

Chlor-Alkali & Derivatives Markets

PVC Committee Meeting at APIC 2013

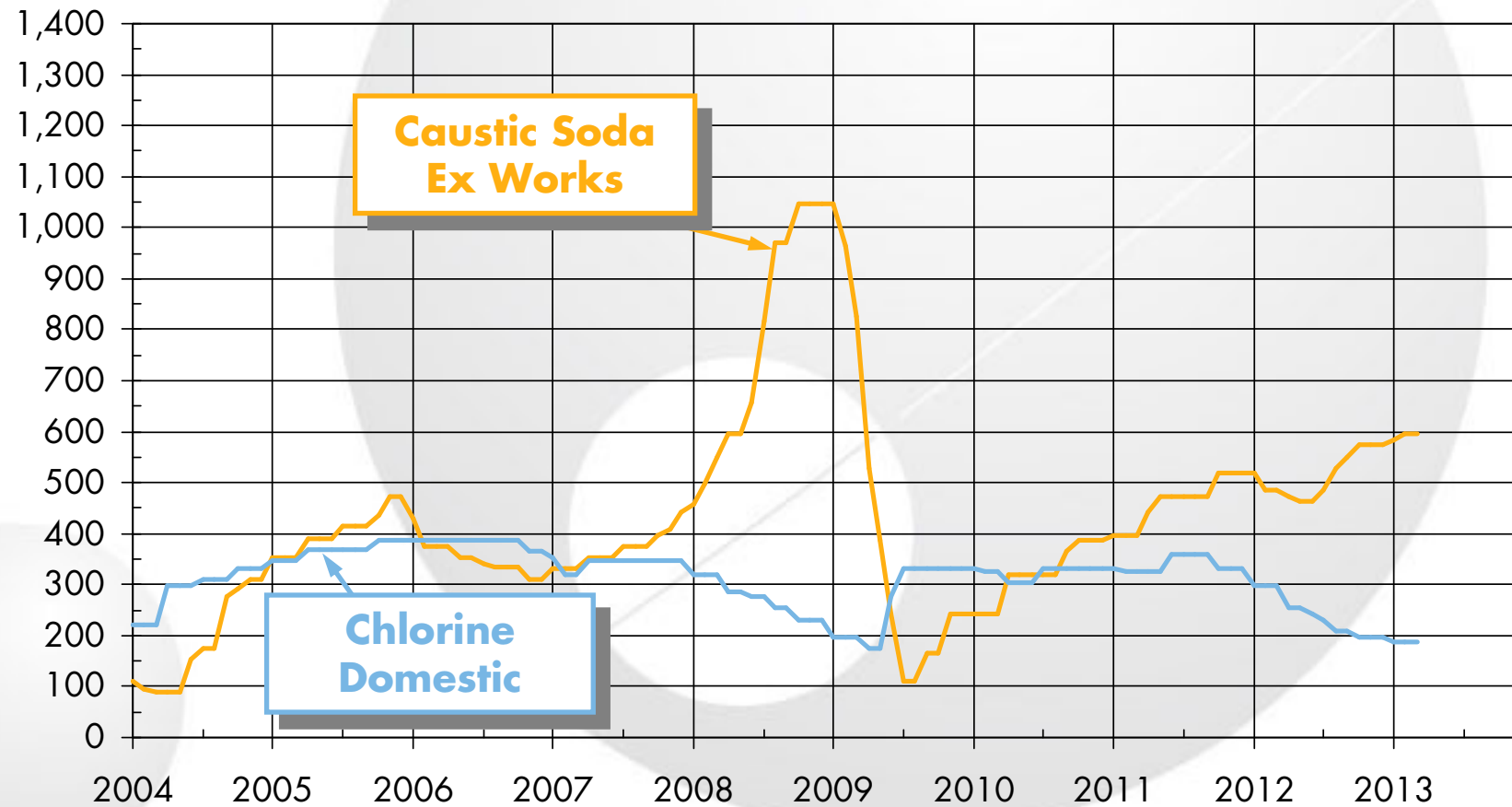
Taipei, 10 May 2013

Charles Fryer

APIC 2013

US GULF CAUSTIC SODA & CHLORINE PRICES

\$/Metric Ton

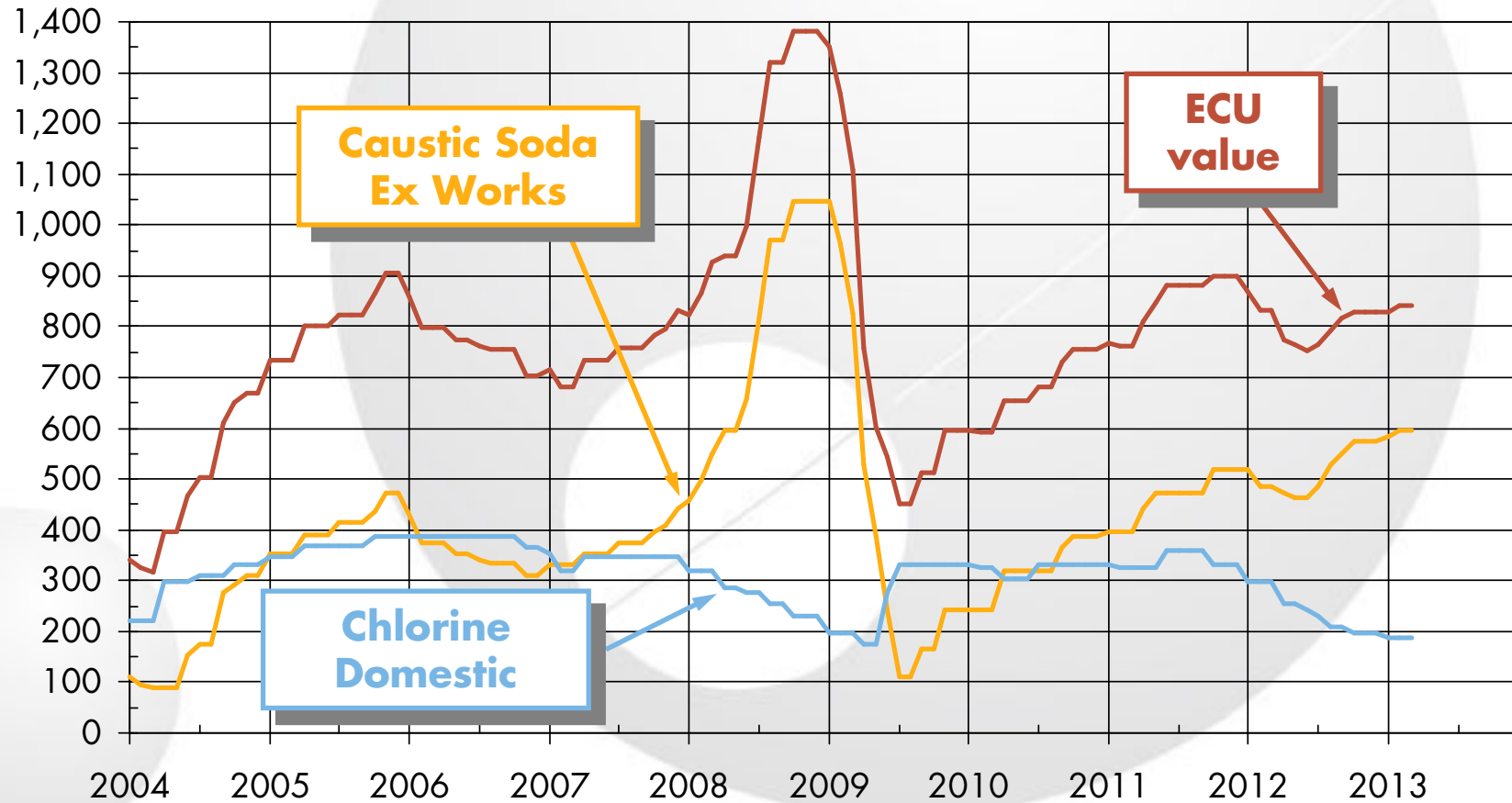


Source: Tecnon OrbiChem

APIC 2013

US GULF CAUSTIC SODA & CHLORINE PRICES

\$/Metric Ton

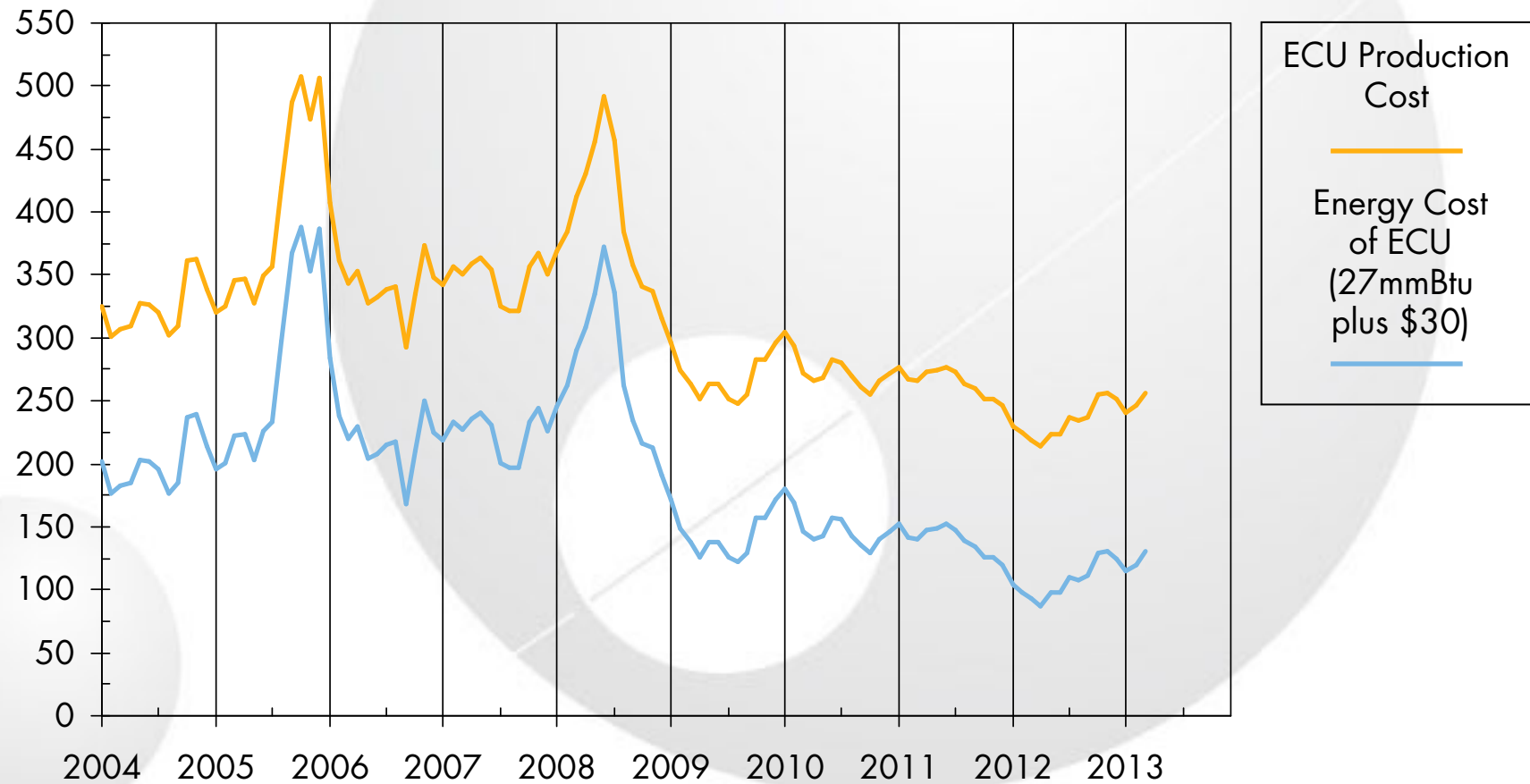


Source: Tecnon OrbiChem

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COST of ECU on the US GULF

\$/Metric Ton

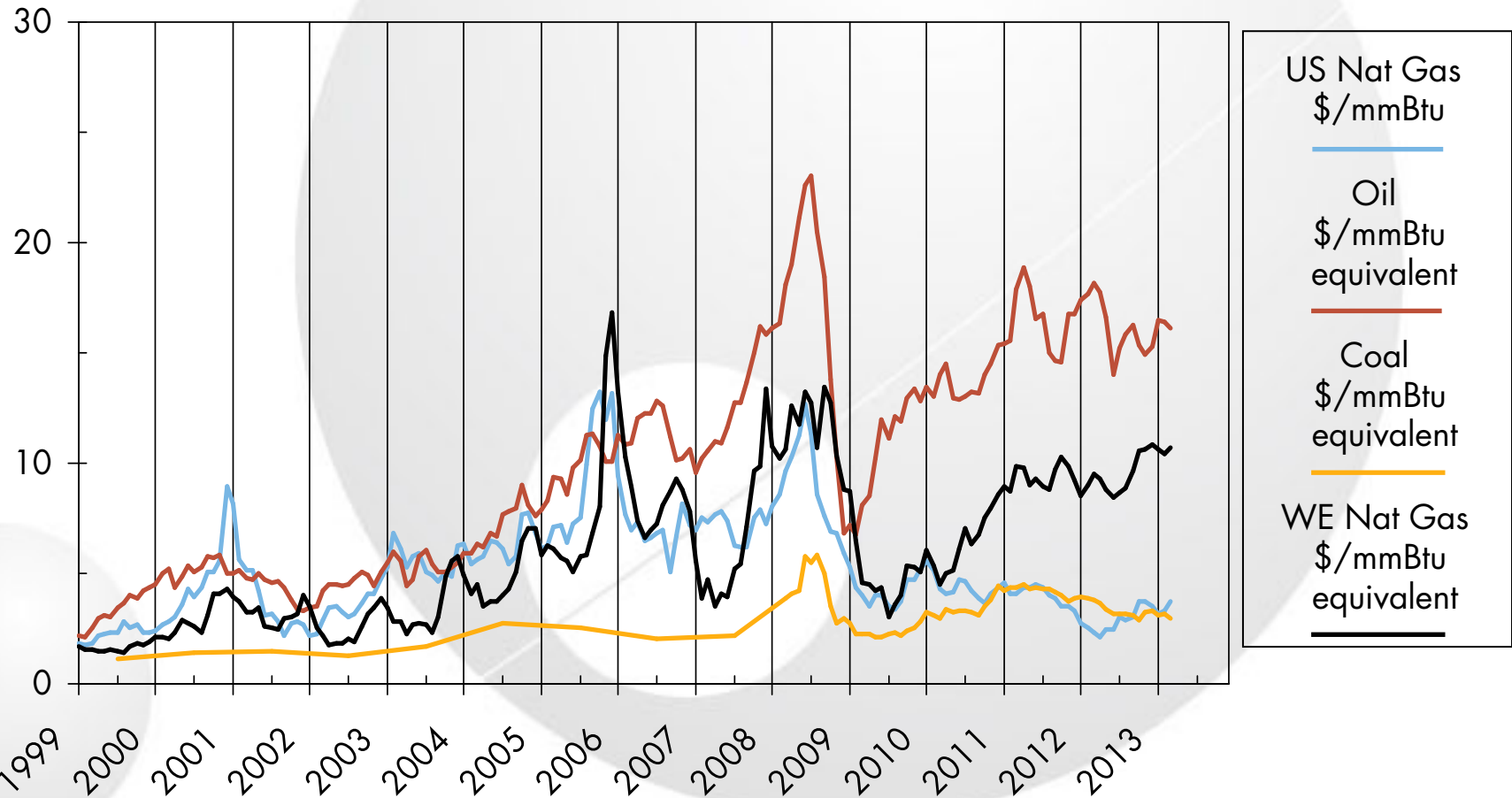


Source: Tecnon OrbiChem

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NATURAL GAS, CRUDE OIL & COAL PRICES

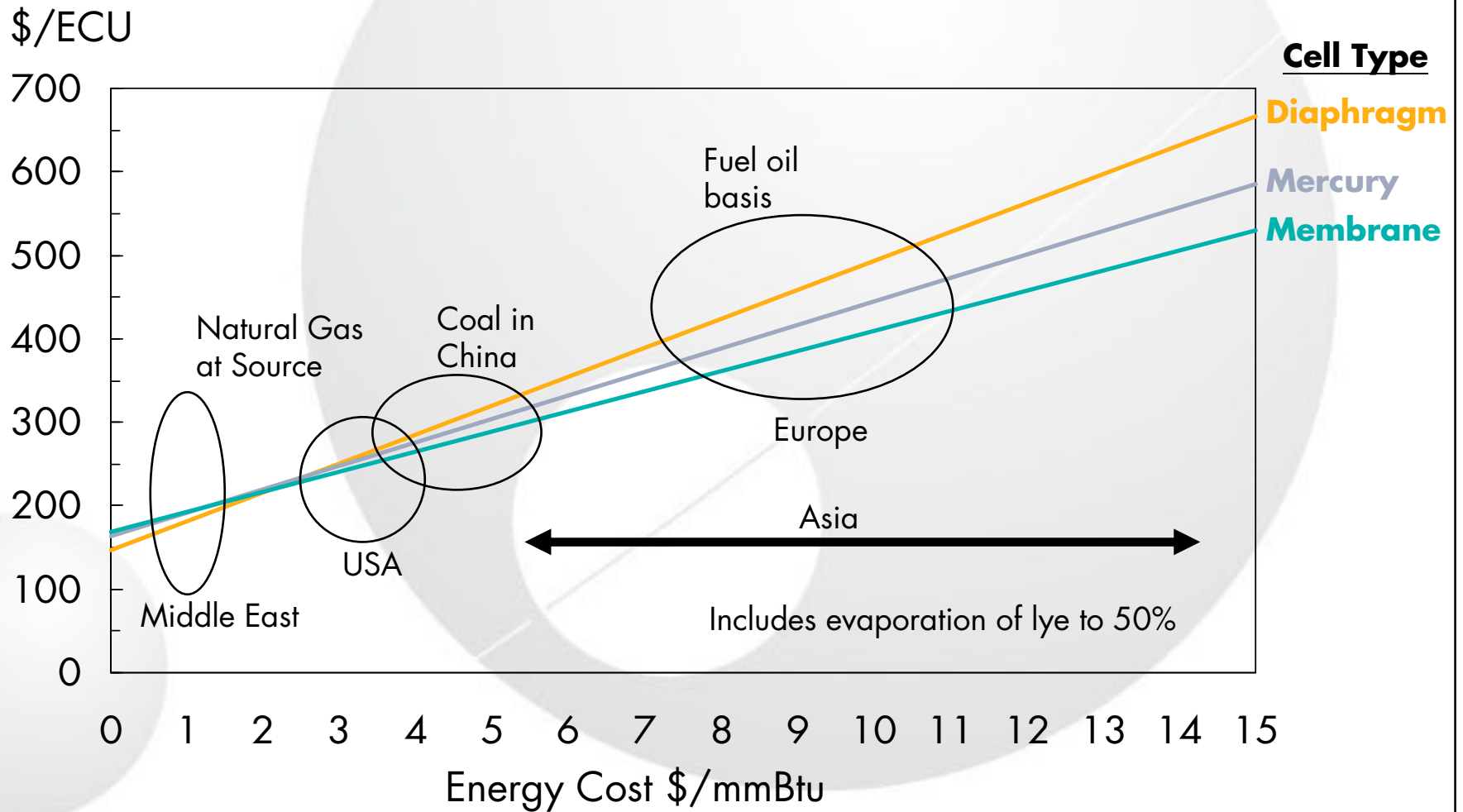
\$/mmBtu



Source: Tecnon OrbiChem

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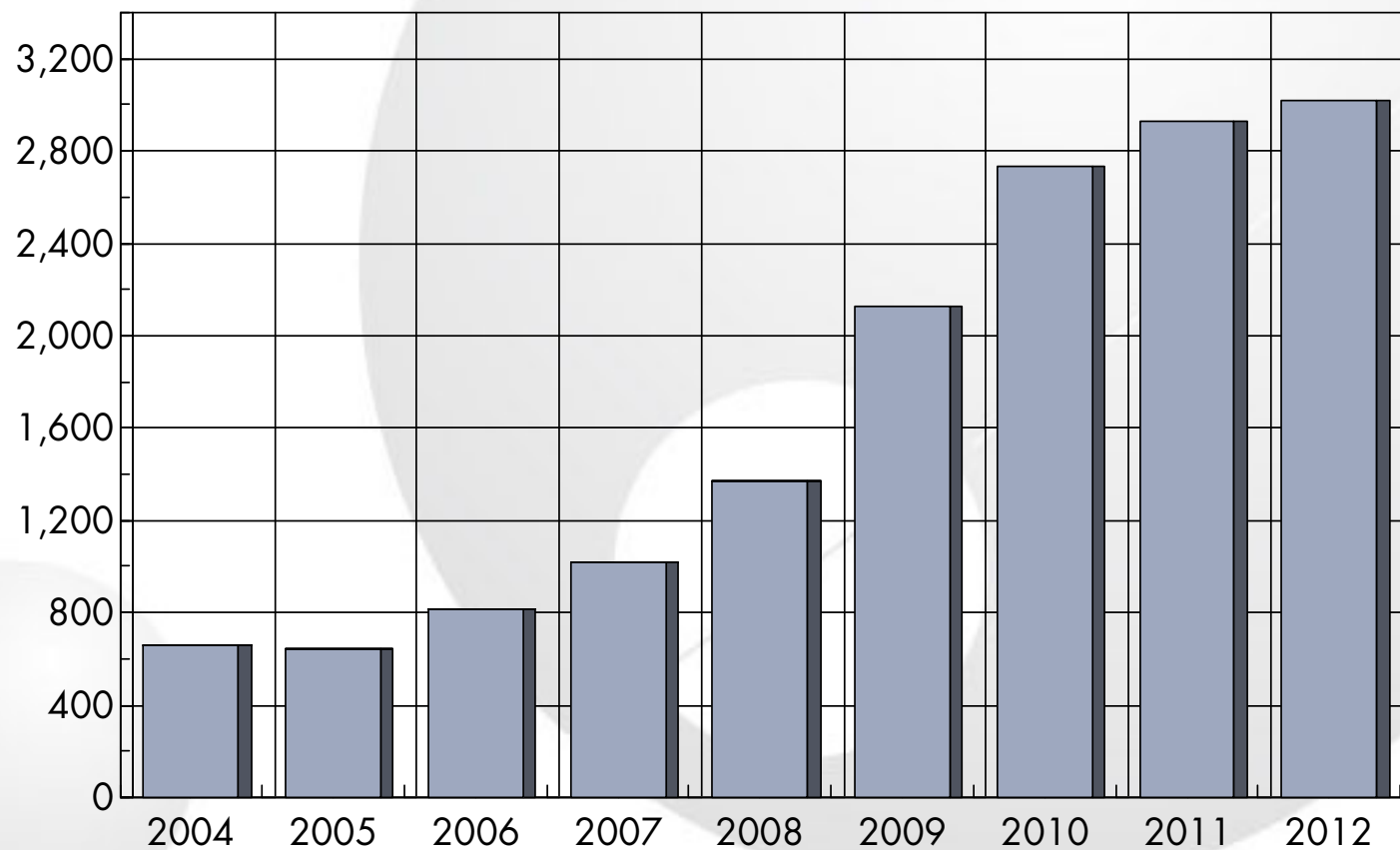
EFFECT OF ENERGY COST ON CASH COST OF PRODUCTION OF THE ECU (Metric)



Source: Tecnon OrbiChem

APIC 2013 US PVC EXPORTS

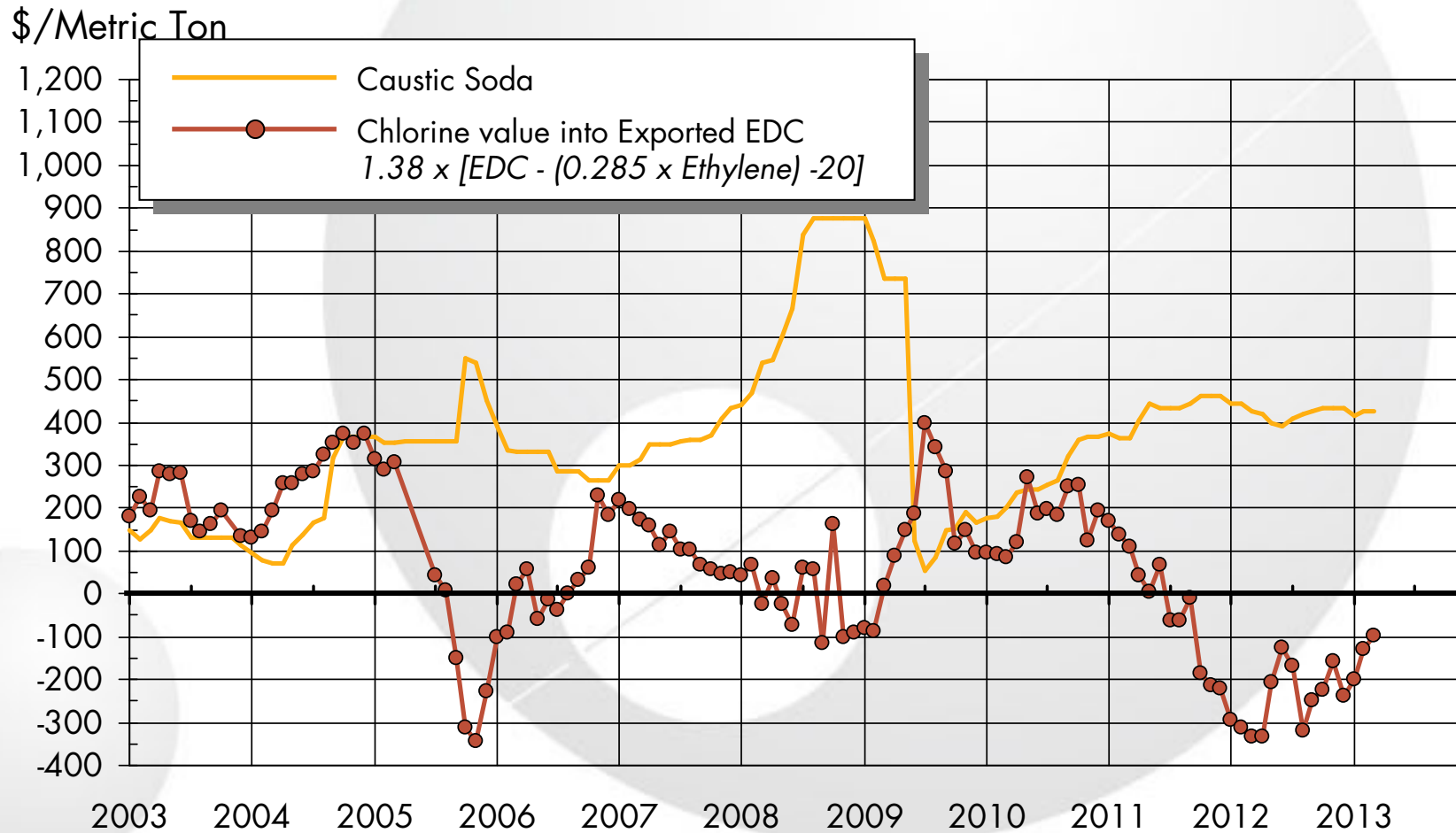
1,000 Metric Tons



Source: Tecnon OrbiChem

APIC 2013

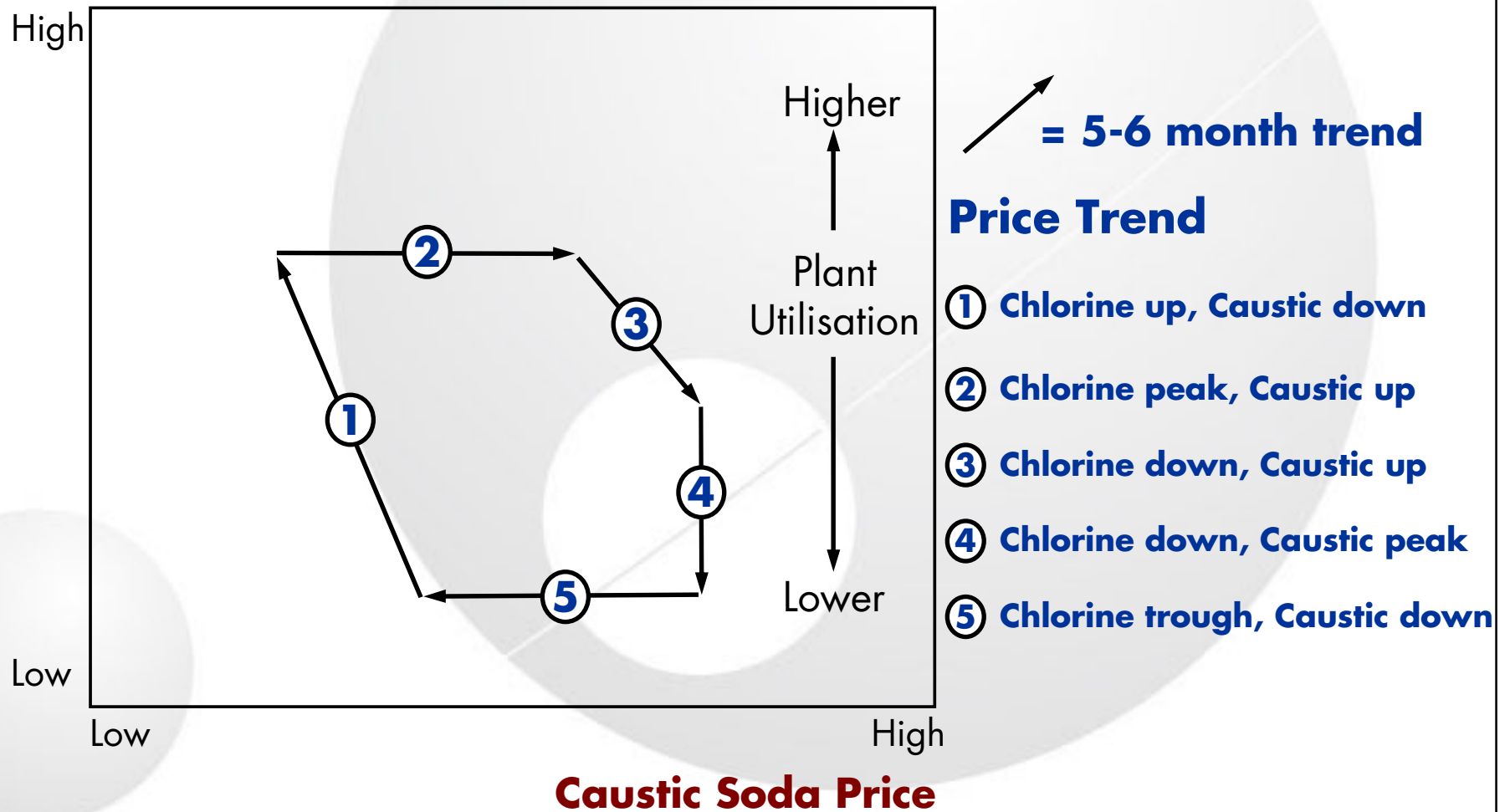
US GULF EXPORT CAUSTIC SODA & CHLORINE PRICES



Source: Tecnon OrbiChem

APIC 2013 CYCLES IN CHLOR-ALKALI BUSINESS

Chlorine Price

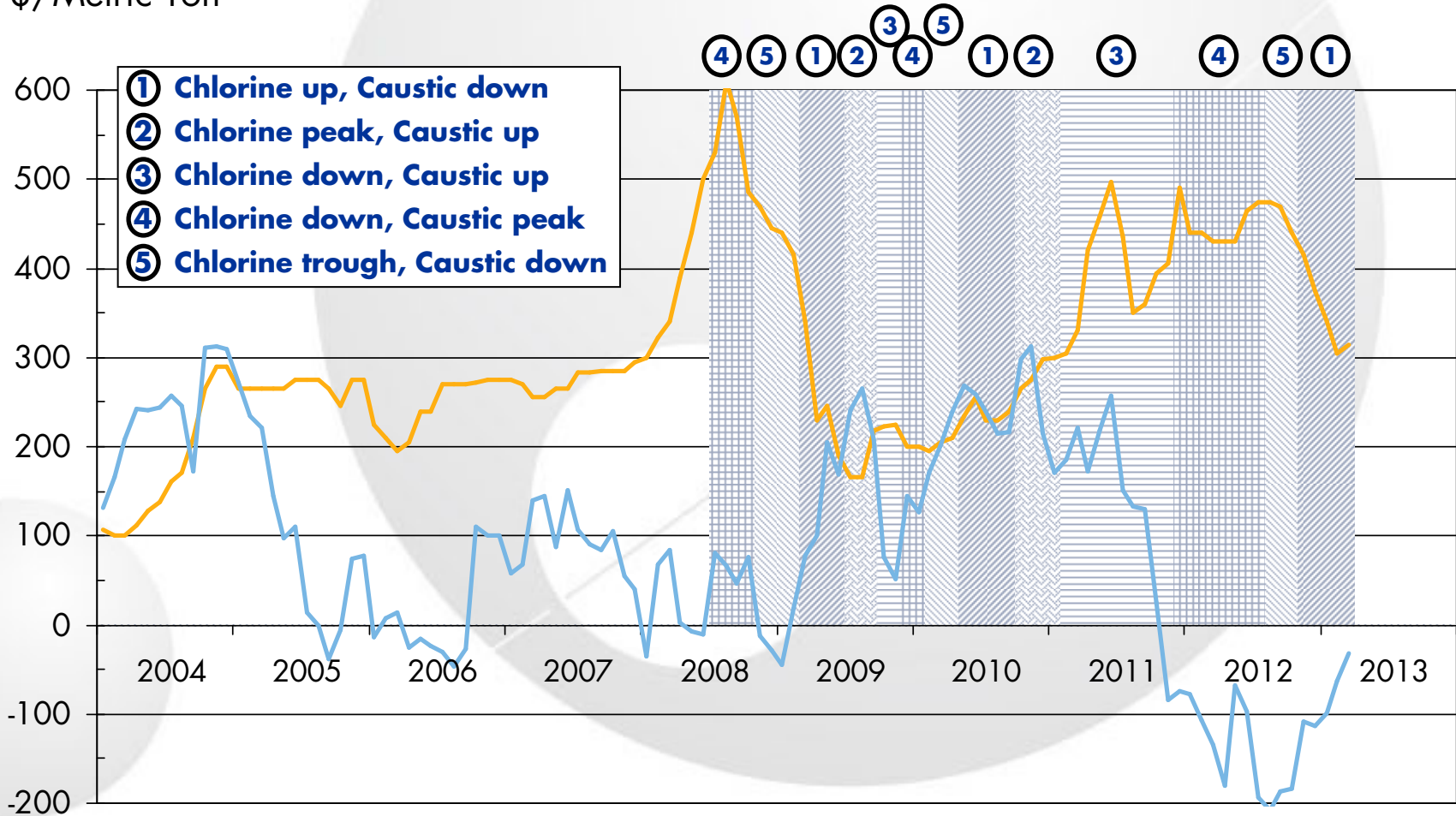


Source: Tecnon OrbiChem

APIC 2013 ASIAN CAUSTIC SODA & CHLORINE PRICES

— Caustic Soda Liquid Spot Export FOB Northeast Asia
— Chlorine value into Imported EDC
 $1.38 \times [EDC - (0.285 \times Ethylene) - 20]$

\$/Metric Ton

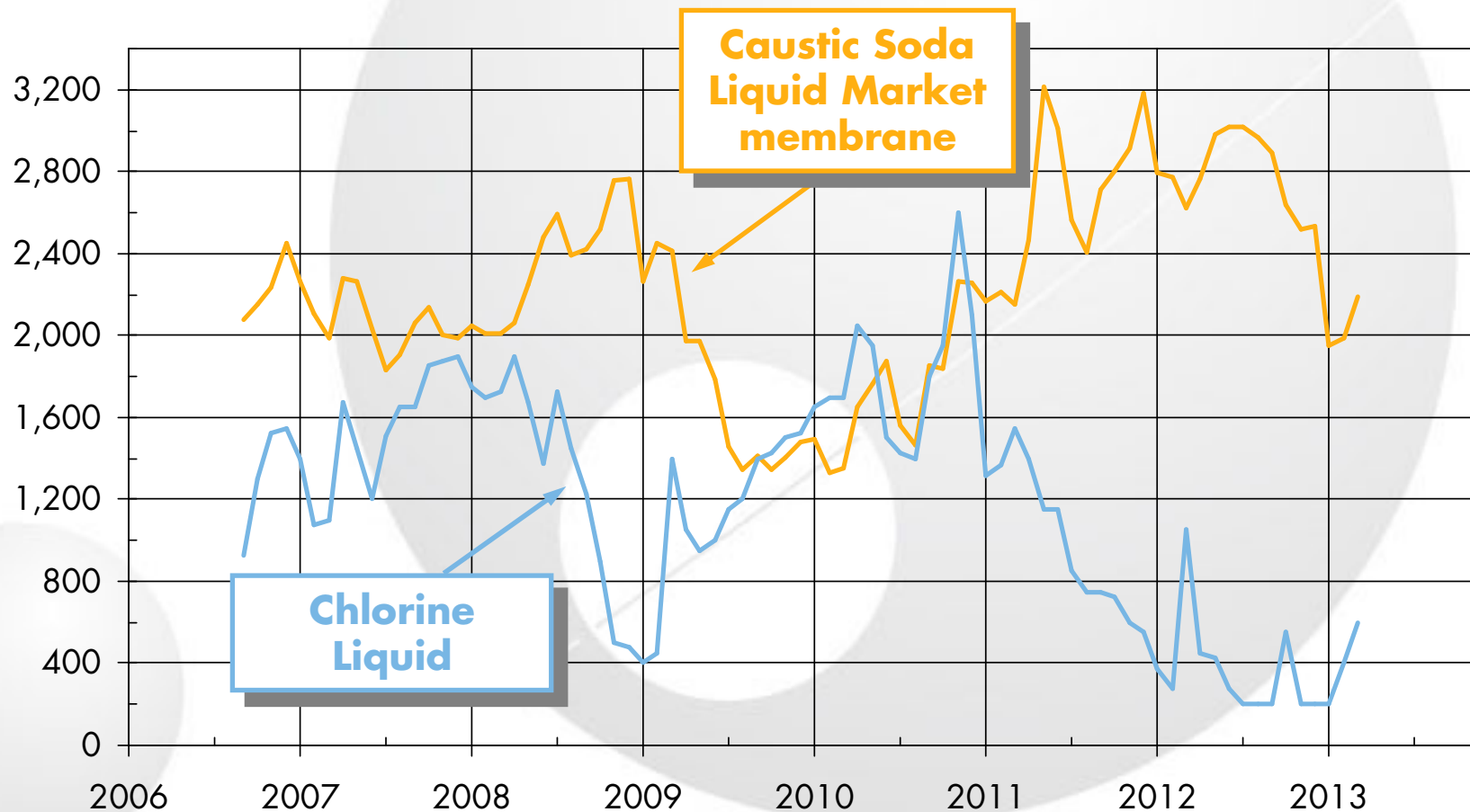


Source: Tecnon OrbiChem

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CHINESE CAUSTIC SODA & CHLORINE PRICES

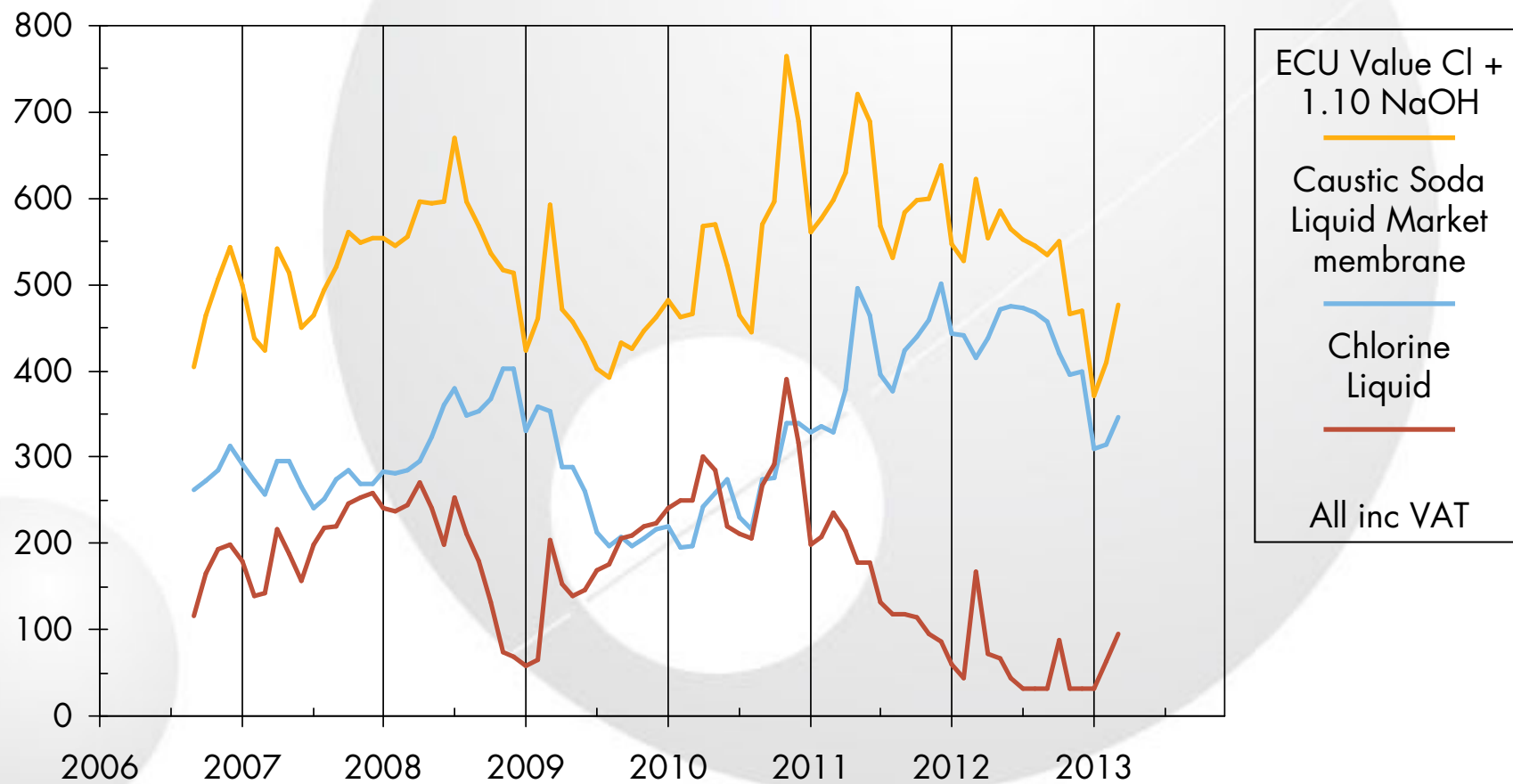
Rmb/Metric Ton (inc. VAT)



Source: Tecnon OrbiChem

APIC 2013 CHINESE VALUE OF ECU

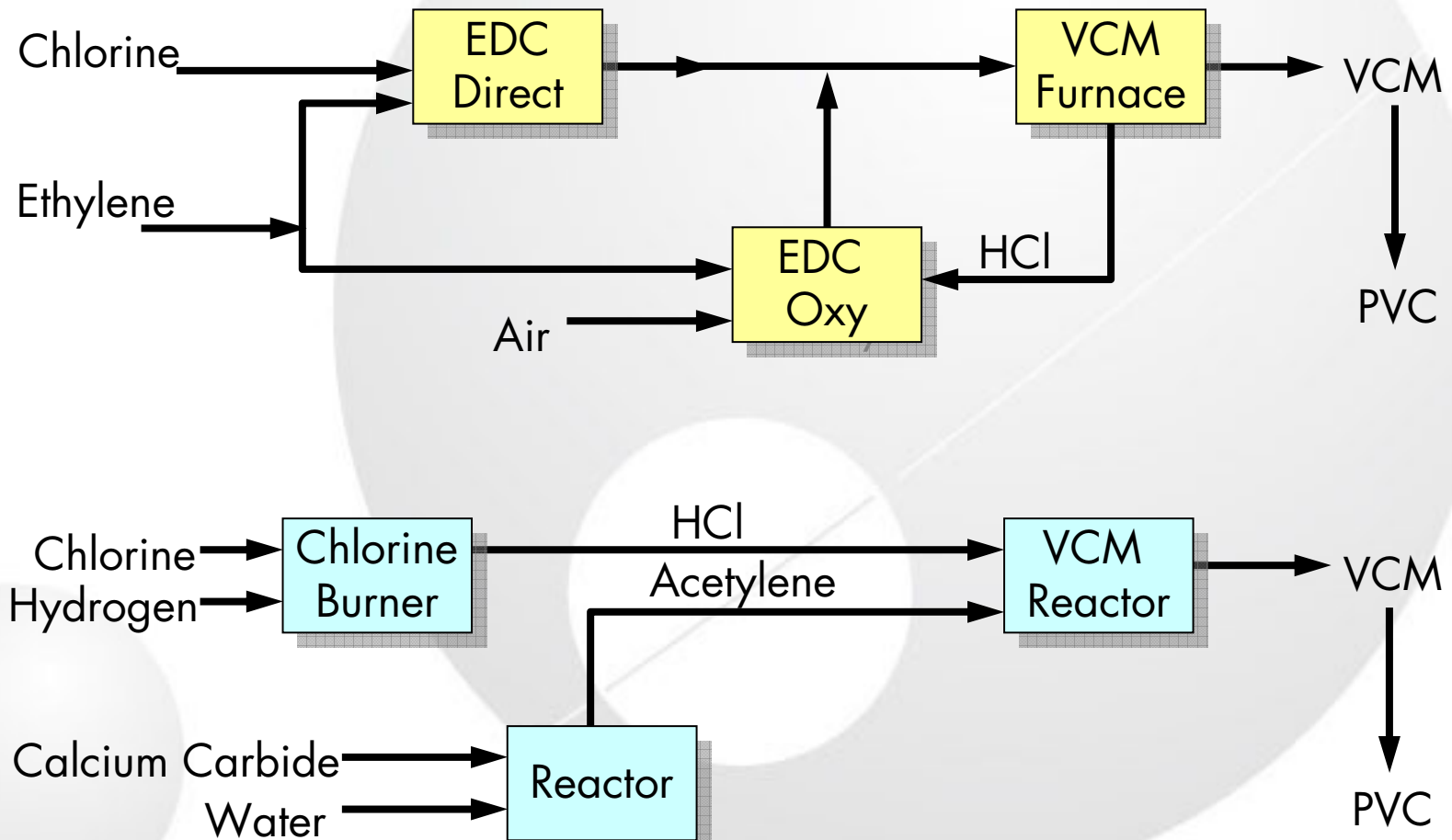
\$/Metric Ton/ECU



Source: Tecnon OrbiChem

APIC 2013

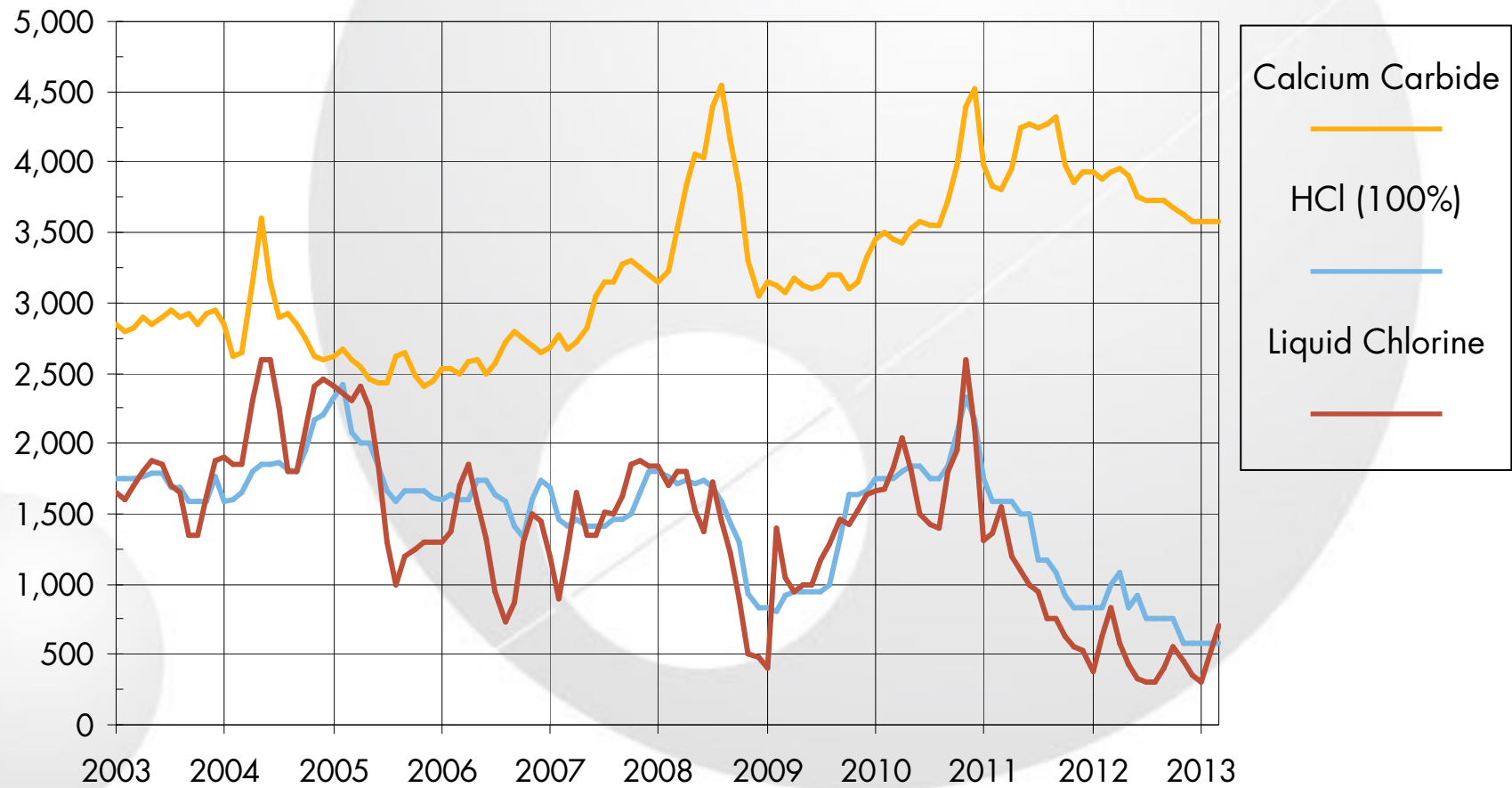
PRODUCTION ROUTES TO PVC



Source: Tecnon OrbiChem

APIC 2013 EAST CHINA RAW MATERIAL PRICES

Rmb/Ton (inc VAT)

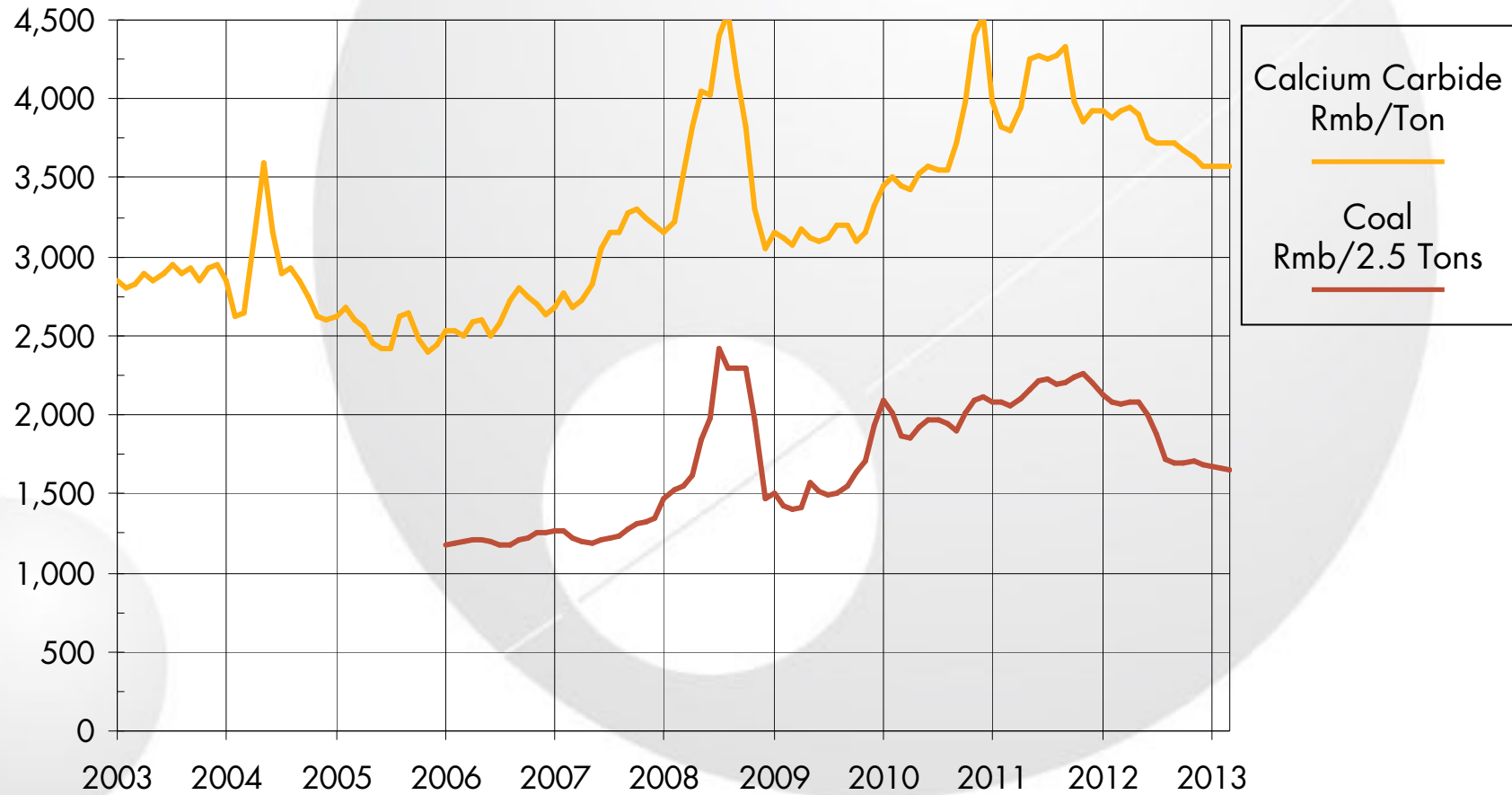


Source: Tecnon OrbiChem

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EAST CHINA COAL vs CALCIUM CARBIDE PRICES

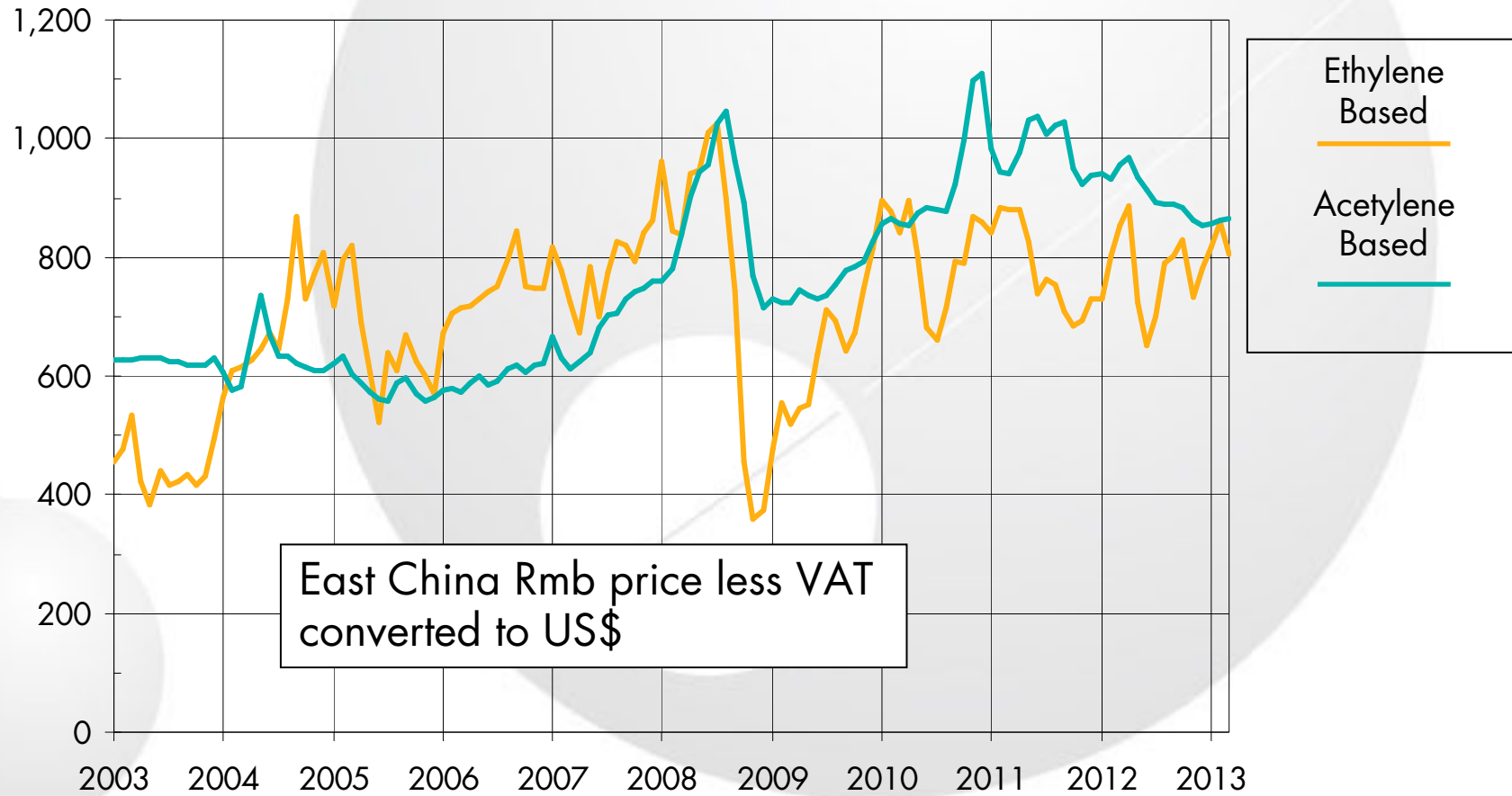
Rmb (inc VAT)



Source: Tecnon OrbiChem

APIC 2013 PVC CASH COST COMPARISON IN CHINA

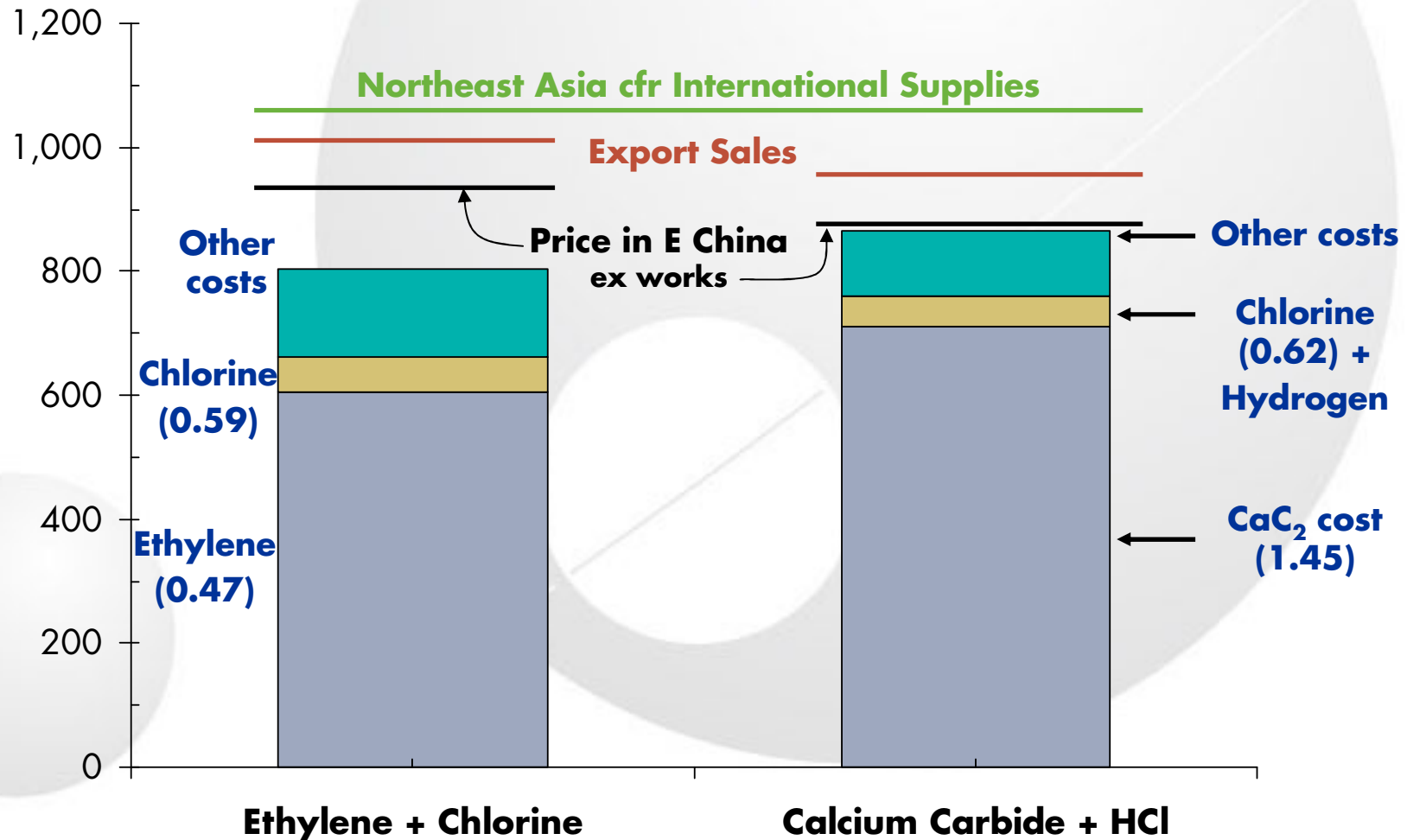
\$/Metric Ton



Source: Tecnon OrbiChem

APIC 2013 EAST CHINA PVC PRODUCTION COSTS (March 2013)

\$/Ton (excl VAT)

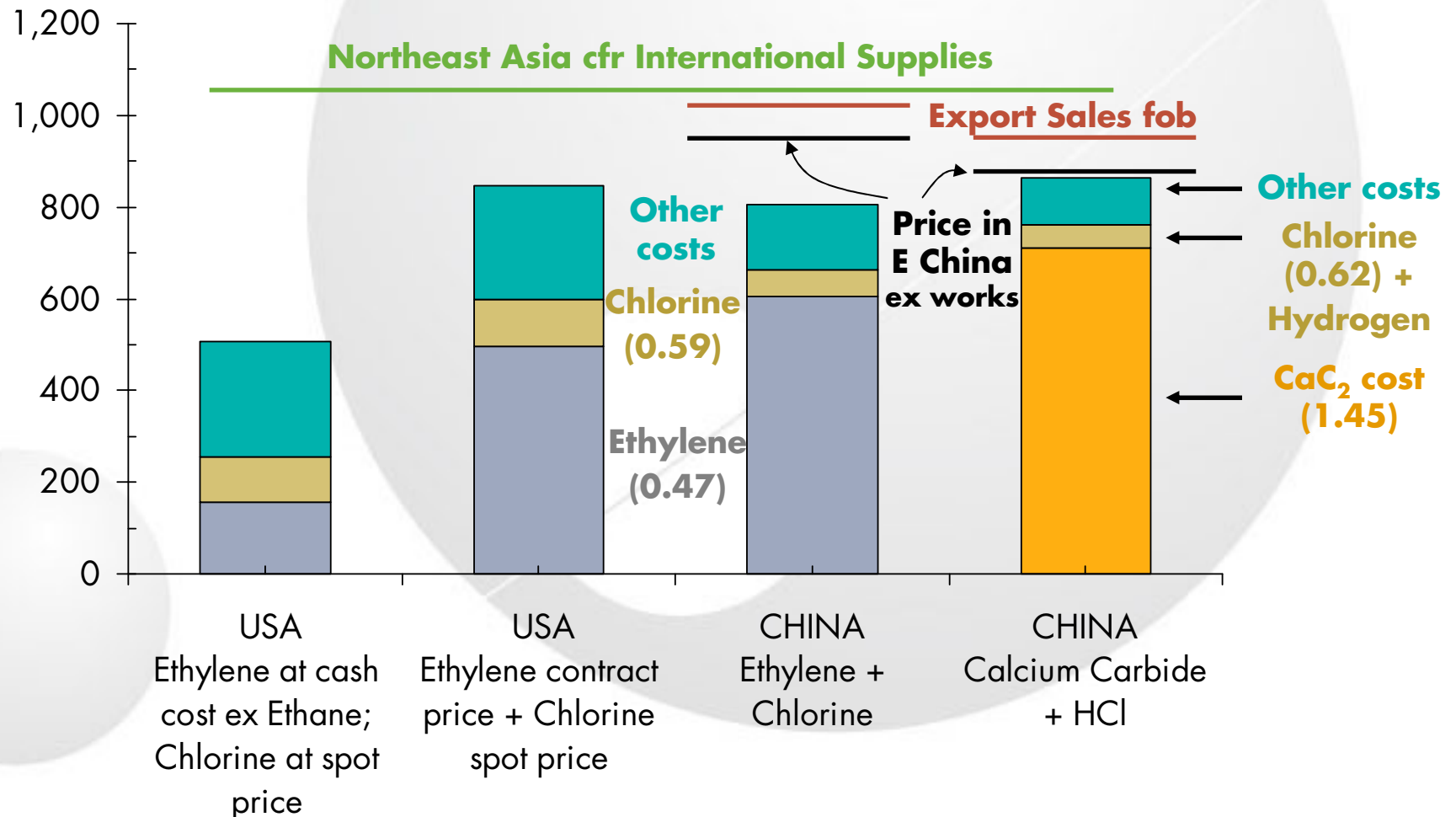


Source: Tecnon OrbiChem

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USA & CHINA CASH PVC PRODUCTION COSTS (March 2013)

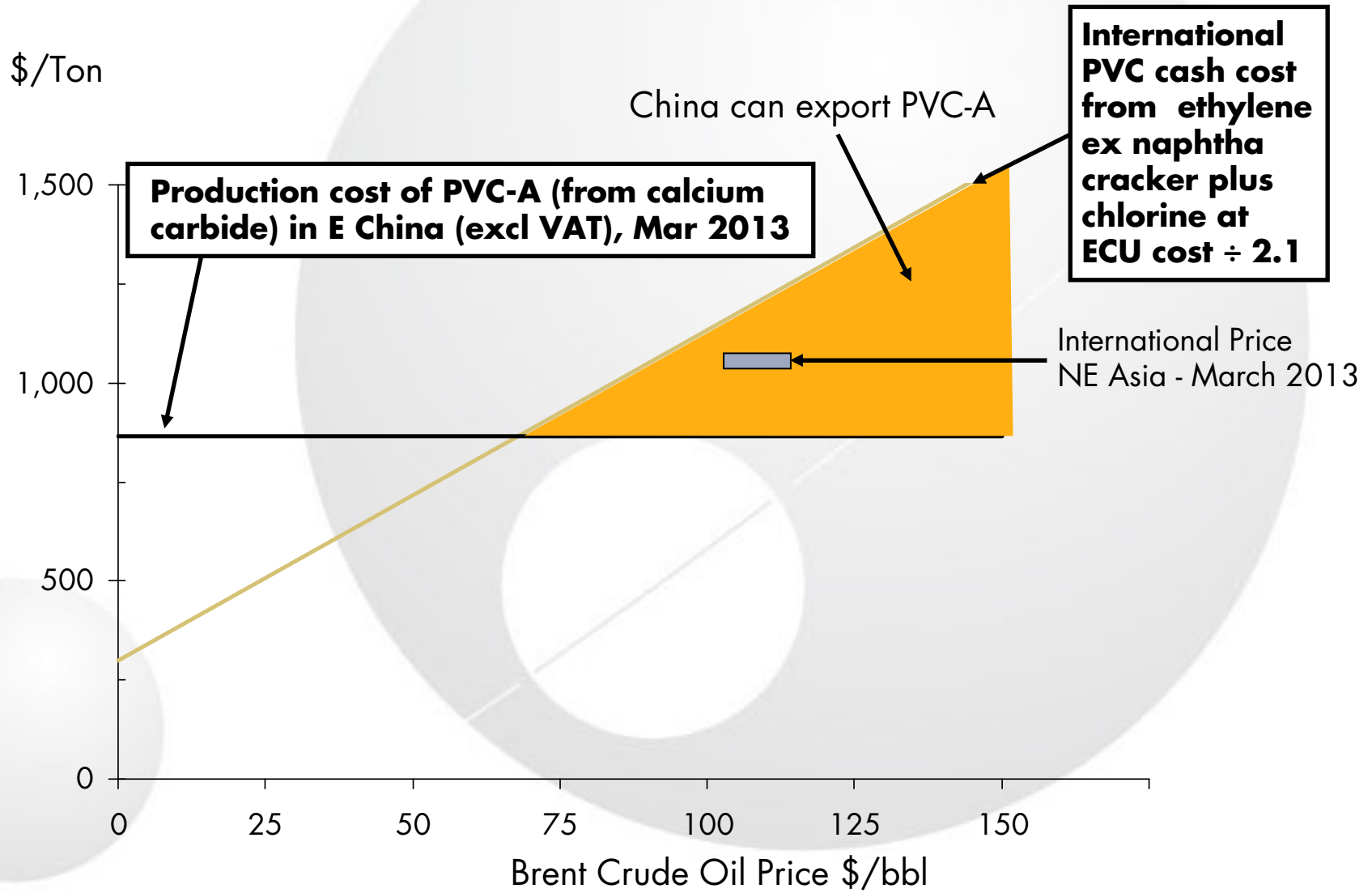
\$/Ton (for China excl VAT)



Source: Tecnon OrbiChem

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PVC PRODUCTION COSTS vs CRUDE OIL PRICE

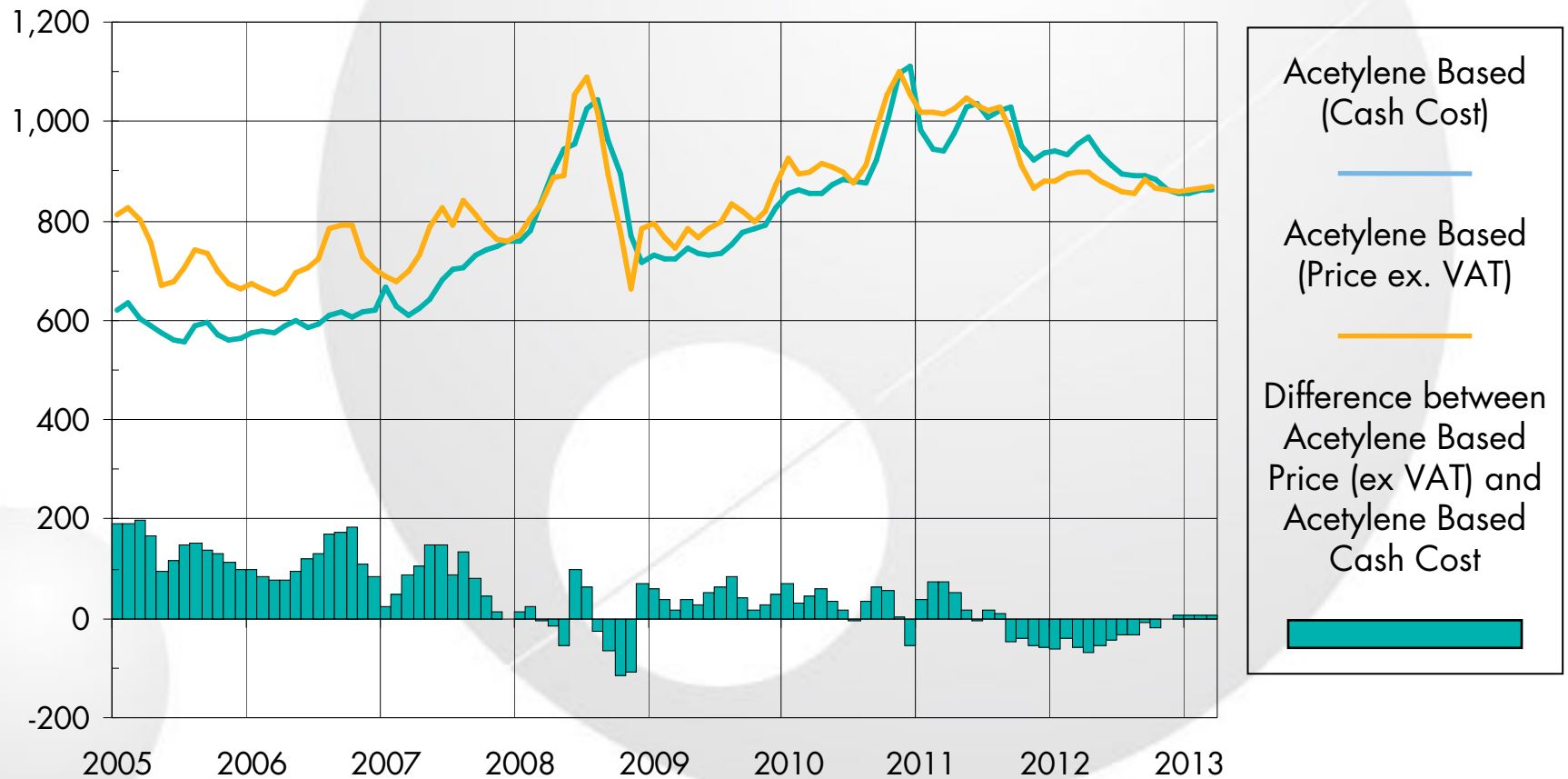


Source: Tecnon OrbiChem

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CHINA PVC-A PRODUCTION GROSS MARGIN

\$/Ton

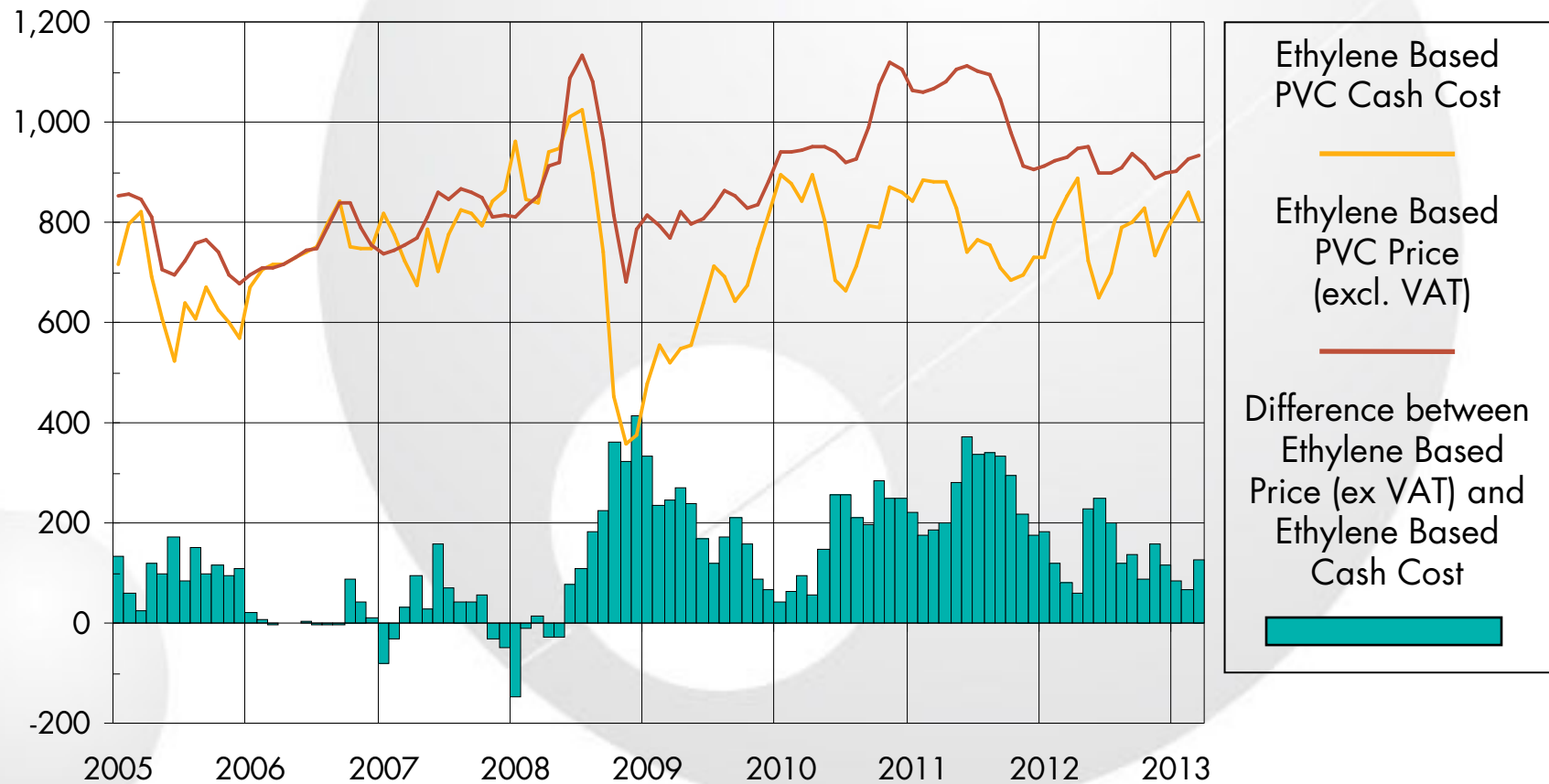


Source: Tecnon OrbiChem

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CHINA PVC-E PRODUCTION GROSS MARGIN

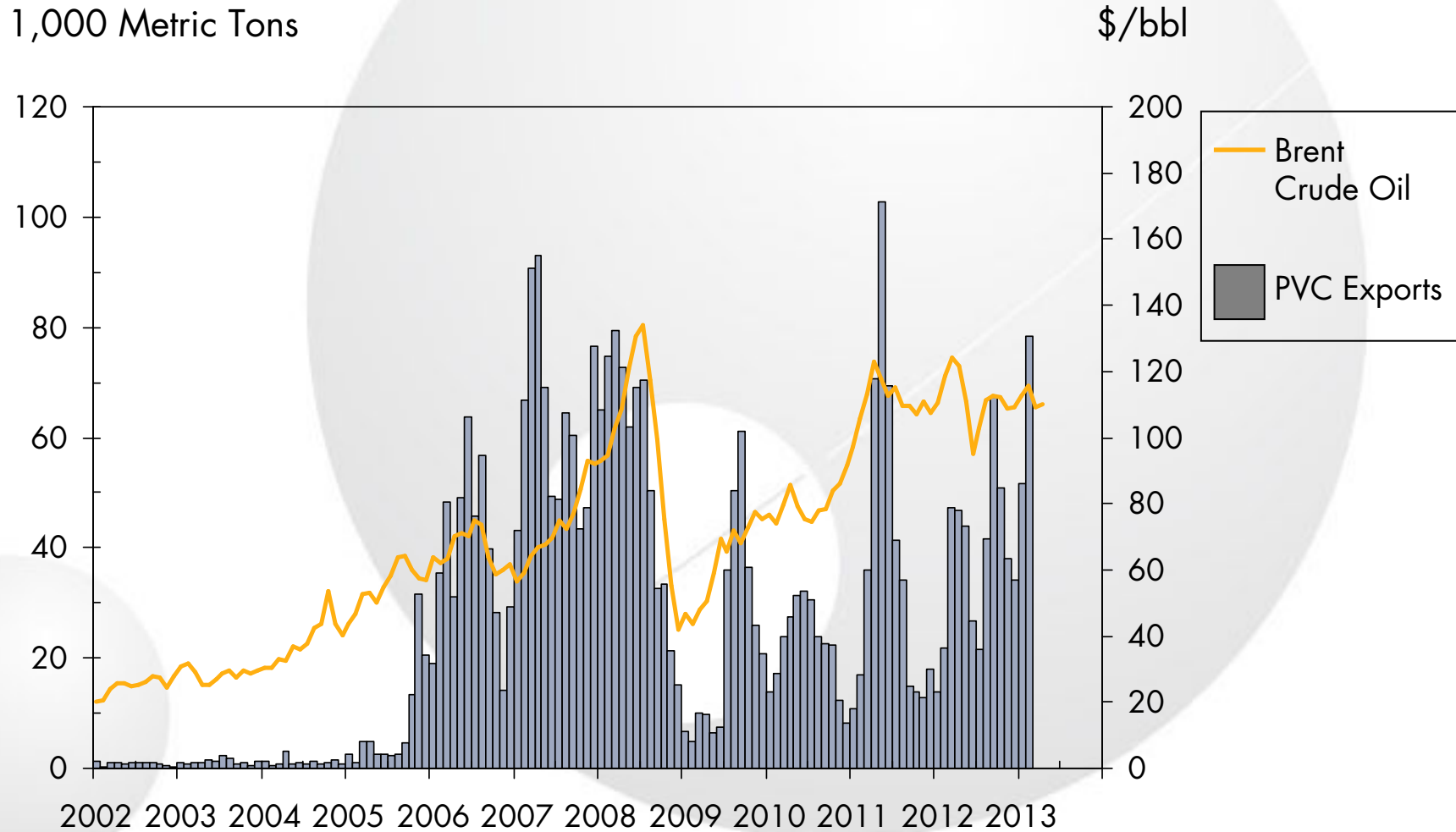
\$/Ton



Source: Tecnon OrbiChem

APIC 2013

CHINA PVC EXPORTS vs CRUDE OIL PRICE

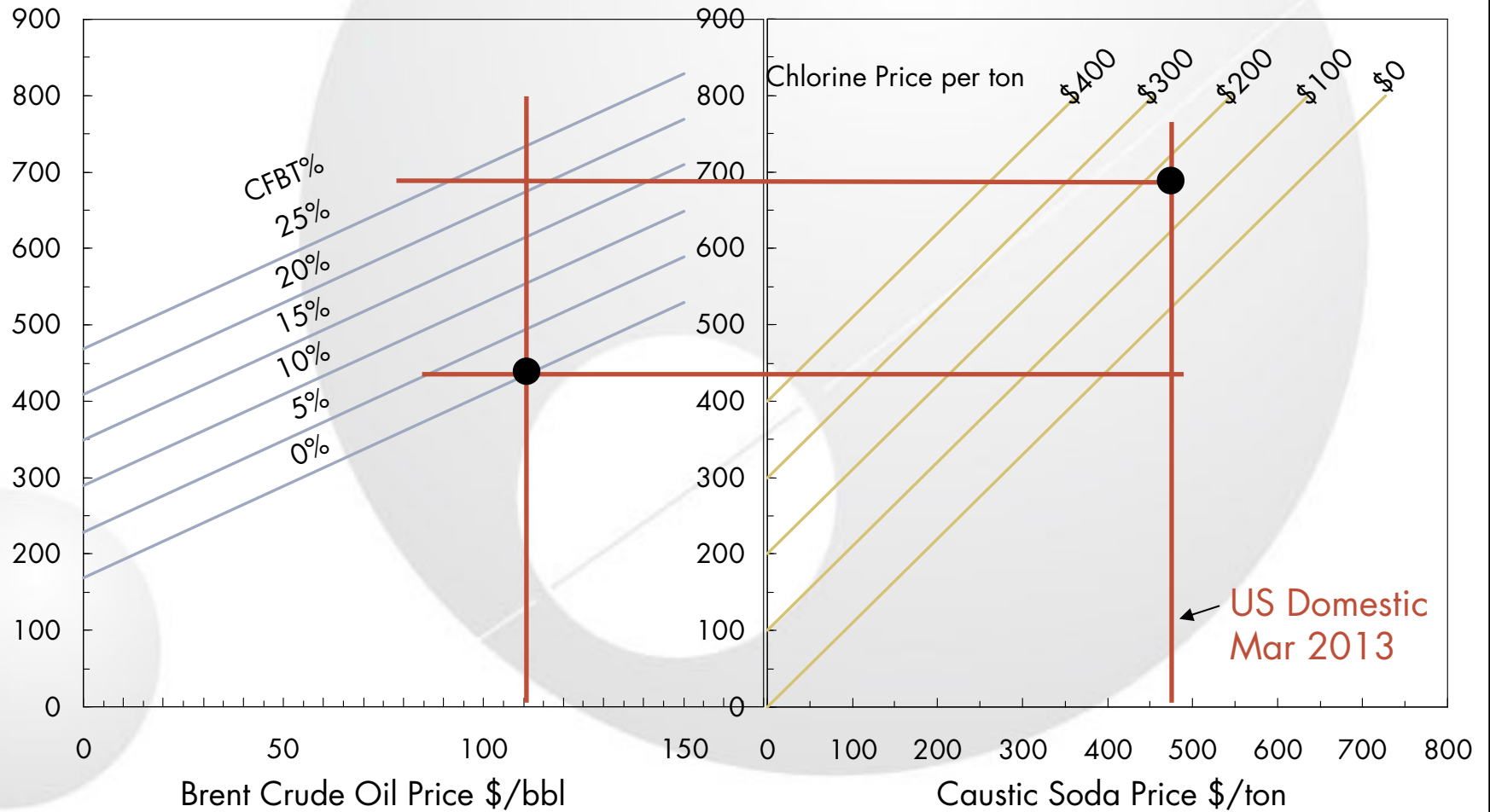


Source: Tecnon OrbiChem

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CRUDE OIL PRICE, ECU COST, CFBT, CHLORINE PRICE & CAUSTIC SODA PRICE RELATIONSHIP

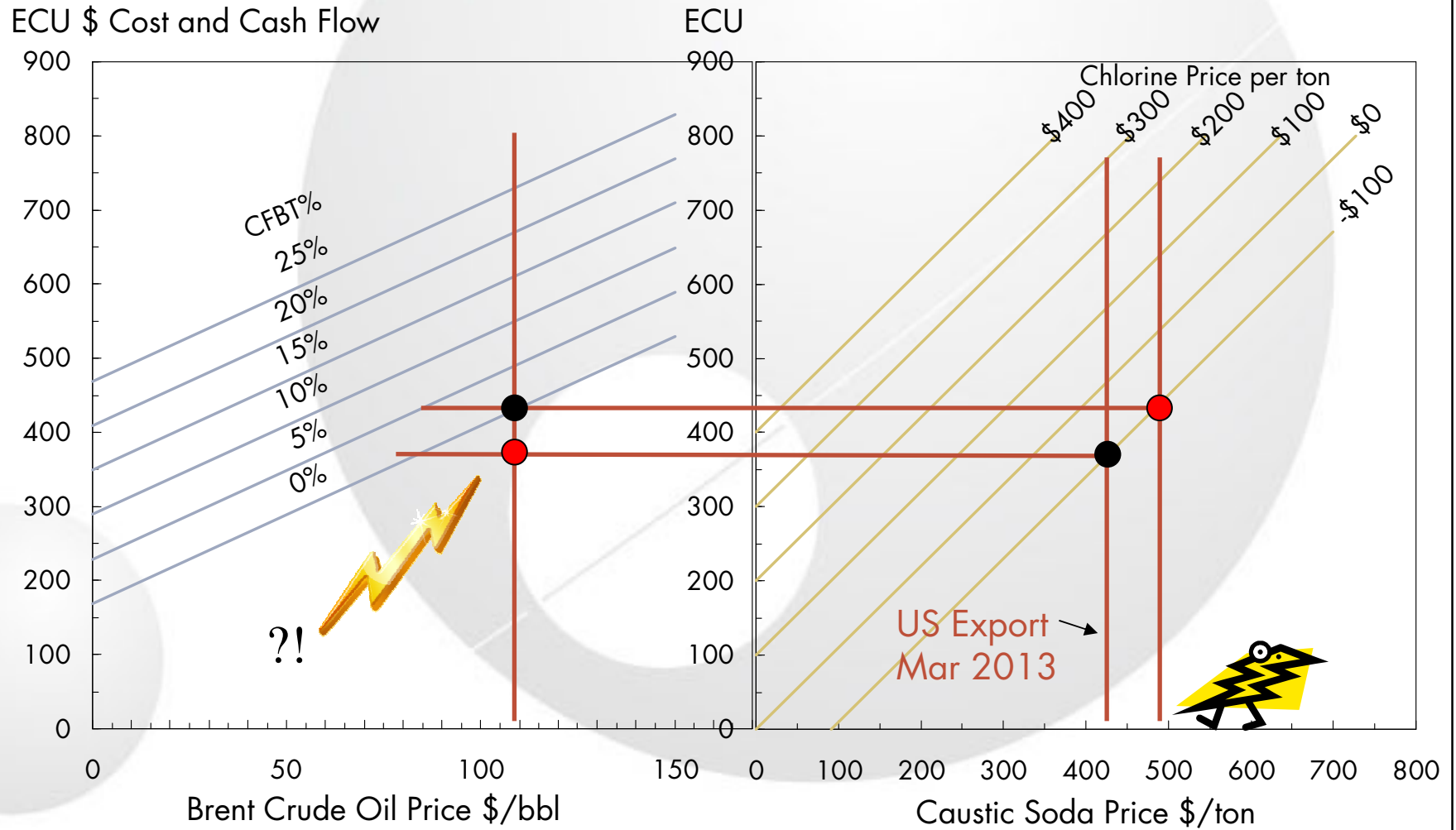
ECU \$ Cost and Cash Flow



Source: Tecnon OrbiChem

APIC 2013

'SHOULD WE SELL LOW-PRICED EDC TO MAKE ADDITIONAL CAUSTIC SODA AVAILABLE FOR SALE?'



Source: Tecnon OrbiChem

APIC 2013 CONCLUSIONS

- The slump in building construction in the USA and Europe and the 2012 slowdown in the Chinese economy led to weakened prices for vinyl chain products, worldwide, weak chlorine values and therefore high caustic soda prices BUT ...
 - Building construction is recovering in the USA
 - Asian caustic prices are now in decline, so ...
 - Chlorine values are likely to recover, then strengthening PVC prices
- Low-cost gas from shale has greatly strengthened the US competitive position for chemicals, particularly for vinyl products
 - US ethylene production costs from ethane are far lower than from naphtha-based crackers widely used in Asia and Europe
 - US electrical power costs and hence the cost of the ECU are lower than for most other chlor-alkali producers
 - Hence US producers of EDC, VCM and PVC have a huge competitive advantage
 - US advantages will last for many years

Source: Tecnon OrbiChem

APIC 2013

CONCLUSIONS continued

- The traditional chlor-alkali cycle seems to have entered a caustic-weakening and chlorine-strengthening phase, at least in Asia. If there is economic improvement in 2013 we can expect that worldwide:
 - Operating rates and chlorine values will rise
 - Caustic soda prices will decline
- Chinese PVC, largely acetylene-based, had lost competitiveness in 2011-2012 based on high coal costs, but a decline in coal prices over the past 12 months is leading to better margins and rising export flows.

Source: Tecnon OrbiChem



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chemical industry knowledge