CENTRUM

Graphite Electrodes

Sector Update **26 April 2018**

Golden Era of Graphite Electrodes

The pace of positive developments and rally in Graphite Electrode prices has been unprecedented and almost unreal since we postulated in June 2017 that Graphite electrodes (GE) industry is poised to enter an upcycle and initiated coverage on Graphite India (Link). With GE industry storming into a violent pricing upcycle in the last one year which has surprised the investors, analysts and the companies in the business themselves, we take a detailed reassessment of the fundamentals of the industry and arrive at some important conclusions in this note. We believe that strong upcycle in GE is likely to sustain led by i) favorable demand-supply equation, ii) scarcity of petroleum needle coke (for UHP GE) and iii) relative attractiveness of Electric Arc Furnace steel production (EAF) led by spreads (HRC-Scrap) & environment diktats (especially in China). The potential barriers to the upcycle intensity are i) GE capacity addition (already underway), ii) higher use of non-UHP electrodes in Ex-China markets aided by supplies from China and iii) retracement of steel & raw material prices making BOF route attractive again and/or China's steel exports pick up. We believe that GE industry upcycle would sustain for next three to five years but the profitability for GE producers is likely to moderate (by FY20E/21E) and hence maintain our Hold stance on Graphite India with a revised TP of Rs780.

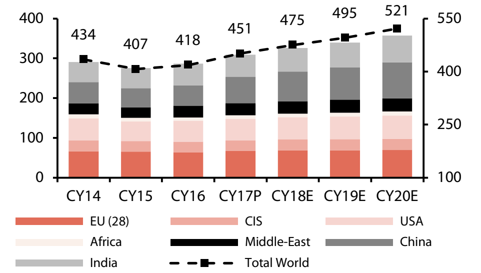
- **EAF production outlook remains bright until China stays its course:** EAF production has picked up materially in CY17 (up ~8%) and outlook remains bright led by i) lower Chinese steel exports leading to higher production in Ex-China geographies which have ~45% EAF share, ii) higher EAF production in China itself post closure of polluting IF's and increased scrap availability and iii) sustenance of strong spreads between HRC & Scrap which incentivises EAF production and makes them ignore the pinch of high GE prices. EAF outlook is unlikely to change soon unless steel prices and RM see strong retracement or China's steel exports expand. We expect EAF steel production to grow at a CAGR of ~5% during CY17-20E to reach ~520 MT by CY20E.
- **Incremental GE demand has supply visibility but needle coke remains a missing piece; possible flexibility to use more Non-UHP grades could be key:** We expect incremental GE demand of ~120ktpa during CY18-20E and our analysis shows that the supply for the same might not be difficult to find as i) Graftec alone has signalled an option to add/start ~65ktpa by CY18-end, ii) 40kt production could come from the existing 800ktpa capacity's higher utilisation and iii) strong possibility of a portion of demand being met from non-UHP grades which can be produced with much less difficulty and is witnessing demand traction. While petroleum needle coke supply additions remain uncertain and their alternate usage in Li-Ion batteries emerges as a supply threat for GE industry, we see a fine balance emerging in due course led by supply additions in new plants and higher pitch needle coke supplies.
- **GE producers' profitability to see moderation by FY20E/21E while the upcycle sustains longer:** Graftec's long term take-or-pay contracts at ~US$10000/t have provided sanctity to high spot GE prices and indicate that large EAF consumers see the GE supply as a possible issue over medium term. The contracts have significant termination charges and hence also indicate a shift from traditional non-binding annual supply agreements done by GE producers with consumers. However, we believe that Graftec was in a unique position with captive needle coke and profitability for other GE producers (with no needle coke integration) would see moderation by FY20E/21E from current exorbitant levels. Margins and return ratios would remain fairly strong over the next few years while earnings are likely to remain highly sensitive to GE spreads.
- **Valuation and key risks:** Post an unprecedented rally in stocks of GE producers globally in last 12 months, valuations are no more in value zone and remain highly sensitive to small changes in spreads & GE price outlook. We believe that our time tested and conservative approach of valuing the companies on 5 year adjusted operating cash flows is the best way for arriving at a fair value in such situations. We use the same for Graphite India and arrive at a revised TP of Rs780 based on FY16-20E avg. AOCF/EV yield. Maintain Hold.

Price Performance* (%)

Name	1 M	3 M	6 M	1Yr
Graphite India	*(7.7)*	*(14.1)*	*50.4*	*446.3*
HEG	*(15.7)*	*(9.1)*	*114.4*	*848.3*
Showa Denko (JP)	*(5.3)*	*(25.7)*	*10.0*	*127.4*
Tokai Carbon (JP)	*(4.5)*	*(13.7)*	*34.2*	*220.1*
CNX Metal	*9.9*	*(9.1)*	*(1.4)*	*29.5*
Nifty	*6.2*	*(4.2)*	*4.2*	*15.1*

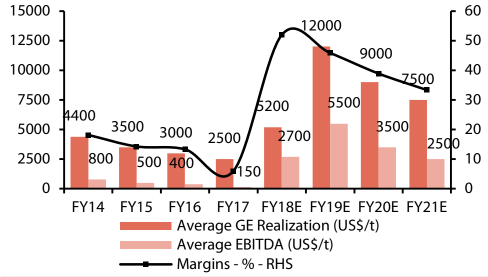
*Source: Bloomberg, *as on 24 April 2018*

EAF steel production (MT) has picked up strongly from CY17 and likely to grow steadily



Source: WSA, Centrum research estimates

GE prices and profitability* expected to peak in FY19E but remain strong in medium term



*Source: Centrum Research Estimates, *For GE industry*

Read the inside pages for:

- *EAF production outlook and our forecasts*
- *Graphite Electrodes and Needle coke demand-supply dynamics*
- *Study of electrode exports trend from China and their surprise increase in CY17*
- *Graftec's long term supply contracts and what implications it has for the industry*
- *Company update on Graphite India with our revised estimates & TP*

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Company	Rating	CMP* (Rs)	TP (Rs)	*Upside / (Downside) (%)*	Adj-EPS dil.(Rs)			P/E (x)			EV/EBITDA (x)			*ROE (%)*		
					FY18E	FY19E	FY20E	FY18E	FY19E	FY20E	FY18E	FY19E	FY20E	*FY18E*	*FY19E*	*FY20E*
Graphite India	Hold	683	780	*14.2*	49.8	105.0	65.0	8.3	6.5	10.5	5.2	4.1	6.2	*44.2*	*62.6*	*28.5*

*Source: Company, Centrum Research Estimates, *as on 24 April 2018*

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Company Section

EAF production outlook remains bright until China stays its course

EAF prominence back led by Chinese exports fall and environment diktats

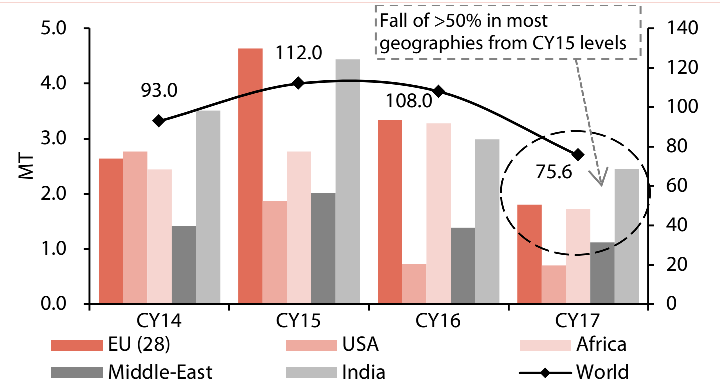
After years of stagnation, EAF production outlook has turned highly conducive from CY17 led by large fall in Chinese steel exports and bounce back in global steel demand. We expect EAF steel production to grow at a CAGR of ~5% during CY17-20E to reach ~520 MT by CY20E.

- **Chinese steel exports fall has triggered smart EAF production growth:** Chinese steel exports into key geographies (with substantial EAF share in their overall steel production) fell materially in CY17 (Exhibit 1) and led to higher overall and proportionate EAF steel production in those markets. As a result of lower Chinese steel exports and better internal demand, steel production has picked up sustainably in these markets (Exhibit 2) and hence led to an increase in EAF production also as large portion of their overall production is produced through EAF route. Our analysis of EAF production share for last 15 years indicate that in most of the geographies, EAF share has increased steadily (Exhibit 4) and it was only China where the EAF share decreased significantly as China added large capacities in the BF route to achieve high production scale.

  We believe that long overdue increase in EAF share in China has started from CY17 as strict environment diktats have already led to closure of polluting capacities in China (Induction furnaces and several inefficient blast furnaces). This has led to increase in availability of scrap and allowed better utilization of existing EAF's in China. Additionally as per various reports there is large scale new EAF constructions currently underway in China as EAF capacity is environment friendly and hence compliant with China's new environment focused regulations.

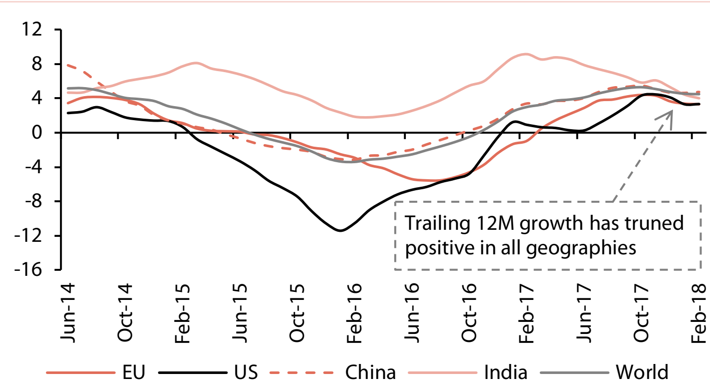
  Global EAF production increased 7.8% in CY17 to reach ~450 MT as per our ballpark estimates. We expect World EAF production to reach ~520 MT by CY20E with Ex-China contributing ~430 MT (~47% share in Ex-China's overall steel production) and China accounting for ~90 MT.

Exhibit 1: Chinese steel exports have fallen sharply in CY17



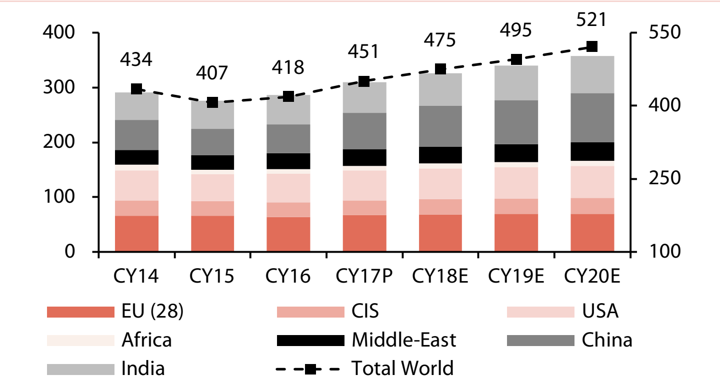
Source: Bloomberg, Centrum Research

Exhibit 2: Steel production growth (trailing 12M) has picked up sustainably in most geographies



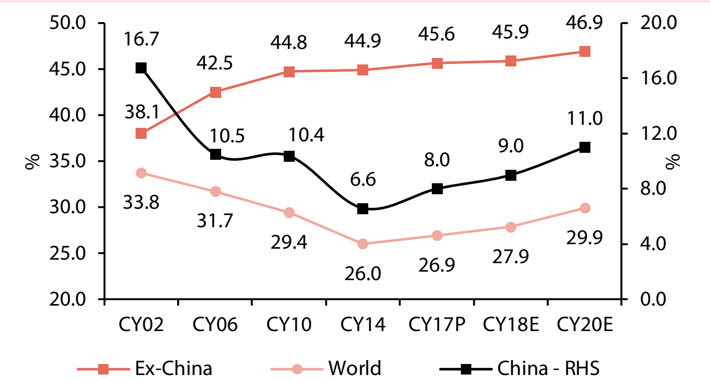
Source: Bloomberg, Centrum Research

Exhibit 3: EAF steel production (MT) has picked up strongly from CY17 and likely to grow steadily



Source: WSA, Centrum Research Estimates

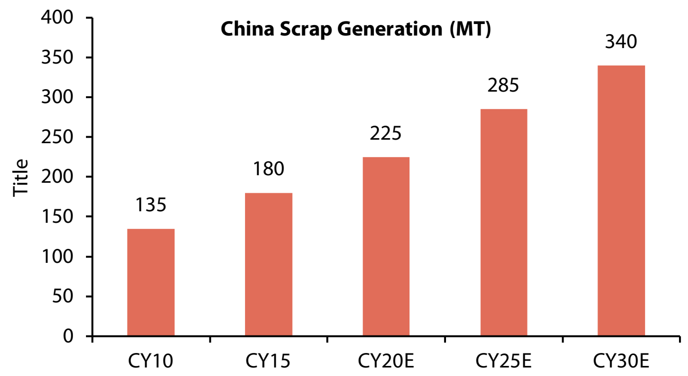
Exhibit 4: EAF production share - Ex-China share has always increased, now China also expected to see increase



Source: WSA, Centrum Research Estimates

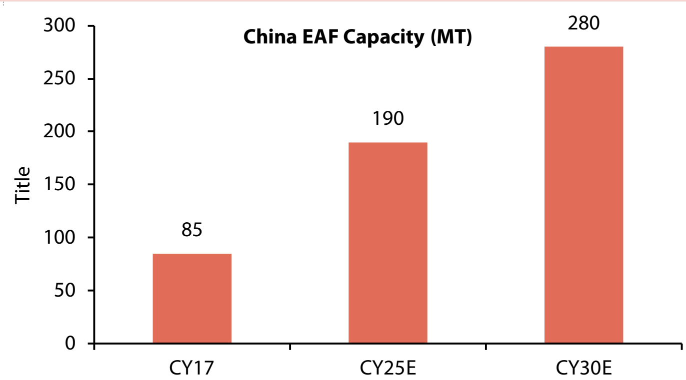
- **China's long term scrap availability increase and EAF production outlook paints a bright future for GE demand:** After clamping down on its polluting and illegal steel capacities, China has started setting itself up for producing more steel through the scrap route in future (essentially the EAF route), putting the traditional BF route in the backseat as far as incremental steel production in China is concerned as China would require less of large capacities (BF) while scrap generation could increase materially in the next decade which would be better utilized in smaller EAFs along with higher scrap charging in BF's. *We note that a detailed study by Mckinsey about "The growing importance of steel scrap in China" indicates towards increase in scrap generation in China to 225MT/285MT by CY20E/25E respectively*. This could be good news for EAF steelmaking in China and in turn for the graphite electrode industry in our view and could create a huge sustainable demand of electrodes from China in the next 5-10 years. EAF capacity in China is expected to more than double by CY25E to 190 MT.

Exhibit 5: China's scrap generation likely to increase steadily led by obsolete scrap



Source: WSA, Mckinsey, Centrum Research Estimates

Exhibit 6: EAF capacity in China is expected to more than triple to 280 MT by CY30E



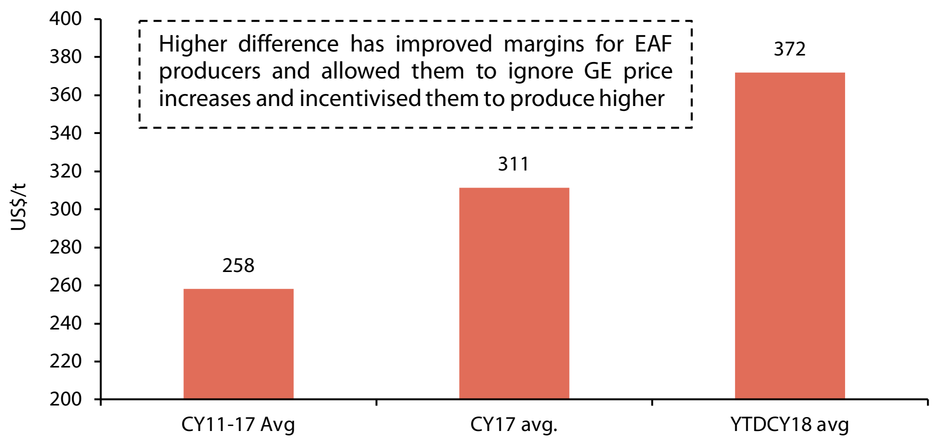
Source: WSA, Mckinsey, Centrum Research Estimates

Widened spreads between HRC & Scrap continue to keep EAF route attractive

The difference between HRC and scrap prices has increased materially in the last 18 months and the average of this difference is now substantially higher as compared to its long term average. This equation tilts the balance in favor of making steel through melting scrap in an EAF rather than going through the BF route and also allows EAF producers to ignore/absorb GE cost increases.

- **HRC to scrap spread remains highest in several years supporting EAF production:** While the global steel prices have recovered in the last one year led by a general uptick in commodity prices there has been higher uptick in HRC prices in several geographies due to regulatory support measures. We note that the difference between HRC and scrap prices has increased materially in the last 18 months and the average of this difference is now substantially higher as compared to its long term average. *This equation tilts the balance in favor of making steel through melting scrap due to the availability of a large spread in between, which further strengthens our view point that EAF's share in steel production would continue increasing going ahead.*

Exhibit 7: Difference between HRC and scrap is at its highest in several years



*Source: Bloomberg, Centrum Research, *HRC price is avg. of US & Europe, Scrap price is Turkey heavy melt*

- **CoP is almost comparable from both BF & EAF routes currently and RM price corrections could make BF route slightly economical vs EAF:** EAF CoP had become cheaper (vs BF) in CY17 led by benign scrap prices in comparison to strong rally in other key RM for steelmaking like iron ore and coking coal which in turn had increased the BF CoP materially. However that situation has reversed and currently the BF and EAF CoP are largely comparable as EAF CoP has seen increase due to uptick in GE prices as well as scrap price increases. We believe that BF route could become economical if steel RM's correct further and hence there could be marginal shift back to BF route even though the key premise for increasing EAF share hinges on its several operational advantages and environment friendly nature. We infer that attractiveness of producing steel through EAF in terms of lower CoP (vs BF route) no more exists at current commodity prices.

Exhibit 8: BF CoP at current RM prices

	BF Production		
Particulars	**Cost/unit (US$/tonne)**	**I/P Reqd/tonne**	**Cost (US$)**
Iron Ore (tonne)	65	1.7	111
Coking Coal	200	0.9	180
Power (KwH)	0.062	550	34
Scrap (tonne)	340	0.1	34
Ferro alloys (tonne)	1200	0.015	18
Other Raw Material	35	1	35
Labour	30	1	30
Transport & Others			25
Total Cost/tonne			**466**

Source: Centrum Research Estimates

Exhibit 9: EAF CoP at current scrap prices

	EAF Production		
Particulars	**Cost/unit (US$/tonne)**	**I/P Reqd/tonne**	**Cost (US$)**
Steel Scrap (tonne)	340	1.1	374
Power (KwH)	0.062	500	31
Ferro Alloys (tonne)	1,200	0.01	12
Graphite Electrodes (Kgs)	12,000	1.7	20
Labour	20	1	20
Transport & Others			25
Total Cost/tonne			**482**

Source: Centrum Research Estimates

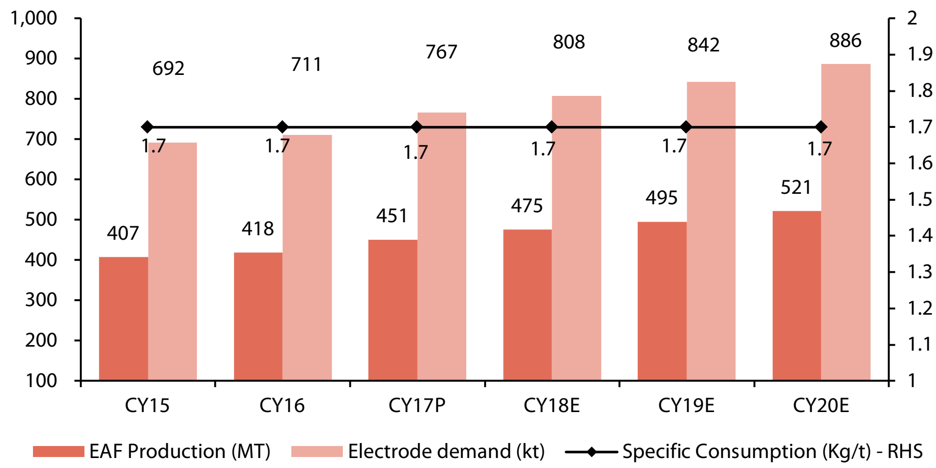
Conclusion No. 1 - EAF production should see secular mid-single digit growth and generate equivalent demand growth for Graphite Electrodes over the next few years. This trend is unlikely to reverse soon barring extreme downward movements in steel raw materials and change in Chinese steel export strategy.

Incremental GE demand has supply visibility but needle coke remains a missing piece; possible flexibility to use more Non-UHP grades could be key

Incremental Graphite Electrode demand of ~120ktpa during CY18-20E after ~55kt increase seen in CY17

As per our rough cut calculations, GE demand increased by ~55kt in CY17 led by 7.8% increase in global EAF production and this led to short term supply crunch of electrodes in the market as GE producers were operating between 80-85% utilization levels before the demand surge occurred. As GE manufacturing process involves long cycles, the capacity utilization pick up took time before increasing to ~90% by H2CY17. Based on our forecasts for EAF production globally, we expect incremental GE demand of ~120kt during CY18-20E.

Exhibit 10: Incremental Graphite Electrode demand of ~120kt during CY18-20E

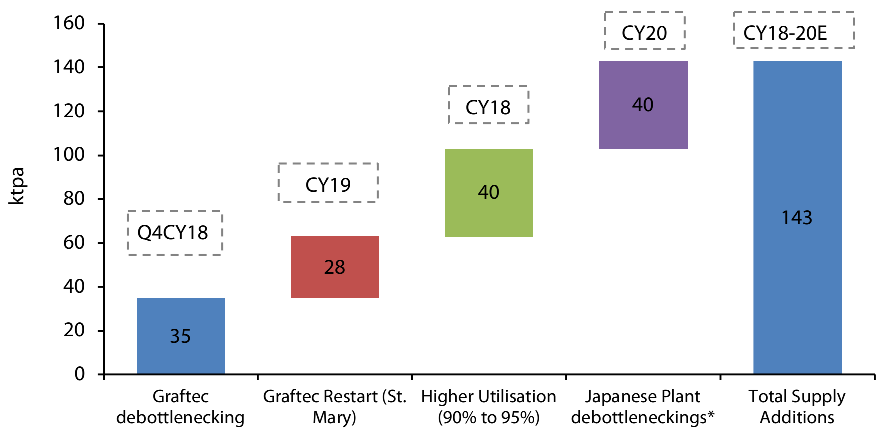


Source: WSA, Centrum Research Estimates

Existing capacity and debottlenecking efforts gives supply visibility for GE to meet increased demand

We believe that supply of GE can keep pace with demand and only issue would be related to procuring the needle coke supplies for producing the electrodes. In terms of GE supply visibility, we note that Graftec has already announced debottlenecking at its three key plants which would increase its capacity by 35ktpa by Q4CY18 and has also indicated a possible restart of its St Marys facility of 28ktpa in CY19E. Apart from this, the 800ktpa global capacity spread across 21 plants operated at ~90% utilization levels in H2CY17 and is expected to operate at ~95% in CY18 thereby adding ~40ktpa supplies. Lastly, we note that the supply cuts taken by the industry during CY14-16 involved reduction of ~40ktpa capacity by Japanese producers at their plants in Japan and these could potentially come back on-stream quickly in our view as these were not permanent closures.

Exhibit 11: GE capacity can meet the demand



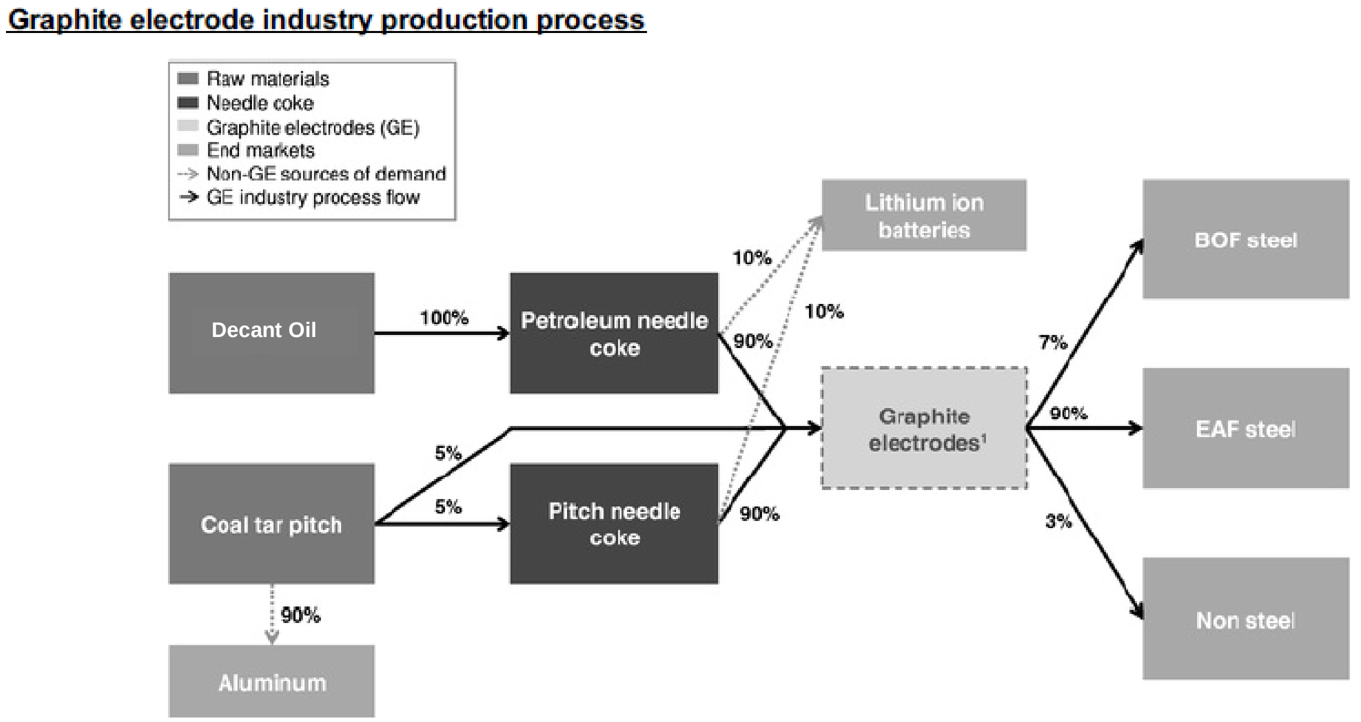
*Source: Graftec, Centrum Research Estimates, *Not announced*

Needle coke supplies critical for GE supply and remains scarce, capacity additions have been rare

Needle coke supplies remain critical for achieving the required GE production and we discuss in detail the recent developments in this critical industry which we believe has also been one of the key reasons for a sharp increase in GE prices and their short supply in CY17 and CY18E.

- **Needle coke is an important piece in the GE production maze:** Needle coke is a critical RM for producing GE and is available in two varieties – 1. Petroleum or oil based needle coke and 2. Coal tar pitch based needle coke. Both these varieties of needle coke are in turn produced from raw materials which are byproduct of refining and coke making processes and also involve complex production set-ups which are highly capital intensive and difficult to manage.

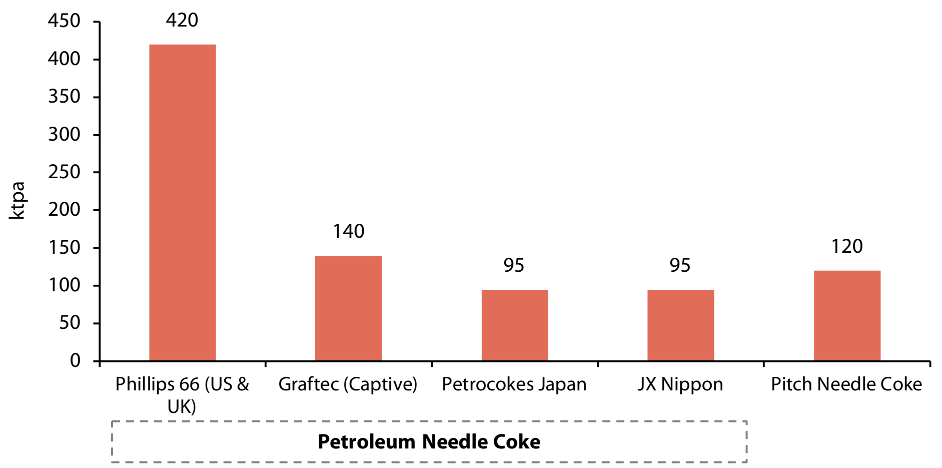
Exhibit 12: Graphite electrode production process is critically dependent on needle coke



Source: Graftec, Centrum Research

- **Needle coke capacity is limited and concentrated:** Needle coke industry is highly concentrated and characterized by lack of disclosures but the industry capacity is estimated to be at ~750ktpa for petroleum based needle coke and ~120ktpa for pitch based needle coke.

Exhibit 13: Needle coke capacity has remained stagnant for last 10 years

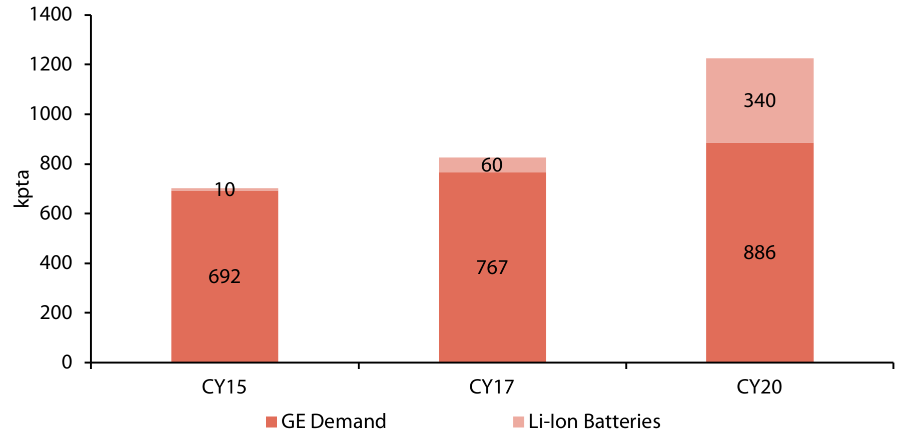


Source: Graftec, Industry, Centrum Research Estimates

- **Needle coke capacity additions have remained rare:** Petroleum based needle coke production is believed to be highly complex and available with only four suppliers in the world out of which one is captive (Graftec's Seadrift facility) and one other major supplier accounts for ~70% of the merchant supplies. Our study of needle coke industry shows that petroleum needle coke capacity additions have remained very rare in the last 10 years due to high capital intensity, technical know –how, long lead times to build production facilities and stringent regulatory processes apart from difficulty in arranging for raw material feed (decant oil). Pitch based needle coke supplies are better spread with more than 10 suppliers all over the World including suppliers in India (IOC) and China (Baosteel, Petrochina etc). Currently pitch needle coke supplies are also constrained due to scarcity of coal tar pitch (RM for pitch needle coke) which is used in fast growing aluminium industry and is a by-product of metallurgical coke process which has seen slowing production (especially in Ex-China markets). We believe that capacity addition in pitch needle coke is relatively easier v/s petroleum needle coke and the only constraint in the same is supply of coal tar pitch. We also believe that China has one small facility of petroleum needle coke and it is currently making big efforts to put more such plants to meet its growing demand of petroleum needle coke for UHP electrodes

- **Needle coke's new demand from EV segment proving to be a concern for GE industry:** Needle coke demand has started increasing rapidly since CY17 led by i) higher demand from GE industry (which was traditionally the only demand source for needle coke) as EAF production has entered a steady growth phase and ii) new demand from manufacturers of lithium ion batteries as a raw material for carbon anodes over other forms of graphite due to technological advances and better quality of needle coke. This has suddenly created shortage of needle coke and an urgent need for capacity augmentation for the needle coke industry. Needle coke prices have seen an increase of 7-8 times from their CY16 lows of ~US$400/t to current contract levels of ~US$3500/t and could see further traction due to short supplies. As per Graftec's estimates, needle coke demand from Li-ion batteries segment stood at ~60kt in CY17 and could touch as high as 340kt by CY20E.

Exhibit 14: Needle coke demand is increasing rapidly



Source: Graftec, Centrum Research Estimates

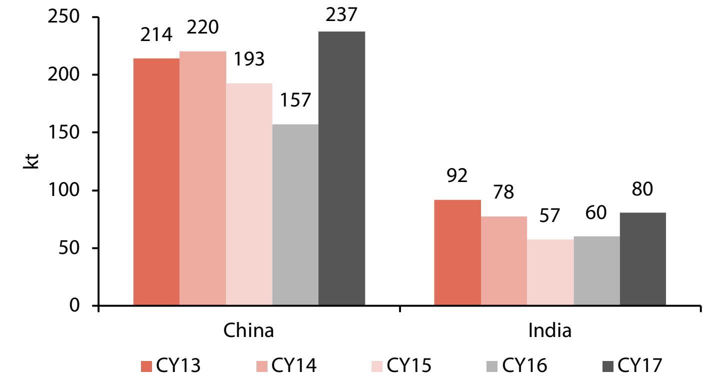
- **Needle coke supplies could build up and alternate demand might not be price inelastic:** *We believe that constraint in GE supply is not due to scarcity of GE capacity but more due to possible scarcity of needle coke capacity and its alternate usage in sunrise sector of Li-Ion batteries.* However, in our limited and humble understanding, we believe that needle coke demand might not be fully price inelastic from Li-Ion battery segment and if this is the case then the price of needle coke would eventually come down or the supply of needle coke for GE industry would again increase (considering that GE industry would pay more for needle coke v/s Li-ion industry). First indication to this effect comes from the fact that *needle coke suppliers have promised 10% YoY increase in volumes for GE producers in FY19 (vs FY18) as per our interactions with electrode producers*. Additionally we believe that needle coke capacity additions could have been rare in the past as demand was virtually stagnant and not growing at current pace ever in the last 10-15 years and with long term visibility returning to the industry there could be fast paced additions of new needle coke capacity (both varieties) which could result in higher or adequate supplies of needle coke by CY20E. All in all, we believe that needle coke shortage would remain a concern for GE industry for few years before things start to normalize. *However, we believe needle coke would continue to play a major role in the fortunes of the GE industry and would aid in sustaining the current upcycle in GE.*

Non-UHP electrodes could see higher acceptance, increased Chinese electrode exports a key indicator of this trend in our view

Our analysis of global GE trade data shows that GE exports picked up materially from both China and India in CY17 and Chinese electrode exports surpassed their CY14 highs to reach ~237kt, growth of ~50% YoY (Exhibit 15). Also, Chinese GE exports were well spread across all geographies and large YoY increases were seen in developed economies of US & Europe. Since China produces largely non-UHP electrodes, this large increase in their electrode exports points to some key observations namely i) possible higher acceptance and flexibility shown by EAF's globally in using non-UHP grades in wake of short supply of UHP grades, ii) higher price arbitrage realized by EAF's in using non-UHP grades at much lower cost vs costly UHP grades and iii) quick production scale-up by China in non-UHP grades which allowed it to meet the increased global demand. We note that non-UHP electrodes are used in ladles and other industries also but the demand increase from those are not enough to justify a 50% increase seen from China in CY17 and hence we infer that these exports were supplied to large EAF producers in most markets. *We believe that this is an important trend indicator and point towards the evolving landscape of GE demand globally which could lead to potential increase of non-UHP demand and its increased share in overall GE industry.*

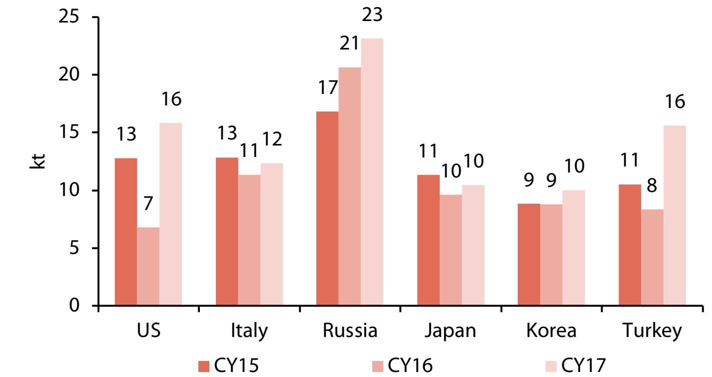
As manufacturing of non-UHP grade is more pronounced in China and could be better managed (from RM procurement point of view as it doesn't require petroleum needle coke), we believe that non-UHP production could scale up quite fast in China as well as across the globe and make up for lower supply of UHP grade if petroleum needle coke supplies don't increase fast enough. However, we do understand that using Non-UHP grades beyond a certain level creates issues of inefficiencies, possibility of frequent shutdowns, higher per tonne GE usage and lower throughput for EAF's and this continues to limit their usage and acceptance by EAF producers.

Exhibit 15: China's electrode exports went up by ~50% in CY17 while India saw 35% increase



Source: Trademap, Centrum Research

Exhibit 16: Chinese electrode exports were well spread across all key EAF geographies



Source: Trademap, Centrum Research

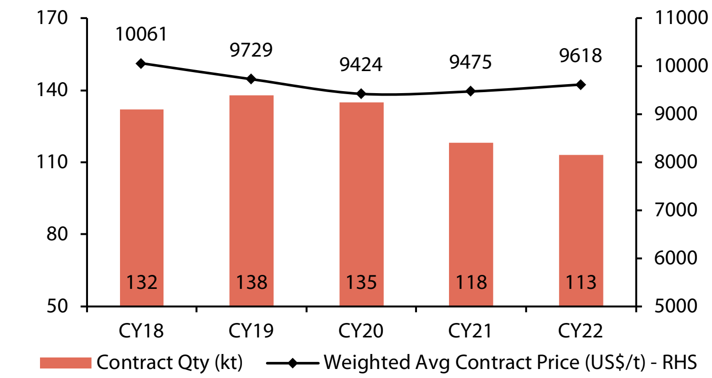
Conclusion No. 2 – The incremental electrode demand can be met by increased share of Non-UHP electrodes supplies (driven by China) and higher production of UHP electrodes through debottlenecking and increased utilizations. Needle coke supplies (pitch & petroleum combined) look scarce in short term but could be sufficient enough to support electrode industry if their alternate demand source (Li-ion batteries) is not price inelastic.

Profitability for GE producers likely to see moderation by FY20E/21E while the upcycle sustains longer

Graftec's long term take-or-pay contracts provide sanctity to GE prices

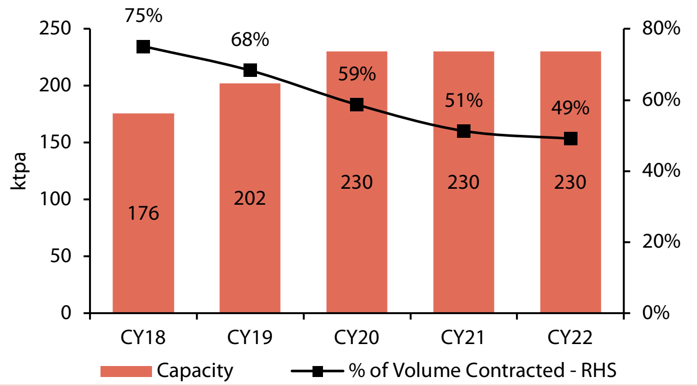
While the GE spot prices have been on fire since the middle of CY17 and have reportedly been moving in the range of US$15000-25000/t for spot and new bookings, Graftec has announced entering into 3 to 5 year take-or-pay contracts with its long term customers at a fixed price ranging between US$9500-10000/t thereby fixing the sales of 60-65% of its production capacity from CY18-22E which are likely to fetch EBITDA margins of 60%+. Our study of the terms of the contracts from Graftec's recent IPO documents show that the contracts have binding terms for any short supply or lower offtake on both parties and significant termination clauses (ranging between 50% to 70% of remaining contract value) in addition to parent guarantees and collateral arrangement. We believe that these long term contracts have provided sanctity to the current spot GE prices and have also indicated towards customer willingness to accept consistent GE supply at a premium price. Also, these new contracts have created new system of firm GE sales and have moved away from previously practiced annual purchase orders on an uncontracted and non-binding basis.

Exhibit 17: Graftec's take-or-pay contracts signed at attractive prices



Source: Graftec, Centrum Research Estimates

Exhibit 18: Graftec has contracted a major portion of its supplies leaving marginal spot sales



Source: Graftec, Centrum Research Estimates

Graftec's contracts reveal more than what meets the eye

Though we are enthused with the fact that Graftec was able to get a strong demand for a large portion of its volumes on a five year basis at a good contract price, but we believe that Graftec's contracts reveal much more than what meets the eye and we would like to play the devil's advocate in making some key inferences and possible conclusions.

We feel that Graftec's long term contracts indicate towards the following:-

- **Strong cumulative profitability over 5 years -** *Graftec has essentially fixed the sales price for the quantity for which it has captive needle coke and this implies that Graftec firmly believes that there is very little chance of making higher profitability on these volumes on a 5 year basis cumulatively*. We see this as a big indication because based on current spot prices and near term contracts, Graftec's profitability on per tonne basis could be similar or even lower than GE producers who don't possess captive needle coke. If and when the needle coke prices correct, Graftec's profitability would end up being well ahead of the peers and Graftec might have felt that this could be a high probability event in medium term.

- **Possibility of sharp fall in GE prices in due course** - Graftec has indicated that 87% of the contracts are with 5 year terms and mentioned in its IPO filings that there is very high chance of GE prices correcting materially from current levels and hence their strategy of locking the volumes at ~US$10000/t made commercial sense. This in turn implies that GE average price realisations could get capped above Graftec's contract prices sooner than later as supply of GE improves.

- **Cannibalization of UHP GE demand from Non-UHP GE** - *We believe that these contracts indicate that UHP electrode demand in future could see cannibalization from cheaper non-UHP electrodes and hence put downward pressure on UHP electrodes prices and profitability and hence Graftec chose to hedge against that situation in current euphoric times for its UHP supplies at an attractive price and margins.*

- **Lower negotiation power for GE producers for contracts vs spot prices** - Based on Graftec's contracts we believe that there could be more sanctity to GE contracts in future and past trends of multiple renegotiations may not be the base case. This could result in lower volatility but also lower negotiation power for GE producers as compared to spot prices since Graftec contracts were agreed at a large discount to spot levels.

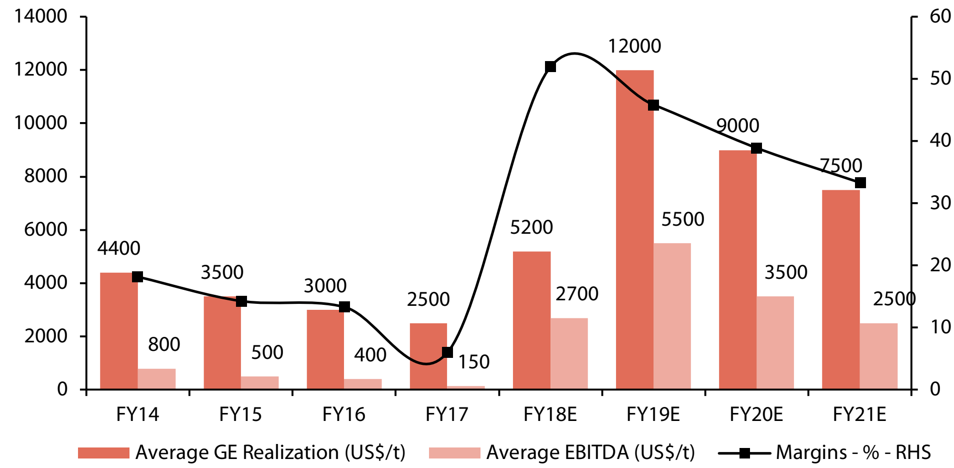
- **Supplies of needle coke likely to improve** - Since Graftec has left only 35-40% of its capacity for spot sales which are likely to fetch higher margins in short-term, it might be fairly confident of producing the same which in turn implies that it is confident that needle coke supplies from merchant market can be sourced for that easily. This in turn could mean easing of GE supplies in medium term and hence downward pressure on GE prices and profitability.

- **Lower quantity open for contracts which could benefit other producers** - One positive outcome of these contracts could be lower volumes available for spot sales and shorter contract terms (3/6/12 month contracts) for customers from the remaining GE suppliers and in the wake of stronger demand, there could be more bargaining power left with other suppliers who have majority of their volumes free unlike Graftec.

We see moderation in GE prices and EBITDA/t by FY20E/21E while the upcycle sustains and keeps margins well above historical average

We present our estimates for the trend of GE industry's average realisations and EBITDA/t in last few years and their unprecedented pick-up from FY18E. We note that EBITDA/t for the industry has reached a new all-time high in FY18E and is likely to average at ~US$2700/t with margins of >50%. We see GE average realisations of ~US$12000/t in FY19E resulting in new all-time high EBITDA/t of ~US$5500/t which would also be the peak profitability year before both prices and profitability start moderating from FY20E. We firmly believe that the GE industry would still remain in an upcycle and our FY20E/21E price and EBITDA expectations indicates that the industry would still be making an attractive EBITDA margins of 30-35% in these years which is significantly higher than their long term average and hence generating very strong cash flows and superlative return ratios.

Exhibit 19: GE prices and profitability* expected to peak in FY19E but remain strong in medium term



*Source: Centrum Research Estimates, *For GE industry*

Conclusion No. 3 – GE industry should continue to witness an upcycle led by favorable demand-supply balance but GE prices and EBITDA/t are likely to moderate from FY20E led by host of factors. Despite this expected moderation in profitability, we see EBITDA margins remaining well above the historical long term average and return ratios to remain superlative.

INDIA

HOLD

Graphite India

Company Update 26 April 2018

Metals

Best play for electrode upcycle, maintain Hold

We continue to remain positive on prospects of Graphite India (GIL) led by our view of electrode industry remaining in an upcycle for next few years as explained in our sector thesis. We continue to expect extremely strong earnings trajectory for GIL in next few years with peak earnings in FY19E and moderation kicking in from FY20E. GIL remains the best bet to play the electrode upcycle with healthy balance sheet, strong adj. FCF generation, high dividend payout and strong management pedigree. Margins are expected to remain well above the long term average over the next few years but we continue to value the stock on our conservative (and rightfully prudent) 5 year cash flow methodology to arrive at a revised fair value of Rs780. Maintain Hold.

- **On a strong footing to deliver solid volumes:** GIL has always remained ahead of competition in terms of operational excellence and efficient production & cost management despite having constraints of multiple manufacturing locations in India. GIL has operated at ~95% utilisation in its domestic operations in FY18E and expects to maintain the same or do marginally better in FY19E led by commissioning of efficiency projects at Nasik and Durgapur. The company also expects to have better utilisations at its overseas subsidiary in Germany. We expect consolidated electrode volumes of ~85kt each from GIL in FY18E/19E.
- **Margins to reach new all-time highs of 45%+ in FY19E:** GIL's margins and EBITDA/t has seen significant improvements in last few quarters led by strong rally in graphite electrode prices which allowed the company to not only renegotiate its old contracts but also sell the uncontracted volumes at high spot prices. FY19E contracts have been taken by the company largely under a RM cost pass through mechanism where quantities are fixed but prices are linked to spot movements and quarterly needle coke contracts. Management expects strong spreads and margins for these contracts. We expect consolidated EBITDA margins of 46% for GIL in FY19E
- **Earnings revised higher materially as strongest upcycle in store, sensitivity to spreads to remain high:** We expect strong expansion in GIL's gross profit/t in FY19E/20E led by better pricing aided by favorable demand-supply balance. We expect strongest upcyle of last few decades in store for electrode industry and have revised our EBITDA/t estimates higher to build in higher realisations and gross profit spreads. We now expect consolidated EBITDA/t of GIL to expand materially to US$5605/$3374 in FY19E/20E (vs. our estimates of US$2677/1790 earlier). We see earnings remaining highly sensitive to volumes and spreads and every US$100/t additional spreads results in ~2.5% increase in EBITDA/EPS/TP while every 5% increase in volumes lead to ~4% increase in EBITDA/EPS/TP. We expect GIL's cash kitty to swell to ~Rs24bn by FY20E despite factoring in strong dividend (25% of PAT every year) and increased absolute working capital requirements. We believe that prudent cash management would be key and we would keep a close eye on the capital allocation decisions from hereon.
- **Valuation and risks – Maintain Hold:** The stock has seen a relentless up move and is up ~400% since our **IC report titled "Electrifying growth ahead"** dated 20 June 2017. As postulated by us in our sector view earlier, we expect profitability to start moderating from FY20E albeit remaining higher than long term average and hence we believe that it would be prudent to value the company on 5 year average earnings. We continue to value GIL on our conservative AOCF/EV yield methodology using five year average adj. cash flows (FY16-20E) to arrive at our revised TP of Rs780. Maintain Hold. Key downside risk is margin pressure due to raw material volatility while upside risk is continuation of high spreads into FY20E/21E as that of FY19E.

Target Price	780
CMP*	Rs683
Upside	14.2%
Previous Target	435
Previous Rating	Buy

Key Data	
Bloomberg Code	GRIL IN
Curr Shares O/S (mn)	195.4
Diluted Shares O/S(mn)	195.4
Mkt Cap (Rsbn/USDbn)	133.4/2
52 Wk H / L (Rs)	908/102.5
5 Year H / L (Rs)	908/57
Daily Vol. (3M NSE Avg.)	2394567

Price Performance (%)*	1M	6M	1Yr
JSTL IN	(7.7)	52.2	446.3
NIFTY	6.2	4.0	15.1

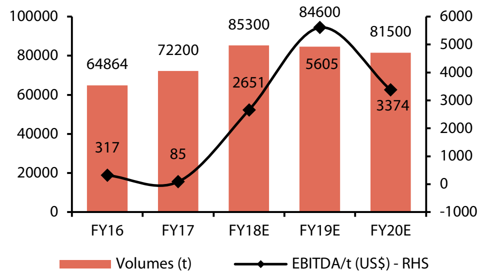
*as on 24 April 2018; Source: Bloomberg, Centrum Research

Shareholding pattern (%)*

	Mar-18	Dec-17	Sep-17	Jun-17
Promoter	65.2	65.2	65.2	65.2
FIIs	4.6	5.9	4.7	10.3
Dom. Inst.	8.5	8.8	9.1	8.1
Public & Others	21.7	20.1	20.9	16.4

Source: BSE, *as on 24 April 2018

GIL Volumes and EBITDA/t (Cons)



Source: Company, Centrum Research Estimates

Earnings Revision

Particulars (Rs mn)	FY19E			FY20E		
	New	Old	Chg (%)	New	Old	Chg (%)
Sales	65,965	39,805	65.7	48,921	33,665	45.3
EBITDA	30,348	13,385	126.7	17,599	9,243	90.4
EBITDA Margin (%)	46.0	33.6		36.0	27.5	
PAT-adj.	20,512	8,971	128.6	12,691	6,490	95.6

Source: Centrum Research Estimates

Abhisar Jain, CFA, abhisar.jain@centrum.co.in, 91 22 4215 9928

Y/E Mar (Rs mn)	Revenue	YoY (%)	EBITDA	EBITDA (%)	Adj. PAT	YoY (%)	EPS (Rs)	RoE (%)	RoCE (%)	PE (x)	EV/EBITDA(x)
FY16	15,323	(10.4)	1,346	8.8	828	31.1	4.2	4.6	4.1	18.0	9.6
FY17	14,678	(4.2)	396	2.7	705	(14.9)	3.6	3.9	3.6	22.8	29.8
FY18E	32,547	121.7	14,473	44.5	9,728	1,280.6	49.8	44.2	34.4	8.3	5.2
FY19E	65,965	102.7	30,348	46.0	20,512	110.9	105.0	62.6	48.4	6.5	4.1
FY20E	48,921	(25.8)	17,599	36.0	12,691	(38.1)	68.2	28.5	44.6	10.5	6.2

Source: Company, Centrum Research Estimates

Earnings revised higher materially to factor in higher contract prices and higher spreads

We revise our earnings estimates higher materially as we factor in the positive impact of sharp increase in realisations. We expect strong expansion in GIL's gross profit/t in FY19E/20E led by better pricing aided by favorable demand-supply balance. We expect strongest upcyle of last few decades in store for electrode industry and have revised our EBITDA/t estimates higher to build in higher realisations and gross profit spreads. We now expect consolidated EBITDA/t of GIL to expand materially to US$5605/$3374 in FY19E/20E (vs. our estimates of US$2677/1790 earlier). We expect EBITDA of Rs30.3bn/Rs17.6bn and PAT of Rs20.5bn/Rs12.7bn in FY19E/20E.

Exhibit 20: Earnings Revision

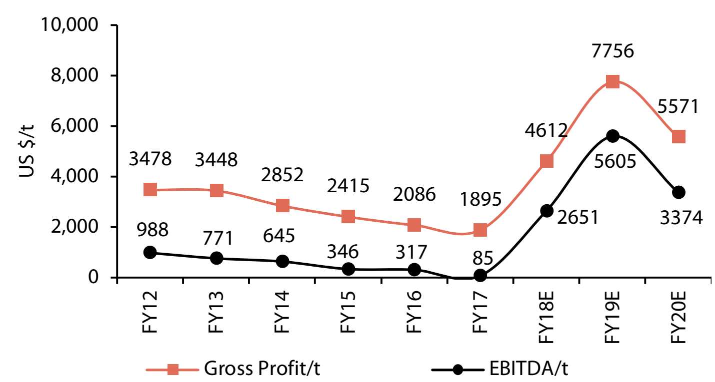
	FY19E			FY20E		
	Revised	**Previous**	***% Chg***	**Revised**	**Previous**	***% Chg***
Net Sales (Rsmn)	65,965	39,805	*65.7*	48,921	33,665	*45.3*
EBITDA (Rsmn)	30,348	13,385	*126.7*	17,599	9,243	*90.4*
EBITDA %	*46.0*	*33.6*		*36.0*	*27.5*	
PAT (Rsmn)	20,512	8,971	*128.6*	12,691	6,490	*95.6*

Source: Company, Centrum Research Estimates

Sharp improvement in spreads, earnings remain highly sensitive to spreads

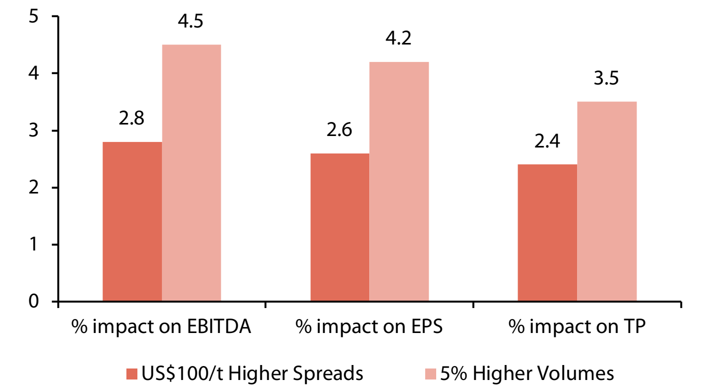
We expect sharp improvements in spreads to ~US$7750/t in FY19E before coming down to ~US$5600/t in FY20E. This is expected to be driven by new contracts which are expected to be executed with a pass through for needle coke price increases and hence ensures higher & sustainable spreads. We note that earnings remain highly sensitive to volumes and spreads and every US$100/t additional spreads results in ~2.5% increase in EBITDA/EPS/TP while every 5% increase in volumes lead to ~4% increase in EBITDA/EPS/TP.

Exhibit 21: Spreads and EBITDA/t to reach all time high levels in FY19E



Source: Company, Centrum Research Estimates

Exhibit 22: Earnings sensitivity to volumes & spreads remain high



Source: Centrum Research Estimates

Valuation – Prudent to value on 5 year average earnings, Maintain Hold

We believe that investors need to look beyond FY19E's supernormal profitability and factor in the valuations on more sustainable earnings which would emerge from FY20E/21E. Since GIL's business is highly cyclical in nature and there have been several instances of significant renegotiation in contracts (both up and down), we believe that investors should look at average earnings and cash flows from a valuation perspective. We value GIL on our conservative AOCF/EV yield methodology using five year average adj. cash flows (FY16-20E) to arrive at our revised TP of Rs780. Maintain Hold. Key downside risk is margin pressure due to raw material volatility while upside risk is continuation of high spreads into FY20E/21E as that of FY19E.

Exhibit 23: Cash flow-based valuation

	Avg CF basis
5 Year avg. AOCF/EV Yield - % (FY14-18)	11.5
Ascribed AOCF/EV yield - % (50% premium)	5.7
Ascribed EV/AOCF Multiple (x)	17.4
Avg. AOCF (Rs mn) - FY16-20	7,377
EV (Rs mn)	1,28,513
Add: Net Cash (FY20E)	24,389
Fair value mkt cap	1,52,903
No. of shares (mn)	195.4
Fair Value/share (Rs)	**780**

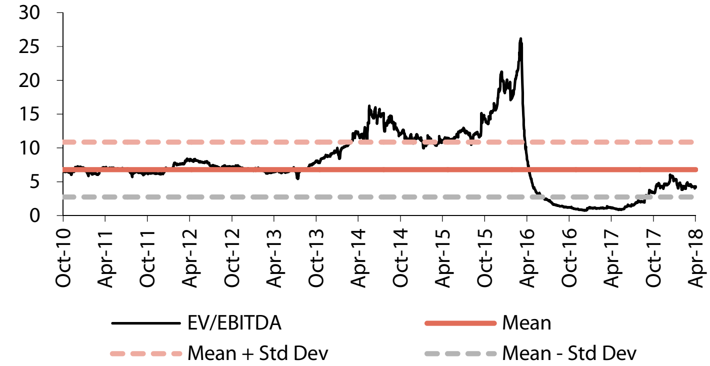
Source: Company, Centrum Research Estimates

Exhibit 24: Sensitivity Analysis (FY19E)

Sensitivity to key variables	% change	% impact on EBITDA	% impact on PAT
Electrode volume	1	0.9	0.9
Electrode Realization	1	2.7	2.5

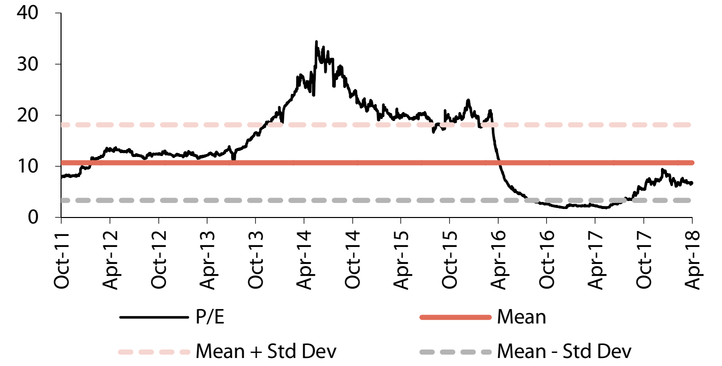
Source: Company, Centrum Research Estimates

Exhibit 25: 1 year forward EV/EBITDA chart



Source: Bloomberg, Company, Centrum Research Estimates

Exhibit 26: 1 year forward P/E chart



Source: Bloomberg, Company, Centrum Research Estimates

Exhibit 27: Valuation– Peer comparison

Company	Mkt. Cap	CAGR FY17-FY19E (%)			EBITDA Margin (%)			P/E (x)			EV/EBITDA (x)			RoE (%)			Div Yield (%)		
		Rev.	EBITDA	PAT	FY17	FY18E	FY19E	FY17	FY18E	FY19E	FY17	FY18E	FY19E	FY17	FY18E	FY19E	FY17	FY18E	FY19E
Domestic(Rs mn)																			
Graphite India	**1,33,412**	**112.0**	**776.0**	**439.6**	**2.7**	**44.5**	**46.0**	**22.8**	**8.3**	**6.5**	**29.8**	**5.2**	**4.1**	**3.9**	**44.2**	**62.6**	**2.4**	**3.0**	**3.8**
Vesuvius India#	27,704	13.5	15.4	20.4	18.2	18.5	18.8	28.1	23.9	20.2	16.0	14.6	11.0	15.2	16.4	16.9	0.5	0.7	0.8
Orient Refractories	19,583	16.5	17.3	18.4	19.5	19.8	19.8	22.7	20.5	17.1	15.6	14.2	11.6	26.4	26.0	25.8	1.6	1.8	2.0
International#(US$ mn)																			
Tokai Carbon Co	3,024	37.4	92.2	85.7	17.5	32.7	34.3	18.6	9.1	7.7	12.1		4.7	10.0	24.7	21.9	1.2	1.7	2.2
Showa Denko KK	5,454	12.2	30.8	66.9	14.9	20.3	20.2	14.9	7.5	6.3	7.2	4.3	4.6	10.4	20.0	18.8	2.3	1.8	2.6
Nippon Carbon Co	557	27.5	76.5	48.7	14.8	26.2	28.4	16.0	10.0	8.6	12.9		5.4	11.0			1.2	2.0	2.0

Source: Bloomberg Estimates, Centrum Research Estimates, #FY17=CY16 for Vesuvius India and global cos

Quarterly financials, operating metrics and key performance indicators

Exhibit 28: Quarterly Financials

Particulars (Rs mn)	Q4FY16	Q1FY17	Q2FY17	Q3FY17	Q4FY17	Q1FY18	Q2FY18	Q3FY18
Net sales	**3,416**	**2,752**	**3,146**	**3,308**	**3,734**	**3,510**	**4,619**	**9,331**
Other Operating Income	76.7	0	50.6	67.7	0	0	0	0
Total Income	**3,493**	**2,752**	**3,196**	**3,376**	**3,734**	**3,510**	**4,619**	**9,331**
Accretion to Stocks in trade & work in progress	653.2	(73.3)	(4.9)	(79.9)	359.0	(42.3)	(160.3)	33.2
Cost of Raw Materials consumed	1,044	1,302	1,350	1,261	1,260	1,282	1,470	1,787
Consumption of Stores & Spares	245	212	300	320	352	344	346	430
Power & Fuel	406	526	599	625	633	709	729	797
Staff Cost	317	351	371	388	411	411	450	446
Other Operational expenses	507	329	440	499	573	451	485	651
Operating Profit (Core EBITDA)	**322**	**105**	**141**	**364**	**147**	**355**	**1,299**	**5,186**
Depreciation	110	97	97	96	126	120	120	113
EBIT	**212**	**8**	**44**	**268**	**20**	**235**	**1,179**	**5,073**
Interest	20	14	18	21	11	10	15	17
Other Revenue/Income	84	178	220	129	312	211	192	115
Profit Before Tax	**276**	**172**	**246**	**375**	**321**	**436**	**1,356**	**5,170**
Tax	90	38	87	142	(144)	142	457	1,765
Profit After Tax	**186**	**110**	**159**	**234**	**620**	**294**	**899**	**3,405**
Growth (%)								
Revenue	*(16.2)*	*(13.0)*	*0.8*	*(5.0)*	*9.3*	*27.6*	*46.8*	*182.1*
EBITDA	*(10.9)*	*(68.5)*	*(69.6)*	*(14.8)*	*(54.4)*	*237.9*	*822.1*	*1,326.5*
PAT	*31.0*	*(32.7)*	*(42.5)*	*1.9*	*233.0*	*168.0*	*464.2*	*1,356.5*
Margin (%)								
EBITDA	*9.2*	*3.8*	*4.4*	*10.8*	*3.9*	*10.1*	*28.1*	*55.6*
EBIT	*6.1*	*0.3*	*1.4*	*7.9*	*0.5*	*6.7*	*25.5*	*54.4*
PAT	*5.3*	*4.0*	*5.0*	*6.9*	*16.6*	*8.4*	*19.5*	*36.5*
Key Drivers								
Average Capacity Utilization (Electrodes - standalone) %	*70*	*68*	*75*	*85*	*89*	*95*	*89*	*95*
EBITDA/t (US$)	340	116	140	317	123	290	1135	4218

Source: Company, Centrum Research

Exhibit 29: Key Assumptions

	FY16	FY17	FY18E	FY19E	FY20E
Electrode Volumes (tonne)					
India Operations	55,600	63,200	73,600	72,000	68,000
Germany Operations	9,264	9,000	11,700	12,600	13,500
Total	64,864	72,200	85,300	84,600	81,500
Electrode Realisations (US$/t)*	3,052	2,558	5,500	12,000	9,000
Needle Coke (US$/t)*	900	700	1,000	4,500	3,750
USD/INR	65.5	64.5	64.0	64.0	64.0

*Source: Company, Centrum Research Estimates; * Projected for FY15-17 as company doesn't report exact nos*

Financials (Cons)

Exhibit 30: Income Statement

Y/E March (Rs mn)	FY16	FY17	FY18E	FY19E	FY20E
Revenues	**15,323**	**14,678**	**32,547**	**65,965**	**48,921**
Materials cost	6,461	5,851	7,368	23,972	19,862
% of revenues	*42.2*	*39.9*	*22.6*	*36.3*	*40.6*
Employee cost	2,012	2,225	2,687	2,931	3,106
% of revenues	*13.1*	*15.2*	*8.3*	*4.4*	*6.3*
Others	5,504	6,206	8,018	8,714	8,354
% of revenues	*35.9*	*42.3*	*24.6*	*13.2*	*17.1*
EBITDA	**1,346**	**396**	**14,473**	**30,348**	**17,599**
EBITDA margin (%)	*8.8*	*2.7*	*44.5*	*46.0*	*36.0*
Depreciation & Amortisation	492	464	570	594	625
EBIT	**854**	**(68)**	**13,903**	**29,754**	**16,974**
Interest expenses	95	79	84	64	44
PBT from operations	**759**	**(147)**	**13,819**	**29,690**	**16,930**
Other income	494	865	700	925	2,013
Exceptional items	0	0	0	0	0
PBT	**1,254**	**718**	**14,519**	**30,615**	**18,942**
Taxes	426	13	4,791	10,103	6,251
Effective tax rate (%)	*33.9%*	*1.8%*	*33.0%*	*33.0%*	*33.0%*
Reported PAT	**828**	**705**	**9,728**	**20,512**	**12,691**
Adjusted PAT	**828**	**705**	**9,728**	**20,512**	**12,691**

Source: Company, Centrum Research Estimates

Exhibit 31: Key Ratios

Y/E March	FY16	FY17	FY18E	FY19E	FY20E
Growth Ratio (%)					
Revenue	*(10.4)*	*(4.2)*	*121.7*	*102.7*	*(25.8)*
EBITDA	*(1.6)*	*(70.6)*	*3,559.5*	*109.7*	*(42.0)*
Adjusted PAT	*31.1*	*(14.9)*	*1,280.6*	*110.9*	*(38.1)*
Margin Ratios (%)					
EBITDA	*8.8*	*2.7*	*44.5*	*46.0*	*36.0*
PBT from operations	*5.0*	*(1.0)*	*42.5*	*45.0*	*34.6*
Adjusted PAT	*5.4*	*4.8*	*29.9*	*31.1*	*25.9*
Return Ratios (%)					
ROE	4.6	3.9	44.2	62.6	28.5
ROCE	*4.1*	*3.6*	*34.4*	*48.4*	*25.0*
ROIC	*3.4*	*(0.4)*	*46.5*	*63.9*	*44.6*
Turnover Ratios (days)					
Gross block turnover ratio (x)	1.1	1.0	2.1	4.0	2.8
Debtors	113	110	80	75	75
Inventory	178	150	110	105	105
Creditors	41	54	45	45	45
Cash conversion cycle	250	205	145	135	135
Solvency Ratio (x)					
Net debt-equity	(0.1)	(0.2)	(0.2)	(0.2)	(0.5)
Debt-equity	0.2	0.1	0.1	0.0	0.0
Interest coverage ratio	0.1	(1.2)	0.0	0.0	0.0
Gross debt/EBITDA	2.2	6.6	0.1	0.1	0.1
Current Ratio	2.8	2.9	3.0	3.1	4.6
Per share Ratios (Rs)					
Adjusted EPS	4.2	3.6	49.8	105.0	65.0
BVPS	91.5	95.1	130.4	204.8	250.9
CEPS	6.8	6.0	52.7	108.0	68.2
DPS	3.9	2.0	12.4	26.2	16.2
Dividend payout %	*112.4*	*64.5*	*29.1*	*29.1*	*29.1*
Valuation (x)* Avg MCap					
P/E (adjusted)	18.0	22.8	8.3	6.5	10.5
P/BV	0.8	0.9	3.2	3.3	2.7
EV/EBITDA	9.6	29.8	5.2	4.1	6.2
Dividend yield %	*5.2*	*2.4*	*3.0*	*3.8*	*2.4*
5 Yr Avg AOCF/EV yield %	*14.5*	*20.7*	*4.7*	*3.4*	*6.8*

Source: Company, Centrum Research Estimates

Exhibit 32: Balance Sheet

Y/E March (Rs mn)	FY16	FY17	FY18E	FY19E	FY20E
Equity Share Capital	391	391	391	391	391
Reserves & surplus	17,489	18,185	25,084	39,632	48,634
Shareholders' fund	17,880	18,576	25,475	40,023	49,025
Total Debt	3,023	2,592	2,092	1,592	1,092
Def tax liab. (net)	863	821	850	850	850
Total Liabilities	**21,766**	**21,989**	**28,418**	**42,466**	**50,967**
Gross Block	14,165	15,394	16,294	16,969	17,869
Less: Acc. Depreciation	8,253	8,717	9,287	9,881	10,506
Net Block	5,912	6,677	7,007	7,088	7,363
Capital WIP	655	321	421	496	596
Net Fixed Assets	6,567	6,998	7,428	7,584	7,958
Investments	4,751	6,310	6,310	6,310	6,310
Inventories	7,485	6,021	9,809	18,976	14,073
Sundry debtors	4,742	4,415	7,134	13,555	10,052
Cash	211	515	2,093	4,974	19,172
Loans & Advances	357	116	892	1,807	1,340
Other assets	957	1,034	1,472	2,845	2,145
Total Current Asset	13,752	12,101	21,399	42,158	46,783
Trade payables	1,724	2,184	4,013	8,133	6,031
Other current Liab.	1,378	984	2,229	4,518	3,351
Provisions	201	249	474	932	699
Net Current Assets	10,448	8,684	14,683	28,575	36,701
Total Assets	**21,766**	**21,989**	**28,418**	**42,466**	**50,967**

Source: Company, Centrum Research Estimates

Exhibit 33: Cash Flow

Y/E March (Rs mn)	FY16	FY17	FY18E	FY19E	FY20E
Operating profit before WC	1,735	407	14,473	30,348	17,599
Changes in working capital	1,626	2,070	(4,392)	(11,011)	6,070
Cash flow from operations	**2,846**	**2,464**	**5,290**	**9,234**	**17,418**
Adj. OCF (OCF - Interest)	2,751	2,385	5,206	9,170	17,375
Net Capex	550	895	1,000	750	1,000
Adj. FCF	2,201	1,490	4,206	8,420	16,375
Cash flow from investments	**(871)**	**(1,184)**	**(300)**	**175**	**1,013**
Cash flow from financing	**(1,911)**	**(964)**	**(3,412)**	**(6,528)**	**(4,234)**
Net change in cash	**64**	**315**	**1,578**	**2,881**	**14,197**

Source: Company, Centrum Research Estimates

Appendix A

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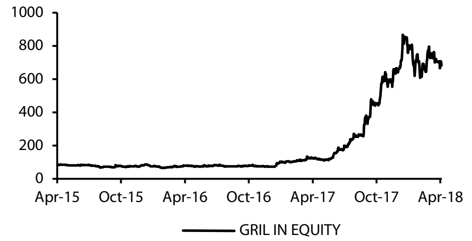

Source: Bloomberg, Centrum Research

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