



RioTinto

# Fixed income investors update

March 2019

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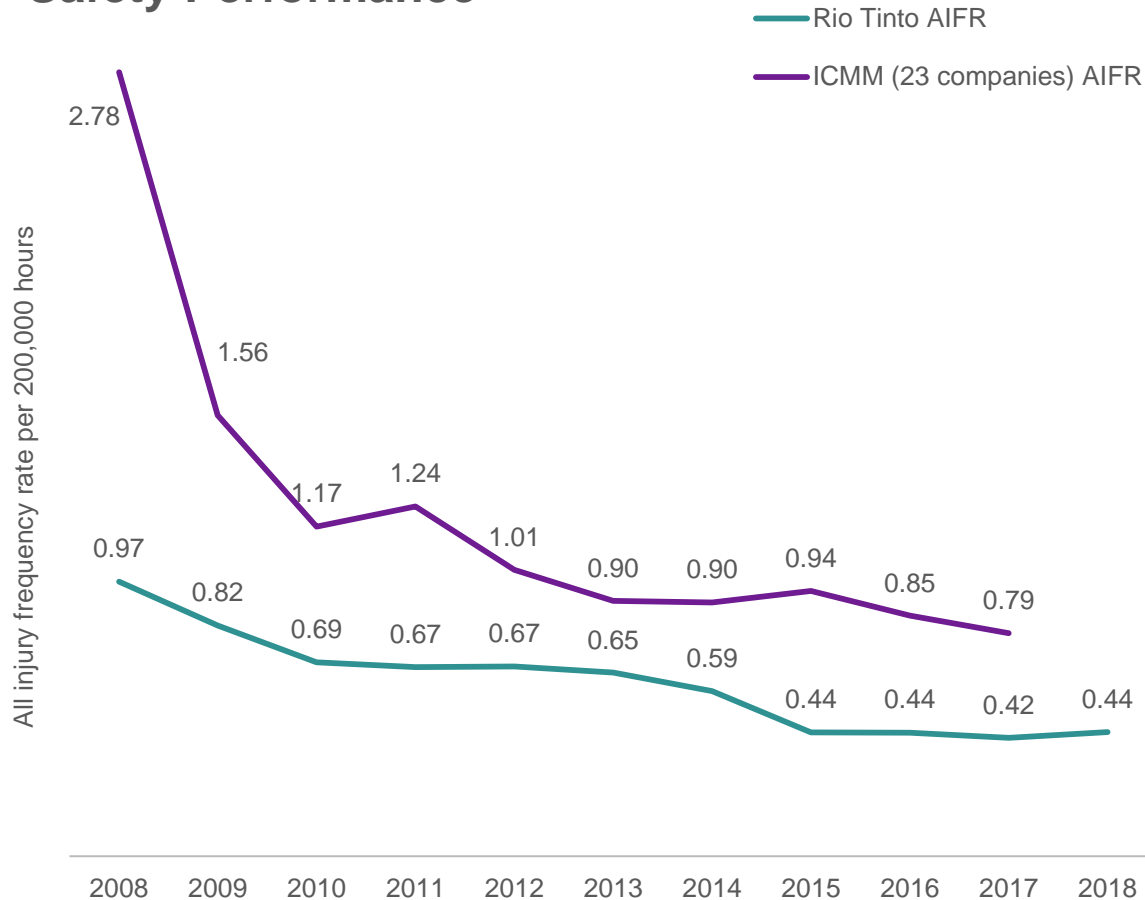
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# Focus on people and sustainability

## Safety Performance



## Health and Safety

3 fatalities in 2018; 2 workplace related, 1 security incident  
 CRM\* a strong focus with 1.4 million verifications in 2018  
 White Ribbon accreditation in Australia

## Environment

Successful divestment of Grasberg and sale of coal  
 First TCFD\* report released – includes 2°C scenario analysis  
 GHG\* emissions intensity reduced by 2.5% YoY, and 29% below 2008 baseline



Rio Tinto Kennecott, Utah, US



Hope Downs 4, Pilbara, Western Australia



Boron, California, US

# Tailings storage facilities

**32**  
operations

With active or inactive tailings storage facilities, including 3 non-managed operational sites and 4 legacy sites

**100**  
facilities

Active or inactive, with an additional 36 facilities closed or under rehabilitation

## Construction type:

Upstream



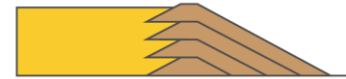
**21**  
facilities

19 active

2 inactive

17 closed

Centreline



**14**  
facilities

10 active

4 inactive

3 closed

Downstream



**24**  
facilities

16 active

8 inactive

5 closed

Other\*



**41**  
facilities

36 active

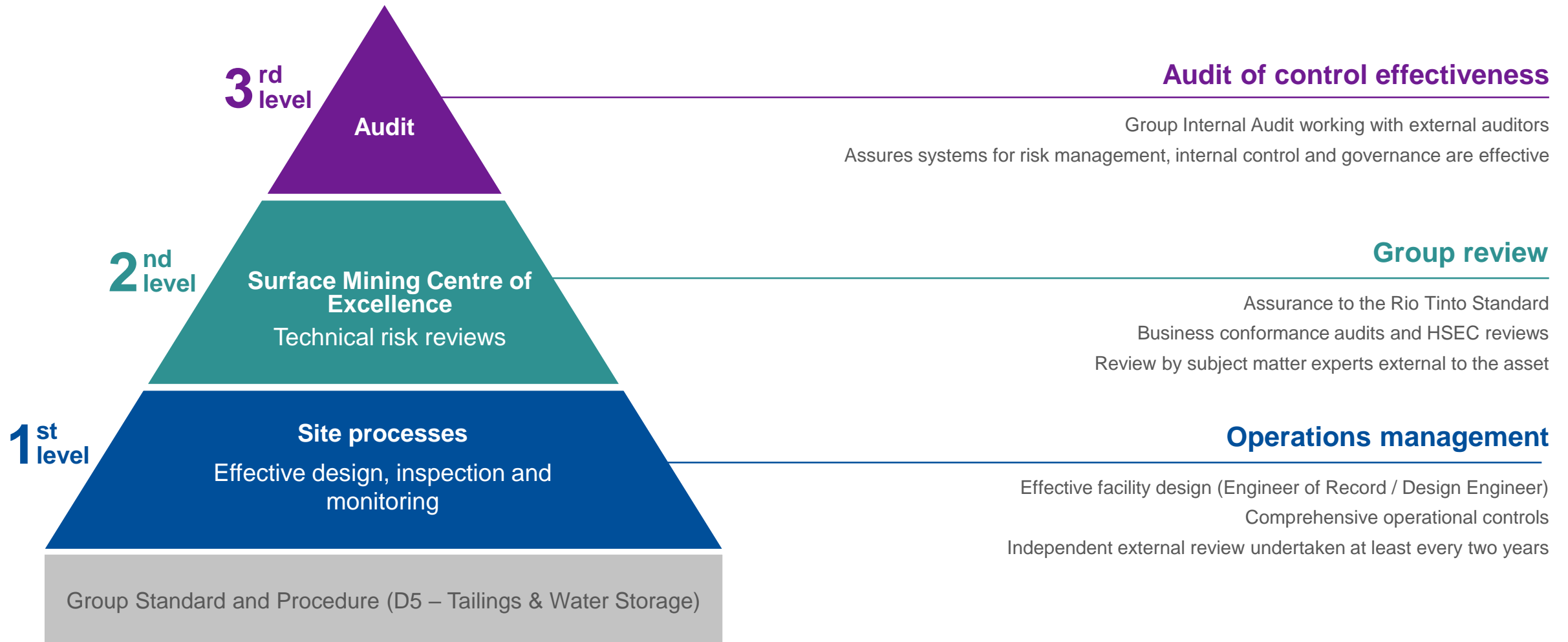
5 inactive

11 closed

[www.riotinto.com/tailings](http://www.riotinto.com/tailings)

\*Other includes Single embankment, No embankment – excavated storage facility, No embankment – dry stack, Lake discharge. Active includes tailings storage facilities under construction.

# Three levels of assurance for managing tailings and water storage



# A strong 2018

## Financial performance

**\$18.1bn**

EBITDA\* on margin of 42%

**\$11.8bn**

Operating cash flows

**\$8.6bn**

Disposal proceeds\*\*\*

- Divested coking coal, Grasberg and Dunkerque

## Balance sheet

**\$0.3bn**

Net cash at Dec-2018

- Adjusted net debt of \$8.0 billion\*\*
- No bond maturities until 2020

## Value creation

**\$13.5bn**

Total shareholder cash returns

**\$2.9bn**

Development capital investment

Approval of Koodaideri and Robe River replacement iron ore mines

**19%**

Return on capital employed\*\*\*\*

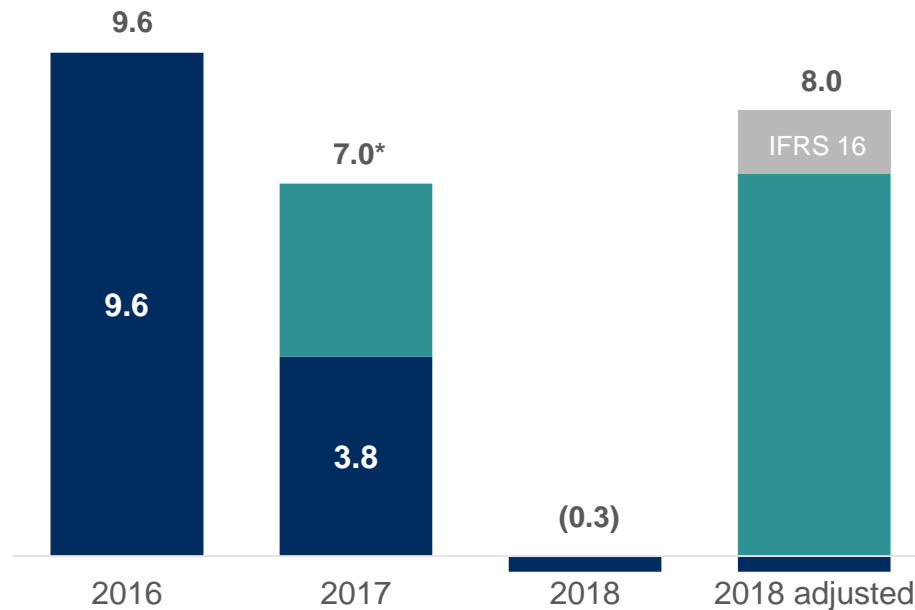


\* Underlying EBITDA | \*\* Adjusted net debt of \$8.0 billion includes return of Grasberg/Dunkerque proceeds, previously announced buy-backs, Australian tax lag, and leasing accounting standard change | \*\*\* Pre-tax proceeds

\*\*\*\* Return on Capital Employed (ROCE) is defined as underlying earnings excluding net interest divided by average capital employed (operating assets before net debt)

# Our strong balance sheet gives us resilience and flexibility

## Net debt \$ billion



Adjusted net debt / EBITDA	2016	2017	2018	2018 adjusted
	0.7x	0.4x	(0.0x)	0.4x
Gearing ratio****	17%	12%	(1%)	14%
Credit rating	S&P	A-	A-	A
	Moody's	Baa1	A3	A2***

## Net cash of \$0.3 billion

Committed cash outflows for 2019 will result in adjusted net debt of \$8.0 billion\*\*:

- \$4.0 billion return of Grasberg and Dunkerque proceeds via special dividend
- \$1.7 billion in buy-backs previously announced in 2018
- \$0.4 billion for lag in Australian tax payments
- \$0.9 billion coal disposal tax payment
- New leasing accounting standard to come into effect from January 2019, increases net debt by \$1.2 billion (non-cash)

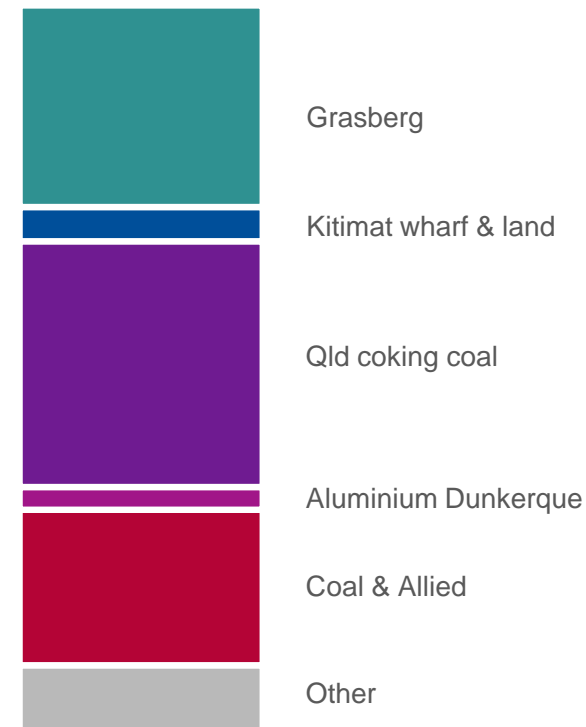
\* Adjusted Dec-2017 net debt of \$7 billion included announced buy-backs relating to the Coal & Allied proceeds and the Australian tax lag

\*\* Numbers are rounded to the closest \$0.1bn | \*\*\* As at February-2019 | \*\*\*\* Gearing ratio = net debt / (net debt + equity)

# Increased portfolio value and performance



Completed ~\$12bn  
disposals since 2015



And strengthened  
the portfolio:

Increase in CuEq CAGR of **1.4%\***

– Driven by a **3.4%** increase in CuEq CAGR across our remaining portfolio

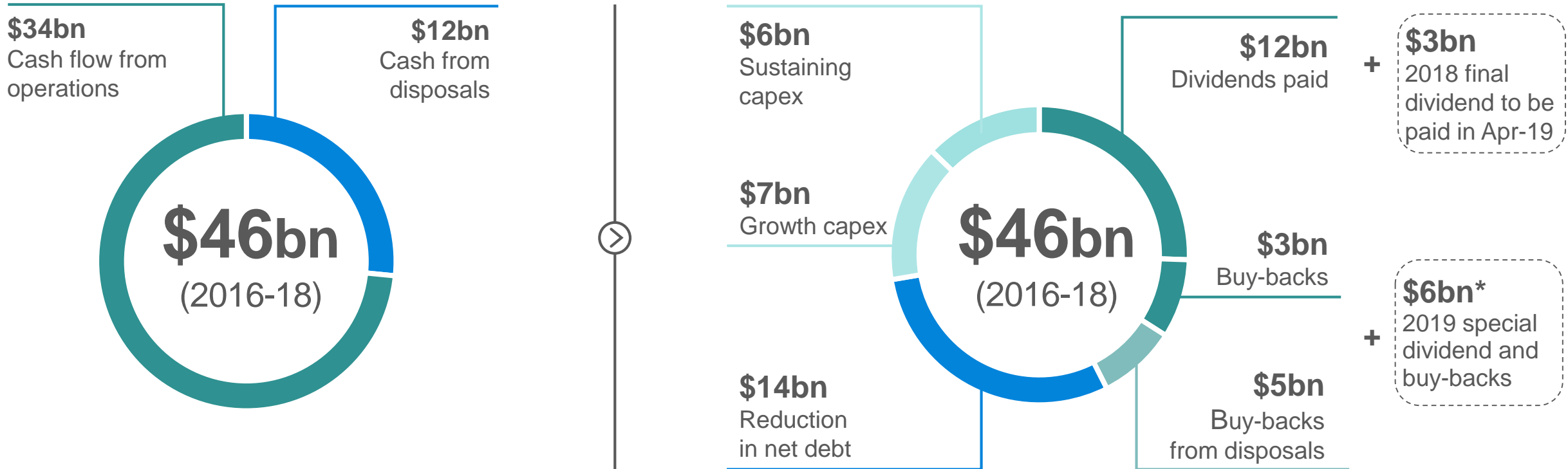
Increased ROCE by **10pp** from 2015-2018

Reduced net debt by **\$14 billion** since Dec-2015



# Consistent, disciplined capital allocation

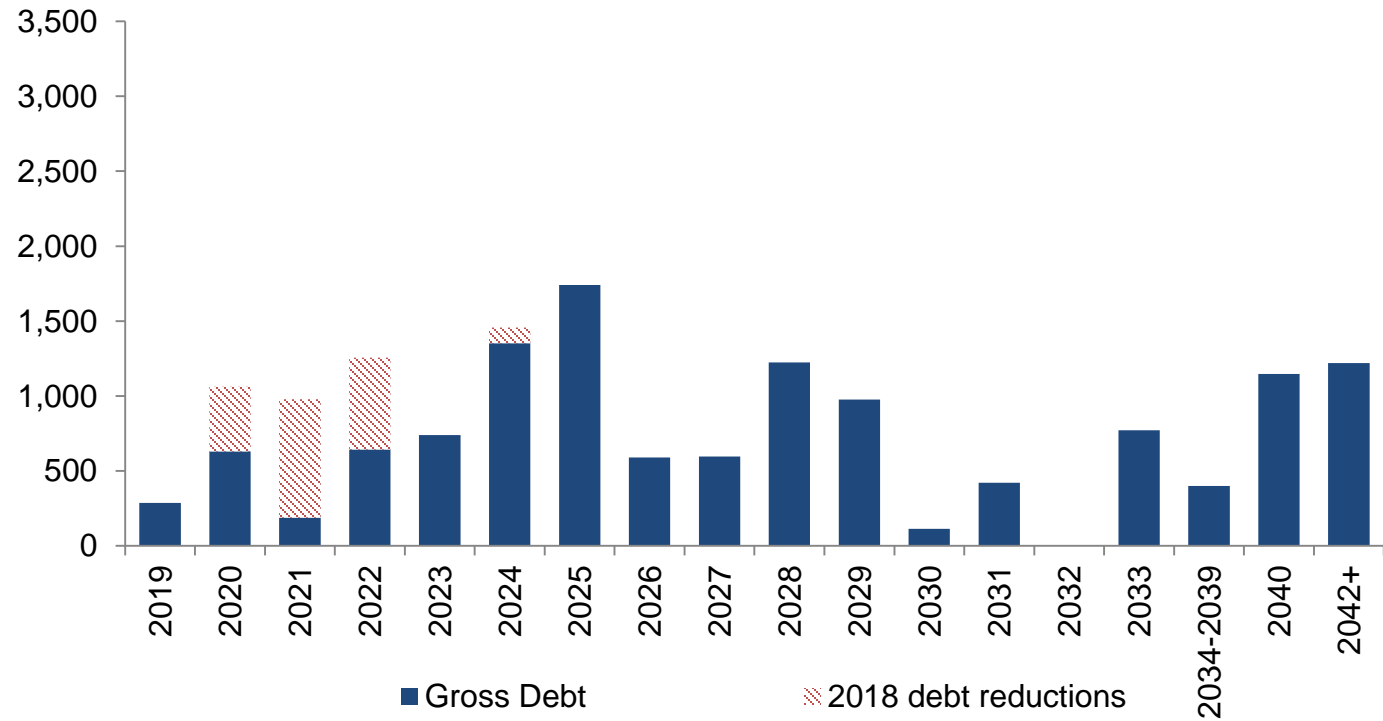
## Investment and shareholder returns delivered from operating cash flow



\* Comprises \$4 billion of special dividends and \$1.7 billion of on-market Plc buy-backs by 28 February 2020. Numbers have been rounded to the nearest \$bn

# Near-term maturities further reduced in 2018

31 December 2018 debt maturity profile\*  
\$ million



Gross debt reduced by \$2.3 billion in 2018 to ~\$13 billion

\$1.9 billion nominal value of bonds purchased in 2018

Average outstanding debt maturity of corporate bonds at ~13 years (~ 11 years for all Group debt)

No bond maturities until 2020

# Commodity specific price drivers in 2018

## Iron Ore (-4%)



## Aluminium (+7%)



## Copper (+6%)



## Iron ore

Solid growth in global steel production, including Chinese crude steel production of ~930Mt

China's structural policy-driven demand for higher grade products

Disrupted seaborne supply (~40Mt)

## Aluminium

Robust global demand growth of ~4%

Volatility in supply surrounding potential Rusal sanctions

Trade tariffs and uncertainty

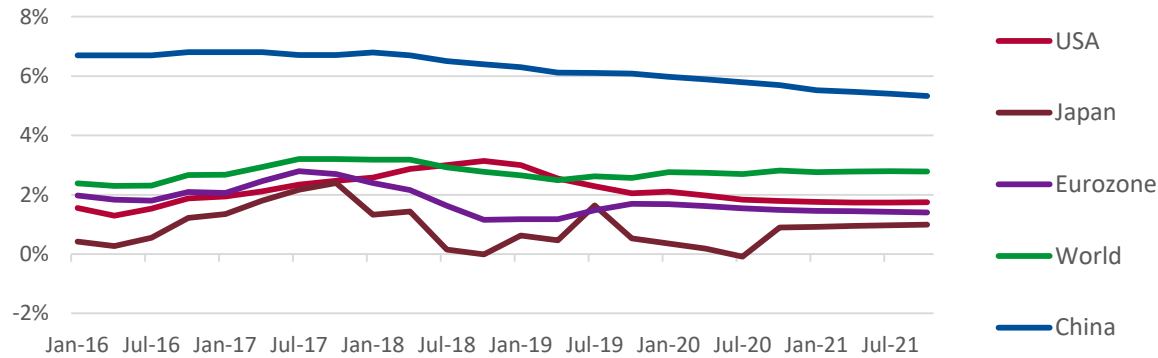
## Copper

Macro headwinds affected demand in H2

Limited supply disruption of ~3%

# 2019 outlook

## Global GDP



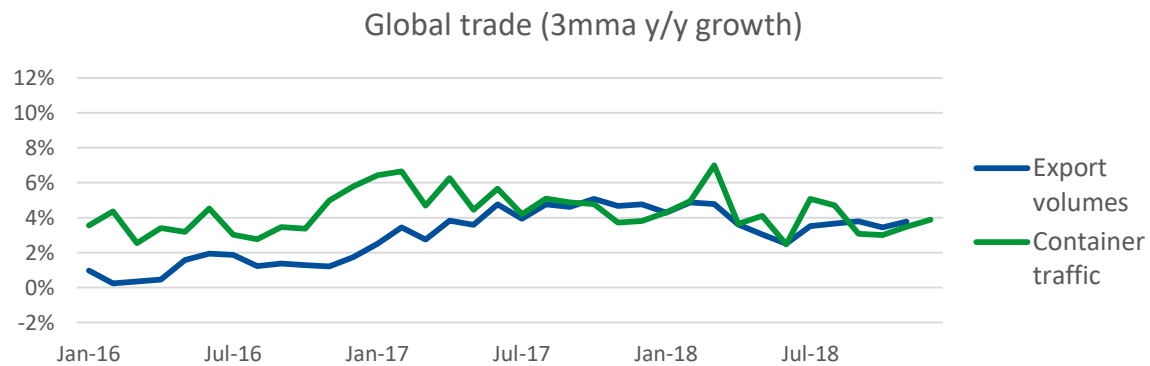
## Global economic growth

- Momentum slowing
- Volatility and risk of trade war is ongoing

## China's GDP growth

- Decelerating as expected
- Introducing stimulus measures to encourage infrastructure investment and support the private sector

## Global trade



White House: Trump weighing possibilities on China Trade Deadline

China tipped to continue stimulus as growth slows

US-China trade war: who has the upper hand?

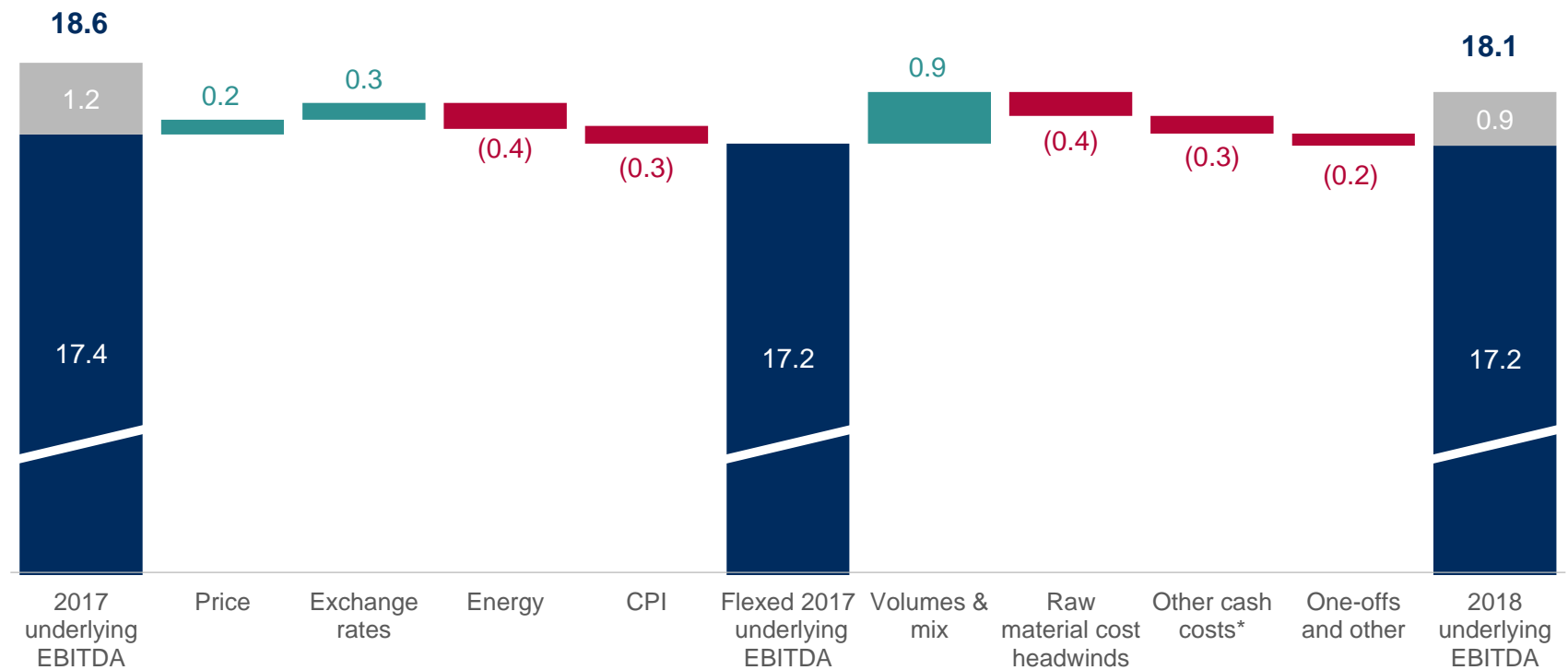
China's new trade offer is better than a tariff war

As the clock ticks, there's a path to a 'win-win' outcome in US - China trade talks

# Strong and consistent EBITDA

## Underlying EBITDA \$ billion

Coal EBITDA ■  
EBITDA excl. Coal ■

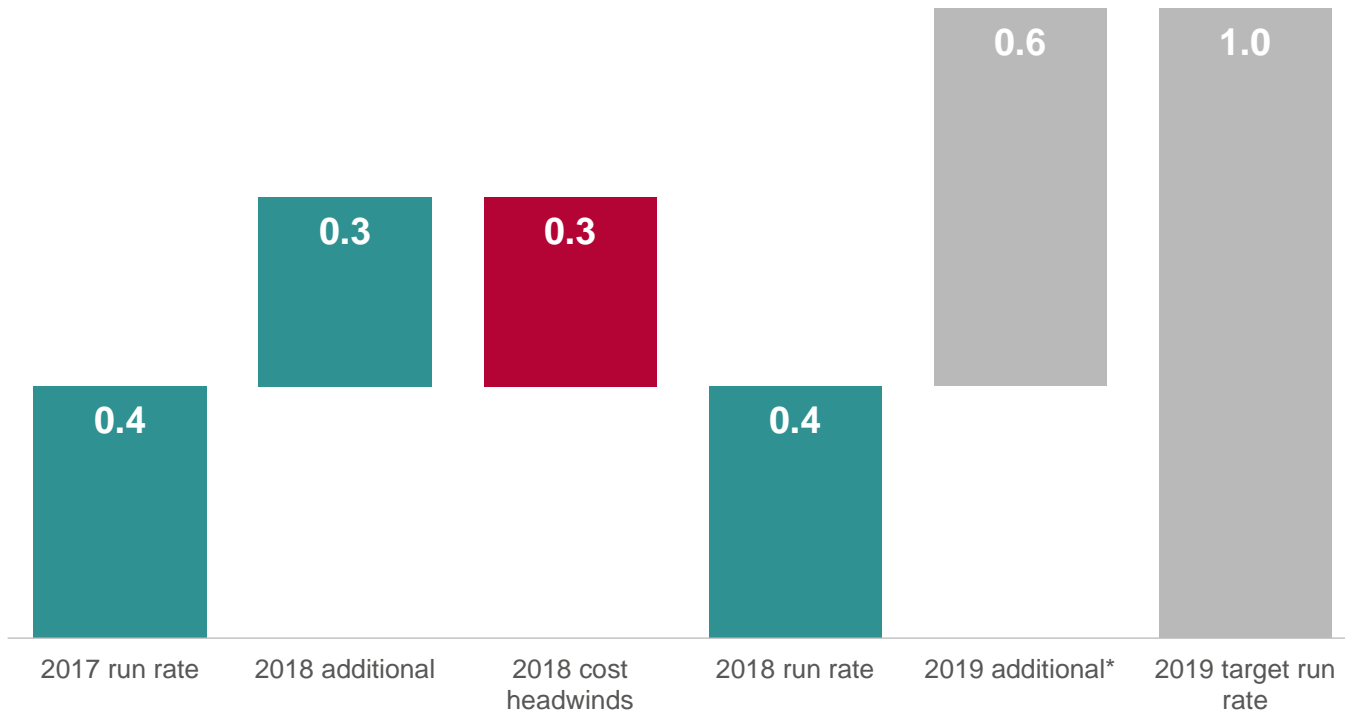


\* Other cash costs include movements in Central costs and Exploration & Evaluation costs. All variances exclude coal



# Productivity accelerating in 2019

## Post-tax mine-to-market (M2M) productivity programme \$ billion (free cash flow)



2018 M2M additional free cash flow fully offset by raw material cost headwinds, primarily related to Aluminium

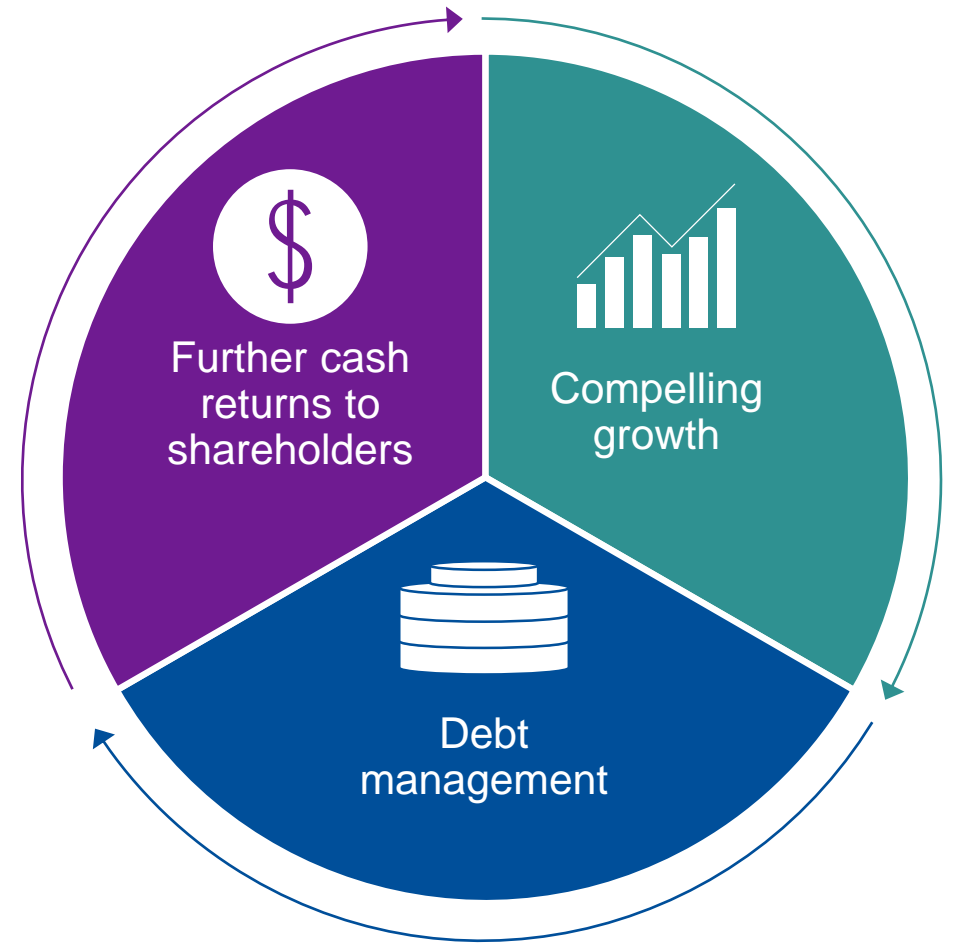
2018 invested in capabilities and technology for future productivity

2018 run rate of **\$0.4 billion** with additional **\$0.6 billion** M2M free cash flow expected in 2019

Maintain M2M free cash flow target of **\$1.5 billion** run-rate from 2021

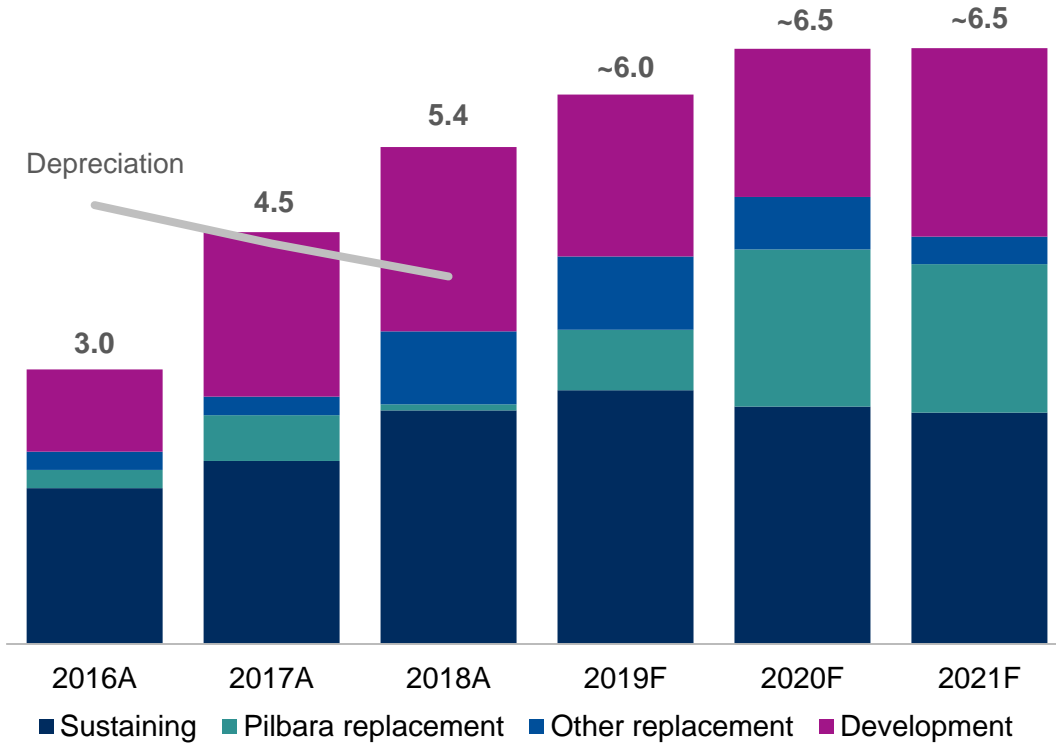
# Disciplined capital allocation

- 1 | Essential sustaining capex
- 2 | Ordinary dividends
- 3 | Iterative cycle of >



# Disciplined ramp-up of investments

**Capital expenditure profile**  
\$ billion



Maintained sustaining capital guidance of \$2.0 to \$2.5 billion per year, including:

- Iron Ore sustaining capex of ~\$1 billion per year

Pilbara replacement capital includes Koodaideri and Robe River mine developments from 2019

All capital decisions go through rigorous evaluation and challenge

Development capital delivers 2% CAGR (2019 – 2023)





# Investing through the cycle

## 2% CAGR\*\* from an extensive pipeline of growth options

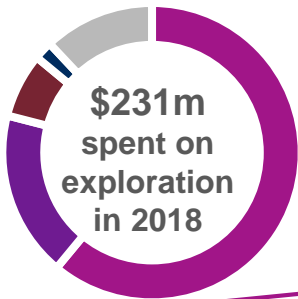
### World Class Resource Base and Established Exploration Programme

#### 6 Brownfield exploration programmes

- Pilbara Iron Ore
- Oyu Tolgoi Copper
- Cape York Bauxite
- Bingham Canyon Copper
- Other minerals

#### 64 Greenfield exploration programmes

- Pilbara Iron Ore
- Copper (inc. Winu)
- Diamonds
- Bauxite
- Other minerals



- Copper
- Diamonds
- Iron Ore
- Bauxite
- Other

### Pre-Feasibility & Feasibility

- Arvida, AP60
- Kennecott: SPB Slice 2\*  
Selective U/G Project\*
- Western Range, WTS 2\*
- Zulti South\*
- Resolution
- Koodaideri Stage 2
- Jadar

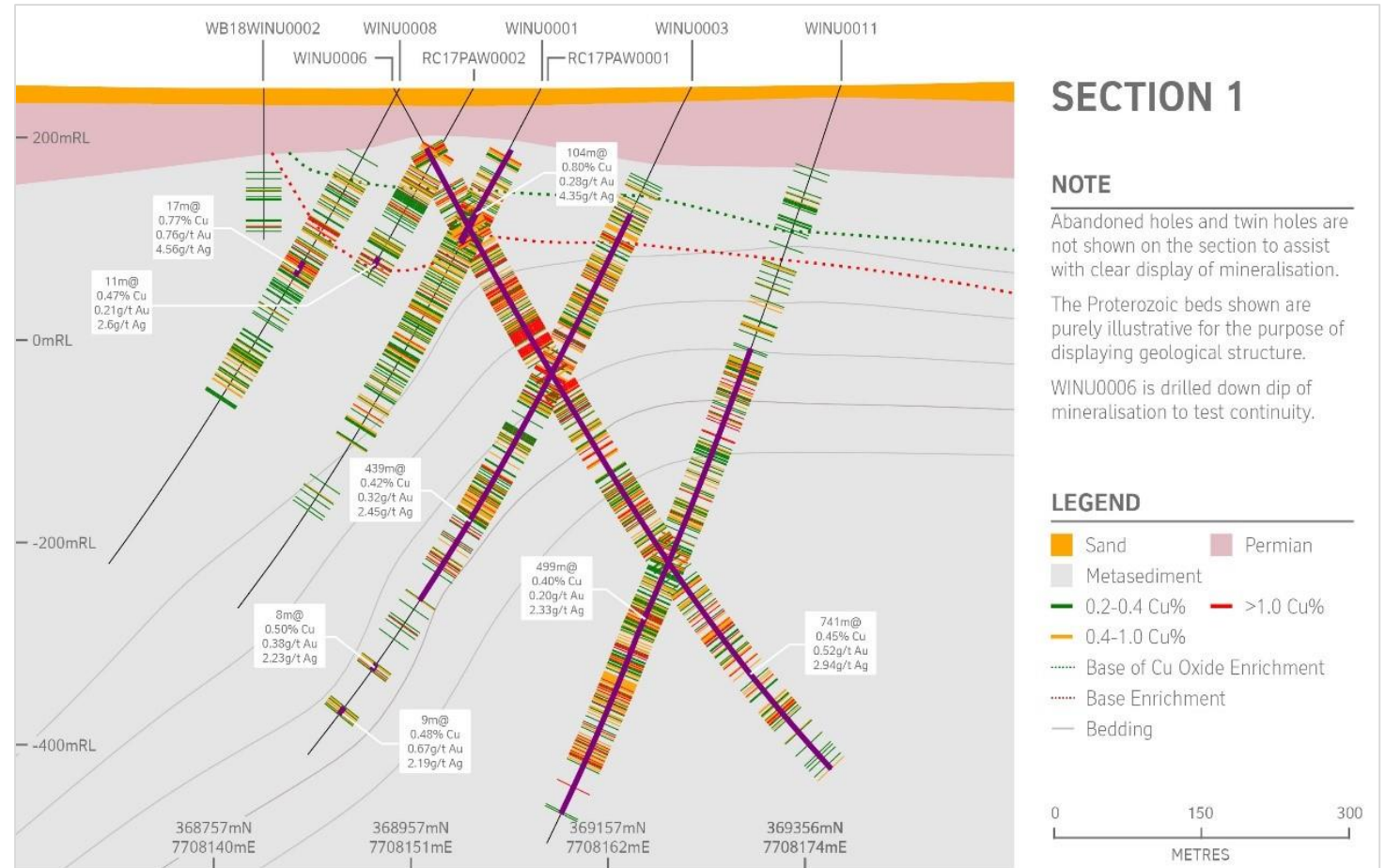
### Execution

- OT Underground
- Koodaideri\*
- Mesas B, C, H, West Angelas C&D\*
- Kennecott Southwall Pushback\*

# Discovery of copper-gold mineralisation in Western Australia

## Early success in copper at Winu\*:

- Copper-gold mineralisation intersected
- Mineralisation close to surface 50-100m
- 1.4 km of strike length open to North, South and East
- Located in Western Australia and 100% owned
- Extensive drilling to continue in 2019
- High quality exploration targets emerging



\*For full details, see the Notice to ASX dated 27 February 2019 ("Rio Tinto Exploration Update – copper-gold mineralisation discovered in the Paterson Province in the far east Pilbara region of Western Australia") and accompanying information provided in accordance with the Table 1 checklist in The Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code, 2012 Edition). These materials are also available on [riotinto.com](http://riotinto.com).

# Strong base for future growth and profitability

**Safety is our priority #1**

**Consistent financial discipline**

**\$29bn\***

Returned to shareholders in 3 years, cash generative assets and strong balance sheet

**Attractive growth opportunities**

**2% CuEq**

Annual growth rate to 2023 from broad pipeline of growth opportunities

**Operating efficiency**

**\$1.5bn**

Free cash flow per year from 2021 delivered through our productivity programme

**World-class portfolio**

**19% ROCE**

Through a simplified portfolio of long life, low cost assets

**21st century mining company**

**Zero**

Coal or oil production plus a leading position in technology and automation

\* Including 2016-2018 cash returns, 2018 final dividend, 2019 buy-backs and special dividend

RioTinto

# Appendix



上海金銀	5188.13	+0.87%	2017-10-31 18:00:00	匯豐	多云	22-15℃	上海證券	10000.00	+0.01%
COMEX黃金	1278.00	-0.00%	2017-10-31 04:00:00	渣打	多雲	22-15℃	中國證券	10000.00	-0.01%

# Net earnings reconciliation

(\$bn)	Reported	Underlying	Exclusions
<b>EBITDA</b>	<b>23.3</b>	<b>18.1</b>	<b>5.1*</b>
Depreciation & Amortisation	(4.6)	(4.6)	0.0
Impairment charges	(0.1)	0.0	(0.1)
Finance items	(0.1)	(0.7)	0.6
Tax	(4.5)	(3.7)	(0.8)
Non-controlling interests	(0.3)	(0.3)	(0.0)
<b>Net Earnings</b>	<b>13.6</b>	<b>8.8</b>	<b>4.8</b>
Tax rate	23%	29%	
ROCE	30%	19%	

## Exclusions from underlying EBITDA:

- gains on disposal of businesses and land (Kitimat), and gain on formation of Elysis JV
- gains on embedded commodity derivatives
- offset by increases to closure provisions at Argyle and ERA

Impairment charges relate mainly to ISAL and excluded from underlying earnings

Finance items are reported net of exchange gains on net debt and intragroup which are excluded from underlying earnings. Underlying finance costs are lower than 2017 on lower net debt

Tax rate on underlying earnings of 29%. The tax rate on net earnings is 23% due to non-taxable gains on disposal

# Iron Ore

## continued delivery from a world-class asset

Operating metrics	2018	2017 comparison	2019 guidance
Average realised price*	\$62.8 / t	- 3%	
Shipments (100% basis)	338mt	+ 2%	338-350Mt
Operating cost / t**	\$13.3 / t	- 0%	\$13-14 / t

### Financial metrics (\$bn)

Revenue	18.5	+ 1%	
EBITDA	11.3	- 2%	
Margin (FOB)	68%	+ 0pp	
Operating cash flow	8.3	- 2%	
Sustaining capex	0.9	+ 67%	~1.0
Replacement and growth capex	0.4	- 43%	
ROCE	42%	+ 1pp	

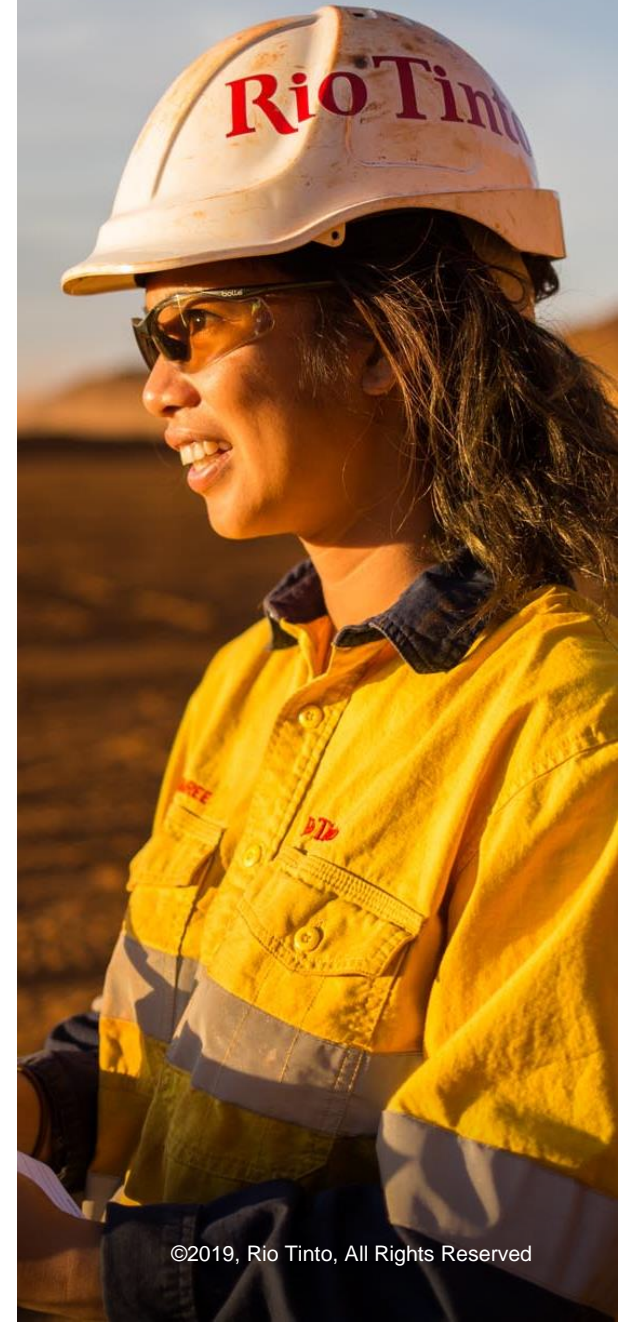
Shipments increased 2%

Maintained EBITDA margin

Strong demand for our 62%  
Pilbara Blend product

Full deployment of AutoHaul™  
in December 2018

Koodaideri Phase 1 approved  
for \$2.6 billion



# Aluminium

## stable operations squeezed by raw material costs

Operating metrics	2018	2017 comparison	2019 guidance
Average aluminium price*	\$2,470 / t	+ 11%	
Average bauxite price**	\$38.7 / t	+ 6%	
Average alumina price***	\$474 / t	+ 34%	
Production – bauxite	50.4mt	- 1%	56-59Mt
Production – alumina	8.0Mt	- 2%	8.1-8.4Mt
Production – aluminium	3.5Mt	- 3%	3.2-3.4Mt
Canadian smelters – hot metal cash costs****	\$1,533 / t	+ 15%	Refer to p41
Financial metrics (\$bn)			
Revenue	12.2	+ 11%	
EBITDA	3.1	- 10%	
Margin (integrated operations)	32%	- 3pp	
Operating cash flow	2.3	- 12%	
Sustaining capex	0.8	+ 33%	
Replacement and growth capex	0.9	+ 32%	
ROCE	8%	- 2pp	

1% primary metal productivity creep\*\*\*\*

Raw material and energy inflation impacted EBITDA by \$0.5 billion

Volatility in markets from tariffs and sanctions:

- increase in mid-west premium effectively offset tariff increase
- Alumina market upside capped by legacy contracts - \$0.5 billion

Amrun completed ahead of schedule and below budget

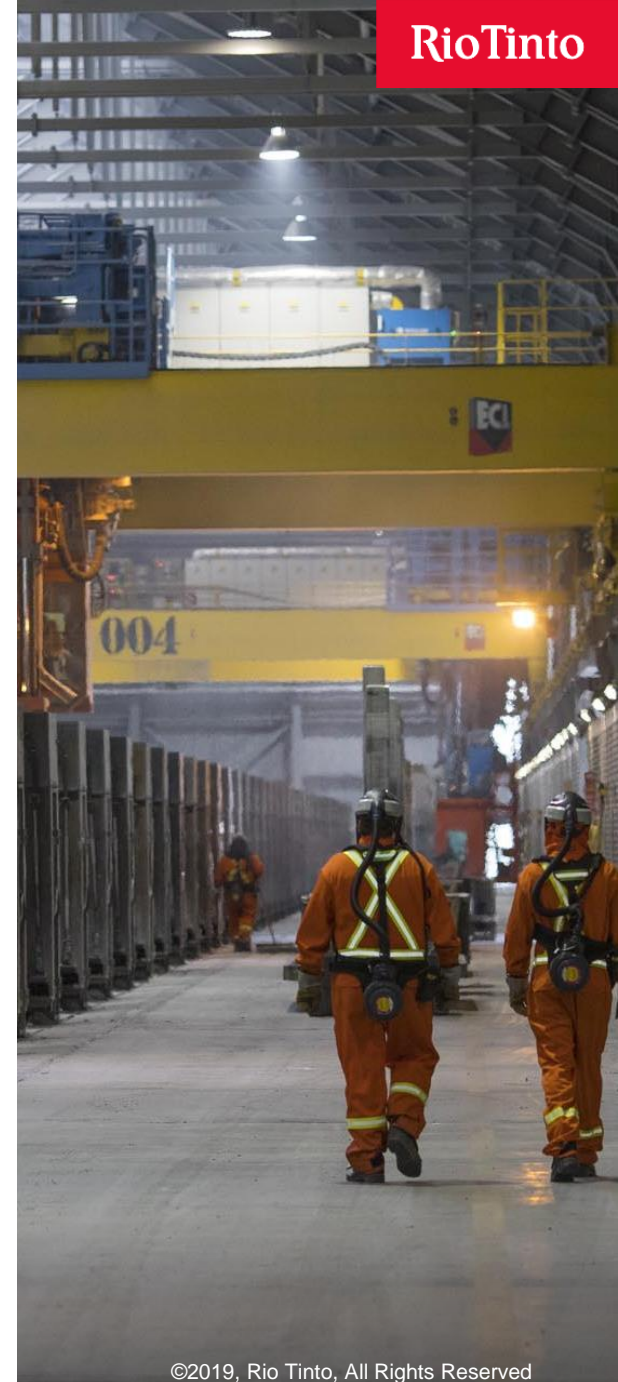
Completed disposals:

- Dunkerque Aluminium divestment completed for \$0.4 billion, net of completion adjustments
- Surplus land at Kitimat for \$0.6 billion

\* Realised price, including VAP and mid-west premium | \*\* Realised price, dry metric tonne, FOB basis

\*\*\* Platts Alumina PAX FOB Australia | \*\*\*\* Excluding Becancour and Dunkerque smelters

\*\*\*\*\* Operating costs defined as hot metal cash costs for the Canadian smelters (alumina at market price)



# Copper & Diamonds

## strong operational performance

Operating metrics	2018	2017 comparison	2019 guidance
Copper price	297 c/lb	+ 6%	
Production – mined copper	634kt	+ 33%	550-600kt
Production – refined copper	275kt	+ 39%	220-250kt
Production – diamonds	18.4Mct	- 15%	15-17Mct
Unit cost*	109 c/lb	- 21%	110-120 c/lb

### Financial metrics (\$bn)

Revenue	6.5	+ 34%
EBITDA	2.8	+ 46%
Margin	43%	+ 4pp
Operating cash flow	2.1	+ 25%
Sustaining capex	0.3	+ 32%
Replacement and growth capex	1.6	+ 35%
ROCE	9%	+ 7pp

### Improved performance at Escondida

- Resulting in \$786 million of dividends received

### Significant productivity improvements delivered at Kennecott

### OT underground project

- Progressed well in 2018
- Signed the Power Agreement with the Government of Mongolia
- Reviewing the existing schedule

### Successful divestment of Grasberg for \$3.5 billion

### Completion of the A21 pipe at Diavik





# Energy & Minerals\*

## a challenging year

Operating metrics	2018	2017 comparison	2019 guidance
IOC pellets	\$114 / t	+ 5%	
TiO <sub>2</sub> **	\$647 / t	+ 18%	
Production – IOC	9.0mt	- 20%	11.3-12.3Mt
Production – TiO <sub>2</sub>	1.1Mt	- 15%	1.2-1.4Mt
Production – Borates	0.5Mt	- 1%	0.5Mt

### Financial metrics (\$bn)

Revenue	4.7	- 5%	
EBITDA	1.3	- 18%	
Margin	28%	- 4pp	
Operating cash flow	0.9	- 19%	
Sustaining capex	0.3	- 6%	
Replacement and growth capex	0.1	+ 142%	
ROCE	8%	-2pp	

Production instability at RTIT an opportunity to improve in 2019

- 2 furnaces currently being rebuilt at Rio Tinto Fer et Titane

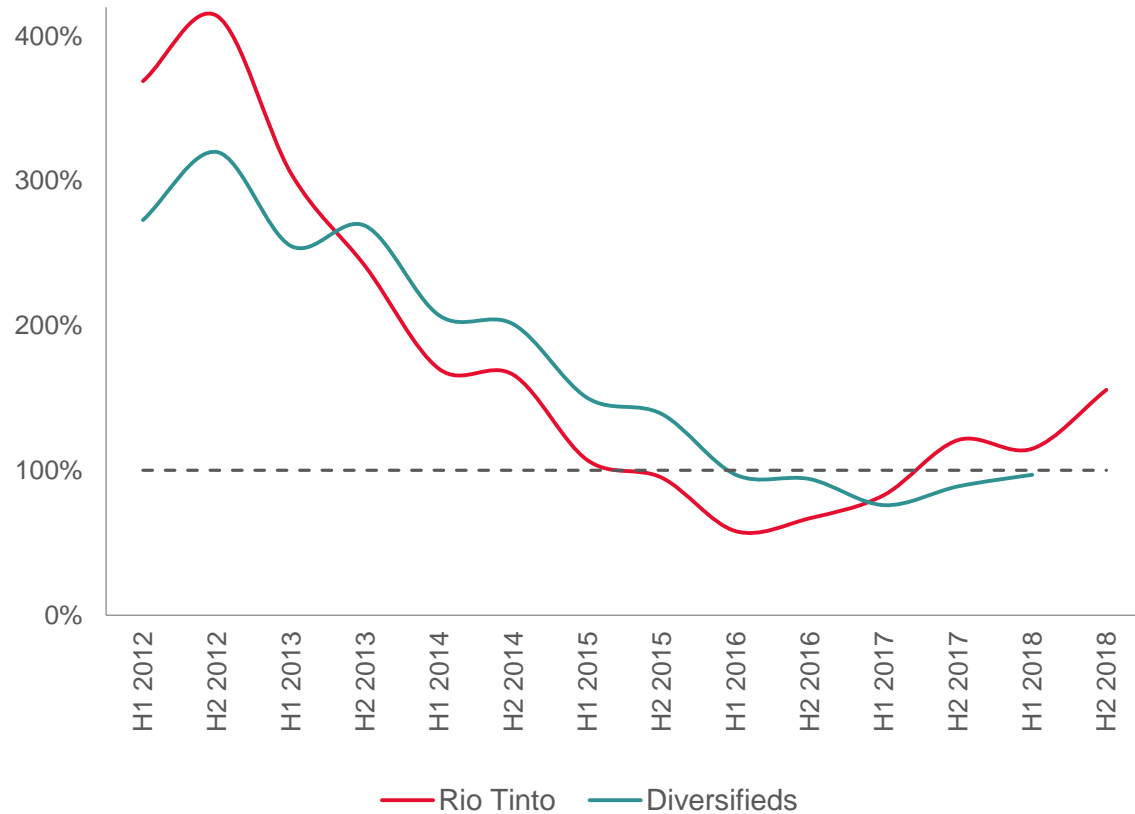
Portfolio simplification through divestments of coking coal and Rössing Uranium

Full recovery from strike at IOC

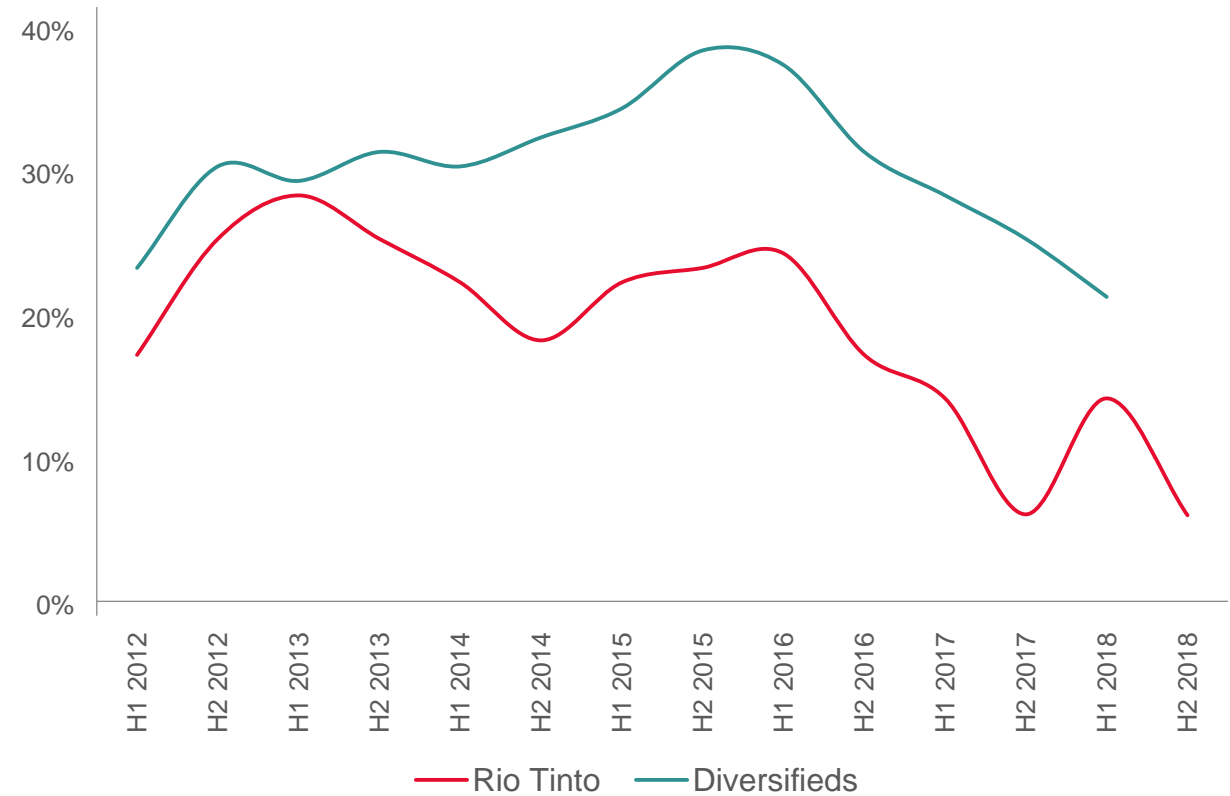


# The industry fundamentals are robust with Rio Tinto leading the way

Capex / Depreciation and amortisation\*



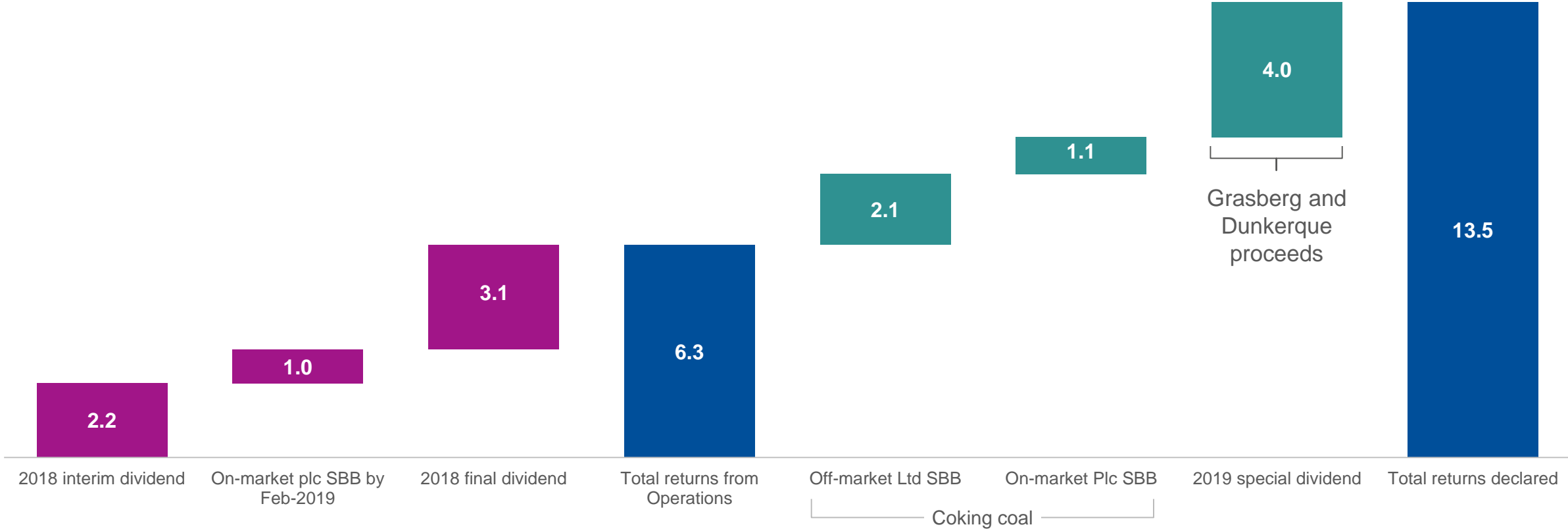
Gearing (Net debt / (Net debt + equity))\*



\* Diversifieds peer group includes BHP, Glencore, Vale and Anglo American (Excludes Rio Tinto). Net debt for gearing calculated as current and non-current borrowings, less cash.  
 Source: FactSet. The principal difference between Rio Tinto's H2 2018 net cash of \$0.3bn and the above view of H2 2018 net debt is due to the treatment of highly liquid financial assets held in managed investment funds

# Superior cash returns declared of \$13.5 billion in 2018

**2018 cash returns declared to shareholders**  
\$ billion



# Our strategy has delivered value through the cycle

## Superior cash generation



World-class assets  
**Portfolio**



Operating and Commercial excellence  
**Performance**



Capabilities  
**People & Partners**

## Disciplined capital allocation

**Balance sheet strength**

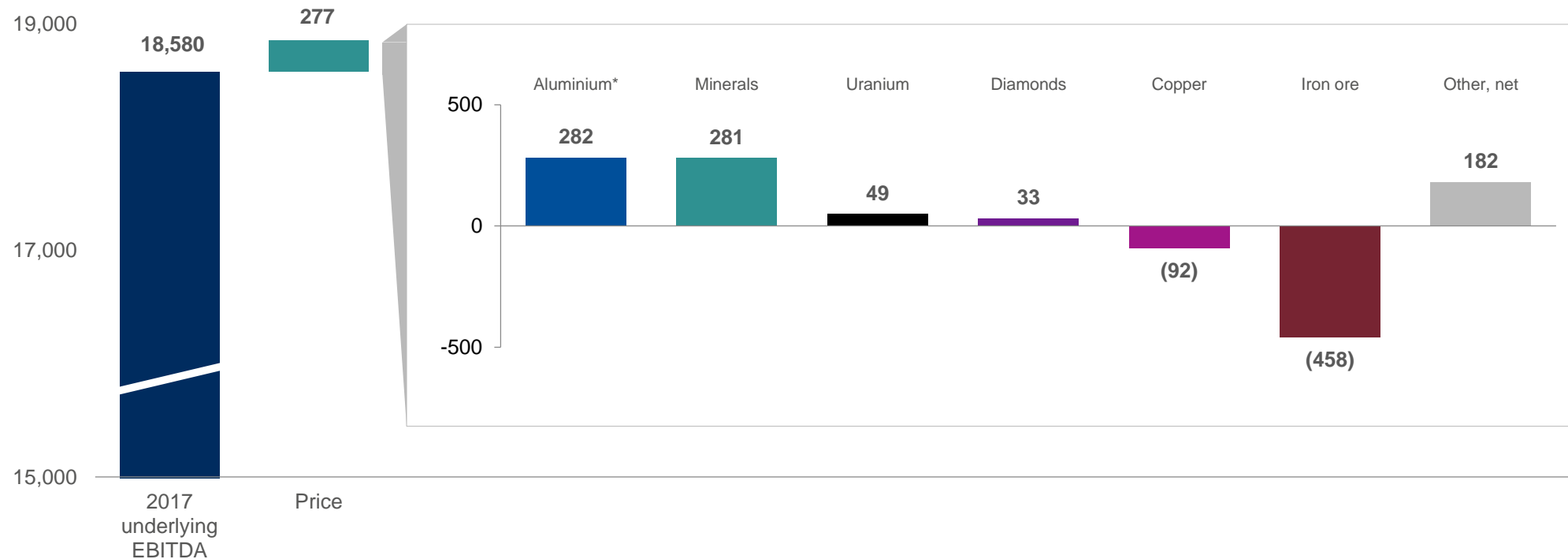
**Superior shareholder returns**

**Compelling growth**

# Higher aluminium and RTIT prices partly offset by lower iron ore prices

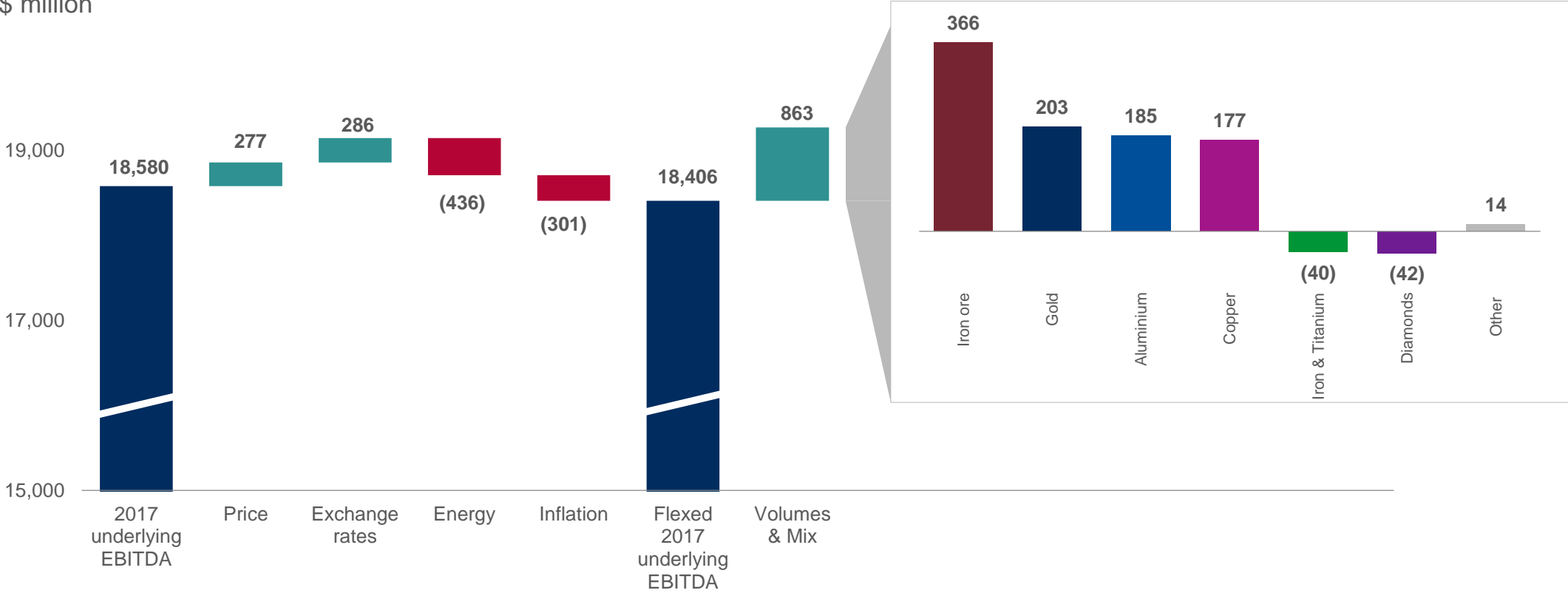
## Underlying EBITDA 2017 vs 2018

\$ million



# Strong sales in iron ore, copper, gold and aluminium

Underlying EBITDA 2017 vs 2018  
\$ million

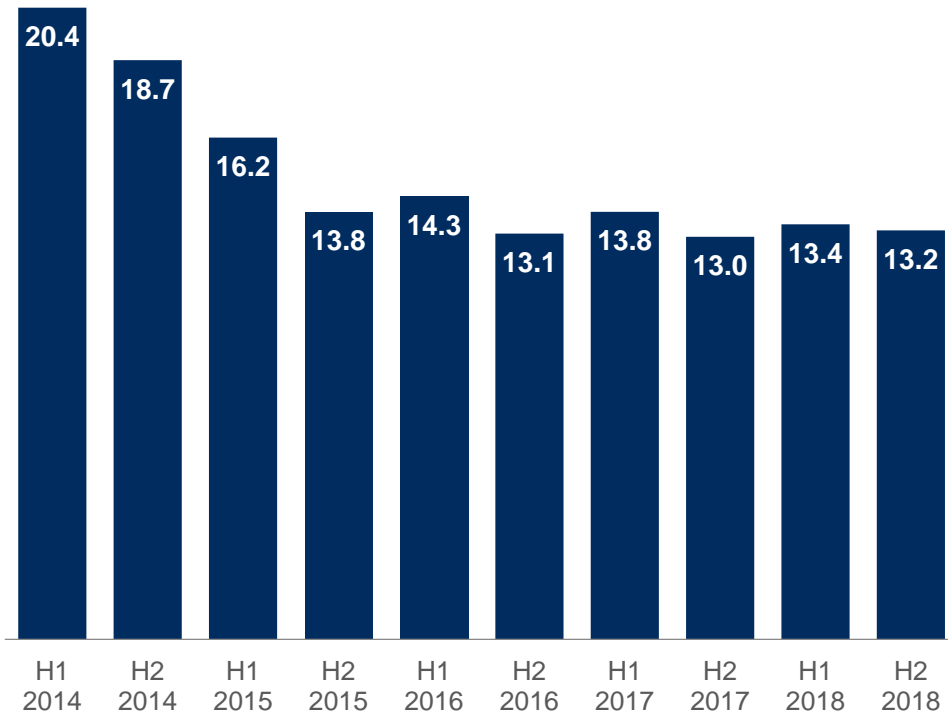


\* Aluminium includes alumina and bauxite

# Iron Ore

## maintaining our competitive advantage

**Pilbara cash unit cost**  
\$ per tonne



2018 cash unit cost of \$13.3/t (\$0.1/t lower than 2017)

Focus on maintaining strong EBITDA margins (68% in 2018, in line with 2017)

Productivity initiatives and weakening Australian dollar in 2018 offset:

- Steeper hauls
- Higher diesel, labour and maintenance costs

Average realised FOB price of \$57.8 per wet metric tonne (\$62.8 per dry metric tonne)

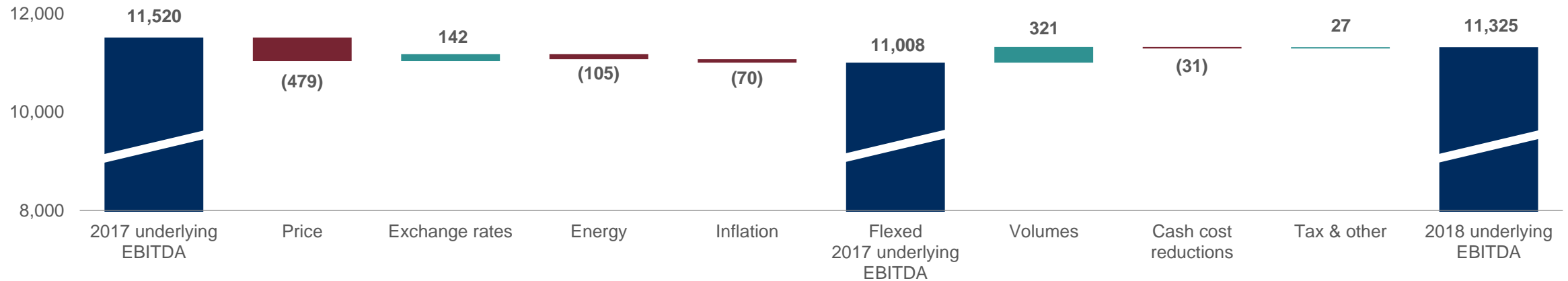
2019 guidance for shipments from the Pilbara remains unchanged at 338-350Mt, subject to market conditions and any weather constraints

# Iron Ore

## lower prices partly offset by higher volumes

### Underlying EBITDA 2017 vs 2018

\$ million



- Our Pilbara mines produced 338 million tonnes in 2018 (282 million tonnes as Rio Tinto's share) – 2% higher than 2017. This increase came from expanded mines and minimal weather interruptions compared to 2017
- Pilbara FOB EBITDA margins of 68% achieved in 2018 (68% in 2017)
- Pilbara cash unit costs were \$13.3 per tonne in 2018, compared to \$13.4 per tonne in 2017
- Pilbara iron ore revenues includes \$1.7 billion of freight in 2018 compared to \$1.5 billion in 2017
- Approximately 68% of sales in 2018 were priced with reference to the current month average, 17% with reference to the prior quarter's average index lagged by one month, 5% with reference to the current quarter average and 10% were sold on the spot market
- Approximately 32% of our sales were made on an FOB basis with the remainder sold including freight

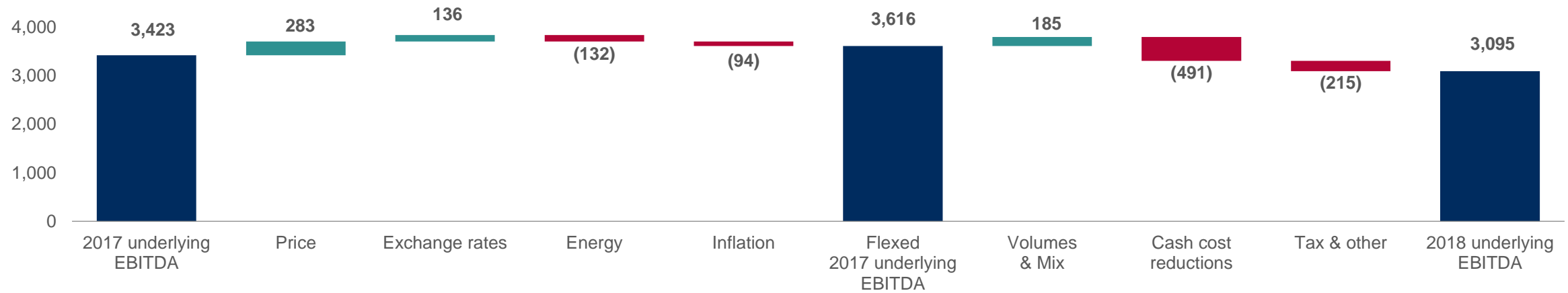


# Aluminium

## higher prices and volumes offset by raw material cost headwinds

### Underlying EBITDA 2017 vs 2018

\$ million



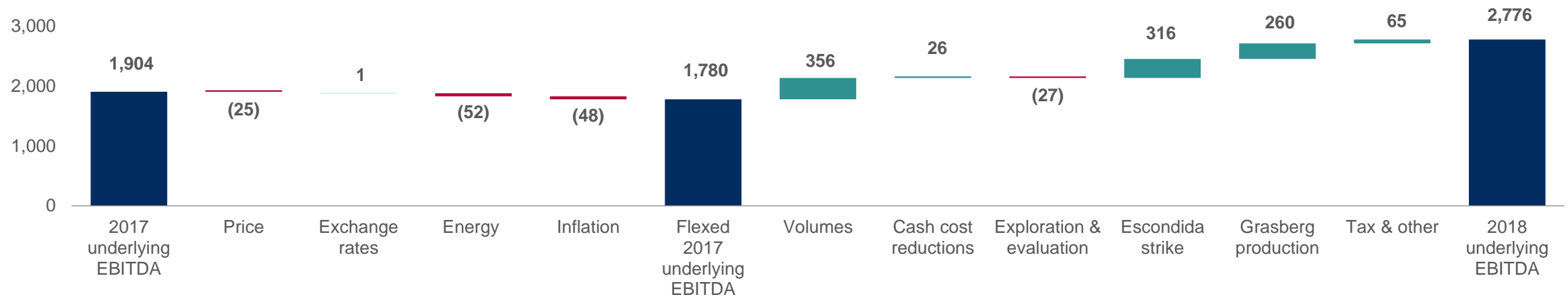
- Aluminium underlying EBITDA of \$3.1 billion declined by 10% compared with 2017. Stronger prices in H1 2018 were more than outweighed by the impact of legacy alumina sales contracts, raw material cost inflation and lower aluminium volumes
- The average realised price per tonne averaged \$2,470 in 2018 (2017: \$2,231)
- The 2018 cash LME aluminium price averaged \$2,110 per tonne, an increase of 7% on 2017
- The mid-West premium rose 111% to \$419/tonne (2017: \$199/tonne), driven by the 10% US tariff implemented on 1 June which is included in our operating costs
- VAP represented 57% of the primary metal we sold (2017: 57%) and generated attractive product premiums averaging \$224/tonne of VAP sold (2017: \$221/tonne)
- EBITDA margins were 32% in 2018, compared to 35% in 2017
- Bauxite revenues includes \$371 million of freight in 2018 (\$266 million in 2017)
- In 2018, we sold the Dunkerque aluminium smelter in France to Liberty House for \$0.4 billion, net of completion adjustments, and a wharf and land in Kitimat, British Columbia to LNG Canada for \$0.6 billion

# Copper & Diamonds

## strong operational performance

### Underlying EBITDA 2017 vs 2018

\$ million



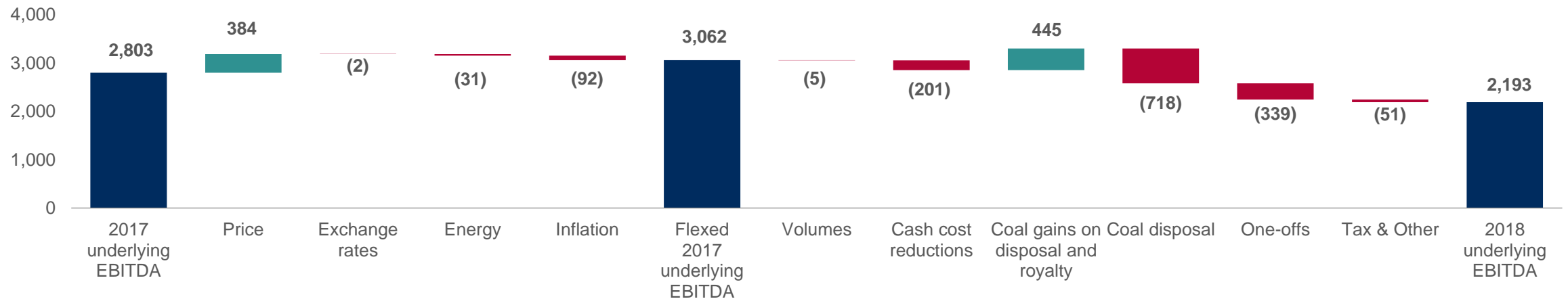
- Underlying EBITDA of \$2.8 billion was 46% higher than 2017. Our strong performance was primarily driven by increased volumes of copper and gold, lower costs linked to productivity improvements at our managed operations, and Escondida running at full capacity after the 2017 strike
- Copper & Diamonds generated \$2.1 billion in cash from operating activities, a 25% increase on 2017. This included \$786 million of dividends from Escondida. Working capital, productivity and cost management initiatives also contributed to favourable cash flows
- Average copper prices increased 6% to 297 US cents per pound, and the average gold price rose 1% to \$1,269 per ounce compared with 2017. Price changes, including the effects of provisional pricing movements, resulted in a \$25 million decrease in underlying EBITDA compared with 2017
- At 31 December 2018, the Group had an estimated 240 million pounds of copper sales that were provisionally priced at 277 cents per pound. The final price of these sales will be determined during the first half of 2019. This compares with 250 million pounds of open shipments at 31 December 2017, provisionally priced at 304 cents per pound

# Energy & Minerals

## higher prices offset by coal disposal and one-off disruptions

### Underlying EBITDA 2017 vs 2018

\$ million



- Underlying EBITDA of \$2.2 billion was 22% lower than 2017. Excluding the entire contribution from coal in both years, 2018 EBITDA of \$1.3 billion was 18% lower than the 2017 comparative of \$1.6 billion
- Coal EBITDA included a \$278 million gain from the sales of the Winchester South and Valeria coal development projects and a \$167 million pre-tax gain from the revaluation of a royalty receivable arising from the disposal of the Mount Pleasant coal project in 2016
- Net operating cash flows of \$1.3 billion were 35% lower than 2017
- We completed the sale of the Kestrel and Hail Creek coking coal mines and the Valeria coal and Winchester South development projects by 1 August 2018 for headline proceeds of \$4.15 billion, and expect to pay ~\$0.9 billion in tax on these disposals to the Australian Taxation Office in H1 2019
- Excluding the entire contribution from coal in both years, 2018 net operating cash flows of \$0.9 billion was 19% lower than the 2017 comparative of \$1.1 billion.

# Other movements in underlying EBITDA

## Underlying EBITDA impact

\$ million	2017	FX/ price	Energy & Inflation	Volumes	Cash costs	E&E	Non-cash	Interest, tax, other	2018
Other operations	(116)	121	(117)	6	(31)	-	2	64	(70)
Exploration & Evaluation (net)	(218)	2	1	-	-	(17)	-	-	(231)
Other	(736)	-	3	-	(22)	-	(43)	(153)	(952)
<b>Total</b>	<b>1,070</b>	<b>123</b>	<b>(113)</b>	<b>6</b>	<b>(53)</b>	<b>(17)</b>	<b>(41)</b>	<b>(89)</b>	<b>1,253</b>

- Other operations includes the Gove alumina refinery (curtailed in May 2014), Rio Tinto Marine and Legacy projects
- Central exploration & evaluation costs higher due to increased activity levels, primarily at Resolution
- The increased loss in Other primarily relates to a \$95 million rise in restructuring, project and other one-off costs and a \$60 million increase in central pension costs and insurance. It also reflects an increase in our information system and technology spend and continued investment in capability to support our mine-to-market productivity programme

# Modelling EBITDA

Underlying EBITDA sensitivity	2018 average price/ rate	(\$m) impact on FY 2018 underlying EBITDA of 10% price/rate change
Copper	297c/lb	388
Aluminium	\$2,110/t	612
Gold	\$1,269/oz	46
Iron ore (62% Fe FOB)	\$61.2/dmt	1,566
A\$	75USc	721
C\$	77USc	354
Oil	\$71/bbl	78

Note: The sensitivities give the estimated effect on underlying EBITDA assuming that each individual price or exchange rate moved in isolation. The relationship between currencies and commodity prices is a complex one and movements in exchange rates can affect movements in commodity prices and vice versa. The exchange rate sensitivities include the effect on operating costs but exclude the effect of revaluation of foreign currency working capital.

# Modelling aluminium costs

## Canadian\* smelting unit cash\*\* cost sensitivity

(\$/t) Impact a \$100/t change in each of the input costs below will have on our 2018 Canadian smelting unit cash cost of \$1,533/t

Alumina (FOB)	191
Green petroleum coke (FOB)	34
Calcined petroleum coke (FOB)	30
Coal tar pitch (FOB)	7

\* Canadian smelters include all fully-owned smelters in Canada (Alma, AP60, Arvida, Grande-Baie, Kitimat, and Laterrière), as well as Rio Tinto's share of the Becancour and Alouette smelters | \*\* The smelting unit cash costs refer to all costs which have been incurred before casting, excluding depreciation but including corporate allocations and with alumina at market price, to produce one metric tonne of primary aluminium.

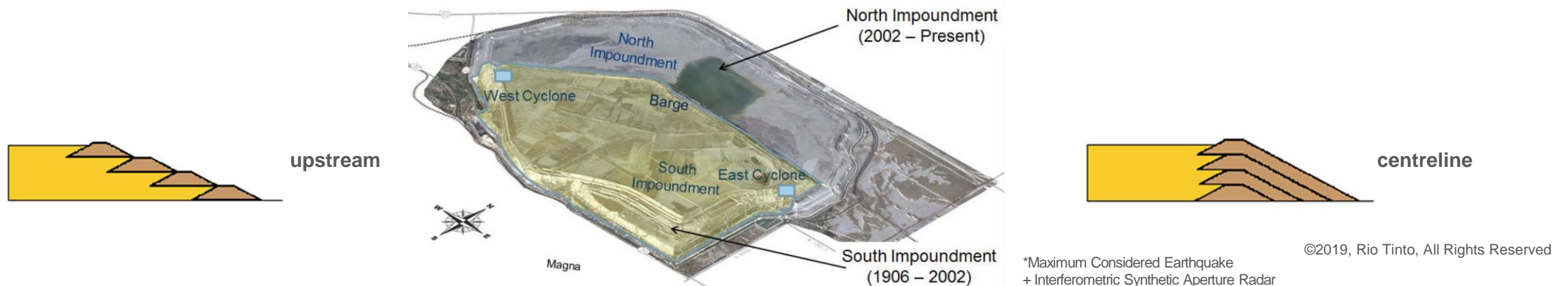
# Case Study: Active management at Kennecott

## South impoundment – closed in 2002

- No longer met seismic hazard design criteria
- Upstream construction method
- Deposition at new North impoundment commenced in 1998
- South impoundment de-weighting work undertaken
- 46 dewatering wells, 200+ horizontal and 1300+ wick drains installed
- Deflection berms installed
- Ongoing work planned

## North impoundment – opened 2002-present

- Design review board comprised of international experts
- Designed to +7.25 magnitude earthquake (MCE\*)
- Limited water storage and away from crest
- Wide beaches
- Centreline construction method
- Sophisticated monitoring systems:
  - 450+ piezometers for pore pressure monitoring
  - Accelerometers (earthquake detection) – linked to emergency alarms
  - GPS survey for construction monitoring and InSAR+ monitoring for early detection of instability
  - inclinometers to detect settlement and displacement in slope



# Closure, taking the long term view

## **Committed to closing our assets well**

At end 2018, closure and restoration provisions of \$10 billion

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## **Dedicated closure team, in-house R&D**

Dedicated team, defined strategy and technical experts to improve closure outcomes and manage legacy sites

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## **Proven closure capability**

Leading technical, environmental and community practices in closure:  
Holden, a recent example