

FILE

Confidential Release

Case Number: 09-119-EL-AEC

Date of Confidential Document: 8/29/2013

Release Date: 3/22/19

Page Count: ~~59~~ 32

PUCO

2019 MAR 22 PM 4:31

RECEIVED-POCKETING DIV

Document Description: Exhibit IEU-Ohio #5, OCC #2

“Consent to Release to the PUCO DIS Website”

Name Sarah J. Parrot
Reviewing Attorney Examiner's Signature

Date Reviewed 03/22/19

This is to certify that the images appearing are an accurate and complete reproduction of a data file document delivered in the regular course of business.
Technician A Date Processed 3/22/19

RECEIVED

AUG 29 2013

CONFIDENTIAL

DOCKETING DIVISION
Public Utilities Commission of Ohio

Confidential treatment has been requested for the following document:

Case # 09-119-EL-AEC

➤ Page Count 31 pgs

➤ Date Filed 8/29/13

➤ Filed by M. DiPaolo Jones on behalf of
Armstrong - Okey, Inc.

❖ Summary of document:

Exhibit IEU-Ohio # 5



> aluminum intelligence unit
the global leader in aluminum industry analysis and outlook

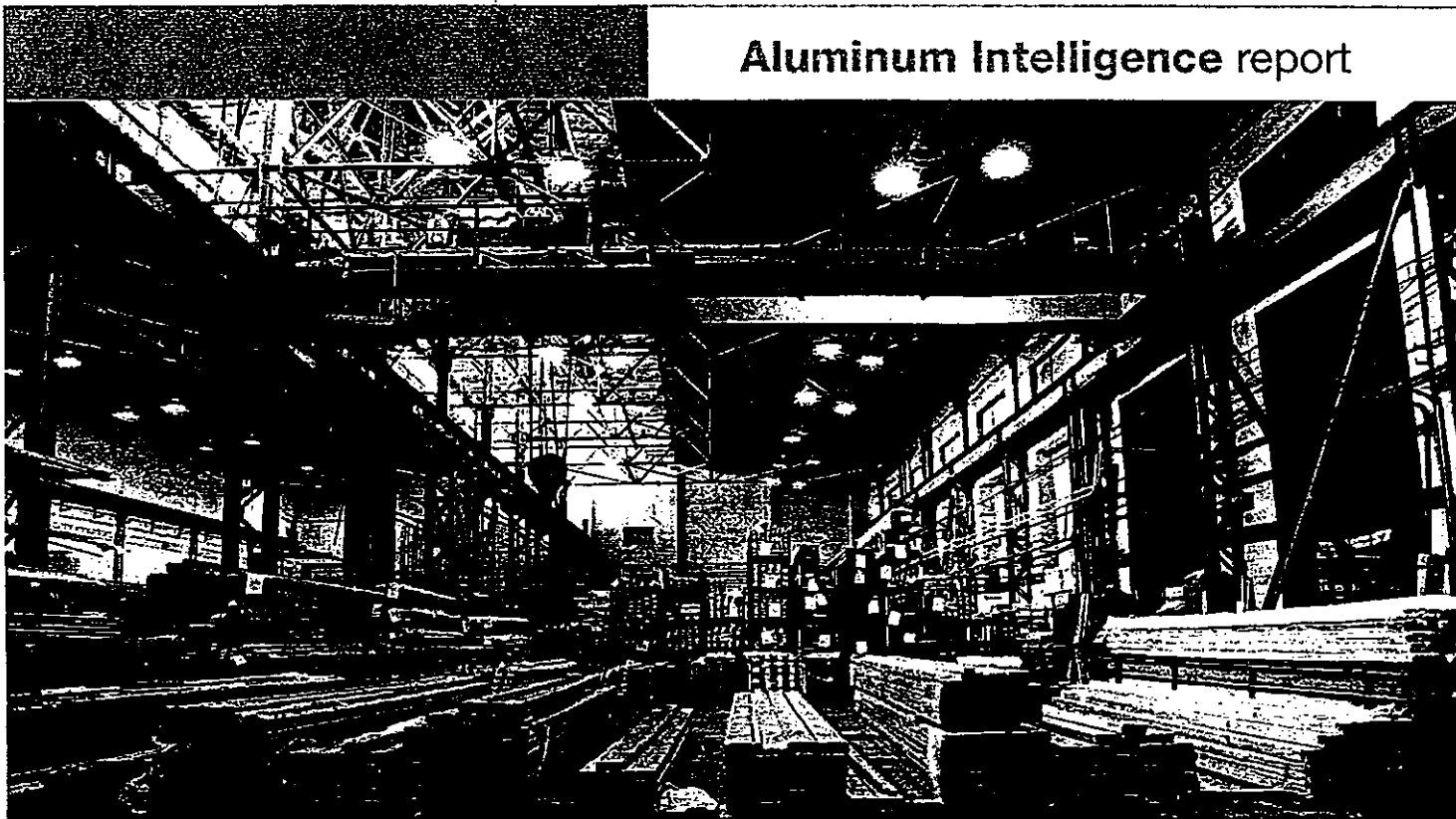
IEU Ex. 5

RECEIVED

AUG 29 2013

DOCKETING DIVISION
Public Utilities Commission of Ohio

Aluminum Intelligence report



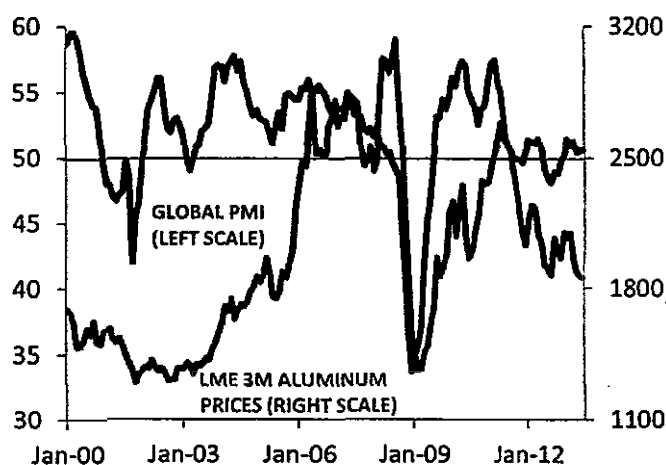
> Record Bearishness Towards Aluminum's Industry Fundamentals

MONTHLY FULL REPORT
June-July 2013

> Record Bearishness Towards Aluminum's Industry Fundamentals

1 Global manufacturing activity (end-user aluminum demand) remains stagnated

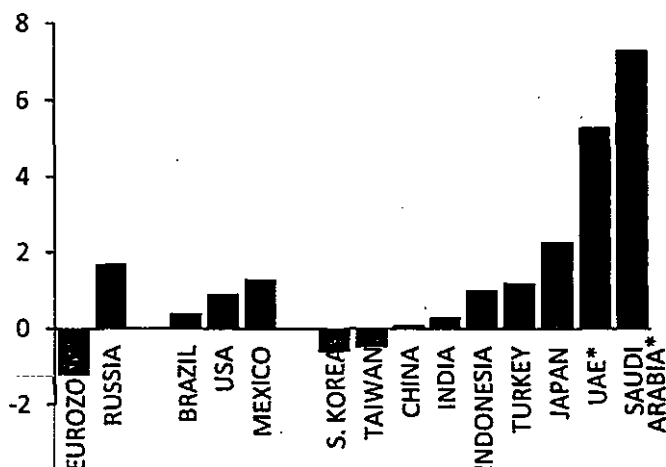
JP MORGAN GLOBAL MANUFACTURING PMI vs LME 3M ALUMINUM PRICES (monthly data)



Source: HARBOR Aluminum with LME and Markit Economics data

2 The Middle East is growing the most, the Americas have some momentum, but Asia (excluding Japan) is not growing

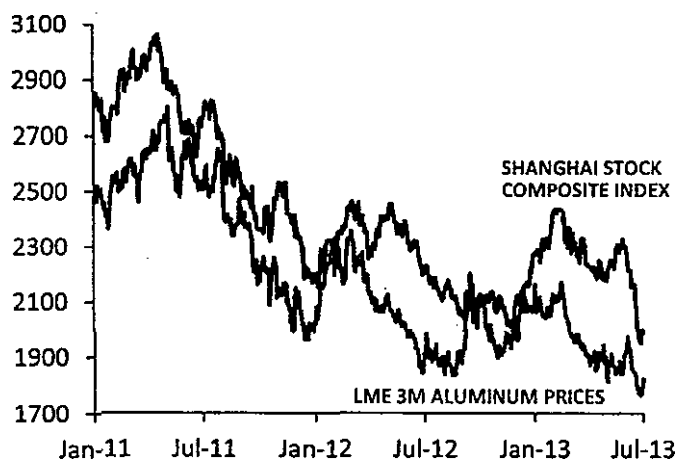
REGIONAL MANUFACTURING ACTIVITY GROWTH IN JUNE (monthly % change)



Source: HARBOR Aluminum with Markit Economics, ISM and CFLP data
*Non-oil producing private sector; May data

3 In fact, mounting concerns over China's economy have pressured down the local stock market and most metals...

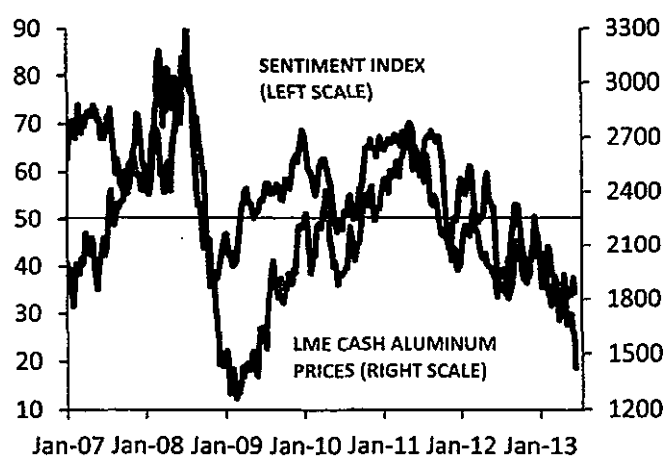
SHANGHAI STOCK COMPOSITE INDEX VS LME 3M ALUMINUM PRICES (index vs \$/mton)



Source: HARBOR Aluminum with LME and Bloomberg data

4 ...which in part have further depressed market sentiment towards the aluminum industry along with...

HARBOR's ALUMINUM MARKET SENTIMENT INDEX* (weekly data; index vs \$/mton)

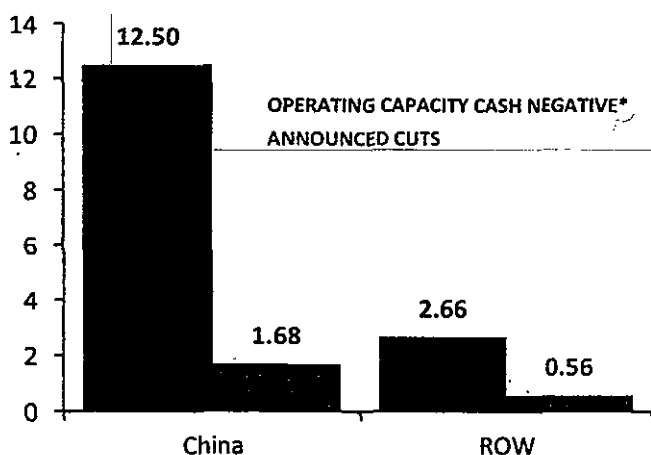


Source: HARBOR Aluminum with LME data
*Index above (below) 50 signals market sentiment is bullish (bearish)

> Record Bearishness Towards Aluminum's Industry Fundamentals

5 ...overproduction, overcapacity and an unprecedented overhang of metal

**PRIMARY ALUMINUM PRODUCTION CAPACITY
UNDERWATER VS ANNOUNCED CUTS** (million mtpy)

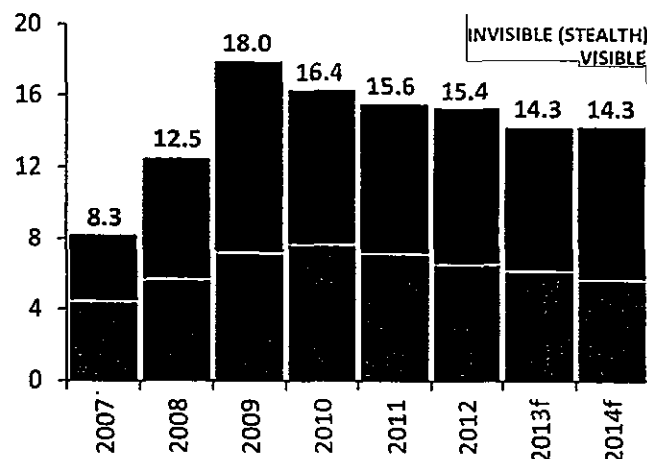


Source: HARBOR Aluminum

*Cash cost after casting; assuming LME prices of \$1,793 per mton and SHFE 1M prices of \$2,355 per mton

6 The unprecedented overhang of metal is not likely to be worked out in the short/mid term

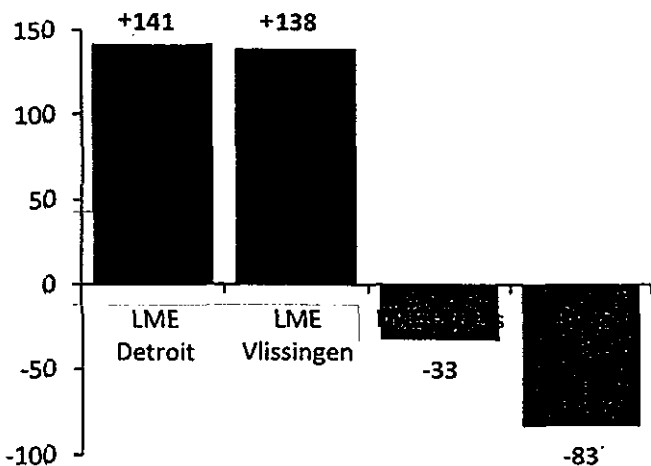
GLOBAL ALUMINUM INVENTORY-DEMAND COVERAGE
(inventories in terms of weeks of consumption)



Source: HARBOR Aluminum

7 The producer/trader/warehousing model continued as evident by large inventory buildups/cancellations in Vlissingen and Detroit

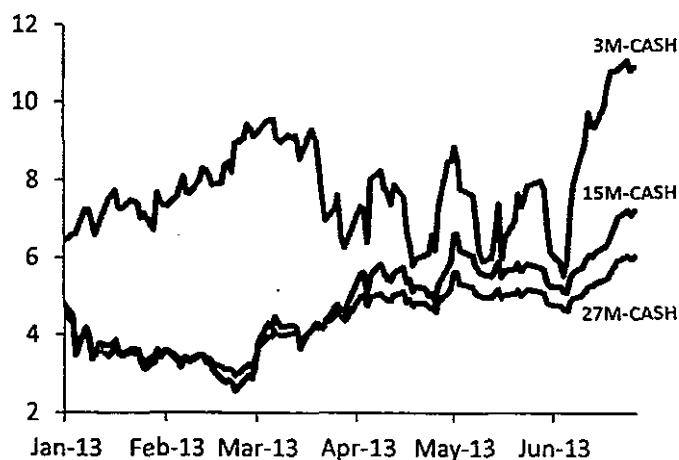
GLOBAL COMMERCIAL INVENTORY CHANGE IN JUNE
(thousand mtons; month-to-date change as of June 26th)



Source: HARBOR Aluminum with LME, SHFE and SMM data.

8 A widening contango, has pushed the profitability of cash and carry trade to a 4-year high...

LME ALUMINUM FORWARD CURVE SPREADS
(daily data; % annualized yield)



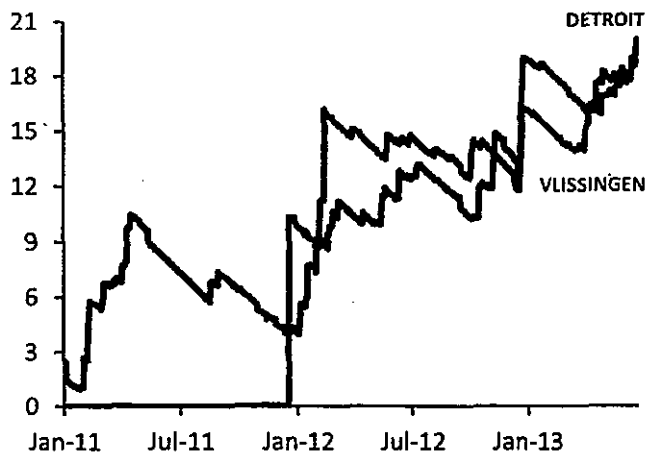
Source: HARBOR Aluminum with LME data

> Record Bearishness Towards Aluminum's Industry Fundamentals

9 ...as a result, load out queues at LME Detroit & Vlissingen warehouses have further lengthened to fresh record highs

QUEUES FROM KEY LME LOCATIONS

(max. delivery time in months for a warrant if canceled today)

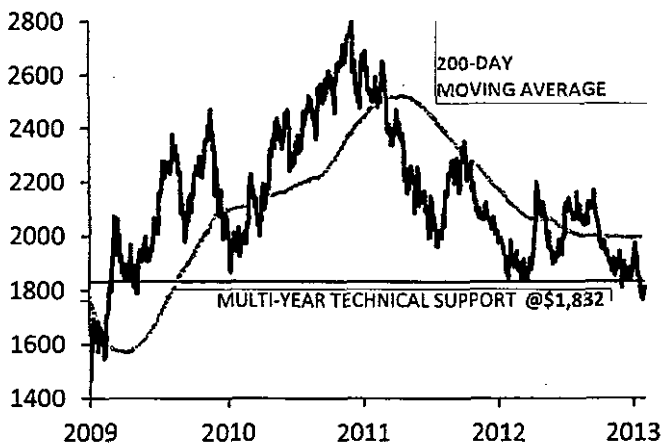


Source: HARBOR Aluminum

11 ...pushing prices below the multi-year long support of \$1,832 per mton and to levels as low as \$1,759 per mton...

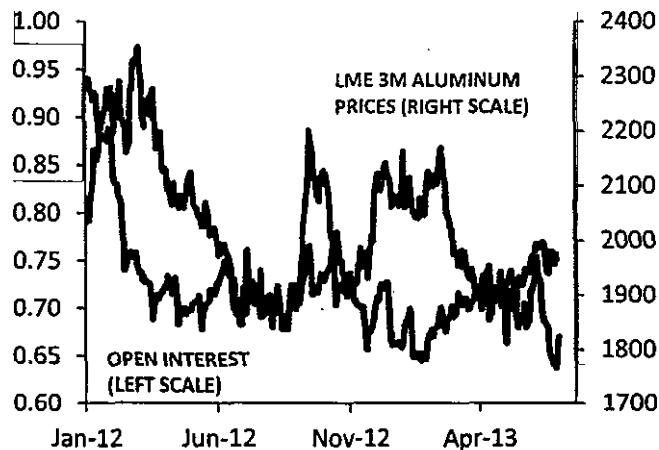
LME 3M ALUMINUM PRICES

(daily data; \$/mton)



Source: HARBOR Aluminum with LME data

10 In this context, a new round of heavy long liquidation by funds and increasing short selling re-emerged...

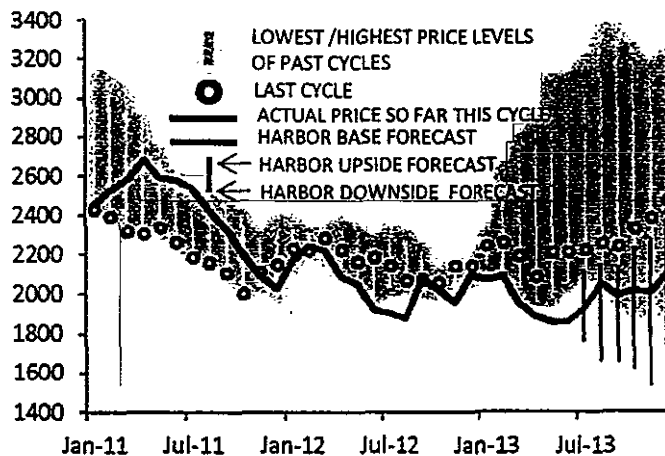
LME 3M ALUMINUM PRICES VS FUTURES OPEN INTEREST
(\$/mton vs million contracts)

Source: HARBOR Aluminum with LME data

12 ...which has opened the downside to \$1,650 per mton (74.8 cent/lb); expect at least slightly higher prices in 2014

HARBOR'S ALUMINUM PRICE CYCLICAL ANALYSIS

(expected price range; monthly averages, \$/mton)



Source: HARBOR Aluminum

> Record Bearishness Towards Aluminum's Industry Fundamentals

Takeaways:

- * Record bearishness amid overproduction, overcapacity & metal overhang
- * Bearish sentiment compounded by rising concerns over China
- * Aluminum demand outlook is positive beyond short term headwinds...
- * ...but global aluminum output growth to accelerate too in China/ROW
- * Metal overhang not likely to diminish in the short/mid term
- * HARBOR downgraded its price forecasts; still sees higher prices in 2014

DEMAND

Market's intense bearish sentiment towards aluminum compounded by mounting concerns over global manufacturing activity and China. Global manufacturing activity in June (end-user aluminum demand) continued roughly stalled with either contraction or stagnation widespread among every major aluminum consuming region. China's manufacturing activity has now more than 12 months in stagnation mode (m/m), which adds to the perception of a structural demand slowdown in China's economy. The US resumed some manufacturing expansion in June, after contracting in May. Growth pace still slower vs Q1. The Eurozone contracted at a slower rate, but still contracted for the twentieth-third consecutive month. India didn't grow for the second month in a row, worst streak since March 2009. Brazil remains stagnated after a positive start of the year, while more resilient markets such as Turkey, Indonesia, South Korea and Mexico are in a clear slowdown mode. The Middle East was practically the only spot still delivering robust manufacturing acceleration. Japan was also an exception as it grew at its fastest pace in twenty-two months, although growth remains far from robust. Once again, the bottom line is that disappointing global end-user demand readings out of China, US, India, Brazil and Europe add to the intense bearish sentiment the market has had towards aluminum given the context of overproduction, overcapacity and unprecedented overhang of metal. HARBOR's proprietary *Aluminum Market Sentiment Index* has dropped to a fresh record low, while overall levels of fear as measured by regional VIX indexes have increased to year highs.

Aluminum's mill shipments less discouraging. In China, official data shows no major slowdown in B&C, while the auto sector continues to deliver double-digit annual growth rates and electrical sector demand is heard strong amid power grid projects. However, aluminum semis output fell 2.3% m/m in May, first monthly decline in four months. In annual terms, growth pace remained healthy. In the US, autos continue to be the bright spot in the equation, while B&C recovery path remains on track. However, the growth pace in both sectors has almost halved so far this year vs same period of 2012 with flat rolled products shipments almost stalled (+0.8%) and extrusions marginally contracting (-0.7% ytd). Castings and aluminum conductor shipments (+5.0% ytd) have excelled by far. In West Europe, B&C has yet to find a bottom and extrusions shipments continues to contract y/y. Packaging is flat. Motor vehicles production grew y/y in March and April. However, car registrations were still declining y/y in May. Flat rolled product shipments in the Eurozone have actually delivered some growth in the year (5.6% average annual growth in Jan-Apr). In Japan, extrusion shipments no longer declining y/y after eight months of contraction, while flat rolled products shipments remain in

contraction zone (auto production has improved, but still well inside y/y contraction). The rest of Asia remains as a bright spot. At the margin, rapid rates of growth seen for VAP in South Korea, billet in Taiwan and P1020 and billet in Turkey. Strong growth continues to be cited out of the Middle East region, while Latin America is also adding to the demand equation. In Mexico, castings excelling at the margin, but flat rolled products and extrusions shipments growing less than expected. In fact, construction in the country has contracted y/y in January-April. In Brazil, flat rolled product and extrusion shipments grew 7.5% and 4.4% respectively y/y in Jan-Apr, while wire & cable was off by 30% in Q1.

Primary aluminum demand doing better than last year and expected to gain momentum. Year to date (up to April), HARBOR estimates that global primary aluminum demand has grown by 6.4%, more than the 4.7% registered during Jan-Apr 2012. China grew 7.1% vs 6.2% in the same period of last year, while ROW grew 5.1% vs 3.8% in Jan-Apr 2012. HARBOR expects global primary aluminum demand to grow faster this year vs 2012, although recovery continues to be slower than expected (primary demand probably slowed down in May-June). Beyond the short term, the outlook for aluminum demand is constructive on the back of positive demographics (in the Emerging World excluding China and in the US), pent-up demand, aluminum penetration in transportation, and as manufacturing activity enters in a growth/acceleration mode as the cycle advances. Possible demand/financial shocks in Europe and the US, and a slower-than expected demand recovery in China could lower aluminum demand's growth rate below expectations. We expect global primary aluminum demand to grow 6.1% in 2013 and gain momentum in 2014 by growing 8.2% with Chinese demand growing 7.9% and 9.8% and ROW growing 4.6% and 6.9% respectively.

PRODUCTION & COSTS

Primary output economics worsens further. LME cash prices have fallen 16% from this year's peak and 36% from the peak they reached in early May 2011. Primary aluminum output capacity operating underwater has increased by 41% compared to a month ago. HARBOR now estimates that global primary aluminum production capacity operating underwater on a cash cost basis considering income from regional premiums now adds 15.1 million mtpy vs 10.7 million mtpy a month ago with most of this capacity located in China (12.5 million mtpy). In ROW, capacity losing money on a cash cost basis after considering the effective realized price of aluminum (including premiums given each smelter's casthouse products mix) is today around 2.655 million mtpy (9% of operating capacity) vs 0.6 million mtpy at the end of 2012. Unprofitable capacity in ROW is located mainly in West Europe (37% of total

unprofitable capacity in ROW), Oceania (28%), East Europe (20%) and North America (15%). See HARBOR's *Aluminum Smelting Cash Cost Curve Report* for a detailed smelter by smelter analysis.

Producers unable to cut as needed. The fact is that the average profit margin for aluminum producers was negative in 2012 and remains so today. Nevertheless, a sizable portion of the current cash negative capacity has managed to survive on the back of government subsidies/incentives in the form of electricity tariff discounts and/or low fuel prices mainly in China but also in ROW. So far this year, production capacity cuts in China add up to only 1.68 million mtpy (represents 13% of today's cash negative capacity). In ROW, only 563,000 mtons of capacity have been officially curtailed (21% of capacity currently operating underwater). In fact, global primary output was roughly unchanged in May, decreasing by a marginal 0.2% monthly rate (-0.4% in ROW and +0.1% in China). ROW production fell only by 98,915 mtons annualized dragged down mainly by small cuts in India (*Nalco*), Eastern Europe (*Rusal* and probably other small producers) and North America (*Alcoa Baie-Comeau*). Meanwhile, Chinese production was roughly stalled and near record highs as smelting curtailments mainly in Shaanxi, Guangxi, Henan and Hubei provinces offset increases from the ramping up of new projects in the Northwest. In June, *Chalco* began idling production capacity of 380,000 mtpy while *Xinfa* announced the idling of 200,000 mtpy at Guangxi province also starting this month, while in ROW, *Rusal* and *Alcoa* should have continued to execute planned curtailments, small disruptions were confirmed in Argentina, and profitability pressures continued in Montenegro and Bosnia. Even taking these new expected cuts into account, the bottom line remains that curtailments so far announced seem almost irrelevant given the ongoing record overhang of metal in the industry.

Even more aluminum production coming. Aluminum production is scheduled to boom in the next six months. In ROW, expansions adding up to 1.46 million mtpy are currently on their ramp up stage: *Ma'aden-Alcoa's* smelter in Saudi Arabia, *Hindalco's* Mahan & *Vedanta's* Korba III in India, *Press Metal's* Sarawak II in Malaysia, and *RTA's* AP60 in Canada. Additionally, another three projects adding up to 2.45 million mtpy should begin production in Q4 of this year: *Emal* Phase II in Abu Dhabi, and *Vedanta's* Jharsuguda II along with *Hindalco's* Aditya in India. In China, production in the Northwest is scheduled to accelerate further in the next 12 months and add at least another 4 million tons per year of capacity. Assuming no further curtailments and/or disruptions, HARBOR expects global aluminum production to grow 4.8% (2.3 million tons) in 2013 and to accelerate to 11% or 5.3 million tons in 2014. No lack of aluminum is expected in the next months at all.

BALANCE & INVENTORIES

So far this year the global market has generated a surplus. Between January and April, the global primary aluminum market generated a surplus of 381,000 mtons vs 434,000 in the same period of 2012. HARBOR estimates that in April, total global stocks (visible and stealth) reached 14.43 million mtons (vs 14.09 million tons in April 2012) with visible stocks up by 667 thousand mtons y/y to 8.55 million mtons and stealth stocks down by 371 thousand mtons. In Jan-Apr 2013, China delivered a surplus of 561,412 mtons (vs 176,828 mtons in Jan-Apr 2012), while ROW experienced a deficit of 180,230 mtons (vs a surplus of 256,985 mtons in Jan-Apr 2012).

LME inventories reached a record high in June. LME aluminum inventories registered a buildup of 233,600 mtons in June, reaching a fresh high of 5.45 million mtons. Net inflows were concentrated at Detroit (+136,450 mtons) and Vlissingen (+132,375 mtons) warehouses. Additionally, these locations also experienced a 221,775 mtons combined increase in canceled warrants (metal booked for warehouse withdrawal), lengthening load out queues to record levels above 19 months.

The LME aims to end warehousing model behind premiums bubble. The LME announced early last week plans to tackle the unprecedented lengthy queues to load-out metal from Detroit and Vlissingen warehouses. These unprecedented queues are in HARBOR's view the main reason behind record aluminum premiums. The aim is to revert queues and make sure it doesn't happen again. Plans are under consultation mode. Official approval is due by next October and implementation in next April. HARBOR believes this measure represents the end of the biggest rally ever in spot premiums and, at best, a gradual decline with relevant odds of a sharp adjustment scenario. This represent a robust case in avoiding locking premiums. HARBOR will discuss in detail in our soon-to-be-released *Aluminum Premiums Report (Q3 2013)*.

Without meaningful output curtailments or/and disruptions, expect another surplus next year. HARBOR estimates that the global primary market could end 2013 in a 178,000 mtons marginal deficit (160,000 mtons in China and 18,000 mtons in ROW). As we have been mentioning consistently, this marginal deficit is irrelevant in the context of the record overhang of metal that the industry has generated over the past six years. In fact, assuming no more curtailments and/or disruptions, HARBOR expects this marginal and irrelevant deficit to turn into a surplus of 1.19 million mtons next year (0.24 million mtons in China and 0.95 million mtons in ROW) given the numerous expansions taking place in China and ROW.

PRICE OUTLOOK

Aluminum prices have fallen 15% so far this year and closed on July the 5th at the lowest weekly level since June 2009. LME 3M aluminum prices are trading at \$1,768 per mton (80 cent/lb), the lowest price ever in real terms after adjusting by the cycle. Aluminum is also trading at a record low valuation vs oil. From a technical standpoint, prices are in a short term downward trend and headed towards \$1,650 per mton (75 cent/lb) after multi-year support of \$1,832 per mton (83 cent/lb) failed in June.

HARBOR has downgraded its 2013-2014 price forecasts, although still sees at least slightly higher prices in 2014 amid expectations of a pickup in global manufacturing activity given leading indicators and monetary stimulus, falling aluminum inventories in terms of weeks of consumption (in spite of a nominal surplus) and some fund short covering. HARBOR has downgraded its base scenario for 2013 (odds lowered to 50% from 60%) from \$1,968 (89 cent/lb) to \$1,923 per mton (87 cent/lb) and for 2014 basically unchanged at \$2,294 per mton (104 cent/lb). HARBOR has also downgraded its downside scenario for 2013 (odds raised to 40% from 30%) from \$1,842 (84 cent/lb) to \$1,778 per mton (81 cent/lb) and for 2014 from \$2,100 (96 cent/lb) to \$1,977 per mton (90 cent/lb).

ANNUAL FORECASTS BY REGION: PRIMARY ALUMINUM CONSUMPTION AND PRODUCTION
(thousand mtons)

GLOBAL ALUMINUM CONSUMPTION BY REGION

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013f | 2014f |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| China | 5,897 | 7,094 | 8,764 | 12,497 | 13,126 | 14,505 | 17,724 | 20,047 | 22,128 | 23,880 | 26,210 |
| y/y | 15.8% | 20.3% | 23.6% | 42.6% | 5.0% | 10.5% | 22.2% | 13.1% | 10.4% | 7.9% | 9.8% |
| World ex-China (ROW) | 24,322 | 24,537 | 25,429 | 25,121 | 23,990 | 20,145 | 23,740 | 25,411 | 25,466 | 26,634 | 28,461 |
| y/y | 10.8% | 0.9% | 3.6% | -1.2% | -4.5% | -16.0% | 17.8% | 7.0% | 0.2% | 4.6% | 6.9% |
| North America | 7,182 | 6,863 | 6,973 | 6,090 | 5,731 | 4,880 | 5,292 | 5,632 | 5,846 | 6,136 | 6,496 |
| of which USA | 6,380 | 6,093 | 6,180 | 5,345 | 5,062 | 4,112 | 4,590 | 4,890 | 5,120 | 5,379 | 5,700 |
| y/y | 12.2% | -4.4% | 1.6% | -12.7% | -5.9% | -14.8% | 8.4% | 6.4% | 3.8% | 5.0% | 5.9% |
| West Europe | 6,670 | 6,652 | 6,992 | 7,255 | 6,097 | 4,097 | 5,822 | 6,331 | 5,906 | 5,865 | 5,950 |
| y/y | 4.9% | -0.3% | 5.1% | 3.8% | -16.0% | -32.8% | 42.1% | 8.7% | -6.7% | -0.7% | 1.4% |
| East Europe | 1,721 | 1,867 | 2,011 | 2,109 | 2,086 | 1,825 | 1,950 | 2,050 | 2,130 | 2,265 | 2,400 |
| of which Russia | 910 | 960 | 1,034 | 1,063 | 1,031 | 882 | 938 | 990 | 1,020 | 1,090 | 1,144 |
| y/y | 0.6% | 8.5% | 7.7% | 4.9% | -1.1% | -12.5% | 6.8% | 5.1% | 3.9% | 6.3% | 6.0% |
| Japan | 2,427 | 2,390 | 2,419 | 2,270 | 2,203 | 1,807 | 2,095 | 2,035 | 1,985 | 2,015 | 2,065 |
| y/y | -0.1% | -1.5% | 1.2% | -6.2% | -3.0% | -18.0% | 15.9% | -2.9% | -2.5% | 1.5% | 2.5% |
| Other Asia | 3,720 | 3,982 | 4,190 | 4,413 | 4,668 | 4,475 | 5,190 | 5,802 | 5,985 | 6,458 | 7,125 |
| of which India | 868 | 930 | 1,020 | 1,125 | 1,227 | 1,428 | 1,653 | 1,860 | 1,882 | 2,030 | 2,250 |
| y/y | 20.7% | 7.0% | 5.2% | 5.3% | 5.8% | -4.1% | 16.0% | 11.8% | 3.2% | 7.9% | 10.3% |
| Middle East | 648 | 659 | 700 | 760 | 785 | 780 | 817 | 890 | 909 | 1,050 | 1,390 |
| y/y | 28.0% | 1.6% | 6.2% | 8.6% | 3.3% | -0.6% | 4.7% | 8.9% | 3.3% | 15.5% | 32.4% |
| Latin America | 1,171 | 1,306 | 1,325 | 1,348 | 1,490 | 1,411 | 1,660 | 1,750 | 1,785 | 1,895 | 2,040 |
| of which Brazil | 636 | 743 | 758 | 762 | 939 | 820 | 1,040 | 1,069 | 1,075 | 1,130 | 1,220 |
| y/y | 8.7% | 11.5% | 1.5% | 1.7% | 10.5% | -5.3% | 17.6% | 5.4% | 2.0% | 6.2% | 7.7% |
| Africa | 380 | 410 | 449 | 486 | 530 | 495 | 524 | 541 | 550 | 580 | 622 |
| y/y | 16.7% | 7.9% | 9.5% | 8.2% | 9.1% | -6.6% | 5.9% | 3.2% | 1.7% | 5.5% | 7.2% |
| Oceania | 403 | 408 | 370 | 390 | 400 | 375 | 390 | 380 | 370 | 370 | 373 |
| y/y | 3.9% | 1.2% | -9.3% | 5.4% | 2.6% | -6.3% | 4.0% | -2.6% | -2.6% | 0.0% | 0.8% |
| Global Consumption | 30,220 | 31,631 | 34,193 | 37,618 | 37,116 | 34,650 | 41,464 | 45,458 | 47,594 | 50,514 | 54,671 |
| y/y | 10.1% | 4.7% | 8.1% | 10.0% | -1.3% | -6.6% | 19.7% | 9.6% | 4.7% | 6.1% | 8.2% |

GLOBAL ALUMINUM PRODUCTION BY REGION

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013f | 2014f |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| China* | 6,589 | 7,743 | 9,317 | 12,598 | 13,600 | 13,630 | 17,600 | 19,600 | 22,300 | 23,720 | 26,451 |
| y/y | 20.6% | 17.5% | 20.3% | 35.2% | 8.0% | 0.2% | 29.1% | 11.4% | 13.8% | 6.4% | 11.5% |
| World ex-China (ROW) | 23,198 | 24,149 | 24,560 | 25,543 | 26,463 | 24,043 | 24,926 | 26,444 | 25,734 | 26,616 | 29,414 |
| y/y | 3.2% | 4.1% | 1.7% | 4.0% | 3.6% | -9.1% | 3.7% | 6.1% | -2.7% | 3.4% | 10.5% |
| North America | 5,110 | 5,379 | 5,333 | 5,643 | 5,783 | 4,759 | 4,689 | 4,970 | 4,851 | 5,004 | 5,063 |
| of which USA | 2,517 | 2,480 | 2,281 | 2,560 | 2,659 | 1,727 | 1,722 | 1,987 | 2,070 | 2,027 | 2,084 |
| y/y | -7.0% | 5.3% | -0.9% | 5.8% | 2.5% | -17.7% | -1.5% | 6.0% | -2.4% | 3.2% | 1.2% |
| West Europe | 4,295 | 4,350 | 4,175 | 4,306 | 4,618 | 3,722 | 3,808 | 3,994 | 3,604 | 3,613 | 3,687 |
| y/y | 5.6% | 1.3% | -4.0% | 3.1% | 7.2% | -19.4% | 2.3% | 4.9% | -9.8% | 0.3% | 2.0% |
| East Europe | 4,533 | 4,616 | 4,681 | 4,948 | 5,155 | 4,479 | 4,661 | 4,684 | 4,655 | 4,363 | 4,439 |
| of which Russia | 3,809 | 3,855 | 3,893 | 4,103 | 4,284 | 3,782 | 3,947 | 3,992 | 4,024 | 3,741 | 3,785 |
| y/y | 20.1% | 1.8% | 1.4% | 5.7% | 4.2% | -13.1% | 4.1% | 0.5% | -0.6% | -6.3% | 1.8% |
| Asia ex. China | 1,568 | 1,623 | 1,873 | 2,006 | 2,181 | 2,217 | 2,512 | 2,682 | 2,735 | 3,165 | 4,736 |
| of which India | 861 | 942 | 1,105 | 1,222 | 1,308 | 1,412 | 1,604 | 1,688 | 1,699 | 1,952 | 3,277 |
| y/y | 11.0% | 3.5% | 15.4% | 7.1% | 8.7% | 1.6% | 13.3% | 6.8% | 2.0% | 15.7% | 49.6% |
| Middle East | 1,410 | 1,790 | 1,867 | 1,953 | 2,054 | 2,467 | 2,960 | 3,820 | 4,005 | 4,478 | 5,400 |
| y/y | 11.1% | 27.0% | 4.3% | 4.6% | 5.2% | 20.1% | 20.0% | 29.1% | 4.8% | 11.8% | 20.6% |
| Latin America | 2,356 | 2,391 | 2,493 | 2,557 | 2,660 | 2,508 | 2,277 | 2,185 | 2,053 | 2,077 | 2,112 |
| of which Brazil | 1,454 | 1,497 | 1,604 | 1,658 | 1,540 | 1,535 | 1,535 | 1,440 | 1,436 | 1,451 | 1,471 |
| y/y | 3.8% | 1.5% | 4.3% | 2.6% | -4.0% | -5.7% | -9.2% | -4.0% | -6.0% | 1.2% | 1.7% |
| Africa | 1,710 | 1,748 | 1,864 | 1,815 | 1,715 | 1,681 | 1,742 | 1,803 | 1,637 | 1,763 | 1,804 |
| y/y | 19.3% | 2.2% | 6.6% | -2.6% | -5.5% | -2.0% | 3.6% | 3.5% | -9.2% | 7.7% | 2.3% |
| Oceania | 2,216 | 2,252 | 2,274 | 2,315 | 2,297 | 2,211 | 2,277 | 2,306 | 2,195 | 2,154 | 2,173 |
| y/y | 2.5% | 1.6% | 1.0% | 1.8% | -0.8% | -3.7% | 3.0% | 1.3% | -4.8% | -1.9% | 0.9% |
| Global Production | 29,787 | 31,892 | 33,877 | 38,141 | 40,063 | 37,673 | 42,526 | 46,044 | 48,034 | 50,336 | 55,865 |
| y/y | 6.6% | 7.1% | 6.2% | 12.6% | 5.0% | -6.0% | 12.9% | 8.3% | 4.3% | 4.8% | 11.0% |
| Global Market Balance | -433 | 261 | -316 | 523 | 2,947 | 3,023 | 1,062 | 586 | 440 | -178 | 1,194 |

Source: HARBOR Aluminum

IMPORTANT NOTES:

*Production figures for China are official CNIA/IAI reported data up to 2009. From 2010 on, production data incorporates an estimate of non-reported production.

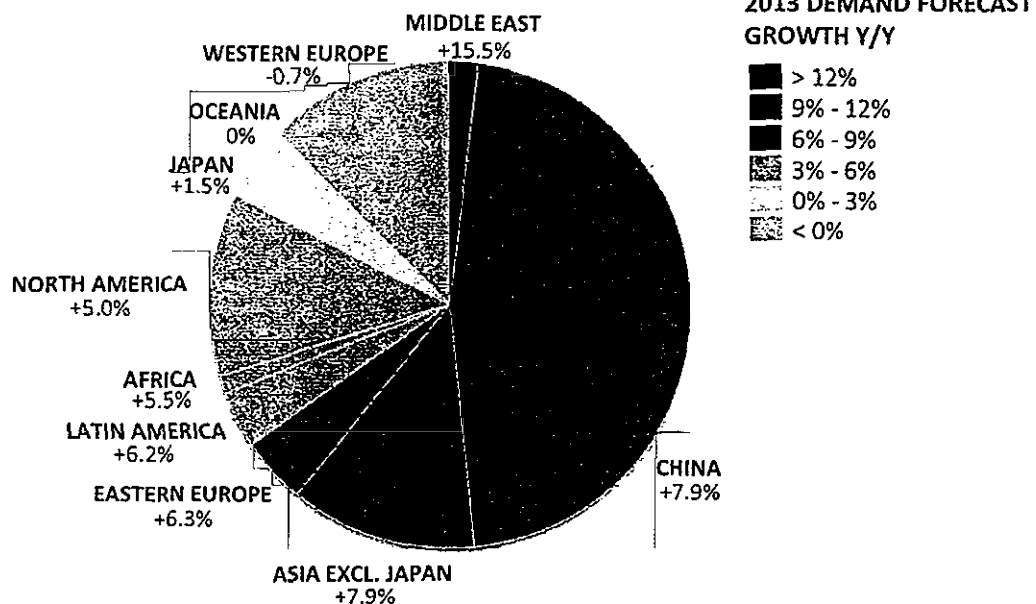
A) Aluminum production forecasts assume all confirmed brownfield / greenfield projects hit the market as planned (no delays).

B) Aluminum production forecasts assume no cuts in production beyond the ones that have been confirmed so far nor disruptions in operating capacity.

C) Aluminum production forecasts include annual capacity creep of 0.5% per year for all smelters.

GLOBAL PRIMARY ALUMINUM DEMAND BY REGION

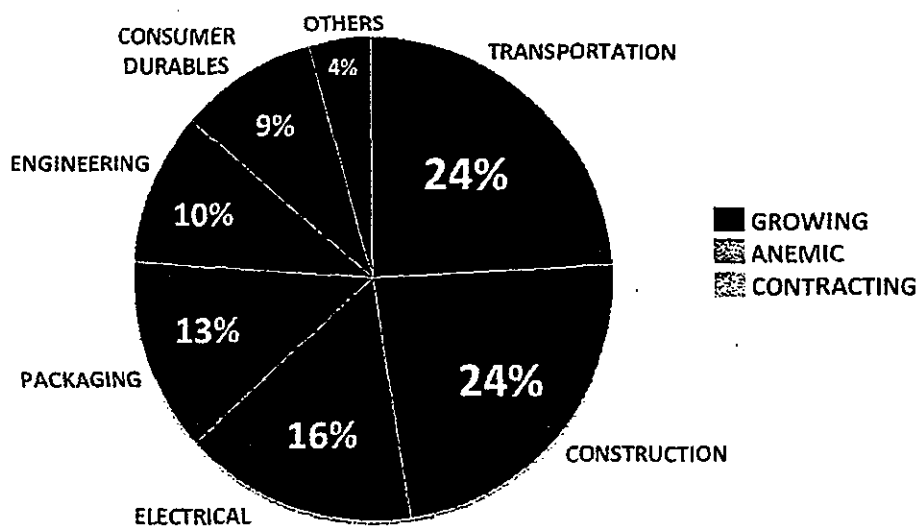
(share of 2012 global demand and 2013 growth forecast)



Source: HARBOR Aluminum

GLOBAL PRIMARY ALUMINUM DEMAND BY MAJOR MARKETS

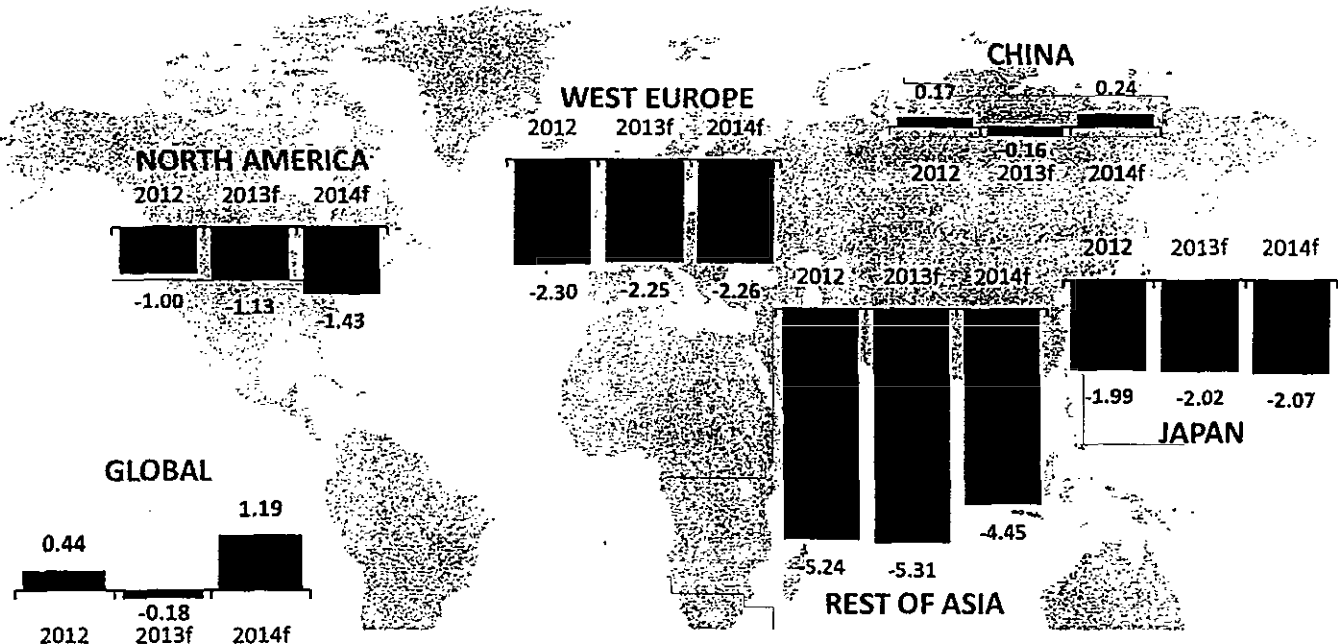
(share of 2012 global demand)



Source: HARBOR Aluminum

PRIMARY ALUMINUM MARKET REGIONAL DEFICITS BY REGION 2012-2014*

(million mtons)



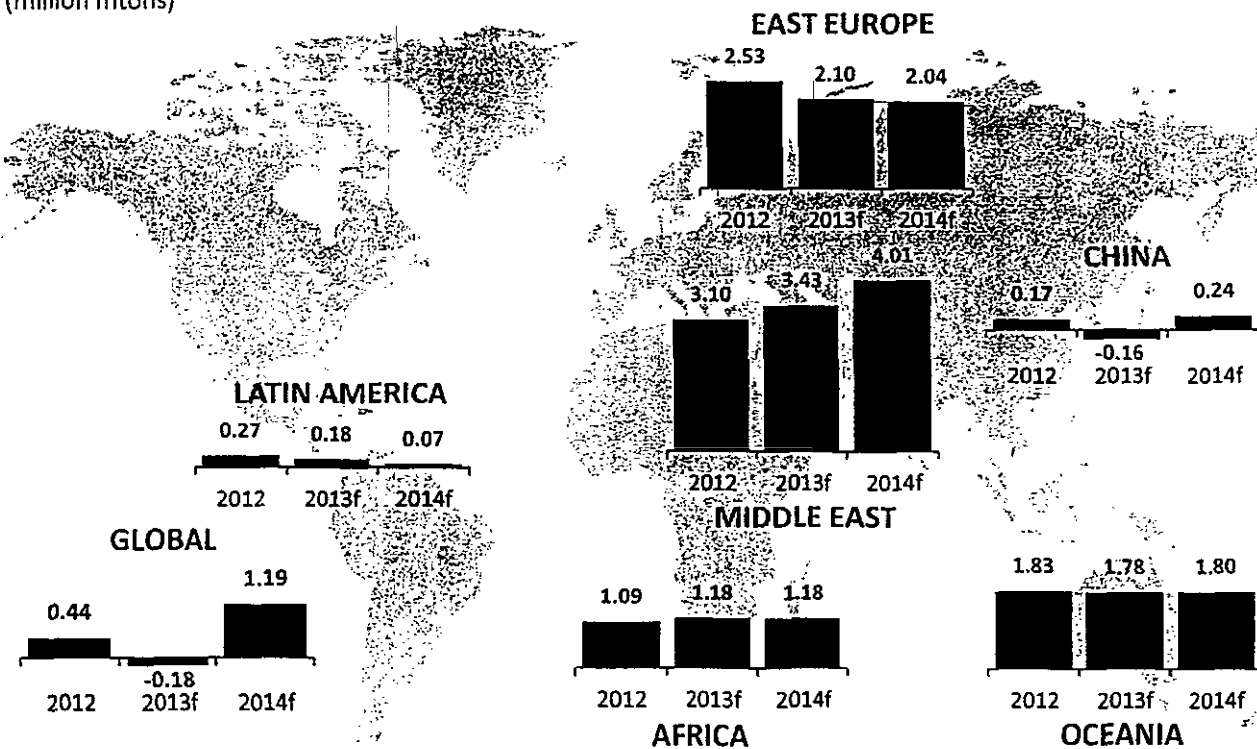
*IMPORTANT NOTES:

- A) Aluminum production forecasts assume all confirmed brownfield/greenfield projects hit the market as planned (no delays).
 B) Aluminum production forecasts assume no cuts in production beyond the ones that have been confirmed so far nor disruptions in operating capacity.
 C) Aluminum production forecasts include annual capacity creep of 0.5% per year for all smelters.

Source: HARBOR Aluminum

PRIMARY ALUMINUM MARKET REGIONAL SURPLUSES BY REGION 2012-2014*

(million mtons)



Source: HARBOR Aluminum

HARBOR'S KEY MARKET BALANCE, INVENTORY MOVEMENTS & LME PRICES

(balance and inventory figures in thousand mtons; prices in \$/mton)

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013f | 2014f |
|---|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Global Balance | -433 | 261 | -316 | 523 | 2,947 | 3,023 | 1,062 | 586 | 440 | -178 | 1,194 |
| China Balance | 692 | 649 | 553 | 101 | 474 | -875 | -124 | -447 | 172 | -160 | 241 |
| Rest of World Balance | -1,124 | -388 | -869 | 422 | 2,473 | 3,898 | 1,186 | 1,033 | 268 | -18 | 953 |
| Global Visible Inventories* | 2,869 | 2,844 | 2,599 | 2,795 | 4,902 | 7,181 | 6,935 | 7,374 | 8,065 | | |
| Annual Change | -637 | -25 | -245 | 196 | 2,107 | 2,279 | -246 | 439 | 691 | | |
| Global Invisible (Stealth) Inventories | 2,595 | 2,881 | 2,810 | 3,213 | 4,053 | 4,797 | 6,105 | 6,252 | 6,001 | | |
| Annual Change | 204 | 286 | -71 | 403 | 840 | 744 | 1,308 | 147 | -251 | | |
| Weeks of Consumption (Visible Inventories) | 4.9 | 4.7 | 4.0 | 3.9 | 6.9 | 10.8 | 8.7 | 8.4 | 8.8 | | |
| Weeks of Consumption (Total Inventories) | 9.4 | 9.4 | 8.2 | 8.3 | 12.5 | 18.0 | 16.4 | 15.6 | 15.4 | | |
| LME Cash Price Base Forecast (50% odds) | | | | | | | | | 2,020 | 1,923 | 2,294 |
| LME Cash Price Downside Forecast (40% odds) | | | | | | | | | 2,020 | 1,778 | 1,977 |
| LME Cash Price Upside Forecast (10% odds) | | | | | | | | | 2,020 | 2,068 | 2,612 |

Source: HARBOR Aluminum

*Visible inventories include LME, IAI, SHFE, China SRB, Wuxi and Nanhai, Japanese Ports Stocks, NYMEX and Tocom

ALUMINUM CAPACITY CUTS/DISRUPTIONS

(year to date; thousand mtons per year)

| | ROW CONFIRMED CUTS / DISRUPTIONS | ROW AT IMMINENT RISK | ROW RESTARTS | CHINA CONFIRMED CUTS | GLOBAL CASH COST NEGATIVE** |
|----------------------------|-------------------------------------|-------------------------|-----------------|-------------------------|--------------------------------|
| TOTAL | 563 | 837 | 170 | 1,675 | 15,114 |
| % OF 2012 REGION DEMAND | 2.1% | 3.1% | 0.7% | 7.4% | 32.0% |
| UC Rusal (RUS)* | KAP (Montenegro) | Alcoa (SPA) | Guangxi | | |
| 300 | 53 | 25 | 200 | | |
| (Jan-Dec 2013) | (Q3 2013) | (Jan 2013) | (Jun 2013) | | |
| RT Tiwai Point (NZ) | Mostar (BOS) | RT Tiwai Point (NZ) | Yunnan | | |
| 21 | 160 | 45 | 250 | | |
| (Mar 2013 -) | (H2 2013) | (Jan 2013) | (Mar-Jun 2013) | | |
| Novelis (BRA) | RTA St. Jean (FRA) | Hydro Neuss (GER) | Shaanxi | | |
| 20 | 141 | 100 | 115 | | |
| (Q1 2013) | (Dec 2013) | (Early 2013) | (Mar-Apr 2013) | | |
| KAP (Montenegro) | Voerdal (GER) | | Henan | | |
| 20 | 128 | | 210 | | |
| (H1 2013 -) | (2013) | | (Jan-Aug 2013) | | |
| Nalco (IND) | Alcoa System | | Hubei | | |
| 97 | 355 | | 135 | | |
| (May 2013 -) | (2013-2014) | | (Mar-Jun 2013) | | |
| Alcoa Baie-Comeau (CAN) | | | Others | | |
| 105 | | | 765 | | |
| (Aug 2013) | | | (Jan-Aug 2013) | | |

Source: HARBOR Aluminum

*Effective annual output decline projected

**Cash-cost basis; assuming LME 3M prices of \$1,793 per mton and SHFE 1M prices of \$2,355 per mton

LME ALUMINUM CASH PRICE ANNUAL FORECASTS (\$/mton)

| | 2013 | 2014 | 2015 |
|---|-------|-------|-------|
| AVERAGE FORECAST (updated since Jan 2013) | 2,075 | 2,186 | 2,333 |
| AVERAGE FORECAST (updated Apr-June 2013) | 1,988 | 2,131 | 2,268 |
| LOWEST FORECASTED PRICE (updated Apr-June 2013) | 1,783 | 1,836 | 1,887 |
| HIGHEST FORECASTED PRICE (updated Apr-June 2013) | 2,110 | 2,500 | 2,963 |
| AVERAGE OF THOSE EXPECTING HIGHER PRICES (updated Apr-Jun 2013) | 2,033 | 2,162 | 2,318 |
| AVERAGE OF THOSE EXPECTING LOWER PRICES (updated Apr-Jun 2013) | 1,969 | 1,883 | 2,019 |
| BEST 10 ANALYSTS IN 2012 | 2,023 | 2,094 | 2,246 |
| BEST 5 ANALYSTS IN 2001-2012 | 2,025 | 2,185 | 2,405 |
| HARBOR BASE SCENARIO (50% odds in 2013-2015) | 1,923 | 2,294 | 2,400 |
| HARBOR DOWNSIDE SCENARIO (40% odds in 2013-2015) | 1,778 | 1,977 | 1,887 |
| HARBOR UPSIDE SCENARIO (10% odds in 2013-2015) | 2,068 | 2,612 | 2,913 |
| LAST CYCLE AVERAGE | 2,223 | 2,704 | 2,937 |
| HIGHEST IN PAST CYCLES | 3,018 | 3,120 | 3,113 |
| LOWEST IN PAST CYCLES | 2,036 | 2,513 | 2,716 |
| PREDOMINANT FORECAST | 2,076 | 2,300 | 2,457 |

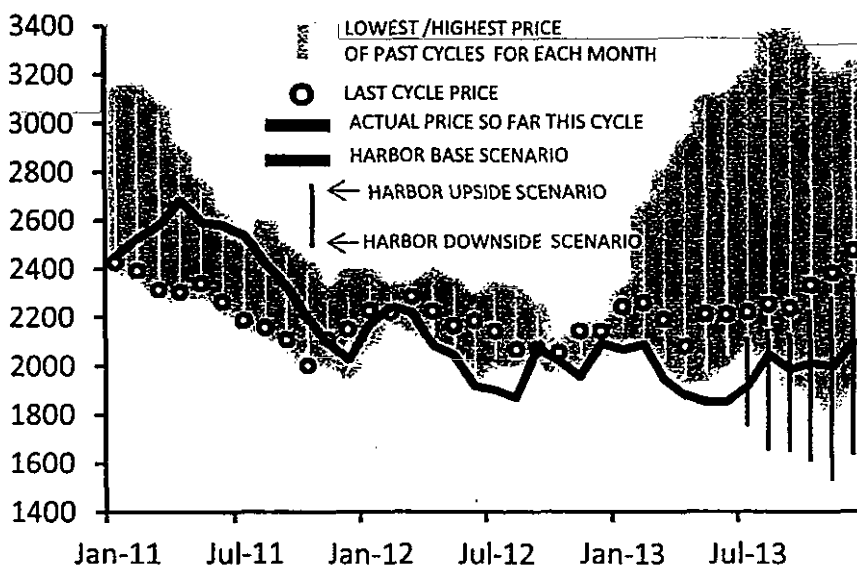
Source: HARBOR Aluminum

| ODDS | 40% | 50% | 10% |
|----------|----------------------|------------------|--------------------|
| | Downside Scenario | Base Scenario | Upside Scenario |
| Jan 2012 | 2,144 | 2,144 | 2,144 |
| Feb | 2,204 | 2,204 | 2,204 |
| Mar | 2,183 | 2,183 | 2,183 |
| Apr | 2,047 | 2,047 | 2,047 |
| May | 2,000 | 2,000 | 2,000 |
| Jun | 1,885 | 1,885 | 1,885 |
| Jul | 1,874 | 1,874 | 1,874 |
| Aug | 1,838 | 1,838 | 1,838 |
| Sep | 2,054 | 2,054 | 2,054 |
| Oct | 1,975 | 1,975 | 1,975 |
| Nov | 1,943 | 1,943 | 1,943 |
| Dec | 2,087 | 2,087 | 2,087 |
| Jan 2013 | 2,038 | 2,038 | 2,038 |
| Feb | 2,053 | 2,053 | 2,053 |
| Mar | 1,913 | 1,913 | 1,913 |
| Apr | 1,857 | 1,857 | 1,857 |
| May | 1,831 | 1,831 | 1,831 |
| Jun | 1,816 | 1,816 | 1,816 |
| Jul | 1,753 | 1,938 | 2,122 |
| Aug | 1,653 | 1,904 | 2,154 |
| Sep | 1,649 | 1,893 | 2,138 |
| Oct | 1,608 | 1,920 | 2,231 |
| Nov | 1,530 | 1,906 | 2,283 |
| Dec | 1,634 | 2,004 | 2,374 |
| 2012 | 2,020 | 2,020 | 2,020 |
| 2013 | 1,778 | 1,923 | 2,068 |
| 2014 | 1,977 | 2,294 | 2,612 |
| 2015 | 1,887 | 2,400 | 2,913 |

Source: HARBOR Aluminum

LME CASH ALUMINUM PRICE OUTLOOK CYCLICAL PROFILE*

(expected price range; monthly averages, \$/mton)



Source: HARBOR Aluminum

GLOBAL ALUMINUM PREMIUMS DATA & FORECASTS
(quarterly averages)

| | 2011 | | | | 2012 | | | | 2013 | | | |
|--|------|------|------|------|------|------|------|------|------|----|-----|-----|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3f | Q4f |
| US Midwest Premium (prompt delivery; cent/lb) | 6.5 | 8.3 | 8.2 | 7.9 | 8.1 | 9.7 | 11.0 | 11.0 | | | | |
| US Full 6063 Billet Premium (prompt delivery; cent/lb) | 17.3 | 20.0 | 18.7 | 18.4 | 18.9 | 21.3 | 22.7 | 23.2 | | | | |
| Brazil Spot Ingot Premium (delivered; \$/mton) | 279 | 290 | 293 | 270 | 265 | 280 | 300 | 290 | | | | |
| Brazil Spot Billet Premium (delivered; \$/mton) | 530 | 540 | 545 | 520 | 520 | 540 | 560 | 550 | | | | |
| Mexico Spot Ingot Premium (delivered; \$/mton) | 188 | 210 | 210 | 180 | 200 | 237 | 264 | 268 | | | | |
| Mexico Spot Billet Premium (delivered; \$/mton) | 421 | 481 | 452 | 436 | 480 | 500 | 520 | 525 | | | | |
| Europe Spot Duty-Paid Premium (In-Warehouse Rotterdam; \$/mton) | 194 | 198 | 200 | 178 | 190 | 219 | 269 | 285 | | | | |
| Europe Spot Duty-Unpaid Premium (In-Warehouse Rotterdam; \$/mton) | 121 | 125 | 130 | 121 | 123 | 158 | 214 | 216 | | | | |
| Europe Full 6063 Billet Duty-Paid Premium (In-Warehouse Rotterdam; \$/mton) | 435 | 435 | 435 | 414 | 397 | 400 | 423 | 459 | | | | |
| Europe Spot A7E Ingot Premium (In-Warehouse Rotterdam; \$/mton) | 121 | 124 | 130 | 119 | 123 | 154 | 205 | 214 | | | | |
| Japan Ingot Contract Premium (CIF; \$/mton) | 113 | 114 | 121 | 119 | 112 | 121 | 205 | 255 | | | | |
| Japan Ingot Spot Premium (CIF; \$/mton) | 113 | 118 | 119 | 116 | 115 | 172 | 247 | 232 | | | | |
| South Korea Spot Ingot Premium (CIF; \$/mton) | 105 | 111 | 108 | 112 | 135 | 190 | 235 | 239 | | | | |
| India Ingot Premium (FOB; \$/mton) | 68 | 67 | 71 | 57 | 85 | 163 | 195 | 184 | | | | |
| GCC Ingot Premium (delivered; \$/mton) | | | | | 82 | 93 | 160 | 188 | | | | |
| GCC Billet Premium (delivered; \$/mton) | | | | | 170 | 180 | 380 | 320 | | | | |
| China LME Ingot Premium (C&F; \$/mton) | 108 | 115 | 115 | 115 | 115 | 154 | 235 | 230 | | | | |
| China Spot Wuxi Ingot Premium (spot price spread to SHFE; \$/mton) | -4 | 2 | 21 | 8 | -8 | 2 | -6 | -7 | | | | |
| China Spot Nanhai Ingot Premium (spot price spread to SHFE; \$/mton) | 1 | 3 | 36 | 13 | -11 | 13 | -11 | -5 | | | | |
| China Spot Billet Premium (delivered Guangxi; \$/mton) | | | | | 135 | 117 | 180 | 162 | | | | |

For full 2013
quarterly
premiums
forecast please
refer to our
**Global
Aluminum
Premiums
Intelligence
Report**

**SUBSCRIBERS
ONLY**

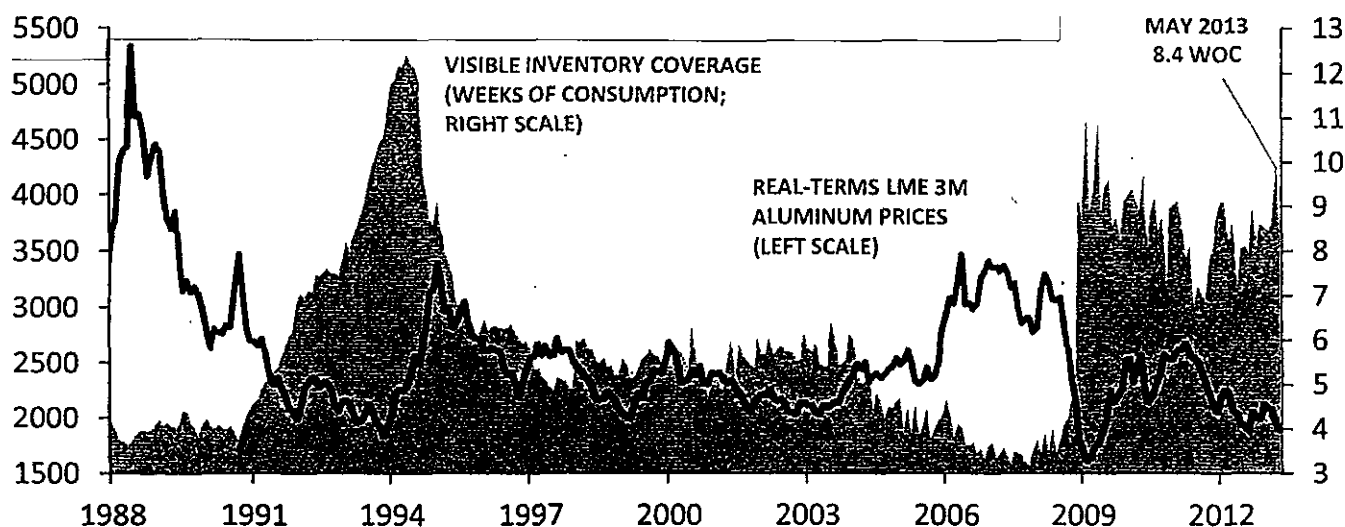
Source: HARBOR Aluminum

GLOBAL SCRAP AND SECONDARY ALUMINUM PRICES DATA & FORECASTS
(quarterly averages; cent/lb unless indicated otherwise)

| | 2011 | | | | 2012 | | | | 2013 | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3f | Q4f |
| MW P1020 Transaction | 119 | 126 | 117 | 103 | 107 | 97 | 98 | 102 | 102 | 95 | 103 | 106 |
| MW A380.1 | 119 | 122 | 118 | 110 | 110 | 102 | 99 | 103 | 104 | 103 | 111 | 109 |
| US 319 | 124 | 128 | 125 | 115 | 115 | 109 | 105 | 108 | 110 | 109 | 117 | 118 |
| US Sec 356 | 127 | 131 | 127 | 118 | 117 | 111 | 107 | 111 | 112 | 110 | 118 | 120 |
| A413 | 127 | 130 | 127 | 117 | 116 | 111 | 107 | 110 | 111 | 110 | 118 | 119 |
| US Mill Grade MLCCs | 94 | 98 | 89 | 77 | 83 | 80 | 78 | 81 | 82 | 79 | 82 | 81 |
| US UBCs | 92 | 97 | 89 | 78 | 81 | 76 | 76 | 81 | 81 | 77 | 80 | 79 |
| US Taint/Tabor (Old Sheet) | 81 | 80 | 76 | 70 | 73 | 72 | 67 | 71 | 74 | 71 | 73 | 71 |
| US Twitch (HG Auto Shreds) | 88 | 88 | 85 | 79 | 86 | 81 | 77 | 83 | 84 | 79 | 80 | 80 |
| DIN226/A380 Europe (€ per mton) | 2,018 | 1,878 | 1,851 | 1,726 | 1,801 | 1,759 | 1,775 | 1,745 | 1,754 | 1,750 | 1,842 | 1,885 |
| EU Fragmentizer Shreds (€ per mton) | 1,443 | 1,395 | 1,355 | 1,293 | 1,298 | 1,392 | 1,385 | 1,365 | 1,385 | 1,385 | 1,340 | 1,374 |
| China Shredded Tense | 94 | 96 | 99 | 95 | 97 | 96 | 92 | 97 | 92 | 93 | 95 | 96 |

Source: HARBOR Aluminum

GLOBAL VISIBLE PRIMARY ALUMINUM INVENTORY / DEMAND COVERAGE VS LME 3M ALUMINUM PRICES IN REAL TERMS (\$/mton in March 2013 US dollar terms vs weeks of consumption)



Source: HARBOR Aluminum with LME data

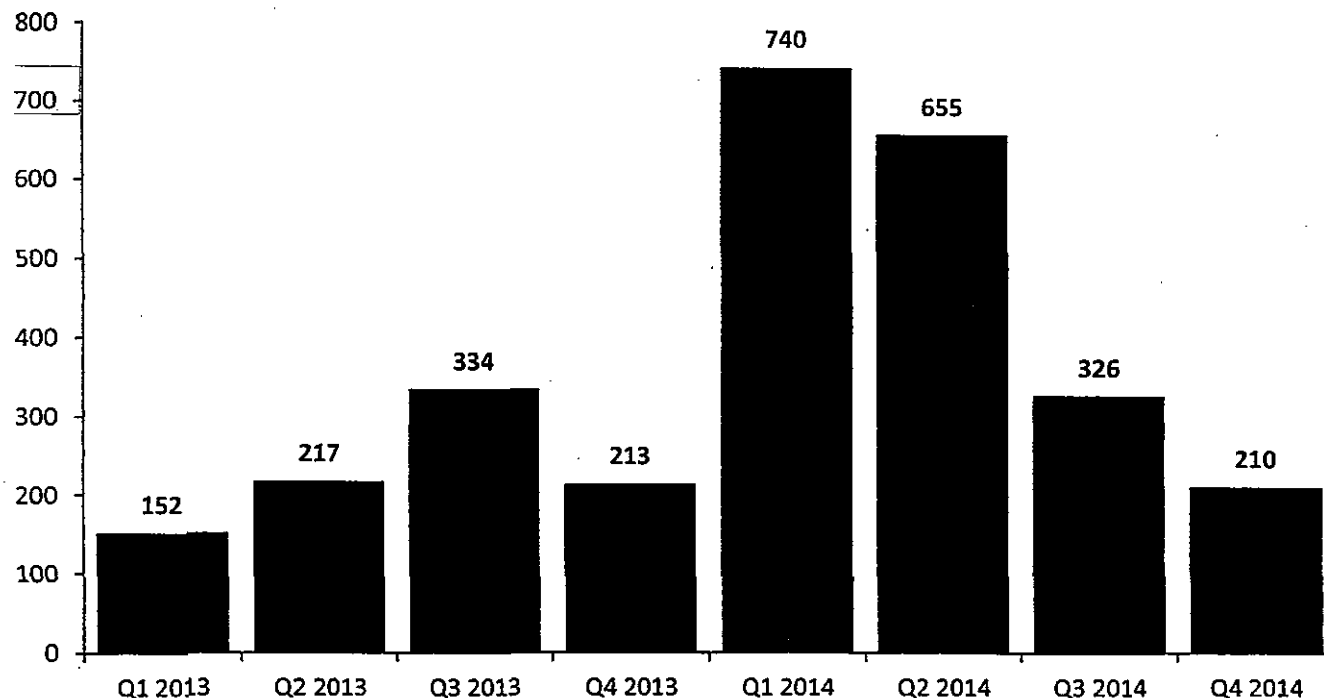
TOTAL GLOBAL ALUMINUM INVENTORIES (VISIBLE & STEALTH) (month-end data)

| | 2012 | | | | | | 2013 | | | | | | | | | |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--|
| | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June | |
| LME TOTAL | 5,025 | 4,919 | 4,834 | 4,886 | 4,870 | 5,056 | 5,077 | 5,207 | 5,210 | 5,157 | 5,162 | 5,237 | 5,158 | 5,202 | 5,436 | |
| North America | 2,189 | 2,129 | 2,078 | 2,041 | 1,972 | 2,133 | 2,013 | 1,982 | 1,974 | 1,938 | 1,900 | 1,869 | 1,765 | 1,724 | 1,833 | |
| Europe | 1,936 | 1,934 | 1,963 | 2,098 | 2,188 | 2,233 | 2,388 | 2,516 | 2,531 | 2,518 | 2,579 | 2,682 | 2,727 | 2,816 | 2,942 | |
| Asia | 890 | 856 | 793 | 717 | 710 | 691 | 674 | 709 | 712 | 701 | 683 | 686 | 666 | 662 | 661 | |
| LME CANCELED WARRANTS | 1,636 | 1,773 | 1,776 | 1,716 | 1,691 | 1,594 | 1,728 | 1,766 | 2,230 | 2,059 | 1,913 | 1,955 | 2,028 | 2,065 | 2,256 | |
| North America | 658 | 750 | 785 | 794 | 756 | 774 | 775 | 846 | 1,089 | 1,027 | 971 | 1,058 | 1,069 | 1,063 | 1,104 | |
| Europe | 853 | 882 | 893 | 851 | 876 | 788 | 935 | 891 | 1,058 | 975 | 901 | 868 | 944 | 988 | 1,137 | |
| Asia | 122 | 141 | 97 | 72 | 58 | 31 | 18 | 29 | 92 | 58 | 41 | 29 | 15 | 14 | 15 | |
| IAI PRIMARY PRODUCERS | 1,453 | 1,431 | 1,314 | 1,363 | 1,343 | 1,316 | 1,300 | 1,241 | 1,260 | 1,312 | 1,295 | 1,238 | 1,223 | 1,192 | - | |
| North America | 325 | 324 | 272 | 325 | 256 | 258 | 245 | 261 | 286 | 282 | 297 | 293 | 285 | 260 | - | |
| Europe | 451 | 438 | 413 | 409 | 437 | 423 | 377 | 355 | 381 | 417 | 381 | 375 | 334 | 325 | - | |
| Asia | 355 | 351 | 330 | 336 | 337 | 332 | 328 | 337 | 324 | 349 | 331 | 295 | 321 | 316 | - | |
| RoW (excluding China) | 322 | 318 | 299 | 293 | 313 | 303 | 350 | 288 | 269 | 264 | 286 | 275 | 283 | 291 | - | |
| MAIN JAPANESE PORTS | 235 | 223 | 233 | 235 | 268 | 274 | 258 | 273 | 284 | 316 | 286 | 267 | 279 | 272 | - | |
| CHINA SHFE TOTAL | 349 | 320 | 313 | 325 | 369 | 396 | 445 | 465 | 447 | 425 | 482 | 505 | 468 | 438 | 400 | |
| SHFE CANCELED WARRANTS | 238 | 254 | 265 | 266 | 304 | 287 | 307 | 299 | 273 | 240 | 264 | 247 | 209 | 191 | 218 | |
| CHINA WUXI & NANHAI | 378 | 328 | 316 | 385 | 444 | 442 | 490 | 468 | 385 | 404 | 622 | 684 | 648 | 509 | 410 | |
| CHINA SRB | 376 | 376 | 376 | 376 | 376 | 376 | 376 | 376 | 476 | 476 | 476 | 776 | 776 | 776 | 776 | |
| GLOBAL VISIBLE INVENTORIES | 7,816 | 7,597 | 7,386 | 7,570 | 7,670 | 7,860 | 7,946 | 8,030 | 8,062 | 8,081 | 8,323 | 8,707 | 8,551 | 8,389 | - | |
| Monthly Change | -89 | -219 | -211 | 185 | 100 | 190 | 86 | 84 | 32 | 19 | 242 | 384 | -156 | -162 | - | |
| WEEKS OF CONSUMPTION | 8.3 | 7.6 | 7.3 | 8.5 | 8.3 | 8.8 | 8.6 | 8.7 | 8.6 | 8.4 | 8.9 | 9.9 | 8.5 | 8.4 | - | |
| GLOBAL INVISIBLE INVENTORIES | 6,247 | 6,013 | 6,404 | 6,246 | 6,132 | 6,228 | 6,063 | 5,904 | 5,980 | 6,004 | 5,911 | 5,865 | 5,876 | - | - | |
| Monthly Change | 150 | -234 | 392 | -158 | -114 | 96 | -165 | -159 | 76 | 24 | -93 | -46 | 11 | - | - | |
| GLOBAL TOTAL INVENTORIES | 14,094 | 13,610 | 13,790 | 13,816 | 13,802 | 14,088 | 14,009 | 13,934 | 14,042 | 14,085 | 14,234 | 14,572 | 14,427 | - | - | |
| Monthly Change | 61 | -484 | 180 | 26 | -14 | 286 | -79 | -75 | 108 | 43 | 149 | 339 | -145 | - | - | |

Source: HARBOR Aluminum with LME, IAI, SHFE, SMM and Manubeni data

ROW's PRIMARY ALUMINUM PRODUCTION CAPACITY EXPANSIONS SCHEDULE FOR 2013-2014

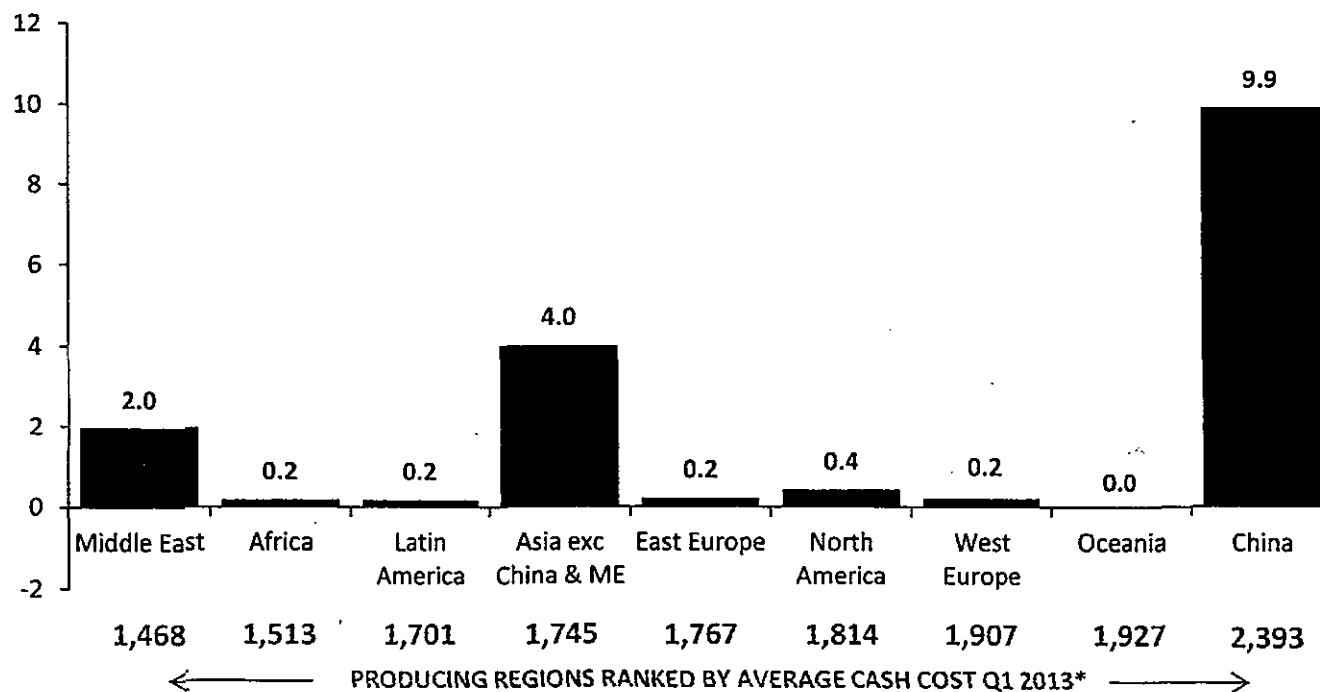
(thousand mtons of annualized capacity in ramping-up process net of announced capacity cuts)



Source: HARBOR Aluminum

PRIMARY ALUMINUM PRODUCTION EXPECTED CHANGE 2016 VS 2012

(figures in million mtons; cash costs in \$/mton)



Source: HARBOR Aluminum *Before casting

ROW's UPCOMING PRIMARY ALUMINUM EXPANSION PROJECTS 2013-2020 (thousand mtons)

| REGION | COUNTRY | COMPANY | SMELTER | CAPACITY | FIRST METAL | INVESTMENT (USD MILLION) | CAPEX (USD '000 per mton) | TYPE | STATUS |
|-----------------------|--------------|-------------------------------|-----------------------|----------|-------------|-----------------------------|------------------------------|------------|--------|
| Asia exc India and ME | Malaysia | Press Metal - Sumitomo | Sarawak | 300 | Q2 2013 | 600 | 2.5 | Greenfield | 1 |
| Asia exc India and ME | Malaysia | Chalco - GIG Holdings | Sarawak | 370 | 2016-7 | 1,600 | 4.3 | Greenfield | 2 |
| East Europe | Russia | UC Rusal | BEMO Phase I | 147 | Q3 2013 | 795 | 5.4 | Greenfield | 1 |
| East Europe | Russia | UC Rusal | BEMO Phase II | 151 | 2015 | 817 | 5.4 | Greenfield | 1 |
| East Europe | Russia | UC Rusal | Talshet Phase I | 375 | 2015-7 | 1,772 | 4.7 | Greenfield | 2 |
| India | India | Hindalco | Mahan | 359 | Apr 2013 | 2,000 | 5.6 | Greenfield | 1 |
| India | India | Hindalco | Aditya | 359 | Late 2013 | 2,000 | 5.6 | Greenfield | 1 |
| India | India | Hindalco | Hirakud | 52 | Q2 2013 | na | na | Brownfield | 1 |
| India | India | Vedanta | Xorba III | 325 | Q3 2013 | 1,800 | 5.5 | Greenfield | 1 |
| India | India | Vedanta | Jharsuguda II | 1,250 | Q4 2013 | 2,900 | 5.8 | Brownfield | 1 |
| India | India | Hindalco | Jharkhand | 359 | 2015 | 2,174 | 6.1 | Greenfield | 1 |
| Middle East | Saudi Arabia | Ma'aden and Alcoa | Ras Al Khair | 740 | Dec 2012 | 7,500 | 10.1 | Greenfield | 1 |
| Middle East | Saudi Arabia | Ma'aden and Alcoa | Ras Al Khair Phase II | 740 | 2017-7 | na | na | Brownfield | 2 |
| Middle East | UAE | Emirates Aluminum | Al Taweelah Phase II | 520 | Q4 2013 | 4,580 | 8.8 | Brownfield | 1 |
| Middle East | Oman | Sohar Aluminium | Sohar Phase II | 700 | 2016-7 | 5,600 | 8.0 | Brownfield | 2 |
| Middle East | Oman | Oman Oil & Others | Oman Oil & Others | 360+ | 2017-7 | na | na | Greenfield | 2 |
| Middle East | Bahrain | Aluminium Bahrain | Ras Zurrayd (Line 6) | 400 | Late 2016 | 2,500 | 6.3 | Brownfield | 2 |
| Middle East | Qatar | Norsk Hydro - Qatar Petroleum | Qatalum Phase II | 585 | 2017-7 | na | na | Brownfield | 2 |
| North America | Canada | Rio Tinto Alcan | AP60 | 60 | Q2 2013 | 758 | 12.6 | Greenfield | 1 |
| North America | USA | Noranda | New Madrid | 16 | 2013 | 38 | 2.4 | Brownfield | 1 |
| North America | Canada | Rio Tinto Alcan | Kitimat | 135 | End 2014 | 800 | 5.9 | Brownfield | 1 |
| North America | Canada | Alcoa | Deschambault | 25 | 2016 | na | na | Brownfield | 1 |
| North America | Canada | Alcoa | Baie-Comeau | 160 | 2019 | 175 | 1.1 | Brownfield | 1 |
| West Europe | Iceland | Century Aluminum | Grundartangi | 50 | 2013-2016 | 90 | 1.8 | Brownfield | 1 |
| West Europe | Iceland | Rio Tinto Alcan | ISAL | 15 | 2013-7 | 487 | 12.2 | Brownfield | 1 |
| West Europe | Iceland | Century Aluminum | Helgufvuk Phase I | 90 | 2015-7 | 567 | 6.3 | Greenfield | 2 |
| West Europe | Germany | Norsk Hydro | Neuss | 100 | Early 2013 | na | na | Restart | 1 |

Source: HARBOR Aluminum

*Status: (1) Confirmed, (2) High odds, (3) Low odds, (4) Remote odds

ROW's POTENTIAL PRIMARY ALUMINUM EXPANSION PROJECTS 2014-2020 (thousand mtons)

| REGION | COUNTRY | COMPANY | SMELTER | CAPACITY | FIRST METAL | INVESTMENT (USD MILLION) | CAPEX (USD '000 per mton) | TYPE | STATUS |
|-----------------------|--------------|-------------------------------------|-----------------------------|----------|-------------|-----------------------------|------------------------------|------------|--------|
| Africa | Algeria | Sonatrach and Emal | Beni Saf | 500 | na | 5,000 | 10.0 | Greenfield | 4 |
| Africa | Algeria | Sonatrach and Emal | Beni Saf Phases II-III | 1,000 | na | na | na | Brownfield | 4 |
| Africa | Angola | Alcoa | Angola | 750 | 2020-7 | na | na | Greenfield | 4 |
| Africa | Cameroon | Hydromine | Cameroon | 500 | 2017-7 | 2,800 | 5.6 | Greenfield | 4 |
| Africa | Cameroon | Rio Tinto and Cameroon | Kribi | 1,000 | 2017-7 | na | na | Greenfield | 4 |
| Africa | Libya | Klesch Group - LAP | Ubaya | 725 | na | na | na | Greenfield | 4 |
| Asia exc India and ME | Indonesia | Abu Dhabi Port Authority | West Kalimantan | na | na | 4,500 | na | Greenfield | 3 |
| Asia exc India and ME | Indonesia | Beijing Shuangzhongli | West Kalimantan | 600 | 2018 | 7,100 | na | Greenfield | 3 |
| Asia exc India and ME | Indonesia | Nalco | East Kalimantan | 500 | 2015 | 2,900 | 5.8 | Greenfield | 3 |
| Asia exc India and ME | Indonesia | Ras Al Khaima Investment Authority | East Kalimantan | na | na | 5,500 | na | Greenfield | 4 |
| Asia exc India and ME | Malaysia | Rio Tinto and Cahya Mata | SALCO (Phase II) | 950 | na | na | na | Greenfield | 4 |
| Asia exc India and ME | Malaysia | Rio Tinto and Cahya Mata | SALCO (Phase I) | 550 | na | 2,000 | 3.6 | Greenfield | 4 |
| Asia exc India and ME | Malaysia | Mubadala and IMDB | Sarawak | na | na | 7,000 | na | Greenfield | 3 |
| Asia exc India and ME | Vietnam | Vinacomin and Dongyang Gangchui | Nhan Co | 300 | na | na | na | Greenfield | 4 |
| East Europe | Russia | UC Rusal | BEMO Phase III | 290 | 2017-7 | na | na | Brownfield | 3 |
| East Europe | Russia | UC Rusal | Talshet Phase II | 375 | 2017-7 | na | na | Brownfield | 3 |
| India | India | Nalco | Angul Phase III | 105 | 2015-7 | na | na | Brownfield | 3 |
| India | India | Nalco | Sundergarh | 500 | 2018-7 | 2,900 | 5.8 | Greenfield | 3 |
| India | India | Anrak | Visakapatnam | 250 | 2018-7 | na | na | Greenfield | 4 |
| Latin America | Brazil | Alcoa | Parana | 300 | na | 3,000 | 10.0 | Greenfield | 4 |
| Latin America | Paraguay | Rio Tinto Alcan | Paraguay | 674 | 2017 | 4,000 | 5.9 | Greenfield | 4 |
| Middle East | Iran | SALCO and NFC China | Larnard | 276 | 2015-7 | 1,200 | 4.3 | Greenfield | 3 |
| Middle East | Iran | NALCO and Aluminum Paras | Kerman | 310 | 2016 | 2,000 | 6.5 | Greenfield | 3 |
| Middle East | Saudi Arabia | Emar and EMAL | King Abdullah Economic City | 700 | 2017-7 | 5,000 | 7.1 | Greenfield | 3 |
| Middle East | Saudi Arabia | Saudi Binladin Group - Chalco - MMC | Sino Saudi Jazan | 1000 | 2017-7 | 4,500 | 4.5 | Greenfield | 3 |
| North America | Canada | Rio Tinto Alcan | AP60 Phases II-III | 400 | 2017-7 | na | na | Brownfield | 3 |
| North America | USA | Glencore | Columbia Falls Aluminum | 72 | 2014-7 | na | na | Restart | 3 |
| North America | USA | Century Aluminum | Ravenswood | 170 | 2014-7 | na | na | Restart | 3 |
| North America | Canada | RTA - Norsk Hydro - AMAG - Marubeni | Alouette Phase III | 355 | 2016-7 | 1,500 | 4.2 | Brownfield | 3 |
| West Europe | Norway | Norsk Hydro | Karmoy | 70 | 2015-7 | na | na | Brownfield | 3 |
| West Europe | Iceland | Century Aluminum | Helgufvuk Phases II-IV | 270 | 2016-7 | 1,283 | 4.8 | Brownfield | 3 |
| West Europe | Iceland | Alcoa | Fjarðal | 180 | 2018-7 | 724 | 4.0 | Brownfield | 3 |

Source: HARBOR Aluminum

*Status: (1) Confirmed, (2) High odds, (3) Low odds, (4) Remote odds

CHINA IDENTIFIED UPCOMING & POTENTIAL PRIMARY ALUMINUM EXPANSION PROJECTS 2012-2020 (thousand mtons)

| COMPANY | LOCATION | CAPACITY | FIRST METAL | STATUS |
|-----------------------------------|-----------------------|----------|-------------|--------|
| Shaanxi Nonferrous Metals | Shaanxi Yulin | 650 | 2012 | 1 |
| Chalco | Gansu Hualu | 500 | 2012 | 1 |
| JISCO Dongxing | Gansu (Phase I) | 450 | 2012 | 1 |
| Xinjiang Qiya Aluminum | Xinjiang | 450 | 2012 | 1 |
| Yunnan Yongxin Aluminum | Yunnan | 330 | 2012 | 1 |
| Huangguoshu Aluminum | Guizhou | 65 | 2012 | 1 |
| Guangxi Yinhai Aluminum | Laibin | 40 | 2012 | 1 |
| CLI-XinRen Aluminium Holdings | Xinjiang | 447 | 2012 | 1 |
| Xinjiang Shenhua | Xinjiang | 130 | 2012 | 1 |
| Xinjiang Jiarun | Xinjiang (Phase I) | 400 | 2012 | 1 |
| Sanmenxia Tianyuan Aluminum | Qinghai | 500 | 2013 | 1 |
| Huomei-Hangzhou Jinjiang Group | Inner Mongolia | 500 | 2013 | 1 |
| Zhongwang Group | Yingkou (Phase I) | 400 | 2013 | 1 |
| Henan Shenhua Aluminium | Henan | 350 | 2013 | 1 |
| Xinshan Guangxi Aluminium | Guangxi | 300 | 2013 | 1 |
| Songjuehuarong-Chongqing Wujiang | Qianjiang | 200 | 2013 | 1 |
| Xinjiang Tianshan | Xinjiang (Phases 1-2) | 900 | 2013 | 1 |
| Gansu Hongtai Aluminum | Gansu | 400 | 2013 | 1 |
| Guangxi Suyuan Investment | Guangxi | 300 | 2013 | 1 |
| Henan Yulian Group | Xinjiang | 1,200 | 2014 | 1 |
| JISCO Dongxing | Gansu (Phase II) | 550 | 2014 | 1 |
| Chalco | Inner Mongolia | 500 | 2014 | 1 |
| Qinghai West Hydropower Company | Qinghai (Phase II) | 250 | 2014 | 1 |
| East Hope Group | Guizhou | 400 | 2014 | 1 |
| Chongqing Qineng Power & Aluminum | Qijiang | 500 | 2014 | 1 |
| CPI Chongqing Tiantai Aluminum | Chongqing (Phase II) | 100 | 2014 | 1 |
| Chalco | Baotou | 650 | 2015 | 1 |
| Tianrui Group | Qinghai | 600 | 2015 | 1 |
| Shandong Innovation Group | Inner Mongolia | 800 | 2015 | 1 |
| China Huaneng Group | Gansu | 1,000 | 2015 | 1 |
| Xinjiang Tianshan | Xinjiang (Phases 3-4) | 1,140 | 2015 | 2 |
| Zhongwang Group | Yingkou (Phase II) | 400 | 2015 | 2 |
| Chalco-Jiaozuo Wanfang Aluminum | Xinjiang | 1,000 | 2016 | 1 |
| Shandong Xinfu Group | Guizhou | na | 2017 | 3 |
| Chalco | Ningxia | 900 | na | 1 |
| Chalco | Qinghai | 500 | na | 2 |
| Guizhou Qiya Aluminum | Guizhou | 400 | na | 2 |
| Gansu Hongtai Aluminum | Gansu (Phase II) | 600 | na | 2 |
| Qinghai Material Industry Group | Qinghai | 300 | na | 2 |
| Chalco | Gansu | na | na | 3 |
| Xinjiang Jiarun | Xinjiang (Phase II) | 1,200 | na | 3 |
| China Power Investment (CPI) | Wuzhengdao | 400 | na | 3 |

Source: HARBOR Aluminum

*Status: (1) Confirmed, (2) Under study - high odds, (3) Under study - low odds, (4) Remote odds

AVERAGE GLOBAL PRIMARY ALUMINUM OUTPUT COSTS*

(\$/mton; annual data until 2010, monthly data from 2011)

| PERIOD | CASH COSTS | TOTAL COSTS | TOTAL + PROFIT |
|--------|------------|-------------|----------------|
| 1970 | 388 | 477 | 517 |
| 1971 | 404 | 498 | 538 |
| 1972 | 429 | 524 | 564 |
| 1973 | 481 | 574 | 614 |
| 1974 | 564 | 653 | 691 |
| 1975 | 716 | 799 | 834 |
| 1976 | 788 | 869 | 903 |
| 1977 | 876 | 981 | 1,025 |
| 1978 | 973 | 1,084 | 1,131 |
| 1979 | 1,073 | 1,186 | 1,233 |
| 1980 | 1,231 | 1,361 | 1,416 |
| 1981 | 1,280 | 1,425 | 1,486 |
| 1982 | 1,207 | 1,354 | 1,417 |
| 1983 | 1,166 | 1,310 | 1,370 |
| 1984 | 1,124 | 1,257 | 1,314 |
| 1985 | 1,083 | 1,219 | 1,276 |
| 1986 | 1,002 | 1,170 | 1,241 |
| 1987 | 1,007 | 1,172 | 1,243 |
| 1988 | 1,131 | 1,298 | 1,369 |
| 1989 | 1,201 | 1,391 | 1,469 |
| 1990 | 1,376 | 1,597 | 1,685 |
| 1991 | 1,277 | 1,499 | 1,597 |
| 1992 | 1,156 | 1,373 | 1,476 |
| 1993 | 1,084 | 1,305 | 1,415 |
| 1994 | 1,136 | 1,360 | 1,472 |
| 1995 | 1,226 | 1,437 | 1,546 |
| 1996 | 1,231 | 1,437 | 1,551 |
| 1997 | 1,235 | 1,438 | 1,556 |
| 1998 | 1,223 | 1,421 | 1,540 |
| 1999 | 1,270 | 1,465 | 1,584 |
| 2000 | 1,321 | 1,536 | 1,665 |
| 2001 | 1,247 | 1,521 | 1,678 |
| 2002 | 1,204 | 1,473 | 1,630 |
| 2003 | 1,238 | 1,508 | 1,665 |
| 2004 | 1,395 | 1,659 | 1,814 |
| 2005 | 1,493 | 1,750 | 1,903 |
| 2006 | 1,681 | 1,939 | 2,090 |
| 2007 | 1,732 | 1,989 | 2,138 |
| 2008 | 1,980 | 2,230 | 2,374 |
| 2009 | 1,615 | 1,875 | 2,035 |
| 2010 | 1,802 | 2,106 | 2,200 |
| Jan-11 | 2,027 | 2,255 | 2,456 |
| Feb-11 | 2,027 | 2,255 | 2,532 |
| Mar-11 | 2,027 | 2,255 | 2,585 |
| Apr-11 | 2,168 | 2,401 | 2,691 |
| May-11 | 2,168 | 2,401 | 2,610 |
| Jun-11 | 2,168 | 2,401 | 2,593 |
| Jul-11 | 2,214 | 2,399 | 2,534 |
| Aug-11 | 2,214 | 2,399 | 2,569 |
| Sep-11 | 2,214 | 2,399 | 2,569 |
| Oct-11 | 2,081 | 2,330 | 2,500 |
| Nov-11 | 2,081 | 2,330 | 2,500 |
| Dec-11 | 2,081 | 2,330 | 2,500 |
| Jan-12 | 2,116 | 2,378 | 2,548 |
| Feb-12 | 2,116 | 2,378 | 2,548 |
| Mar-12 | 2,116 | 2,378 | 2,548 |
| Apr-12 | 2,055 | 2,315 | 2,485 |
| May-12 | 2,055 | 2,315 | 2,485 |
| Jun-12 | 2,055 | 2,315 | 2,485 |
| Jul-12 | 2,017 | 2,274 | 2,444 |
| Aug-12 | 2,017 | 2,274 | 2,444 |
| Sep-12 | 2,017 | 2,274 | 2,444 |
| Oct-12 | 2,011 | 2,268 | 2,438 |
| Nov-12 | 2,012 | 2,270 | 2,440 |
| Dec-12 | 2,031 | 2,296 | 2,474 |
| Jan-13 | 2,044 | 2,310 | 2,480 |
| Feb-13 | 2,023 | 2,288 | 2,458 |
| Mar-13 | 1,985 | 2,250 | 2,420 |
| Apr-13 | 1,840 | 2,102 | 2,272 |
| May-13 | 1,807 | 2,121 | 2,191 |

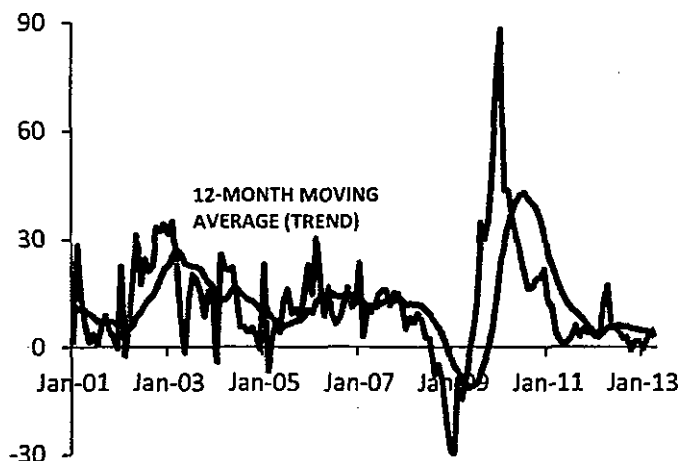
Source: HARBOR Aluminum

*After-casting cost excluding depreciation, sustained capital expenses, working capital and amortization.

Total cost = cash cost + depreciation, sustained capital expenses, working capital and amortization.

1 Global automotive production growing slower y/y than a year ago amid more sustainable rates in the US, China and Japan...Europe improving and Brazil strong

GLOBAL AUTOMOTIVE SECTOR OUTPUT*
(annual % change)



Source: HARBOR Aluminum

*USA, Europe, Japan, China and Brazil weighted by share of total aluminum consumption.

2 Construction sector resilient amid sustained growth in China; elsewhere, the US a bit slower, Japan growing, Brazil modest growth...Europe deep inside contraction

GLOBAL CONSTRUCTION SECTOR ACTIVITY*
(annual % change)

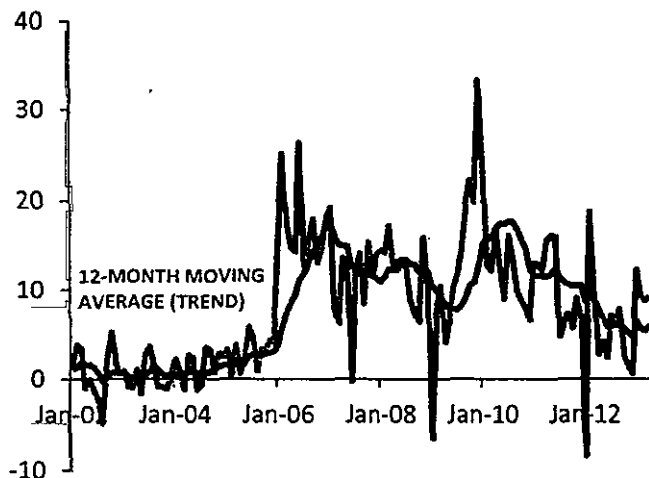


Source: HARBOR Aluminum

*USA, Europe, Japan, China and Brazil weighted by share of total aluminum consumption.

3 Packaging sector being a drag in the US, muted in Europe, Japan now contracting and even Brazil now declining y/y, practically all the growth delivered by China & Southeast Asia

GLOBAL ALUMINUM PACKAGING SECTOR OUTPUT*
(annual % change)

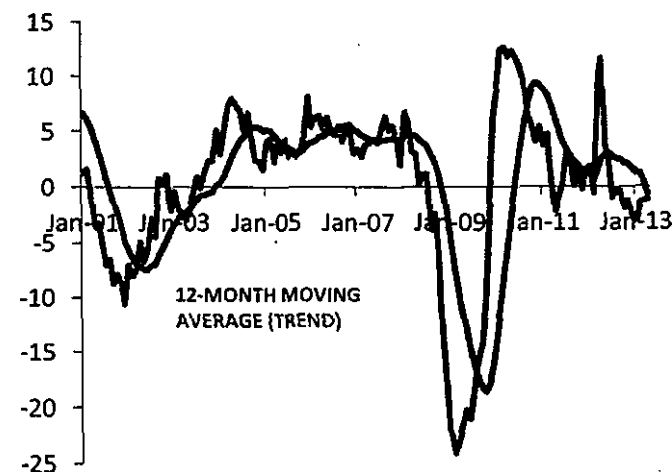


Source: HARBOR Aluminum

*USA, Europe, Japan, China and Brazil weighted by share of total aluminum consumption.

4 ROW's durable goods sector contracting in annual terms for almost a year now mainly pulled down by declines out of Japan & Europe...US & the Emerging World growing

ROW DURABLE GOODS SECTOR OUTPUT*
(annual % change)



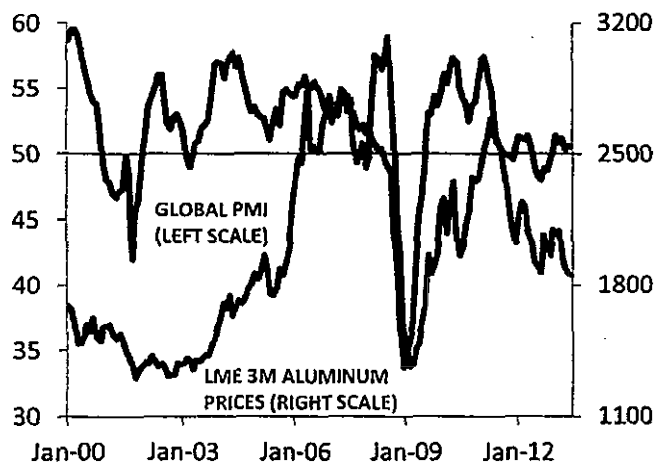
Source: HARBOR Aluminum

*USA, Europe, Japan, China and Brazil weighted by share of total aluminum consumption.

Aluminum Intelligence report

5 Global manufacturing activity (end-user aluminum demand) continued roughly stalled in May with either slower growth rate or stagnation/contraction in almost every region

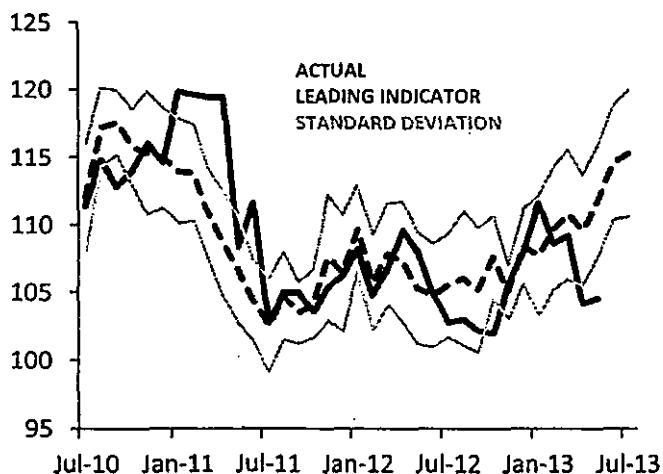
JP MORGAN GLOBAL MANUFACTURING PMI vs LME 3M ALUMINUM PRICES (monthly data)



Source: HARBOR Aluminum with LME and Markit Economics data

7 From a cyclical standpoint, HARBOR's US manufacturing leading indicator signals some kind of manufacturing recovery as the H2 of the year advances...

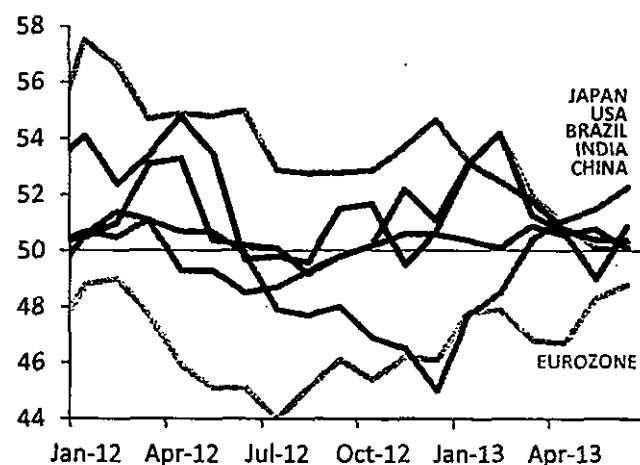
HARBOR's US MANUFACTURING LEADING INDICATOR (monthly data; index, 100 = no growth)



Source: HARBOR Aluminum

6 Main takeaways: China stagnated again (could contract in June), the US entered contraction (and decline at the fastest pace since July 2009) and India didn't grow

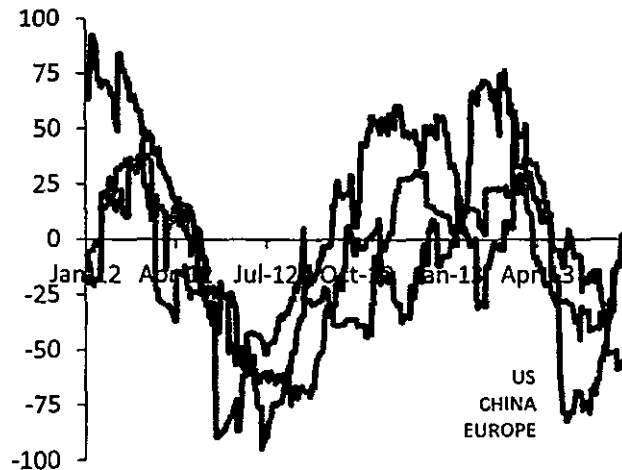
GLOBAL MANUFACTURING ACTIVITY INDEXES (monthly data; index*)



Source: HARBOR Aluminum with Markit Economics and ISM data
*Index above/below 50 signals monthly expansion/contraction

8 ...although concerns over China's credit crunch and monetary stimulus tapering could derail expected recovery in the short term; economic data is still underperforming

CITIGROUP ECONOMIC SURPRISE INDEX (daily data; index)

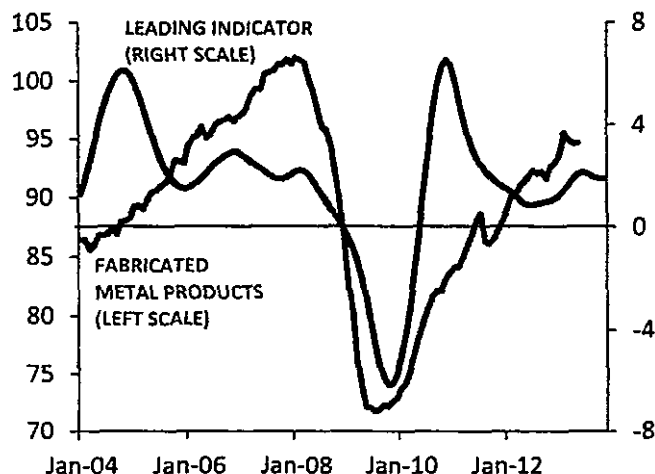


Source: HARBOR Aluminum with Bloomberg data

Aluminum Intelligence report

9 US leading indicators are consistent with the US resuming manufacturing growth, although not much acceleration expected ahead

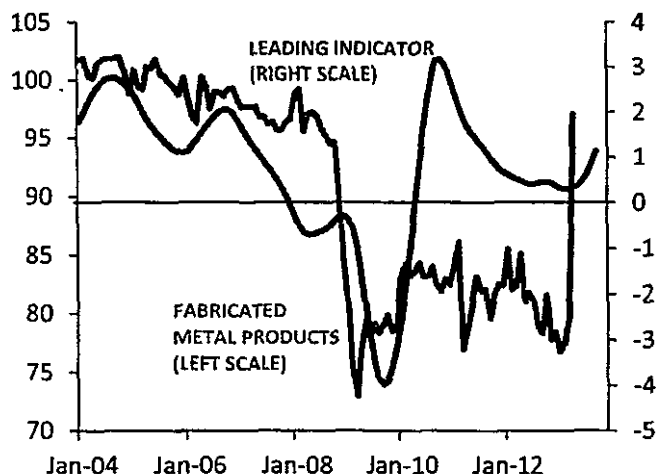
US LEADING ECONOMIC INDICATOR* VS FABRICATED METAL PRODUCTS OUTPUT (index vs annual % change)



Source: HARBOR Aluminum with OECD and Fed data.
*Leading indicator graphed six months forward.

11 According to leading indicator readings, it is reasonable to expect end-user aluminum demand in Japan to continue to gather momentum in H2...

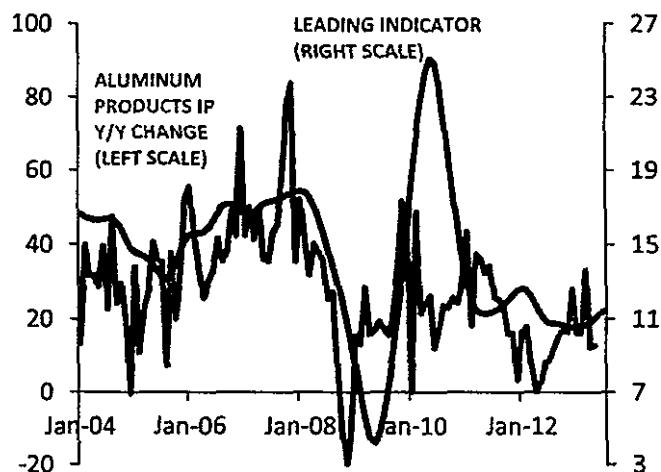
JAPAN LEADING ECONOMIC INDICATOR* VS FABRICATED METAL PRODUCTS OUTPUT (index vs annual % change)



Source: HARBOR Aluminum with OECD and Eurostat data.
*Leading indicator graphed six months forward.

10 In the same line, leading indicators for China suggest modest aluminum demand y/y growth rate acceleration as this year advances

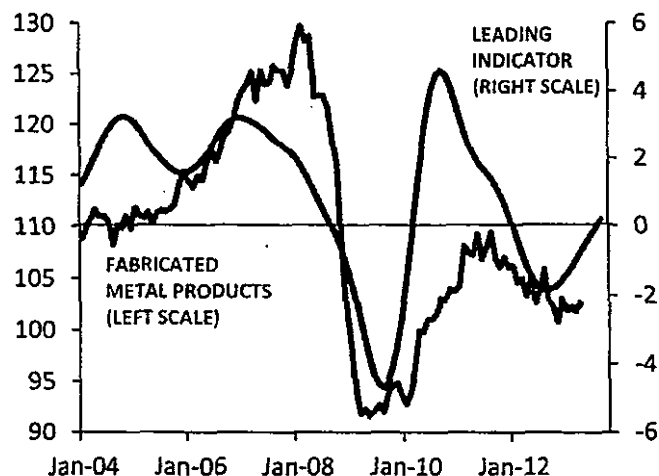
CHINA LEADING ECONOMIC INDICATOR VS ALUMINUM PRODUCTS OUTPUT (annual % change)



Source: HARBOR Aluminum with OECD and NBS data.
*Leading indicator graphed six months forward.

12 ...while Europe has yet to get out from contraction territory, albeit a consistent easing in the pace of contraction could be seen for the remainder of the year

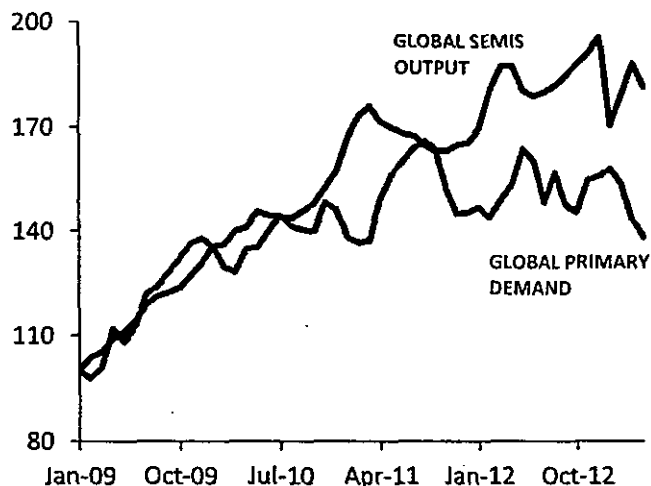
EUROPE LEADING ECONOMIC INDICATOR* VS FABRICATED METAL PRODUCTS OUTPUT (index vs annual % change)



Source: HARBOR Aluminum with OECD and METI data.
*Leading indicator graphed six months forward.

13 Global semi-finished aluminum products shipments roughly stalled in the last two quarters in line with end-user demand...primary demand more than reflecting (de-stocking)

GLOBAL SEMIS OUTPUT* VS APPARENT PRIMARY DEMAND
(index Jan '09=100; seasonally adjusted 2M moving averages)

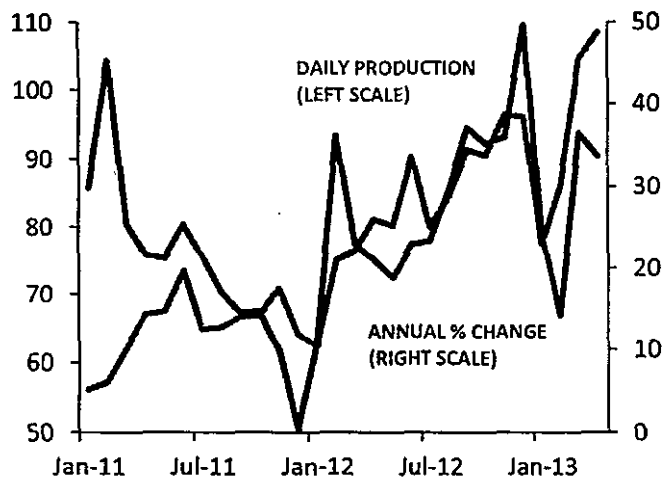


Source: HARBOR Aluminum

*USA, Europe, Japan, China and Brazil weighted by share of total aluminum consumption.

15 In China, official data shows aluminum semis is still reaching new highs amid no major slowdown in B&C and auto sector delivering double-digit annual growth

CHINA TOTAL SEMIS PRODUCTION
(daily production in thousand mtons* vs annual % change)

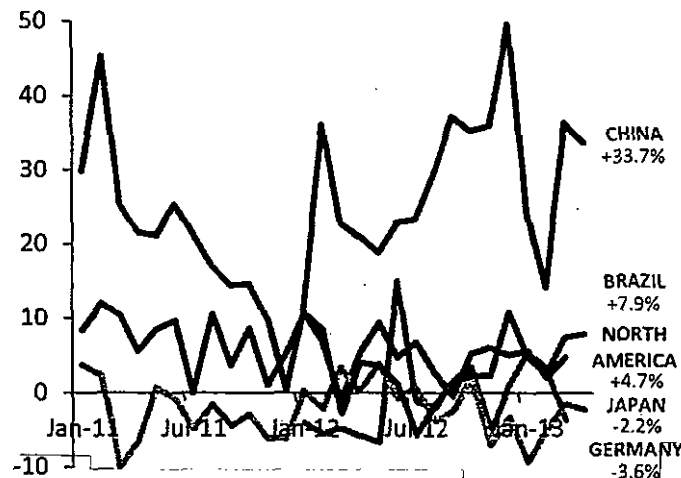


Source: HARBOR Aluminum with CNIA data

*Jan-Feb monthly breakdown estimated by HARBOR

14 In annual terms, all regions other than West Europe and Japan are still delivering growth...although the growth pace has slowed down in the US

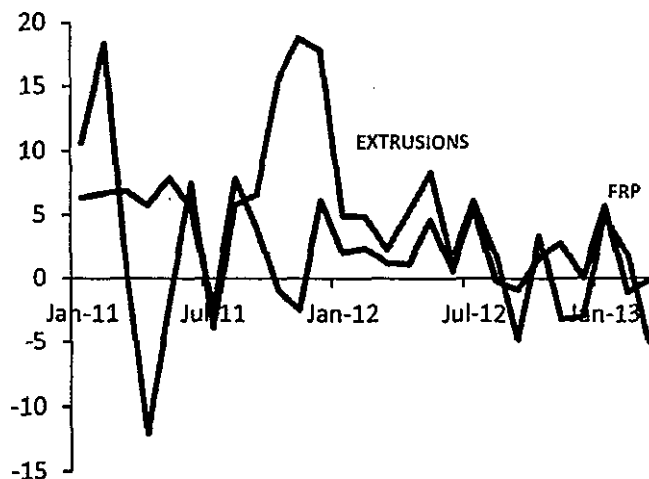
ALUMINUM SEMIS SHIPMENTS GROWTH BY REGION
(annual % change)



Source: HARBOR Aluminum with AA, JAA, GDA and CNIA data

16 Latest official data for North America showed flat rolled products almost stalled y/y (packaging being a drag) in January-May and extrusions barely growing

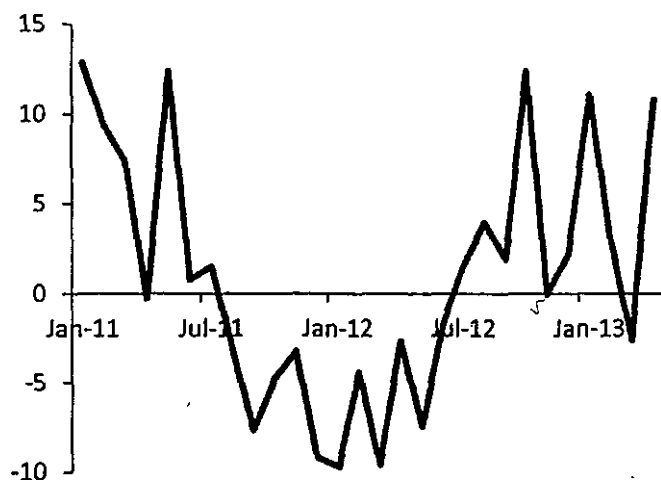
NORTH AMERICA FRP & EXTRUSIONS SHIPMENTS
(annual % change)



Source: HARBOR Aluminum with AA data

13 Latest data from Europe shows flat rolled product shipments have actually delivered some growth in the year partly as transportation has been resilient and packaging not a drag

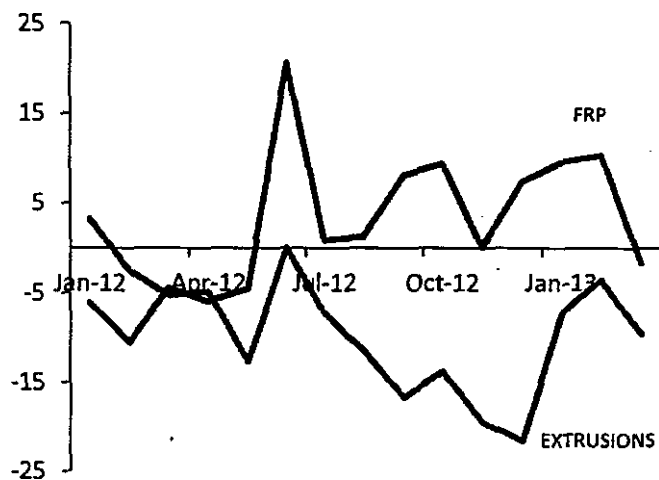
EUROPE ALUMINUM FRP SHIPMENTS
(annual % change)



Source: HARBOR Aluminum

14 However, building & construction sector has yet to find a bottom and extrusions market continues deep into annual contraction zone

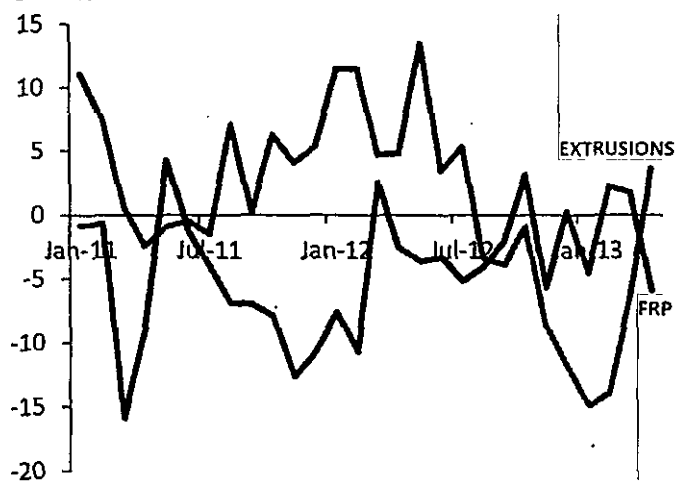
GERMANY ALUMINUM FRP & EXTRUSIONS PRODUCTION
(annual % change)



Source: HARBOR Aluminum with GDA data

15 In Japan, extrusion shipments no longer declining y/y after eight months of contraction, while flat rolled products seem not close to exit contraction zone in the short term

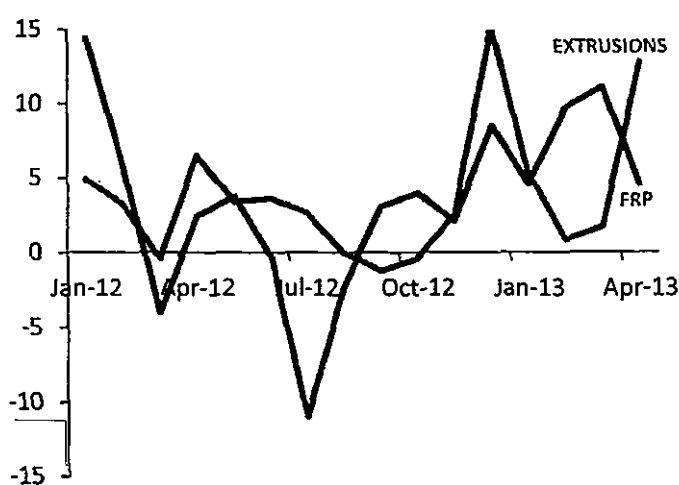
JAPAN FRP & EXTRUSIONS SHIPMENTS
(annual % change)



Source: HARBOR Aluminum with JAA data

16 In Brazil, flat rolled product and extrusion shipments are showing annual growth. FRP have shown some slowdown (packaging a drag), while extrusions have accelerated

BRAZIL FRP & EXTRUSIONS SHIPMENTS
(annual % change)

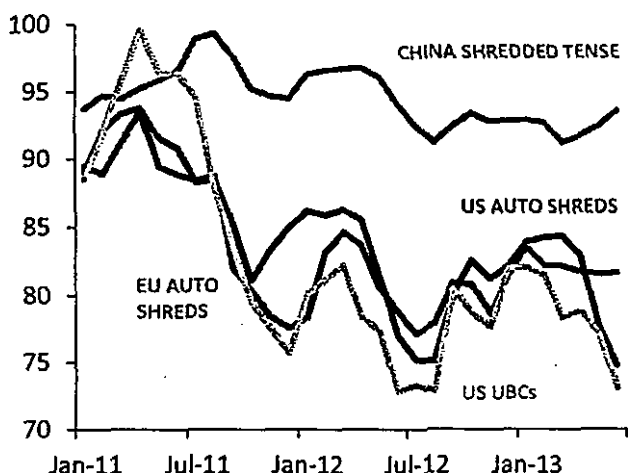


Source: HARBOR Aluminum

Aluminum Intelligence report

17 Aluminum scrap prices were mixed during June, falling in the US, while increasing in China and remaining well supported in Europe ...

REGIONAL ALUMINUM SCRAP PRICES*
(USD cent/lb)



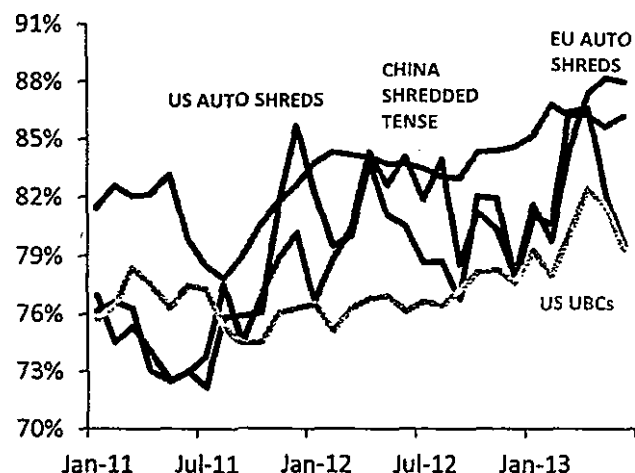
Source: HARBOR Aluminum

*Floated fragmentizer shreds for US and Europe; Shredded Tense Guangdong for China

**June 2013 data estimated

18 ...which resulted in less tight scrap – P1020 transaction price spreads in the US, at the time that spreads in China and Europe sustained near multi-year highs

REGIONAL ALUMINUM SCRAP-P1020 PRICE SPREADS*
(regional scrap price as a % of P1020 transaction price)



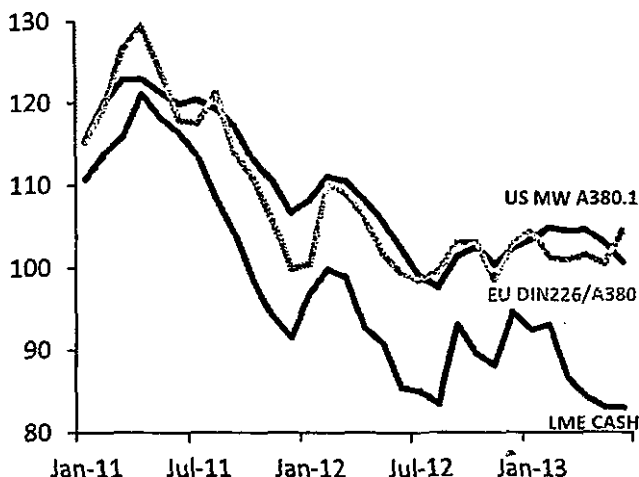
Source: HARBOR Aluminum

*Floated fragmentizer shreds for US and Europe; Shredded Tense Guangdong for China

**June 2013 data estimated

19 In the same tone, secondary alloy prices in the US shed further ground along with the LME, however prices in Europe actually increased during June

REGIONAL ALUMINUM ALLOY PRICES VS LME HIGH-GRADE CASH PRICE (USD cent/lb)

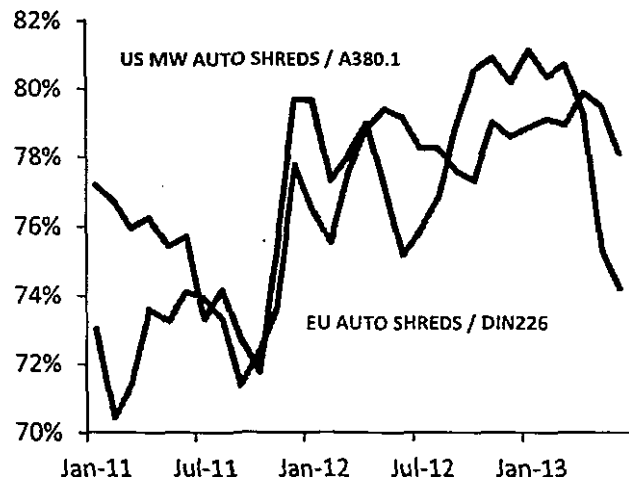


Source: HARBOR Aluminum

**June 2013 data estimated

20 This translates into some relief for secondary producer margins in the US, but more tightness in Europe causing concerns over potential producer bankruptcies

REGIONAL ALUMINUM ALLOY-SCRAP PRICE SPREADS
(regional scrap price as a % of alloy price)



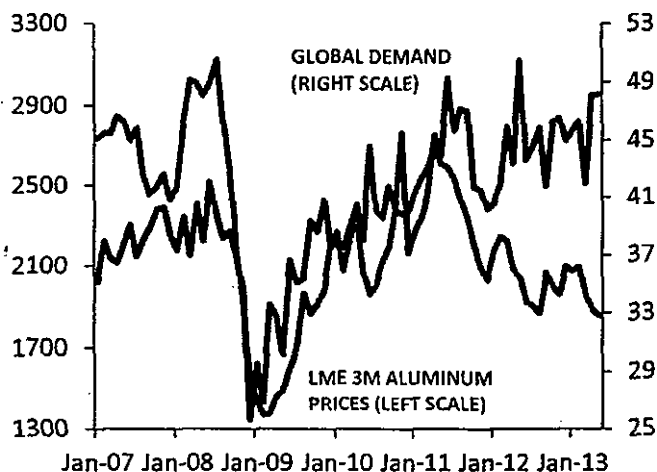
Source: HARBOR Aluminum

**June 2013 data estimated

Aluminum Intelligence report

21 Global primary aluminum consumption grew by 2.8% m/m sa in May, but contracted 4.5% in y/y terms; In Jan-May, demand grew by an average annual rate of 3.5%

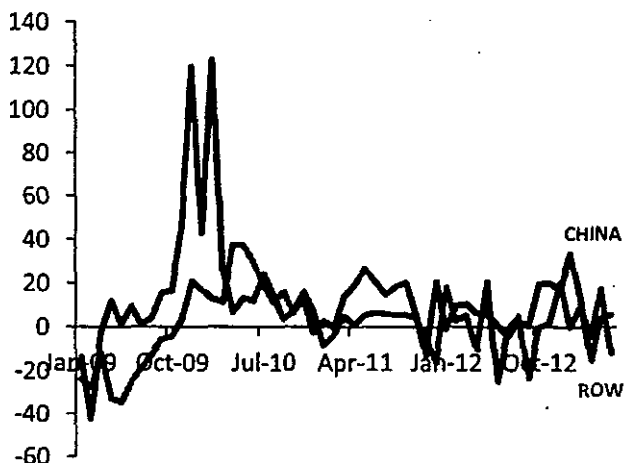
GLOBAL PRIMARY ALUMINUM DEMAND VS LME 3M ALUMINUM PRICES (\$/mton vs annualized million mtons)



Source: HARBOR Aluminum with LME data

22 All the monthly growth registered in May came from China (after a poor Q1), while primary demand in ROW have been nearly stalled since February

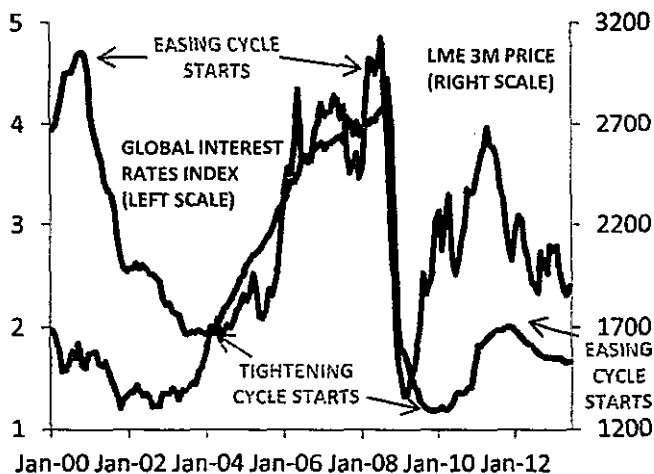
CHINA VS ROW PRIMARY ALUMINUM DEMAND (annual percentage change)



Source: HARBOR Aluminum with IAI, LME, SHFE and China Customs data

23 Odds have risen for the US Fed to start unwinding some of its monetary stimulus (QE) soon, although the start of a tightening cycle (bull for prices) not in the foreseeable future

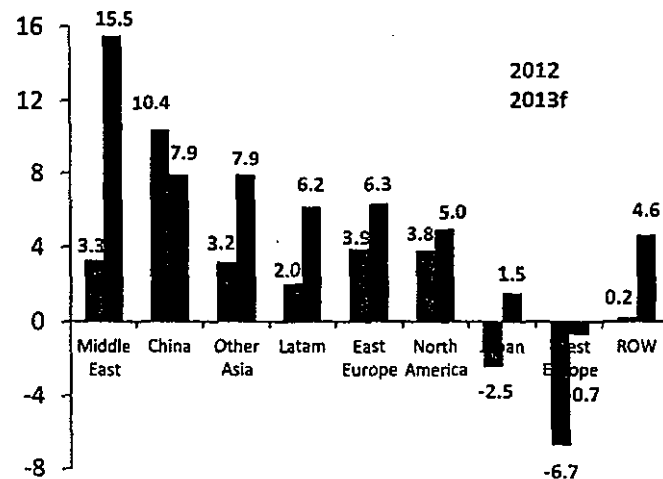
GLOBAL INTEREST RATES vs LME 3M ALUMINUM PRICES (percentage points vs \$/mton)



Source: HARBOR Aluminum with Bloomberg data

24 Headwinds for global aluminum demand are partially cyclical-related and are not structural outside China and Europe; demand outlook still positive. We expect a 6.1% growth this year

PRIMARY ALUMINUM DEMAND GROWTH FORECASTS (annual % change)



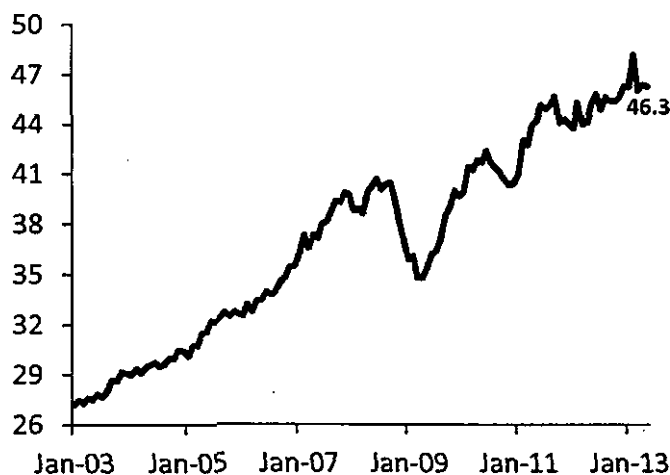
Source: HARBOR Aluminum

Aluminum Intelligence report

25 Global primary output was roughly unchanged in May, decreasing by a marginal 0.2% monthly rate; producers still unable to react enough to negative economics

GLOBAL PRIMARY ALUMINUM DAILY PRODUCTION

(annualized million mtons; monthly data)

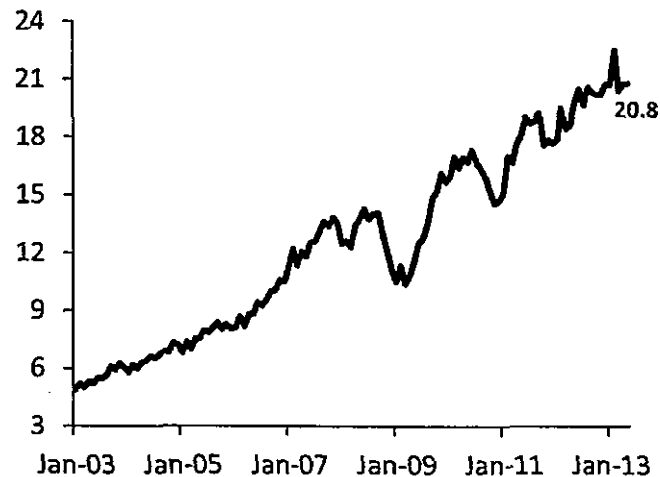


Source: HARBOR Aluminum with IAI data

26 Chinese production was roughly stalled as curtailments mainly in Shaanxi, Guangxi, Henan and Hubei offset increases in the Northwest

CHINA PRIMARY ALUMINUM DAILY PRODUCTION

(annualized million mtons)

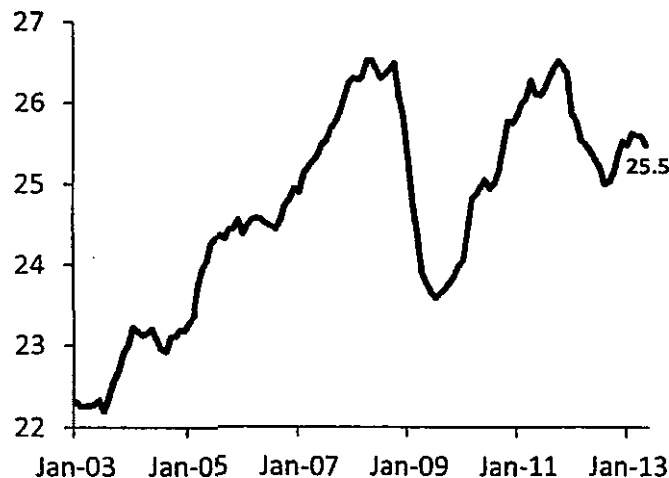


Source: HARBOR Aluminum with IAI data

27 ROW production down 0.4% m/m mainly pulled down by cuts in India (Nalco), Eastern Europe (Rusal and probably other small producers) and North America (Alcoa Baie-Comeau)

NON-CHINA REPORTED PRIMARY ALUMINUM DAILY PRODUCTION

(annualized million mtons)

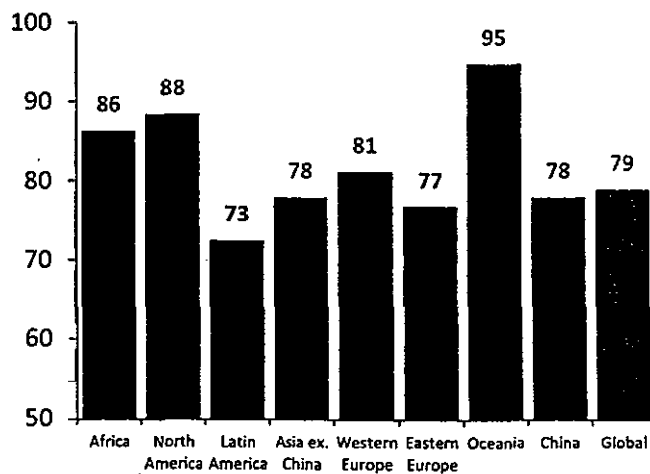


Source: HARBOR Aluminum with IAI data

28 Production is far from falling enough to help reduce the ongoing record overhang of metal in a context of ample idled capacity waiting to come back as soon as prices go back up

ALUMINUM PRODUCTION CAPACITY UTILIZATION RATE BY REGION

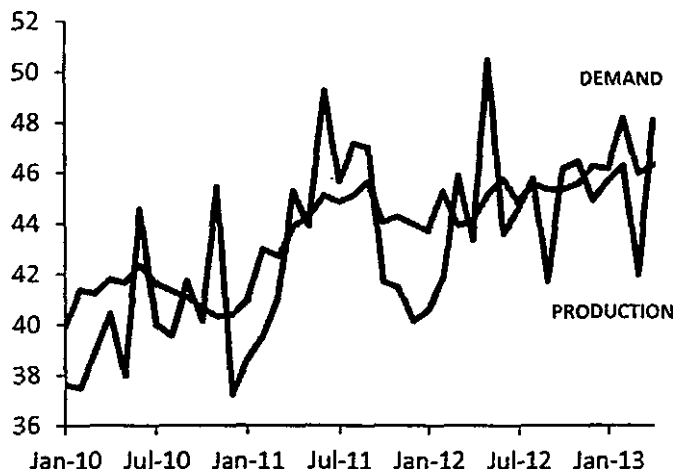
(% of capacity utilization; April 2013)



Source: HARBOR Aluminum

29 Global primary aluminum consumption increased in April, recovering from a significant decline experienced the prior month...

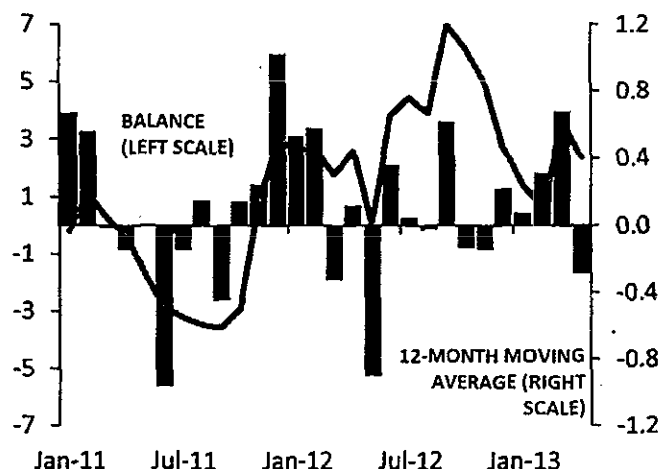
GLOBAL PRIMARY ALUMINUM PRODUCTION & DEMAND
(annualized million mtons)



Source: HARBOR Aluminum

30 ...leading the global primary aluminum market out of monthly deficit, after being in monthly surplus since last December...

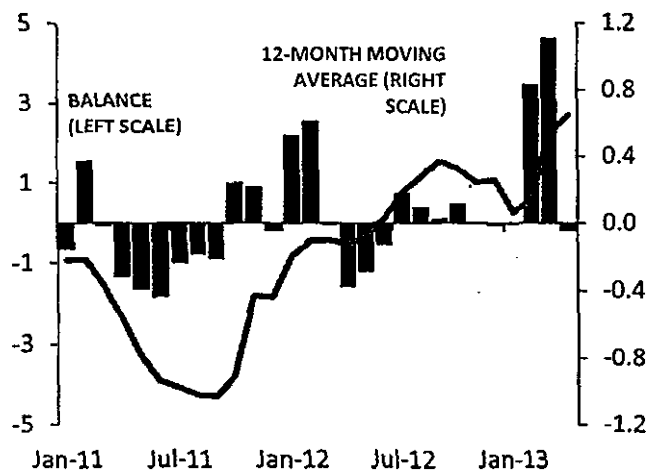
GLOBAL PRIMARY ALUMINUM MONTHLY MARKET BALANCE (annualized million mtons)



Source: HARBOR Aluminum

31 ...mainly as China came back into balance as primary consumption started to recover...

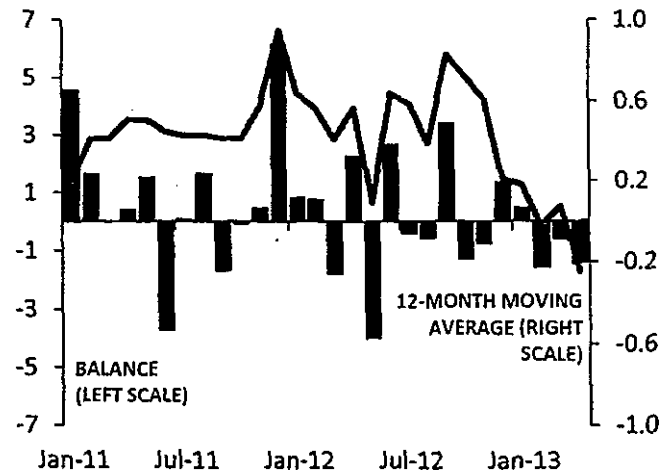
CHINA PRIMARY ALUMINUM MONTHLY MARKET BALANCE (annualized million mtons)



Source: HARBOR Aluminum

32 ...and as ROW's continued to experience small monthly deficits on the back of some demand growth and modest production decline

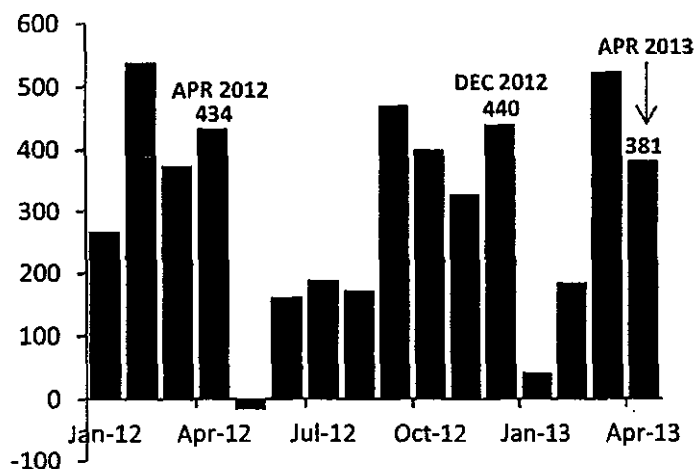
NON-CHINA PRIMARY ALUMINUM MONTHLY MARKET BALANCE (annualized million mtons)



Source: HARBOR Aluminum

29 In January-April 2013, the global primary aluminum market accumulated a surplus of 381 ktons, down by 12.2% vs the same period of 2012

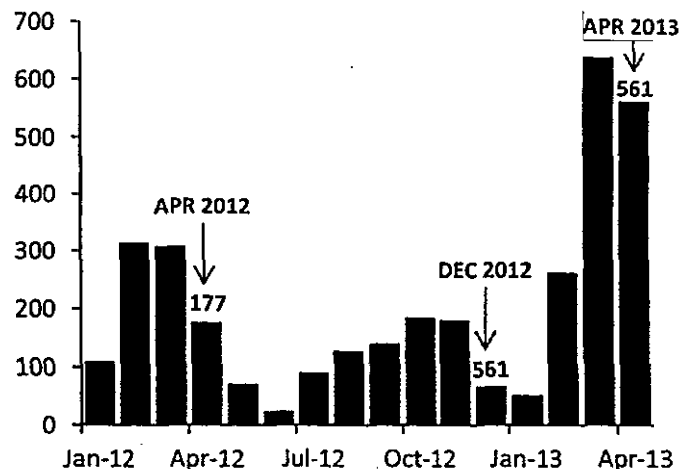
GLOBAL PRIMARY ALUMINUM YEAR-TO-DATE MARKET BALANCE (thousand mtons)



Source: HARBOR Aluminum

30 China delivered a surplus of 561,412 tons (vs 176,828 tons in Jan-Apr 2012)...

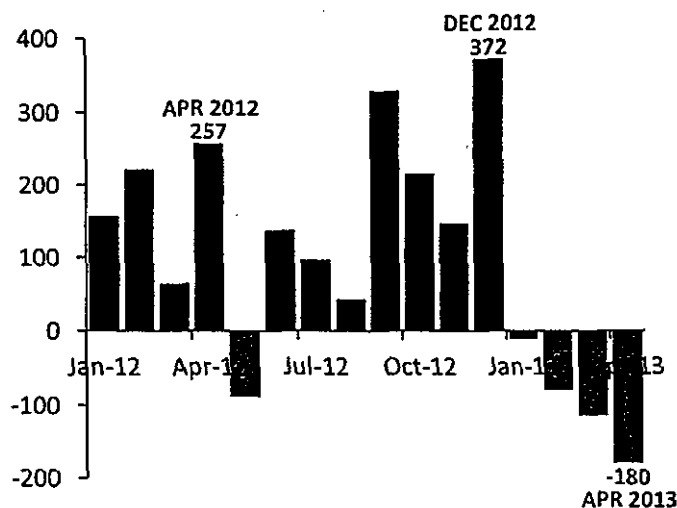
CHINA PRIMARY ALUMINUM YEAR-TO-DATE MARKET BALANCE (thousand mtons)



Source: HARBOR Aluminum

31 ...while ROW experienced a deficit of 180,230 tons (vs a surplus of 256,985 tons in Jan-Apr 2012)

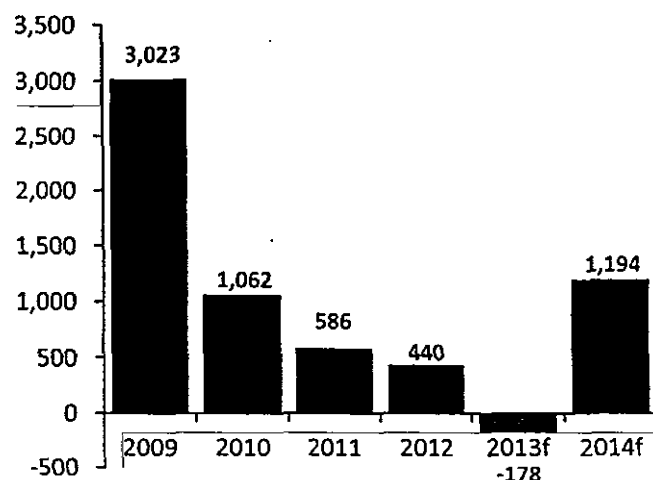
NON-CHINA PRIMARY ALUMINUM YEAR-TO-DATE MARKET BALANCE (thousand mtons)



Source: HARBOR Aluminum

32 However, the unprecedented overhang of metal not likely to be worked out in the short/mid term. We estimate a deficit of 178,000 mtons in 2013 and 1.1 million tons surplus in 2014

GLOBAL PRIMARY ALUMINUM MARKET BALANCE FORECASTS (thousand mtons)

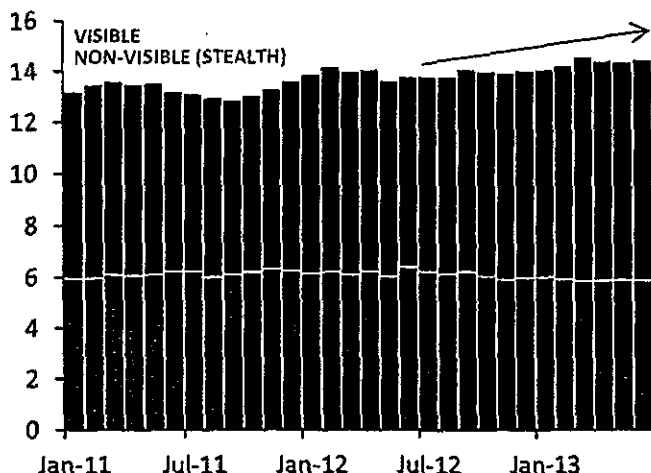


Source: HARBOR Aluminum

Aluminum Intelligence report

33 After a slight decline in May, global primary aluminum inventories (visible + stealth) are set to increase again near to all-time highs in June...

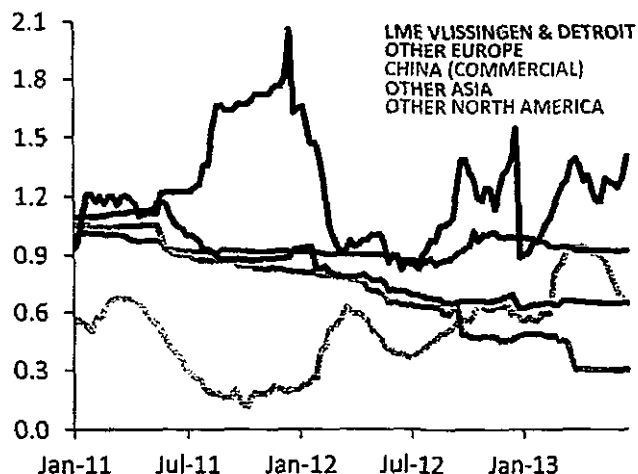
GLOBAL TOTAL PRIMARY ALUMINUM INVENTORIES
(million mtons)



Source: HARBOR Aluminum
*June 2013 data estimated

35 It is worth to note that visible aluminum inventories are not increasing outside of these two locations. In China, inventories should decline for a third consecutive month

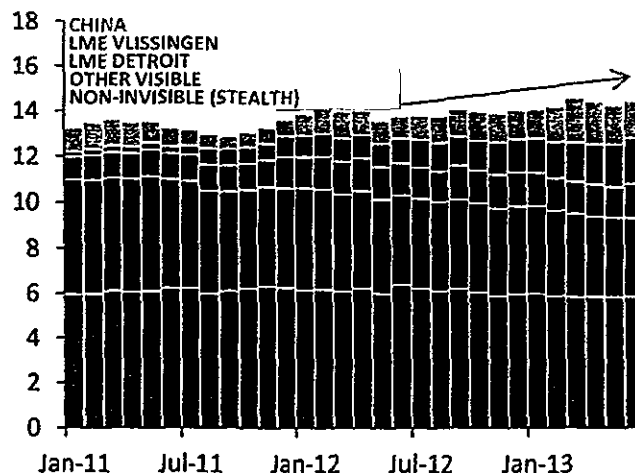
COMMERCIAL PRIMARY ALUMINUM INVENTORIES
ON-WARRANT BY REGION (weekly data; million mtons)



Source: HARBOR Aluminum with LME, SHFE and SMM data

34 ...given net inflows in June of 136,450 mtons in Detroit (HARBOR understands mainly two traders put metal in) and 132,375 mtons in Vlissingen (Netherlands)

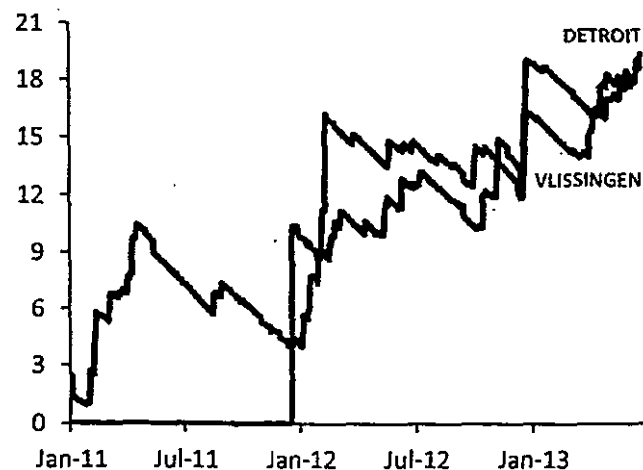
GLOBAL TOTAL PRIMARY ALUMINUM INVENTORIES
(million mtons)



Source: HARBOR Aluminum with LME, IAI, Marubeni, SHFE and SMM data.
*LME, primary producers reporting to IAI, Japanese ports, SHFE, SRB, Wuxi & Nanhai.
***June 2013 data estimated

36 Load out queues at LME Detroit & Vlissingen warehouses have lengthened to new record highs (20 months in Vlissingen and 19 months in Detroit)

QUEUES FROM KEY LME LOCATIONS
(max. delivery time in months for a warrant if canceled today)

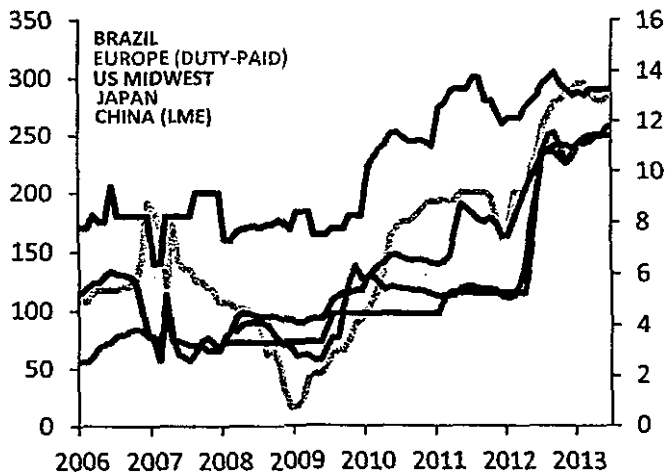


Source: HARBOR Aluminum

Aluminum Intelligence report

37 Lengthening queues= further upward pressure for global spot aluminum premiums. Spot premiums for ingot in the US Midwest are now quoted at a record 12.00-13.00 cent/lb range

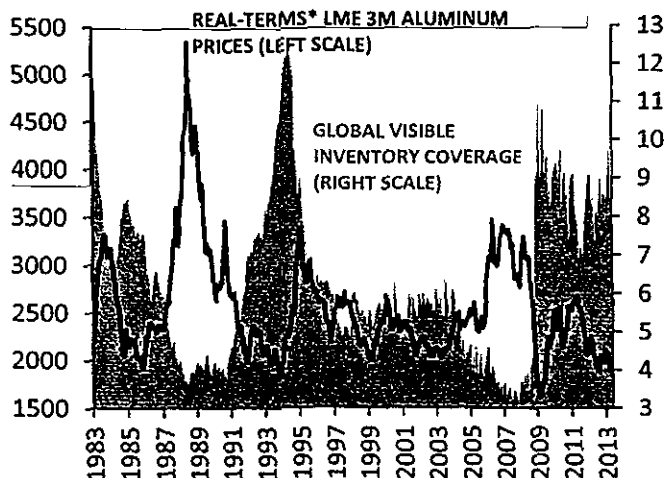
GLOBAL SPOT ALUMINUM P1020 INGOT PREMIUMS
(monthly averages in \$/mton vs cent/lb; equivalent scales)



Source: HARBOR Aluminum

38 LME prices will hardly exit the lower end of the typical cycle range if inventories in terms of weeks of consumption don't decline notably and consistently (not likely in the short term)

VISIBLE INVENTORY / DEMAND COVERAGE VS REAL-TERMS* LME 3M PRICES (\$/mton vs weeks of consumption)

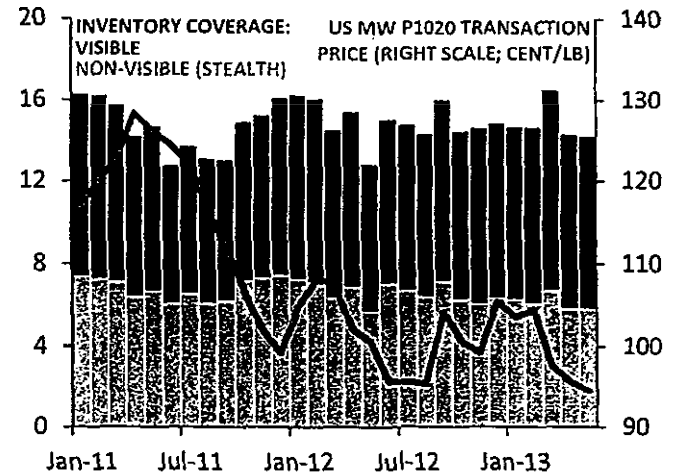


Source: HARBOR Aluminum with LME data

*Inflation-adjusted prices in March 2013 US dollar terms

39 Global total inventories (visible + stealth) in terms of week of consumption roughly stalled at 14.7 weeks in May....metal overhang not being worked out

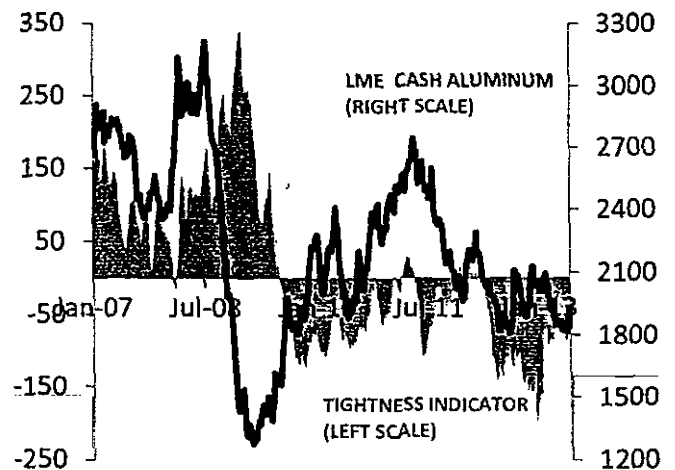
GLOBAL PRIMARY ALUMINUM INVENTORY DEMAND COVERAGE VS MW P1020 (inventories in woc vs cent/lb)



Source: HARBOR Aluminum with LME data

40 HARBOR's proprietary measure suggests at the margin the physical market remains tight, but not enough in a context of the ongoing record metal overhang.

HARBOR'S ALUMINUM MARKET TIGHTNESS INDICATOR* VS LME CASH ALUMINUM PRICES (index vs \$/mton)

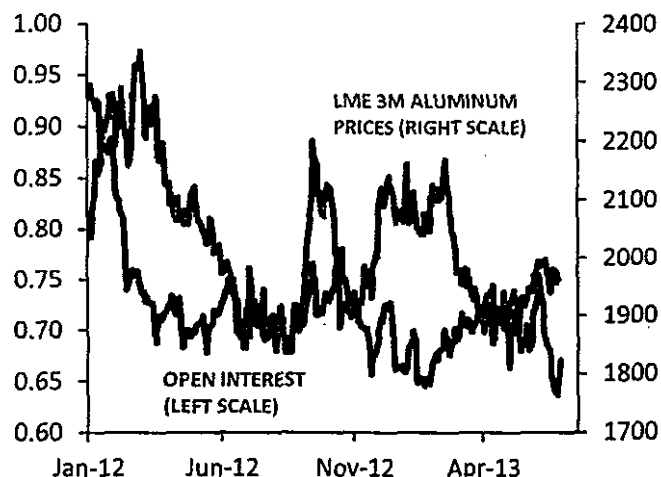


Source: HARBOR Aluminum

*Index below (above) zero signals market conditions tightening (loosening) at the margin. Considers inventory movements, forward curve spreads, regional premiums, alumina price trends, and SHFE-LME arbitrage, among other factors.

41 Prices have touched levels as low as \$1,762 per mton (not seen since mid 2009) in June as a new round of heavy long liquidation by funds and increasing short selling emerged....

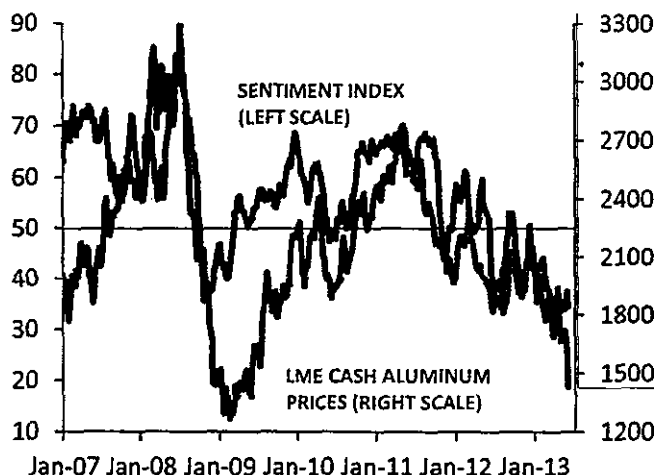
LME 3M ALUMINUM PRICES VS FUTURES OPEN INTEREST
(\$/mton vs million contracts)



Source: HARBOR Aluminum with LME and Bloomberg data

42 ...as market sentiment towards aluminum continues to be strongly bearish given overproduction, overcapacity and an unprecedented overhang of metal ...

HARBOR's ALUMINUM MARKET SENTIMENT INDEX*
(weekly data; index vs \$/mton)

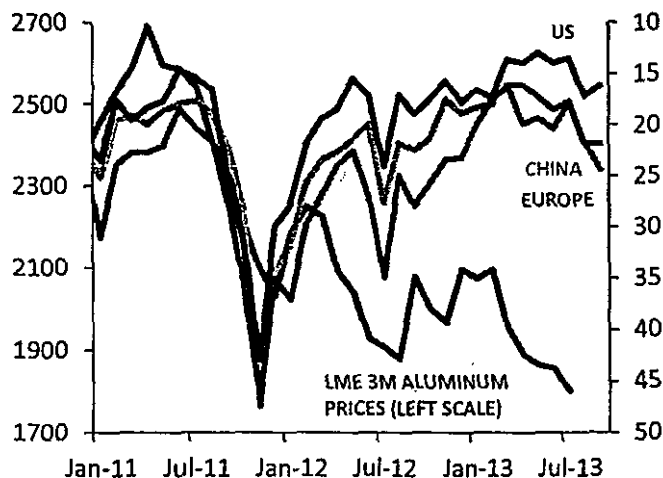


Source: HARBOR Aluminum with LME data

*Index above (below) 50 signals market sentiment is bullish (bearish)

43 ...in a context of rising global market fear amid rising concerns over economic growth (mainly in China), and the Fed potentially starting to taper its monetary stimulus

LME 3M ALUMINUM PRICES VS MARKET CONFIDENCE INDEXES
(monthly averages; \$/mton vs volatility indexes*)

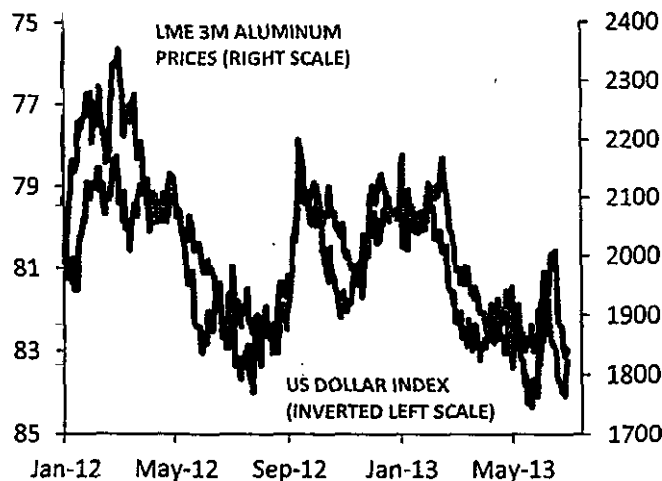


Source: HARBOR Aluminum with LME and Bloomberg data

*Volatility indexes graphed two months forward; inverted right scale

44 ...which prompted the US dollar to strengthen in the second half of June (bearish for prices) after having reached a four-month low earlier in the month

LME 3M ALUMINUM PRICES VS US DOLLAR INDEX
(\$/mton vs index)



Source: HARBOR Aluminum with LME and Bloomberg data

Aluminum Intelligence report

45 The LME futures banding report shows open positions roughly balanced for July but still with a bearish bias for August-September...

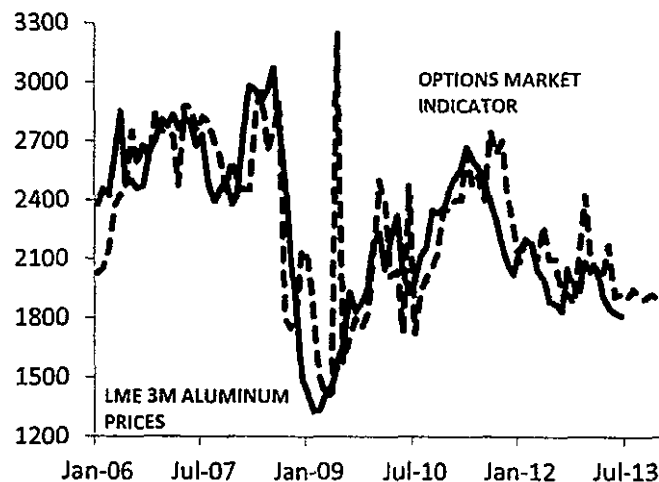
LME FUTURES BANDING REPORT (number of players with open positions as % of total open interest prompt each month)

| POSITION | % | JUL | AUG | SEP |
|----------|----------|-----|-----|-----|
| Long | 5 - 9% | 3 | 4 | 4 |
| Long | 10 - 19% | 0 | 0 | 0 |
| Long | 20 - 29% | 1 | 0 | 0 |
| Long | 30 - 39% | 0 | 0 | 0 |
| Long | 40% > | 0 | 0 | 0 |
| Short | 5 - 9% | 1 | 4 | 0 |
| Short | 10 - 19% | 2 | 1 | 1 |
| Short | 20 - 29% | 0 | 0 | 0 |
| Short | 30 - 39% | 0 | 0 | 0 |
| Short | 40% > | 0 | 0 | 0 |

Source: HARBOR Aluminum with LME data
*As of June 27, 2013.

43 ...which is in line with LME options market no longer pricing on any meaningful aluminum price recovery for the balance of the year

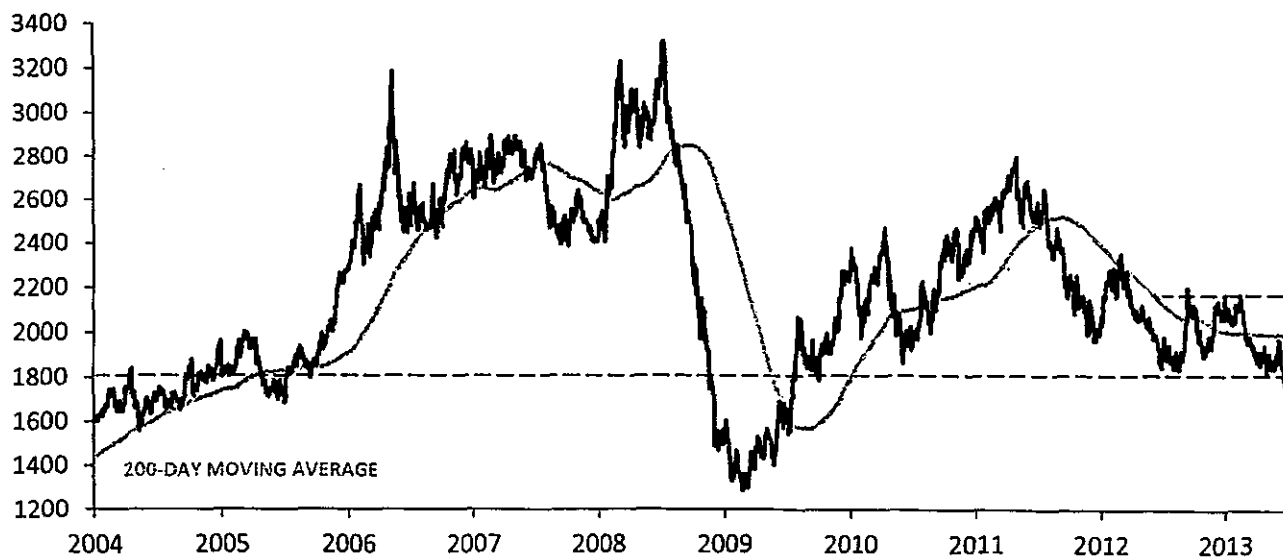
HARBOR'S LME OPTIONS MARKET PRICE INDICATOR (\$/mton)



Source: HARBOR Aluminum

47 A new leg down is possible in the short term if prices don't bounce back above \$1,832 per mton (83 cent/lb). From a technical standpoint, aluminum prices have confirmed failure of the multi-year long support of \$1,832 per mton (83 cent/lb) which opens the downside to \$1,650 per mton (74.8 cent/lb) or lower. A cyclical-related bottom more likely as the year advances.

LME 3M ALUMINUM PRICE TECHNICALS
(\$/mton; daily data)



Source: HARBOR Aluminum with LME data