



Sulphur Market Outlook

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Global Sulphur Review and Outlook



Current Global Market Environment

Weak Phosphate Market

- Supply growth in Morocco and Saudi Arabia increases competition
 - Morocco exported 3.1m t of finished phosphates in Jan-July vs 1.8m t in prior-year period
- Lower-than-expected demand from key markets (i.e. US, India)
 - North America saw two consecutive planting seasons of weak demand, mainly weather driven
 - Focus now on fall demand – shorter application window, colder temperatures
- Mounting pressure results in production cuts
 - China – hard to quantify
 - Mosaic – idles Uncle Sam, Louisiana operations for 4Q – 500,000t phosphates

Shifts in Sulphur Supply Strategy

- OCP Morocco does not agree with UAE's Adnoc for 4Q volume...more for China
- Mosaic Brazil does not agree with UAE's Adnoc for 4Q volume....more for China
- Continue to see more supply out of FSU to Brazil, resulting in less from USGC

Sulphur Inventory Building

- Limited in Middle East (Berri – Saudi Arabia)
- Some occurring in FSU (i.e. Turkmenistan)
- Limited so far in Canada



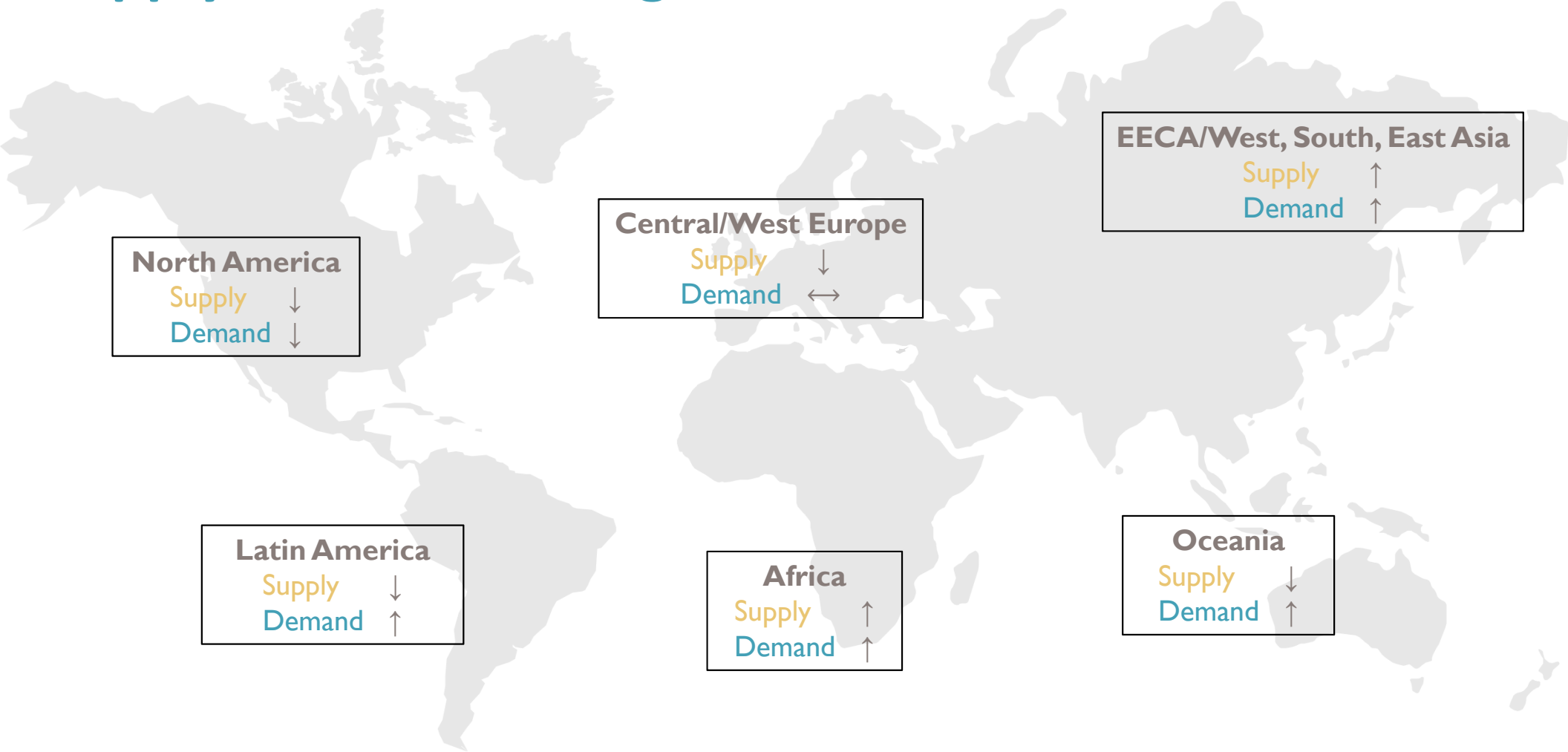
IMO 2020 Impact is Still Question Mark

- Most impactful sudden global change for shipowners and refiners... ever.
- 4Q 19-3Q20: Significant market turbulence.
- Key focus right now is the light/sour crude spread.
- Acuity's base case scenario in early 2019 indicated 2m t of incremental sulphur production, but indications are shifting – project cancelled in USGC and one European refiner indicating less.
- Assumed growth in
 - Asia – SK building new heavy upgrader at Ulsan refinery.
 - US - ?
 - Europe – new coker in Antwerp late last year, other projects in Poland, Spain and Sweden but others back away (i.e Gunvor new coking unit in Netherlands shelved).

Supply and Demand Factors

	SUPPLY	DEMAND
BULLISH	IMO 2020	Electric vehicle (EV) evolution; Growth in fertilizer demand
NEUTRAL	Exports of crushed and granular from Turkmenistan and crushed from Saudi will correspond with pricing of sulphur; EV evolution	Rationalisation of P ₂ O ₅ industry in China and North Am will be offset by increasing P ₂ O ₅ production from Morocco and Saudi
BEARISH	Trade and other policy uncertainties/geopolitical factors; Environmental policy/regulation around the world could change supply and demand for sulphur	

Supply/Demand Change Outlook to 2023



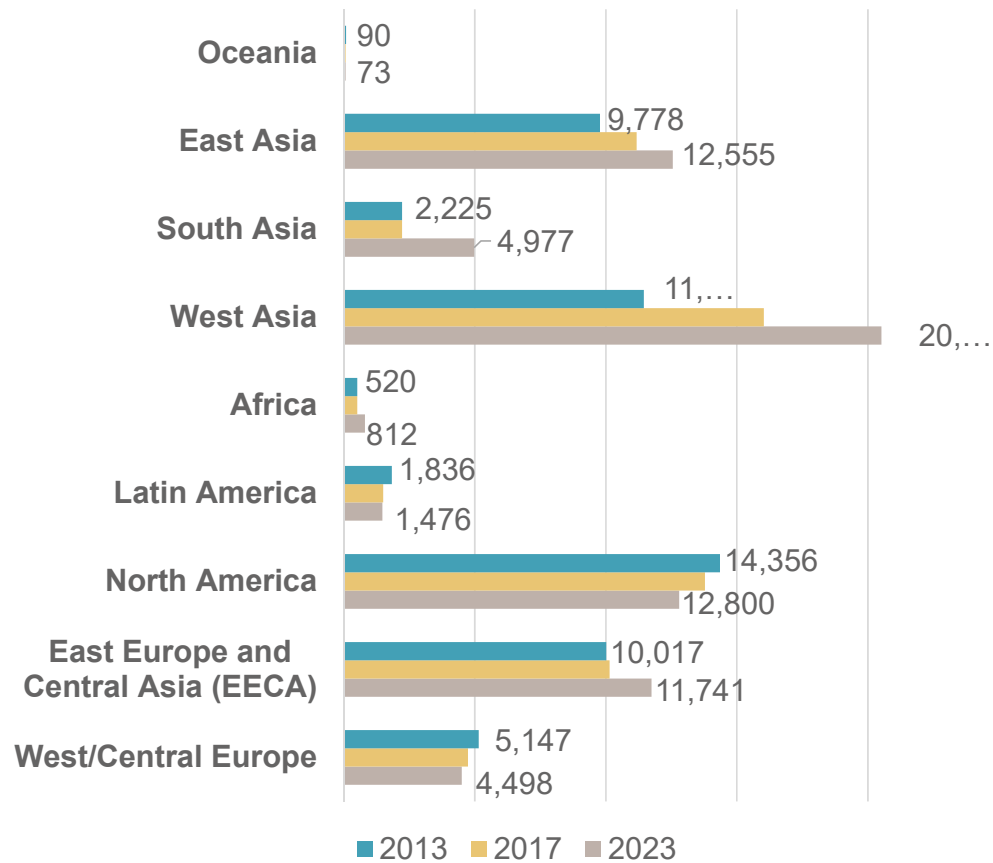
What Continues to Drive Supply Changes

- Development of refinery and natural gas processing capacity, particularly throughout Asia.
 - Lower sulphur content in refined products.
 - Lower sulphur dioxide emissions.
- Declining production from natural gas, notable in North America and Europe.
- Pricing continuing to influence if product moves to market or to inventory.
- Government influence and geopolitical issues.
- Regulation – IMO 2020.

Global Supply

2013 – 55m t
 2017 – 60m t
 2023 – 69m t

Sulphur Supply by Region - '000 metric tonnes



Region	Supply Changes
Oceania	No notable changes
East Asia	Growth in China, southeast Asia
South Asia	India key to watch – 3m t growth by 2023
West Asia	Most significant growth in supply
Africa	Developing countries add capacity – Nigeria
Latin America	Brazil, Mexico, Venezuela outlook poor
North America	Decline from gas offsetting refinery/upgrading
EECA	Ongoing growth from gas and Nornickel
Europe	IMO 2020, Gas Decline

What Continues to Drive Demand Changes

- Global shipments of global finished phosphate products increased 1.5% /yr 2010-15, but firmed to 2% /yr since.
- An evolving phosphate market... Sulphur demand is growing overall, but where it is being consumed is the most notable shift.
 - US – Mosaic idles Plant City in December 2017. It produced 1.3m t of DAP/MAP in 2017...followed by Uncle Sam in 4Q19.
 - Morocco – 19m t of acid production in 2018 versus 12m t in 2013.
 - Saudi Arabia – Latest phase produced around 450kt of DAP in 2017, up to around 1.5m t against expectations of as high as 2.5m t.

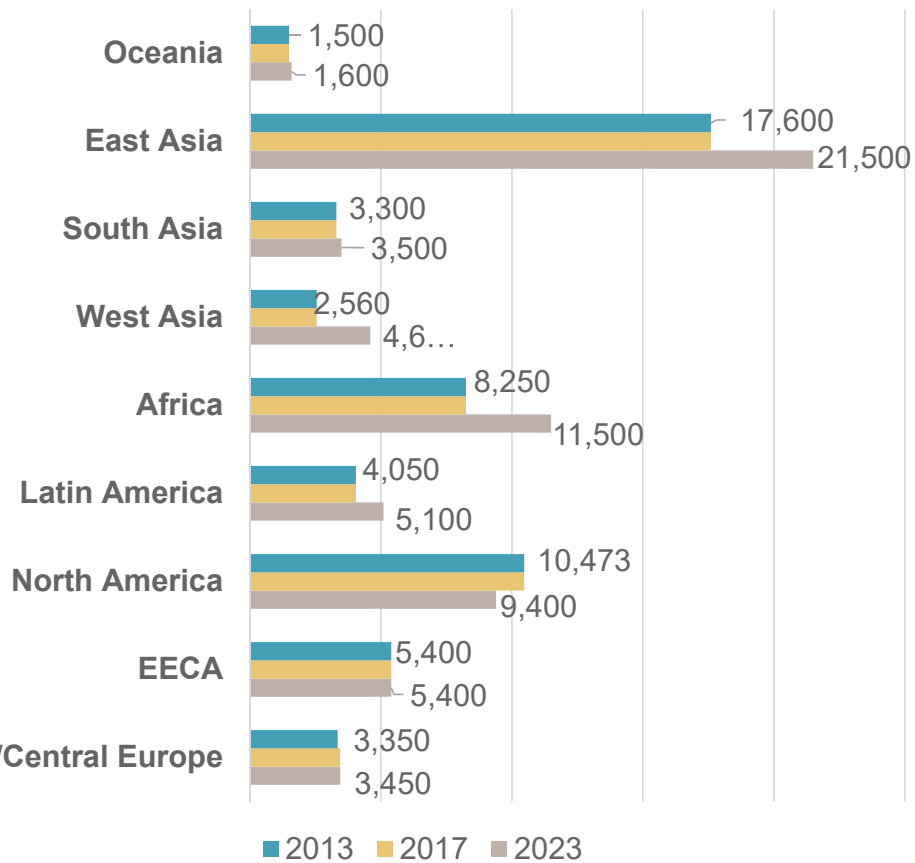
Global Demand

2013 – 56m t

2017 – 62m t

2023 – 66m t

Sulphur Demand by Region - '000 metric tonnes



Region	Demand Changes
Oceania	EV could fuel demand
East Asia	Potential fluctuation in China
South Asia	Stable to firmer on agricultural development
West Asia	Continued growth at Ma'aden
Africa	Continued growth at OCP
Latin America	Phosphate production growth
North America	Decline on phosphate rationalisation
EECA	Will hinge on phosphate landscape
Europe	Competition in downstream applications

Seaborne Trade

- While global production was around 62m t in 2018, actual seaborne trade is estimated at 35m t/yr.
- Major seaborne exports from:
 - UAE
 - Canada
 - Saudi Arabia
 - Russia
 - Kazakhstan
 - US
- Major seaborne exports to:
 - China
 - Morocco
 - Brazil
 - India
 - US



Drivers and Restraints

2019 4Q

↑ Drivers

- P₂O₅ needs supported by plantings in Americas, China
- US Beaumont priller still down and lower output ex-Canada/FSU

↓ Restraints

- Blocking unlikely across Canada, Middle East and Iran
- Freight ex-AG may still be high, putting pressure on AG FOB

2020 1Q

↑ Drivers

- NCIC in Egypt, Katanga in DRC should ramp up, consume more
- Yara's will have new requirement in Brazil

↓ Restraints

- Al Zour refinery in Kuwait should come online
- Jazan refinery in Saudi Arabia should already be online

2020

↑ Drivers

- Increase in fertilizer production capacity supports demand
- Some expect Europe production to decline

↓ Restraints

- Production to rise in India on new fuel standards
- Prilling projects in Canada continue to be pursued



Key to Watch 2020+

- Phosphate market – outlook is bearish
- Impact of IMO 2020 on sulphur production
- Start up of expected new refining capacity
- Changes in inventory strategy in low-price environment
- Morocco's firm consumption, supply dependency on Middle East/FSU
- Mosaic's strategy for buying for US/Brazil
- Less acceptance of crushed lump/bulk product
- Restart of Ravensthorpe in Australia – historically supplied ex-Qatar, up to 500k t/yr S demand





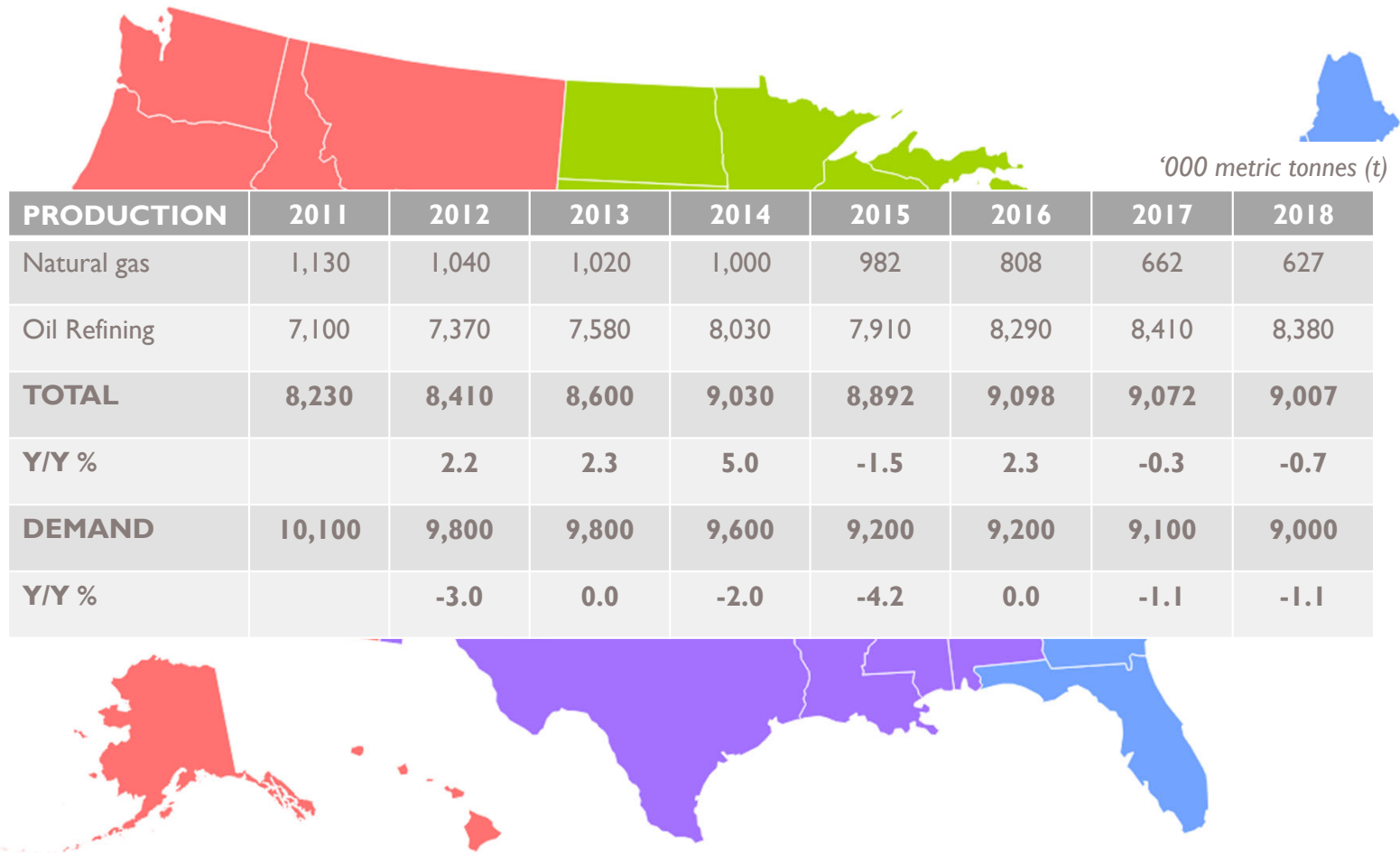
Sulphur - US



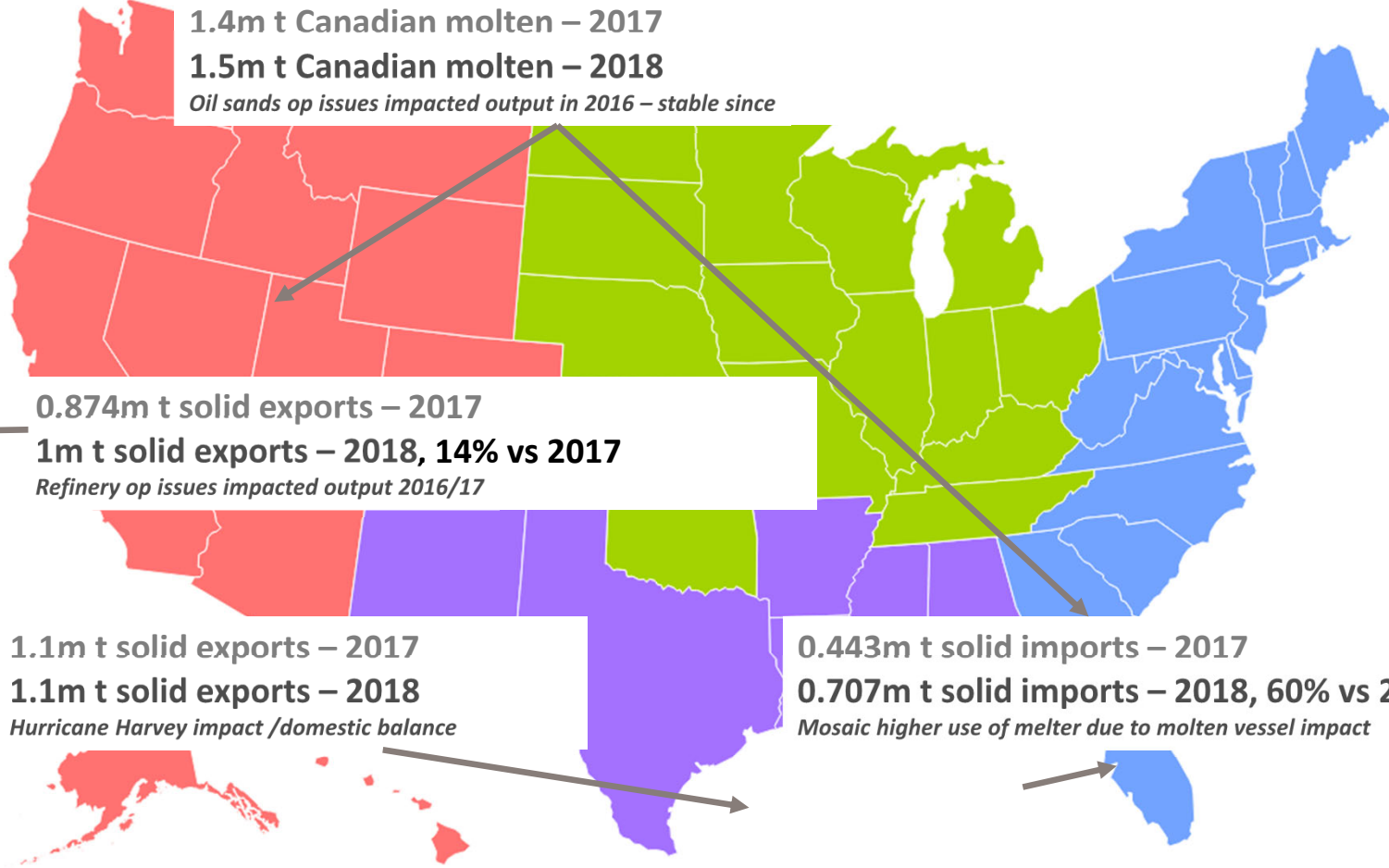
Key 2018-19 Events

- Refinery operational issues still lingering
- Crude slate is a reducing heavy crude options and therefore less sulphur being produced
- Lost Cabin fire in December 2018 – created rail shortage for Mosaic, resolved with Beaumont outage
- Domestic demand firm, particularly due to sul acid market conditions
- Mexico's production remains constrained – more pull from USGC – new transload capacity
- Mosaic buying strategy
- China tariffs
- Beaumont ship loader to be down until February 2020 – molten trending long in Texas but constrained by only truck capacity (similar to California)
- HJ Baker's acquisition of Oxbow – overlap in California
- Mosaic idles Uncle Sam in 4Q

Annual Sulphur Production/Demand

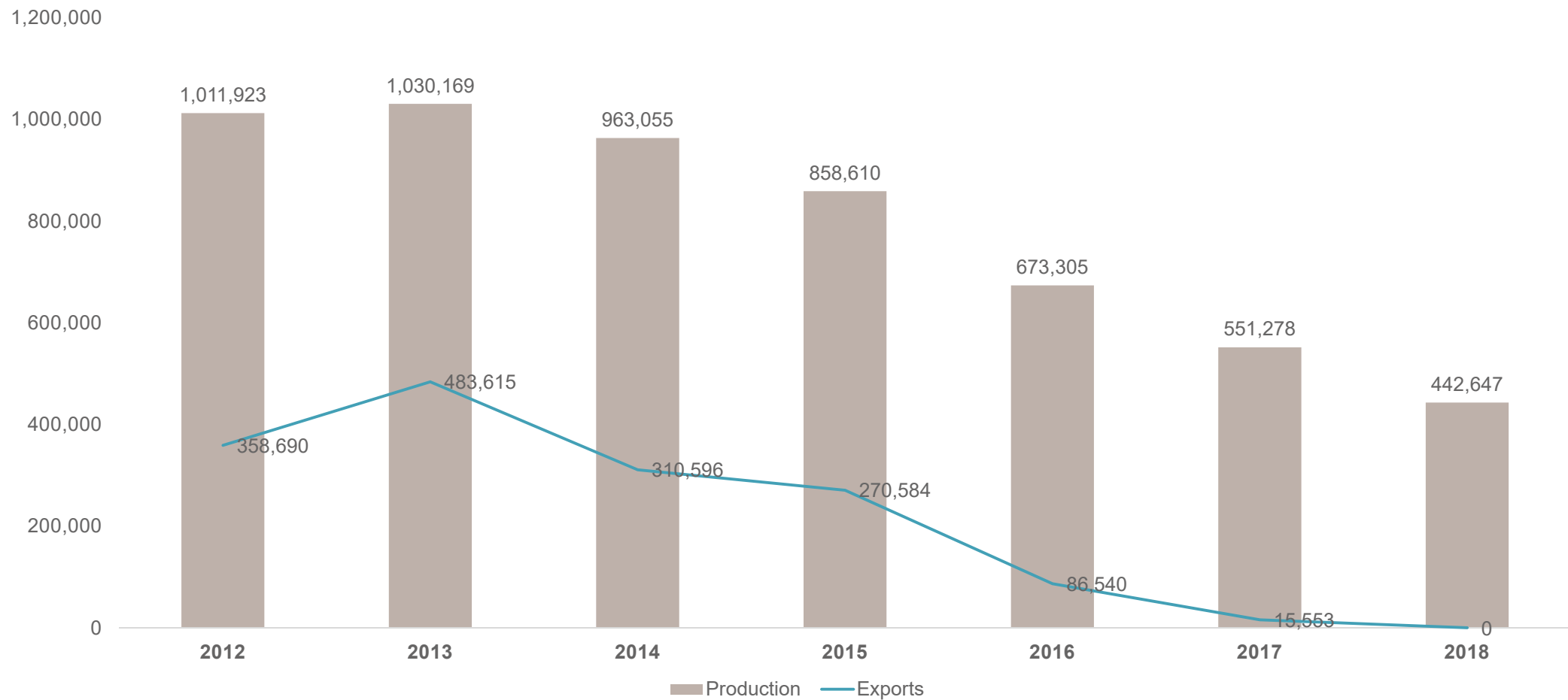


2017-18 Trade

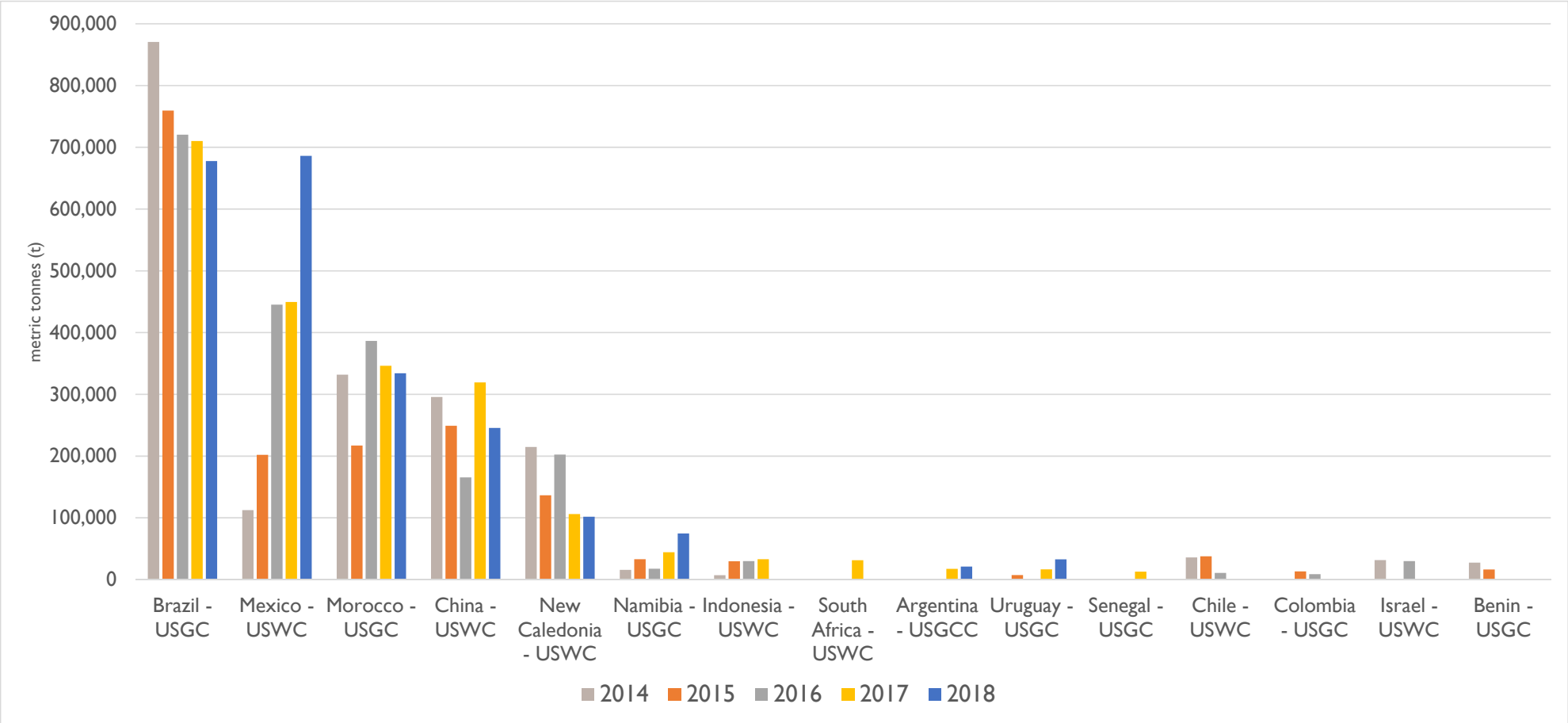


Molten Supply from Mexico Declines

Mexico: Output and exports decline



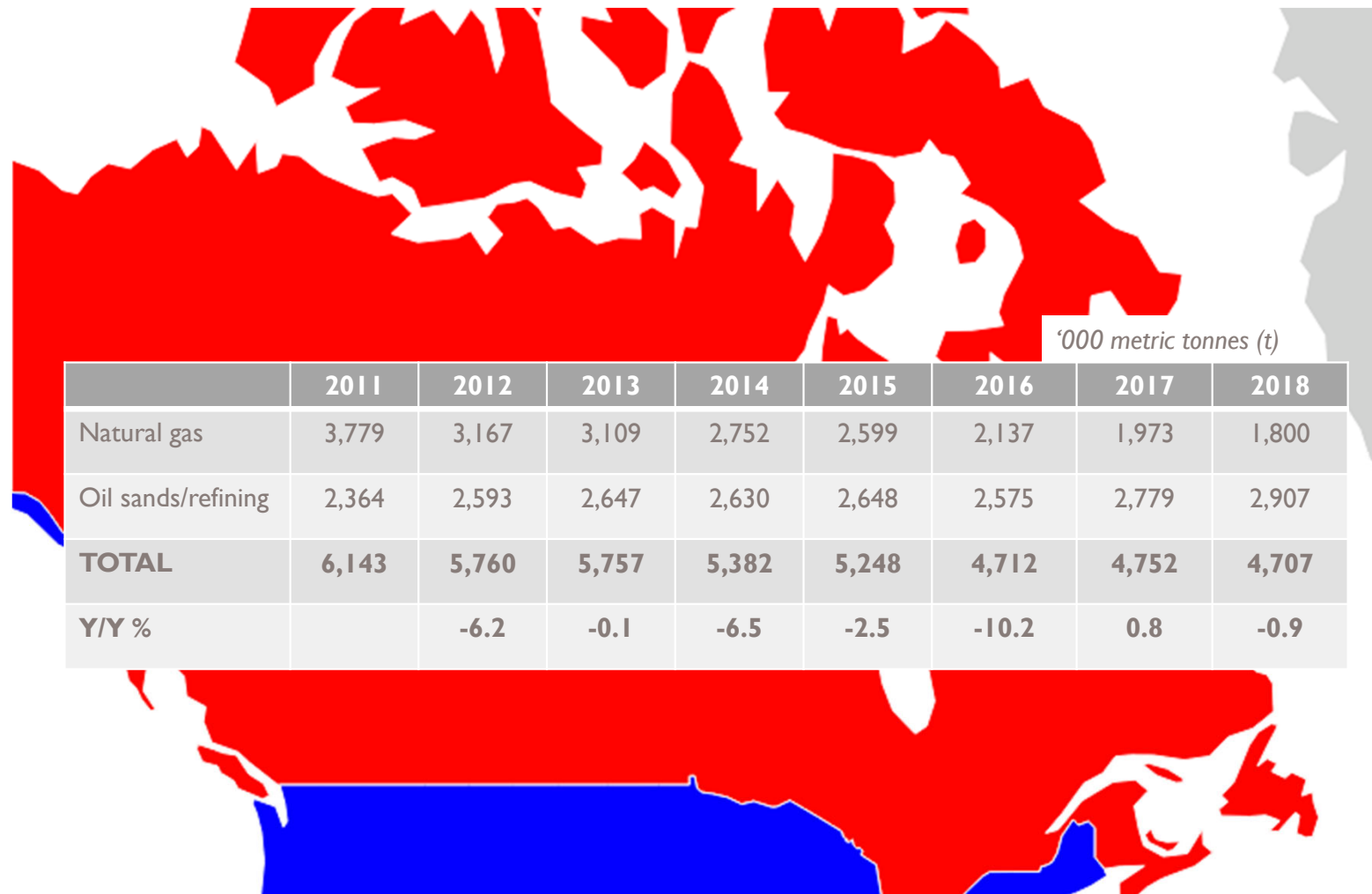
US Exports by Country



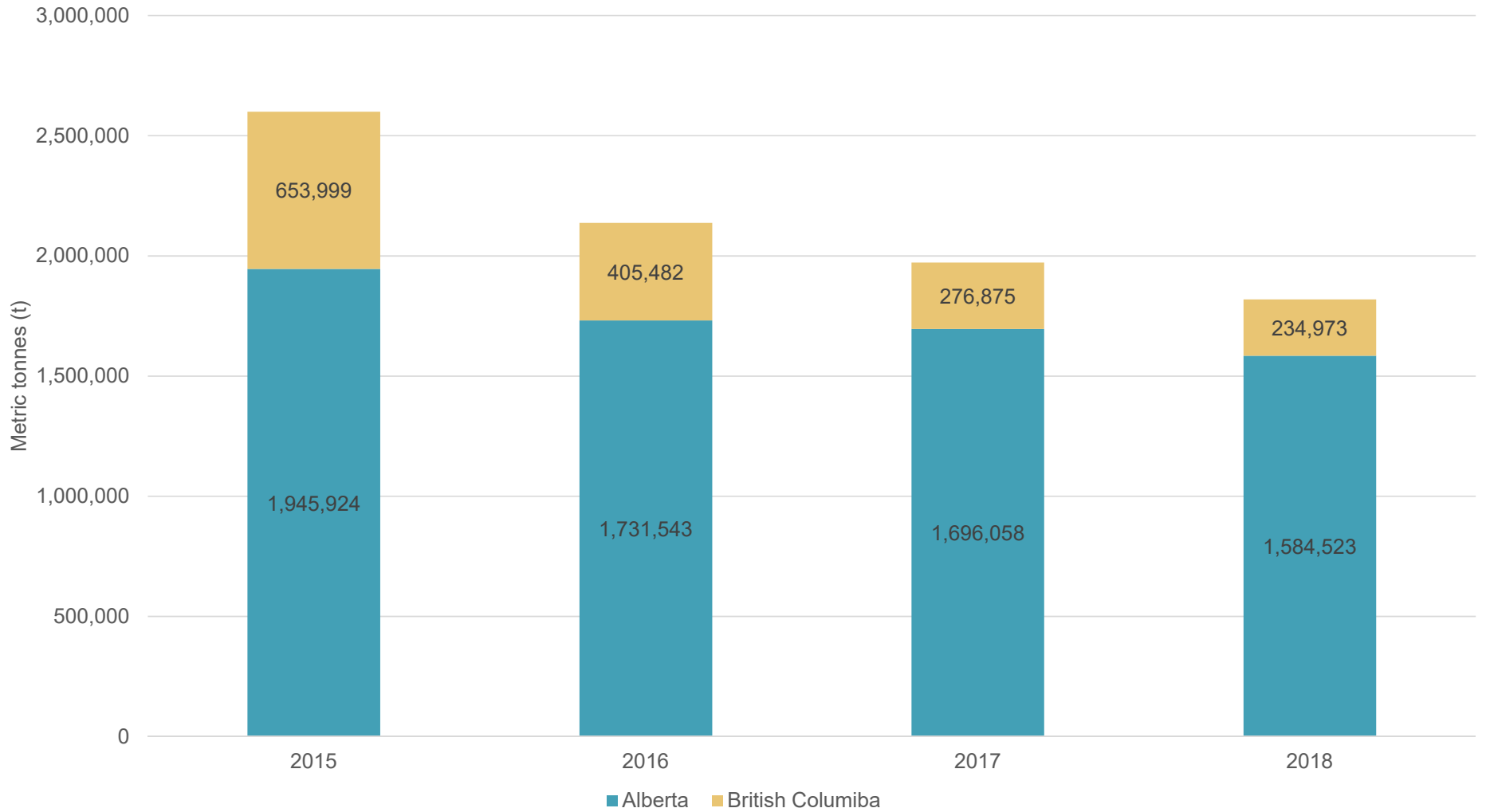
Sulphur - Canada



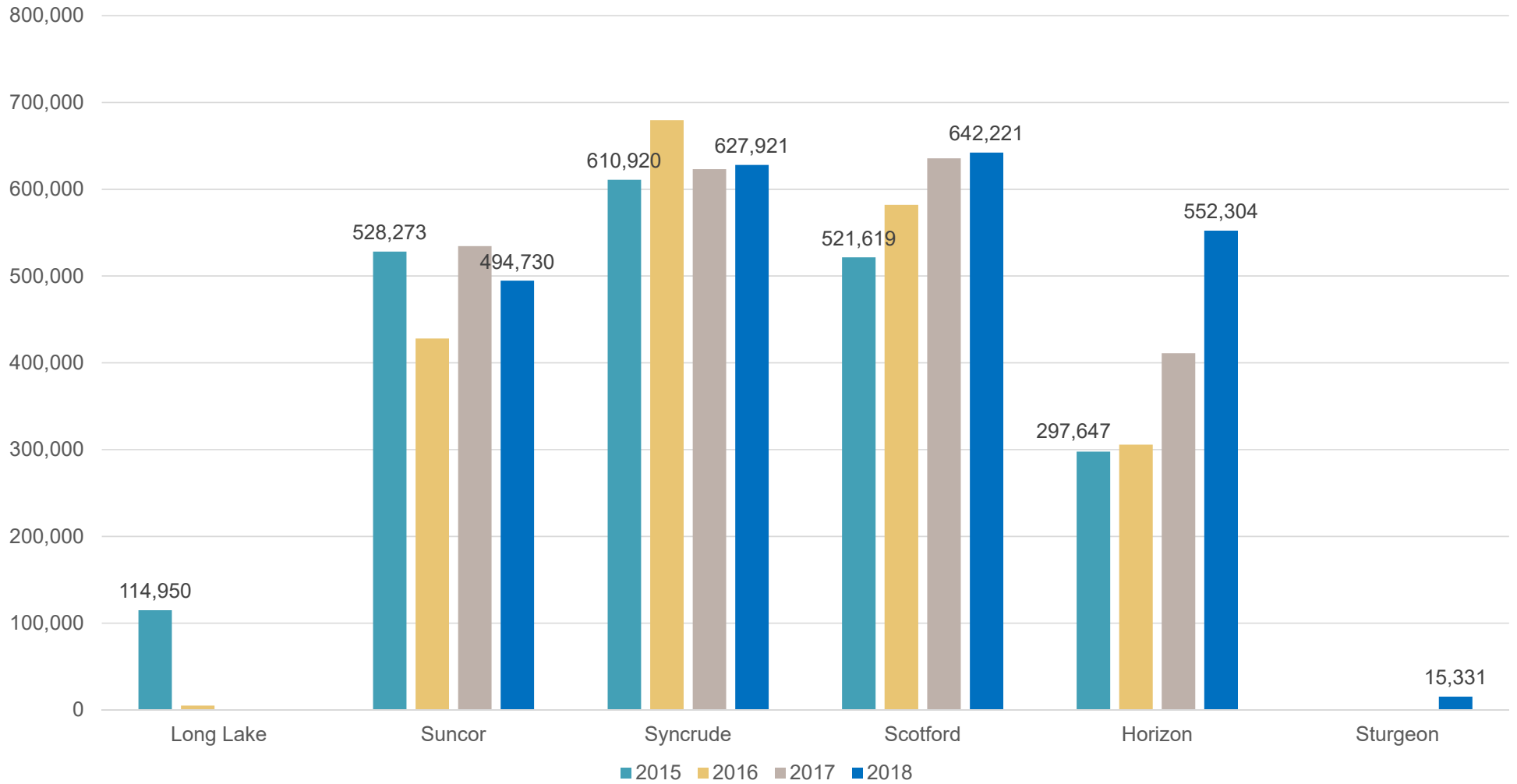
Annual Sulphur Production



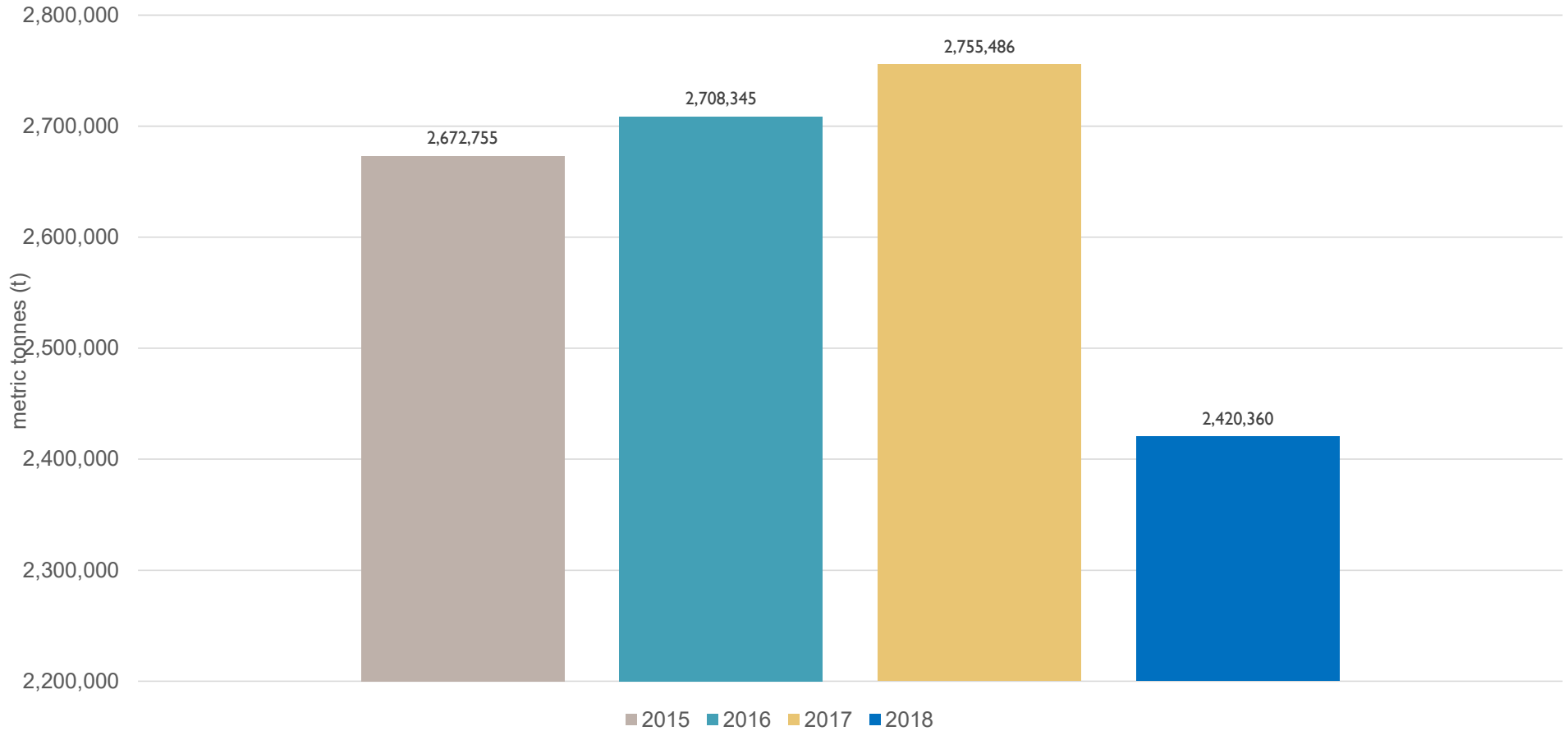
Total Production from Natural Gas Processing



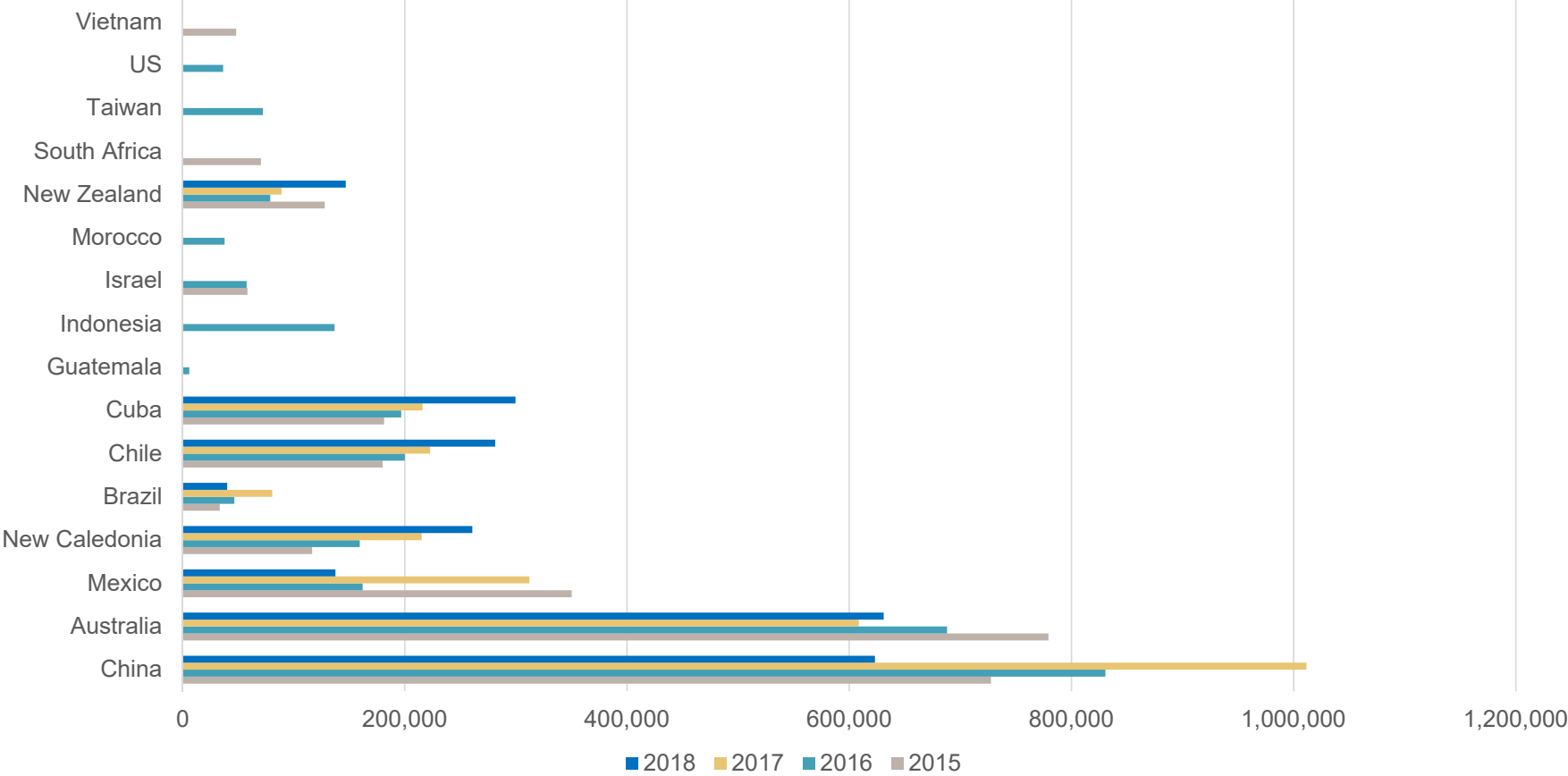
Total Production from Oil Sands Upgrading



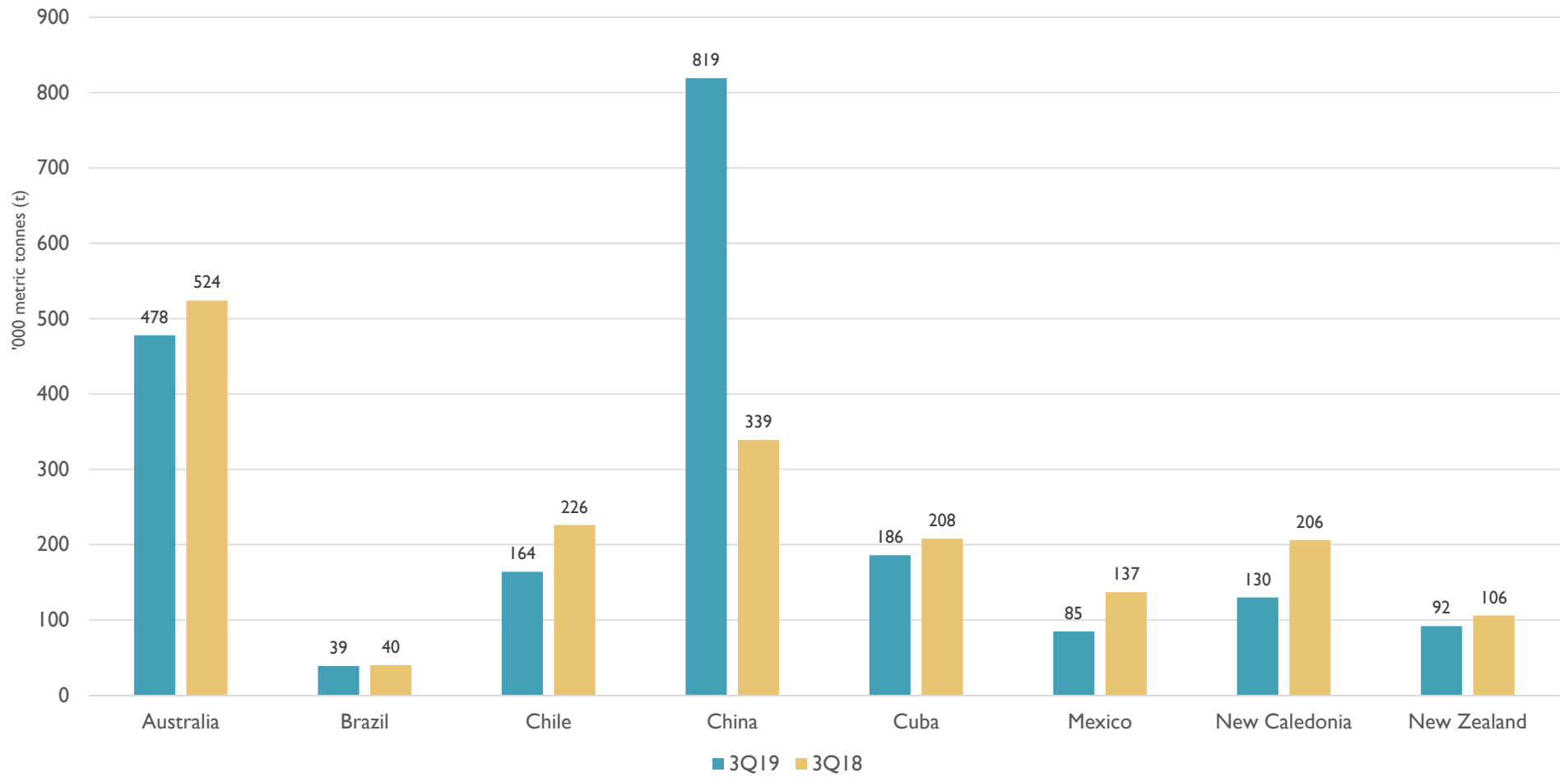
Vancouver Exports



Vancouver Exports



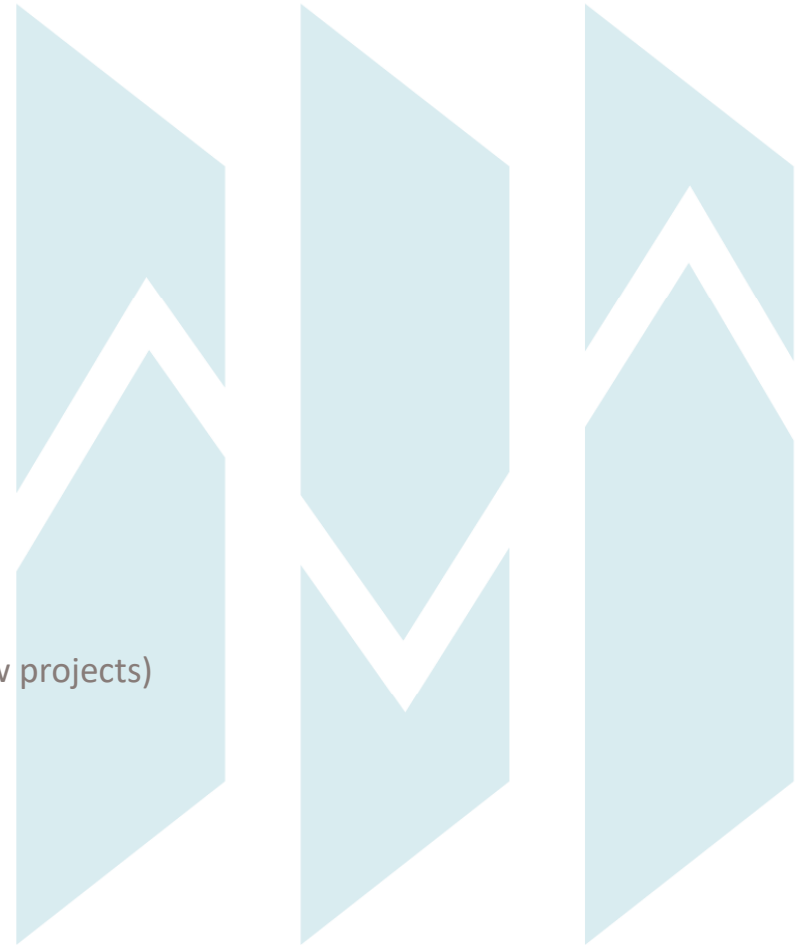
Vancouver Exports as of end 3Q19 vs 3Q18





Key to Watch 2020+

- Any change in pouring to block strategy?
- Forming projects
- Consumption changes
 - Redwater ceases phosphate production
 - Nutrien's total buy down around 100kt
- Production changes
 - Natural gas
 - More remelt from Ram River in 2019 with new owner
 - Pine River change following CNRL acquisition?
 - Strachan – transitioned to sweet
 - Simonette – transition to gas injection (in line with Keyera's new projects)
 - Kaybob – to shift to K3, uplift from new projects
 - Caroline – transitioning to sweet feedstock? Shell sold.
 - Waterton closure – late 2020s or early 2030s. Shell sold.
 - Oil Sands/Refining
 - Impact of production curtailments limited
 - Sturegon ramp up
 - New Sinopec project



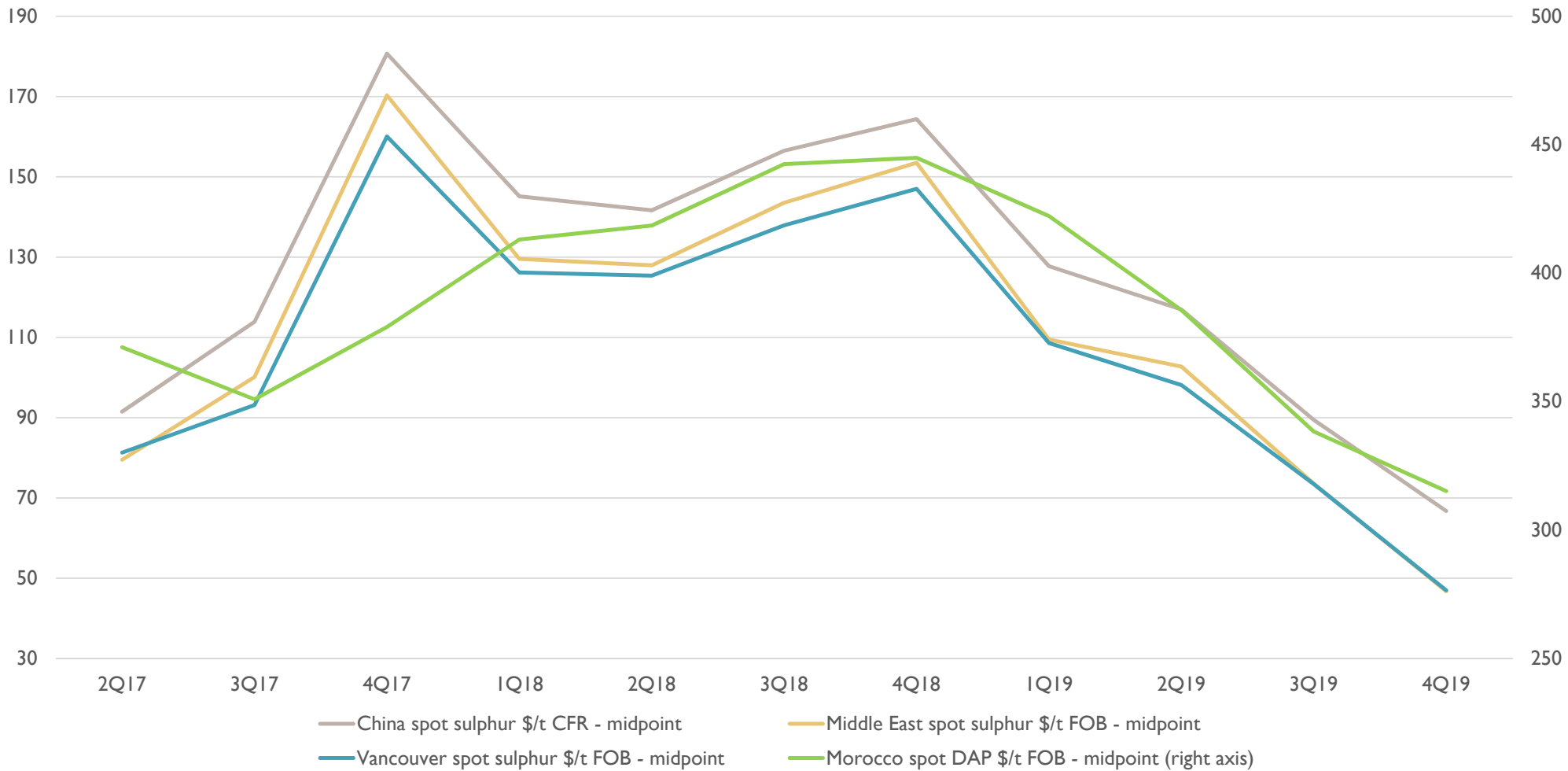


Price Trends

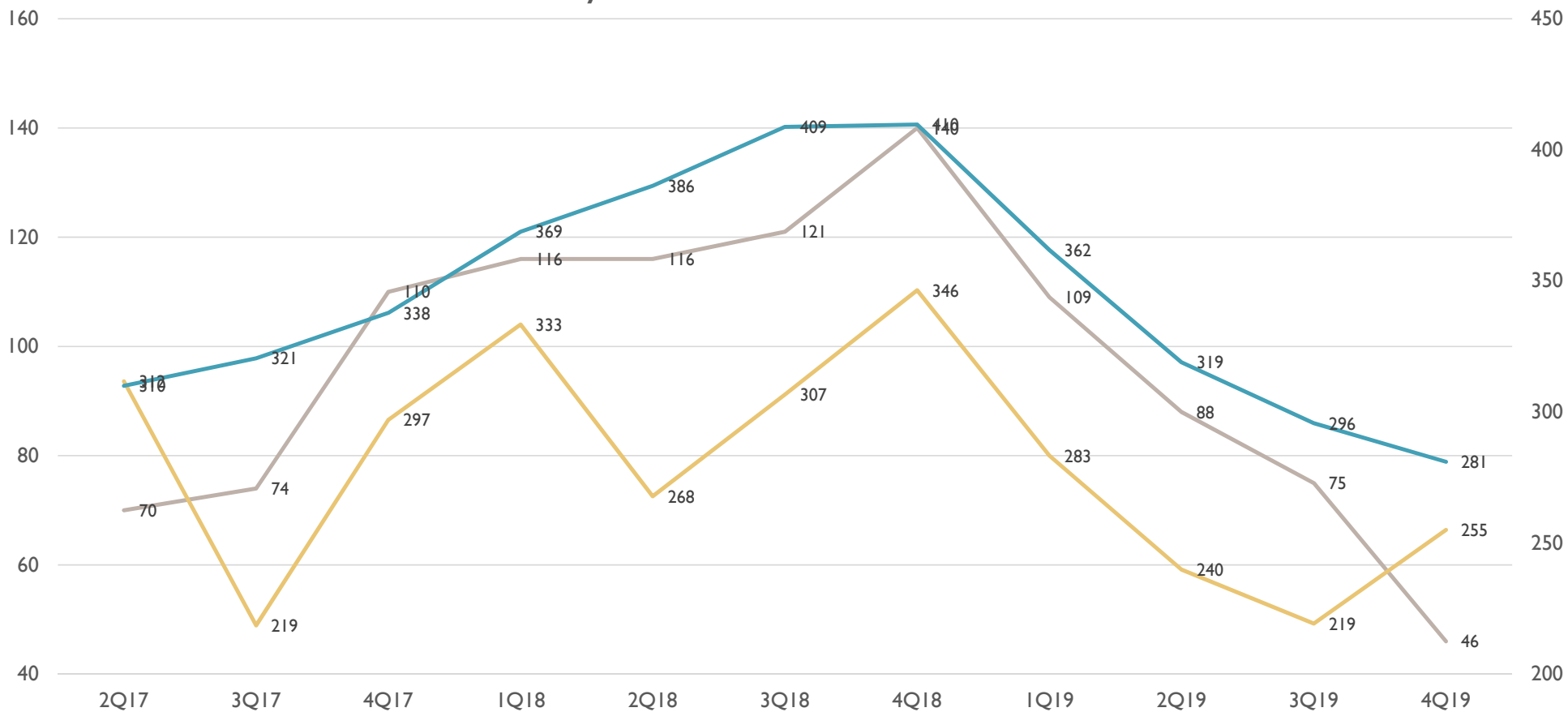


Independent Analysis You Can Trust

Global Benchmark Price Movement



Key US Benchmark Price Movement



— Tampa sulphur \$/lt DEL — Tampa ammonia \$/t CFR — DAP USGC barge \$/st FOB midpoint



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