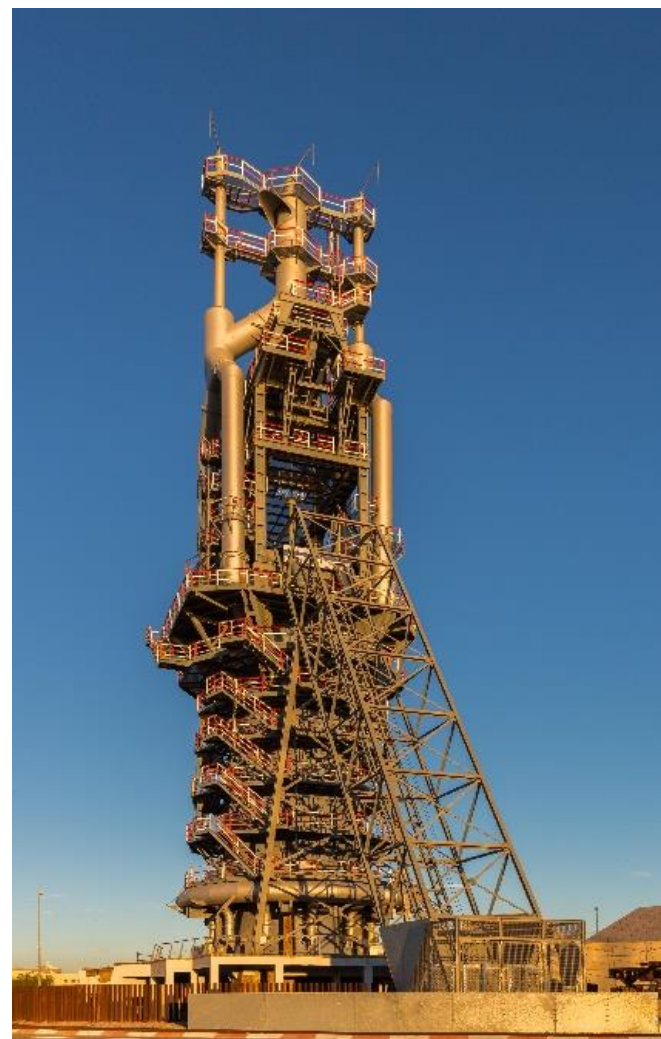
- IPO: \$15 @ April 19th 2018
- Major shareholder: Brookfield Asset Management 76% (bot co. in 2015)
- Insider Purchases: 3: \$19 @ Jun 4th, \$19 @ May 22nd, \$16 @ Apr 23rd



- Founded in 1886.
- GrafTech has 3 plants (France, Spain, Mexico) that make **graphite electrodes (GE)**.
- Graphite electrodes are used to produce **steel in an electric arc furnace**.
- **By year-end 2018, debottlenecking will increase capacity to ~202,000 mt** (@ \$37m cost). If idled St Mary's facility were restarted, capacity would rise to ~230,000 mt.
- **Total worldwide capacity: ~800,000 mt** (ex China) with ~90% utilization. Largest competitor: ~230,000 mt.



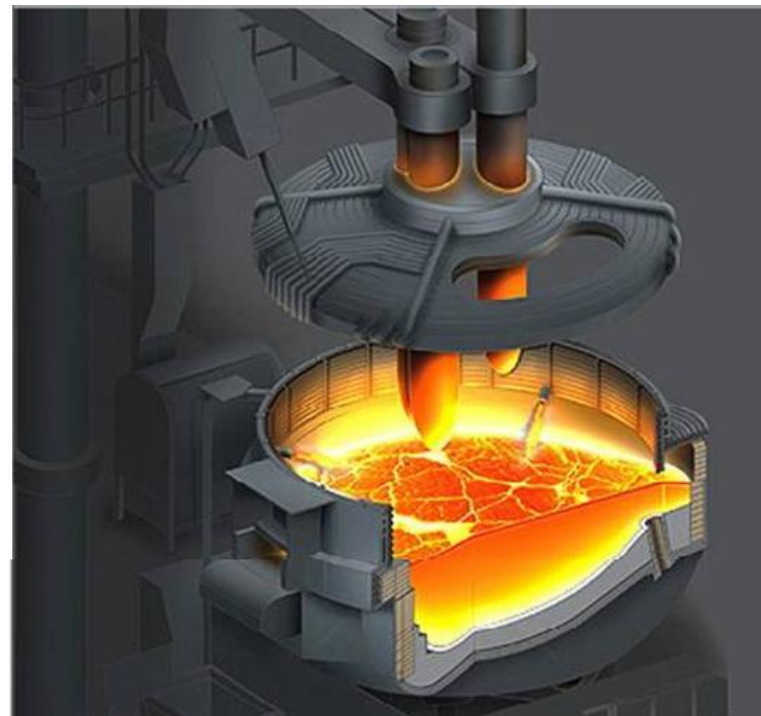
- Graphite electrodes are used to produce **steel in an electric arc furnace**.
- **Steel is made via blast furnaces and electric arc furnaces.**
- **Blast furnaces:**
 - **Iron ore** melted using coke as fuel.
 - Pig iron is produced and converted to steel by blowing oxygen through it.
 - They are large and need a high investment.
 - **Produce a large amount of carbon dioxide emissions.**



Blast Furnace
Source: Wikipedia



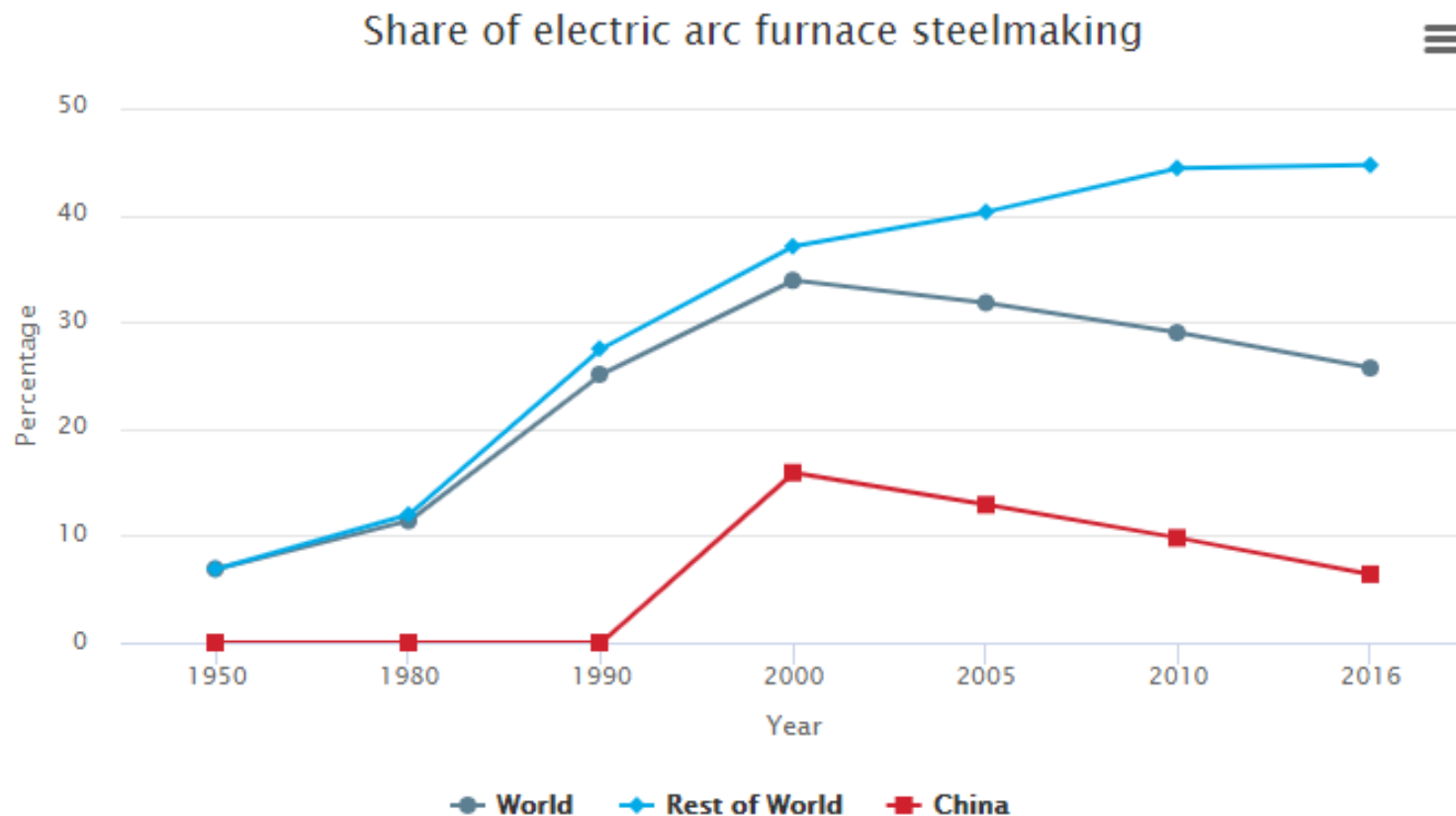
- **Electric arc furnace:**
 - **Electricity is passed through giant electrodes in the roof of an oven**, creating an arc in which the temperature reaches thousands of degrees.
 - Heat melts the scrap metal put in the furnace.
 - **Advantage is use of scrap metal as main fuel**, uses less energy than blast furnaces & can be quickly stopped and restarted. Steel plants can time their operations to take advantage of low cost electricity.
 - **~75% less carbon dioxide emission than blast oxygen furnace (BOF)**
 - ~1 ton of GE to produce ~1 ton of steel.



Electric Arc Furnace

Source: ExportersIndia.com





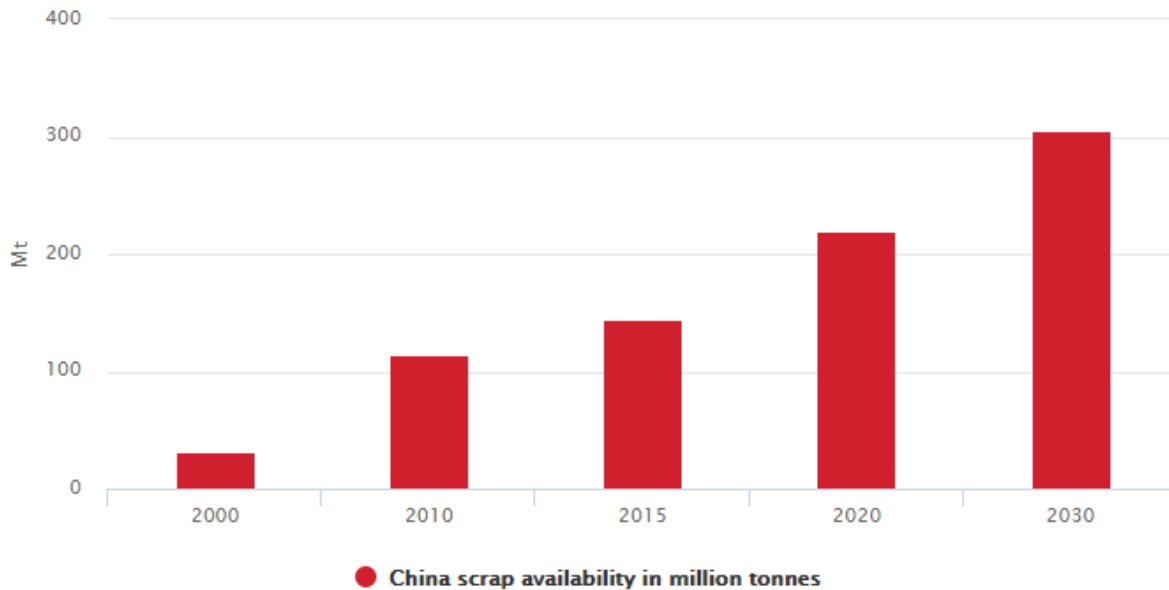
Source: worldsteel.org

worldsteel.org

- EAFs are dominant in the U.S. while blast furnaces globally.
- EAF is around 6.5% of China's steel production vs 45% in the rest of the world.



Projection of steel scrap availability in China



China's Ministry of Industry and IT (MIIT) said it would **encourage steel producers to use EAFs**, which generate **less pollution and involve the melting of steel scrap** (*Mining Journal, Jan 2018*)

Source: *worldsteel.org*

worldsteel.org

- **Capacity replacement campaign in China.** According to S&P Global Platts, the new capacity will come on stream over 2018-20 with closures occurring once new facilities are commissioned. 34% or 51.4 million mt will use EAF while the rest will be converters.
- **“China has been encouraging steel mills to switch from blast furnaces and converters to EAFs since 2017. This is because EAFs are more environmentally friendly, and the supply of ferrous scrap has grown after the elimination of 140 million mt/year of induction furnace capacity in 2017.”** (*S&P Global Platts*)



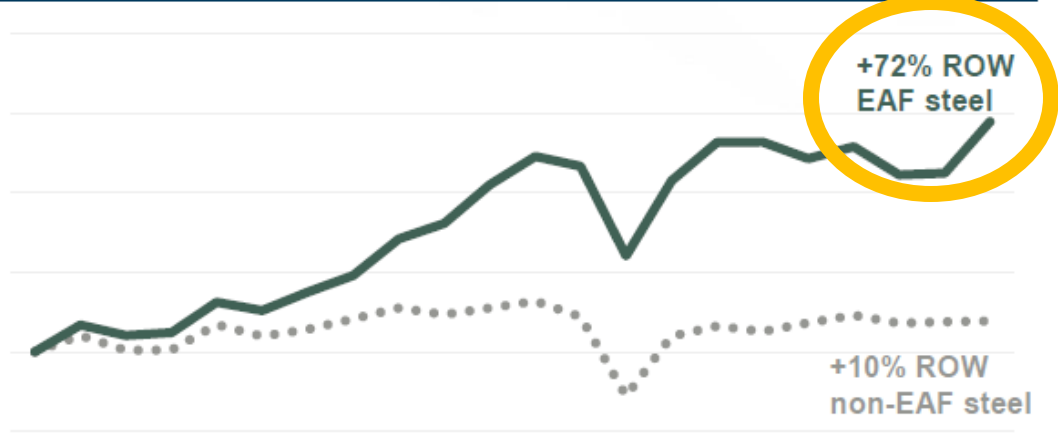
EAFs: Fastest Growing Segment of Steel Market

Global & China:

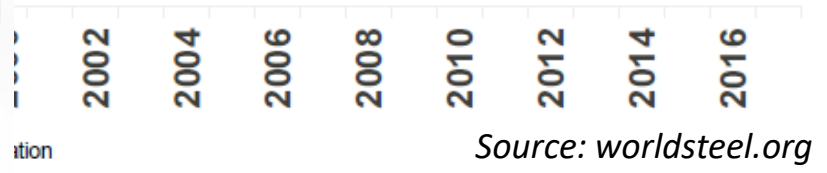
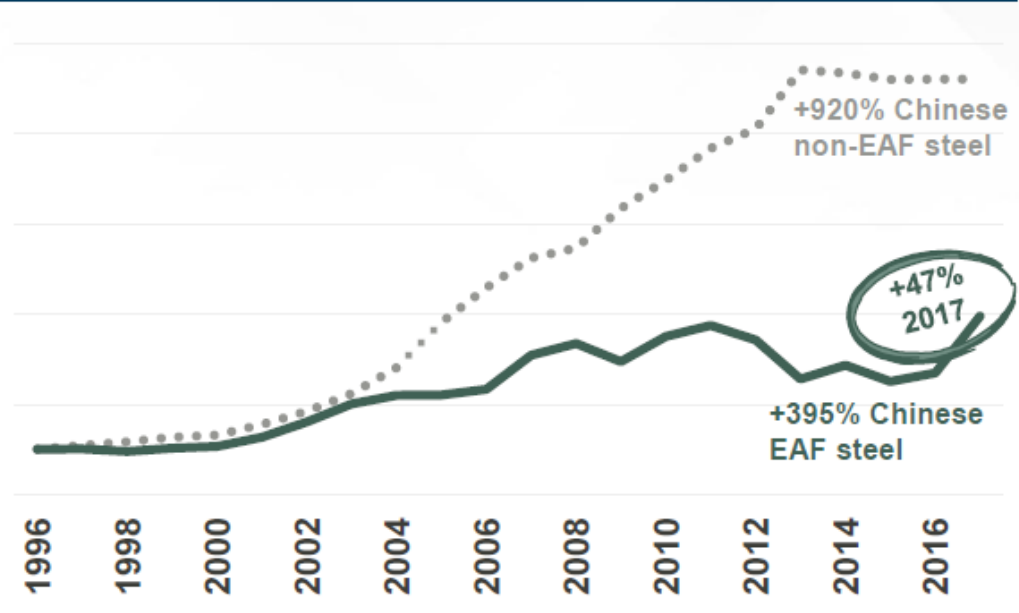
Non-EAF steel: Flat growth

EAF: Growing

Steel Production Growth (Global ex-China)



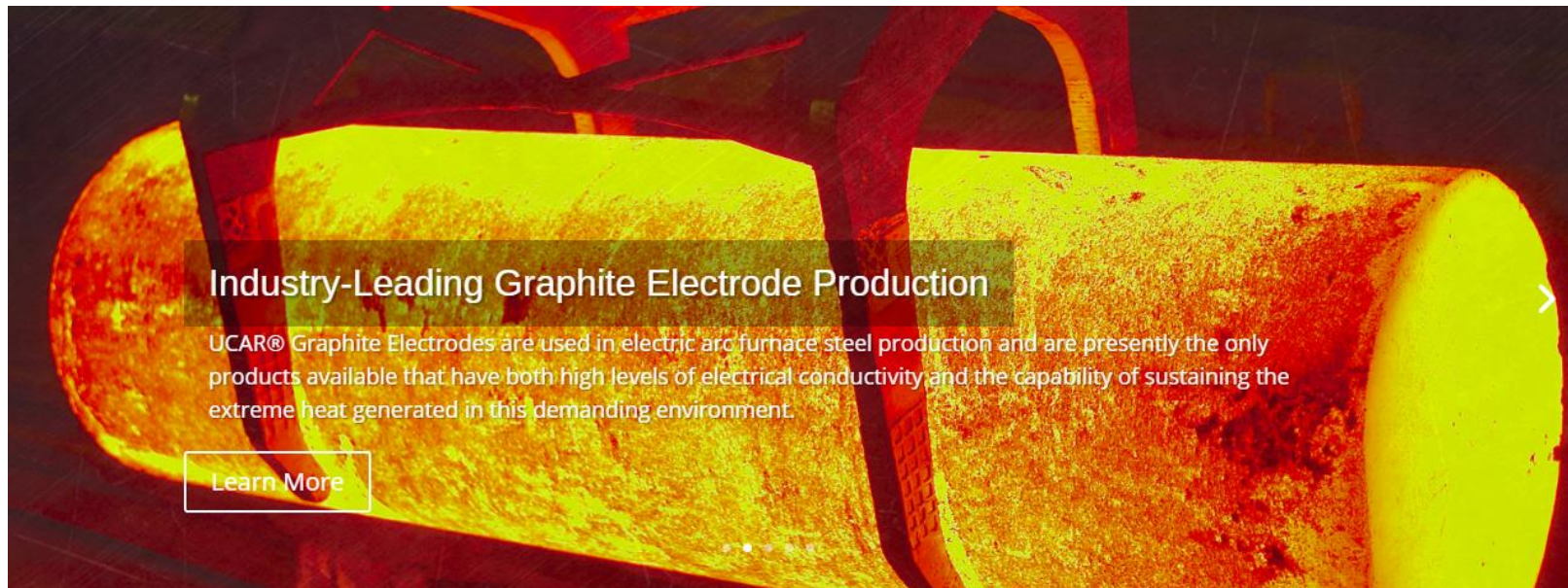
Steel Production Growth (China only)



Source: worldsteel.org

Source: worldsteel.org

- **Demand for Electric Arc Furnaces is increasing.**
- Graphite Electrodes are needed because **graphite is the only material** that has the chemical properties **to pass a current consistently** at the required temperatures.
- **No known substitute for graphite electrodes in EAF process**
- **~ 3-5% of steel production cost.** (i.e. small cost that can also be passed on)
- Steel manufacturers willing **to pay a premium for high quality, reliability, consistency.**
- Ultra-high power (UHP) electrodes (Graftech's specialty):
 - **6 months to produce but consumed in one single 8-10 hour shift**
 - 3 months to make needle coke input, 3 months to make the GE.

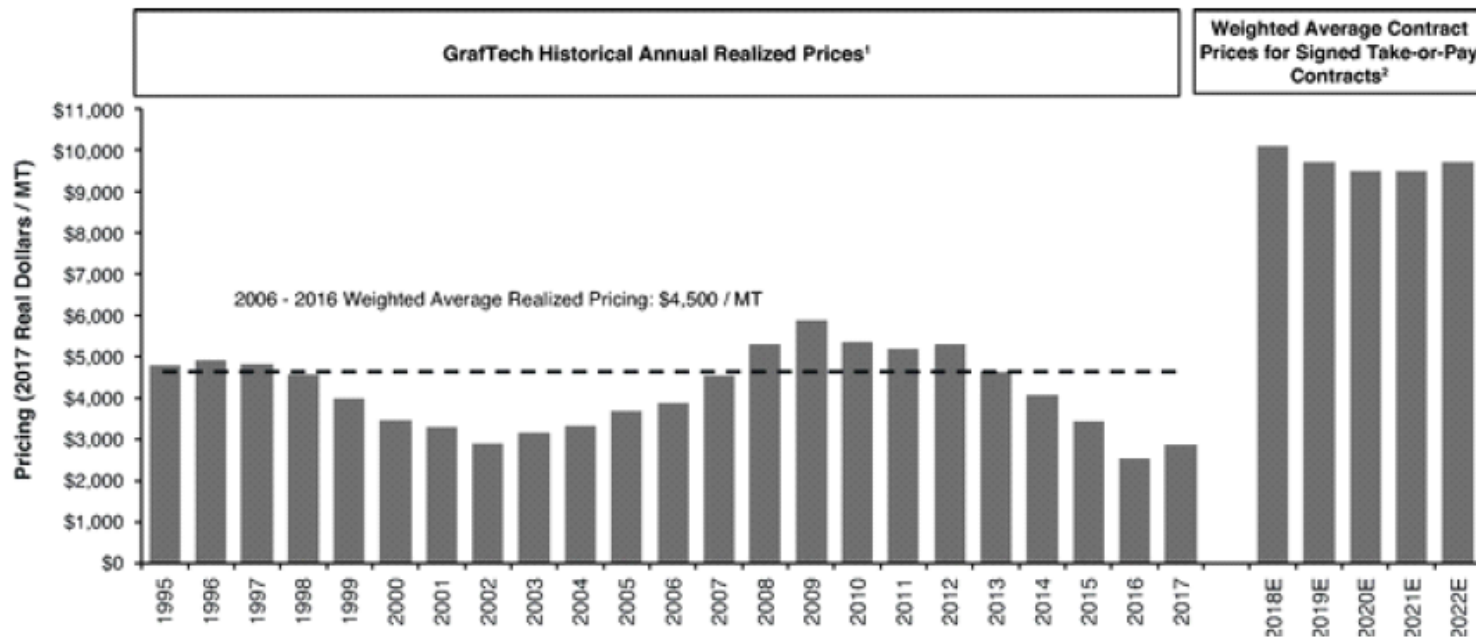


Historical **2016 low of \$2,500. 2Q18: \$15,000-20,000.**

GE was a volatile commodity. This changed because:

- 1. Prior to 2016, global steel production overcapacity existed driven by Chinese blast furnace production.** Thus affecting demand for GE. Since 2016, EAF use has made a comeback due to **new policies (restructuring of industry in China).**
- 2. Global electrode supply has been cut by ~20% (JPM).** Company believes these are permanent. 6 plants mainly in Europe and America closed down over the last 3-4 years bringing down capacity by ~ 200,000 mt.
- 3. Consolidation in industry** – 2 of top 5 producers joined in 2017 (Showa Denko of Japan bought out SGL Carbon of Germany – 3rd bought 2nd).
- 4. Development of an alternative use for key input (needle coke)**
 - The only input for UHP electrodes.
 - It is used as an anode material in Lithium Ion batteries
- 5. Shortages appearing in global supply of GE** (Indian steel makers requested lifting of anti-dumping duties on Chinese GE imports – effective Sept 6th)
- 6. Increasing environmental standards making new-build capacity in China very difficult.**

GrafTech historical weighted average realized prices and signed three- to five-year weighted average contract prices for graphite electrodes

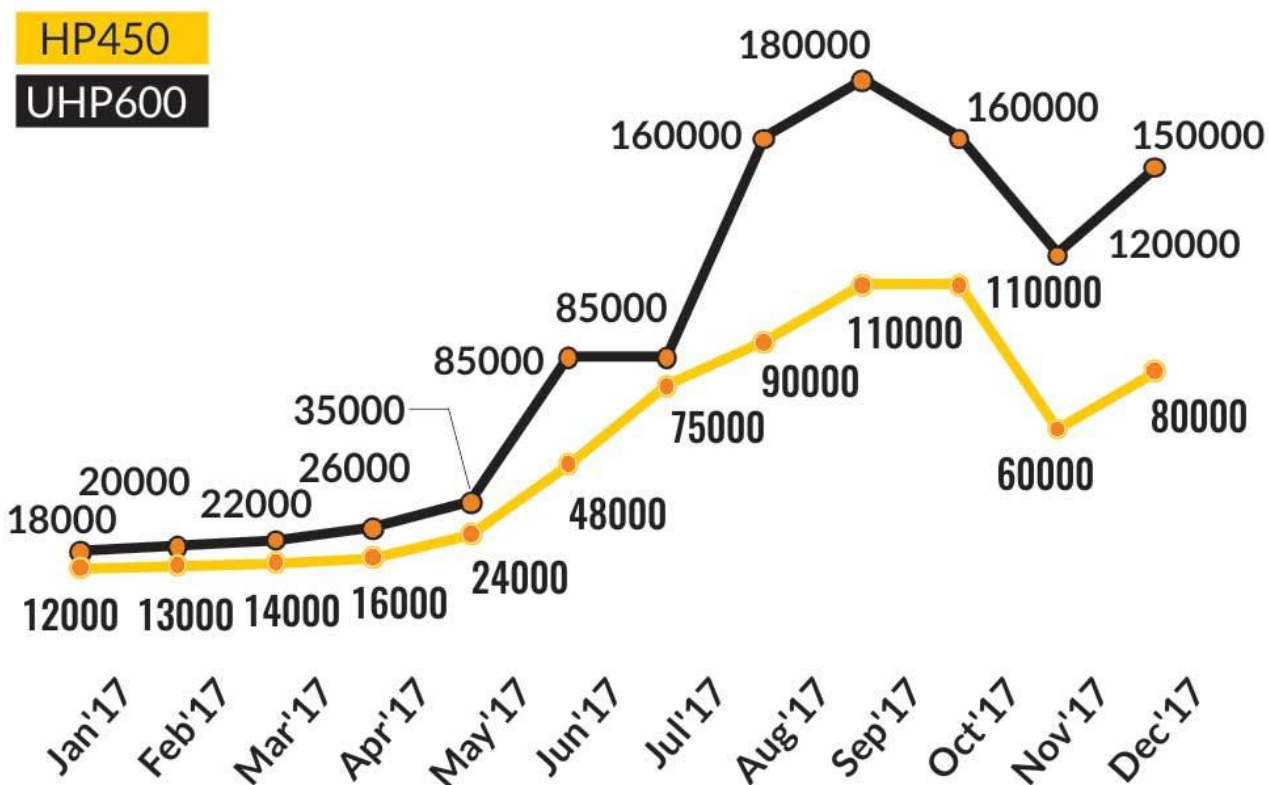


- GrafTech's avg realized prices 2006-16 was ~\$4,500 /mt
- Company has signed 3-5 year take-or-pay contracts at ~\$10,000.
- **The contracts include termination payments of 50-70% of remaining contracted revenue.**
- Historically, sales were negotiated annually and were non-binding. Company is able to offer these fixed-term contracts because it has access to input.
- 3-5 yr contracts shows buyer willingness to commit because of view of pricing.
- **Sold 60-65% of capacity (~636k mt) from 2018-22. 96% of 2018. @ 60%+ EBITDA margins!**



CHINA'S GRAPHITE ELECTRODE PRICE TREND 2017

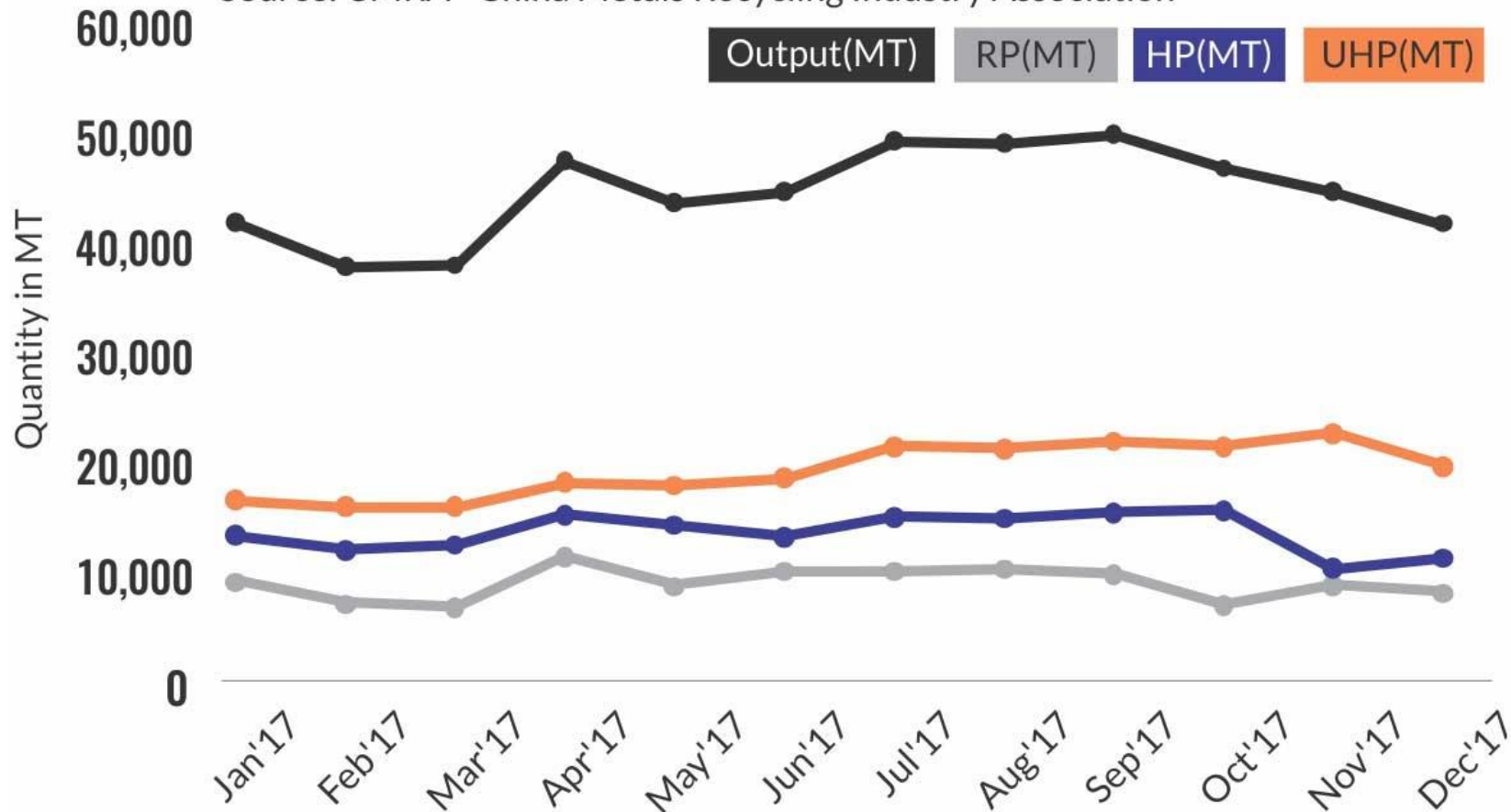
Prices in Yuan/Ton, Source: IC Carbon



Source: IC Carbon, steel-360.com

GRAPHITE ELECTRODE OUTPUT (GRADE WISE) IN 2017

Source: CMRA - China Metals Recycling Industry Association

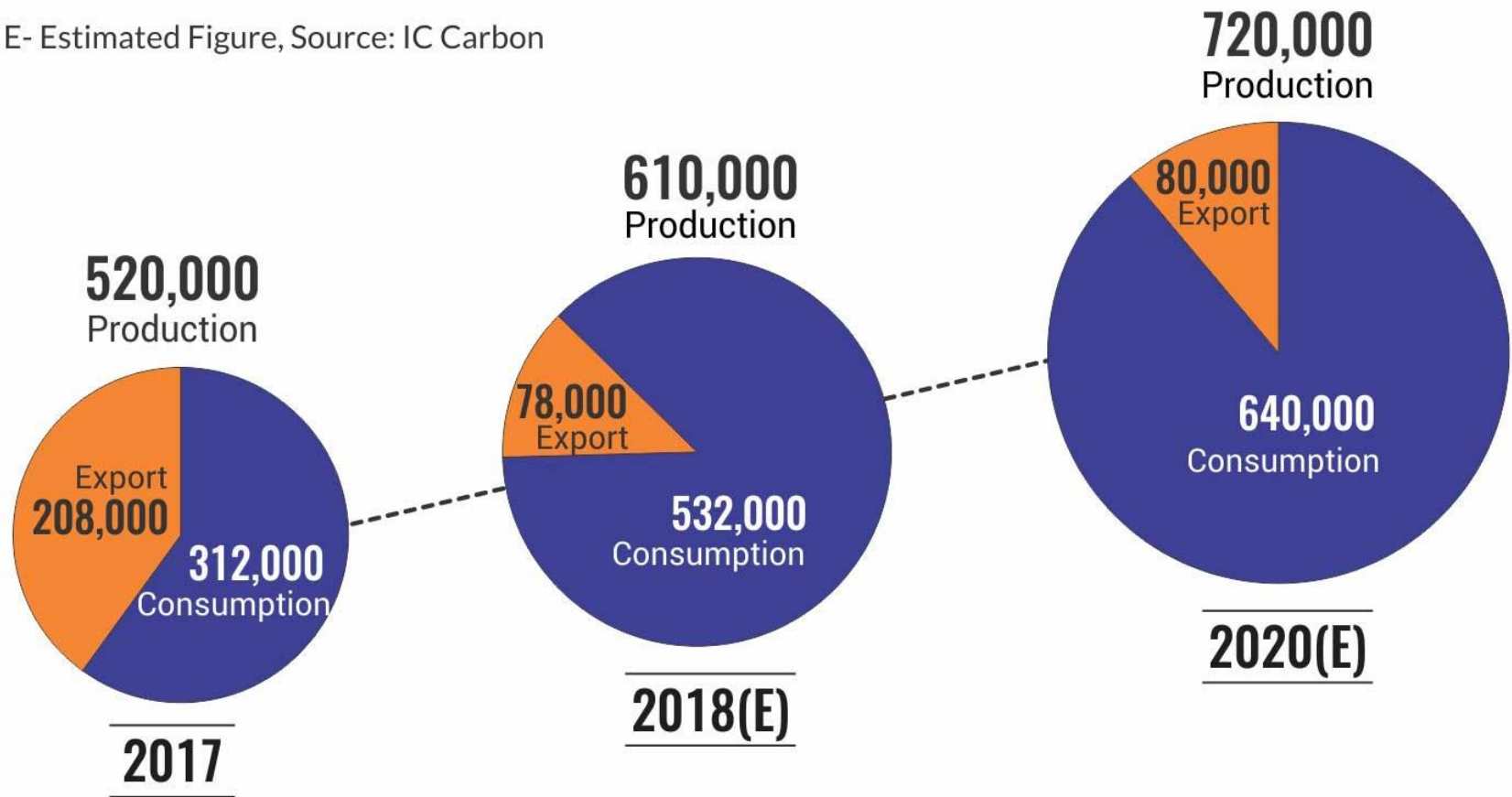


Source: IC Carbon, steel-360.com

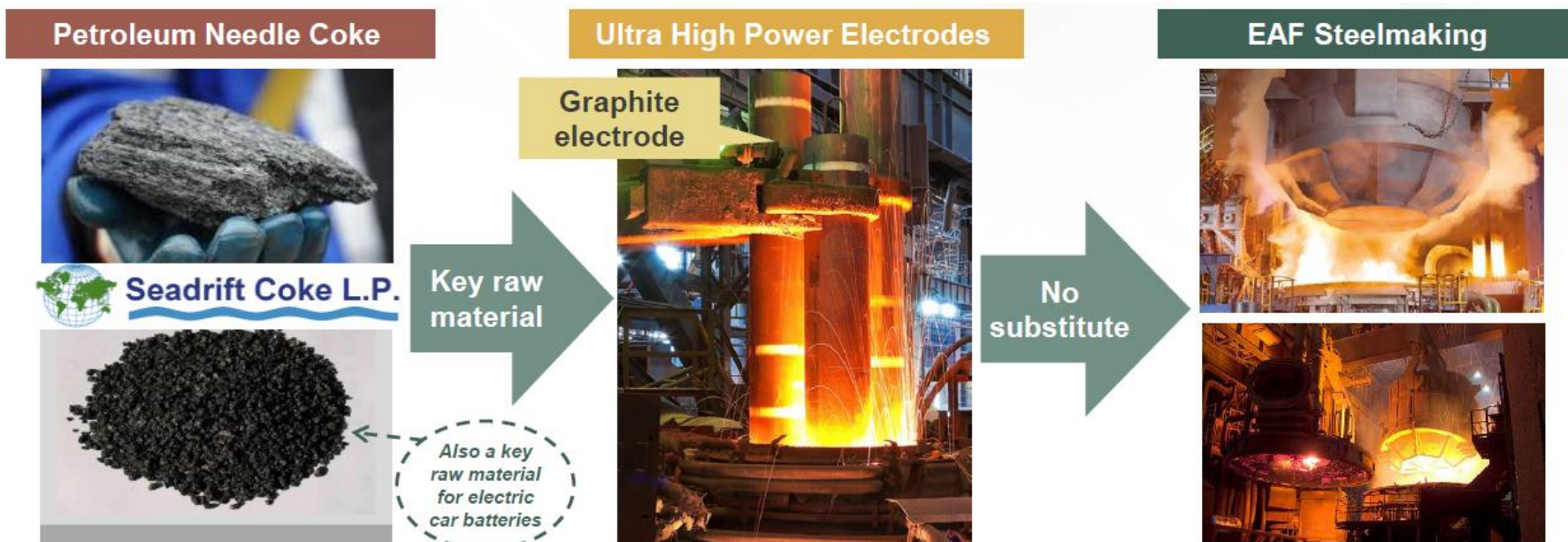
NOTE: Above could be optimistic. According to JPM, only 15% is UHP

CHINA GRAPHITE ELECTRODE PRODUCTION VS CONSUMPTION VS EXPORTS INCLUDING PROJECTED

E- Estimated Figure, Source: IC Carbon



Source: IC Carbon, steel-360.com

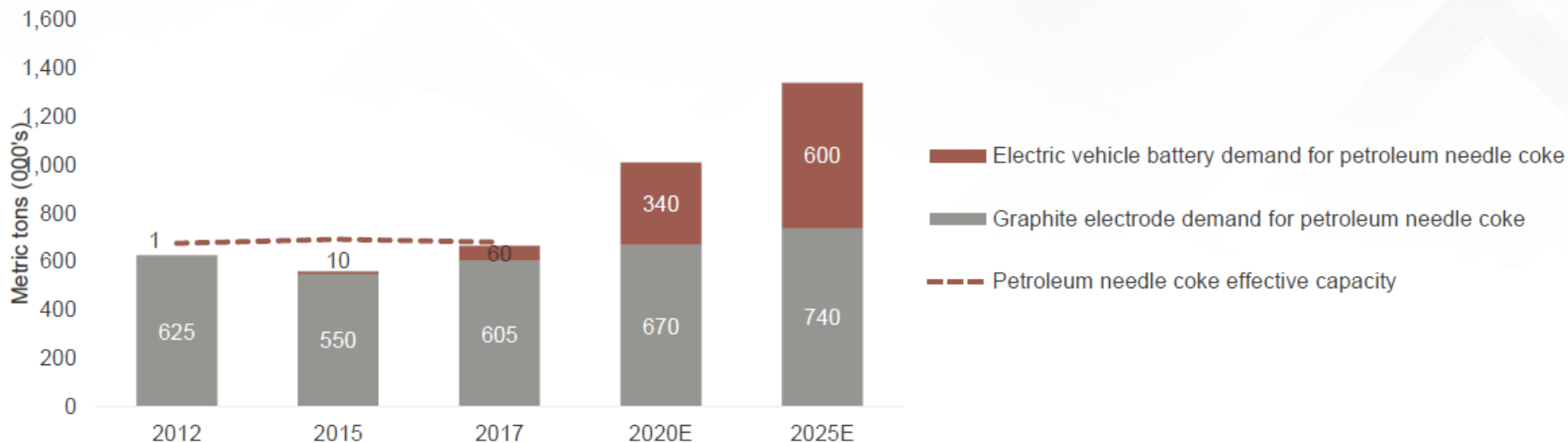


- **No substitute for Graphite Electrodes** in EAF Steelmaking.
- **No substitute for Petroleum Needle Coke** - input to produce ultra high power GE. (other needle cokes can not be used).
- 1 ton of needle coke required for 1 ton of GE, 1mt of steel requires 1.7 kg of GE.
- **Needle coke is sourced from tar which is <10% of output of a barrel of crude oil.**
- The tar is put through a coker which creates various kinds of cokes
 - 80% are fuel grade and not good enough to make electrodes.
 - **Up to ~2% of a barrel of crude can ever end up as petroleum needle coke.**
 - **Not simple to create more capacity of needle coke because you need to make use of other 98% (by-product of refining process)**

Needle Coke: Demand from EV batteries

- In 2017, **10% of needle coke capacity** went to Electric battery vehicles.
- **EV sales are still under 2%** of total market.
- **10x rise in batteries doubles demand for needle coke!** (possibly conservative estimate!)
- **No substitute.** Tiny piece of battery so unlikely to see anything change soon.
- Economics: 40 kg of anode powder per EV. Anode powder consumes 2 mt of needle coke per mt with a min 75% of needle coke supply from petroleum needle coke.

Strong Demand Pull from Electric Vehicle Batteries¹



¹ GrafTech estimated annual electric vehicle deliveries based on the midpoints of IEA's estimated ranges for electric vehicle stock in 2020 (9 million to 20 million) and 2025 (40 million to 70 million); estimated annual electric vehicle deliveries reflect CAGRs of 79% for 2017-2020 and 12% for 2020-2025 to achieve each midpoint, assuming no replacement of existing stock. Electric car demand for petroleum needle coke is based on management estimates of 40 kilograms of anode powder per electric vehicle (anode powder consumes 2 MT of needle coke per MT, with at least 75% of needle coke supply provided by petroleum needle coke)



- Graftech is the **ONLY** vertically integrated GE producer globally!
 - Owns Seadrift Coke which provides petroleum need coke.
 - 79% of planned GE production for 2019 is covered. Over 66% of LT needs.
 - Incremental increase in capacity in 2019.
- 4 primary producers of pet needle coke: Phillips 66, Seadrift, JX Nippon Oil, JX Nippon Oil & Energy (Mitsubishi), Petrocokes Japan (Sumitomo). Phillips 66 has an 56% share (outside of China), Seadrift is 2nd with ~19%.
- Petroluem needle coke is ~25-45% of cost to produce a UHP GE.
- GrafTech TOTAL cost of producing GE < market price of needle coke alone.
 - **1Q18 cost of production using Seadrift needle coke was approximately \$2,600/mt, whereas the market price for needle coke alone was about \$3,000/mt.**
- **Graftech estimates will take 5+ yrs to see meaningful needle coke capacity emerge outside China and perhaps longer to see real GE capacity emerge.**
- As contracts expire, GrafTech will lock in higher GE rates.
 - **53,000 mt (spot exposure) for 2019.**
 - In 1Q18, GrafTech only had 3,000 mt of spot @ \$20k (double contract price)
 - According to JPM, the average spread between GE prices and needle coke was \$17.3k in 1Q18 with every \$1k shift in spread equal to about \$42m of 2019 EBITDA.

- Brookfield's **ownership overhang**.
- **Capacity additions** to GE could pressure prices
 - But needle coke input is in short supply.
 - EV market will keep needle coke supply tight.
 - China market is tight as 105 new EAFs were ordered (double EAF production).
- **Surge in GE prices may not be enough for new capacity.**
 - Eg. Tokai Carbon has 30k mt idle facility with no plans to restart due to CAPEX and needle coke shortage.
 - GrafTech estimates that **from initial permitting to full production takes 5-10 years, and costs \$10,000/mt.**
 - Technical know how is also a barrier to entry.
 - **Time to complete, uncertainty of prices and difficulty of sourcing input will result in higher GE prices for longer than market estimates.**
- 88k mt of oil-based **needle coke capacity will be added in China** but quality is questionable and even if good enough will be absorbed by local market.
- **EV market finds a substitute** for petroleum needle coke would push down prices and result in supply for additional GE capacity.
- **Economic downturn** could reduce demand for steel.
 - Take-or-pay provisions could be tested. These are new to the industry.

GrafTech has better margin than similar + better market conditions. Should even trade at premium!

At 2018E numbers:

@ 7% FCF/EV
Implies 60%
Upside

@ 10 P/E
Implies 49%
Upside

2019: 1/3 of capacity in spot prices!

CC: special div, buyback potential by end '18

		Mkt Cap	Sales Est	EV/EBITDA Est	FCF Est/EV	P/E Est	EBITDA margin		
Metal - Aluminium & Steel (Mills, Stainless, Speciality and Service Centers)									
ALCOA CORP	AA US	USD	Aluminum	7,552	13,563	3.4X	2%	9.8X	23%
CENTURY ALUMINUM	CENX US	USD	Aluminum	997	1,917	9.2X		37.1X	6%
CONSTELLIUM NV-A	CSTM US	USD	Aluminum	1,661	5,636	7.1X		17.1X	9%
KAISER ALUMINUM	KALU US	USD	Aluminum	1,807	1,587	9.4X	4%	16.9X	13%
COMMERCIAL METAL	CMC US	USD	Steel	2,381	4,778	7.9X		14.0X	8%
NUCOR CORP	NUE US	USD	Steel	19,952	24,857	5.6X	8%	8.3X	17%
STEEL DYNAMICS	STLD US	USD	Steel	10,690	11,786	5.6X	9%	8.1X	19%
TIMKENSTEEL	TMST US	USD	Steel	653	1,641	7.9X		47.6X	6%
ALLEGHENY TECH	ATI US	USD	Steel	3,739	4,009	10.3X	3%	18.1X	13%
CARPENTER TECH	CRS US	USD	Steel	2,798	2,414	8.6X	3%	16.2X	16%
HAYNES INTL INC	HAYN US	USD	Steel	443	431	20.0X		#N/A N/A	5%
FERROGLOBE PLC	GSM US	USD	Diversified M	1,386	2,267	5.2X	2%	11.4X	15%
RELIANCE STEEL	RS US	USD	Steel	6,158	11,448	6.4X	6%	8.6X	11%
RYERSON HOLDING	RYI US	USD	Steel	427	4,313	4.6X	1%	7.6X	7%
WORTHINGTON INDS	WOR US	USD	Steel	2,505	3,960	10.5X	5%	13.0X	8%
				Average		8.1X	4%	16.7X	11%
Graphite electrode producers									
FANGDA CARBON-A	600516 CH	CNY	Electrical Co	5,786	10,746	#N/A N/A		7.4X	#N/A N/A
SHOWA DENKO K K	4004 JT	JPY	Diversified C	8,273	993,080	5.5X	7%	7.5X	22%
TOKAI CARBON CO	5301 JT	JPY	Commodity C	4,423	221,459	5.9X	5%	6.3X	38%
GRAPHITE INDIA	GRIL IN	INR	Electrical Co	2,249	76,161	3.4X	9%	4.9X	57%
IBIDEN CO LTD	4062 JT	JPY	Electronic Co	1,978	309,040	4.2X	5%	18.2X	15%
MERSEN	MRN FP	EUR	Electrical Co	740	865	6.8X	3%	11.6X	15%
NIPPON CARBON	5302 JT	JPY	Electrical Co	821	45,950	6.6X		9.8X	33%
TOYO TANSO CO LT	5310 JT	JPY	Electrical Co	623	41,750	#N/A N/A	4%	15.0X	#N/A N/A
				Average		5.4X	6%	10.1X	27%
Graphite electrode customers									
NUCOR CORP	NUE US	USD	Steel	19,952	24,857	5.6X	8%	8.3X	17%
STEEL DYNAMICS	STLD US	USD	Steel	10,690	11,786	5.6X	9%	8.1X	19%
ALLEGHENY TECH	ATI US	USD	Steel	3,739	4,009	10.3X	3%	18.1X	13%
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CARPENTER TECH	CRS US	USD	Steel	2,798	2,414	8.6X	3%	16.2X	16%
				Average		7.6X	6%	12.9X	16%
GRAFTECH INTERNA	EAF US EQ	USD	Electrical Co	5,830	1,857	6.7X	10%	6.8X	63%
Net Debt (\$m):	2,044								
No. of shares (\$m)	302.2								
EAF @ FCF/EV yield	7%	\$ 30.41	Upside from \$19	60%	Still higher than many comparables - logical				
EAF @ P/E	10.0	\$ 28.30	Upside from \$19	49%	Easy peasy valuation - P/E 10x an investor favourite				
EAF @ EV/EBITDA	8.0	\$ 24.44	Upside from \$19	29%	Metals Avg Val - faces new supply headwinds (worse case)				



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