



# Market Outlook

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Oslo, January 2019

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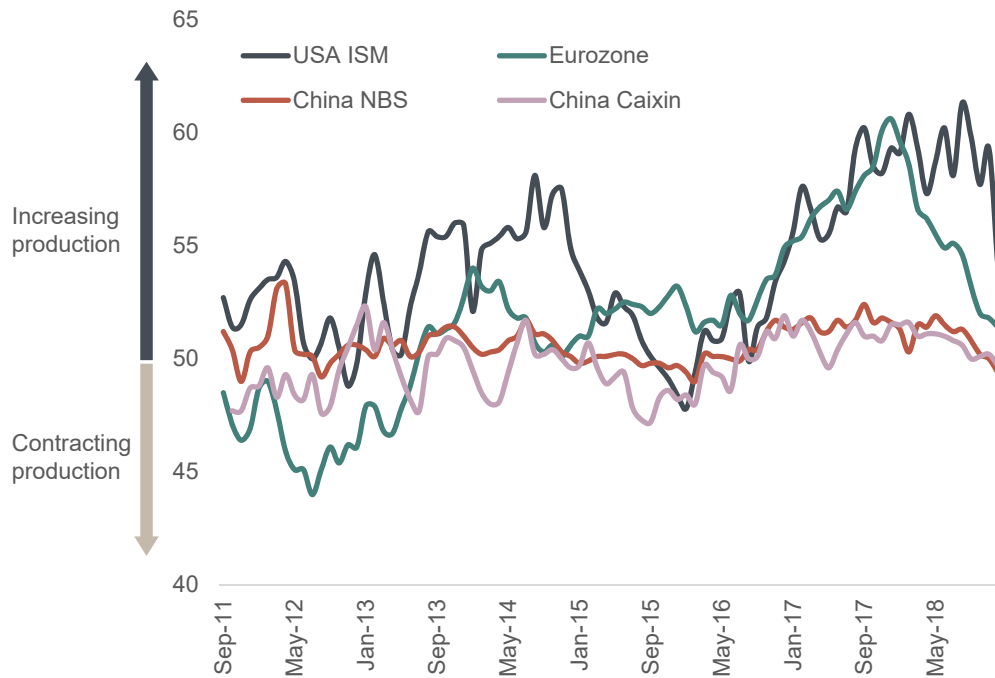
Macro and trade

# Macro sentiment worsening amid trade tensions

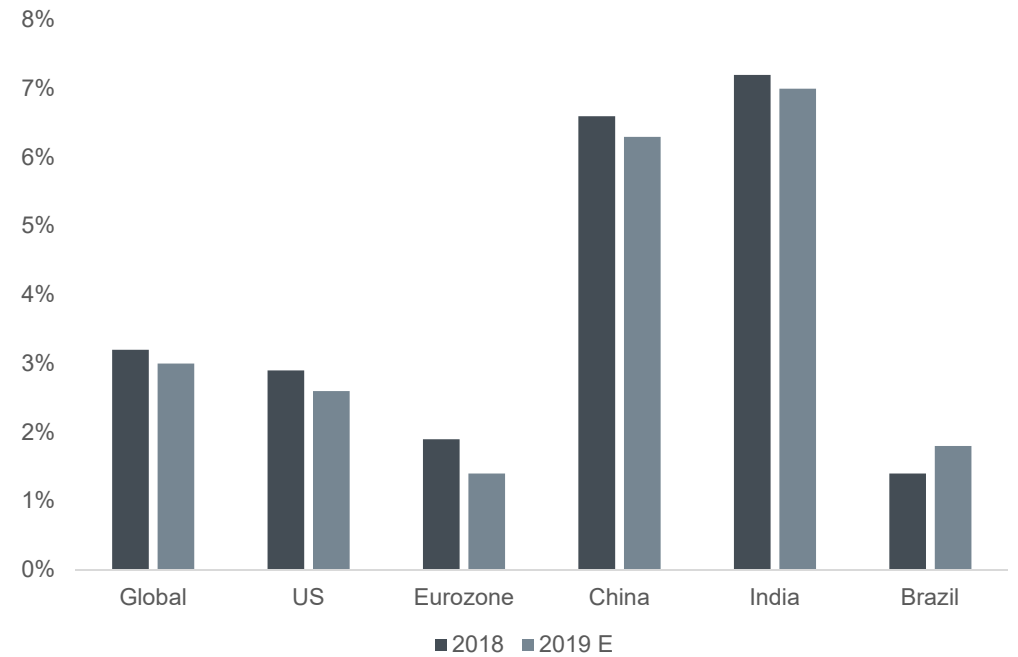


Increasing uncertainty on GDP-effects from trade disputes

Manufacturing PMI's



Annual GDP-growth, key regions



Source: Thomson Reuters, IHS Global Insight

# Trade sanctions and tariffs impacting global aluminium flows



## US

- Section 232: aluminium
- Section 232: auto (potential)
- Section 301
- Common alloy sheet and foil
- USMCA\*

## Europe

- Monitoring of aluminium imports
- Potential safeguards

## Russia

- Rusal sanctions

## India

- Duties on primary and scrap imports
- Potentially more/higher duties

## China

- Limitations on scrap imports

## Indonesia

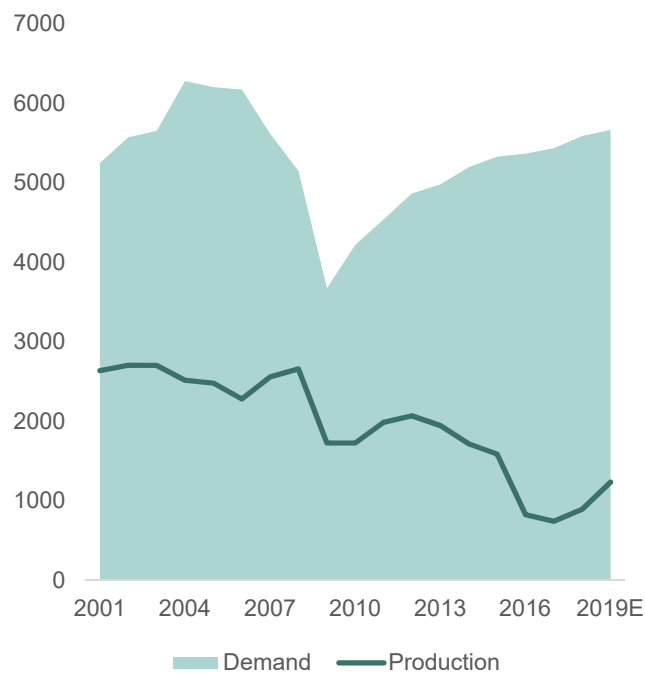
- Safeguard investigation into aluminium foil

Source: Hydro analysis  
\*USMCA = United States Mexico Canada Agreement

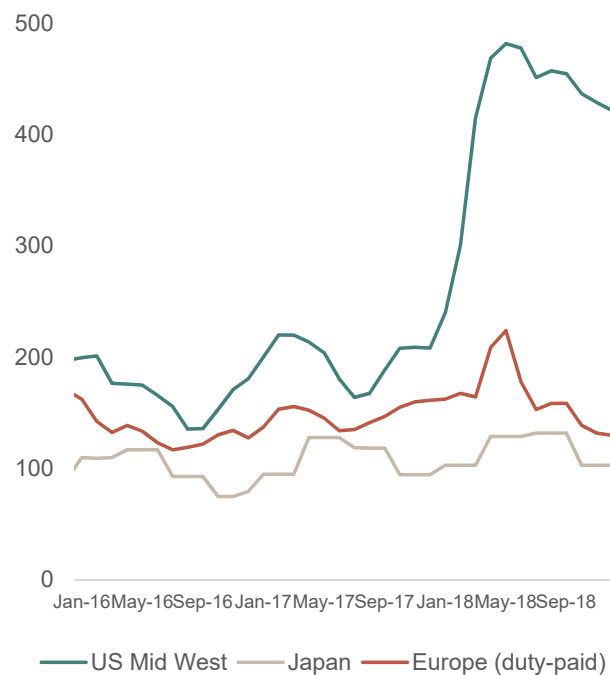
# Section 232 impacting US metal premiums

Premiums reflecting high underlying metal deficit

US primary demand and production ('000t)



Ingot premiums USD/t



## Section 232

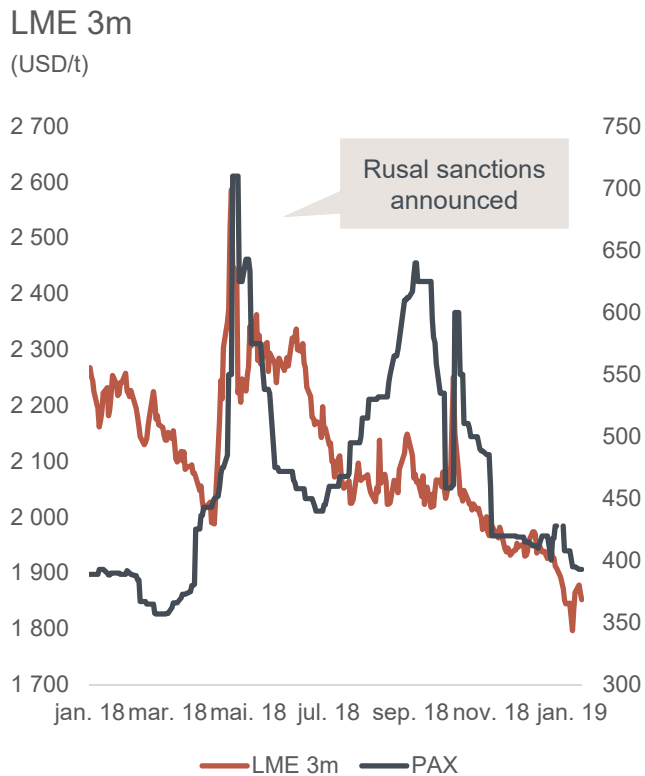
- 10% duty on aluminium imports
- The US has a large underlying metal deficit and needs to attract large metal volumes
- Some US restarts so far – however, limited overall restart potential
- Restart of Hawesville and New Madrid adding volumes in 2019



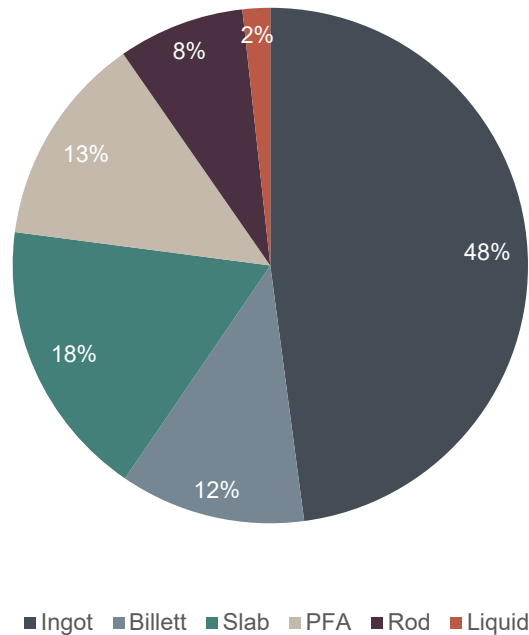
# Rusal sanctions leading to price volatility



Large producer of value added products, impacting regional product premiums



**Rusal primary production per product**  
(total 2017: 3.8 million tonnes)

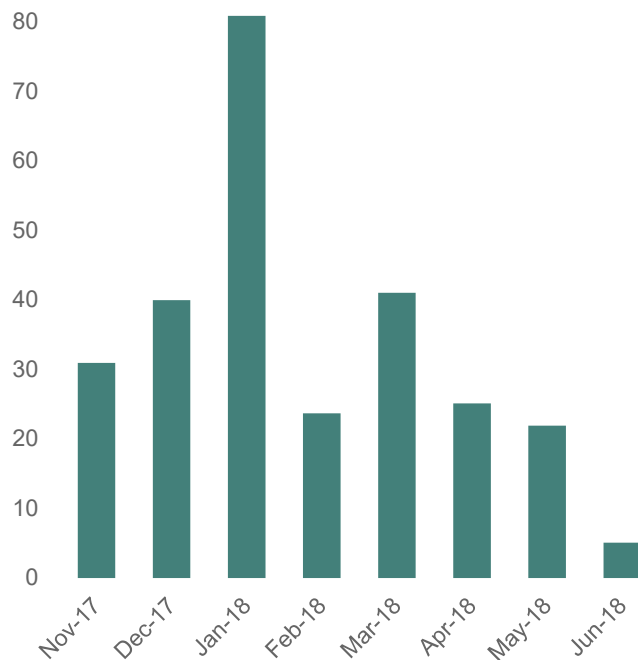


## Rusal sanctions

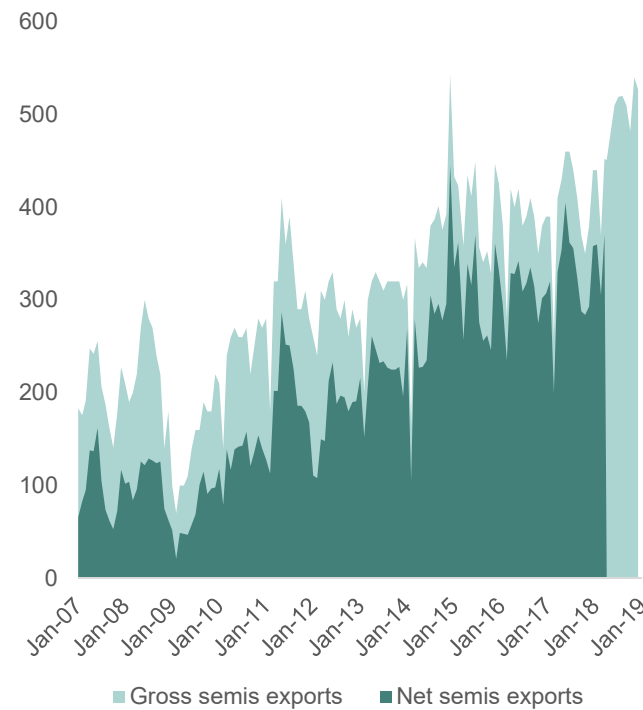
- On 19<sup>th</sup> December, U.S. Department of the Treasury's Office of Foreign Assets Control (OFAC) notified Congress of its intention to terminate the sanctions imposed on En+ Group plc ("En+"), UC Rusal plc ("Rusal"), and JSC EuroSibEnergo ("ESE") in 30 days
- Following past postponements, supply contract deals for 2019 are permissible provided they were similar to 2018 deals
- Aughinish is an important supplier of alumina to European smelters

# Chinese semis exports increasing in 2018, less volumes going to the US

US imports of sheet and plate from China  
000s tonnes



Semis exports  
(monthly, kmt)



## Chinese semis exports

- Increasing volumes in 2018 amid higher export arbitrage
  - + 21% gross exports 2019 vs 2018
- Export arbitrage supported by weak RMB
- Asia key destination
  - More than 50% of export volumes in 2017
- AD and CVD against Chinese foil and Chinese common alloy sheet have led to sharp declines in US imports from China



Source: IHS Market, 7606: sheet and plate, Thomson Reuters, Antaika

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Downstream



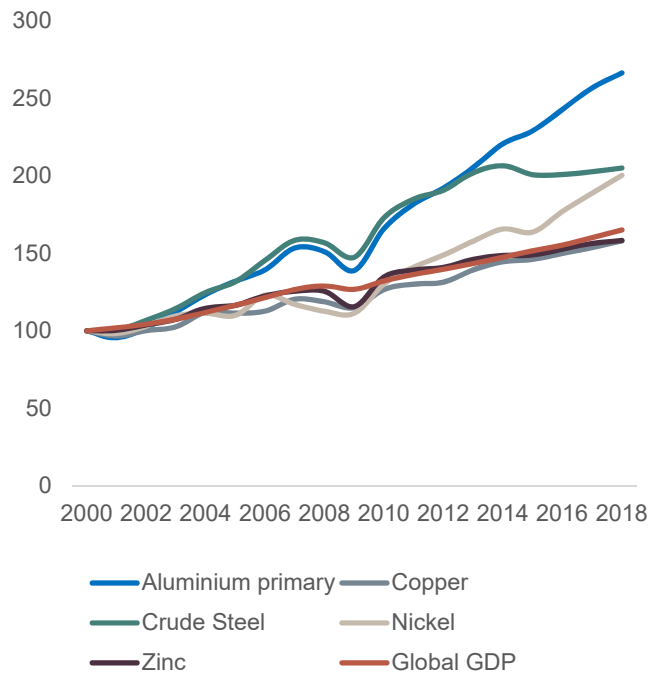
# Aluminium continues to be the fastest growing base metal



Gaining market share from other metals in key segments

## Global metal demand

Index 2000=100



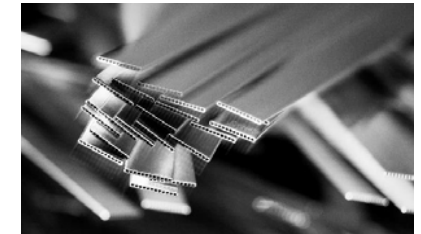
## New segments and applications supporting aluminium demand



Offshore / Marine applications, e.g. fish farms



Railway, including new technologies like maglev



HVAC&R



Aluminium formwork for B&C



Automotive, strong drive towards EV



Middle and high voltage cables, wire and cable for electrical applications

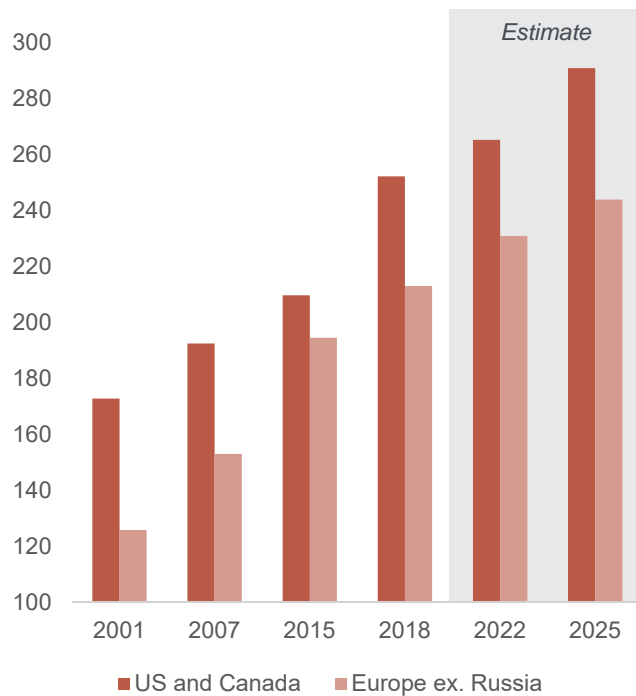
# Substitution trend in automotive progressing



Positive US demand despite moderate auto sales, Europe gaining ground

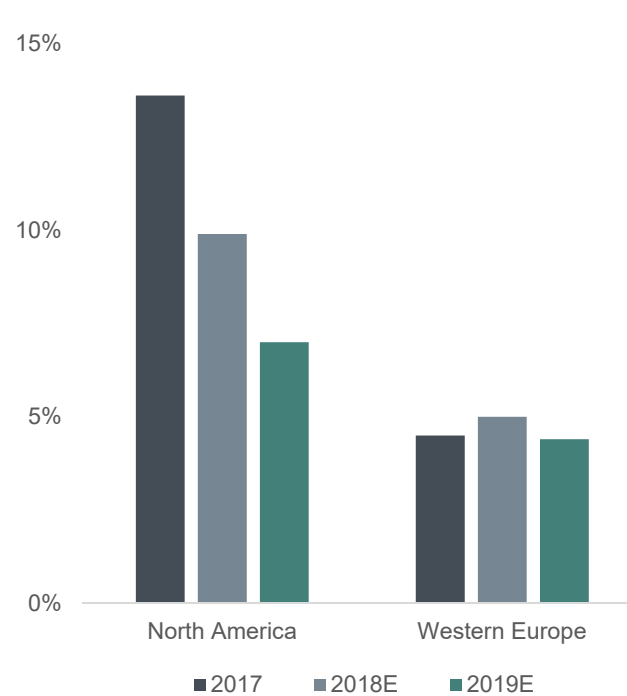
Aluminium vehicle penetration\*

Demand per vehicle, kg/car



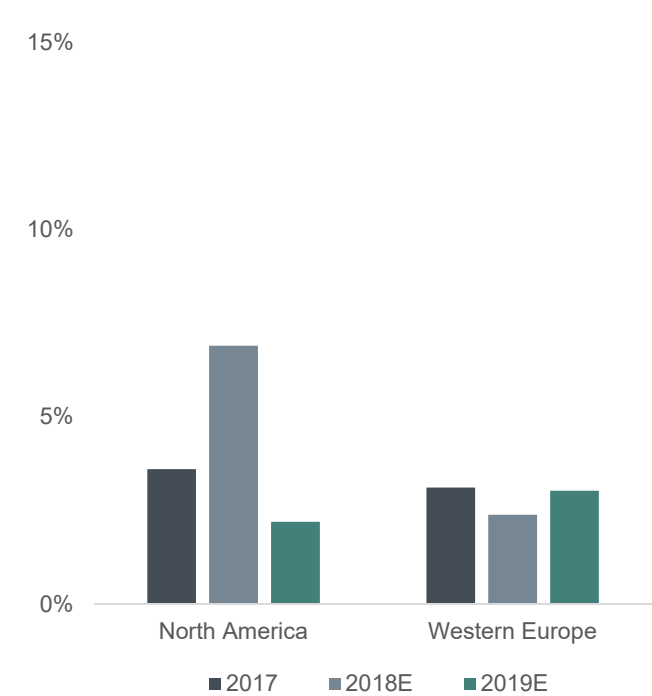
Rolled products demand in transport

(annual growth)



Extrusions demand in transport

(annual growth)



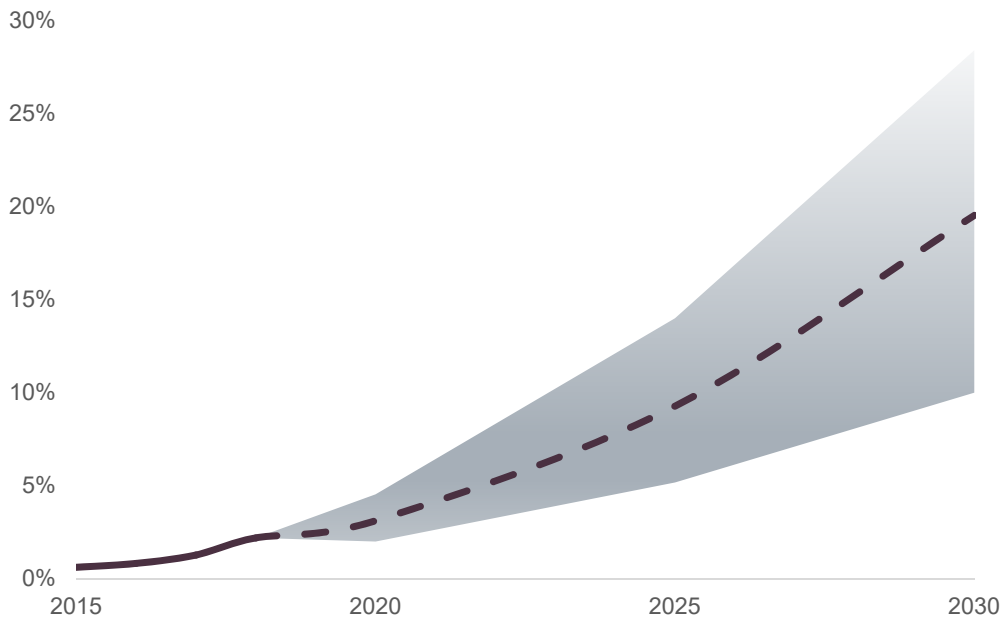
Source: Hydro analysis, Republished under license from CRU International Ltd  
 \*Aluminium demand per vehicle (captures the consumption from the sector. The amount in a vehicle will be less due to fabrication losses)

# E-mobility trend favourable for aluminium demand

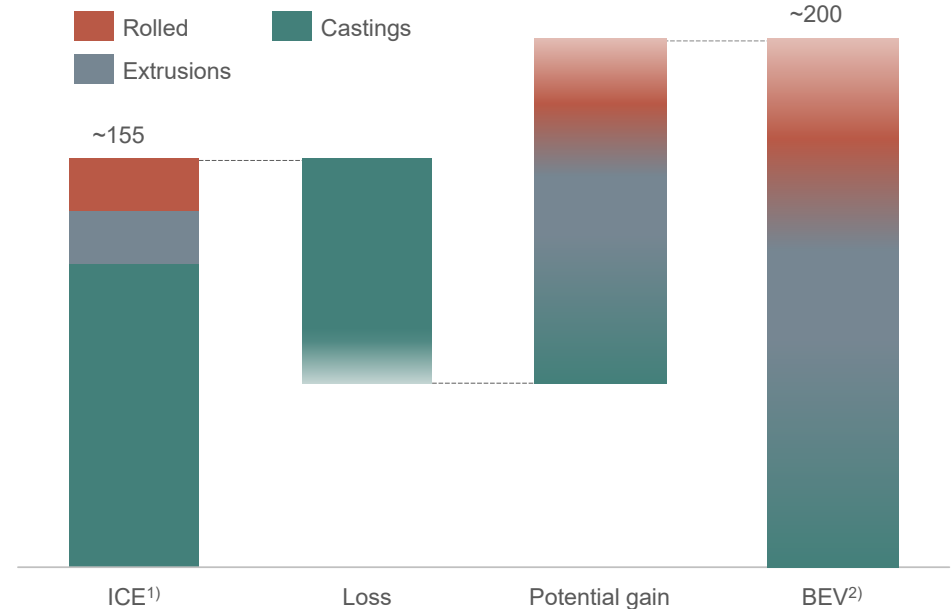


High aluminium content in BEVs, increasing share of total car sales

Electric vehicle\* share of new car sales (%)



Net increase in aluminium content in electric vehicle's  
Average kg aluminium per vehicle type in 2018



Source: Hydro analysis, Republished under license from CRU International Ltd  
 \* Battery electric vehicles & plug-in-hybrid vehicles  
 1) ICE= Internal Combustion Engine, 2) BEV= Battery Electric Vehicle  
 Forecast based on 10 different sources including CRU, Wood MacKenzie, JP Morgan, IEA, Bloomberg New Energy Finance and others

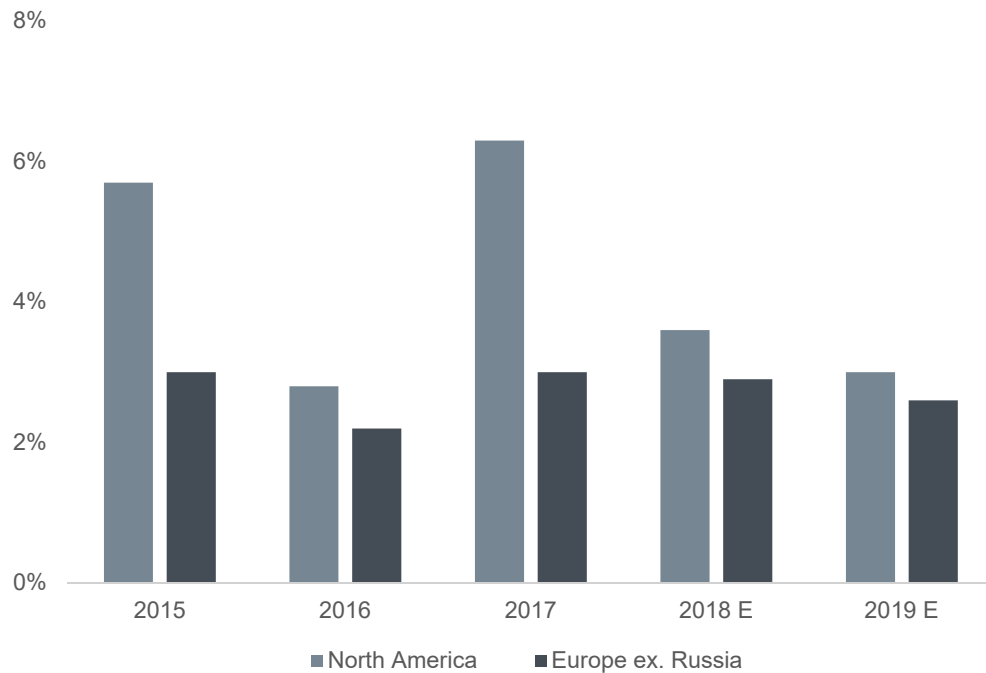
# Rolled products demand driven by transport segment



Transport share increasing in total rolled products demand

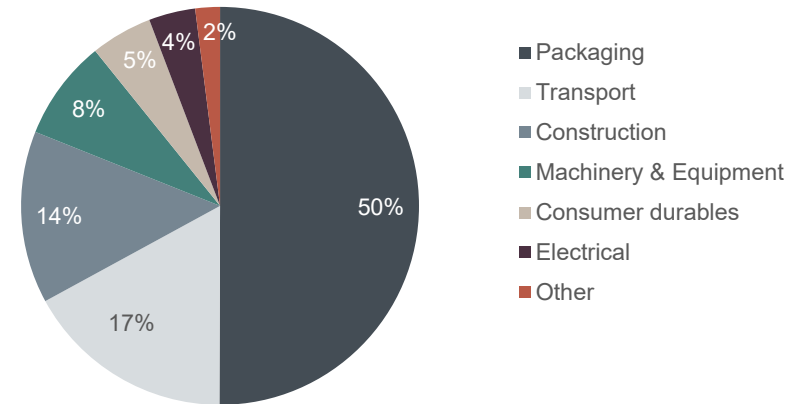
General rolled products demand, selected regions

YoY-growth



Global segment composition, rolled products

(2017)

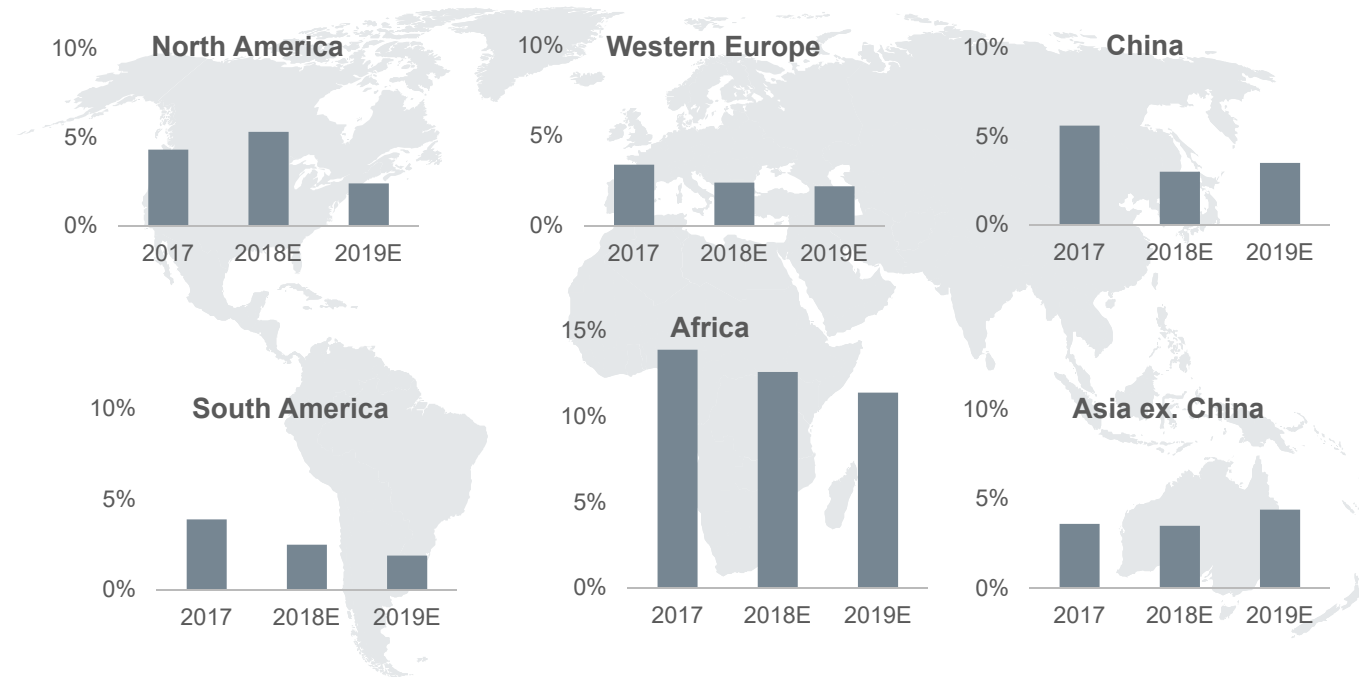


## Expected market development

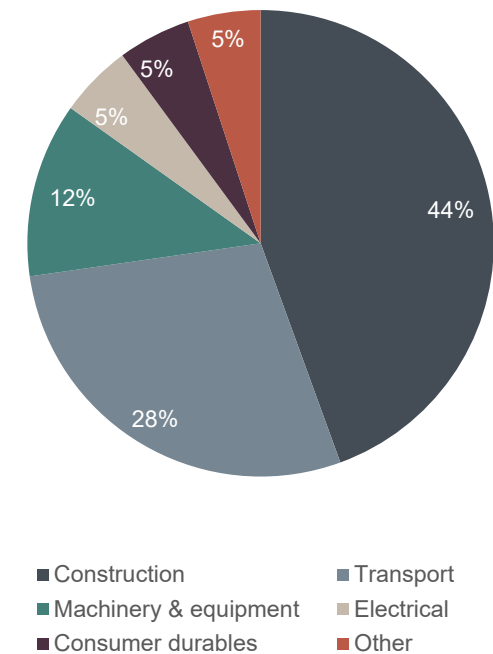
- Continued substitution trend in transport main demand driver
- Growth in packaging driven by can stock and foil in emerging markets

# Moderating extrusion demand growth in Western Europe and North America, improving in Asia

Extrusion demand, selected regions  
YoY-growth



European segment composition, extrusion  
(2017)



Source: Hydro analysis, Republished under license from CRU International Ltd

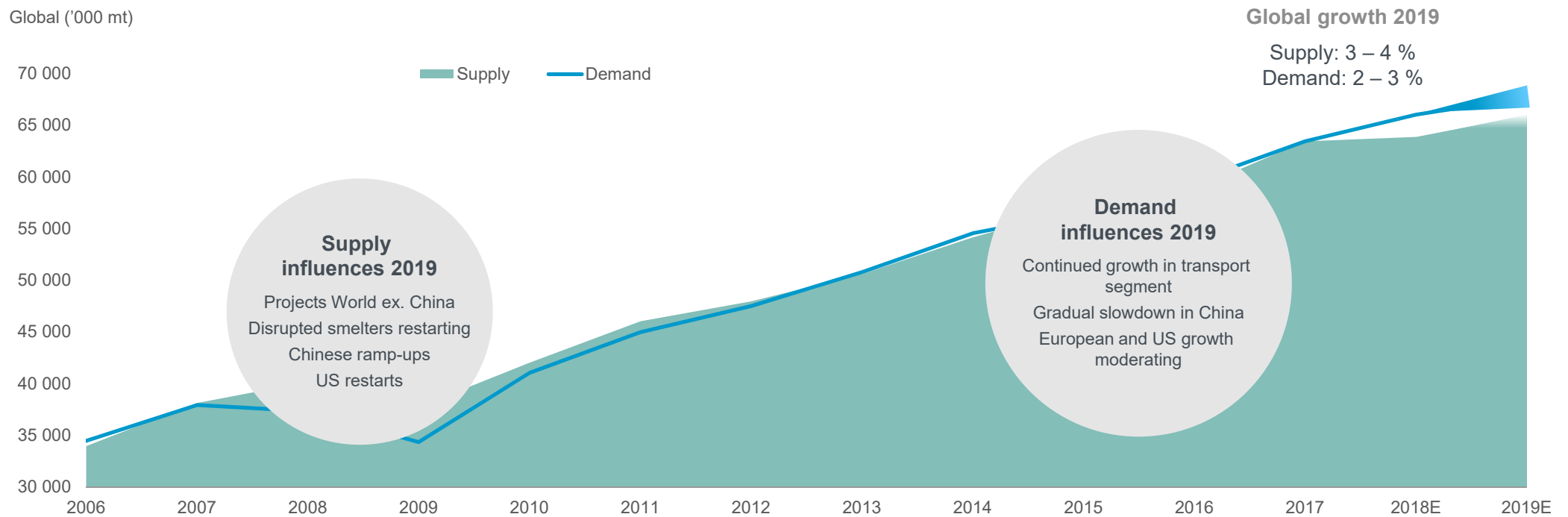
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# Primary metal market

# Global primary market expected to be in deficit also in 2019



Supply growth picking up, demand growth slowing



# High input costs challenging smelter profitability



Higher end of the cost curve dominated by Chinese smelters

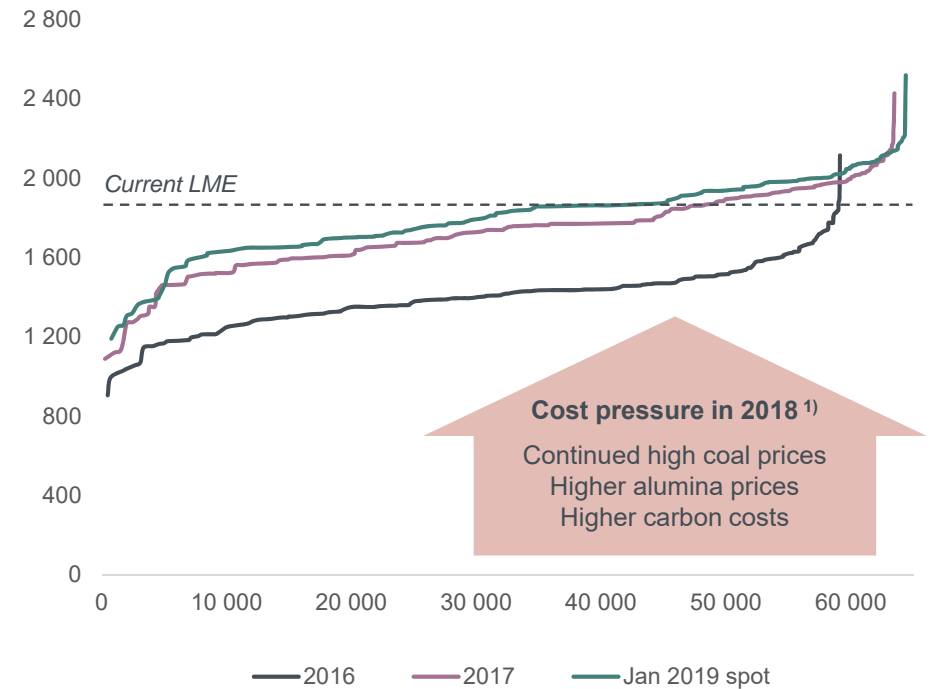
Input costs aluminium production

Index: Q1 2016 = 100



Business operating cost (BOC)

USD/t



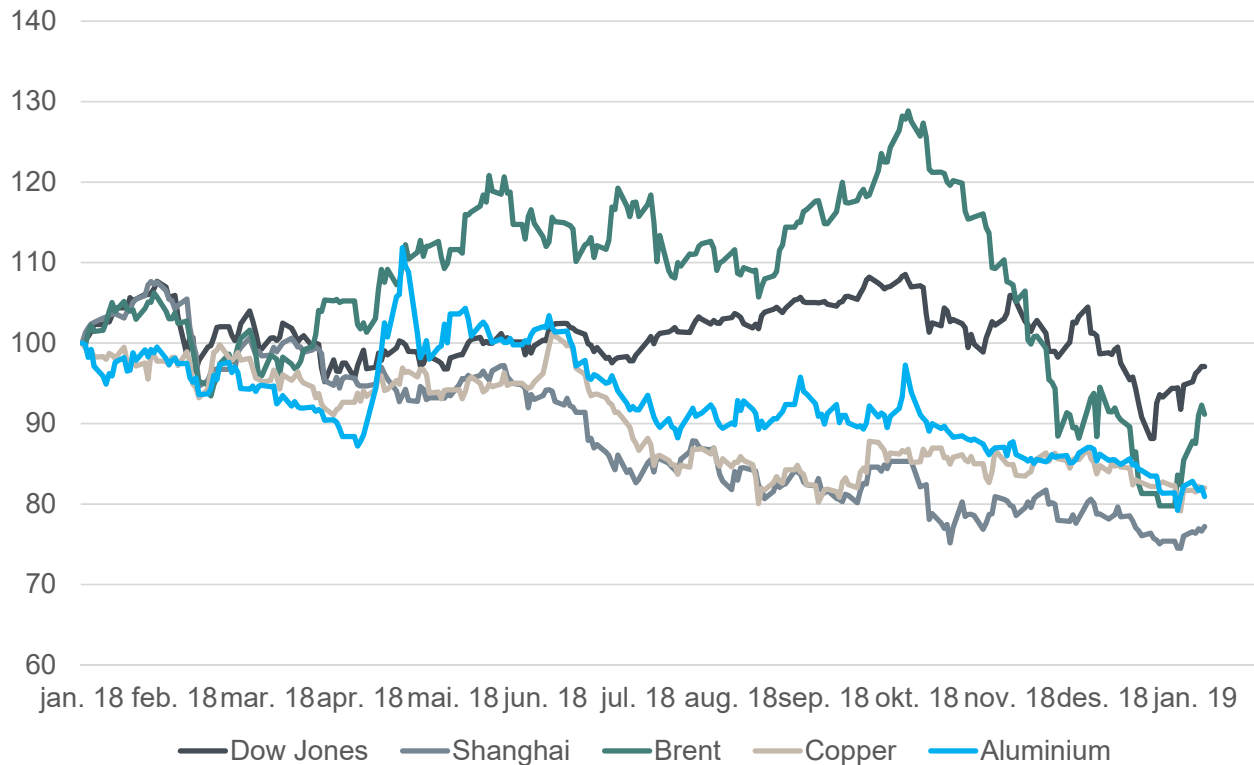
Source: Hydro analysis, IHS, Platts, Republished under license from CRU International Ltd  
 1) Average cost factors 2018 versus average costs 2017



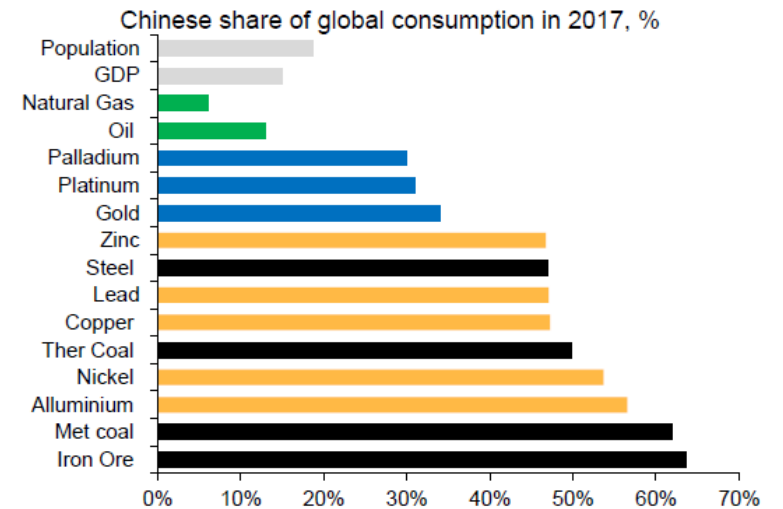
# Aluminium & copper drifting south in 2018 along with Chinese equities



Index. 2018 YTD

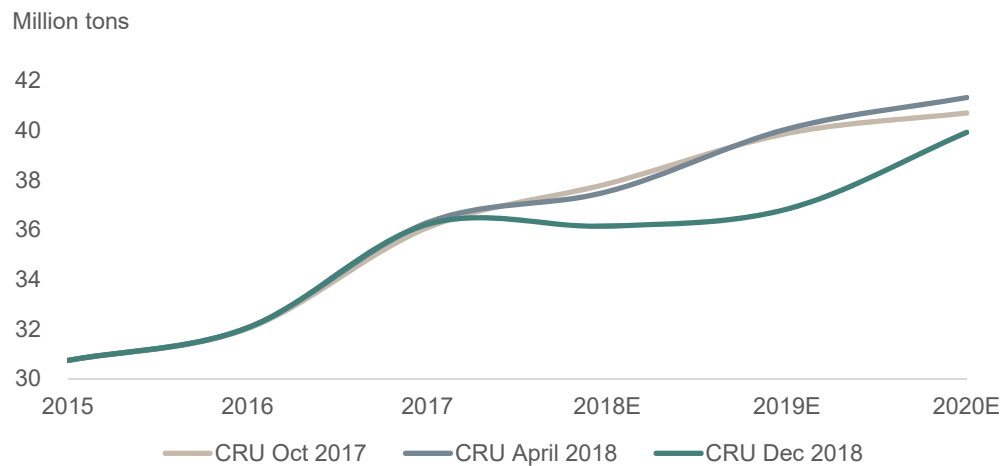


## China remains dominant in hard commodities



# Primary supply in China impacted by policy and cost, captive power market reform influencing power cost

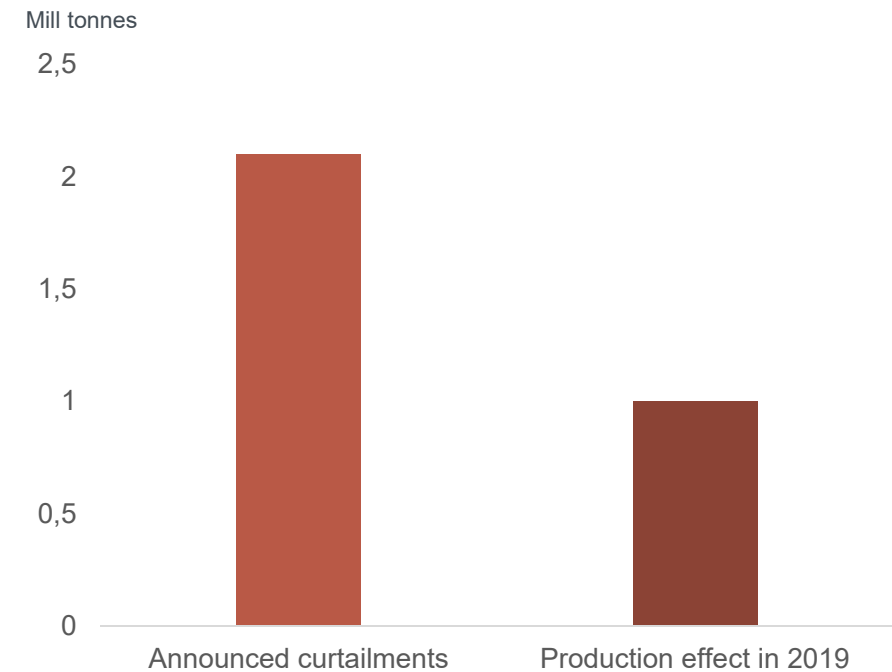
## Chinese primary supply forecasts



### Primary supply growth moderating

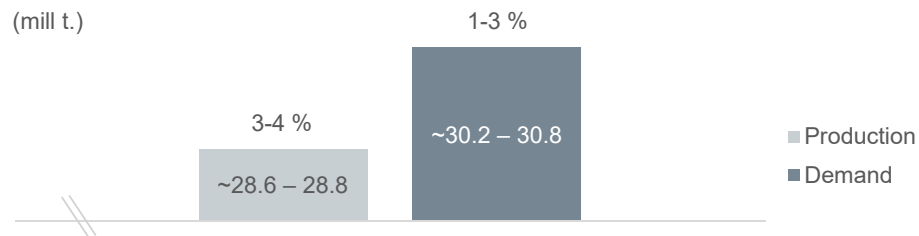
- Supply-side reform and winter shutdowns reducing primary supply growth
  - Limited impact from winter shutdown expected in 2018/19
- Ramp-up speed of new projects subdued by replacement quotas and high input cost
- SOE gaining share versus private companies

## Chinese market-driven primary curtailments in 2018

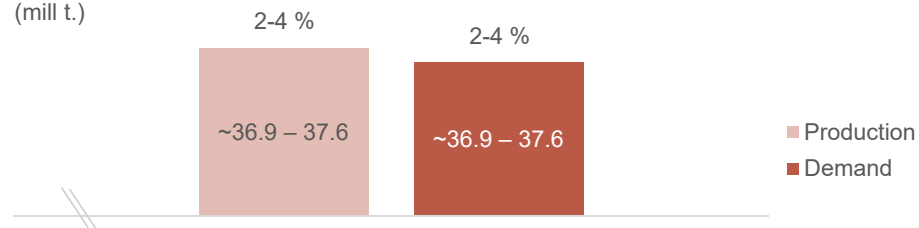


# China expected to be largely balanced in 2019, global market in deficit

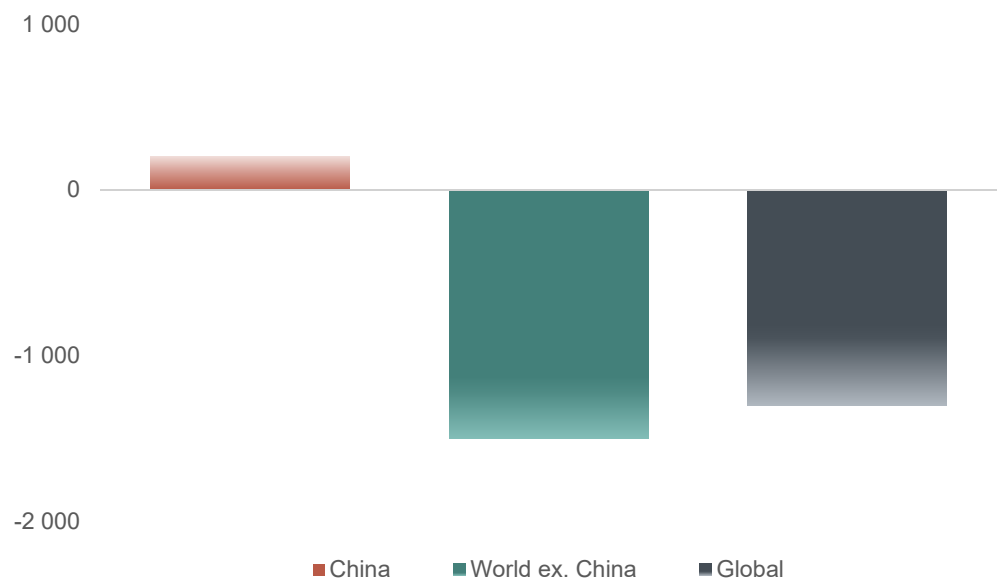
World ex. China 2019  
(mill t.)



China 2019  
(mill t.)



Estimated primary market balance 2019  
(‘000t)

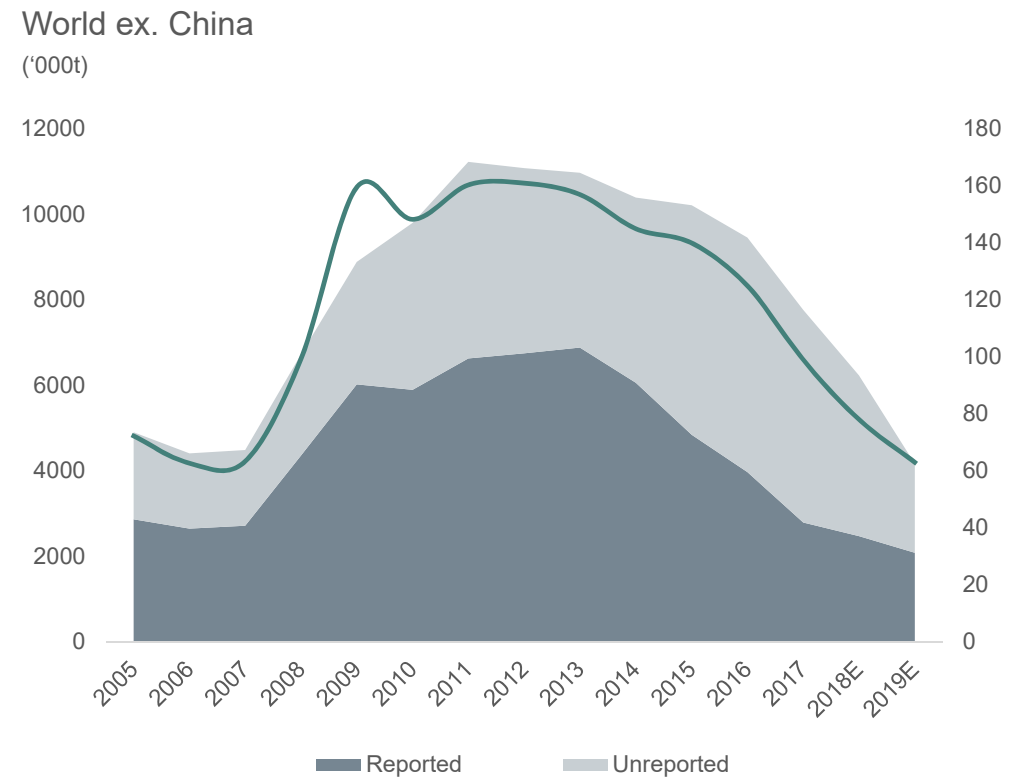


Source: CRU, Hydro analysis  
%: Growth from 2018 to 2019

# Stocks outside China continue to decrease

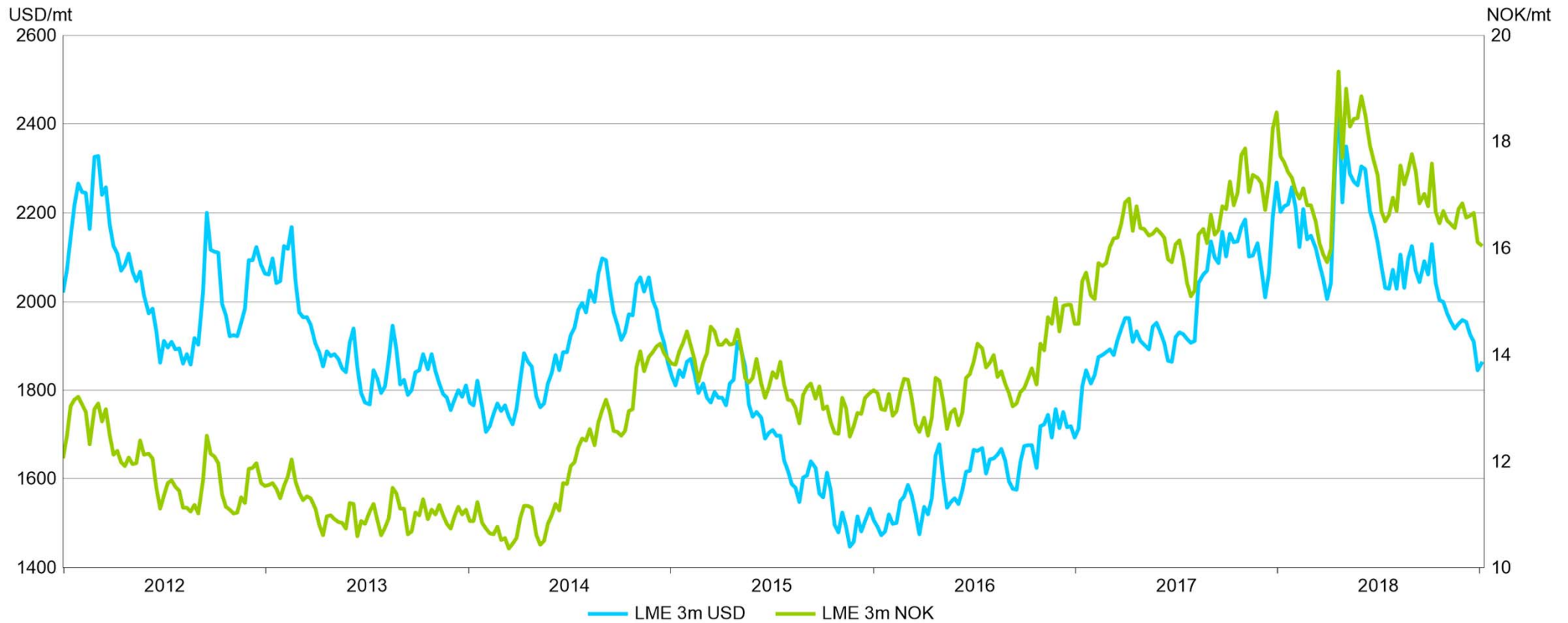


Inventory days approaching pre-crisis levels world outside China



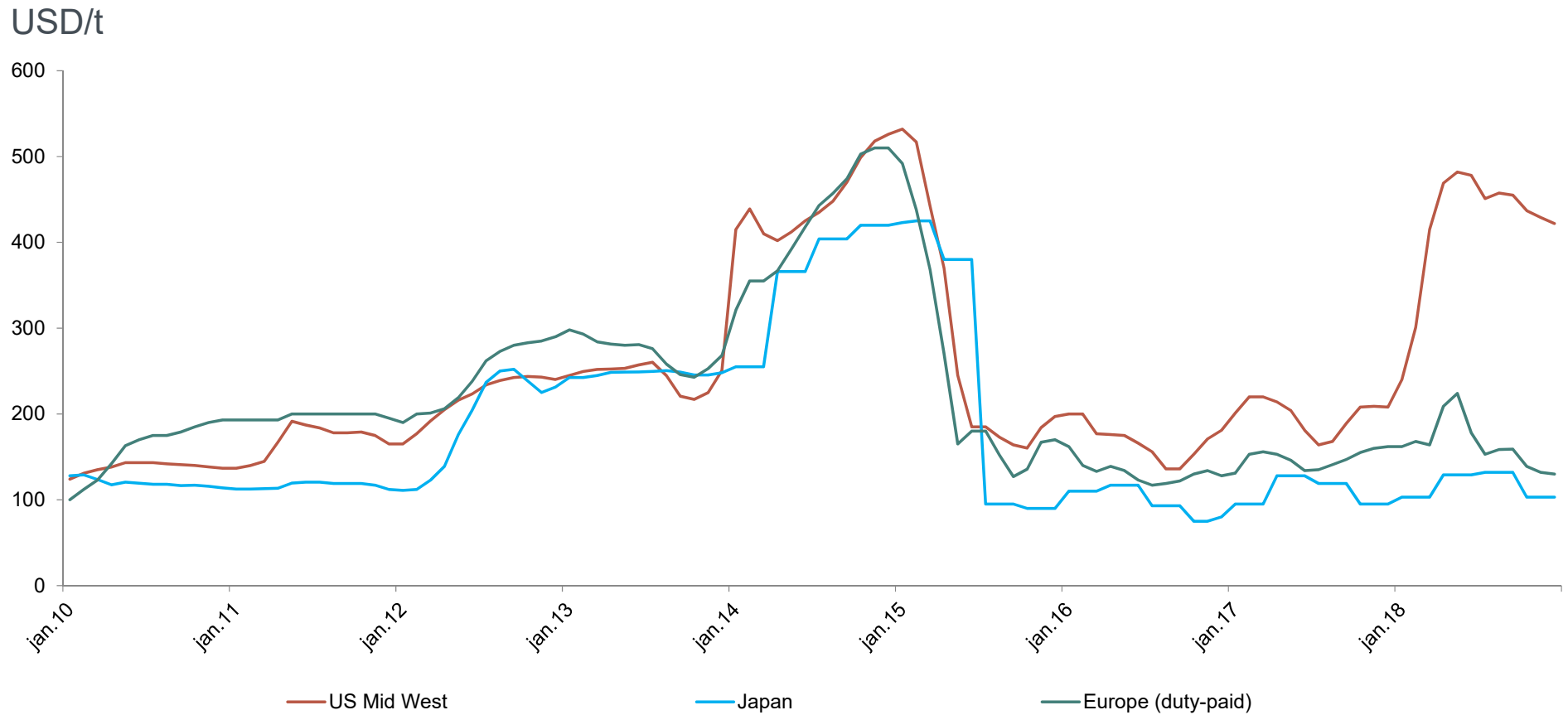
Source: CRU, Hydro analysis

# LME moderating towards the end of 2018 and into 2019, but holding up in NOK terms amid weaker NOK



Kilde: Thomson Reuters Datastream

# Premiums also moderating lately, US premium reflecting section 232 duty



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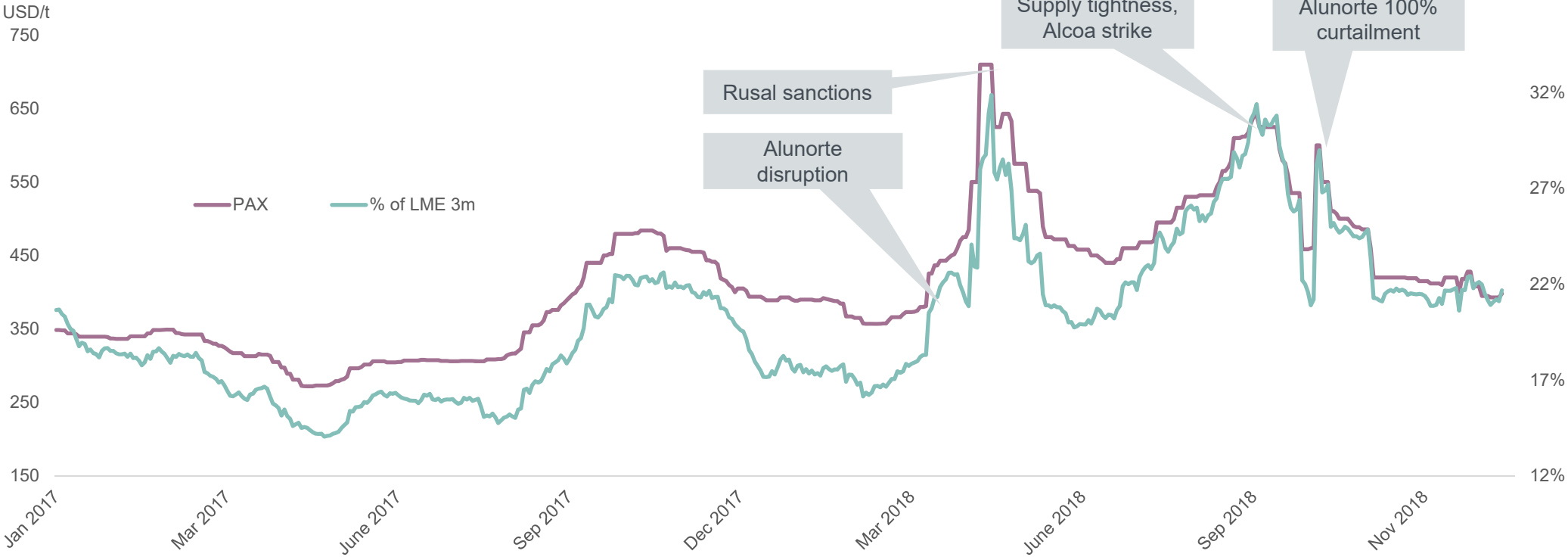
# Bauxite and alumina market

# Volatile alumina market due to supply disruptions



Alunorte embargo and Rusal sanctions lead to increased volatility

Alumina price (PAX) and share of LME



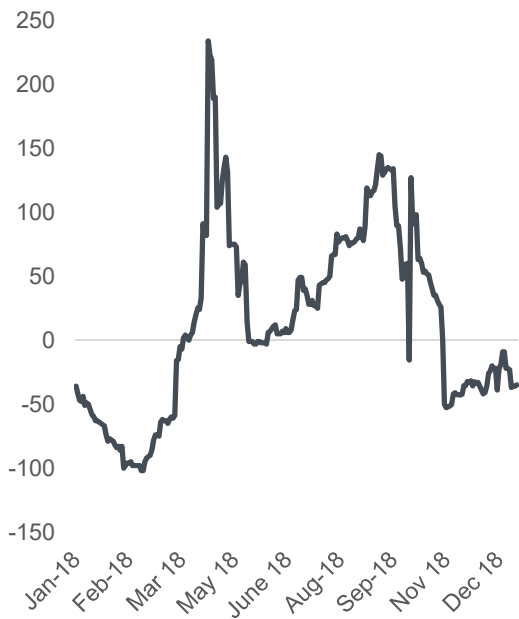
Source: Platts, Hydro analysis



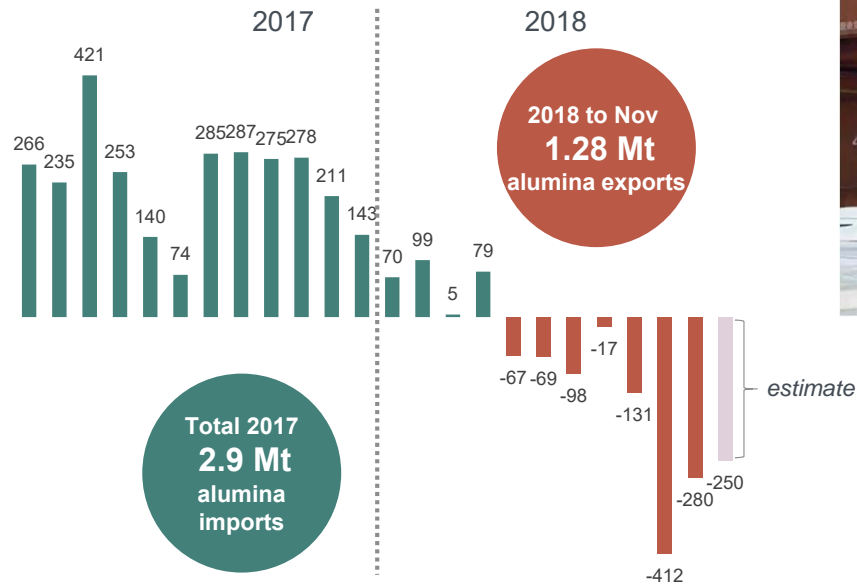
# PAX increase triggers Chinese exports

Chinese alumina required to balance the global market

China alumina export arbitrage (USD/t)



Chinese alumina trade balance by month 2017-2018 (kt)



- Challenging port logistics related to de-bagging alumina
- Quality issues
- Exported alumina incurs VAT (16%), logistics costs, port fees
- Shortage of domestic bauxite causing refinery curtailments

Source: Platts, Antaike, Hydro analysis

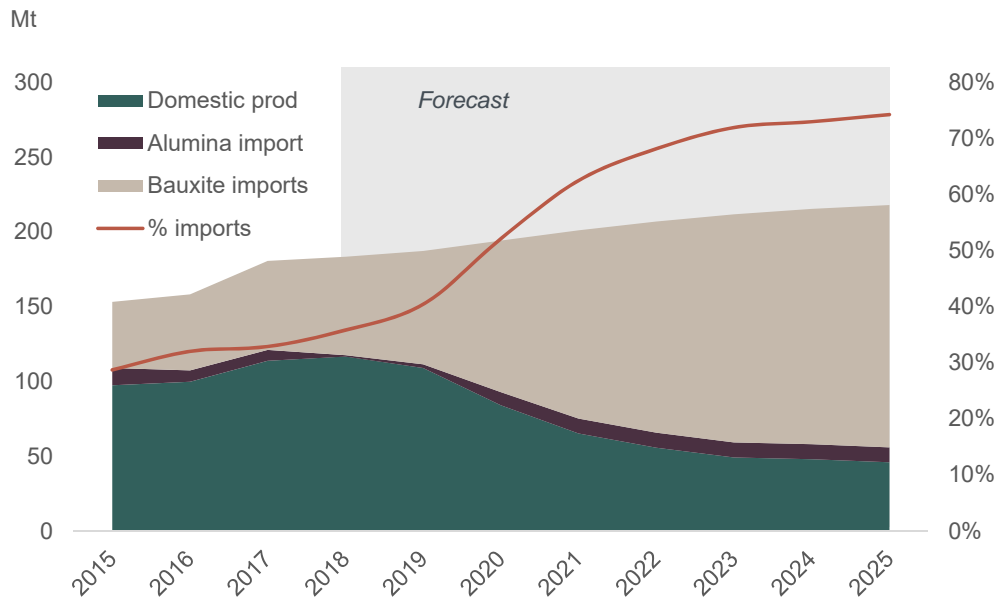
1) Alumina export arbitrage formula: Ex.works Shanxi + Transport to port + Port Fee & Loading cost – PAX – Freight differential

# China increasingly reliant on bauxite imports



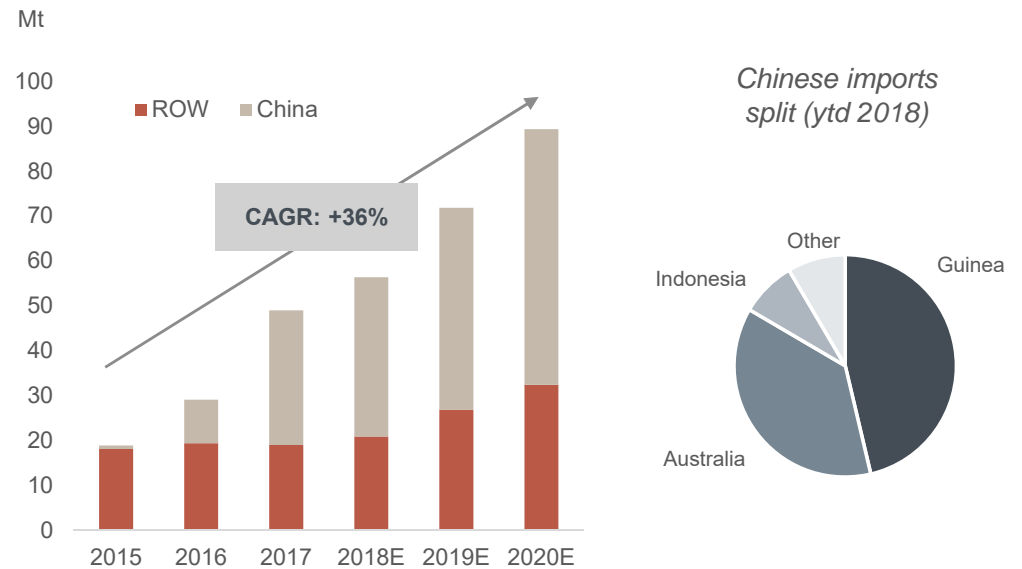
## Guinea bauxite increasingly filling Chinese demand

Growing need for bauxite imports amid domestic depletion



- Increasing Chinese bauxite prices triggering more bauxite imports
  - Chinese quality deteriorating
  - Unlicensed mines closures

Guinea bauxite production increasing, but still need for other sources

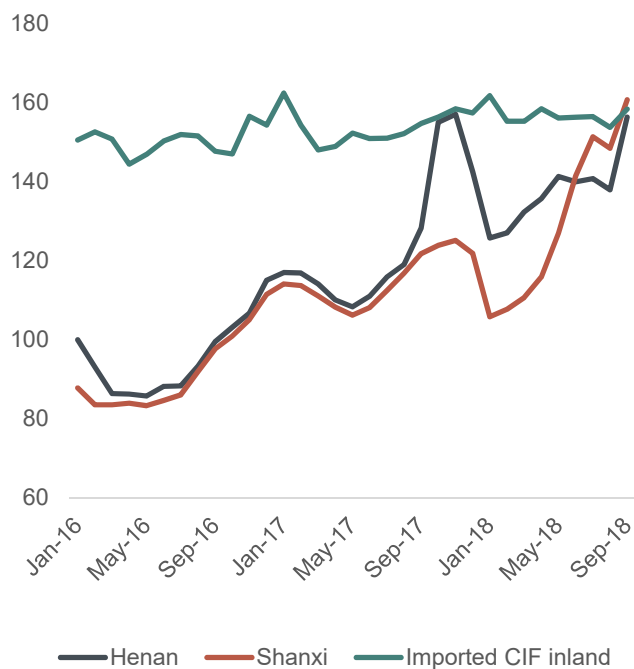


- Guinea bauxite production increasing dramatically
  - Includes non-Chinese players
  - Atlantic-sourced seaborne bauxite continues to grow, adding freight exposure

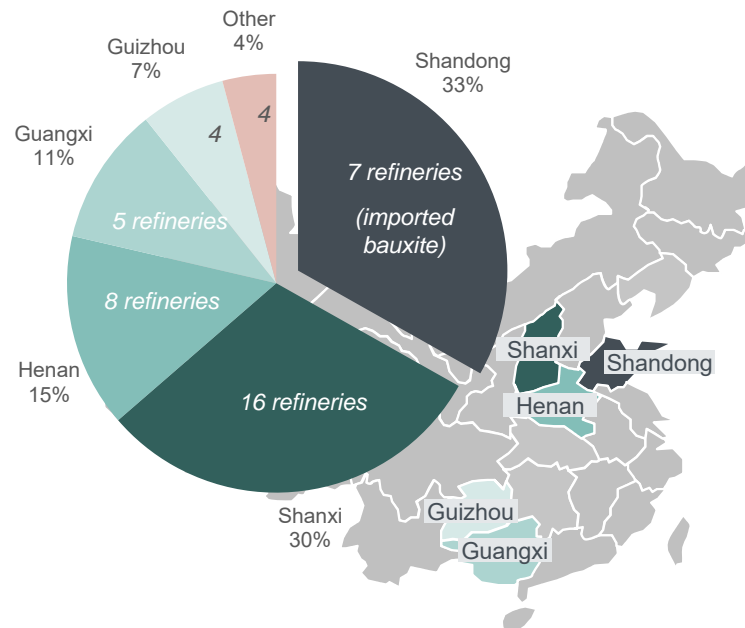
Source: CM, China customs, Hydro analysis

# More imported bauxite going to inland refineries

Delivered bauxite prices <sup>1)</sup>



2018 refinery production forecast: total ~73 Mt



- Extremely tight domestic bauxite market leading to price escalations for poor quality (high silica)
  - Not economic for some refineries to operate on local bauxite
- YTD September; 2.6 million tonnes of bauxite imported to 9 refineries in Henan and Shanxi
  - Incurs additional inland freight of ~ \$25/t
  - Refinery processing issues when switching bauxite type
  - Costs partially offset by low silica of imported (Guinea) bauxite

Source: China customs, CM, CRU, Hydro analysis

1) Prices index delivered at refinery (Henan = 100 in Jan 2016. Bauxite quality: Henan A/S 4.0 to 5.0, Shanxi A/S 4.5 to 5.0, Guangxi A/S 7.0 to 8.0, imported prices by CM Group)

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# Long-term outlook

# Strong growth drivers across segments providing solid demand outlook

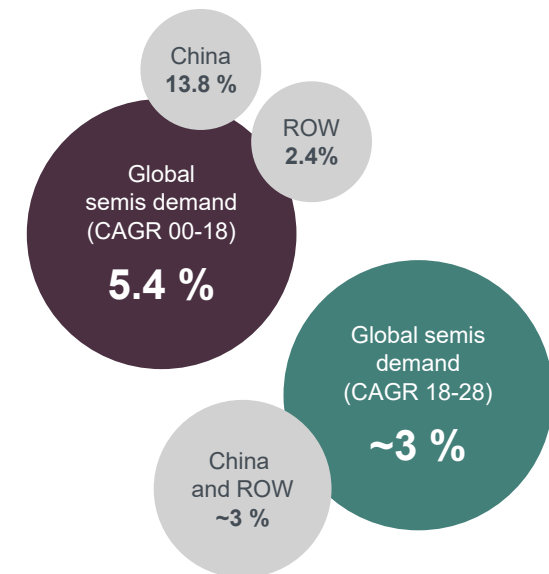
Still encouraging demand outlook from strong base – converging demand China and outside China

## Strong demand drivers in key aluminium segments

Transport	Growth in automotive vehicle production Aluminium content in cars increasing Growth in other transport modes, e.g. railway
Construction	Urbanization Housing market recovery in mature regions Energy neutral buildings
Electrical	Urbanization Copper substitution
Machinery & equipment	Improving industrial sentiment in mature regions Manufacturing activity and industrial growth in emerging countries
Packaging & foil	Urbanization Environmentally-friendly solutions

## Global semis demand per segment, CAGR

2000-18	2018-28
5.1 %	3 – 4 %
6.2 %	2 – 3 %
5.6 %	2 – 3 %
6.4 %	3 – 4 %
4.1 %	2 – 3 %





# Hydro

*We are aluminium*

