



# Bauxite and Alumina Markets

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# AWAC Joint Venture (Alumina Ltd 40% interest)

## BAUXITE PRODUCTION (million BDT#)

2H 2017 & 1H 2018	
Huntly & Willowdale	33.5
Juruti	5.6
MRN*	1.3
CBG*	3.3
<b>Total</b>	<b>43.7</b>

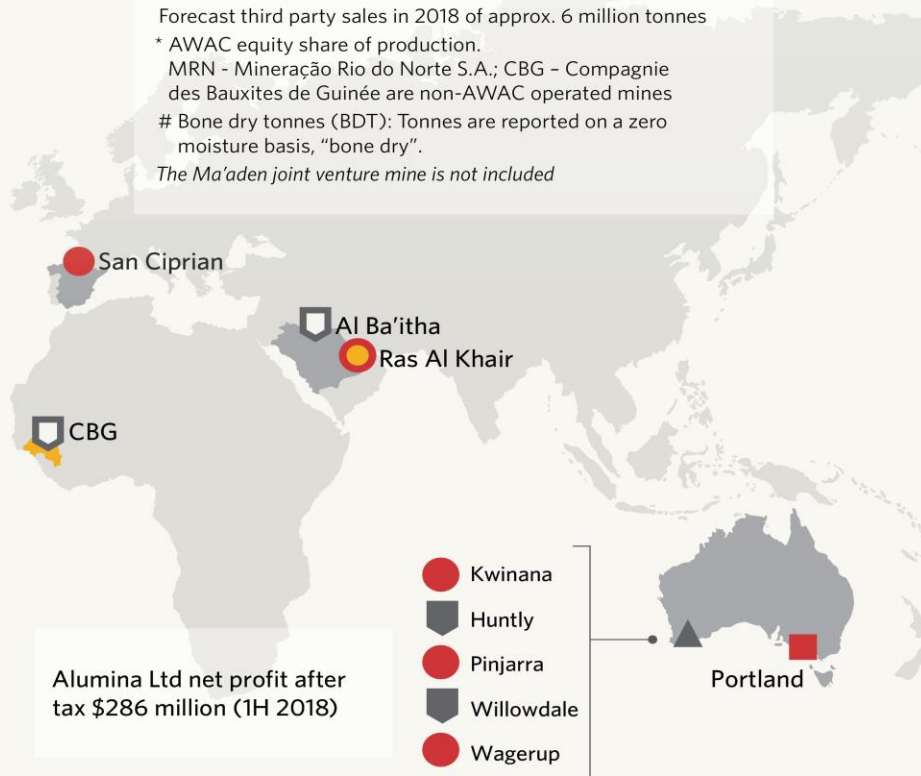
Forecast third party sales in 2018 of approx. 6 million tonnes

\* AWAC equity share of production.

MRN - Mineração Rio do Norte S.A.; CBG - Compagnie des Bauxites de Guinée are non-AWAC operated mines

# Bone dry tonnes (BDT): Tonnes are reported on a zero moisture basis, "bone dry".

The Ma'aden joint venture mine is not included



## ALUMINA PRODUCTION (million tonnes)

2H 2017 & 1H 2018	
Pinjarra	4.5
Wagerup	2.8
Kwinana	2.1
Alumar	1.4
San Ciprian	1.6
<b>Total</b>	<b>12.4</b>

**Total**

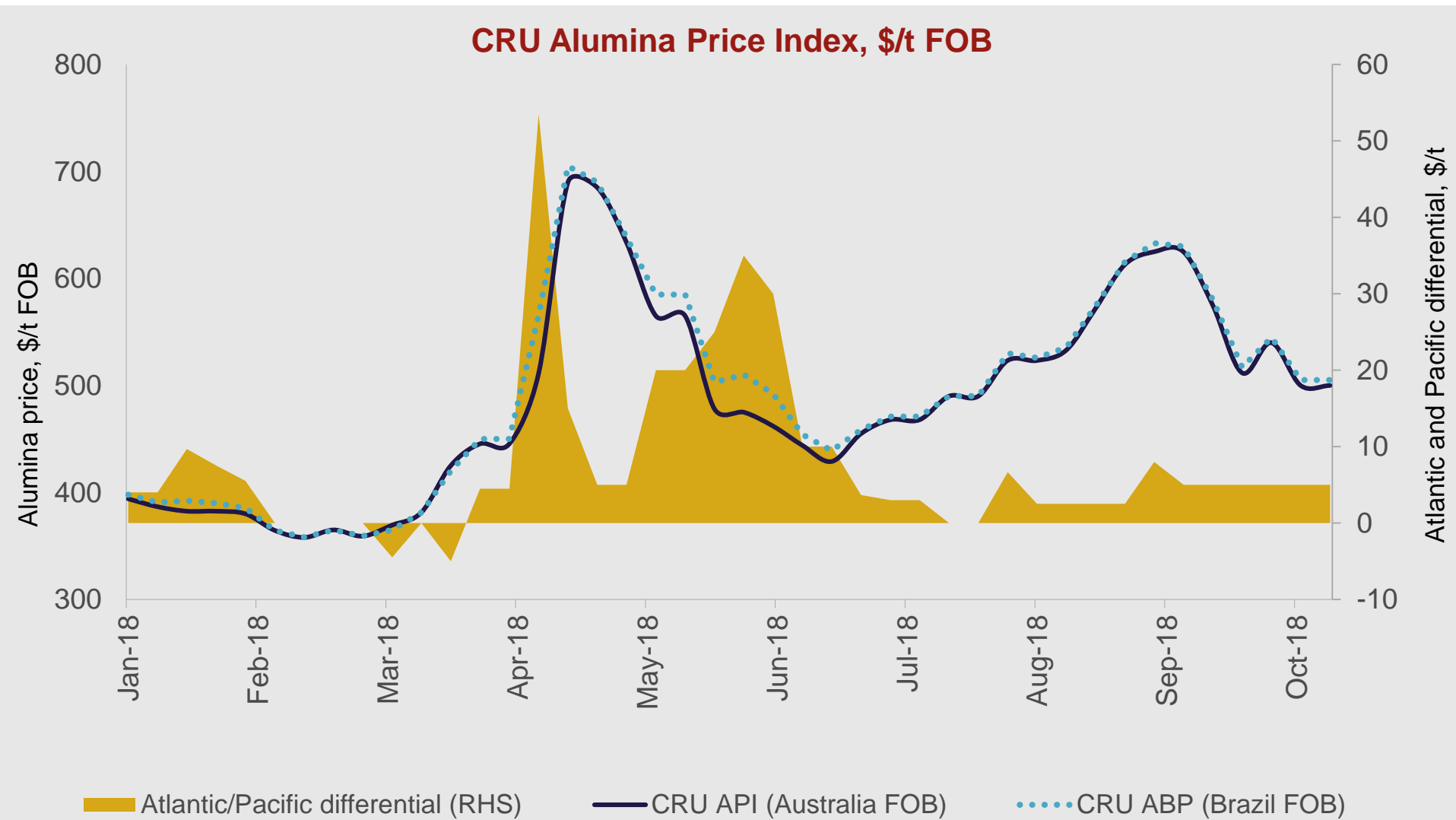
**12.4**

Production of AWAC's operated refineries.

Therefore, the Ma'aden Joint venture is not included

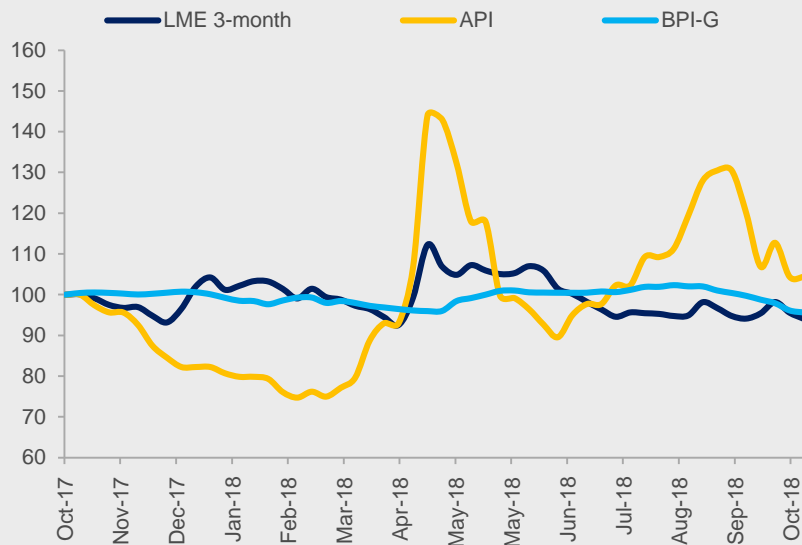


# Political upheavals destabilise market

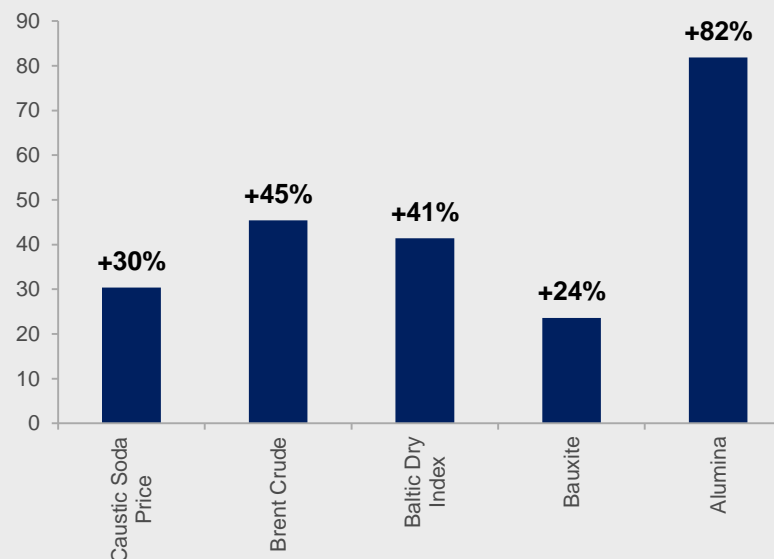


# Alumina price less correlated to input costs than to supply/demand impacts

**Index of bauxite, alumina and aluminium prices**  
26 October 2017 = 100



**Alumina price gain exceeds alumina cost gain**  
Year-on-year change, %

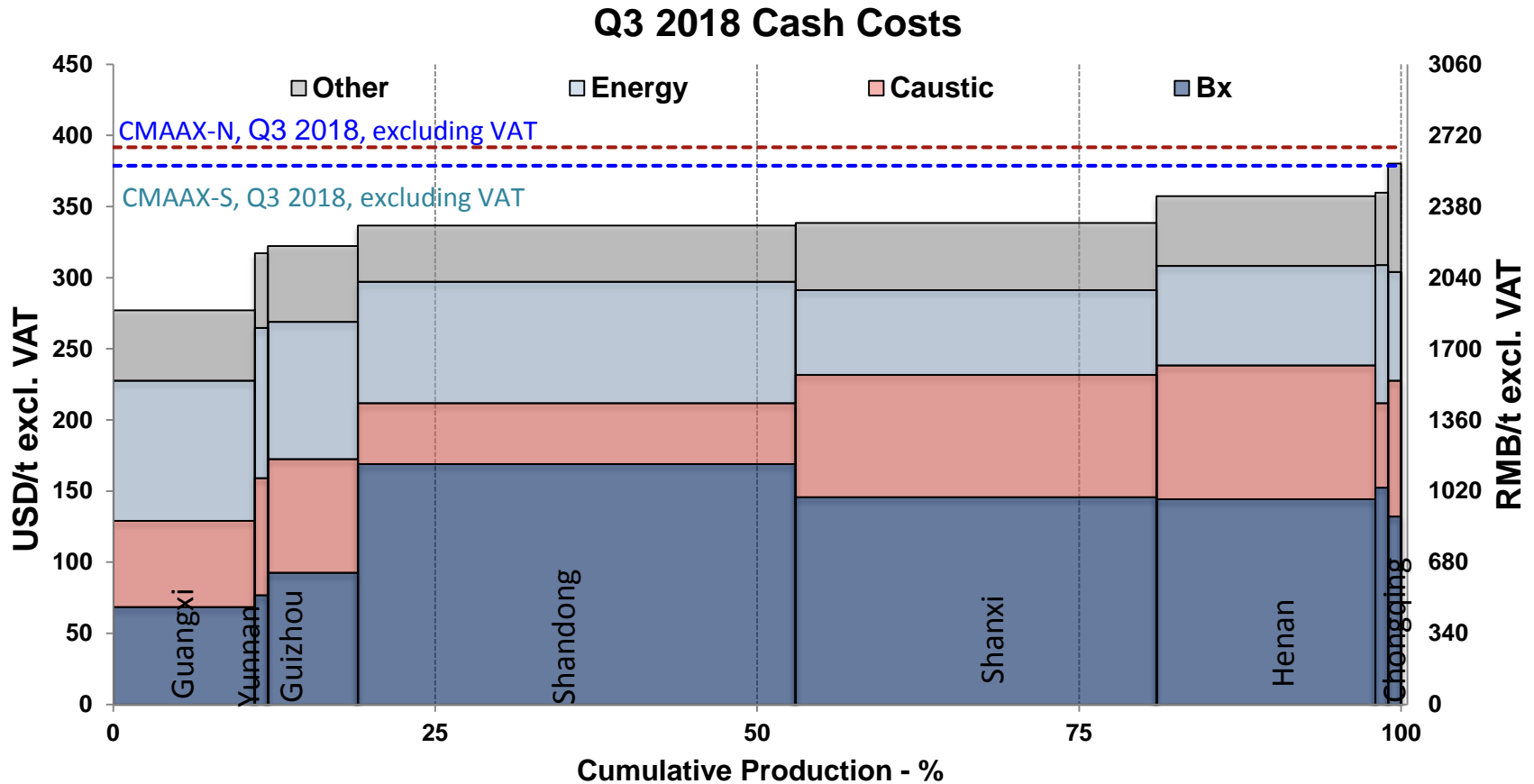


August 2017 versus August 2018\*



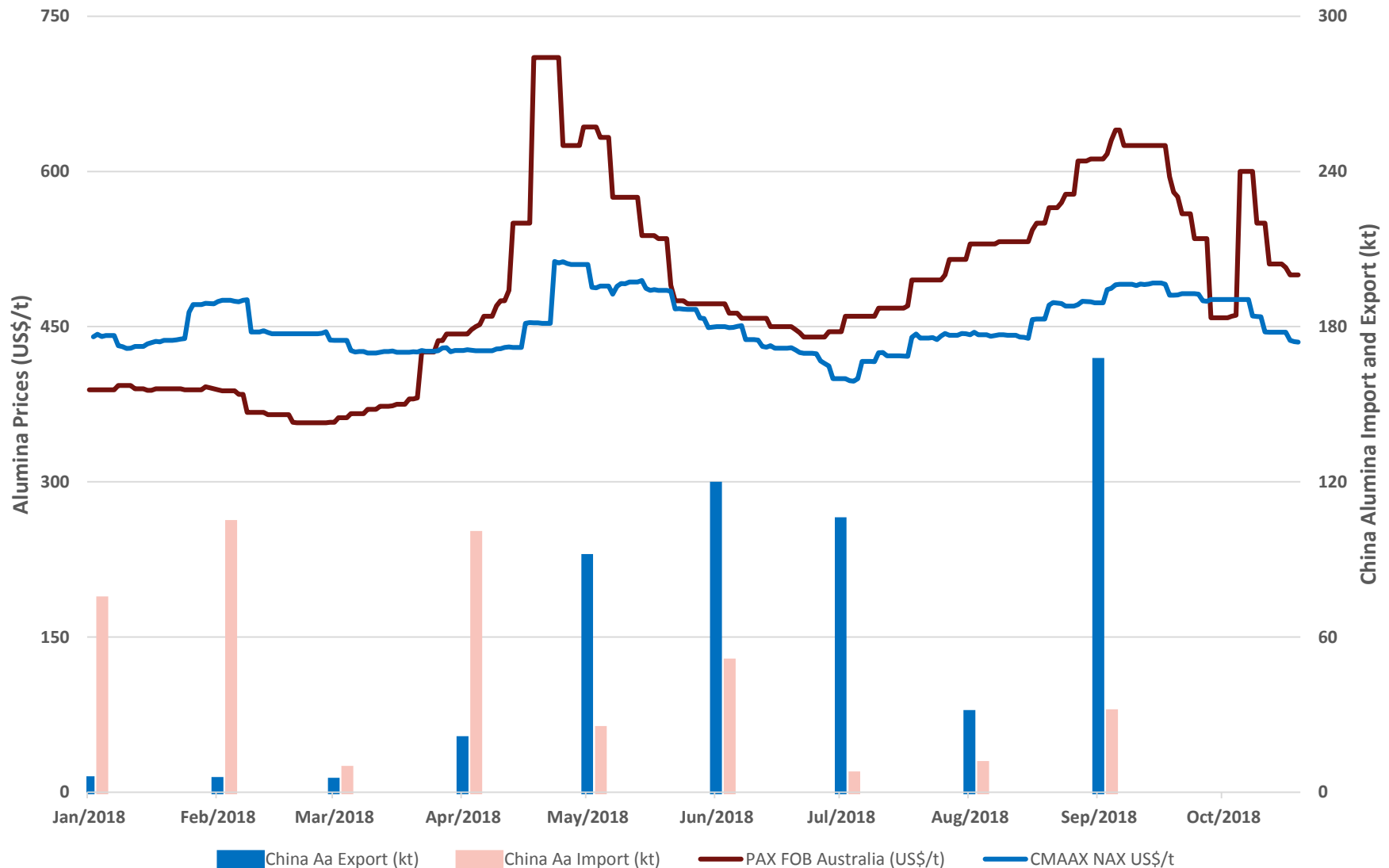
# Chinese SGA Cash Cost Curve

*Chinese cash cost curve higher and flatter due to lower bauxite quality.  
Relative benefit for those producers with quality bauxite in near proximity.*



- Inland refiners' cost exceeded Shandong due to the rising bauxite prices
- Average cost in RMB terms increased by 2% in Q3 due to the increased bauxite price (8% QoQ), however, considering the shift in exchange rate (RMB depreciated by ~5% QoQ), the cost in USD/t decreased by 4%

# Price arbitrages impact Chinese alumina imports and exports



# RoW: Expected smelting growth to broadly match increasing SGA supply

## Expect global alumina balance with normal Chinese imports

annualised figures	Q4 2017	Q2 2018	Q2 2019	Q4 2019	Q4 2020
SGA Production	55.6 mtpa	52.0 mtpa	56.8 mtpa	59.1 mtpa	60.0 mtpa
SGA Usage	53.1 mtpa	53.1 mtpa	55.0 mtpa	56.5 mtpa	57.1 mtpa
[Aluminium production]	[27.6 mtpa]	[27.6 mtpa]	[28.6 mtpa]	[29.3 mtpa]	[29.7 mtpa]
<b>Market balance before exports to China</b>	<b>+2.6 mtpa</b>	<b>-1.1 mtpa</b>	<b>+1.8 mtpa*</b>	<b>+2.6 mtpa*</b>	<b>+2.9 mtpa*</b>

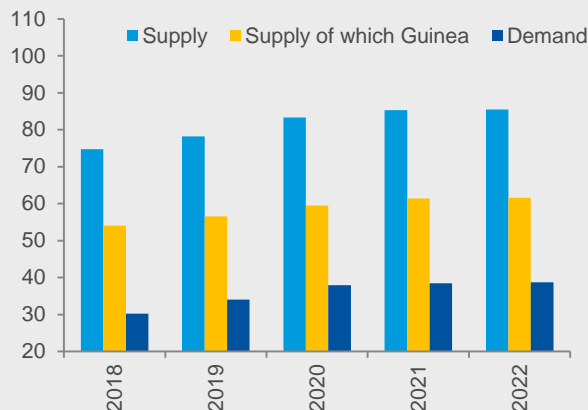
ALUMINA SUPPLY VARIANCE			SGA USAGE VARIANCE				
	Q2 19 VS Q4 17	Q4 19 VS Q4 17		as SGA usage		as Aluminium production	
				Q2 19 VS Q4 17	Q4 19 VS Q4 17	Q2 19 VS Q4 17	Q4 19 VS Q4 17
Al Taweelah greenfield	+0.05 mtpa	+1.40 mtpa					
Re-start Alpart Friguia	+1.65 mtpa	+1.95 mtpa	Alba (Line #6 + creep)	+0.16 mtpa	+0.85 mtpa	+84 ktpa	+444 ktpa
Lanjigarh creep to 1.8 mtpa	+0.36 mtpa	+0.66 mtpa	India (Jharsuguda commissioning + creep)	+0.58 mtpa	+0.59 mtpa	+302 ktpa	+307 ktpa
Ma'aden commissioning	+0.22 mtpa	+0.22 mtpa	Sohar after 2017 incident	+0.54 mtpa	+0.54 mtpa	+280 ktpa	+280 ktpa
Alunorte vs 6.72 mtpa run rate	-0.72 mtpa	-0.52 mtpa	3 US smelters re-start	+0.91 mtpa	+0.97 mtpa	+473 ktpa	+506 ktpa
NMGA (+6%)	+0.26 mtpa	+0.26 mtpa	Iran (Salco + Iralco creep)	+0.06 mtpa	+0.33 mtpa	+34 ktpa	+173 ktpa
			Karmoy pilot + Aldel re-start	+0.26 mtpa	+0.26 mtpa	+133 ktpa	+137 ktpa
			Aviles La Coruña closure	-0.24 mtpa	-0.24 mtpa	-127 ktpa	-127 ktpa
			Albras 2018 reduction	-0.12 mtpa	-	-60 ktpa	-
			Becancour 2018 reduction	-0.7 mtpa	-0.03 mtpa	-194 ktpa	-14 ktpa
<b>Total SGA Variance</b>	<b>+1.28 mtpa</b>	<b>+3.43 mtpa</b>	<b>Total SGA usage variance</b>	<b>+1.92 mtpa</b>	<b>+3.44 mtpa</b>	<b>+997 ktpa</b>	<b>+1,787 ktpa</b>



# 3<sup>rd</sup> party bauxite market well-supplied currently, mainly from Guinea and Australia

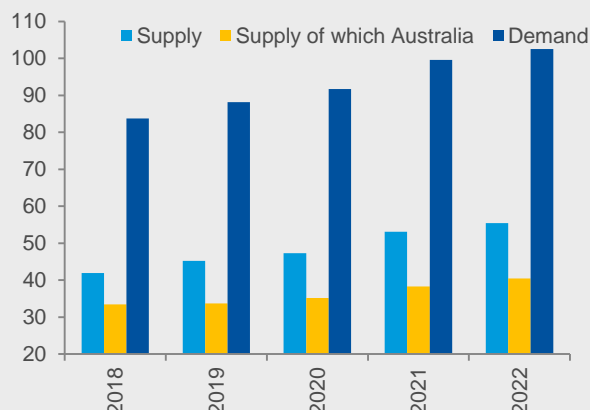
## Guinea driving Atlantic third party supply

Atlantic third party bauxite supply and demand, Mt



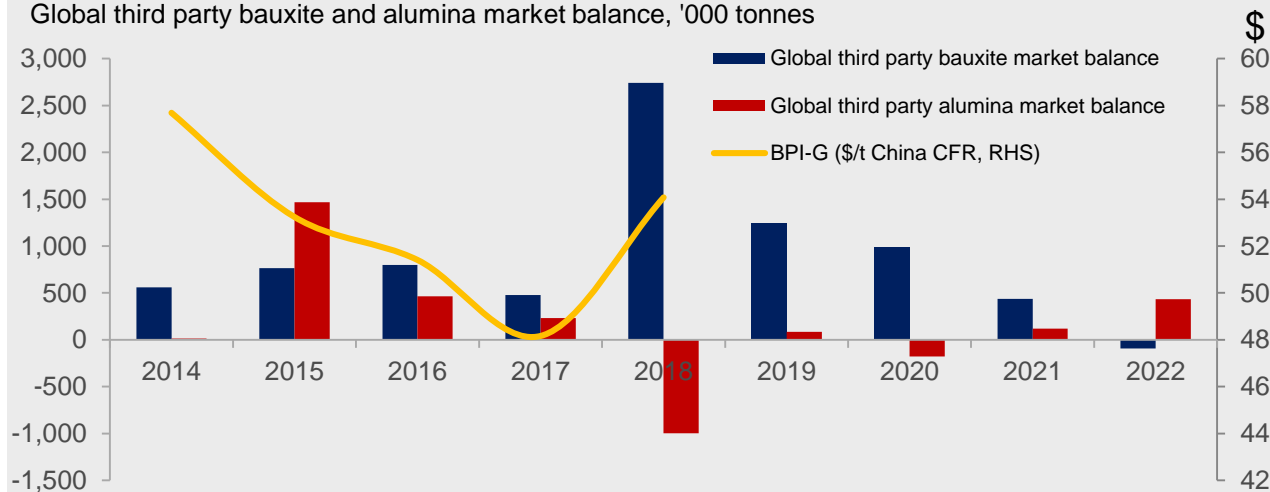
## China driving Pacific third party demand

Pacific third party bauxite supply and demand, Mt



## Oversupplied bauxite market in the near term

Global third party bauxite and alumina market balance, '000 tonnes

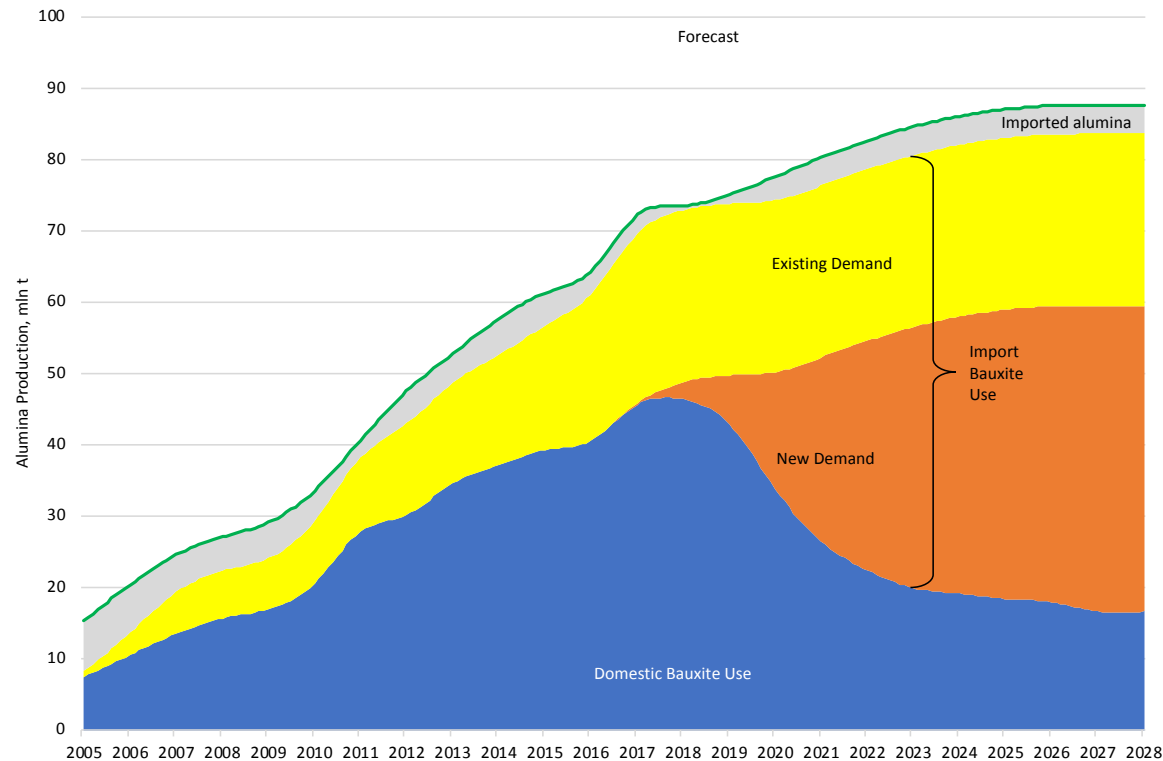


Additional 12 million t bauxite supply in Guinea in 2018. Alunorte curtailment (despite Brazilian bauxite supply cuts) contributed to surplus in 3<sup>rd</sup> party bauxite balance. Market to tighten on higher Chinese bauxite imports.

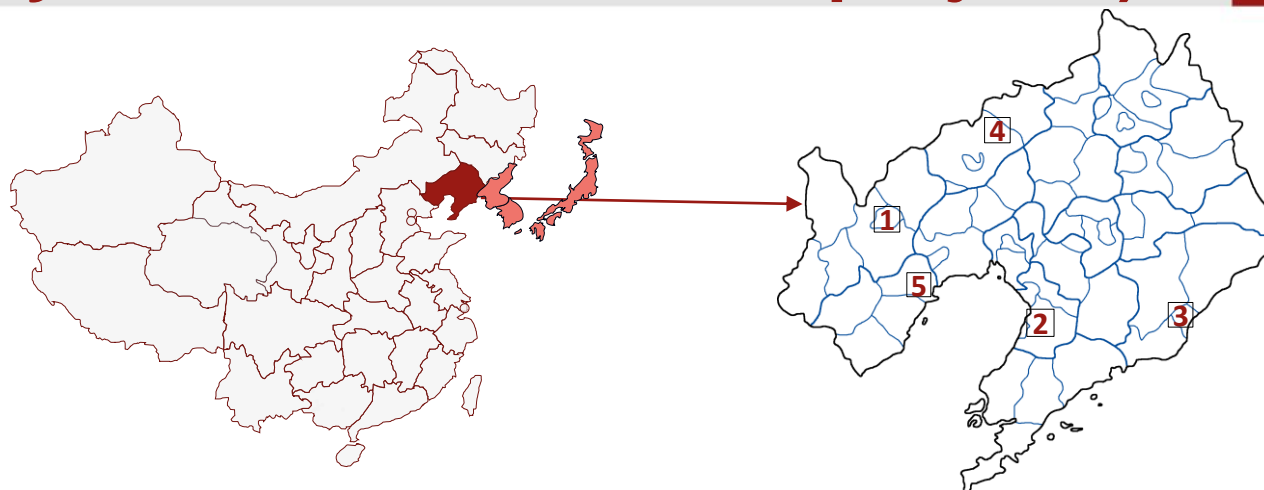
# Bauxite imports to increase as China depletes economic domestic supply

- China's aluminium production forecast to plateau at 43 million tpa by 2025 (30kg/capita)
- This equates to 87 million tpa of alumina consumption with a 5% allowance for non-SGA use
- By around 2028, approx. half of the extra imported bauxite will be for new alumina demand and the remainder will be for replacements of depleted or uneconomic domestic bauxite
- Also some domestic bauxite supply unavailable for environmental reasons
- CM forecast bauxite imports of 164 million t (11m t to security stockpiles) in 2023 compared with 69 million t imported in 2017 (8-9m t to stockpiles)
- Alumina imports not likely to increase significantly, unless insufficient new alumina capacity is approved in China, which might then encourage Chinese to build/buy offshore refineries (which may reduce required bauxite imports)

## Meeting China's alumina demand growth\*: will increase alumina costs



# Liaoning refinery project setbacks (nearly 75% of new Chinese projects)



Company	Location	Owner	Capacity MTPY	Status	Bauxite Source
1 Jingang Aluminium	Chaoyang	SPIC & Jinzhou Port	10	Planning	Guinea, Australia
2 Dananshan Alumina	Yingkou	Bosai Group	2.5	Constructing	Ghana and others
3 Danfeng Aluminium	Dandong	Jinjiang Group	6	Planning	-
4 Fuxin Alumina Project	Fuxin	TBEA	6	Planning	Guinea and others
5 Zhongshi New Material (CGA)	Huludao	-	0.0045	Planning	-
<b>Total</b>			<b>24.5</b>		

- ❑ In early August, 5 new coastal alumina refinery projects in Liaoning province were “cancelled” with immediate effect (total 24.5m tpa capacity affected), due to environmental protection regulations prompted by local residents’ protests
- ❑ After President Xi’s September Liaoning inspection, Liaoning government is reconsidering these refinery projects
- ❑ NDRC and MIIT held a seminar on domestic alumina markets and refinery projects in Liaoning on 17 October 2018
- ❑ If revived, the total capacity of the projects is likely to be less than their pre-cancellation targets
- ❑ Chalco is in the early stages of planning a new 5 million tpa greenfields refinery in Linyi City, coastal Shandong, which, if built, would process imported bauxite via Lanshan Port of Rizhao Port Group

## “Three-Year Plan to Defend Blue Sky” 2018-2020

- **Enlarged affected area** – includes the ‘Yangtze Delta’ and ‘Fenwei Plains’ as well as the original ‘2+26 cities’ in 2017/18’s Winter cuts period
- **Inspection and rectification targets** – 2+26 cities goal to be achieved by 2018, surrounding areas by 2019 and the rest of China by 2020
- **Key environmental targets:** Fine particles (PM2.5), industry, SO<sub>2</sub>, coal, NO<sub>x</sub>, diesel trucks, dust

### Winter cuts

- *Different from the 2017-2018 winter cuts, the new plan does not specify the percentage of capacity to be cut by each industry. Local authorities have more say*
- *Alumina refineries fulfilling special local emission limits will be exempt from 2018~2019 winter cuts*
- *Aluminium producers who meet ultra-low emission targets will be exempt from 2018~2019 winter cuts*

### Others

- **Primary Al:** Strict control over new capacity
- **Coal:** By 2020 (vs 2015), 1) national coal consumption less than 58% of total energy consumption, 2) -10% in 2+26 cities, 3) -5% in Yangtze Delta, 4) negative growth in Fenwei Plains
- **Transport:** Road to rail – 1) increase railway transport to over 50% in affected area, 2) Promote New Energy Vehicles
- **Rectification of open pit mining**

## Other Reforms

- **SSSR 2018:** Further supply-side structural reform with more efforts to improve economic quality, promote innovation, cut overcapacity and foster new growth drivers
- **Points to watch:** Reform of energy-intensive captive power generation, potential control of rapid alumina capacity expansion etc.

### Gas for Coal Rectification

- 2018: 4 million households in North China will convert to gas from coal or thermal power programs in 2018; eliminate 10 tonnes/hour or lower coal-fired boilers

### Solid Waste

- China is paying more attention to treating solid waste, with specific local policies in place already. **Red mud dams** are likely to become a focus sooner rather than later.

The estimated total cuts in 2018/19 is 1~2 million tonnes (2.4 million t last winter) of alumina and 0.2~0.3 million tonnes (0.4 million t last winter) of aluminium this winter

Item	Status and outlook
<b>Alumina supply</b>	<ul style="list-style-type: none"> <li>• Some progress on resolving Alunorte and Rusal issues and expect resolution by mid-2019 but timing is uncertain</li> <li>• May be some price volatility until supply issues resolved and market resettles</li> <li>• New/restarted alumina supply in 2019-2020 expected to broadly match smelting growth with resumed Chinese net imports</li> </ul>
<b>Chinese alumina</b>	<ul style="list-style-type: none"> <li>• Expect opportunistic exports of Chinese alumina from time to time when RoW has deficit (but at a high price)</li> </ul>
<b>Third party bauxite market</b>	<ul style="list-style-type: none"> <li>• Expect bauxite to move from oversupply nearer to balance over next few years and add to Chinese alumina costs</li> </ul>
<b>Chinese policies</b>	<ul style="list-style-type: none"> <li>• On-going environmental and supply-side reforms expected to slow Chinese growth and add costs</li> <li>• Expect more modest production cuts this winter but with some uncertainty for weather and local emission variations</li> </ul>

# Appendix



# Limited new alumina capacity growth outside China

Only refinery currently under construction outside China (commenced 2014):

Country	Company	Refinery	Capacity (m tpa)	Type	Status	Bauxite Source
UAE	EGA	Al Taweelah	2.0	Greenfield	Under construction	Guinea

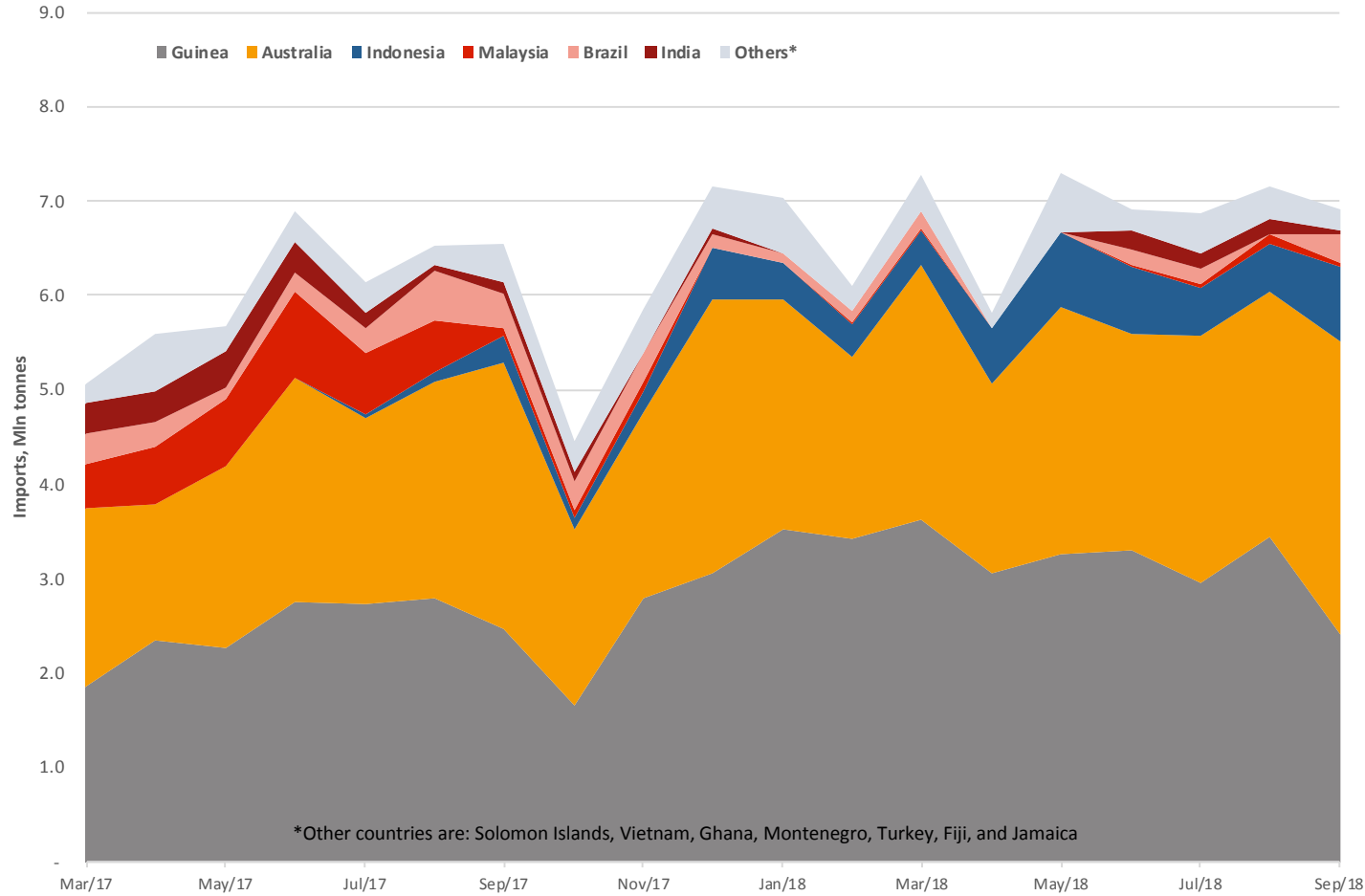
Other projects which are under consideration are:

Country	Company	Refinery	Capacity (m tpa)	Type
Indonesia	Hongqiao	Ketapang Phase II	1.0	Brownfield
Indonesia	Nanshan Group	Bintan	1.0	Greenfield
Indonesia	Inalum/Antam	West Kalimantan	2.0	Greenfield
India	Vedanta	Lanjigarh	5.0	Brownfield
Guinea	SMB/Winning	Dapilon	1.0	Greenfield
Greece	Mytilineos	Distomon	0.85	Brownfield
Laos	Yunnan Aluminum	Paksong	1.0	Greenfield
Iran	SALCO	Persian Alumina I	0.8	Greenfield
Jamaica	JISCO	Alpart	2.0	Brownfield

# Limited curtailed refinery response (ex-China)

Curtailed Refineries	Owner	Location	Producing (M tpa)	Nameplate Capacity (M tpa)	Comment
Point Comfort	AWAC	US	0.0	2.3	Curtailed in June 2016
Alpart Alumina	JISCO	Jamaica	1.2	1.7	Acquired in curtailed state mid-2016. Slow ramp. Backward integration re-start
Kirkvine	Windalco	Jamaica	0.0	0.6	On care and maintenance since 2009
Friguia	Rusal	Guinea	0.05	0.60	Re-start June 2018 (announced pre-sanctions) reportedly for backward integration, to take 12 months to ≈600k t and at least \$120 million
Anrak	Anrak	India	0.0	1.5	Idled since 2014 (or not started). Would need financing and bauxite access.
Eurallumina – Porto Vesme	Rusal	Italy	0.0	1.1	Idled since 2010. Potential from end 2020
Bauxilum	State-owned	Venezuela	0.0	2.0	Idled. Little production since 2015
TOTAL			1.25	9.80	

# Source of bauxite imports to China over last 12 months



- Guinea and Australia are currently the driving force for China's bauxite imports
- China imported 20.8 million tonnes of bauxite in Q3 2018, a marginal increase (4%) compared to Q2.
- Guinea's export slowed down in Q3, largely due to the rain season.

# China's 'Three Year Plan to Defend Blue Sky'

## Affected regions

### A. '2+26' Cities

**Beijing and Tianjin (2)**

**Hebei (8):**

Shijiazhuang  
Tangshan  
Baoding

**Henan (7)**

Zhengzhou  
Xinxiang  
Hebi  
Anyang

Langfang  
Cangzhou  
Hengshui  
Handan  
Xingtai

Jiaozuo

Puyang

Kaifeng

**Shandong (7)**

Ji'nan  
Zibo

**Shanxi (4)**

Taiyuan  
Yangquan  
Changzhi  
Jincheng

Liaocheng  
Dezhou  
Binzhou  
Jining  
Heze

### B. Fenwei Plain (11 cities)

**Shanxi (4):**

Lvliang  
Jinzhong  
Linfen,  
Yuncheng

**Henan (2):**

Sanmenxia  
Luoyang

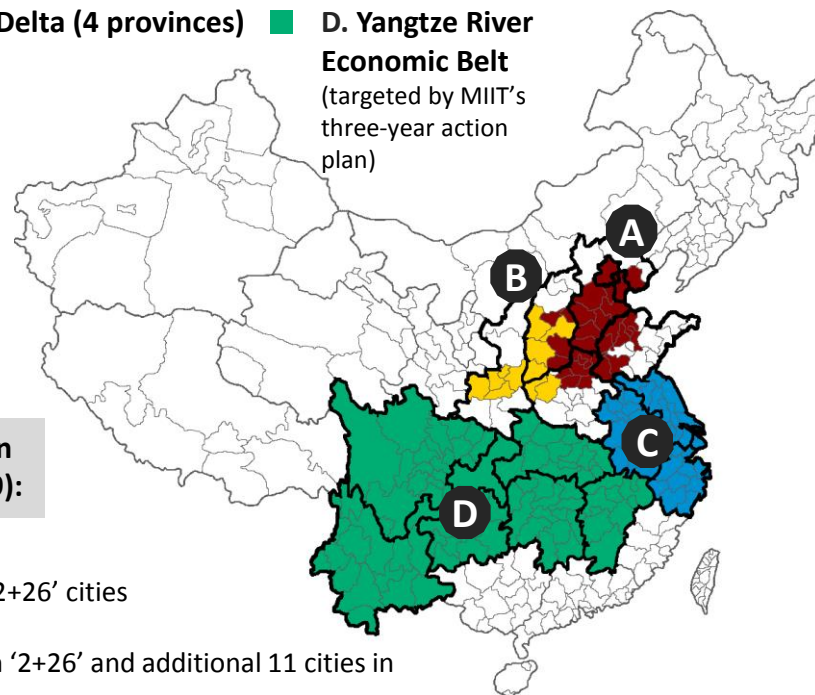
**Shaanxi (5):**

Xi'an  
Xianyang  
Baoji  
Tongchuan  
Weinan

### C. Yangtze River Delta (4 provinces)

Jiangsu  
Shanghai  
Zhejiang  
Anhui

### D. Yangtze River Economic Belt (targeted by MIIT's three-year action plan)



### Three-Stage Implementation (Jun 11 2018 to Apr 28, 2019):

#### Stage 1:

Review of previous results in '2+26' cities

#### Stage 2:

Comprehensive supervision on '2+26' and additional 11 cities in Fenwei Plain

#### Stage 3:

Inspection of '2+26', Fenwei Plain and Yangtze River Delta Region

- Guided by this central policy, local governments will control production cuts based on local weather conditions and emissions standards this winter
- The "One-Size Fits All" approach is unlikely to be repeated this winter
- Aluminium industry producers with better emission records will likely be exempt from the winter cut program
- Cuts for heavy polluting industries like steel, cement and coal-fired power plants may be equal to or more than last year, while alumina has been taken off the "Strictly Controlled Industries" list this year