

European Chemicals

Co-Products 2.0 - Competing in a better supplied market; Buy CLN & DSM; Sell LXS & EVK

- **Cautious on co-products as supply keeps growing** — We analysed the three most important (co-product) chemical chains for the EU chemicals sector: C3 (propylene), C4 (butadiene), and C6 (benzene). Depending on the company, these chains account for 10-70% of group earnings. After years of limited supply growth, we see waves of new supply coming to the market in 2013-2015. Given ongoing sluggish demand in EM and DM, utilisation rates are likely to remain depressed in the next 12-18 months resulting in limited earnings recovery potential for EU petrochemicals as they lack the “scarcity power” of the past when tightness upstream and downstream drove margins throughout these chains. We therefore favour companies with low co-product exposure. Our top Buys are CLN (0% exposure) and DSM (22%). Our top Sells are LXS (70%) and EVK (63%).
- **Asia drives growth**— Asia, esp. China, accounts for the bulk of capacity growth in all three chains; in the next 5 years, Asia will account for about 70-90% of global C3, C4, and C6 capacity expansions, according to our calculations on IHS data. Cheap US shale gas is forcing higher cost Asian chemical companies into “specialties” creating new competition for EU players. In addition, China’s ambition to increase its self-sufficiency will likely reduce demand for EU exports into the region putting pressure on local utilisation rates.
- **Product highlights** — In the C3 chain, Methionine stands out with over 20% anticipated capacity growth in 2014. This is negative for EVK where it accounts for almost 18% of earnings. In the C4 chain, we highlight BD (+8.5%) and synthetic rubber (up to +12%). This supports our more cautious view on LXS and EVK where they account for 58% and 24% of earnings, respectively. In the C6 chain, Caprolactam (+10%), Nylon 6 (+9%) and TDI (+12%) stand out with negative implications for BASF (11% of earnings), DSM (17%) and LXS (9%). We welcome DSM’s ambition to reduce its exposure to this chain.
- **Stock action** – For LXS, we lower our 2013E & ‘14E adj. EPS by 9% and 14% respectively on the back of FX headwinds, likely inventory write down in ‘13 and lower BD prices in ‘14. For CLN we raise our TP to SFr18 as we raise our estimates following higher confidence in the margin expansion potential of the group and better topline growth. For BASF we cut our estimates by c. 4% due to FX headwinds and a more cautious trading outlook for caprolactam and ag. We have not changed our estimates for DSM.

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Company	Ticker	Rating		Target Price		Current Year Earnings Estimates	
		Old	New	Old	New	Old	New
BASF	BASF.DE	2	2	€72.00	€72.00	€5.24	€5.23
Clariant	CLN.VX	1	1	SFr16.00	SFr18.00	SFr1.05	SFr1.06
DSM	DSM.NAS	1	1	€65.00	€65.00	€3.39	€3.39
Evonik	EVKn.DE	3	3	€24.00	€24.00	€1.94	€1.94
Lanxess	LXSG.DE	3	3	€37.00	€37.00	€1.69	€1.54

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Executive Summary – Goodbye Scarcity

Waves of new supply eliminate scarcity pricing power and create a lower margin environment

We provide a detailed analysis of the supply/demand trends in the three most important (co-product) chemical chains for the sector: C3 (propylene), C4 (butadiene), and C6 (benzene). These building blocks and their derivatives account for 10-70% of company group earnings. After years of relative tightness (upstream and downstream) and record profitability of these chains, we are seeing waves of new supply coming to the market, especially in 2013 and 2014; this comes at times of sluggish demand in EM and DM. Asia is the main driver behind this accounting for 70-90% of all supply additions in the coming years. As a result we expect global utilisation rates to remain fairly depressed resulting in limited earnings recovery potential as companies lack the “scarcity power” of the past when tightness upstream in combination with tightness downstream led to record profitability.

Biggest concern for Methionine, butadiene, synthetic rubber, caprolactam, nylon 6 and TDI

In the C3 chain, Methionine stands out: global capacity is set to increase by 20% next year. This is negative for EVK as it accounts for c. 18% of earnings. In the C4 chain, butadiene (+8.5%) and synthetic rubber (+4-12%) are expanding rapidly putting pressure on margins for LXS and EVK. In the C6 chain caprolactam (+10%), nylon 6 (+9%) and TDI (+12%) are expanding rapidly which makes us cautious with regards to BASF, DSM and LXS.,

Key Buys: Clariant and DSM; Key Sell: LXS and EVK

We favour stocks with low exposure to co-products. Our top Buys are Clariant (0% exposure) and DSM (c. 23%) and our key Sells are LXS (c. 70%) and EVK (c. 63%).

Figure 1. Overview Co – Products – Global Capacity growth and company earnings exposures

Chain	Intermediates and Products	Global Capacity growth- 2014 (YoY)	Global Capacity growth CAGR12-17E	Key Companies	% of earnings*	Comments
C3	Acrylic Acid	3.9%	3.8%	AKE BASF DSM EVK	28.0% 9.1% 2.3% 4.5%	supply/demand fairly balanced in 2013/2014; higher risk for 2015
C3	Acrylonitrile	6.3%	5.7%	DSM	2.8%	weakening trend due to Asian capacity growth
C3	Methionine	19.7%	7.2%	EVK	17.9%	strong supply side response, major expansion in 2014
C3	MMA	1.7%	4.6%	EVK	8.3%	solid new capacity on way by FY13/14 compared to modest demand growth
C3	PMMA	2.6%	3.3%	AKE EVK	12.2% 4.4%	weakening trend due to capacity additions in 2015 (6.7% YoY)
C3	Propylene	6.3%	5.0%	BASF EVK	5.0% 4.2%	steady outlook with near term risks
C4	Butadiene	8.5%	3.7%	AKE BASF EVK	9.9% 1.4% 23.5%	we see strongest growth in 2013 and 2014 which is likely to weigh on sector margins
C4	Nylon 6,6	1.7%	2.7%	SOLB	2.3%	supply addition in line with demand; risk of substitution limits upside
C4	Synthetic Rubber	4-12%	2-10%	LXS	57.7%	strong supply side response especially out of Asia leading to intensifying competitive pressures; risk to margins prevails
C6	Adipic Acid	10.0%	5.7%	BASF LXS SOLB	1.5% 2.2% 2.5%	steady outlook but with near term oversupply risk
C6	Benzene	3.5%	2.1%	BASF	1.4%	limited capacity growth due adoption of lighter feedstocks
C6	Caprolactam	10.3%	9.1%	BASF DSM LXS	2.8% 8.9% 5.7%	strong acceleration of capacity growth driven by Asia; oversupply situation likely to worsen
C6	MDI	5.2%	7.2%	BASF	5.1%	supply slightly ahead of demand
C6	Nylon 6	9.3%	5.1%	BASF DSM LXS	2.6% 6.3% 3.3%	risk of near term oversupply; utilisation rates likely to remain under pressure
C6	TDI	12.2%	7.5%	BASF DSM SOLB	5.5% 2.3% 4.9%	strong supply side response, major expansion in 2014

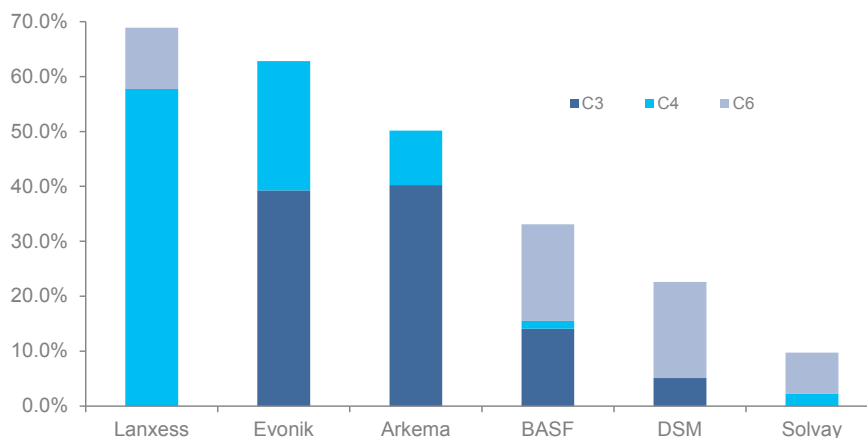
Source: Citi Research

The Who's Who of the Co-Product World

LXS and EVK have the highest co-product exposure in the industry

The chart below shows the companies with the highest co-product exposure in the industry: Lanxess and Evonik top the list with 69% and 63%, respectively. Solvay has the least exposure, but we still see about 40% of its EBITDA as structurally challenged. We prefer names with no or limited exposure to these chains: hence our top picks are Clariant (0% exposure), DSM (c. 23%), and Linde (0%). We recommend avoiding companies with high exposure to these chains. Hence, our Sell recommendations on LXS and EVK.

Figure 2. Companies with meaningful co-product earnings exposure



Source: Citi Research, CMAI, Includes downstream products and intermediates related to chain

Clariant is one of our Top picks; it has no by-product exposure

Clariant (Buy, TP SFr18) – No Exposure to Co-Products

Clariant is one of our Top picks in the sector due to **1)** no exposure to co-products and no evident oversupply risk in any of its products; **2)** c. 40% of EBITDA derived from businesses with value-based pricing (e.g. Care Chemicals, Catalysts & Energy) providing pricing power; **3)** conservative consensus estimates providing earnings upside potential in 2H13 and 2014; **4)** improving FCF and ROCE profile; **5)** dividend upside potential.

TP increased to SFr18

We increase our TP to SFr18 as we raise our 2013E and 2014E estimates on the back of better than expected profitability in Catalysis & Energy and higher top line growth in Care Chemicals and OMS. We note stronger FX headwinds in 3Q13 with CHF appreciating by 3% vs. the US\$ and by 17% vs. the Brazilian Real. This will hold back earnings growth in the quarter, but we don't expect any transactional margin impact. Should currencies remain at current levels, CLN should see reduced headwinds in 4Q13.

DSM generates about 23% of earnings from co-products, but this could drop to just 14% by exiting the merchant caprolactam business

DSM (Buy, TP €65) - Reducing exposure to co-products

DSM generates about 23% of group EBITDA per year from co-product chain products (caprolactam, nylon 6 and acrylonitrile). The strategic aim of DSM is to integrate its recent acquisitions, drive organic growth and improve the ROCE on its problem businesses.

Within the latter issue, it is determined to reduce its merchant caprolactam exposure which accounts for about 9% of group EBITDA. By this, we mean it consumes 30% of its caprolactam production but sells 70% into the merchant market. This should increase its earnings visibility and contribute to the rerating we believe the shares will deliver over the medium term. We already had a cautious view on the prospects for the group and DSM, at its CMD, confirmed its guidance, which is in line with our expectations.

Lanxess (Sell, TP €37) – Goodbye Scarcity Power

Lanxess has the highest co-product earnings exposure in the sector

With 70%, LXS has the highest co-product exposure as % of earnings in our sector. C4 chain chemicals (butadiene and downstream synthetic rubber) account for about 58% of earnings and the C6 chain (caprolactam, nylon 6 and adipic acid) accounts for about 11%. Given the significant capacity additions in these chains in the coming years (esp. 2014), more intense competition and higher price sensitivity amongst its customers, we remain cautious regarding the earnings recovery potential for LXS in the next 12 months.

Cutting 2013E and 2014E estimates; Sell rating confirmed

We lower our 2013E and 2014E estimates by 9% and 14% respectively and reiterate our Sell rating.

Evonik (Sell, TP €24) – Co-Product Exposure bites

Evonik co-product exposure at 63% is only second to that of Lanxess in our sector. Among its exposure we see significant pricing pressure in the methionine (18% of group's earnings) business. We see global methionine capacity up c. 20% next year after a c.13% increase this year. This has resulted in 8% decline in methionine prices YTD but we expect more pain to come in the next year. We also anticipate limited pricing power for Evonik's C4 chain stream (c. 24% of the group's earnings) as we forecast a flat YoY BD prices on account of 8.5% increase in global BD capacity.

Overall, our analysis suggests that 2011 and 2012 overstated the group's long-term earnings power and we see above average risks to margins. We believe there remains scope for further underperformance until pricing at least starts to stabilise.

Solvay (Sell, TP €80) – Structurally challenged

C. 10% of Solvay's earnings are co-product related

We estimate that about 10% of Solvay (SOLB.BR; €110.25; 3) earnings are driven by co-products: c. 2.5% are related to C4 (Nylon 6,6) and c. 7.5% are related to C6 (adipic acid, Coatis).

Hence, given the limited exposure, we think Solvay is least at risk of seeing significant headwinds from co-product capacity expansions compared to the other companies with exposure to these chains.

We still see about 40% of earnings as structurally challenged

However, as outlined here ([Solvay SA \(SOLB.BR\) - Can't Defy Gravity; Sell reiterated](#)) we see 40% of REBITDA structurally challenged. The main challenges are: 1) collapsing guar gum prices (-40% QoQ in 3Q13) due to ample supply and substitute pressure; 2) high cost soda ash in EU facing competitive pressures from low-cost Turkish exports; 3) Rare earth price pressure due to de-stocking and supply additions outside of China; 4) Substitution risk in Nylon 6,6 from lower cost alternatives, such as Nylon 6.

Arkema (Neutral, TP €80) – C3 chain dominates

50% of AKE's earnings are co-product related; C3 chain dominates with 40%

Arkema's (AKE.PA; €82.13; 2) co-product exposure is about 50% of group earnings. The C3 chain (acrylic acid and downstream products, PMMA) dominates with about 40% of earnings. 10% of earnings are C4-related, based on our estimates, due to PA12 which uses a butadiene derivative (CDT) as feedstock. We prefer the C3 chain relative to C4 and C6 given the more favourable supply/demand balances in this chain. Hence, our earnings estimates are mainly driven by our view of the development of end market demand, such as Oil & Gas for its HPM division, and to a lesser extent by concerns about oversupply in its key products.

**Acrylic acid supply/demand look
balanced, but look out for 2015**

Acrylic acid, which accounts for c. 11% of earnings (or c.28% including downstream coatings), still drives sentiment and supply/demand looks balanced in 2014 with some risk of oversupply in 2015 when global capacity is forecast to increase by 13% due to Chinese capacity additions, according to IHS. However, sluggish construction markets and propylene price inflation put pressure on margins YTD.

BASF (Neutral, TP €72) – Cutting estimates slightly

Co-products and its derivatives drive about 34% of BASF's earnings with C6 accounting for 19%, followed by C3 (14%) and C4 (1%). The majority of these earnings comes from the nylon activities (caprolactam, nylon 6, engineering plastics), MDI, TDI, acrylics and basic petrochemicals. Of these businesses, c. 1/3 of the earnings came from specialty applications which are unlikely to see a significant intensification of price/competitive pressures.

**Cutting 2014E and 2015E estimates by
4%**

We have taken a somewhat more cautious assessment of the earnings outlook based partly on the recent strength of the Euro but also because of ongoing price erosion in MDI and acrylics in 3Q13. We expect utilisation rates to fall, notably in caprolactam in 2014. We have also lowered our forecast for ag given our more cautious take on the crop protection market next year. As a result we have lowered both 2014 and 2015 estimates by 4% as a result.

Scarcity Power in Co-Products – 3 Factors

There is a correlation between the availability of building blocks and the profitability of the supply chain. In the 2010 to mid-2012 period, the structural shortage of co-products (see below), we believe, was a dominant factor driving co-product chain margins as companies were able to exploit this market tightness to drive pricing higher – and in the case of butadiene dramatically higher.

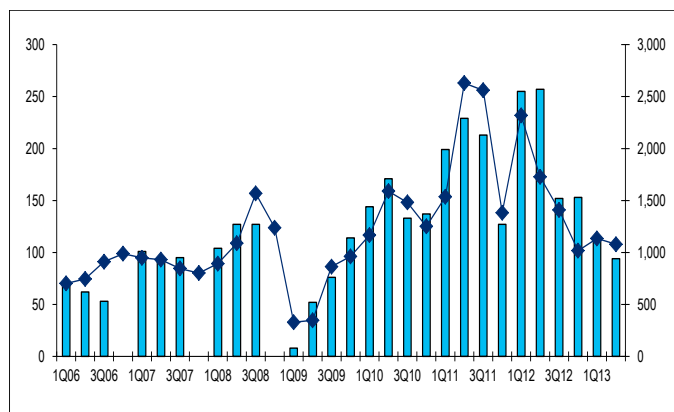
In general, we believe there are three key factors that need to be in place to ensure profitability throughout the chain:

- 1) **A physical shortage of the co-product building blocks;**
- 2) **The downstream product category representing the major end use for the building block; and**
- 3) **A tight to no worse than balanced downstream supply/demand situation.**

Taking this checklist, one can see why the C4 chain was so profitable in 2010-2012: Butadiene was short (1), the major use for BD is synthetic rubber (2), where supply was tight due to strong tyre demand and limited supply (3).

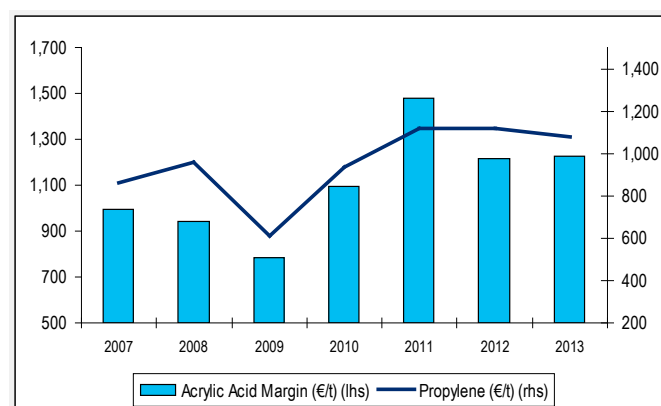
Lanxess' Performance Polymers EBITDA peaked with butadiene prices in late 2011/early 2012 (Figure 3). Taking another example, acrylic acid margins peaked with propylene in 2011 (Figure 4). And provided a material benefit to Arkema.

Figure 3. LXS – Performance Polymers EBITDA (€m) vs Butadiene Price (€/t) (rhs)



Source: Citi Research; IHS; Company Reports

Figure 4. Acrylic Acid Margin vs. Propylene Price

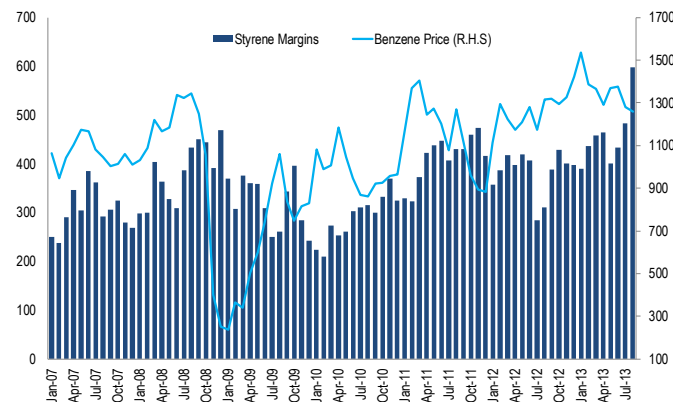


Source: Citi Research; IHS

Another example is styrene (major outlay for benzene) where margins are at record levels at times of high benzene prices (Figure 5).

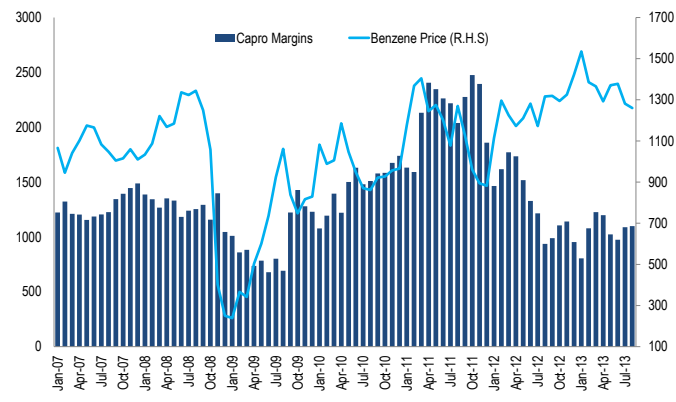
However, as soon as only one of the three factors is not in place, upstream tightness can actually lead to lower margins downstream. This is the case for caprolactam (Figure 6) which is only a minor outlay for benzene (requirement 2 not fulfilled) and its supply is long due to major capacity expansions in Asia (requirement 3 not fulfilled). As a result, upstream tightness resulted in a significant margin squeeze in caprolactam as producers lacked scarcity-induced pricing power.

Figure 5. Styrene margins vs. Benzene price



Source: Citi Research, ICIS, CMAI

Figure 6. Caprolactam margins vs. Benzene price



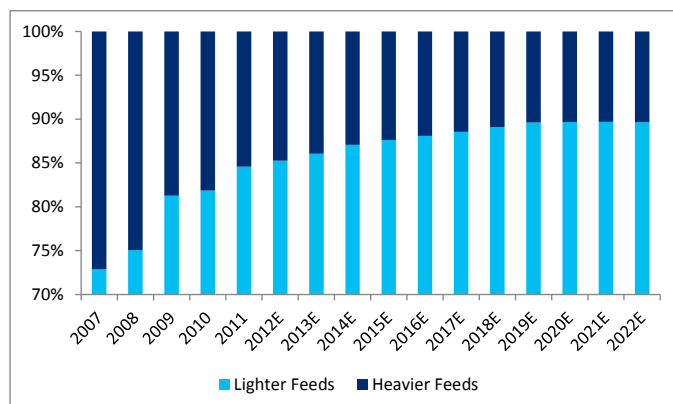
Source: Citi Research, ICIS, CMAI

Co-Product Supply and Demand From Short

US Shale gas revolution triggered global tightness in co-products

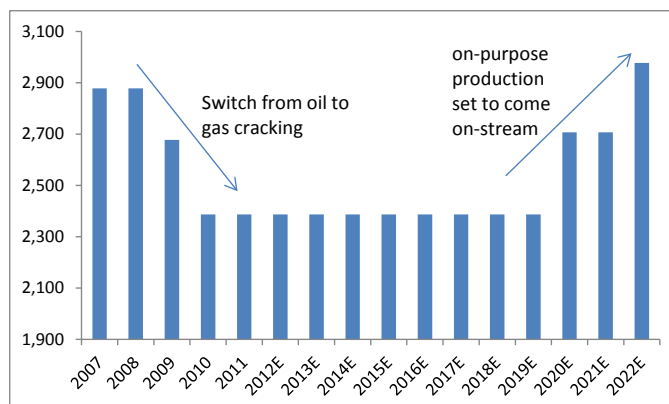
Cheap natural gas in North America was the phenomenon that first emerged in 2008. Along with shale gas came ethane and other gas liquids that need to be cleaned out of the natural gas; this energy “waste” became the raw material of choice for the US petrochemicals industry. As a result the share of ethylene derived from those lighter feeds increased from 73% in 2007 to 85% in 2012 (Figure 7). **The switch from high priced naphtha and other oil fractions to low cost shale gas in the US reduced the availability of co-products (e.g. US Butadiene capacity fell by about 20% between 2007 and 2012) given the different co-product yields for different feedstocks.**

Figure 7. US Ethylene – Lighter Feeds vs. Heavier Feeds



Source: IHS

Figure 8. US Butadiene Capacity (2007-2022E)



Source: Citi Research, IHS

Co-product yields of steam crackers depend on the feedstock

As can be seen in Figure 9, a typical steam cracker based on ethane produces about 0.8kg of ethylene for every 1kg of ethane, or in other words the ethylene yield is about 80% while the butadiene yield is about 2%. Compare this to a steam cracker based on naphtha which yields about 5% of butadiene, i.e. 2.5x more per 1kg of input. The main reason for this is the size of the molecule: naphtha is a mixture of “bigger” molecules (C6-12 molecules) vs. ethane or propane (C2 for ethane and C3 for propane).

Figure 9. Co-Product Yields from Ethylene Production depending on Feedstock

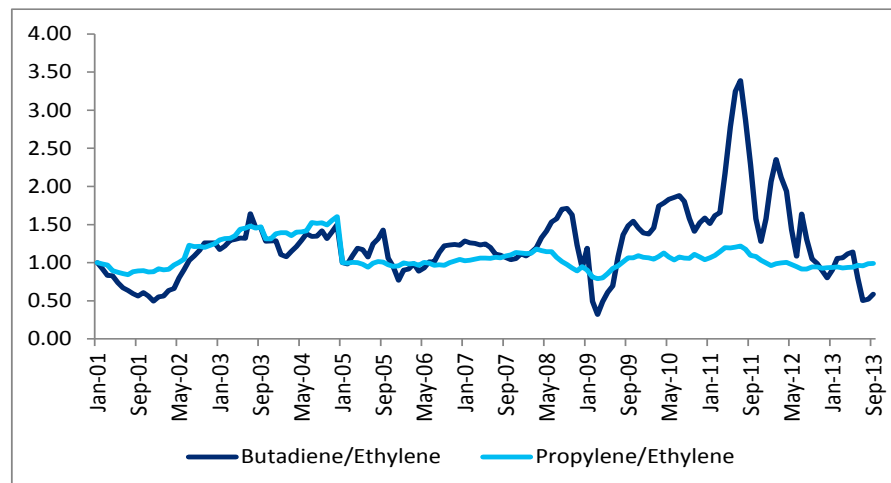
	Ethane	Propane	Naphtha	Gas oil
Ethylene	78%	42%	31%	21%
Propylene	2%	17%	16%	15%
Butadiene	2%	3%	5%	4%
Butylenes	1%	1%	4%	5%
Others/Fuel	17%	37%	44%	55%

Source: Citi Research

The reduced availability, led to global tightness and record prices, esp. in 2010 and 2011, when demand rebounded after the 2009 crisis. The relative rise in the value of co-products versus ethylene (see below) reflects the changed supply/demand dynamics.

For example, from 2007-2008 Butadiene (Propylene) traded on an average premium of about 20% (16%) to ethylene but in the period 2010-2011 the average premium rose to 90% (24%). While this is clearly a cost challenge, it is also a reflection of the tightness in the market for these materials, which, in turn, delivers pricing power to the supply chains derived from these building blocks, assuming they are major outlays for this product and experience tight supply/demand balances themselves.

Figure 10. Price of propylene & butadiene compared with ethylene



Source: ICIS

...to Long(er) mainly due to expansions in Asia

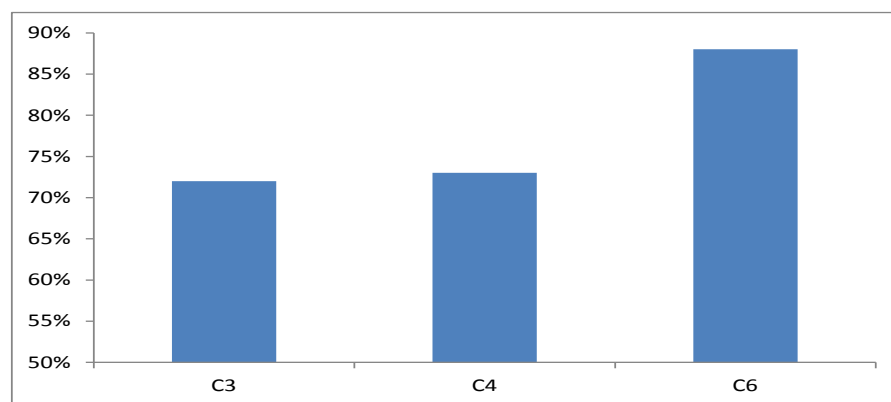
The supply side responds, mainly in Asia

However, global demand started to weaken in 2H12 on the back of the EU debt crisis and slowing Chinese growth just as supply started to crank up (mainly in Asia). Prices and profit margins started to erode.

Chinese coal-to-olefins technology allowed the expansion of both co-products and the more value-added specialties that had been booming, such as caprolactam. Also the US shale gas revolution forced higher cost Asian producers further downstream into specialties creating new competition for EU companies. This has led to easing of co-product market tightness and a progressive decline in their prices versus ethylene since 2012.

On average, Asia accounts for about 72%, 73% and 88% of global C3, C4, and C6 capacity expansions respectively in the next 5 years

Figure 11. Asia - % share of incremental global capacity additions in C3, C4, C6 from 2012-2017



Source: Citi Research; IHS

C3 chain – Our preferred chain, but mind Methionine

Based on our analysis, overall C3 supply/demand looks balanced and we prefer this chain relative to C4 and C6. However, methionine remains the problem child in this chain with c. 20% anticipated capacity growth in 2014, well above demand trend growth of 4-5%. This creates substantial risk of oversupply with negative implications for EVK as methionine accounts for almost 18% of its earnings.

Companies with meaningful earnings exposure to the C3 chain include Arkema (c. 40%), EVK (c.39%), and BASF (14%).

Companies with meaningful earnings exposure: AKE, EVK, BASF

C4 chain - Butadiene and Synthetic rubbers

Companies with meaningful earnings exposure LXS, EVK, AKE

In the C4 chain, we highlight BD (+8.5%) and synthetic rubber (up to +12%). This supports our more cautious view on LXS and EVK where C4 chain chemicals account for 58% and 24% of earnings respectively. We also note that just like in 2013, 70% of global butadiene capacity additions in 2014 will be from lower-cost extraction units which should keep butadiene prices at bay. Demand is likely to remain below trend for these products as consumers down trade premium products in favor of cheaper alternatives. **Companies with meaningful earnings exposure to the C4 chain include LXS (58%), EVK (24%), and AKE (10%).**

C6 chain focus: highest risk of oversupply

Companies with meaningful earnings exposure BASF, DSM, LXS

The C6 chain looks most at risk in terms of oversupply given significant capacity additions in Asia in the coming years. Caprolactam (+10%), Nylon 6 (+9%) and TDI (+12%) stand out. Demand is likely to remain in line with GDP for these products. **Companies with meaningful earnings exposure to the C6 chain include BASF (19%), DSM (17.5%), and Lanxess (11%).**

Figure 12. Overview Co – Products – Demand expectations and trends vs. global capacity growth

Chain	Intermediates and Products	Demand drivers	Demand trend	Global Demand Growth	Global Capacity growth- 2014 (YoY)	Risk of Oversupply	Comments
C3	Acrylic Acid	Consumer - 26% (personal hygiene, baby care), construction - 41% (coatings and adhesives) and industrial -33% (O&G, water treatment etc.)	Stable demand with value chain close to end product.	GDP+	3.9%	L	supply/demand fairly balanced in 2013/2014; higher risk for 2015
C3	Acrylonitrile	Consumer - 38% (textiles-apparels), automobiles - 39% (high performance plastics) and others -23% (binding agents etc.)	Intermediate product. Demand driven by automobiles as consumer sector faces interfiber competition.	GDP	6.3%	H	weakening trend due to Asian capacity growth
C3	Methionine	Animal Feed - Mainly poultry, swine and fish.	Higher protein intake in the emerging markets is the key driver	GDP+	19.7%	H	strong supply side response, major expansion in 2014 creating high risk of oversupply
C3	MMA	PMMA Precursor - 63% (both molding and sheet), construction - 20% (surface coatings), and others -17% (impact modifiers etc.)	Intermediate product mainly used as precursor for PMMA. Also used in coating solutions.	GDP	1.7%	L	Supply and Demand look balanced
C3	PMMA	Used as a shatter resistant alternate to glass. Consumer - 34% (signs and displays, sanitary ware), electrical and fittings -17%, Construction - 17%, automobiles - 14%, others - 18%	Downstream product with demand driven by glass replacement trend in automobiles and PV. Lower demand that expected from electronics sector due to introduction of LED backlights	GDP	2.6%	M	supply/demand fairly balanced in 2013/2014; higher risk for 2015 (6.7% yoy)
C3	Propylene	Building block of C3 Chain	Used for diverse applications including textiles, packaging and plastics .	GDP+	6.3%	M	steady outlook with some near term risks
C4	Butadiene	Building block of C4 Chain. Demand driven by synthetic rubbers (60%) and high performance plastics (40%)	Building block. Demand outlook mainly driven by automobiles (including tires) so expect near term headwinds.	GDP+	8.5%	H	we see strongest growth in 2013 and 2014 which is likely to weigh on sector margins
C4	Nylon 6,6	Automobiles and engineering - 62% (like airbags), consumer - 38% (including carpets, industrial fabrics, apparels)	Automobiles and textile industry are the key outlet. Facing interfiber competition from other inexpensive materials	GDP -	1.7%	L	supply addition in line with demand; risk of substitution limits upside
C4	Synthetic Rubber	Automobiles - <70% (mainly tires), consumer -10% (footwear etc.), Plastics and others - > 20% (include adhesives, polymer modification etc.)	Demand driven by tires (new and replacement). Facing consumer downtrading amid strong supply side response.	GDP+	4-12%	H	strong supply side response driven by Asia leading to intensifying competitive pressures; risk to margins prevails
C6	Adipic Acid	Nylon 6,6 - 60%, polyester -21% and others inc plasticizers -19% precursor	Intermediate product. Demand driven by automobiles, electronics and textile market	GDP	10.0%	H	steady outlook but with near term oversupply risk
C6	Caprolactam	Nylon 6 Precursor	Intermediate product mainly used as a precursor for Nylon 6	GDP	10.3%	H	strong acceleration of capacity growth driven by Asia; oversupply situation likely to worsen
C6	MDI	Construction -54% (including adhesives, sealants, binders), consumer - 22% (appliances, flexible applications etc.), others - 24% (including elastomers)	Demand driven by rigid foams such as board and laminate insulation. Recent trends indicates its rising popularity among flexible foam area as well.	GDP+	5.2%	M	supply slightly ahead of demand
C6	Nylon 6	Textile - 45% (including carpets, apparels) Automobiles and industrial -50% (such as belts, cleaning brushes etc.), others -5%	Demand driven by emerging markets. Benefiting from nylon6,6 replacement trend due better economics	GDP	9.3%	H	risk of near term oversupply; utilization rates likely to remain under pressure
C6	TDI	Consumer - 54% (bedding, furniture, carpets etc.), automobiles -22% (cushions etc.), construction & industrial - 24% (including surface coatings, adhesives, sealants etc.)	Demand driven by flexible foams such as bedding, seating's etc. Recent trends indicates rising competition from MDI.	GDP	12.2%	H	strong supply side response, major expansion in 2014

Source: Citi Research; IHS

Sector Valuation Overview

Figure 13. Sector Valuation overview

		Share Price	Recommendation	PE		EV/EBITDA		ROCE		EV/CE		Dividend yield		FCF yield	
				2013E	2014E	2013E	2014E	2013E	2014E	2013E	2014E	2013E	2014E	2013E	2014E
Ag stocks															
Israel Chem	ICL.TA	29.8	Buy	10.0	10.9	7.6	7.9	20.2%	18.8%	2.25	2.13	7.0%	6.0%	5.6%	6.8%
PhosAgro	PHORq.L	10.1	Buy	10.0	6.9	6.9	5.5	15.2%	18.1%	1.73	1.57	2.9%	5.8%	5.2%	7.7%
K+S	SDFGn.DE	19.0	Neutral	9.2	19.2	4.8	7.4	10.9%	5.6%	0.89	0.90	4.6%	1.8%	-2.3%	1.4%
Syngenta	SYNN.VX	365.0	Neutral	19.3	16.9	12.3	11.2	24.6%	25.4%	4.69	4.36	2.2%	2.5%	4.6%	4.6%
Uralkali	URKAq.L	26.1	Neutral	18.5	15.2	11.5	10.5	9.7%	10.2%	1.76	1.69	2.7%	3.3%	6.9%	6.7%
Yara	YAR.OL	248.6	Buy	9.1	8.3	5.8	5.2	14.4%	14.7%	1.32	1.24	5.2%	5.2%	9.9%	10.7%
Average				15.3	14.2	9.6	9.0	19.5%	19.7%	3.03	2.85	3.8%	3.9%	5.7%	6.3%
Consumer Stocks															
Croda	CRDA.L	26.7	Sell	20.5	20.7	12.8	12.6	31.2%	29.8%	6.54	6.28	2.4%	2.5%	3.6%	4.2%
Givaudan	GIVN.VX	1318.0	Neutral	21.8	21.2	13.9	13.4	20.2%	21.0%	4.45	4.51	3.2%	3.5%	3.9%	3.9%
Symrise AG	SY1G.DE	32.6	Sell	18.1	17.3	12.0	11.4	21.0%	21.4%	3.68	3.60	2.1%	2.2%	5.0%	5.4%
Average				20.7	20.3	13.3	12.8	23.0%	23.2%	4.79	4.74	2.8%	3.0%	4.0%	4.3%
Industrial stocks															
Air Liquide	AIRP.PA	102.5	Neutral	19.4	18.2	10.2	9.7	13.4%	13.3%	2.72	2.56	2.6%	2.8%	2.6%	2.4%
Arkema	AKE.PA	82.1	Neutral	12.1	10.7	6.7	5.8	11.8%	12.7%	1.67	1.57	2.6%	2.9%	5.0%	7.5%
Akzo Nobel	AKZO.AS	48.2	Neutral	13.9	17.7	8.7	8.0	9.8%	11.0%	1.59	1.56	3.0%	3.2%	5.7%	4.8%
BASF	BASFn.DE	70.4	Neutral	13.5	13.2	8.7	8.5	12.1%	11.9%	2.01	1.96	3.8%	4.0%	4.8%	7.2%
Clariant AG	CLN.VX	15.3	Buy	14.3	11.9	7.8	6.9	16.1%	17.8%	2.25	2.14	2.3%	2.5%	4.2%	6.8%
DSM	DSMN.AS	55.9	Buy	16.5	14.1	9.6	8.2	10.2%	11.3%	1.87	1.78	2.7%	3.0%	2.2%	4.1%
Evonik	EVKn.DE	27.4	Sell	14.1	13.4	8.0	8.1	10.5%	9.4%	1.60	1.49	3.4%	3.4%	-1.8%	0.4%
Johnson Matthey	JMAT.L	27.9	Neutral	19.0	17.3	12.1	11.3	15.7%	15.4%	3.59	3.29	2.0%	2.2%	2.9%	3.4%
Linde	LING.DE	145.9	Buy	17.1	15.9	9.6	9.1	12.8%	13.2%	2.48	2.36	2.0%	2.2%	3.1%	3.3%
Lonza Grp	LONN.VX	73.8	Neutral	14.0	11.6	9.6	8.7	8.5%	9.8%	1.44	1.43	3.9%	4.7%	5.8%	8.7%
Lanxess	LXSG.DE	47.7	Sell	31.0	16.6	9.3	8.1	4.5%	6.2%	1.28	1.28	2.1%	2.2%	-1.1%	-0.3%
Novozymes	NZYMb.CO	211.2	Sell	32.1	30.4	18.4	17.2	18.9%	18.8%	5.59	5.23	1.1%	1.2%	2.2%	2.4%
Solvay	SOLB.BR	110.3	Sell	17.9	15.7	8.1	7.7	8.5%	8.7%	1.52	1.48	3.1%	3.4%	3.6%	3.5%
Umicore	UMI.BR	35.5	Neutral	17.9	15.5	8.7	7.9	11.8%	12.7%	2.09	1.98	2.8%	3.0%	5.2%	3.7%
Victrex	VCTX.L	15.8	Neutral	19.2	18.5	12.1	11.2	28.0%	24.4%	4.78	4.02	2.5%	2.6%	1.6%	2.0%
Wacker Chem	WCHG.DE	71.5	Neutral	94.4	23.7	7.6	6.2	2.9%	5.3%	1.20	1.18	0.0%	0.8%	-0.1%	0.2%
Average				18.0	15.7	9.5	8.9	12.1%	12.3%	2.27	2.16	2.9%	3.1%	3.3%	4.4%

Source: Citi Research, datacentral

Co-Product Analysis

C3 Chain – Methionine is the main concern

Overall capacity growth in the C3 chain looks modest with supply and demand growing in line. The only product of concern is Methionine. Here we see 40% capacity expansion in the next few years. This is negative for EVK where Methionine accounts for about 18% of EBITDA. Acrylic acid capacity growth of about 4% p.a. in the next 5 years looks modest, but 2015E growth of 13% is significantly above trend and could put pressure on global margins.

Figure 14. C3 Chain – Products, Capacity growth and exposures

Products and Intermediates	Capacity Growth (2014)	CAGR 2012-17e	Mid-term Outlook	Company	% of earnings (2012)*
Acrylic acid	3.9%	3.8%	Steady outlook until 2015 (13% supply addition yoy)	AKE	28.0%
				BASF	9.1%
				DSM	2.3%
				EVK	4.5%
Acrylonitrile	6.3%	5.7%	Weakening trend due to Asian capacity growth	DSM	2.8%
Methionine	19.7%	7.2%	Weak price trend likely; 40% global supply growth all in Asia in next 3 years	EVK	17.9%
MMA	1.7%	4.6%	Weakening trend due to Asian capacity growth	EVK	8.3%
PMMA	2.6%	3.3%	Weakening trend; Asian capacity additions	AKE	12.2%
				EVK	4.4%
Propylene	6.3%	5.0%	Steady outlook with near term risks	BASF	5.0%
				EVK	4.2%

Source: Citi Research, CMAI, *Includes downstream products and intermediates related to chain

Propylene – 2014 and 2015 above trend

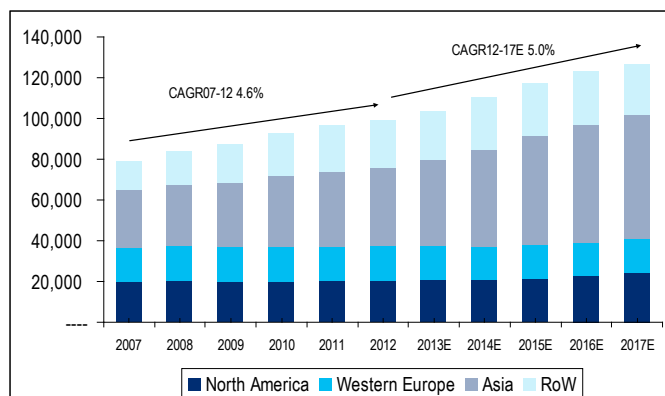
Quick facts:

- **Global capacity growth is CAGR12-17E 5%**, broadly in line with previous five years at c. 4.6% p.a.
- **2014 and 2015 are above trend** at c. 6% p.a.
- **Asia accounts for c. 80% of global capacity additions** between 2012 and 2017 and we are seeing an acceleration of capacity growth in the region in the next five years compared to the past.
- **On-purpose production (CTL, CTO, PDH etc) will outpace steam cracker and FCC production routes** growing at over 20% p.a. on average for the next 5 years compared to 2-3% for traditional routes. It will account for over 70% of propylene supply additions.

Global propylene capacity is c. 100m t;
Asia accounts for c. 40% and drives
growth going forward

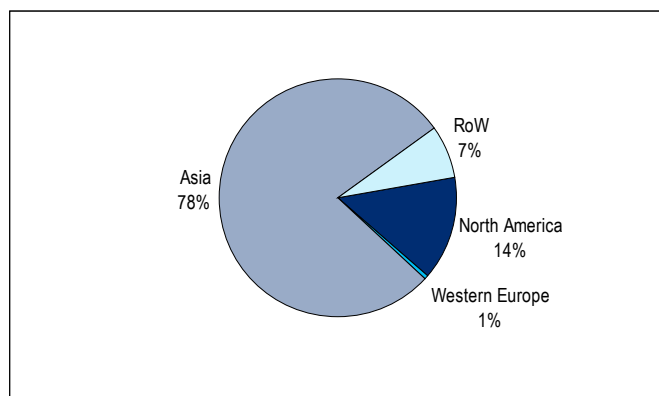
Global propylene capacity is about 100mt with Asia accounting for about 40% of the market, followed by North America (20%) and Europe (17%). Global capacity growth is forecast to be at c. 5.2% p.a. in the next 5 years according to IHS with Asia being the main driver (CAGR12-17E 9.3%) accounting for nearly 80% of incremental capacity growth between 2012 and 2017. BASF and EVK have the highest exposure in terms of earnings (5% and 4% respectively) and the above trend growth in 2014 and 2015 is somewhat negative for them.

Figure 15. Propylene – Global Capacity (2007-2017E) ('000t)



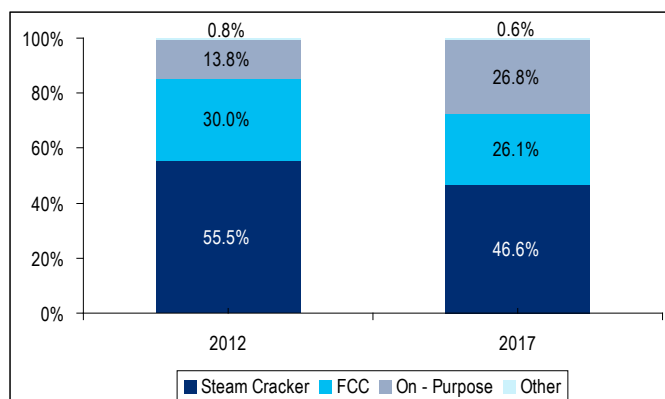
Source: IHS

Figure 16. Propylene – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: IHS

Figure 17. Share of propylene production processes (2012 and 2017E)



Source: Citi Research; IHS

Figure 18. Meaningful capacity additions

Company	Location	Capacity	Year
ADNOC	UAE	675	2014
Borouge	UAE	802	2014
Bohai Chemical	China	450	2014
Nanjing Wison	China	150	2014
Ningbo Haiyue	China	450	2014
PuCheng Clean Energy	China	317	2014
Shanxi Coking Corp	China	450	2014
Shenhua Ningmei	China	208	2014

Source: Citi Research; IHS

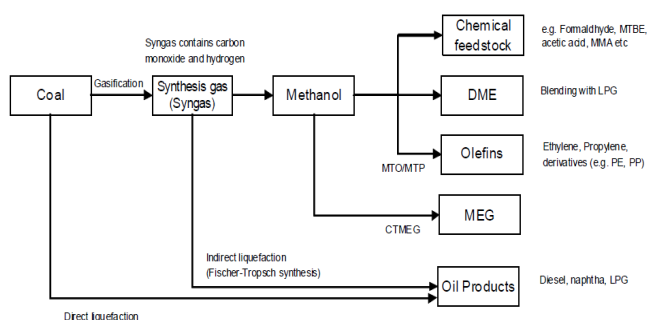
There are three main production routes for propylene vs. one for butadiene:

- 1) **Co-product of steam – cracker:** over 50% propylene is produced as a **by-product of ethylene production** from steam crackers; output depends on cracker operating rates and type of feedstock (naphtha, propane, butane etc)
- 2) **Refinery Fluidized Catalytic Cracking (FCC):** around 30% of propylene is produced as by-product of motor gasoline and distillates production; hence propylene from FCC units accounts for the largest share in regions with high demand for gasoline, e.g. North America.
- 3) **On-purpose production:** accounts for about 14% of propylene production but is expected to grow rapidly (CAGR12-17E 20%) mainly driven by Asia with the main technology being propane de-hydrogenation (PDH): catalytic process that converts propane to propylene and hydrogen (by-product). Propylene yield is 85 weigh percent. Hydrogen is usually used as fuel for the dehydrogenation reaction. Most of today's capacity is located in the Middle East and Asia.

For more details on Chinese MTO/MTP projects, [China Trip Insights - Coal-to-Chemicals Picking Up Speed Despite Initial Road Bumps](#). For more details on US PDH projects, economics and developments [Petrologistics L.P \(PDH.N: US\\$12.01; 2H\). \(PDH\) - Structurally Attractive Margins, but Near-term Neutral due to Lower Oil Prices](#)

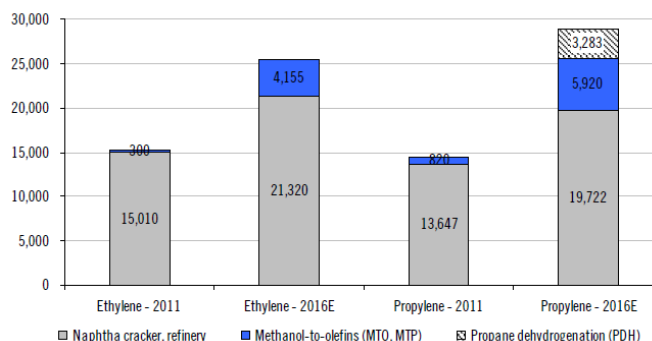
According to IHS global capacity of on-purpose production (esp. PDH and MTO/MTP) is expected to increase by c. 20% p.a. in the next 5 years to about 34.5m t vs. c. 2.0-2.5% p.a. for the other two production routes (steam cracking and FCC). This is mainly driven out of Asia and North America in the next 5 years with most of the capacity scheduled to come on stream in 2015 and 2016. Rising propane production in the US and low cost NGL exports to Asia could make these PDH projects more cost competitive. As a result on-purpose production will most likely account for 70% of the total incremental propylene capacity growth going forward and should increase its share from 14% in 2012 to 27% by 2017E.

Figure 19. Coal – to – Chemicals Flow Chart



Source: Citi Research

Figure 20. China's Ethylene and Propylene Capacity by Feedstock ('000 tonnes)



Source: IHS

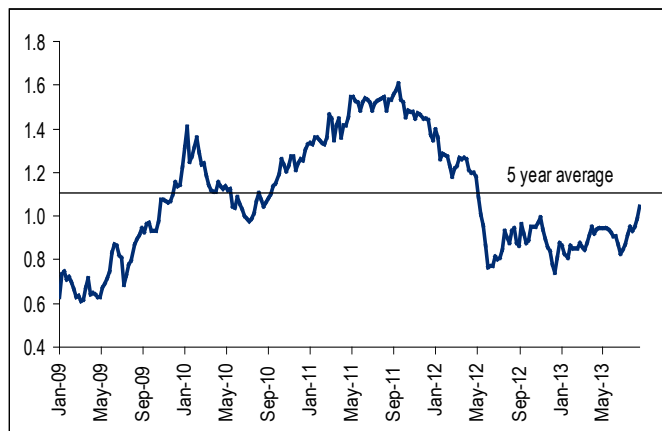
Impact of changes in the feed-slate in steam crackers

However, just like with butadiene the change in feed-slate in steam crackers from ethane to propane could lead to an even greater than currently forecast increase in propylene output.

Propane cracking is above trend YTD

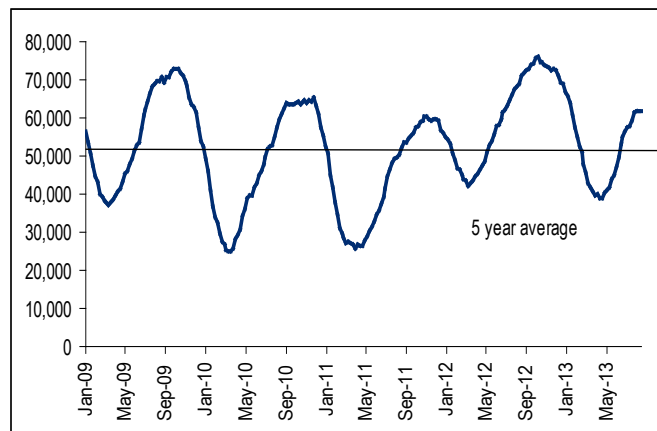
Propane is competing with ethane as feedstock of choice in the US petrochemical industry. YTD the share of ethylene produced from propane cracking was 18.2%, well above its historic average of 15.6%. This is thanks to more favourable propane prices which are below their 5 year historic average despite the recent 15% rally following a significant ramp up in exports (+54% YTD 2013).

Figure 21. US Propane Prices (Mont Belvieu, Texas; \$/gal)



Source: EIA

Figure 22. Propane Inventories (thousand barrels)



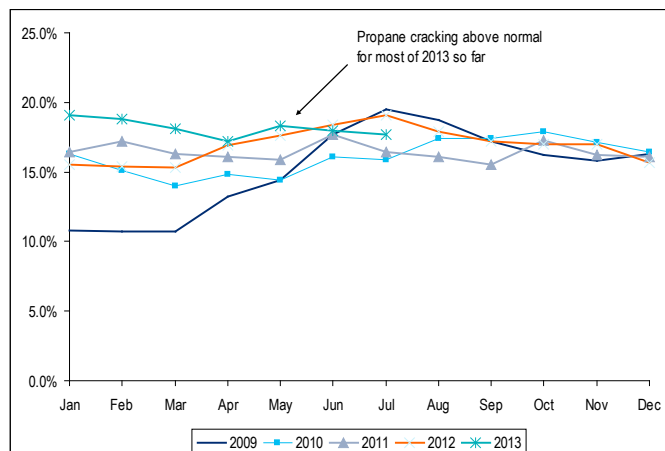
Source: EIA

US is opportunistic when it comes to feedstock

The US industry remains highly opportunistic and exploits raw material cost changes and will switch if the economics permit.

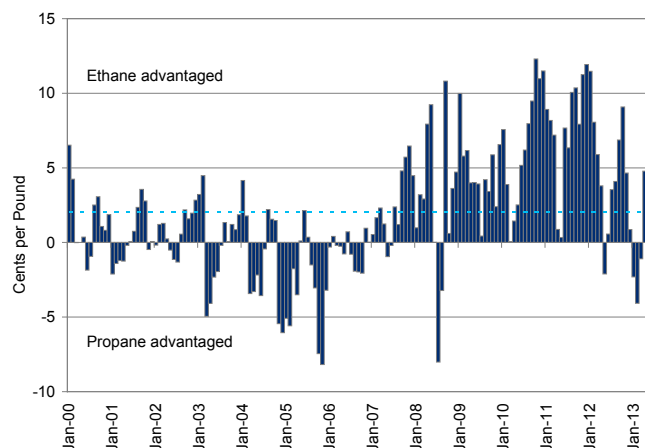
However, given the hike in propane prices this year ethane cracking remains the more profitable route for the time being with an YTD advantage of 1.31 ct/lb vs. propane and a structural shift from ethane to propane seems unlikely at this point in time given increased export capabilities and rising prices.

Figure 23. Percent of US Ethylene Industry Output from Propane



Source: Citi Research; CMAI

Figure 24. Long-Term Production Cost Comparison, Ethane vs. Propane



Source: Citi Research; IHS

Analysis of potential impact from shift to propane

The key swing factors for the feed-slate are the co-products, notably propylene and butadiene. In particular, propylene prices impact the relative production economics of ethane and propane cracking given that **propane cracking generates over 8.5x more propylene than ethane per unit of input raw material**.

As outlined in Citi's Energy 2020 report US NGL supply is expected to increase from 2.3m bbls/d in 2011 to c. 3.0 bbls/d by 2015 and the total implied incremental increase in propane production is about 6.4m t over this time period.

Currently the US petrochemical industry consumes about 1/3 of total propane output (380-420k bbl/d). If 100% of incremental propane availability was used as cracking feedstock in the petrochemical industry (ignoring exports), propylene supply would increase by about 1.1mt. **This represents about 1.4% of current global supply. This would probably be enough to have a discernible impact on margins and would be negative for BASF and EVK.**

Figure 25. Scenario Analysis: Potential impact of propane cracking on propylene supply

	2011	2015E	Delta
NGL supply ('000 bbl/d)	2300	3000	700
Propane ('000 bbl/d)	667	870	203
Propane (m mt p.a.)	21.0	27.4	6.4
% of Propane used as petchem feedstock	100%	100%	
Propane used as Petchem feedstock (in m mt p.a.)	21.0	27.4	6.4
Propylene Output (in m t)	3.57	4.65	1.09
Global Propylene Supply (2011, in m mt)	78.81		
Assumed increase in Propylene Supply (in m mt)	1.09		
as % of global supply	1.38%		

Source: Citi Research; CMAI

Acrylic Acid

Quick facts:

- **Global capacity** growth is **CAGR12-17E 3.8%** in line with historic trend
- **2015 capacity** growth significantly above trend **at 13% YoY**.
- **Asia** accounts for nearly 70% of global capacity additions.
- **Demand** and Supply look balanced through next year with some downside risk to margins in 2015 given the scale of capacity growth.

**Global acrylic acid capacity is 5.9m t;
CAGR12-17E 4%**

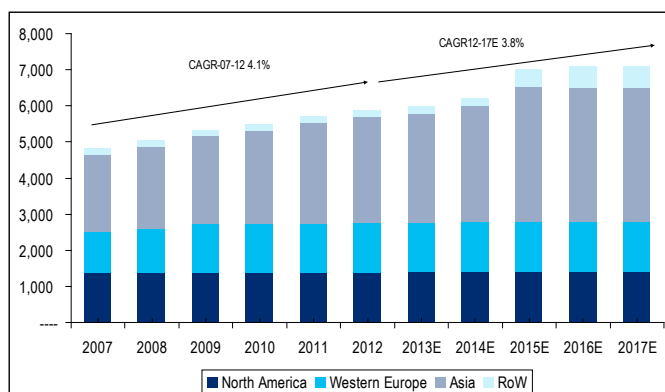
Global acrylic acid capacity is c. 5.9mt and IHS forecasts average growth of about 4% p.a. in the next 5 years broadly in line with historic growth. Over 50% of global capacity is located in Asia with North America and Western EU accounting for 23% respectively.

In the next 5 years global capacity is expected to grow by about 1.2m t with Asia accounting for nearly 70% of all capacity additions, according to IHS

**2015E global capacity increase of 13%
YoY**

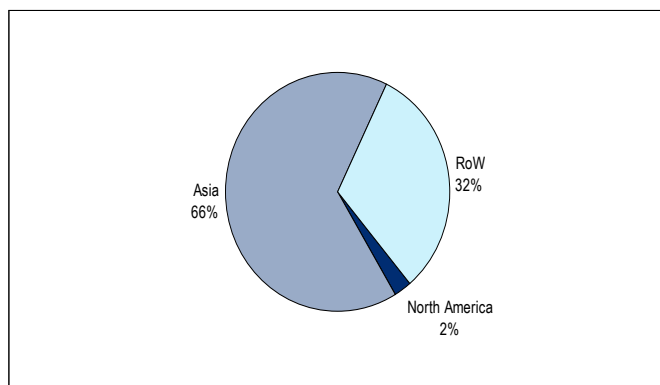
Apart from 2015 when IHS expects global capacity to increase by 13% due to capacity additions in China, we see supply/demand fairly balanced and expect margins to remain at current levels with some downside risk in 2015. We see this as neutral for AKE (28% of earnings)

Figure 26. Acrylic Acid – Global Capacity (2007-2017E)



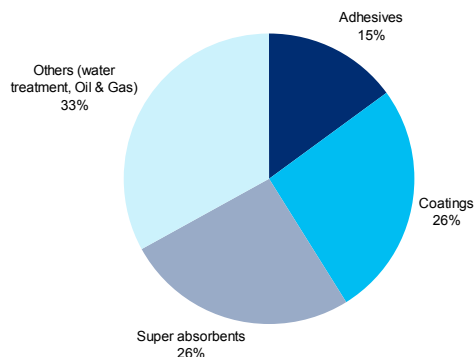
Source: IHS

Figure 27. Acrylic Acid – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: IHS

Figure 28. Acrylic Acid – Main End Markets



Source: Citi Research; Arkema

Figure 29. Acrylic Acid – Meaningful Capacity Additions

Company	Location	Capacity	Year
Yantai Wanhua	China	300	2015
Zhejiang Satellite PC	China	187	2015
SAMCO	Saudi Arabia	225	2015
BASF	Brazil	80	2015

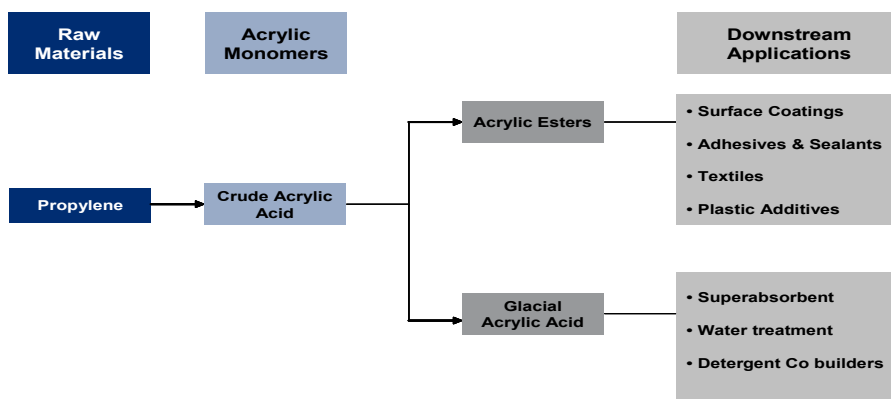
Source: Citi Research; IHS

Demand in line with supply

Demand growth of about 4-5% p.a.

Demand for acrylic acid is broadly divided into two categories: Acrylic Esters used for coatings, adhesives (c.40% of demand) and glacial Acrylic acid used for superabsorbents, water treatment, detergents (c. 60% of demand). Commodity acrylates is a GDP related business and is closely linked to performance of construction sector. Demand for superabsorbent polymers used in baby nappies for instance is driven by socio-demographic megatrends and should grow 5-6% p.a. on average. **Overall we see acrylic acid demand growth in the range of 4-5% p.a and hence in line with expected supply additions.**

Figure 30. Acrylics value chain



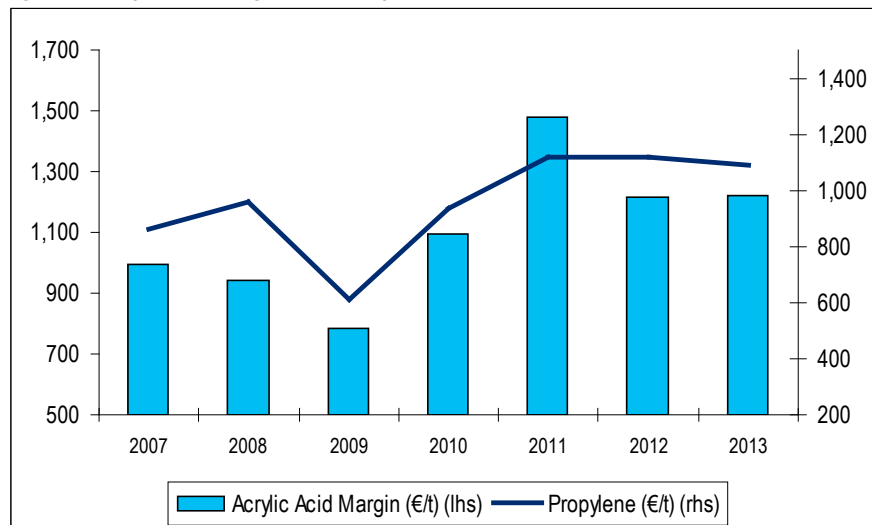
Source: Citi research

Prices and Margins

Margins peaked in 2011

Acrylic acid margins peaked in 2011 on the back of the global recovery, supply disruptions and spiking propylene prices. On the back of a better supplied market, sluggish construction markets and lower propylene prices, margins declined and we do not expect any meaningful change in 2014, but see some downside risk in 2015 when global acrylic acid supply is expected to increase by 13% according to IHS.

Figure 31. Acrylic acid Margins and Propylene Price



Source: Citi Research, ICIS

Acrylonitrile

Quick facts:

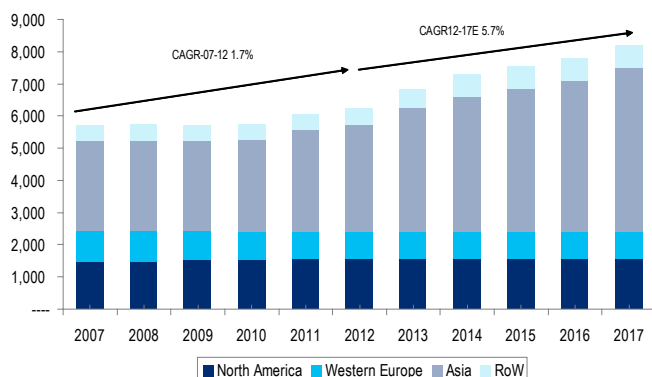
- **Global capacity growth is CAGR12-17E 5.7%** above historic trend of c. 2%
- **2013 and 2014 capacity growth significantly above trend at 6-10% YoY.**
- **Asia** accounts for nearly 90% of global capacity additions.
- **Oversupply** in 2013 and 2014 creates downside risk for margins.

**Global acrylonitrile capacity is 6.2m t;
CAGR12-17E 5.7%**

Global acrylonitrile capacity is c. 6.2mt and IHS forecasts average supply growth of about 6% p.a. in the next 5 years which is significantly above the historic growth trend of about 2%p.a. 90% of capacity additions will be in Asia.

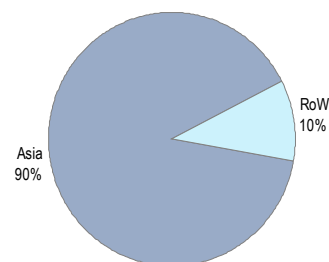
Acrylonitrile is mainly produced by catalytic ammoxidation of propylene and is used as a monomer for acrylic fibres (c. 38%, used in textiles), ABS resins (c. 39%, basic plastic used in construction, automobiles) and acrylamide (c. 11%, used as water-soluble thickeners). Demand is very much GDP driven.

Figure 32. Acrylonitrile– Global Capacity (2007-2017E)



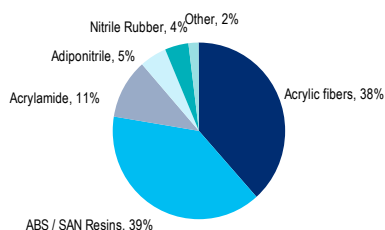
Source: IHS

Figure 33. Acrylonitrile– Incremental Capacity Growth Contribution (2012-2017) by Region



Source: IHS

Figure 34. Acrylonitrile – Main End Markets



Source: IHS

Figure 35. Acrylonitrile – Meaningful Capacity Additions

Company	Location	Capacity	Year
Anqing PC	China	280	2013
Tongshu PC	S. Korea	250	2013
Secco	China	260	2014
Jiangsu Sailboat PC	China	130	2015
Shandong Wanda	China	130	2015

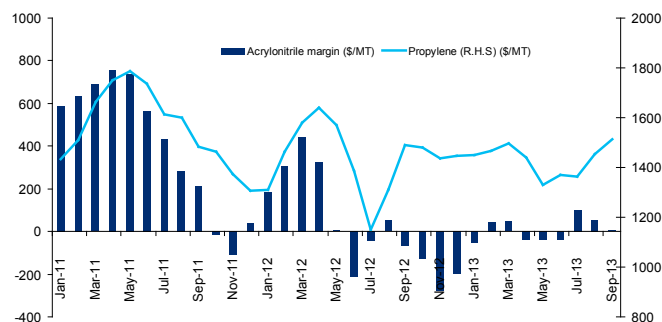
Source: Citi Research; IHS

Prices and Margins – Collapse after 2011 boom times

Above trend supply growth has led to margin collapse

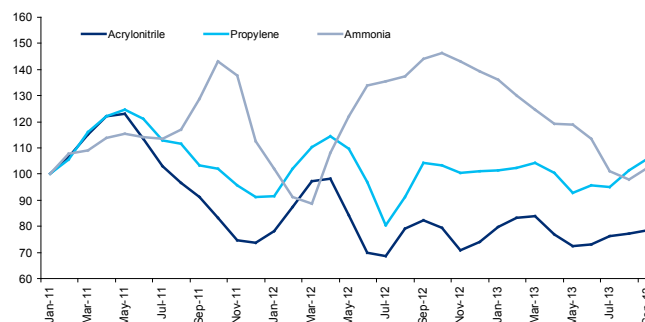
Acrylonitrile prices closely follow propylene prices and thus peaked in 2011 on the back of strong demand and spiking propylene prices. However on the back of better supplied markets, margins declined sharply and have hovered around or below the break-even level since early 2012. We do not expect any meaningful change in 2014, when global supply is expected to increase by 6.3% according to IHS. This has limited negative implications for DSM (3%), in our view.

Figure 36. Acrylonitrile margin vs. Propylene (\$/MT)



Source: Citi Research, CMAI, ICIS

Figure 37. Acrylonitrile price vs. Propylene vs. Ammonia (Jan 11= 100)



Source: Citi Research, CMAI, ICIS

MMA – Risk of oversupply

Quick facts:

- **Global capacity** growth at CAGR12-15E of 4.6% p.a., but could be up to 7% p.a. in a worst case scenario.
- **2015 above trend** at 10.5%
- **Middle East and North America** accounting for the bulk of future capacity expansion

Peak margins in 2008-2011

In the past few years the MMA market benefitted from utilisation rates of above 80% noting the top four players control about 75% of the market. This tightness led to peak cycle margins in 08-11 which attracted competition mainly out of Asia and triggered a supply side response: from 2008-2011 global MMA capacity increased by c400kt or c11% of global capacity.

Capacity expansion equivalent to over 20% of existing capacity in a worst case scenario;

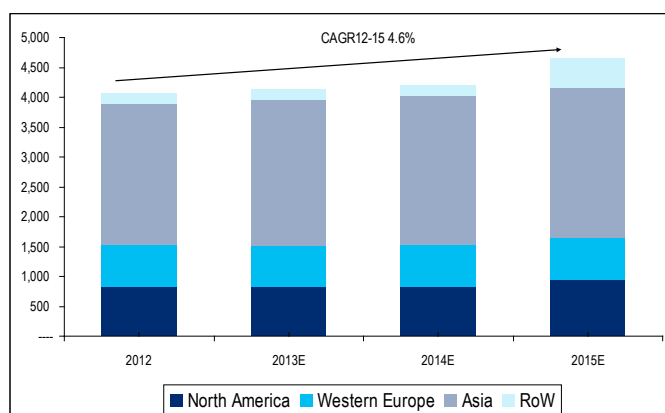
Capacity expansion is set to continue. We gather that about 580kt of additional capacity (i.e 15% of existing capacity) is due to come on-stream by 2015-16 while another 290 kt (c. 7% of existing capacity) of expansion plans are under scope of study. Hence in a worst case scenario over 20% of existing capacity could be added in the next 3-4 years.

Market growth c. 4% p.a.

Demand growth is mainly driven by demand for PMMA resins which account for more than 60% of its end use. Overall growth should be in the region of c. 3-4% p.a. in our view.

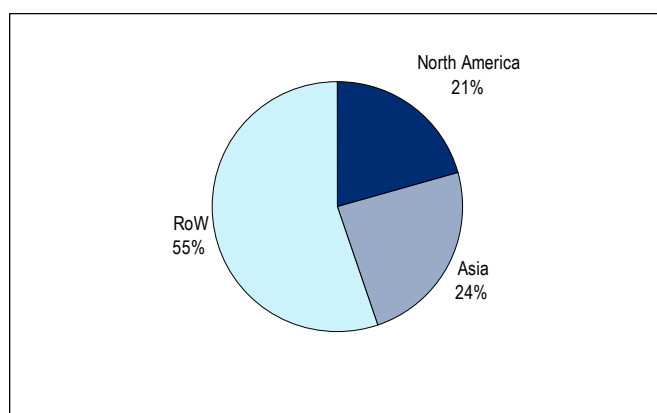
All in all, 2014 looks fairly balanced with some oversupply risk in 2015. This looks neutral/slightly negative for EVK where MMA accounts for 8% of earnings.

Figure 38. Global MMA Capacity



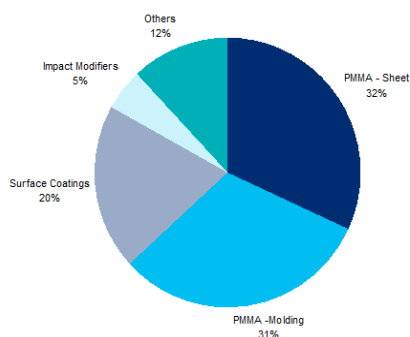
Source: ICIS

Figure 39. MMA – Incremental Capacity Growth Contribution (2012-2015) by Region



Source: Citi Research; ICIS

Figure 40. World consumption of MMA by end use -2011



Source: Citi Research; SRI Consulting

Figure 41. MMA – Meaningful Capacity Additions

Company	Location	Capacity	Year
Mitsubishi Rayon Co	Saudi Arabia	250	2015
SANORS	Russia	70	2015
CNOOC	China	70	2014
Evonik	USA	120	2015

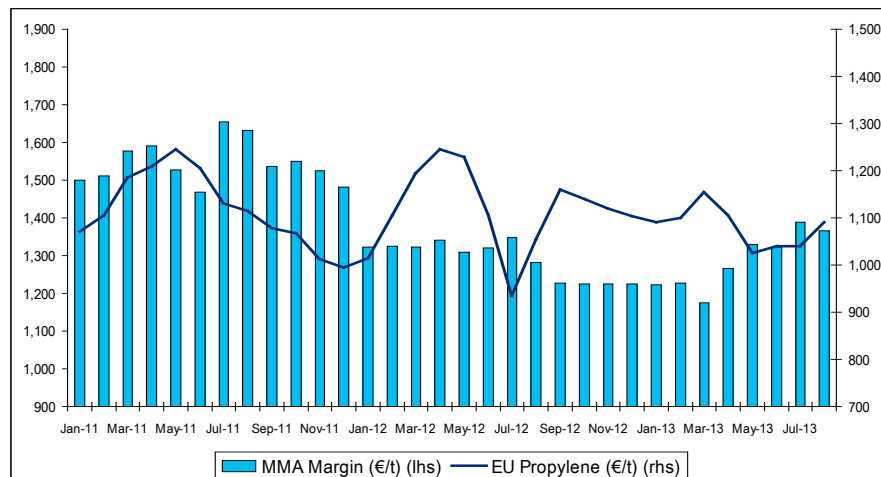
Source: Citi Research; ICIS

Prices and Margins

MMA margins -4% YTD

YTD margins are down 3% compared to the same period last year and started to recover from their lows seen early in the year. We think supply problems and a resulting shutdown of Lucite International's Cassel site (UK) (annual capacity 200kt = 30% of EU capacity) contributed to this as buyers feared supply shortages and stocked up.

Figure 42. EU MMA Margins and Propylene Prices



Source: Citi Research; ICIS

PMMA – Sluggish demand

Quick facts:

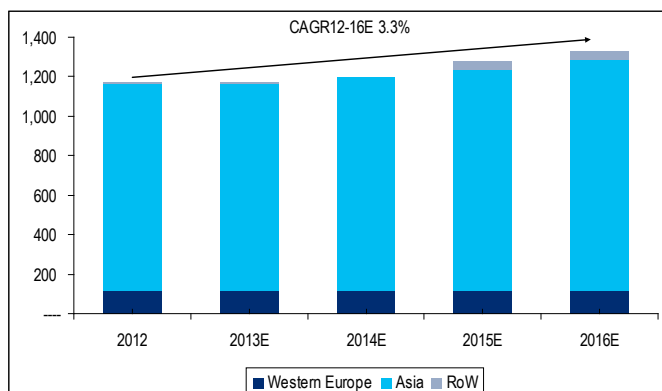
- **Global capacity growth** CAGR12-16E of 3.3%.
- **2015 above** trend with +7% YoY.
- **Medium-term supply/demand** looks balanced
- **Asia** accounting for 75% of capacity expansion.

Evonik and Arkema are leading PMMA producers

PMMA is a transparent thermoplastic acrylic polymer, often used as light or shatter resistant alternative to glass. Global capacity is about 1.2m t p.a.

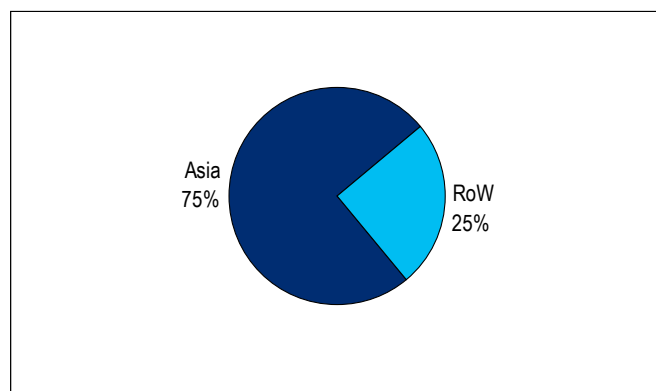
Main applications are signs and displays (c. 30%), construction (c. 17%), Electronics (c. 5%), LED TVs, mobile phone display, LED moldings. Evonik and Arkema are amongst the leading PMMA producers.

Figure 43. PMMA – Global Capacity (2012-2016E)



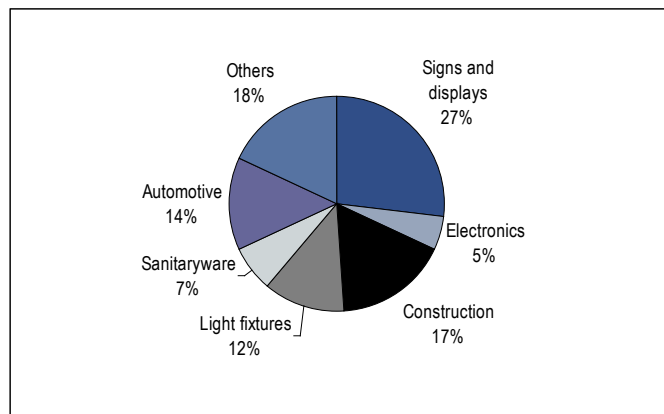
Source: Citi Research; ICIS

Figure 44. PMMA – Incremental Capacity Growth Contribution (2012-2015) by Region



Source: Citi Research; ICIS

Figure 45. PMMA – Main End Markets



Source: Citi Research

Figure 46. PMMA – Meaningful Capacity Additions

Company	Location	Capacity	Year
Jiangsu Double Elephant Group Co. Ltd	China	30	2014
PTT Asahi Chemical - (PTTAC)	Thailand	40	2015
Mitsubishi Rayon Co (MRC)	Saudi Arabia	40	2015

Source: Citi Research; ICIS

PMMA markets have become challenging this year. Demand from the electronics, construction and automotive industry remains sluggish. As a result YTD average PMMA margins are down 23% compared to the same period last year.

The data we have suggests some significant capacity expansions in the coming years:

- In the next 2-3 years ICIS data suggests that industry capacity will increase by c. 160kt or about 13% of the current market.
- There is another 160kt of capacity under planning by Chinese ChiMei Corp which could also be added to the market in the coming years.

As a result in a worst case scenario global capacity could increase by more than 25% within a few years vs. annual demand growth of 4-5% p.a.

Worst case scenario suggests global capacity growth of 25% vs. annual demand growth of 4-5% p.a.

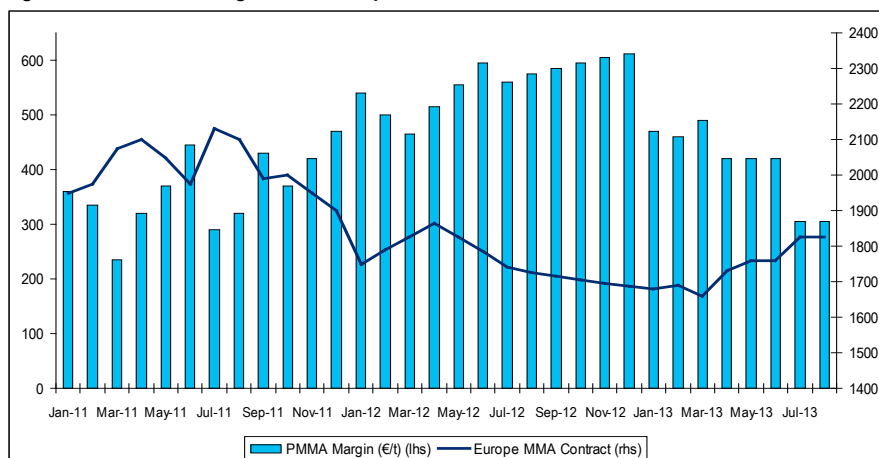
Prices and Margins

On the back of weak end market demand, mainly from the electronics industry, and amply supply in Asia, EU PMMA margins have come under pressure and are down 23% YTD compared to the same period last year.

PMMA accounts for about 12% of AKE's earnings. While, short/mid-term supply/demand look balanced, the decline in margins weighs on the earnings outlook.

Negative for AKE

Figure 47. EU PMMA Margins and MMA prices



Source: Citi Research; ICIS

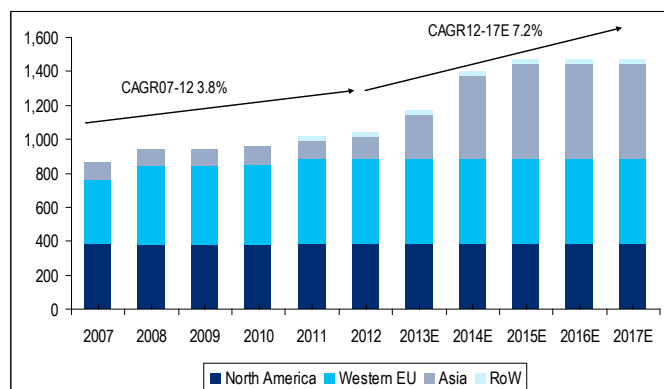
Methionine – Overcapacity is looming

Quick facts:

- **Capacity growth** accelerates to CAGR12-17E of **7.2% vs. 4%** in the previous 5 years.
- **2014** significantly above trend at +20%
- **Demand** growing at about 6% p.a.
- **100% of capacity additions in Asia** with CJ/Arkema entering the market from 2014 and Evonik adding 150kt in Singapore

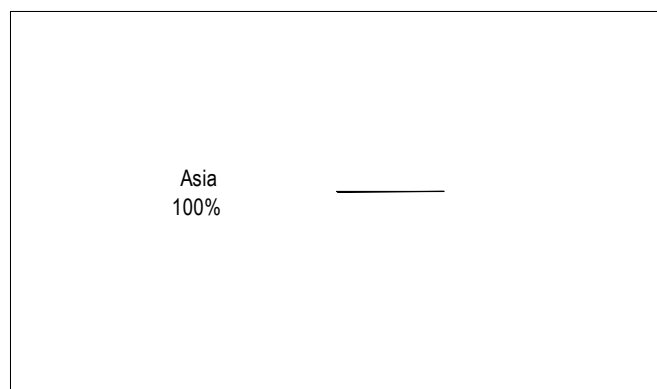
Evonik is the world's largest producer of Methionine with about 430kt of capacity. Methionine is an amino acid and is used as a nutritional supplement in poultry, swine and fish feed. The Methionine business generates sales of about c. €1.3bn or about 11% of Chemicals sales and about 18% of EBITDA based on our estimates. It is a propylene derivative although its price is not correlated with this building block.

Figure 48. Methionine – Global Capacity (2007-2017E)



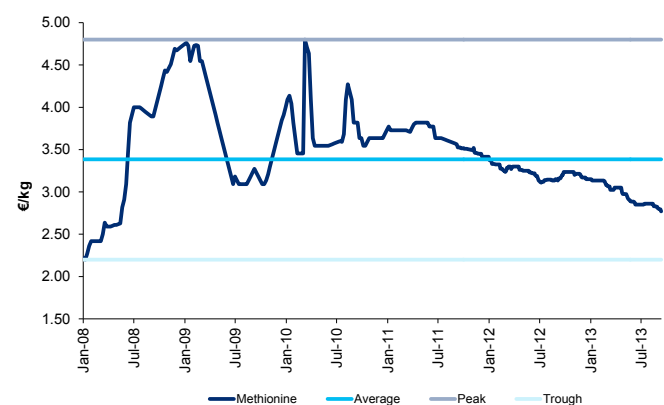
Source: Company reports

Figure 49. Methionine – Incremental Capacity Growth Contribution (2012-2015) by Region



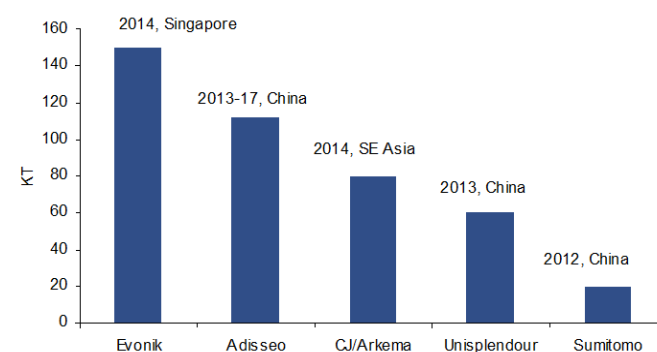
Source: Company reports

Figure 50. Methionine Price (€/kg)



Source: Feedinfo

Figure 51. Methionine – Meaningful capacity additions



Source: Citi Research

We see pricing and margin headwinds in near term on the back of 42% capacity expansion

The methionine market is consolidated with four players representing about 90% of capacity – although this will change as two Chinese companies enter the space (Unisplendour and CJ). Global demand for Methionine grew at a CAGR02-10 of c. 6.0% driven by feed additives. This sustained growth in demand was not matched by capacity additions, which led to the industry operating close to full capacity. This drove prices and margins of methionine to all time highs in 2010 (see Figure 50).

However, in the next 5 years we expect to see global capacity expansion of around 40% with the bulk of new capacity being added next year: Evonik is set to lead this expansion (150kt in Singapore) followed by Adisseo and Arkema.

Prices have already started to come under pressure with YTD Methionine prices at €2.97/kg (down 8% YoY), below the average in 2012 of €3.23/kg and €3.59/kg in 2011. This is mainly the result of new capacity being added to the market. With operating rates set to fall sharply in the next two years, prices are likely to fall further, in our view.

Expect margins to moderate to c30% in medium term

We expect Evonik's margins to erode somewhat due to this price pressure. We see margins falling from the extraordinary 40% + level of 2012 more towards the low-30% levels, which we see as more sustainable.

C4 Chain – More Supply, esp in 2013 & 2014

Overall capacity growth in the C4 chain looks high compared to history and 2014 is above trend. Asia accounts for 70-90% of all additions. Butadiene capacity growth is 8.5% next year after 5% this year. 70% of this growth is from low cost extraction units. This should keep Butadiene prices at bay. Synthetic rubber supply is also accelerating. These developments are most negative for LXS (c. 60% of earnings) and EVK (c. 24%).

Companies' Exposure

Figure 52. C4 Chain – Products, Capacity growth and exposures

Intermediates and Products	Capacity Growth (2014)	CAGR 2012-17e	Mid-term Outlook	Company	% of earnings (2012)*
Butadiene	8.5%	3.7%	Near term weakness due to above trend supply growth	AKE	9.9%
				BASF	1.4%
				EVK	23.5%
Nylon 6,6	1.7%	2.7%	supply addition in line with demand; risk of substitution limits upside	SOLB	2.3%
Synthetic Rubber	4-12%	2-10%	Strong supply side response	LXS	57.7%

Source: Citi Research, CMAI, *Includes downstream intermediates and products related to C4 Chain

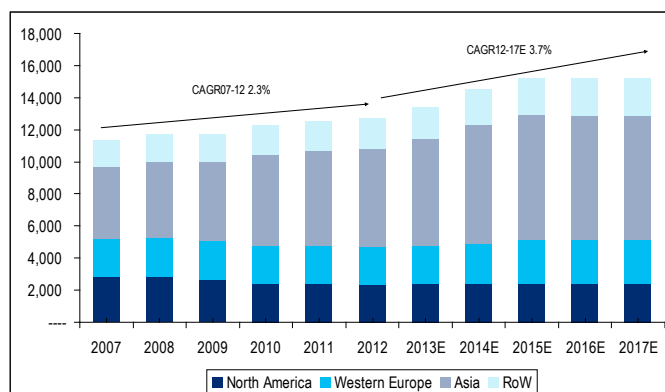
Butadiene – Losing its shine

Quick facts:

- **Global capacity growth** is set to accelerate with CAGR12-17E of 3.7% vs. 2.3% in the past.
- **2013 and 2014** above trend with 5% and 8.5% YoY respectively.
- **Asia** accounts for 66% of future capacity additions

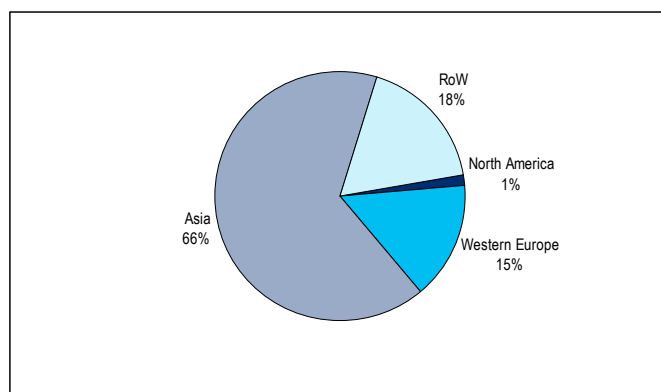
Global BD capacity is currently about 13m t p.a. of which c. 50% is located in Asia. Europe and the US account for about 20% each. Main end-markets are the synthetic rubber industry (PBR and SBR alone account for nearly 60% of global butadiene demand) and Acrylonitrile butadiene Styrene (ABS) Resins, which are used to make basic plastics.

Figure 53. Butadiene Capacity Development (2007-2017E)*



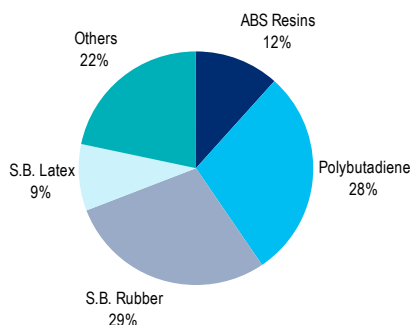
Source: Citi Research; CMAI

Figure 54. Butadiene – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: IHS Chemical

Figure 55. Butadiene – Main End Markets (2013)



Source: IHS

Figure 56. Butadiene – Meaningful Capacity Additions

Company	Location	Capacity	Year
Jinzhou PC	China	100	2014
Shandong Huamao	China	150	2015
Sichuan PC	China	150	2014
Sinopec Baling Co.	China	100	2015
PCS	Singapore	100	2015
PTT Chemical	Thailand	75	2014
BASF	Belgium	155	2015
Evonik	Belgium	100	2015

Source: IHS

There are 2 main production routes:

- Extractive distillation from crude C4 streams from ethylene co-production (95% of production)
- De-hydrogenation of n-butane and n-butenes (Houdry Process; Oxidative dehydrogenation).

Typical composition of “crude C4”: 40-50% butadiene, 10-25% isobutylene, 15-30% butenes, 5-15% butanes

BD capacity growth set to accelerate to about 4% p.a. v.s 2.5% in the past

Over 95% of butadiene is produced as a **by-product of ethylene production** from steam crackers. The crude C4 stream is fed to **butadiene extraction units** where butadiene is separated from the other C4s.

BD availability is set to improve in the coming years, leading to a more stable, less volatile pricing environment, we believe. We see **global capacity growth at around 4% p.a.** on average in the next five years vs. 2.3% p.a. in the past. Especially in **2013 and 2014, global supply is set to increase by about 5% and 8.5% respectively**, with Asia being the main driver accounting for about 2/3 of global capacity additions in the coming years.

Around 70% of the capacity additions are set to come from lower cost extraction units in 2013 and 2014. This should keep BD prices at bay and as a result we see this as negative for EVK and LXS where BD and its derivatives account for 24% and 58% of earnings respectively.

Prices – From Peak to Trough

In the last 2 years, synthetic rubber demand outpaced BD capacity additions creating tightness in the chain

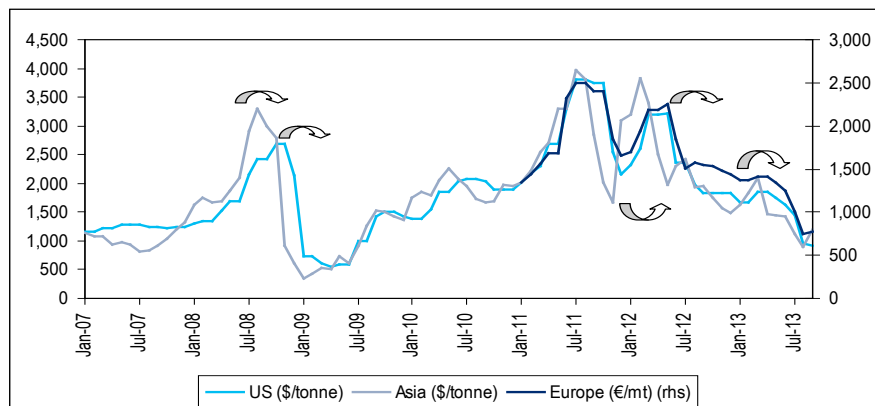
The shift in feedstocks from naphtha to ethane reduced BD capacity by about 500kt in the US. This acted as a drag on global capacity growth which was 5% and 2% in 2010 and 2011, respectively. However, downstream demand from the synthetic rubber industry grew strongly following the crisis of 2009 as the entire chain restocked: This led to extreme tightness, escalating butadiene prices (EU contract price at over €2,500/t), and record profitability for companies like LXS and EVK.

With more capacity being added this year and demand from the tyre industry slowing, prices collapsed in 2013 and are down 43% YTD in Europe.

We think prices have reached a bottom for now. In September we saw a slight increase in Europe (+€25/t), a roll over in the US, and a \$200-300/t increase in Asia on the back of speculation/re-stocking.

However, despite signs of stabilisation we remain cautious given further capacity additions. **As a result, we expect the average butadiene price in 2014 to be flat YoY.**

Figure 57. Global Butadiene Prices – US and EU contract; Asia Spot pricing

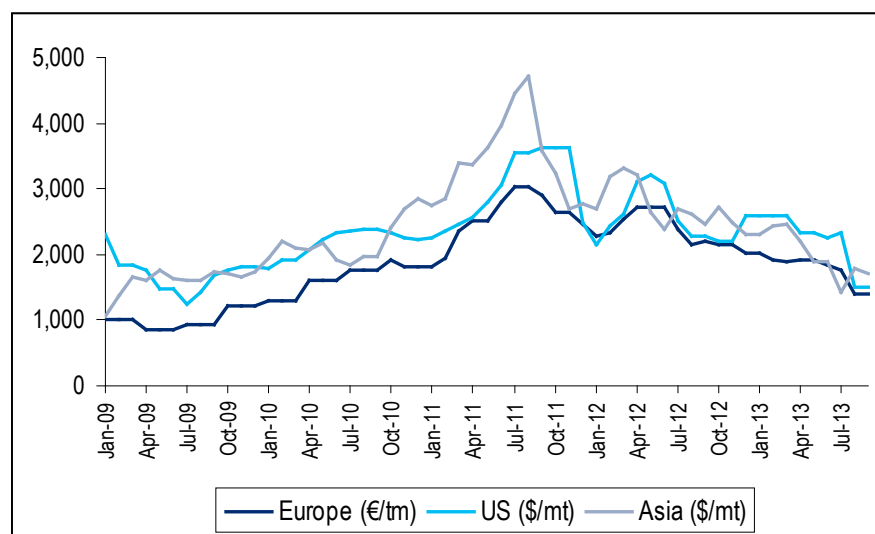


Source: ICIS

Synthetic Rubber (PBR, E-SBR, S-SBR)

Global synthetic rubber capacity is set to increase significantly in the coming years. YTD global SBR prices are down 15-30% YoY due to weak demand, new supply and weak upstream pricing (butadiene). We think competitive pressures will intensify putting pressure on Lanxess and limiting the group's margin upside going forward.

Figure 58. Global SBR Prices – Europe, US, Asia



Source: ICIS

Global synthetic rubber capacity is expanding mainly in the higher end segment

From 2012-2015 we expect to see a significant step up in global synthetic rubber capacity in the higher margin S-SBR and PBR while lower quality E-SBR is seeing lower expansion rates than in the past.

1. S- SBR – Prepare for a supply shock in 2013-2015

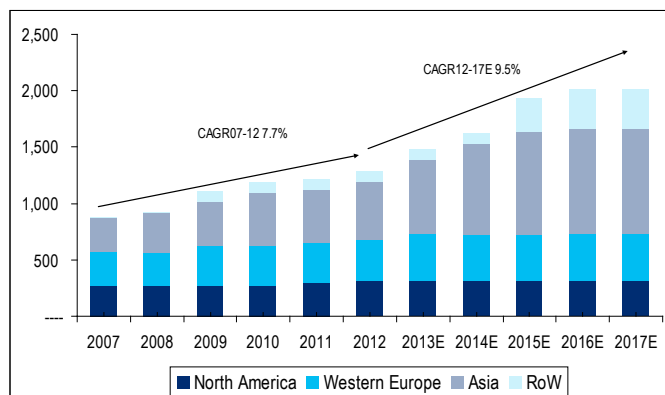
- **Global capacity growth** set to accelerate to CAGR12-17E of 9.5% vs. 7.7% in the previous 5 years.
- **2013, 2014 and 2015 significantly above trend** at 15% YoY, 10% YoY and 19% YoY respectively.
- **Asia** is the main driver accounting for about 60% of incremental capacity additions in the next 5 years.

S-SBR global capacity is 1.3m t; Lanxess is world's largest independent supplier

Solution Styrene Butadiene Rubber (S-SBR) is mainly used in the tyre tread (tyres account for 70% of S-SBR demand). S-SBR is a high performance rubber given its excellent wet grip, reduced rolling resistance and good abrasion and as a result high performance tyres are its main outlet.

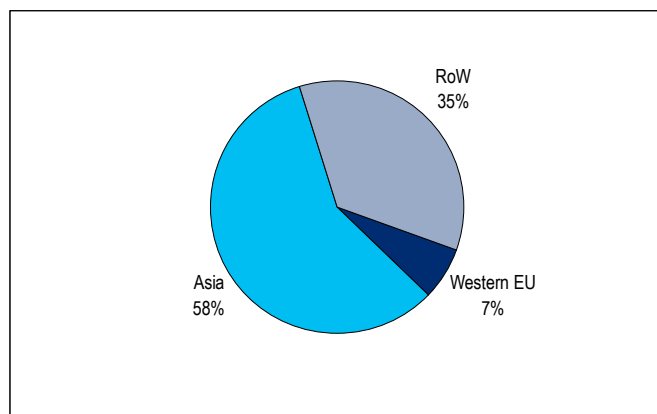
Global S-SBR capacity is about 1.3mt of which about 40% are located in Asia. The market is rather fragmented as the top 7 producers account for about 50% of global capacity. **Lanxess is currently the largest independent supplier according to our estimates with about 130kt p.a.** Bridgestone/Firestone (180kt p.a) and Michelin (170kt) have more capacity but use most of this internally.

Figure 59. S-SBR – Capacity Development (2007-2017E)



Source: Citi Research; CMAI

Figure 60. S-SBR – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research; CMAI

Aggressive capacity growth after years of plenty

In the last 2-3 years global capacity grew only by around 4% p.a. on average well below the the premium tyre market of around 7-9% p.a. This led to healthy operating rates and high levels of profitability. Combined with expectations of ongoing strong growth in the premium tyre segment, the industry went on an expansion spree.

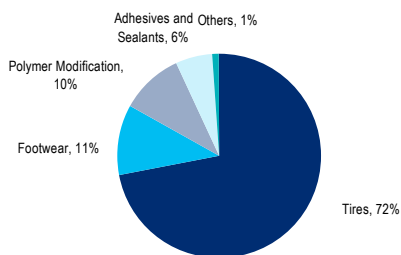
As a result, global capacity is set to increase by 15% in 2013, 10% in 2014 and 19% in 2015 **according to latest CMAI estimates** with Asian companies being the main driver (Asian capacity CAGR12-17E 13%). Overall, global capacity growth is accelerating to CAGR12-17E to 9.5% vs. 7.7% in the previous 5 years.

Given the current slowdown in the EM, slow recovery in the US and ongoing macro concerns in Europe, we think supply will also outpace premium tyre demand growth in the next 2 years.

This should lead to lower industry-wide operating rates, reduced profit margins and a more competitive environment.

Demand growth of 5-10% p.a. on average

Figure 61. S-SBR – Main End Markets (2013)



Source: SRI Consulting

Figure 62. S-SBR – Meaningful Capacity Additions

Company	Location	Capacity (kt)	Year
Styron	Germany	50	2013
Zhenjiang Qimei Chem	China	80	2015
Kumho Petrochemical	South Korea	60	2013
LG Chem	South Korea	60	2014
Asahi Kasei Chem.	Singapore	50	2014
Nippon Zeon	Singapore	35	2014
Sumitomo Chem.	Singapore	40	2014
JSR BST Elastomer	Thailand	25	2014
NKNK	Russia	50	2015
Synthos S.A.	Poland	50	2015

Source: CMAI

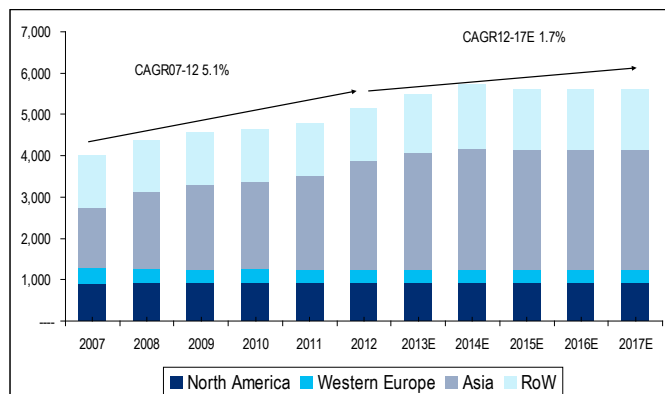
2. E-SBR – Out of favour

Quick facts:

- **Global capacity growth** is set to decelerate to CAGR12-17E of 1.7% vs. 5.1% in the previous five years
- **Asia** will add over 60% of global capacity in the coming years
- **Supply and demand** seem balanced.
- **Current consumer downtrading** benefits E-SBR vs S-SBR

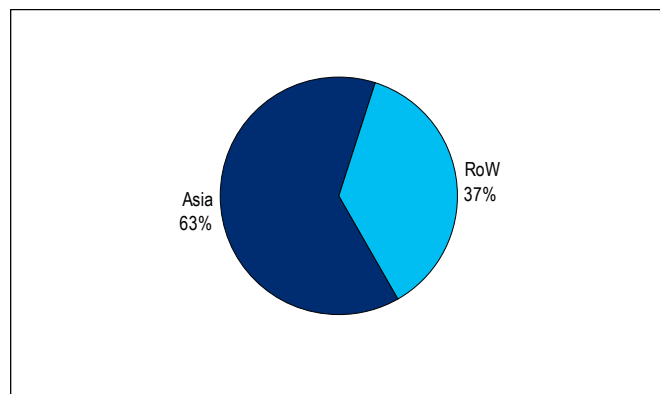
Emulsion Styrene Butadiene Rubber (E-SBR) is the most widely used rubber in the world. The global E-SBR market is about 5.2m t, i.e. about 4x bigger than the S-SBR market. LXS capacity is about 300kt. E-SBR is a commodity product, predominantly used in the tread of tyres where it is inferior to S-SBR regarding wet grip and rolling resistance.

Figure 63. E-SBR – Capacity Development (2007-2017E)



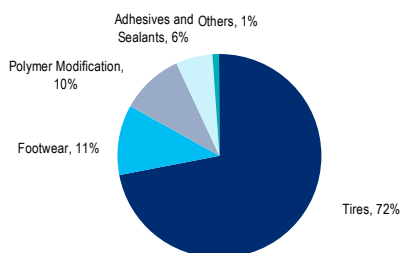
Source: CMAI

Figure 64. E-SBR – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: CMAI

Figure 65. E-SBR– Main End Markets (2013)



Source: SRI Consulting

Figure 66. E-SBR – Meaningful Capacity Additions

Company	Location	Capacity (kt)	Year
Indian	India	120	2014
Oil/TSRC/Marubeni JV	India	150	2014
Reliance Industries	China	100	2014
Zhejiang Vitile	South Korea	80	2013
Kumho Petrochemical			

Source: CMAI

Customers are currently downtrading to cheaper E-SBR

Given the structural trend towards more fuel efficient tyres, E-SBR should see reduced demand in the years ahead. However, given current macro concerns in EU and slowdown in the EM, consumers have started to downtrade and opt for cheaper tyres which tend to have a higher E-SBR content, according to comments made by LXS.

Nevertheless, the industry has started to shift away from E-SBR to S-SBR. Global E-SBR supply is set to increase by only about 2% p.a. on average in the next 5 years vs. 5% in the previous years. Compare this to S-SBR supply where growth is forecasted to be above 9% p.a. in the coming years.

The current shift towards lower margin E-SBR impacts LXS product mix translating into lower margins. The company is in the process of reducing its exposure to E-SBR by switching its E-SBR plant in Brazil to S-SBR by 2014/15.

3. PBR – Specialties to remain tighter

Quick facts:

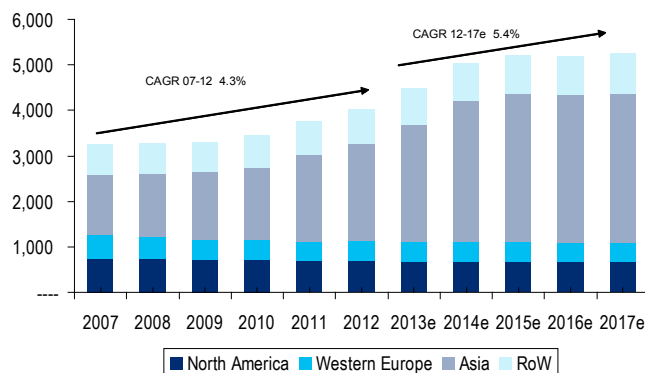
- **Global capacity growth** is set to accelerate to CAGR12-17E of 5.4% vs. 4.3% in the previous five years
- **2013 and 2014** significantly above trend at 11.6% YoY and 12.3% YoY respectively.
- **Asia** will add over 90% of global capacity in the coming years
- **Supply and demand** seem balanced over medium term

Global PBR capacity is 4.2m t; Asia accounts for over 50%; tyres account for 70% of consumption

Polybutadiene Rubber (PBR) is the 2nd largest volume synthetic rubber behind SBR (S-/E-SBR) with **global capacity of 4.0m t in 2012**. It is produced via solution-polymerisation of butadiene using different catalysts, such as Neodymium, cobalt, nickel, depending on the desired product characteristics. The main end market is the tyre industry.

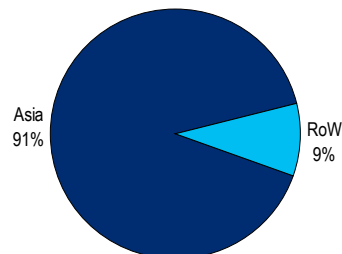
PBR is **mainly used in the tyre tread and sidewall** which together account for over 70% of PBR consumption. Other applications include automotive hoses, rubberised cloth, golf balls etc.

Figure 67. PBR – Capacity Development (2007-2017E)



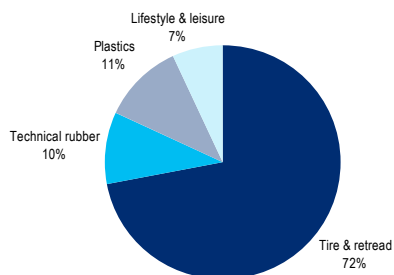
Source: Citi Research, CMAI

Figure 68. PBR– Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, CMAI

Figure 69. PBR– Main End Markets (2013)



Source: Citi Research, Lanxess

Figure 70. PBR– Meaningful Capacity Additions

Company	Location	Capacity	Year
Reliance Industries	India	30	2013
Liaoning Shengyou	China	80	2014
Qixiang Tengda Chem.	China	50	2014
Shandong Junteng	China	50	2014
Shouguang Fenghui	China	100	2014
Sichuan PC	China	150	2014

Source: Citi Research, CMAI

LXS is the largest nd-PBR producer in the world

PBR capacity to increase by c. 5% p.a. on average; in line with demand

Nd-PBR unlikely to see any significant capacity additions until 2015; supply seems long at this point due to downtrading

There are different grades of PBR depending on the catalysts that are used in the reaction process. The catalysts determine the performance features of the rubber. Nickel, lithium, titanium, and cobalt catalysts produce more standardized PBR. LXS on the other hand is predominantly exposed to the high end PBR segment which uses neodymium (Nd) as a catalyst. Nd-PBR is a high performance rubber which provides high abrasion resistance, reduced rolling resistance, and rebound resilience, while reducing heat build up. The global nd-PBR market is about 700kt according to LXS. **Lanxess is the world's largest nd-PBR producer with capacity of 440-460kt according to our estimates.** Other producers are NKKN, Synthos, Versalis, KKPC, Karbochem.

IHS forecasts global PBR capacity to grow c. 5% p.a. on average in the next 5 years. Asian companies are the main driver behind the capacity boost. This seems more or less in line with global demand.

However, the more specialised nd-PBR segment is unlikely to see any significant capacity boost until 2015, when LXS is scheduled to start up its new 140kt plant in Singapore. However, Chinese producers, such as PetroChina, have stated their intention to gradually switch from standard PBR to nd-PBR. **We estimate global nd-PBR capacity CAGR of about 5-8% going forward vs. demand growth of 5-10% p.a.**

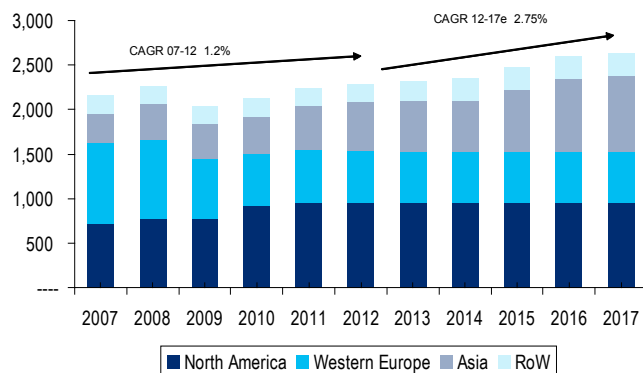
While supply/demand for nd-PBR should remain rather tight going forward, it seems a bit less constrained than in the past given capacity additions from established players and expansion efforts from new entrants, such as PetroChina. In addition, consumer downtrading to cheaper tyres is currently impacting demand for nd-PBRa

Nylon 6,6 – Advantage C4 route

Quick facts:

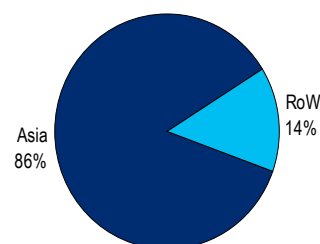
- **Global capacity growth** is set to slightly accelerate to CAGR12-17E of 2.8% vs. 1.2% in the previous five years
- **Asia** will add over 85% of global capacity in the coming years
- **2013 and 2014** are below trend at 1.0% YoY and 1.7% YoY respectively.
- Current consumer downtrading from Nylon 6,6 to cheaper nylon 6 and polyester.

Figure 71. Nylon 6,6 – Capacity Development (2007-2017E)



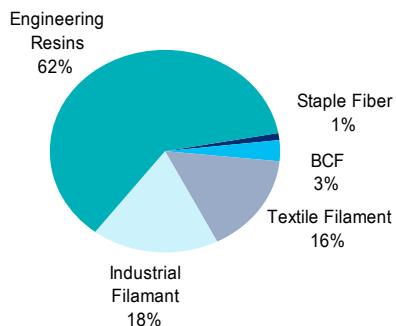
Source: Citi Research, CMAI

Figure 72. Nylon 6,6– Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, CMAI

Figure 73. Nylon6,6– Main End Markets (2013)



Source: Citi Research-CMAI

Figure 74. Nylon6,6– Meaningful Capacity Additions

Company	Location	Capacity	Year
BASF SE	China	40	2015
CNCEC	China	40	2015
Huafeng Group	China	120	2016
Invista	China	120	2016

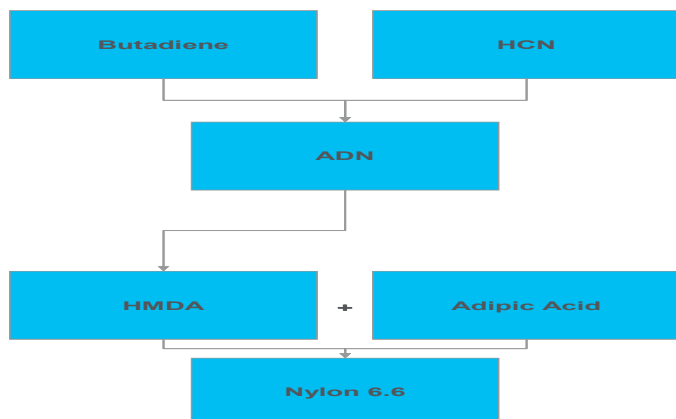
Source: Citi Research, CMAI

main production routes: Butadiene and Propylene

Global nylon 6,6 capacity is about 2.3mt of which about 42% is located in North America followed by Europe (25%) and Asia (24%). In general, there are two main routes for producing Nylon 6,6: the butadiene route (developed by DuPont) and the propylene route (developed by Monsanto).

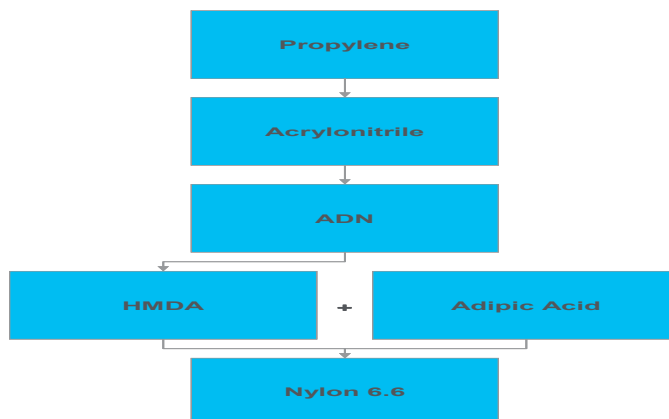
The **BD-route is the dominant route** today with about 70% of nylon 6,6 production being based on this process. Solvay and Invista are the key players in this chain. Ascend and Asahi dominate the propylene-based process

Figure 75. Nylon 6,6 – Butadiene Route



Source: Citi Research

Figure 76. Nylon 6,6 – Propylene Route



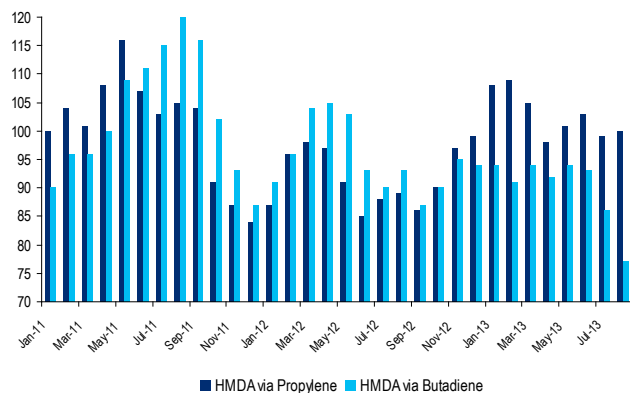
Source: Citi Research

BD route has regained its historic cost advantage; this is good news for Solvay

Historically the BD route had a cost advantage of about 10ct/lb over propylene. However, butadiene prices rocketed in the past following the switch from heavy to light feedstock cracking in the US. As a result **propylene** became the cheaper route in the course of 2H11 (about 10ct/lb on average) and about 3ct/lb cheaper in 2012. However, BD market since then has seen a strong supply side response along with weak demand. This has helped the BD route which has enjoyed a cost advantage of 12.7ct/lb YTD on average.

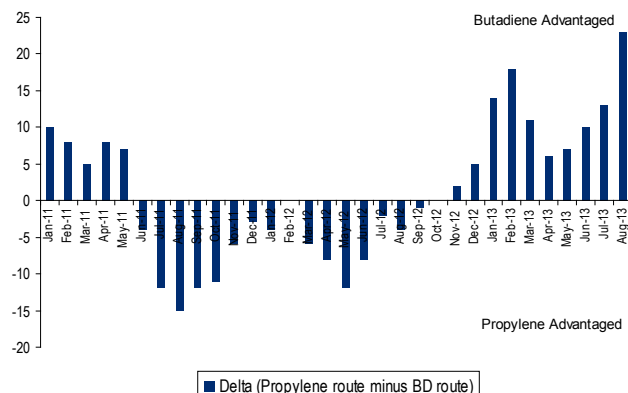
As discussed above in our note, BD market is likely to remain oversupplied for new 2-3 years. This should ensure that BD route maintains its advantage for this year and next. This is positive for Solvay.

Figure 77. HMDA costs (ct/lb) via Butadiene and Propylene



Source: CMAI

Figure 78. Cost difference – HMDA via Propylene vs. Butadiene



Source: CMAI

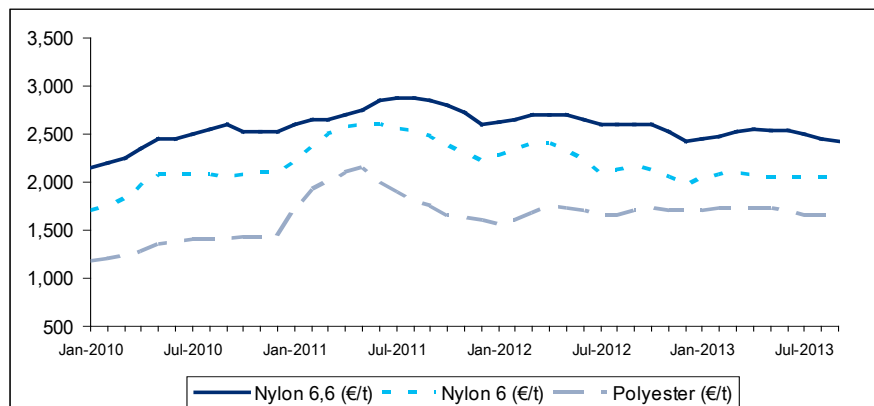
Low capacity growth as risk of substitution looms large

Nylon 6,6 is considered a superior thermoplastic for industrial purpose compared to polyester and nylon 6 due to its heat resistance and better mechanical properties.

Substitution risk due to cheaper nylon 6 and polyester

However Nylon 6,6 is about 10-50% more expensive than nylon 6 and polyester which creates substitution risk especially in the automotive and textile industries.

Figure 79. Nylon 66, nylon 6 and Polyester Prices



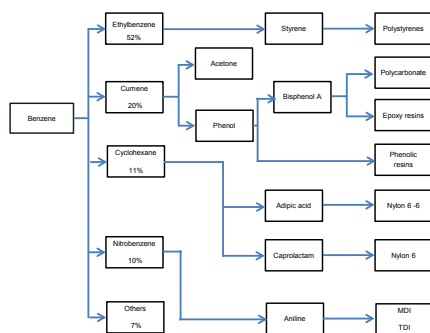
Source: IHS

Polyester has already taken a significant share of the textile and industrial fibre markets, but starts moving into the airbag market, a traditional nylon-dominated field. Also there are efforts underway in the compounding, plastics and textile industries to copy the nylon 6,6 properties by using nylon 6 together with additives and/or changing the compounds etc. This adds uncertainty regarding demand scenario which is currently expected to grow in line with supply over next 5 years.

This has limited negative implications for SOLB where Nylon 6,6 accounts for c. 2% of earnings.

C6 Chain – Short upstream, long downstream

Figure 80. Benzene chain overview



Source: SRI Consulting

Capacity growth in the C6 chain is high and accelerating, especially in the downstream products. Asia accounts for 75-95% of all additions. As benzene is set to remain relatively short, downstream margins are likely to remain under pressure, especially in caprolactam, nylon 6, and TDI. These developments are most negative for DSM (c. 15% of earnings) and LXS (c. 12%), BASF (c. 11.5%).

Figure 81. C6 Chain – Products, Capacity growth and exposures

Products and Intermediates	Capacity Growth (2014)	CAGR 2012-17e	Mid-term Outlook	Company	% of earnings (2012)*
Adipic Acid	10.0%	5.7%	Steady outlook until 2015 with near term oversupply	BASF	1.5%
				LXS	2.2%
				SOLB	2.5%
Caprolactam	10.3%	9.1%	Weakening trend due to Asian capacity growth	BASF	2.8%
				DSM	8.9%
				LXS	5.7%
Nylon 6	9.3%	5.1%	Steady outlook until 2015 with near term oversupply	BASF	2.6%
				DSM	6.3%
				LXS	3.3%
MDI	5.2%	7.2%	Supply slightly ahead of demand	BASF	5.1%
TDI	12.2%	7.5%	Weakening trend due to capacity additions	BASF	5.5%
				DSM	2.3%
				SOLB	4.9%

Source: Citi Research, CMAI, *Includes downstream products and intermediates related to chain

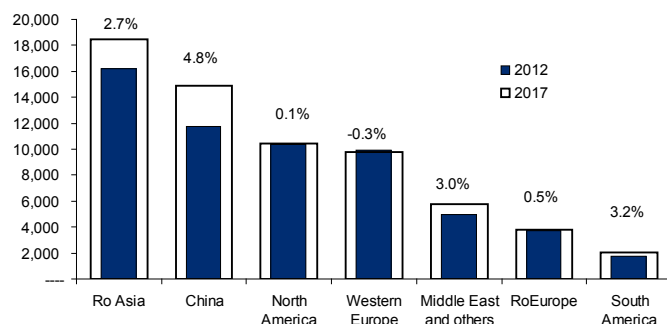
Benzene – Limited supply growth

Quick facts:

- **Global capacity growth** is **CAGR12-17e c2.1%** which is below historic growth patterns.
- **2014 is likely to be above this trend** with c3.5%, mainly driven by Asia.
- **Asia accounts for c. 83% of global capacity additions** between 2012 and 2017 followed by Middle East (c12%). There will be negligible capacity addition in North America while Western European capacity is slated to decline slightly.
- **Capacity growth** will be **largely driven by Naphtha** i.e through reformat and pygas route.

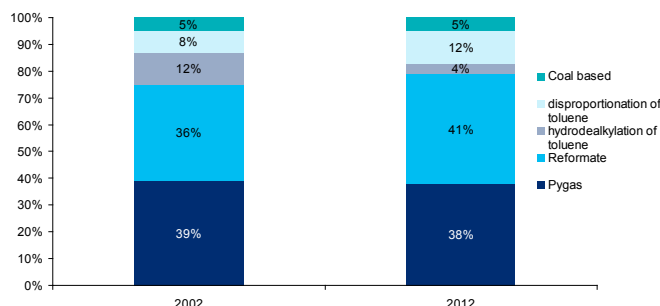
Global benzene capacity is about 59 mt with Asia accounting for about 48% of the market, followed by North America (18%) and Europe (17%). Global capacity growth is forecast to be at c2.1% p.a in the next 5 years according to IHS with Asia being the main driver, accounting for nearly 83% of incremental capacity growth.

Figure 82. Benzene production capacity by region (2012 vs. 2017e)



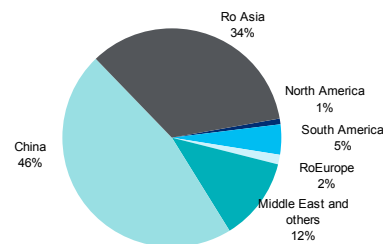
Source: Citi Research, SRI, CMAI

Figure 84. Benzene production routes (2012 vs. 2002)



Source: Argus deWitt, Citi Research

Figure 83. Benzene – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, SRI, CMAI

Figure 85. Average yields of Benzene through various feedstocks

Average Yield	Low Range	Top Range
Catalyst Reformate	5.0%	15.0%
Butane	4.8%	7.6%
Ethane	0.4%	1.2%
Gas Oil	19.3%	23.3%
Naphtha	14.0%	21.6%
Propane	4.5%	6.6%

Source: SRI consulting, Citi Research

Benzene is mainly produced as a by-product of refinery and steam cracker operations and thus its supply is largely driven by the demand for gasoline and ethylene rather than by the profitability or underlying demand for its derivatives.

There are 5 production routes:

- **Co-product of catalytic reforming (Reformate):** over 40% benzene is produced from reformate, a stream resulting from the catalytic reforming process used to produce high octane gasoline. The Benzene content ranges from 5%-15% depending upon whether it is intended for the gasoline pool (to increase octane level) or for BTX (Benzene, Toluene, Xylene) production.
- **Co-product of steam cracking (Pygas):** around 38% of benzene is produced via extraction from pyrolysis gasoline (pygas) which is a co-product of steam cracking. Pyrolysis gasoline is a mixture of saturated hydrocarbons and aromatics and is generally derived from cracking heavy feeds like Naphtha. This process is on a declining trend due to increased ethane and LPG cracking at the expense of naphtha cracking, particularly in the US.
- **Co-product of carbonisation of coal:** about 5% of benzene is produced as a by-product during coke manufacturing by coke-over producers. This process yields a crude light oil as a by-product which contains 55%-75% of benzene by volume. These kind of coking operations are on decline mode across the US and Europe because of technological changes in steelmaking but about 20% of Chinese benzene production is still derived through this process.

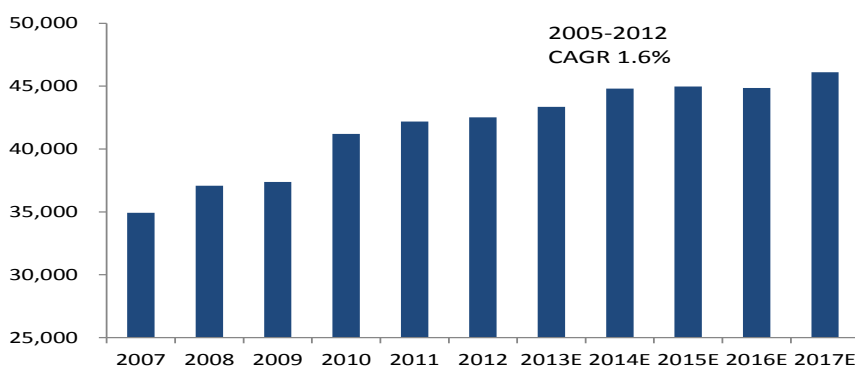
- **On-purpose production through toluene disproportionation:** this process accounts for about 12% of benzene production. Under this process toluene is converted into benzene and xylenes. Benzene production through this route has increased its share to 12% from 8% a decade earlier driven by strong demand for co-product paraxylene which is used for manufacture of polyester.
- **On-purpose production by hydrodealkylation of toluene.** Historically, this process was used to fill short-term demand gaps. Benzene production through this process declined to just 4% due to its relatively unfavourable economics compared to toluene disproportionation.

Benzene Supply looks constrained over medium term

Medium term supply outlook for Benzene looks bleak due to:

- 1) **Adoption of lighter feedstocks such as ethane and liquefied petroleum gas (LPG):** This has led to lower yields of pygas, the key feedstock for benzene
- 2) **Ethanol taking share of reformate in the US gasoline pool:** RFS mandate is unchanged at 14.4 bn gallons and arrival of 2G biofuel is likely to further aggravate the issue reducing demand for petrol and as a result for reformate.
- 3) **Arrival of shale gas oil from Eagle ford and Bakken in the US:** will impact aromatics yields because of the lighter nature of this oil.
- 4) **Downturn in Chinese Steel Industry:** While carbonisation of coal accounts for only 5% of world's production, it is still an important source of supply, especially in Chinese context where this route accounts for 20% of total supply. Thus, the current downturn in the Chinese steel industry is likely to impact supply.

Figure 86. Global Naphtha Capacity growth – a proxy for Benzene



Source: Citi Research, CMAI

Capacity additions are largely driven by Asia and Middle East. Asia is net exporter of Benzene with Korea leading due to its strategic location for exports to both the US and Europe. However, consumption in Asia pacific itself is increasing at a rapid pace and can lead to global shortage.

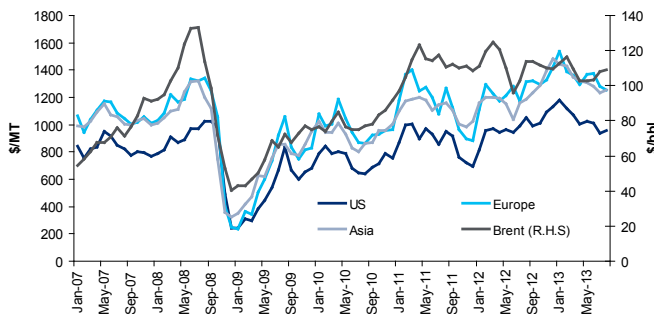
Overall, we expect about 2% on average growth in benzene capacity over next 5 years. None of the companies we cover has a merchant exposure to benzene, but are consumers of this co-product. Given the limited supply growth we expect structurally higher prices going forward putting pressure on consumers, like BASF, DSM, LXS, SOLB

Price volatility due to relatively inelastic supply

Benzene prices tend to closely follow crude oil with a correlation of 0.76.

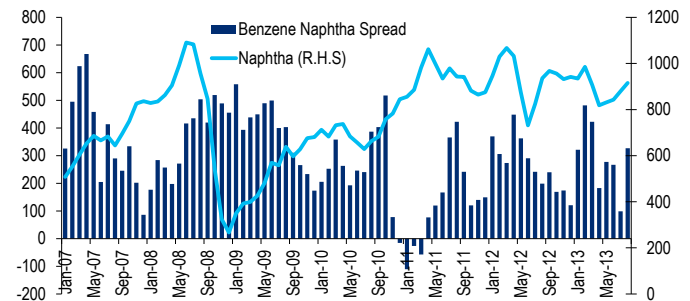
That said, current supply conditions and reduction of on-purpose production through hydrodealkylation of toluene (which is just 4% of the world's supply) makes benzene supply highly inelastic to the price movements in the short term and leads to price volatility in case of supply disruptions. This situation is likely to put pressure on downstream products especially caprolactam, MDI and TDI where supply is abundant and demand is sluggish

Figure 87. Benzene prices closely follow crude prices



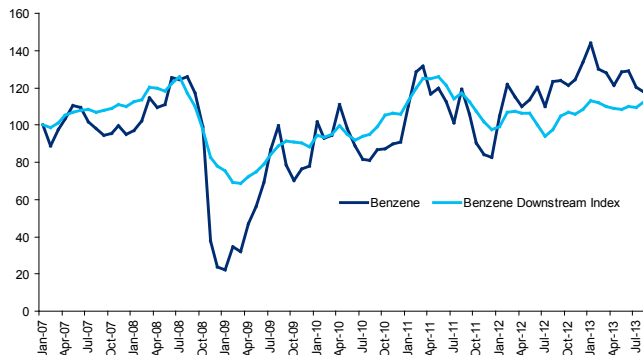
Source: Citi Research, CMAI, ICIS

Figure 88. Benzene margin vs. Naptha price



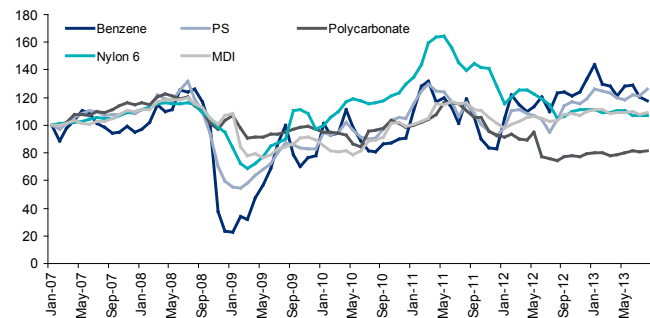
Source: Citi Research, CMAI, ICIS

Figure 89. European Benzene prices vs. Benzene downstream index*



Source: Citi Research, CMAI, ICIS; *Downstream index is a weighted index of PS, PC, Nylon6 and MDI

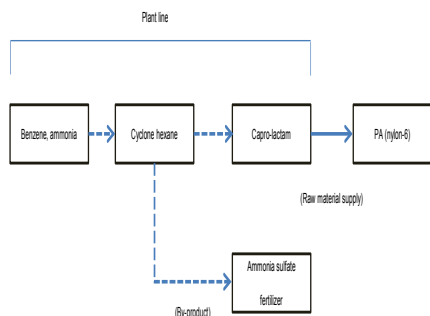
Figure 90. Benzene prices vs. downstream prices



Source: Citi Research, CMAI, ICIS

Caprolactam – Increasing Oversupply

Figure 91. Caprolactam production process via benzene hydrogenation



Source: Citi Research, CMAI

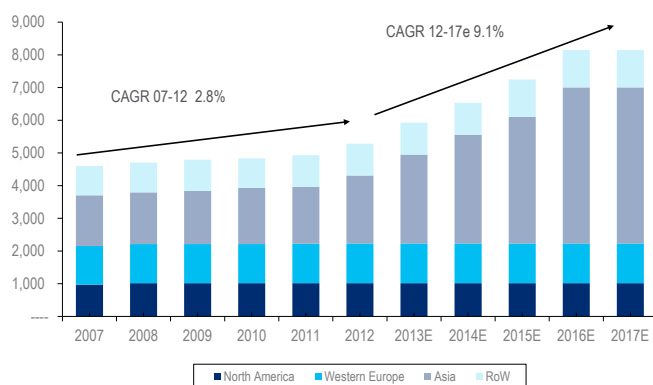
Quick facts:

- Global capacity growth is **CAGR12-17E 9.1%** well above historic trend.
- **2014 and 2015 capacity growth** above trend at 10.3% and 10.9% respectively.
- **Asia** of which mainly China accounts for c. 94% of global capacity additions.
- **Market** looks oversupplied over the medium-term amid sluggish demand.
- **Cash margins have declined to near bottom** levels but above trend supply growth in 2014 and 2015 presents further downside risk.

Global capro capacity is c. 5.3m t and IHS forecasts average growth of about 9.1% p.a. in the next 5 years well above historic levels. About 40% of global capacity is located in Asia with North America and Western EU accounting for 19% and 23% respectively.

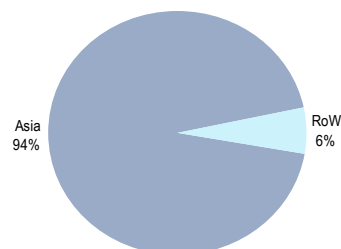
In the next 5 years global capacity is expected to grow by about 2.9m t within Asia, of which China accounts for nearly 94% of all capacity additions, according to IHS.

Figure 92. Caprolactam- Global Capacity (2007-2017E) ('000t)



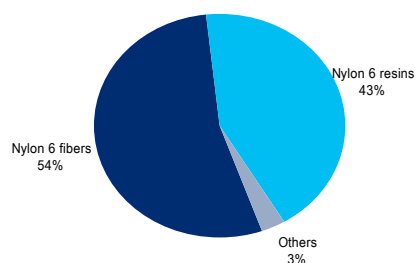
Source: Citi Research, IHS

Figure 93. Caprolactam– Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, IHS

Figure 94. Caprolactam– Main End Markets



Source: Citi Research, IHS

Figure 95. Caprolactam– Meaningful Capacity Additions

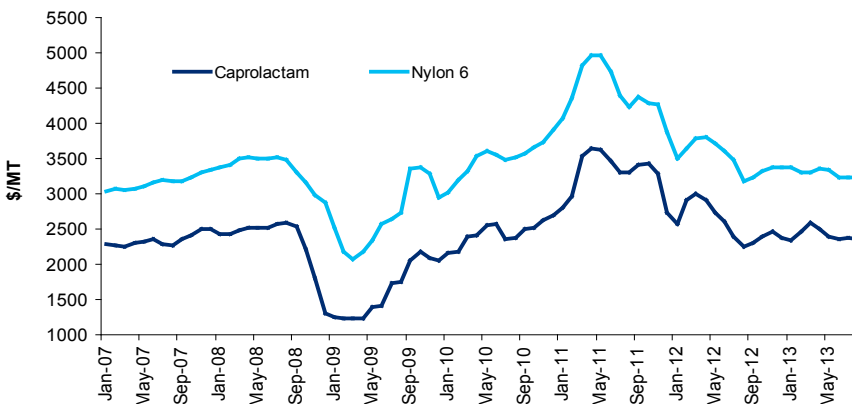
Company	Location	Capacity	Year
Baling PC	China	400	2015/16
China Kingho	China	200	2014/15
DNCC (60:40 DSM and Sinopec JV)	China	200	2013/14
Risun Group	China	200	2015/16
Shandong Fangming	China	200	2013/14
Shanxi Lanhua Sci	China	200	2015/16
Tianchen Yaolong	China	200	2014/15

Source: Citi Research, IHS

Capacity built-up driven by China

From 2007-12, caprolactam capacity growth was 2.8% CAGR, which was below its trend demand growth. In 2010, strong recovery in Asian demand from depressed levels of 2009 pushed utilisation rates to over 90% and created peak market conditions by 2Q11. Downstream Chinese players were affected the most during that period as China was a net importer of Capro with less than 40% self-sufficiency.

Figure 96. European Caprolactam and Nylon 6 prices



Source: Citi Research, ICIS, CMAI

Bullish Chinese projections led to rapid capacity growth

Since then peak capro prices, strong margins and bullish projections made by Chinese government in its 12th five year plan (the government forecasted Chinese caprolactam demand growth of CAGR10-15E of 12.5% vs. 5.8% average demand growth for other major petrochemical products) triggered a capro building frenzy.

Chinese capro capacity which was just 12% of the world's capacity in 2011 is now set to increase to about 45% of global capacity by 2016. This would also imply that self sufficiency of China (in terms of Nylon 6 capacity) which was just 36% in 2011 will increase to 100% by 2016, severely impacting merchant capro units outside of China, such as BASF.

Figure 97. Chinese demand forecast of major products during the 12th five-year plan

Type	Product	Consumption (KT)			CAGR	
		2005	2010	2015e	2005-10	2010-15e
Fuel	Petrochemical	168,590	245,150	320,000	7.8%	5.5%
Olefin	Ethylene	17,850	29,600	38,000	10.6%	5.1%
	Propylene	13,460	21,500	28,000	9.8%	5.4%
Synthetic resin	PE	10,490	17,060	21,000	10.2%	4.2%
	PP	8230	12,950	16,500	9.5%	5.0%
	PVC	7920	12,550	16,000	9.6%	5.0%
Synthetic fiber	Caprolactam	710	1110	2000	9.3%	12.5%
	EG	5090	8000	10,200	9.5%	5.0%
	PTA	12,050	17,200	24,000	7.4%	6.9%
Synthetic rubber	Acrylonitrile	1220	1650	2100	6.2%	4.9%
	SBR	610	1150	1400	13.5%	4.0%
	BR	450	840	1000	13.3%	3.5%
Organic raw materials	Methyl Alcohol	6660	20,920	35,000	25.7%	10.8%
	SM	4280	6900	8800	10.0%	5.0%
Non -organic raw materials	Carbonate soda	12,510	18,500	23,500	8.1%	4.9%
	Caustic soda	11,590	19,400	24,500	10.9%	4.8%
	Carbide	8850	17,000	22,000	13.9%	5.3%
Average					10.9%	5.8%

Source: China's Ministry of Industry and Information Technology

Margin outlook remains bearish

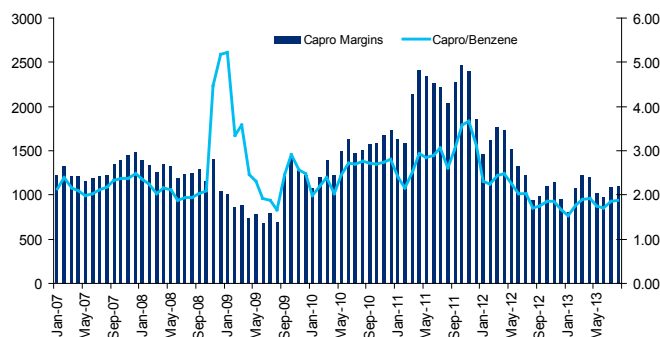
Caprolactam is mainly used as a precursor in the production of Nylon 6 fibers (54%) and Nylon 6 resins and films (43%). Nylon fibers are used in textile, carpet and industrial yarn industries while Nylon resins are mainly used in engineering plastics with applications in the automotive industry and some specialty packaging for food, wire and cable. Overall end market growth is essentially GDP driven and should grow 3%-4% p.a on average.

Capro margins are likely to face double whammy of high upstream costs (benzene) and lower downstream pricing.

The margin outlook for capro remains bearish as it is likely to face a double whammy of high upstream costs (benzene) and weak downstream pricing. There are **three commercial routes** to produce capro: cyclohexane (80%), phenol (17%) and toluene (1%) but the common raw material is benzene which as discussed above is relatively tight. Usually this should mean higher margins for downstream product but capro production accounts for less than 10% of benzene downstream usage and thus price correlation between the two is rather weak at c.0.6. In addition, Caprolactam doesn't allow for any differentiation given its commodity status resulting in a lack of pricing power.

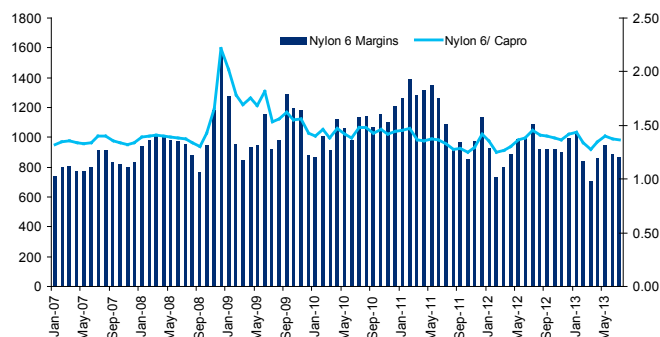
This situation has already resulted in margins declining by more than 50% (from more than \$2,000/tonne in 2011 to around \$1,000/tonne now) from peak levels. Given the current demand supply situation, we believe there is further downside risk to margins which would be negative for DSM (9% of earnings) and LXS (6%).

Figure 98. Caprolactam prices vs Benzene



Source: Citi Research, ICIS, CMAI

Figure 99. Nylon 6 vs caprolactam



Source: Citi Research, ICIS, CMAI

Weak demand trends

In addition to the upstream squeeze, caprolactam is also facing weak downstream trends. Capro is largely used as a precursor for Nylon 6 fibres and resins with demand closely associated with that of the textile and auto industries. Both these sectors are witnessing weak demand trends at the moment. Besides, Nylon 6 capacity is poised to grow at 5.1% CAGR 12-17e, according to HIS, which would limit the uptake for caprolactam capacity which is poised to grow by more than 10% in next 3-4 years, based on IHS data.

Adipic acid

Quick facts:

- **Global capacity growth** is CAGR12-17E 5.7% above historic trend.
- **2014 capacity growth above trend growth at 10%.**
- **Asia** accounts for c. 95% of global capacity additions.
- **Markets look oversupplied** in the medium-term noting downside risk to margins in 2014 given substantial capacity additions.

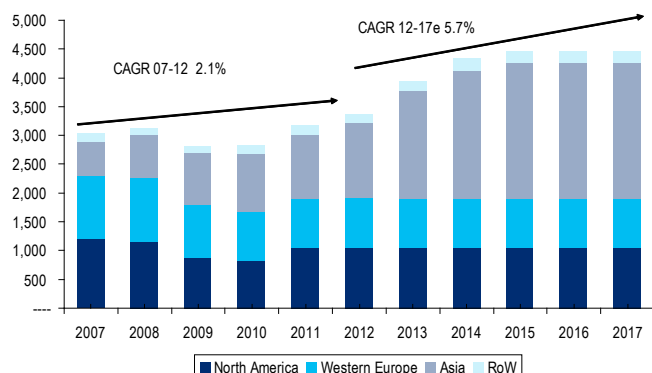
**Global adipic acid capacity is 3.7m t;
CAGR12-17E 5.7%**

Global adipic acid capacity is c. 3.7m t and IHS forecasts average growth of about 5.7% p.a. in the next 5 years well above historic growth of c.2%. About 40% of global capacity is located in Asia with North America and Western EU accounting for 31% and 26%, respectively.

In the next 5 years global capacity is expected to grow by about 1.1mt with Asia (mainly China) accounting for nearly 95% of all capacity additions.

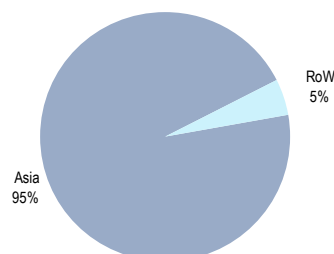
We see a slightly oversupplied market in the medium term driven by Chinese capacity additions in 2013 and 2014. This presents risk to the cash margins in near term which is negative for Solvay (c. 2.5% of earnings) and LXS (2%)

Figure 100. Adipic Acid- Global Capacity (2007-2017E)



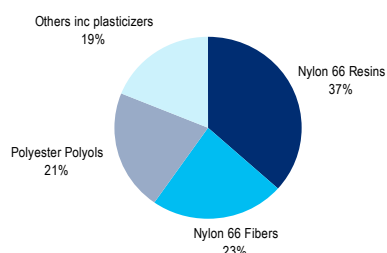
Source: Citi Research, IHS

Figure 101. Adipic Acid- Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, IHS

Figure 102. Adipic Acid- Main End Markets



Source: Citi Research, IHS

Figure 103. Adipic Acid- Meaningful Capacity Additions

Company	Location	Capacity	Year
Huafeng Group	China	160	2014/15
Kailuan Energy	China	150	2014
Shandong Hongye	China	140	2013/14
Zhejiang Shuyang	China	80	2013/14

Source: Citi Research, IHS

Demand

Adipic acid is largely used as a precursor for nylon 6,6 resins (37%), nylon 6,6 fibres (23%) and polyester polyols (21%). Thus downstream demand is mainly driven by consumer goods, such as textile, carpets, shoe soles, automobiles, industrial filaments and PU based systems based on both rigid and flexible foam. Thus demand is closely associated with GDP.

Overall we see adipic acid demand to increase on average c.3.0%

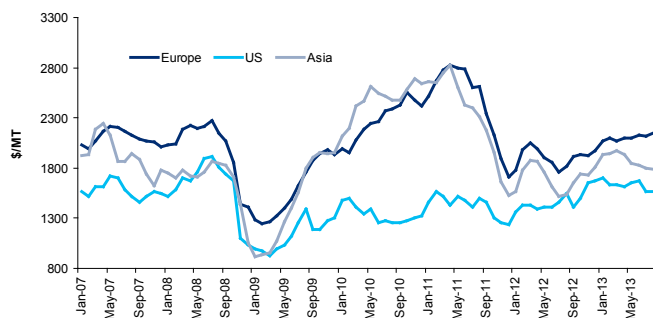
Price and margin dynamics

Margins are 60-70% off peak levels

EU and Asian prices are down more than 20% from their 1H11 peak. The Margin decline is even worse, down 60% and 72% for European and Asian players from the peak levels. Margin improvement in 3Q13 was largely driven by the drop in the ammonia prices than underlying price improvement.

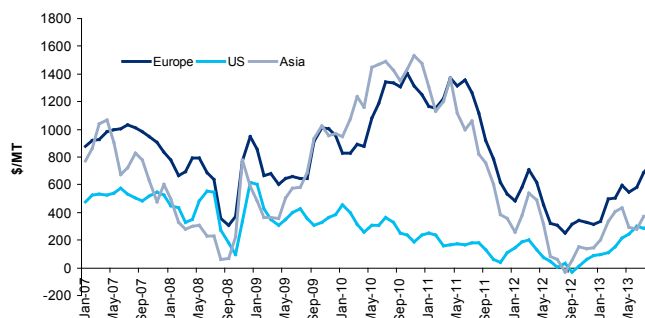
We believe this trend of weakening prices and margin is likely to continue in 2014 as a wave of new capacity additions will hit the market amid sluggish demand from downstream applications such as Nylon 6,6. Over the medium term, we believe mid-cycle conditions are likely to prevail.

Figure 104. Adipic acid price -\$/MT



Source: Citi Research, CMAI

Figure 105. Adipic acid gross margins- \$/MT



Source: Citi Research, CMAI, ICIS,* Based on theoretical yields

Nylon 6

Quick facts:

- Global capacity growth is CAGR12-17E 5% p.a. above historic trend of c. 3%.
- 2014 capacity growth above trend at 9.3%.
- Asia accounts for c. 94% of global capacity additions.
- Markets looks slightly oversupplied in the medium-term noting downside risk to margins in 2014 given substantial capacity additions.

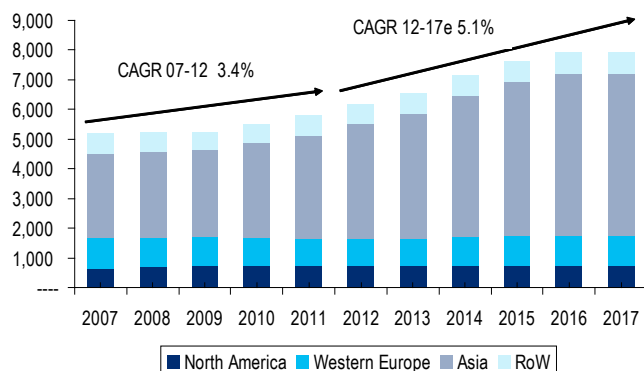
Global nylon 6 capacity is 6.2m t;
CAGR12-17E 5.1% vs. 3.4% historically

Global nylon 6 capacity is c. 6.2m t and IHS forecasts average growth of about 5.1% p.a. in the next 5 years well above historic growth. About 62% of global capacity is located in Asia with North America and Western EU accounting for 12% and 15% respectively.

In the next 5 years global capacity is expected to grow by about 1.7mt with Asia (mainly China) accounting for nearly 94% of all capacity additions.

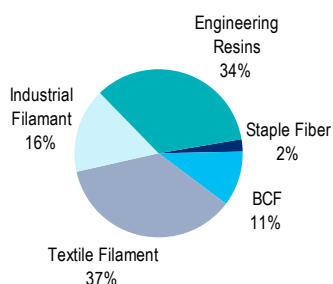
We see a slightly oversupplied market driven by Chinese capacity additions in 2014. This presents risk to the cash margins in near term which is negative for DSM (6% of earnings) and LXS (c. 3%).

Figure 106. Nylon 6- Global Capacity (2007-2017E)



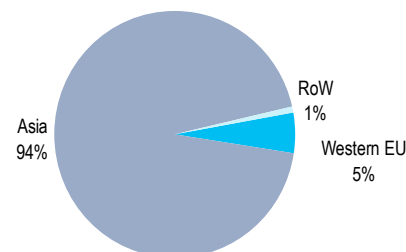
Source: Citi Research, IHS

Figure 108. Nylon 6– Main End Markets



Source: Citi Research, IHS

Figure 107. Nylon 6– Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, IHS

Figure 109. Nylon 6– Meaningful Capacity Additions

Company	Location	Capacity	Year
Fujian Zhongjin New Material	China	200	2014/15
Jiangyin Qiangli	China	172	2014/15
Nantong Wenfeng	China	100	2014
Yiwu Huading	China	70	2014
BASF	China	60	2015

Source: Citi Research, IHS

Demand – Competition with Polyester and Cotton

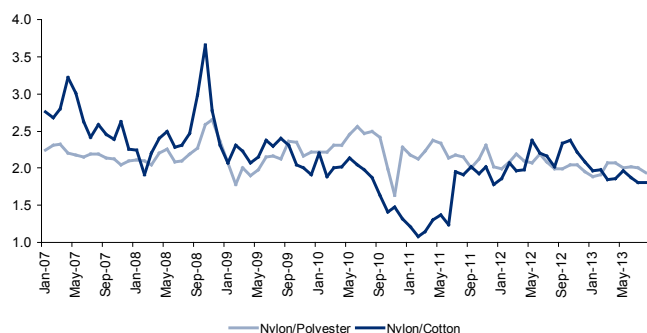
Nylon 6 is mainly used in textiles, automobiles and for miscellaneous industrial uses such as hose, belts, rope, cleaning brushes, industrial brushes etc. Historically Nylon 6 demand was driven by the textile industry and the historic premium to other fibres like Polyester and Cotton is about 2.2x

Nylon textile volumes are expected to grow at 2.3% CAGR 12-17e vs 10.1% CAGR 2008-12, according to IHS

However, this premium has gradually eroded over the years as consumer preference shifted towards cheaper materials such as polyester and towards natural fiber such as cotton. The premium is now c. 10-15% below the historic average.

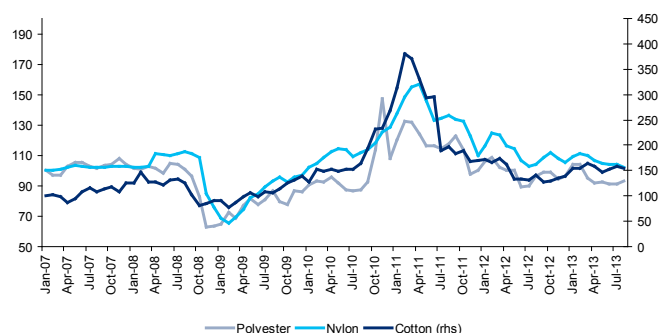
According to IHS, nylon 6 textile filament volumes are likely to grow on average 2.3% for next 5 years compared to 10.1% CAGR 2008-12.

Figure 110. Nylon6 premium vs. Polyester and Cotton



Source: Citi Research, CMAI, Asian contract prices

Figure 111. Nylon 6, Polyester and Cotton Prices (Indexed; Jan 07 = 100)

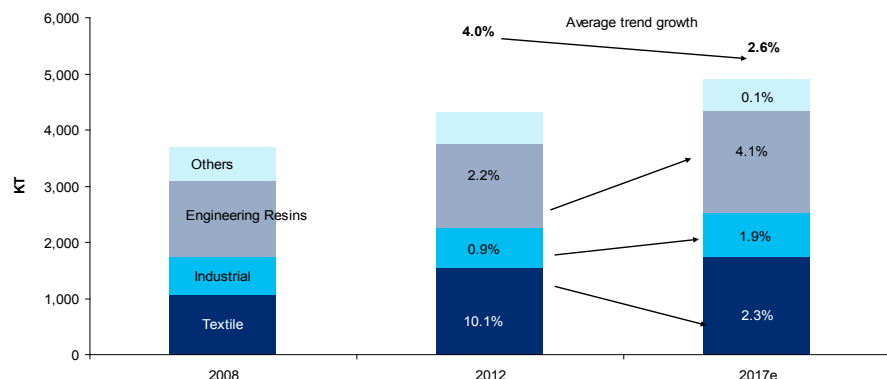


Source: Citi Research, CMAI, Asian contract prices

Nylon 6 competes with Nylon 6,6 in the engineering resins and high end textile filament markets such as carpets. While nylon 6,6 has certain properties, such as heat resistance, there are efforts underway in the compounding, plastics and textile industries to copy the properties by using nylon 6 together with additives and/or changing the compounds etc. This is one of the area where nylon6 is likely to gain market share and its demand is likely to grow on average 4.1% CAGR 2012-17e vs, 2.2% CAGR 2008-12.

Overall we see nylon 6 demand to increase on average c.2.6% CAGR 12-17e which is below its historic trend growth of c. 4.0%.

Figure 112. Nylon 6 downstream demand and growth rates



Source: Citi Research, CMAI

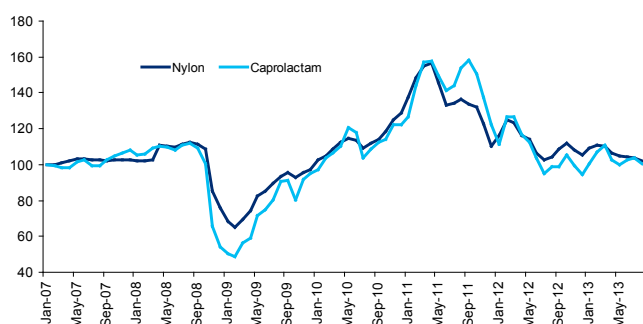
Price and margin dynamics – Margins stable due to capro oversupply

Current price dynamics do reflect these trends and European and Asian prices are down more than 20% from their 2011 peaks. However, oversupply conditions in upstream capro has helped producers to retain gross margins in Asia while in Europe they have turned into positive territory from small loss in 2011.

Prices likely to remain sluggish in 2014, but capro oversupply helps margins

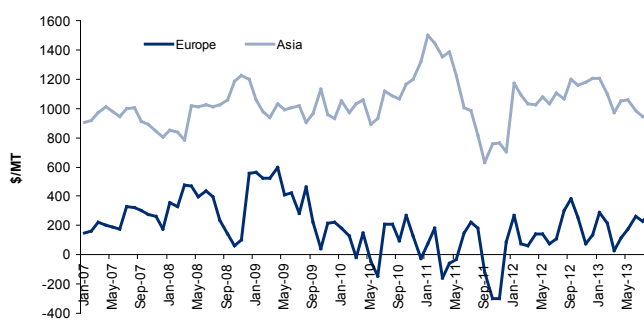
We believe this trend of weakening prices is likely to continue in 2014 with above trend capacity growth. However, margins are likely to be sustained at current levels due to even higher upstream capacity additions.

Figure 113. Nylon prices closely follows direction of caprolactam



Source: Citi Research, CMAI, ICIS, Asian contract prices

Figure 114. Nylon 6 gross margins- \$/MT



Source: Citi Research, CMAI, ICIS, * Based on theoretical yields

MDI – Watch out for 2015

Quick facts:

- Global capacity growth is CAGR12-17E 7.2% above historic trend.
- 2015 capacity growth above trend at 14%.
- Asia accounts for c. 84% of global capacity additions.
- Near term demand supply looks balanced though above trend capacity growth in 2015 is likely to put some pressure on margins.

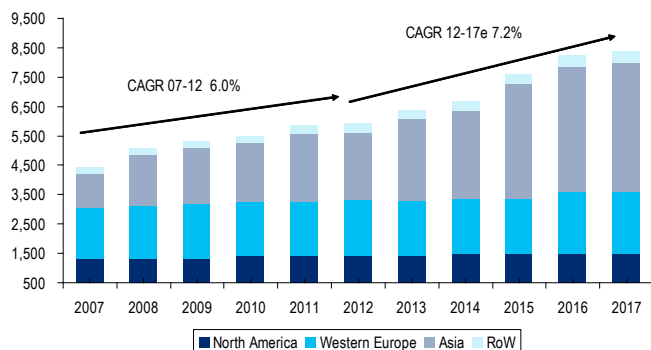
Global MDI capacity is 5.9m t; CAGR12-17E 7.2%

Global MDI capacity is c. 6.2m t and IHS forecasts average growth of about 7.2% p.a. in the next 5 years well above historic growth. About 39% of global capacity is located in Asia with North America and Western EU accounting for 24% and 32% respectively.

In the next 5 years, global capacity is expected to grow by about 2.5mt with Asia (mainly China) accounting for nearly 84% of all capacity additions, according to IHS.

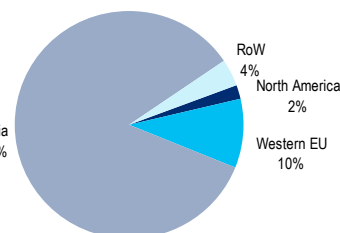
We see a slightly oversupplied market in the medium term driven by Chinese capacity additions in 2015. This presents risk to the cash margins in near term which is negative for BASF (c. 5% of earnings).

Figure 115. MDI- Global Capacity (2007-2017E)



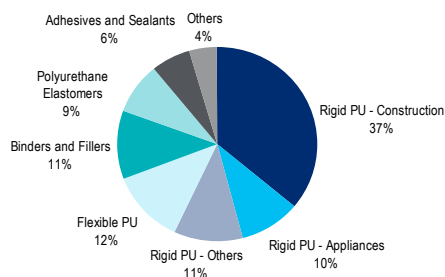
Source: Citi Research, IHS

Figure 116. MDI – Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, IHS

Figure 117. MDI– Main End Markets*



Source: Citi Research, IHS, *US markets considered as proxy to world

Figure 118. MDI– Meaningful Capacity Additions

Company	Location	Capacity	Year
Yantai Wanhua	China	400	2014/15
BASF	China	400	2015
Bayer	Germany	240	2016
Bayer	China	150	2015

Source: Citi Research, IHS

Demand

Demand growth of 5-5.5% p.a.

MDI is largely used for rigid polyurethane applications with end demand largely driven by construction, electronics such as home appliances and automotive sectors. It is also used for polyurethane elastomers and in binders and fillers. Demand for these products are GDP+ at the moment and this trend is likely to continue for over medium term.

Overall we see MDI demand to increase on average 5.0%-5.5% CAGR 11-16e.

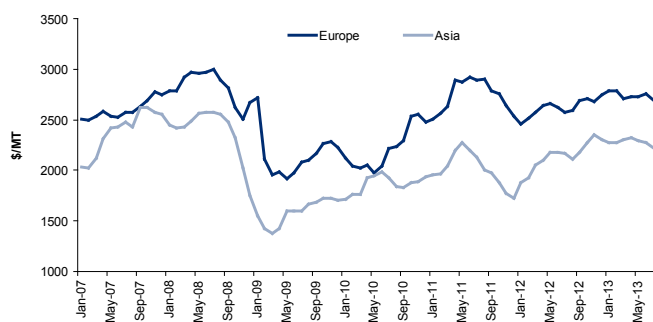
Price and margin dynamics

The MDI market is a highly consolidated market because of the technological and capital cost barriers with top five players accounting for about 80% of global market capacity (Bayer, BASF, Dow, Huntsman and Yantai Wanhua). These companies in addition to MDI, also provide polyether polyols and polyurethane systems to offer the complete value chain to the customers.

Some risk to margins in 2015; apart from this margins look to stay around mid-cycle

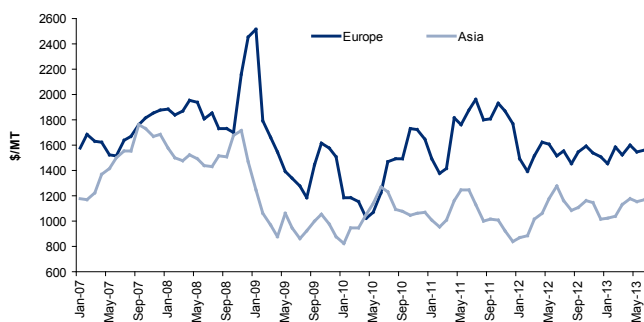
Among these players, BASF, Bayer and Yantai Wanhua have plans to substantially increase their capacities over next several years. This is likely to put pressure on margins in 2015 when new capacity additions will be well above average trend growth rates. Otherwise, we expect prices and margins to trade at mid-cycle range with fairly balanced demand and supply in the near to medium term.

Figure 119. MDI price -\$/MT



Source: Citi Research, CMAI

Figure 120. MDI acid gross margins- \$/MT



Source: Citi Research, CMAI, ICIS,* Based on theoretical yields

TDI – Capacity expansion accelerating

Quick facts:

- Global capacity growth is CAGR12-17E 7.5% above historic trend of c.5%
- 2014 and 2015 capacity growth above trend at 12.2% and 13.6% respectively.
- Asia accounts for c. 75% of global capacity additions.
- Near term demand supply imbalance due to above trend capacity growth in 2014 and 2015.

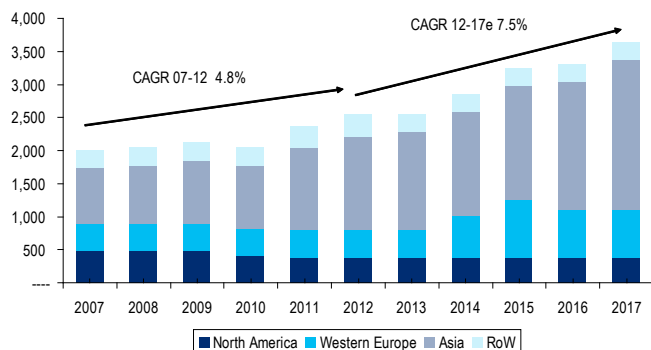
Global TDI capacity is 2.5mt; CAGR12-17E 7.5%

Global TDI capacity is c. 2.5m t and IHS forecasts average growth of about 7.5% p.a. in the next 5 years well above historic growth. About 55% of global capacity is located in Asia with North America and Western EU accounting for 15% and 17% respectively.

In the next 5 years global capacity is expected to grow by about 1.1mt with Asia (mainly China) accounting for nearly 75% of all capacity additions.

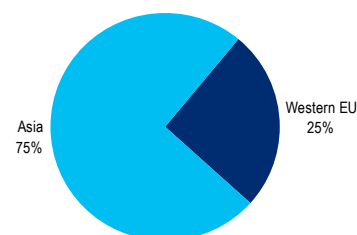
We see a slightly oversupplied market in the medium term driven by Chinese capacity additions in 2015. This presents risk to the cash margins in near term which creates some risk for BASF (c. 5.5% of earnings).

Figure 121. TDI- Global Capacity (2007-2017E)



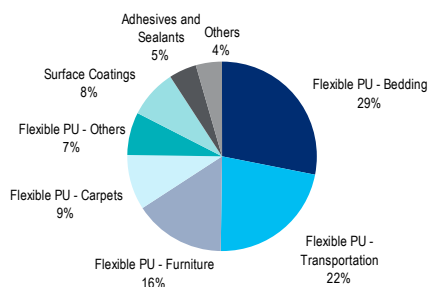
Source: Citi Research, IHS

Figure 122. TDI- Incremental Capacity Growth Contribution (2012-2017) by Region



Source: Citi Research, IHS

Figure 123. TDI- Main End Markets*



Source: Citi Research, IHS, *US markets considered as proxy to world

Figure 124. TDI- Meaningful Capacity Additions

Company	Location	Capacity	Year
BASF SE	Germany	300	2015
Bayer	Germany	300	2014/15
Beifang Jinhua	China	100	2015/16
Fujian SE	China	100	2013/14
Electrochemical			
Yibin Jiangnan	China	200	2015/16

Source: Citi Research, IHS

Demand

Average demand growth is 4-5% p.a.

TDI is largely used for flexible polyurethane applications such as bedding, transportation, furniture, carpets underlay etc. It is also used for surface coatings and adhesives to a lesser extent. Thus end demand is largely driven by consumer goods, automotive and household items. As such demand is closely associated with GDP.

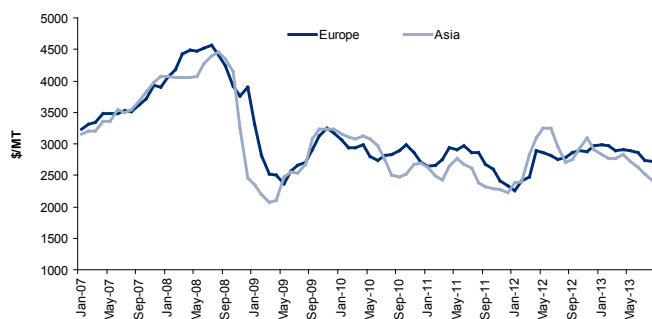
Overall we expect TDI demand to increase on average 4.5%-5.0% CAGR 11-16e.

Price and margin dynamics

Margins coming under pressure due to capacity additions

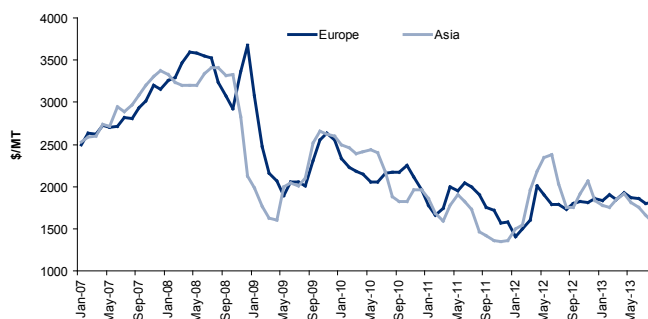
TDI market is a consolidated market with Bayer and BASF controlling about 50% of global market capacity. Both these players have plans to substantially increase their capacities over next several years, esp. 2014 and 2015. This is likely to put pressure on margins in near to medium term as new capacity additions are well above average trend growth rates. These factors have already impacted the margins and this trend is likely to continue in near future.

Figure 125. TDI price -\$/MT



Source: Citi Research, CMAI

Figure 126. TDI acid gross margins- \$/MT



Source: Citi Research, CMAI, ICIS, * Based on theoretical yields

Company Section

Company Focus

■ Estimate Change

Andrew Benson

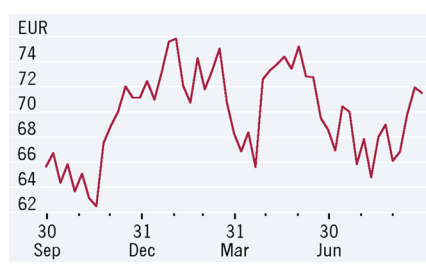
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Neutral	2
Price (30 Sep 13)	€70.55
Target price	€72.00
Expected share price return	2.1%
Expected dividend yield	3.8%
Expected total return	5.9%
Market Cap	€64,799M
	US\$87,621M

Price Performance

(RIC: BASFn.DE, BB: BAS GR)



BASF SE (BASFn.DE)

Restructuring drive underway to mitigate competitive pressures

- **Roughly 30% of 2012 earnings came from co-product chains** — the main earnings came from the nylon activities (caprolactam, bulk nylon 6 and 66 and engineering plastics), polyurethanes (commodity MDI, TDI through to highly specialized, bespoke formulations), basic petrochemicals and acrylics. Of these businesses, roughly one third of the earnings last year came from specialty applications like superabsorbent polymers or system house bespoke polyurethanes that are unlikely to see a significant intensification of price pressures.
- **Restructuring ongoing** — The company is targeting €1bn of savings group-wide. BASF is implementing many segment specific actions, product and asset rationalisation in paper chemicals, for example. It has also re-engineered its US cracker to enable it to use cheap ethane feedstock and established new gas supply deals in Europe to reduce energy costs. These actions are likely to deliver about €2bn in savings by YE15 and are a critical factor in defending its competitiveness.
- **Cutting estimates on Co-product competitive pressures and a slower ag** — We have taken a somewhat more cautious assessment of the earnings outlook based partly on the recent strength of the Euro but also because some commodity segments, such as caprolactam are likely to see lower utilisation rates in 2014. We have also lowered our forecast for ag given our more cautious take on crop prices next year. As a result we have lowered both 2014 and 2015 by 4% as a result.

Neutral recommendation — BASF's broad portfolio, its conversion competitiveness (the Verbund strategy) in addition to its current restructuring actions should ensure some EPS growth in 2014 despite the intensification of competitive pressures we envisage in its commodity-oriented co-product businesses and in its crop protection division. This sluggish growth, the relatively undemanding rating and a solid 3.8% dividend yield look likely to ensure support to the shares price. However, the limited growth potential is also unlikely to support outperformance.

BASF SE (EUR)

Year to 31 Dec	2011A	2012A	2013E	2014E	2015E
Sales (€M)	73,497.0	72,129.0	74,967.4	65,363.0	67,409.9
Net Income (€M)	5,749.0	5,180.2	4,806.1	4,892.9	5,605.9
Diluted EPS (€)	6.26	5.64	5.23	5.33	6.10
Diluted EPS (Old) (€)	6.26	5.64	5.24	5.54	6.34
PE (x)	11.3	12.5	13.5	13.2	11.6
EV/EBITDA (x)	7.1	8.2	8.3	8.3	7.5
DPS (€)	2.50	2.60	2.70	2.80	2.90
Net Div Yield (%)	3.5	3.7	3.8	4.0	4.1

Company Focus

- Target Price Change
- Estimate Change

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Buy	1
Price (30 Sep 13)	SFr15.29
Target price	SFr18.00
from SFr16.00	
Expected share price return	17.7%
Expected dividend yield	2.3%
Expected total return	20.0%
Market Cap	SFr5,075M
	US\$5,602M

Price Performance

(RIC: CLN.VX, BB: CLN VX)



Clariant AG (CLN.VX)

There is still upside; Buy reiterated

- **Top Pick** – CLN shares are up 24% YTD outperforming the Chemicals Euro Stoxx which is up c. 8% YTD. Despite this strong run, the stock remains one of our top picks due to **1)** no exposure to co-products and no evident oversupply risk in any of its products; **2)** c. 40% of EBITDA derived from businesses with value-based pricing (e.g. Care Chemicals, Catalysts & Energy) providing pricing power; **3)** conservative consensus estimates providing earnings upside potential in 2H13 and 2014; **4)** improving FCF and ROCE profile; **5)** dividend upside potential.
- **Raising estimates and TP, but look out for FX** – We increase our TP to SFr18 as we raise our 2013E and 2014E estimates on the back of better than expected profitability in Catalysis & Energy in 1H13 and higher top line growth in Care Chemicals and OMS. However, we note stronger FX headwinds in 3Q13 as the SFr appreciated by 3% YoY vs. US\$ and by 17% vs. the Brazilian Real. As a result we see a negative FX impact of c. 4-5% in 3Q13 which dampens earnings growth.
- **Value-based pricing** - CLN has no exposure to co-product chains and we see no oversupply risk in any of its markets. About 60% of its sales can be defined as defensive with EBITDA margins in the range of 17-24%. 40% of sales are cyclical but at the bottom of the cycle with EBITDA margins at around 12-13%. This part of the group should be able to deliver margins at around 15-17%, in our view, once markets recover. We estimate that about 40% of group EBITDA is generated by businesses that allow for value-based pricing as they deliver a value-add to their customers, such as care chemicals, process catalysts.
- **Dividend upside** – We see CLN's FCF and ROCE profile on an improving trend. As outlined here ([Ringing the Global Register - Themes on Free Cash Flow Analysis of Global Chemicals](#)), we see CLN as one of the rising cash stars with a strong improvement in CROIC in the next 3 years. In combination with a more robust balance sheet, this should allow for dividend increases. We see DPS growth CAGR12-15E at c. 11% well above the sector average of 6% p.a.

Clariant AG (CHF)

Year to 31 Dec	2011A	2012A	2013E	2014E	2015E
Sales (SFrM)	7,370.0	6,038.0	6,128.3	6,424.0	6,744.7
Net Income (SFrM)	361.5	329.2	333.1	407.8	490.8
Diluted EPS (SFr)	1.37	1.17	1.06	1.28	1.54
Diluted EPS (Old) (SFr)	1.37	1.17	1.05	1.23	1.47
PE (x)	11.2	13.1	14.4	12.0	9.9
EV/EBITDA (x)	6.3	8.5	7.8	6.8	6.1
DPS (SFr)	0.30	0.33	0.35	0.38	0.46
Net Div Yield (%)	2.0	2.2	2.3	2.5	3.0

Company Focus

DSM NV (DSMN.AS)

Undervalued Nutrition Strategy; cutting co-product exposure

Andrew Benson

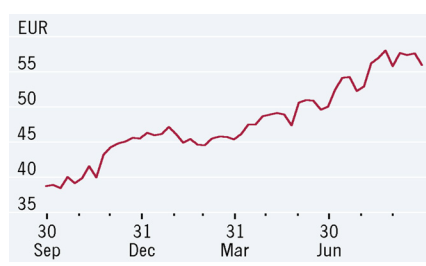
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Buy	1
Price (30 Sep 13)	€55.92
Target price	€65.00
Expected share price return	16.2%
Expected dividend yield	2.7%
Expected total return	18.9%
Market Cap	€10,145M US\$13,718M

Price Performance

(RIC: DSMN.AS, BB: DSM NA)



- **Nutrition dominates; C6 chain being restructured** — DSM has invested €2.8bn in acquisitions, of which €2.4bn were to develop the Nutrition business which accounts for about 75% of group EBIT. The expansion of Nutrition has occurred as the Materials activities' margins have come under pressure. Materials generated €501m of EBIT in 2011 but just €243m last year. We expect profits to be roughly unchanged this year with restructuring offsetting weaker caprolactam profits.
- **€250m to €280m of restructuring benefits targeted by 2015** — The efficiency measures affect the entire group but about 2/3 of the efficiencies are targeted to come from the Materials activities. These should be delivered YE15. We would expect DSM to be able to retain about €100m of these savings.
- **Nutrition now 75% of EBIT** — The plan is to sustain Nutrition's margins between 20-23% and grow sales by 2% above GDP. Given the trends of population growth, wealth and convenience drivers, the growth targets looks achievable.
- **Reduction in merchant Caprolactam exposure sought** — The Materials business is built around engineering plastics (mainly nylon products), coating resins, Dyneema (super strong PE fibres), caprolactam and acrylonitrile. We estimate these activities will generate 44% of sales this year, with 10% of group sales expected from Caprolactam. This product is operating about breakeven this year excluding licensing income (of about €40m). DSM produces about 650kt of Caprolactam a year and sells 70% of this into merchant markets. The rest is consumed internally. DSM considers security of supply for capro a key source of competitive advantage across the whole cycle but it is seeking to reduce its merchant exposure. This disposal should support sentiment.
- **Buy recommendation** — We believe the strategy will deliver value and above-average EPS growth. We see scope for re-rating as DSM executes on its core goals this year of organic growth, extracting synergies from recent acquisitions, and reducing volatility through a lower exposure to caprolactam.

DSM NV (EUR)

Year to 31 Dec	2011A	2012A	2013E	2014E	2015E
Sales (€M)	9,048.0	9,131.0	10,047.9	10,639.4	11,125.2
Net Income (€M)	605.0	427.0	579.5	677.7	800.2
Diluted EPS (€)	3.65	2.58	3.39	3.96	4.68
Diluted EPS (Old) (€)	3.65	2.58	3.39	3.96	4.68
PE (x)	15.3	21.7	16.5	14.1	12.0
EV/EBITDA (x)	7.7	12.2	9.4	8.4	7.5
DPS (€)	1.45	1.50	1.50	1.65	1.87
Net Div Yield (%)	2.6	2.7	2.7	3.0	3.3

Company Focus

Evonik (EVKn.DE)

Supply-driven pricing pressure to remain feature into 2014, Sell

Andrew Benson

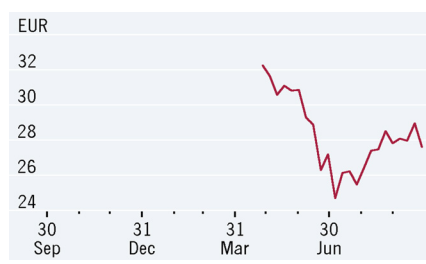
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Sell	3
Price (30 Sep 13)	€27.31
Target price	€24.00
Expected share price return	-12.1%
Expected dividend yield	3.5%
Expected total return	-8.6%
Market Cap	€12,726M US\$17,209M

Price Performance

(RIC: EVKn.DE, BB: EVK GR)



- **C3 and C4 chain accounts for c. 63% of earnings** — Our co-product supply analysis suggests that the utilisation rates for both these chains are set to decline on capacity expansions, especially in the methionine (18% of group's earnings) and butadiene. We see global methionine capacity up c. 20% next year after a c. 13% increase this year. We also anticipate 8.5% increase in global BD capacity which is likely to limit Evonik's pricing power for C4 chain stream (c. 24% of the group's earnings).
- **Pricing pressure to continue** — New capacity addition so far has resulted in the spot European methionine price declining about 8% YTD. We believe that there is more pain to come in light of capacity additions in 2014. Further, Evonik pricing power for C4 chain products is likely to be limited as we expect flat BD prices YoY. Our analysis suggests that 2011 and 2012 overstated group's long-term earnings power and we see above average risks to margins. We believe there remains scope for further underperformance until pricing at least starts to stabilise.
- **€250m in savings sought by end of 2016** — Evonik has announced a planned restructuring of its administrative cost base. Much of these savings will be from headcount reduction so the charge is likely to be substantially a cash one, not write-downs. The company indicated that most of the cash costs will be in 2014 and 2015 with little in the way of costs or benefits in the rest of 2013. Thus this cost saving programme, while helpful over longer term, will constrain cash earnings in 2014.
- **3Q13 trading looks comparable with 2Q13** — At the recent CMD, the company noted that the summer slowdown was less pronounced compared with 2012. However, butadiene and methionine prices look lower and currencies will be slightly adverse. Financial charges will be down reflecting the disposal of 90% of real estate activities in July. Overall trading conditions look uninspiring and show no sign of growth resurgence if not decline. Sell.

Evonik (EUR)

Year to 31 Dec	2011A	2012A	2013E	2014E	2015E
Sales (€M)	14,540.0	13,390.0	13,110.4	13,597.0	14,269.0
Net Income (€M)	1,256.0	1,177.0	904.6	955.4	1,004.1
Diluted EPS (€)	2.70	2.52	1.94	2.05	2.15
Diluted EPS (Old) (€)	2.70	2.52	1.94	2.05	2.15
PE (x)	10.1	10.8	14.1	13.3	12.7
EV/EBITDA (x)	5.3	6.1	7.8	7.8	7.4
DPS (€)	0.86	0.92	0.92	0.92	0.90
Net Div Yield (%)	3.1	3.4	3.4	3.4	3.3

Company Focus

Lanxess (LXSG.DE) 2014 – The Pressure stays on

■ Estimate Change

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Sell	3
Price (30 Sep 13)	€47.86
Target price	€37.00
Expected share price return	-22.7%
Expected dividend yield	1.9%
Expected total return	-20.8%
Market Cap	€3,982M
	US\$5,385M

Price Performance

(RIC: LXSG.DE, BB: LXS GR)



■ **Remaining cautious** — We reiterate our Sell rating and cut our 2013 and 2014E estimates by 9% and 14% respectively. We now anticipate an inventory write down of about €10m in 3Q13 given the sharp decline in butadiene prices in 3Q13 and incorporate FX headwinds (Euro up 5.5% YoY vs. US\$ in 3Q13). The 2014 downgrade is driven by a lowered BD price forecast. We no longer expect a YoY increase in the average BD price, but instead expect prices to remain flat in light of the anticipated 8.5% increase in global BD capacity. About 70% of these additions will come from low-cost extraction units which should keep prices at bay.

■ **Significant capacity additions** — Co-products (C4 and C6) account for about 70% of group earnings and we are seeing significant capacity additions ranging from 8-10% across these chains in the next 12 months. This creates a better supplied, more competitive and less profitable market. Management recently noted that the “fantastic times” in markets like Butyl and EPDM were over and the businesses had to adjust to this new reality in which customers have become more price sensitive as well. It seems unlikely for LXS to return to 2011/12 type profitability anytime soon, in our view. It lost market share in 2Q13 and has to stay price competitive.

■ **C4 chain accounts for c. 60% of earnings** — The C4 chain (BD and synthetic rubber) accounts for about 60% of group earnings. Capacity expansions, especially in the high end rubber segment (S-SBR, nd-PBR) put pressure on utilisation rates. We see global S-SBR and nd-PBR capacity up c. 10% next year after a c. 10-15% increase this year. At the same time customers are opting for cheaper tyres leading to negative mix effects.

■ **Consensus still looks too high** — Our new EPS estimates put us c. 8-28% below consensus. Given another year of significant supply additions and an anaemic recovery in tyre markets, we think LXS earnings recovery will be less pronounced than currently assumed by the market and we expect further downgrades.

Lanxess (EUR)

Year to 31 Dec	2011A	2012A	2013E	2014E	2015E
Sales (€M)	8,775.0	9,094.0	8,003.1	8,483.5	9,130.2
Net Income (€M)	544.7	544.0	128.0	238.8	369.0
Diluted EPS (€)	6.55	6.54	1.54	2.87	4.43
Diluted EPS (Old) (€)	6.55	6.54	1.69	3.34	4.26
PE (x)	7.3	7.3	31.1	16.7	10.8
EV/EBITDA (x)	5.2	5.2	9.1	7.8	6.6
DPS (€)	0.85	1.00	1.00	1.05	1.10
Net Div Yield (%)	1.8	2.1	2.1	2.2	2.3

BASF SE

Company description

BASF is an integrated commodity chemical company with agrochemical and oil & gas interests. Chemicals (65% group) focuses on basic petrochemical and inorganic intermediates. Crop Protection (10% group) forms the bulk of its Agriculture and Nutrition division. Oil & Gas (25% group) focuses on oil production in Libya, on gas production in the North Sea, Argentina and increasingly Russia, and on gas distribution in Europe.

Investment strategy

We rate BASF Neutral. BASF is a three-pillared conglomerate. Looking at the three parts and their medium-term outlook: 1) the industrial businesses, where we forecast lower earnings in 2013 but a recovery thereafter; 2) Oil & Gas should continue to perform at the EBIT level in 2013E, but c.90% of this rise will turn into taxes and minority charges; and 3) Crop Science and some specialty businesses should perform well and mitigate downward pressures in the more commoditised activities. The shares have rallied strongly since the height of the sovereign debt crisis and have significantly outperformed in the past year as a result. Looking at our view of fair value and the uncertainties caused by the weak European economic environment and the high oil price, we believe the recent outperformance will now give way to more in line performance, hence our Neutral rating.

Valuation

We use DCF methodology as basis of valuation. The macro assumptions are 2.6% GDP growth and we have used an oil price of \$100/barrel long term. We use a growth rate of 3.5% and a WACC of 7.2% reflecting the decline in the market equity risk premium in recent months. The model incorporates the recent proposed acquisitions and oil & gas asset swaps with Statoil and Gazprom. This model delivers fair value of €84 (including €16 for O&G). Noting risk to the oil price, assessment of value of resource base and uncertainty involved in long term forecasts, we set our target price at €72, i.e. c15% discount to our DCF value.

Risks

We would highlight the following risks to our valuation and target price.

We highlight volatility and the relatively low visibility of petrochemicals earnings as significant risks. Supply-demand balances can change quickly, which can be difficult to predict. BASF also has an Oil & Gas division and the shares have historically shown greater correlation with the European oil sector than BASF's closest global chemical peer Dow Chemical. Changes in the oil price therefore have significant effect on BASF shares. For BASF's Agrochemical division, the market is dependent on the vagaries of weather patterns. Finally, BASF is a European-based producer. A strengthening of the euro is a significant headwind.

If the impact of these risk factors is more or less negative than we currently anticipate, then the share price could fail to reach or exceed our target price.

Clariant AG

Company description

Clariant is a Swiss-based specialty chemicals company operating in 90 countries. The majority of its portfolio serves relatively mature industries, e.g. textiles, pigments and plastic additives, where the trend has been for its customers to migrate to Asia. After 2 years of extensive restructuring, including the relocation and closure of 20 sites and a 20% headcount reduction, Clariant is a leaner and more efficient organisation. The acquisition of Sued Chemie, which was finalised in April 2011, will further improve the company's overall margin profile and provide the scope needed to make further portfolio adjustments, such as the divestment of lower margin operations.

Investment strategy

We have a Buy (1) rating. We continue to believe that Clariant is a transformation story. The new management team has been aggressive at reducing costs and downsizing the scope of the group. Robust end-market demand, benefits from past restructuring, and Sued Chemie with its attractive end markets and high-quality assets should drive earnings growth. Sentiment towards the stock has improved due to: 1) Strong 4Q12; 2) Divestment of structurally challenged businesses ; and 3) Cost savings and synergies from Sued Chemie integration. Medium term prospects for the company look bright given new focus on core businesses.

Valuation

Our discounted cash flow model for Clariant yields a fair value of SFr19.63per share, with key assumptions being WACC of 8.2%, sustainable ROCE of 12.5%, beta of 1.5x, and long-term growth rate of 2.5%. We set our target price at SFr18, at about 10% discount to our DCF valuation.

Risks

We would highlight the following risks to the stock price reaching our target price.

Clariant generates about 40% of group sales in Europe and about 10% in Southern Europe with Italy and Spain being the key countries. Hence the economic developments in Europe and any further escalation of the European debt crisis pose a key risk to our investment case. Citi economists forecast EU GDP to be down 1.5% in 2012

China and India has seen some slowdown in recent months. As the group generates about 20% of sales in the Asian region the economic progress of this region has direct implications for the group. Citi economists forecast EM GDP growth of 5.2% in 2012

FX headwinds impacted FY11 EBITDA by about SFr200m. The sharp appreciation of the Swiss Franc vs. the US\$ and the Euro in combination with a sharp rise in EM currencies vs. the US\$ were the main drivers behind this. Volatility in the global FX markets pose a risk to our forecasts and the investment case.

DSM NV

Company description

DSM is a global science-based company active in health, nutrition and materials. The company is now in integration mode after substantially ending its acquisition spree and successfully exiting from all of its non-core activities. The company's focus is now to expand and develop its nutrition activities where it has invested €2.4bn.

Investment strategy

We rate DSM Buy (1). The fundamentals of the company look strong. DSM has invested over €2.5bn on ten acquisitions in the past two years. It has substantially boosted the scope of its Nutrition division. The plan is to exploit the growing nutrition needs of the global population. For human health, the drivers are convenience, safety and wellbeing and for animal health the main driver is the efficiency of meat production. DSM is trying to meet these needs and trends with an integrated product offering to these two segments. We believe Nutrition is capable of growth at about 6%, sustain margins of above 20% sustainably and require modest capex. The profit and cash generation profile of this business is similar to the flavour and fragrance segment. Its materials activities are close to trough earnings although we do not expect recovery before 2015. A combination of synergies from recent acquisitions and restructuring should lead to sustained growth in EPS and the potential for rerating.

Valuation

Our DCF analysis, which assumes a WACC of 7.5%, sustainable ROCE of 12%, long-term restructuring costs of 0.8% of sales and mid-term growth of 3%, indicates a fair value of €69. We see the potential to sustain growth and strong cash generation in the Nutrition businesses as good, but there is a risk to earnings from volatility in the industrial activities given their sensitivity to broader economic factors, notably the rising oil price. Hence we see it as prudent to set our target price at a discount to the value suggested by our DCF at €65.

Risks

We would highlight the following risks to our valuation and target price.

The key risks include price pressures in Vitamins, and overcapacity in pharmaceutical intermediate markets. Margins in its Industrial Chemicals division have historically been very volatile. Finally, DSM has a significant bias towards European-based production. While it does hedge some of its currency exposure, a significant weakening of the US dollar could have a material impact on the group's earnings. If the impact from these factors proves to be greater than we anticipate, the stock will likely have difficulty achieving our target price. If the impact proves to be less than we anticipate, the stock could materially outperform our target price.

Evonik

Company description

Evonik is a specialty chemical company focused on C3 and C4 chain of chemicals. It has a strong market position across its business with around 80% of sales coming from market leading positions. Its specialty chemical business is divided into three segments: Consumer, Health & Nutrition, Resource Efficiency and Specialty Materials.

Investment strategy

We rate Evonik as Sell. The prospects for 2013 and 2014 look challenging. Trading conditions are coming off the pricing power-led boom that peaked in 2011/2012. There are two issues: 1) the supply of co-products looks set to exceed demand for the medium term notably for propylene and butadiene. With just over 60% of sales derived from co-products, there is a high probability of a fairly general increase in competitive pressure across the bulk of the portfolio; 2) In addition, our research shows that supply growth is likely to exceed demand over the medium term significantly in four important product segments that generated about 45% of EBIT in 2012 : a) C4 activities – capacity growth of 4% p.a; b) MMA – 20% increase in supply in next 3 to 4 years; c) PMMA - supply growth from 10% to 25% ; d) Methionine – capacity growth of 41% to 2105E.

Valuation

We use three stage DCF to value the company. Our model yields a fair value of €27 per share, with key assumptions being WACC of 8.9%, sustainable ROCE of 10.9% and long-term growth rate of 3%. We set our target price at €24. This discount to DCF valuation is due to number of reasons: 1) initially it is more likely to be compared using standard metrics to its peers, which warrants discount to its existing multiples; 2) it is a new equity and the lack of a track record, as a traded share, suggests investors should take a somewhat cautious view of the outlook; 3) only 14% of the stock is quoted at present and the two major shareholders plan to sell down their stakes and 4) we are more cautious on the EPS outlook that the company's current outlook comments and if we are right, then the company will need to downgrade its expectations within the coming quarters, which is also likely to impact sentiment.

Risks

We would highlight the following risks to our valuation and target price

Economic activity – Should economic activity, especially in Europe, improve materially, Evonik would see a better than currently anticipated earnings development; Methionine accounts for one quarter of group EBITDA with margins close to 40%, according to our estimates. We see Industry capacity growth c 40% over the next five years and as such downside risk for Evonik's margins. Any delays in the start ups or cancellation of expansion projects would result in a much more favourable margin outlook for this business vs our current expectations of margin pressure; Co-products – We anticipate a generally better supplied market going forward resulting in a less profitable outlook for Evonik. However, project delays and cancellations could lead to tighter than currently anticipated co-product chains; Currencies – Euro depreciate materially vs. other major currencies, the sales and earnings outlook for Evonik would improve; Disposal of non-core assets – The growth strategy is reliant of the funding from the disposal of non-core assets (real estate and power plants). These disposals may realize substantially more/less than expected especially if financial markets improve/deteriorate.

Lanxess

Company description

Lanxess generates about €9bn of sales. The company's rubber activities generate half of the sales with the other half coming from specialty chemicals (leather treatment, rubber additives, ion exchange) and basic and fine chemicals. The company has undergone a significant restructuring process divesting about €1.5bn of business (by sales) since its formation, including highly cyclical businesses such as styrenics. With the majority of divestments completed, the focus is now on growth by continuing to extract better performance from existing businesses and expanding capacity in Performance Polymers

Investment strategy

We have a Sell (3) rating. Lanxess has so far delivered on cash generation, EPS performance and restructuring gains. In 2010 and 2011 the company benefitted from tight butadiene markets and strong synthetic rubber demand. Pricing has been key to the success story. In 2013, however, we think earnings momentum could stall. More butadiene and synthetic rubber supply and sluggish demand from the tyre industry should lead to a more competitive environment. Higher D&A and pension charges and plant start-up costs should put additional pressure on EPS. Consensus seems to currently underestimate these challenges and we think downgrades are likely.

Valuation

Our target price of €37 is driven mainly by our view of the cash flow potential of the group. Our DCF analysis uses a WACC of 8.8%, beta of 1.5 and long-term growth rate of 2%. We set our target price in line with our DCF-derived fair value of €37.

Risks

We would highlight the following key risks to our valuation and investment thesis.

If some of the announced butadiene capacity expansion projects are not realised, butadiene markets look more balanced. This would provide upside risk for prices and result in a better earnings outlook for the company than currently anticipated by us.

In addition, a stronger-than-expected improvement in the macro-environment would provide upside to our current estimates. We expect tyre markets to remain challenging in 1H13. However, should sentiment improve earlier than expected, we expect LXS customers to come back to the market, which could result in a stronger-than-expected volume development

Notes

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

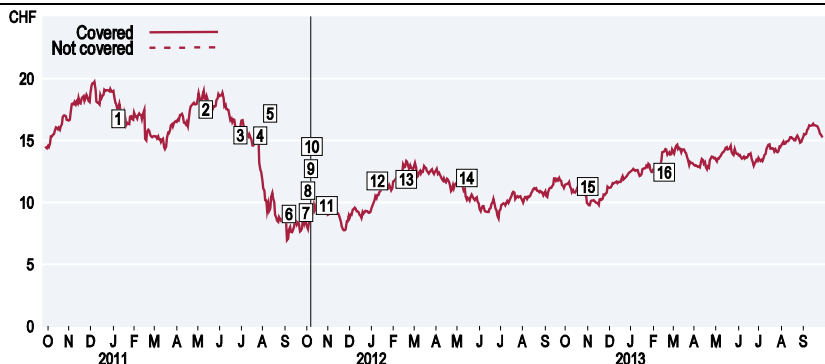
Clariant AG (CLN.VX)

Ratings and Target Price History

Fundamental Research

Analyst: Dominik Frauendienst

Covered since May 12 2011



Date	Rating	Target Price	Closing Price
1 10-Jan-11	2H	*18.00	17.54
2 12-May-11	*1H	*26.00	18.33
3 30-Jun-11	1H	*24.00	16.07
4 28-Jul-11	1H	*20.00	12.60
5 11-Aug-11	1H	*18.00	9.53
6 7-Sep-11	*2H	*8.00	7.79

* Indicates change

Date	Rating	Target Price	Closing Price
7 30-Sep-11	2H	*9.00	8.30
8 4-Oct-11	2H	*8.50	7.86
9 7-Oct-11	Stock rating system changed		
10 8-Oct-11	*2	8.50	8.73
11 31-Oct-11	2	*9.50	9.60
12 10-Jan-12	2	*10.00	10.61

Date	Rating	Target Price	Closing Price
13 20-Feb-12	*1	*17.00	13.35
14 15-May-12	1	*15.00	10.23
15 1-Nov-12	1	*14.00	9.90
16 18-Feb-13	1	*16.00	14.13

Rating/target price changes above reflect Eastern Standard Time

Clariant AG (CLN.VX)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Dominik Frauendienst

Covered since May 12 2011



Date	Rating	Target Price	Closing Price
1 9-Jun-11	*ADD MP	-	17.90

* Indicates change

Date	Rating	Target Price	Closing Price
2 12-Sep-11	*REM MP	-	7.59

Date	Rating	Target Price	Closing Price
3 5-Aug-13	*ADD MP	-	14.90

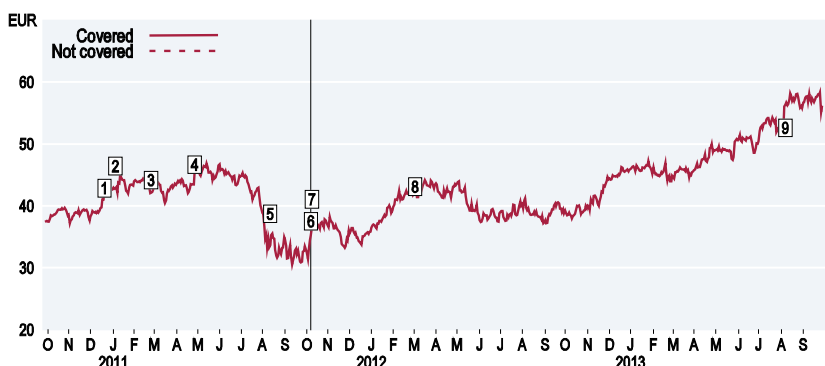
Rating/target price changes above reflect Eastern Standard Time

DSM NV (DSMN.AS)

Ratings and Target Price History

Fundamental Research

Analyst: Andrew Benson



	Date	Rating	Target Price	Closing Price
1	21-Dec-10	*1M	*47.00	42.60
2	5-Jan-11	1M	*50.00	42.88
3	24-Feb-11	1M	*52.00	42.12

* Indicates change

	Date	Rating	Target Price	Closing Price
4	27-Apr-11	1M	*55.00	45.55
5	11-Aug-11	1M	*50.00	33.68
6	7-Oct-11	Stock rating system changed		

	Date	Rating	Target Price	Closing Price
7	8-Oct-11	*1	50.00	35.21
8	2-Mar-12	1	*55.00	42.81
9	7-Aug-13	1	*65.00	56.35

Rating/target price changes above reflect Eastern Standard Time

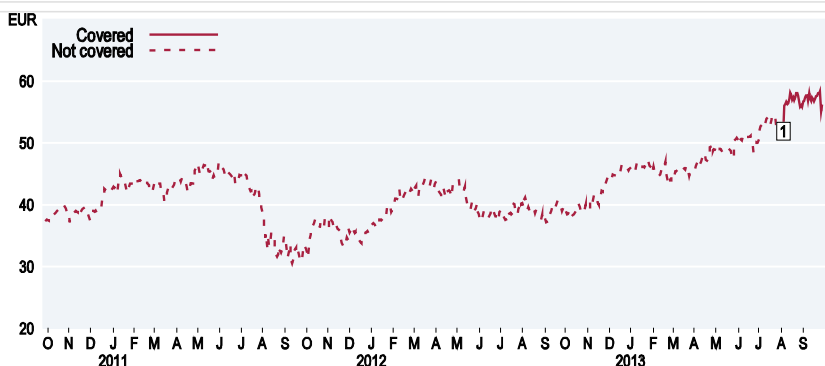
DSM NV (DSMN.AS)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Andrew Benson



	Date	Rating	Target Price	Closing Price
1	5-Aug-13	*ADD MP	-	52.67

* Indicates change

Rating/target price changes above reflect Eastern Standard Time

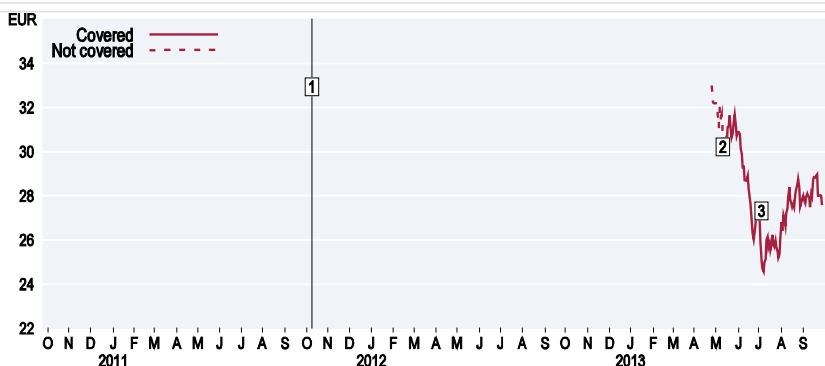
Evonik (EVKn.DE)

Ratings and Target Price History

Fundamental Research

Analyst: Andrew Benson

Covered since May 10 2013



	Date	Rating	Target Price	Closing Price
1	8-Oct-11	Stock rating system changed		

* Indicates change

	Date	Rating	Target Price	Closing Price
2	10-May-13	*3	*28.00	30.60

	Date	Rating	Target Price	Closing Price
3	4-Jul-13	3	*24.00	25.02

Rating/target price changes above reflect Eastern Standard Time

Evonik (EVKn.DE)

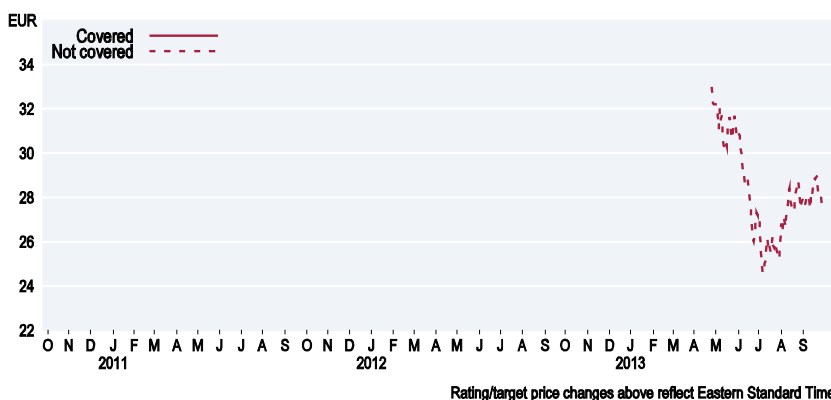
Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Andrew Benson

Covered since May 10 2013



* Indicates change

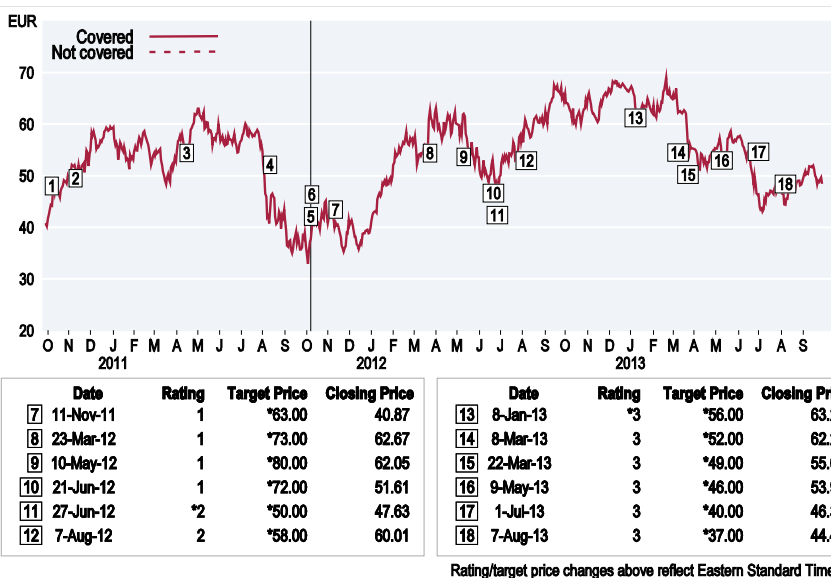
Lanxess (LXSG.DE)

Ratings and Target Price History

Fundamental Research

Analyst: Dominik Frauendienst

Covered since October 8 2010



Date	Rating	Target Price	Closing Price
1 7-Oct-10	*1H	*55.00	44.19
2 10-Nov-10	1H	*60.00	51.15
3 15-Apr-11	1H	*70.00	55.29
4 11-Aug-11	1H	*66.00	43.96
5 7-Oct-11	Stock rating system changed		
6 8-Oct-11	*1	66.00	37.67

Date	Rating	Target Price	Closing Price
7 11-Nov-11	1	*63.00	40.87
8 23-Mar-12	1	*73.00	62.67
9 10-May-12	1	*80.00	62.05
10 21-Jun-12	1	*72.00	51.61
11 27-Jun-12	*2	*50.00	47.63
12 7-Aug-12	2	*58.00	60.01

Date	Rating	Target Price	Closing Price
13 8-Jan-13	*3	*56.00	63.27
14 8-Mar-13	3	*52.00	62.21
15 22-Mar-13	3	*49.00	55.66
16 9-May-13	3	*46.00	53.92
17 1-Jul-13	3	*40.00	46.33
18 7-Aug-13	3	*37.00	44.40

* Indicates change

Lanxess (LXSG.DE)

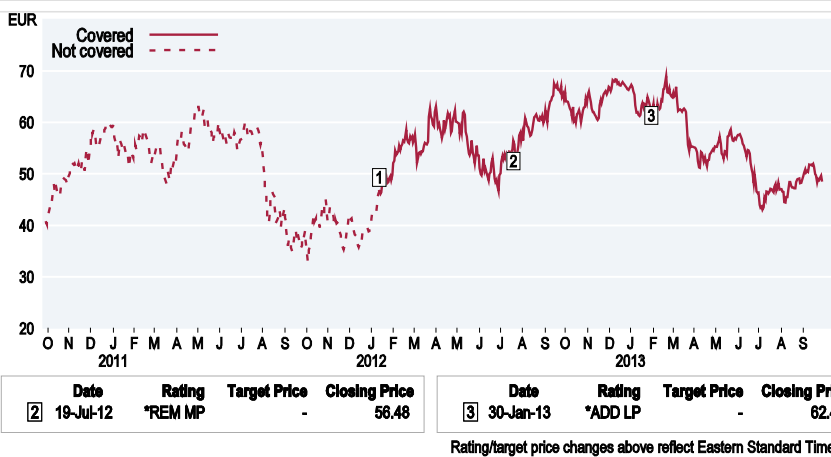
Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Dominik Frauendienst

Covered since October 8 2010



Date	Rating	Target Price	Closing Price
1 12-Jan-12	*ADD MP	-	46.62

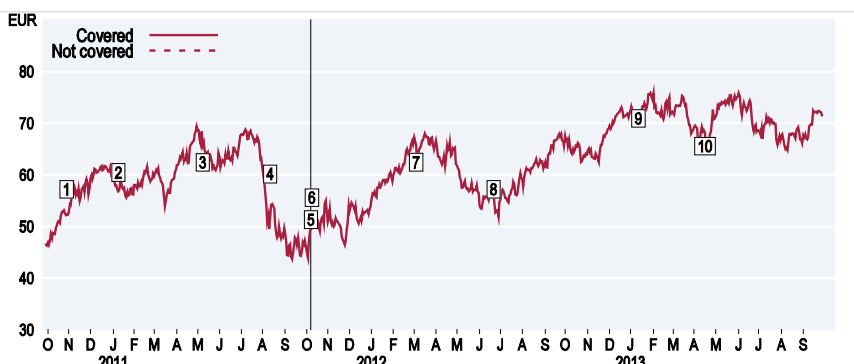
Date	Rating	Target Price	Closing Price
2 19-Jul-12	*REM MP	-	56.48

Date	Rating	Target Price	Closing Price
3 30-Jan-13	*ADD LP	-	62.41

* Indicates change

BASF SE (BASFn.DE) **Ratings and Target Price History** **Fundamental Research**

Analyst: Andrew Benson
Covered since June 9 2011



	Date	Rating	Target Price	Closing Price
1	28-Oct-10	1M	*60.00	52.37
2	10-Jan-11	1M	*67.00	58.78
3	9-May-11	1M	*75.00	65.64
4	11-Aug-11	1M	*72.00	52.23

* Indicates change

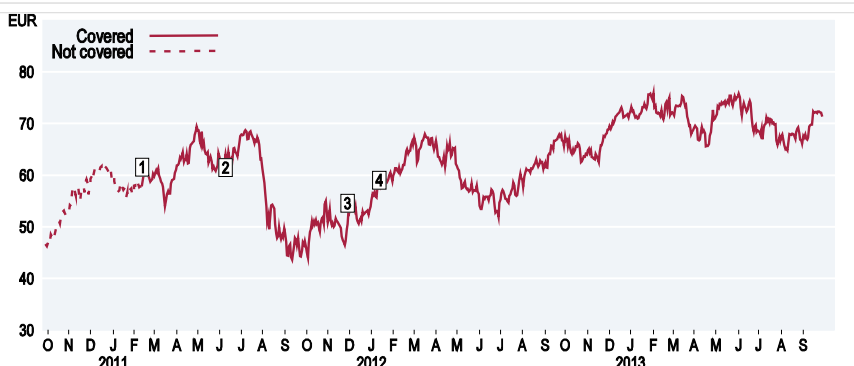
	Date	Rating	Target Price	Closing Price
5	7-Oct-11	Stock rating system changed		
6	8-Oct-11	*1	72.00	49.49
7	5-Mar-12	*2	*70.00	65.65
8	21-Jun-12	2	*60.00	56.35

	Date	Rating	Target Price	Closing Price
9	11-Jan-13	2	*75.00	71.00
10	16-Apr-13	2	*72.00	68.12

Rating/target price changes above reflect Eastern Standard Time

BASF SE (BASFn.DE) **Ratings and Target Price History** **Best Ideas Research** **Relative Call (3 Month)**

Analyst: Andrew Benson
Covered since June 9 2011



	Date	Rating	Target Price	Closing Price
1	11-Feb-11	*ADD MP	-	58.04
2	9-Jun-11	*REM MP	-	64.00

* Indicates change

	Date	Rating	Target Price	Closing Price
3	29-Nov-11	*ADD MP	-	50.56
4	12-Jan-12	*REM MP	-	58.20

Rating/target price changes above reflect Eastern Standard Time

Citigroup Global Markets Ltd is currently mandated as advisor to Clariant AG in relation to their announced evaluation of their strategic options for some of their Business Units.

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Data current as of 30 Sep 2013

	12 Month Rating			Relative Rating		
	Buy	Hold	Sell	Buy	Hold	Sell
Citi Research Global Fundamental Coverage	48%	40%	12%	6%	87%	6%
% of companies in each rating category that are investment banking clients	55%	50%	43%	64%	51%	48%

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