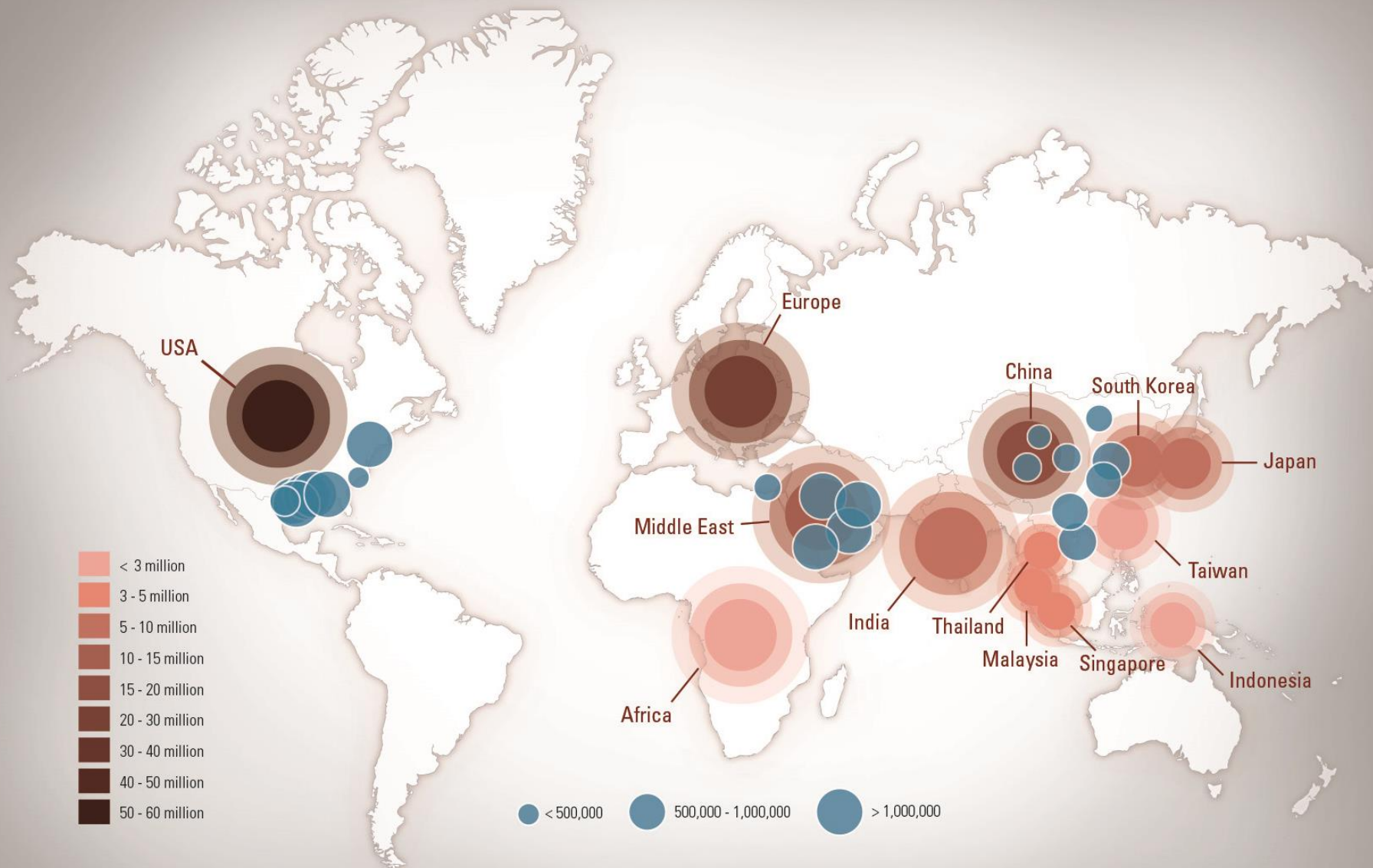


US/Asia ethylene, PVC at a glance

Bernardo Fallas, Managing Editor – Americas Petrochemicals (Olefins & Polymers)

May 5, 2014

Ethylene: Major expansions globally



US ethylene, caustic, PVC

Cheap feedstock from shale gas, PE demand drive olefin expansions,
but PVC sees limited growth

US ethylene margins: Never better

Ethane vs. Naphtha price



US Ethylene: Producers are “all-in”

Company	Location	,000 mt/yr	ETA
Formosa Plastics CUSA	Texas	800	2016
ExxonMobil Chemical	Texas	1,500	2017
Chevron Phillips Chemical	Texas	1,500	2017
Dow Chemical	Texas	1,500	2017
Sasol	Louisiana	1,500	2017
Occidental/Mexichem	Texas	550	2017
Appalachian Resin	W. Virginia	250	2017
Aither Chemical/RMG	W. Virginia	200-300	2017
Odebrecht (Braskem)	W. Virginia	1,000-1,500	2018
Axiall	Louisiana	1,000	2019
Shin-Etsu (Shintech)	Louisiana	1,000	2019
Shell Chemical	Pennsylvania	1,000-1,500	2019

Source: Company announcements, Platts

PVC players getting in the game – too late?

Company	Location	,000 mt/yr	ETA
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ExxonMobil Chemical	Texas	1,500	2017
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Shin-Etsu (Shintech)	Louisiana	1,000	2019
Shell Chemical	Pennsylvania	1,000-1,500	2019

Source: Company announcements, Platts

Brownfield projects: Good barometers

Company	Location	+,000 mt/yr	ETA
BASF-Total	Texas	60	2012
Dow Chemical (restart)	Louisiana	400	2012
Westlake Chemical	Louisiana	110	2013
Williams	Louisiana	230	2013
Ineos	Texas	120	2013
Westlake Chemical	Kentucky	80	2014
BASF-Total	Texas	100	2014
Westlake Chemical	Louisiana	110	2015
LyondellBasell	Texas (3)	830	2014-16
Dow Chemical	TX/LA (2)	400	2014-16

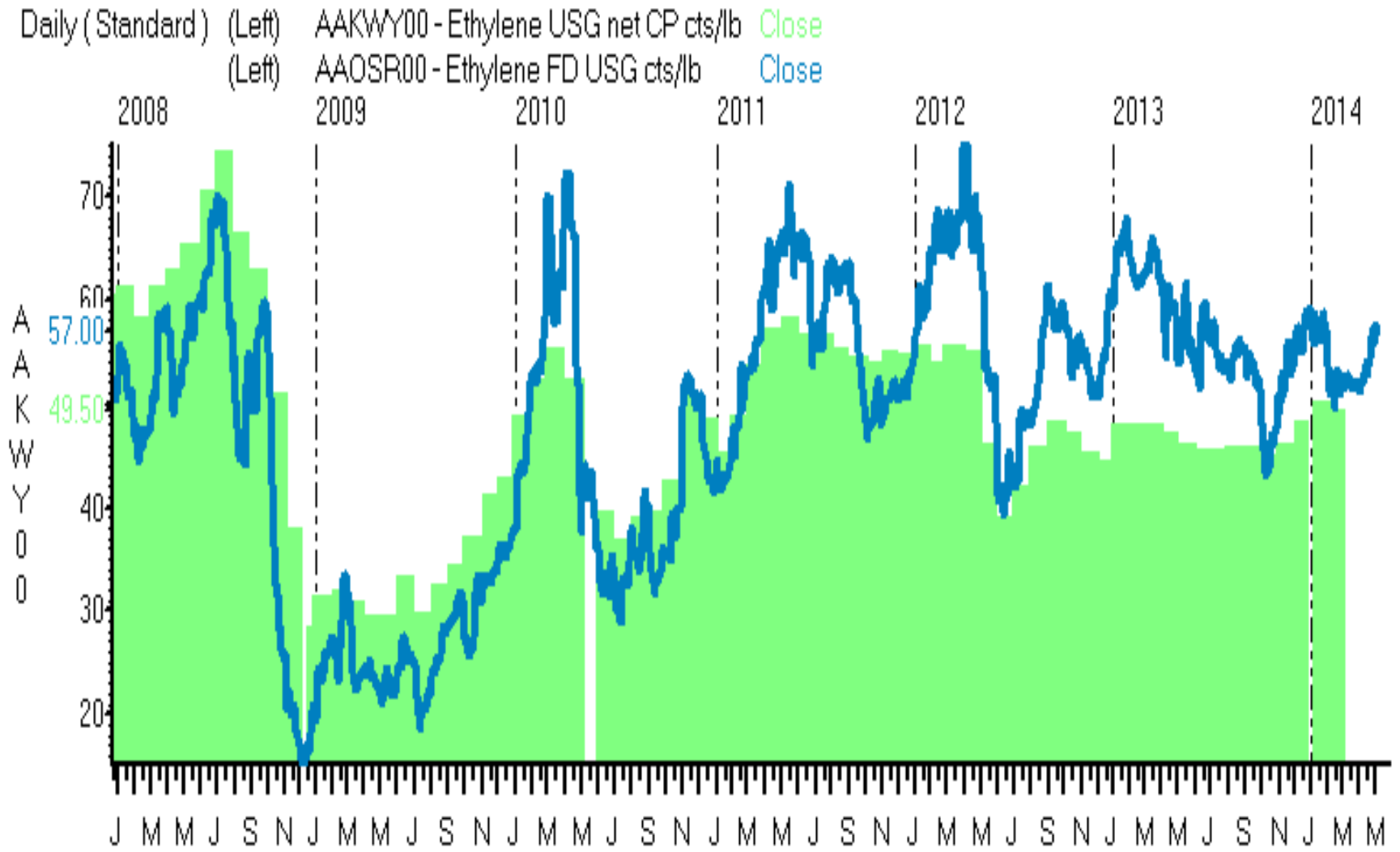
Source: Company announcements, Platts

But less than 15% target PVC

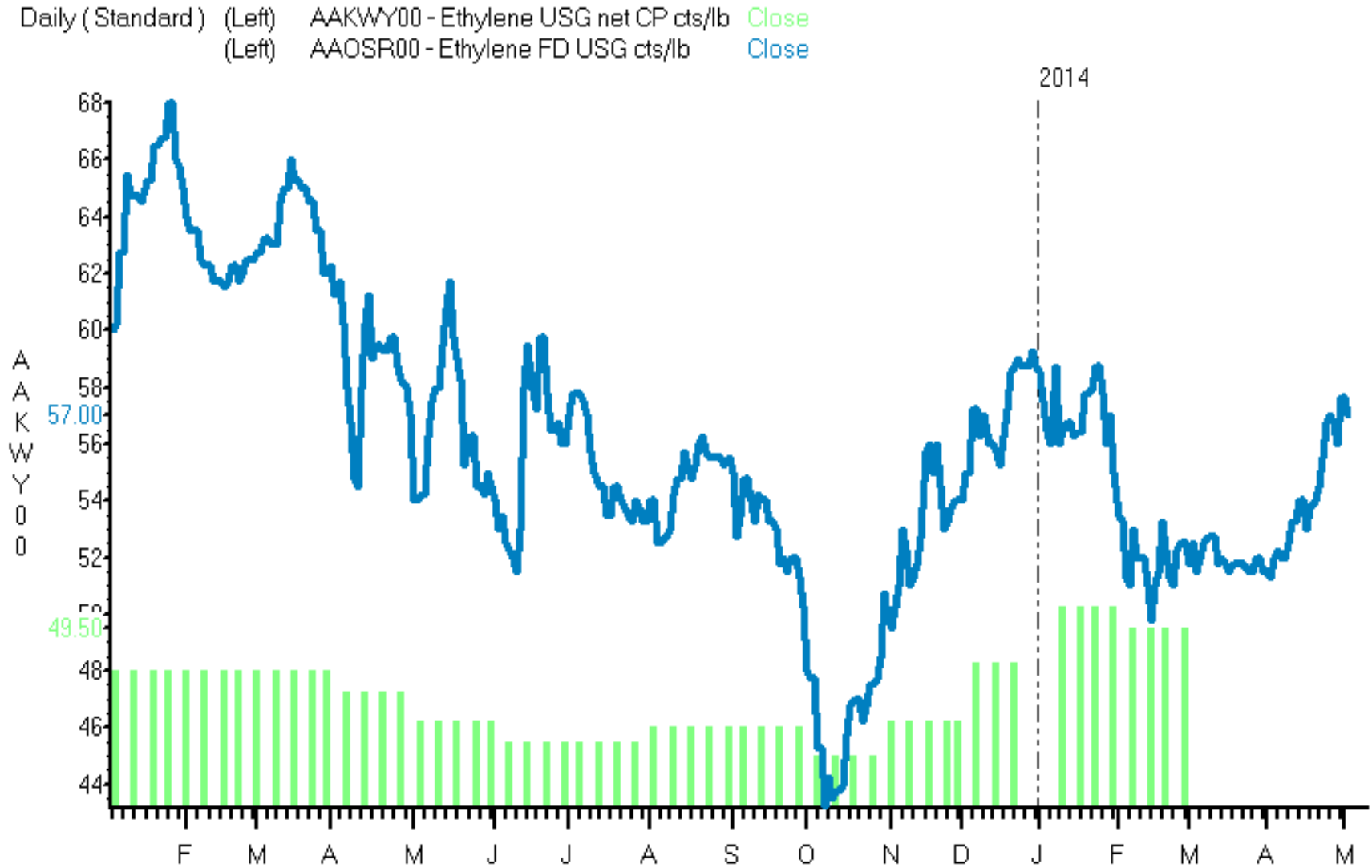
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Source: Company announcements, Platts

US spot ethylene prices



Ramping up in Q2 on TAs, pipe reopening

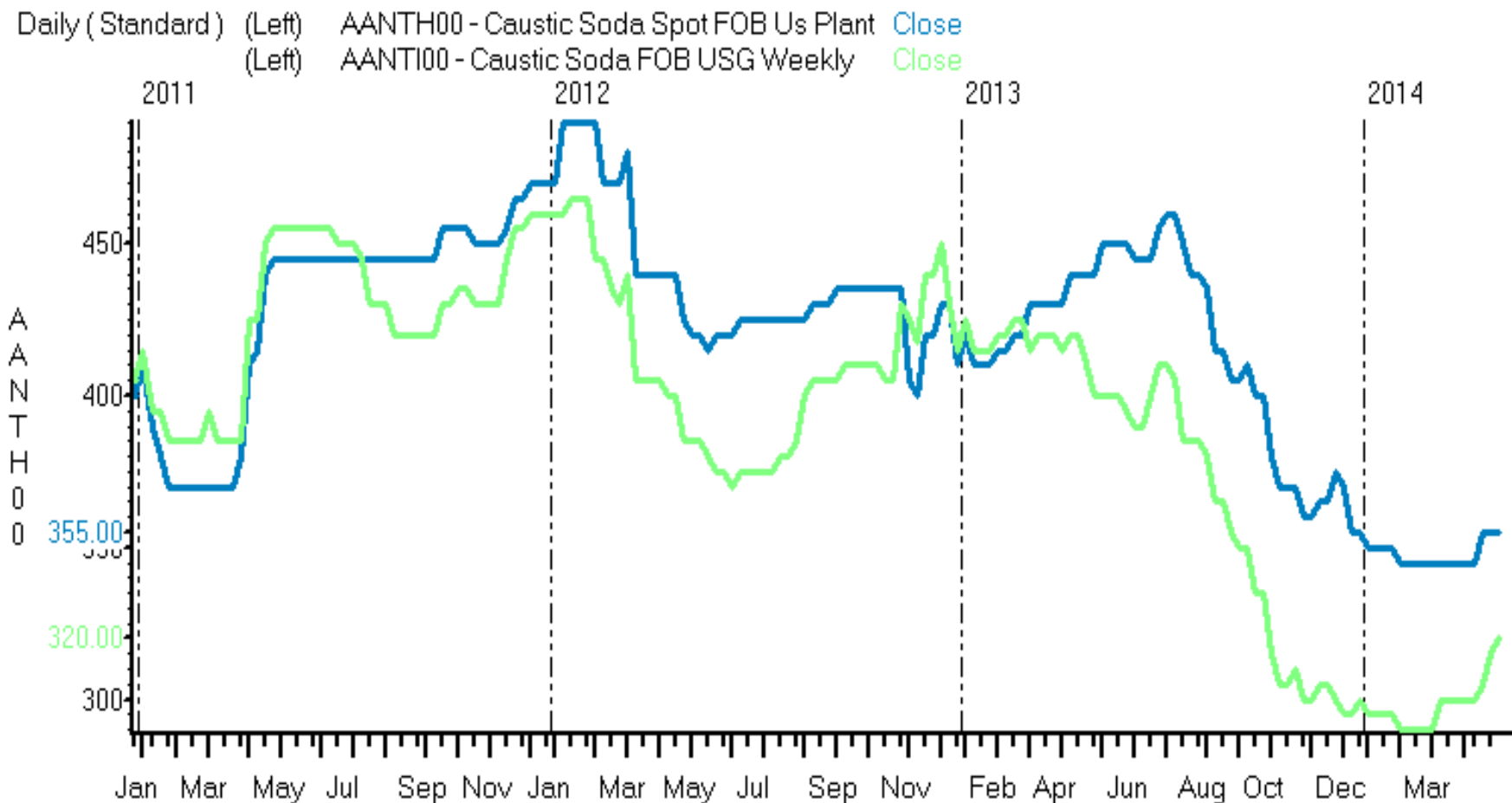


Company	Location	+,000 mt/yr	ETA
Westlake Chemical	Kentucky	350	Q2 2014
OxyChem	Tennessee	200	Q2 2014
Dow Chemical	Texas	880	Q2 2014
HF Chlor-Alkali	Iowa	100	2016
Shintech	Louisiana	220	2016

Source: Company announcements, Platts

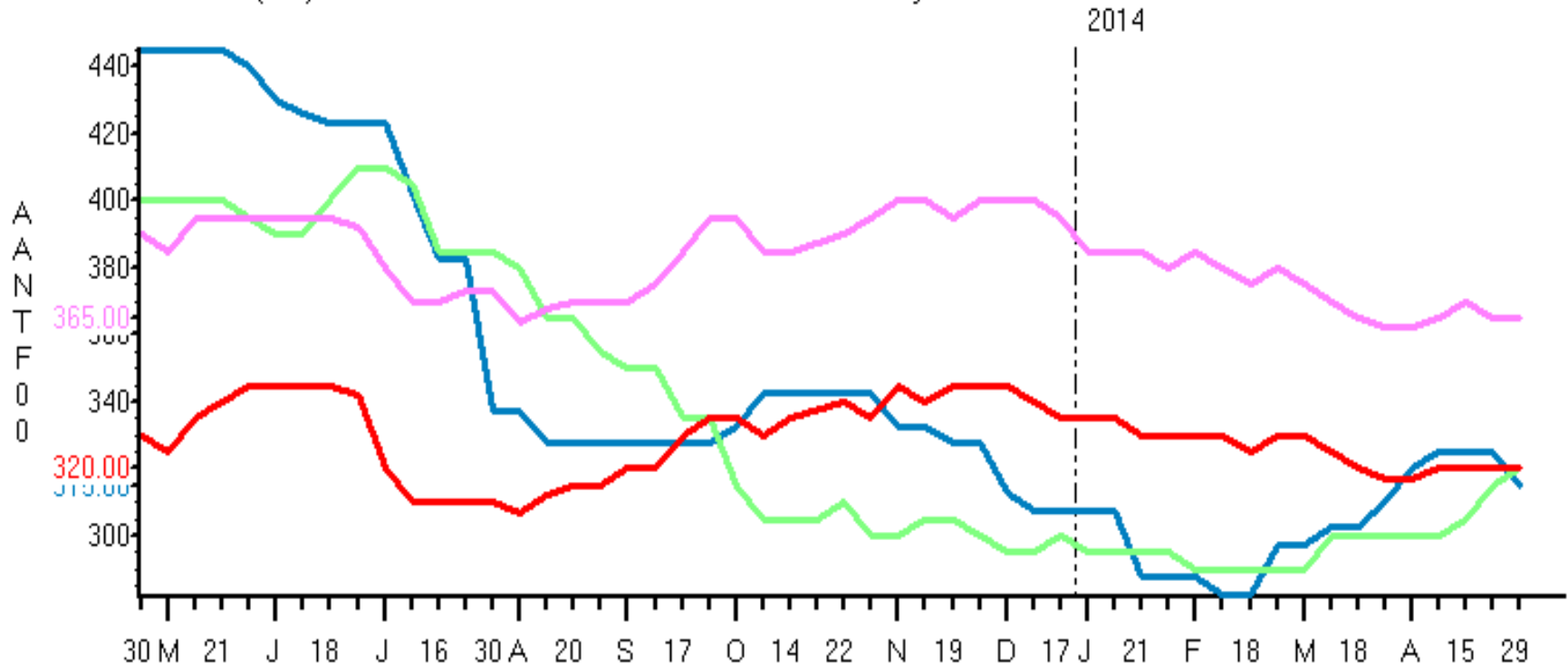
- Favorable natural gas pricing in US has helped improved electrochemical unit margins for chlorine and caustic soda

US caustic soda pricing depressed



Global caustic soda pricing

Daily (Standard) (Left) AANTF00 - Caustic Soda FOB Rotterdam Weekly Close
 (Left) AANTI00 - Caustic Soda FOB USG Weekly Close
 (Left) AAVSE04 - Caustic Soda FOB NE Asia Weekly Close
 (Left) AAVSF04 - Caustic Soda CFR SE Asia Weekly Close



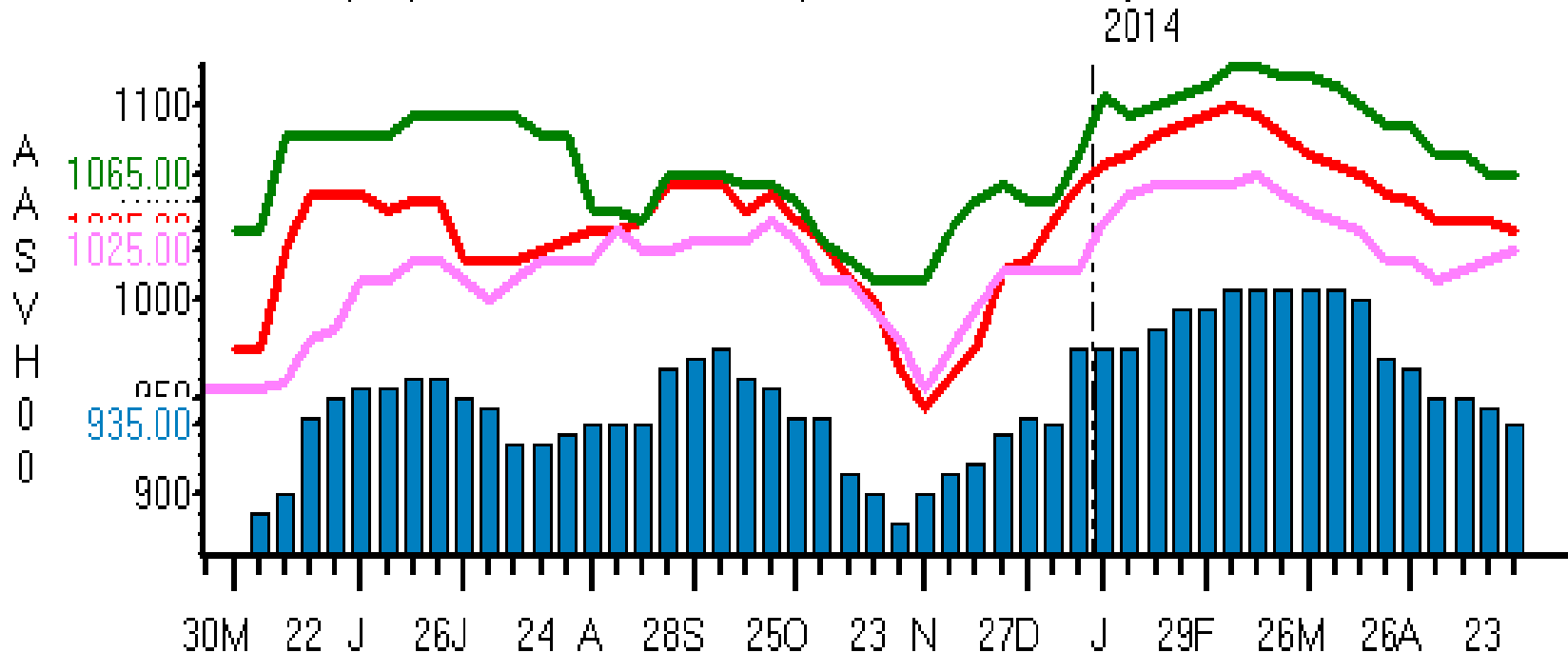
Company	Location	+,000 mt/yr	ETA
Westlake Chemical	Kentucky	80	2014
Shintech	Louisiana	300	2016

Source: Company announcements, Platts

- Caustic, ethylene expansions have translated in additional PVC capacity projects, although scope is currently limited
- Dow Chemical's proposed divestment of its \$5 billion chlor-alkali, chlor vinyls business adds new wrinkle to North American market

US PVC aggressive in export market

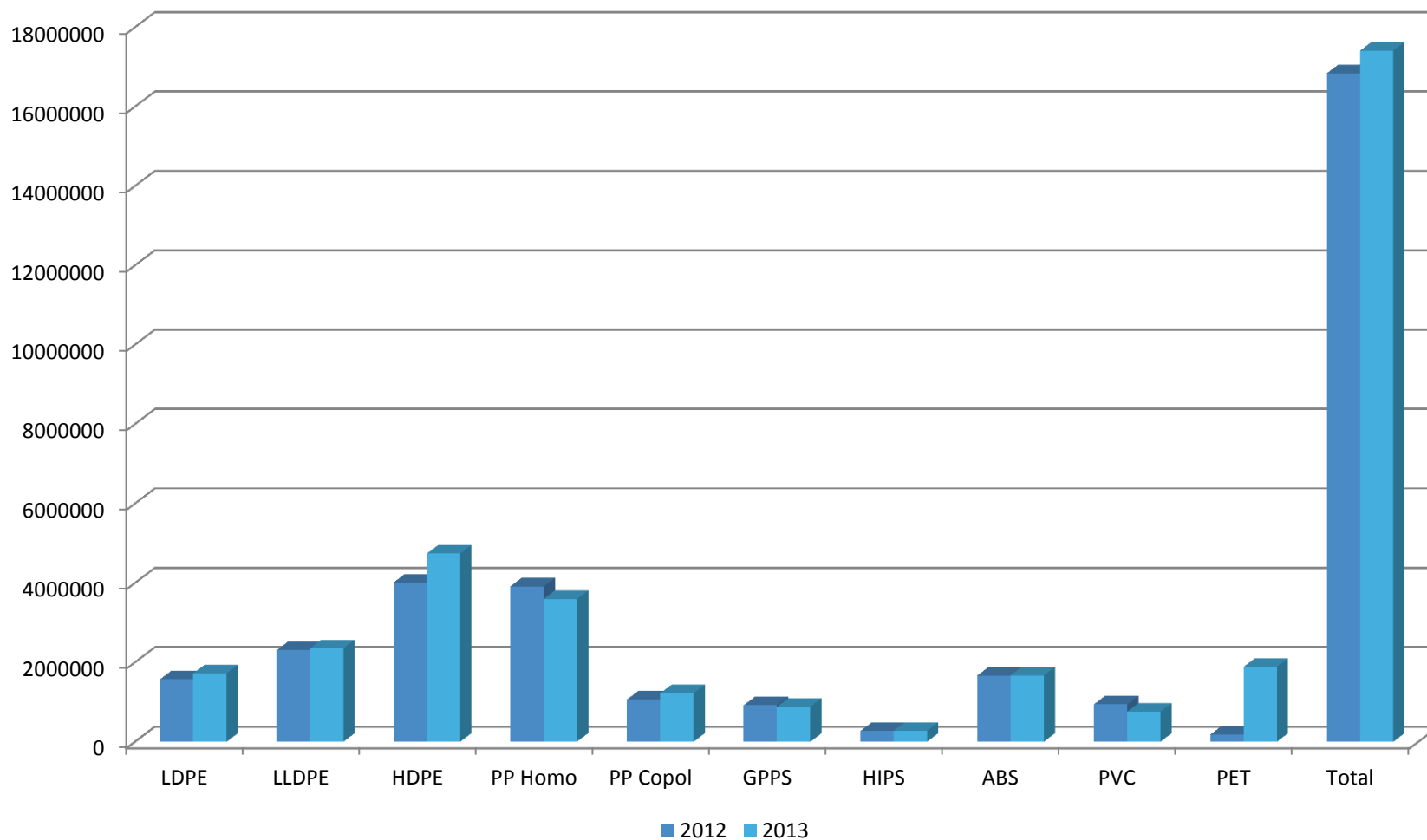
Daily (Standard) (Left) AASVH00 - PVC Susp CFR Peru Weekly Close
 (Left) AAVPZ04 - PVC CFR Brazil Weekly Close
 (Left) PHAIT00 - PVC Susp FAS Houston Weekly Close
 (Left) PHAIX00 - PVC Susp CFR China Weekly Close



Asian ethylene dynamics

China drives polymer demand in the region, but naphtha pricing is a key driver for ethylene, propylene

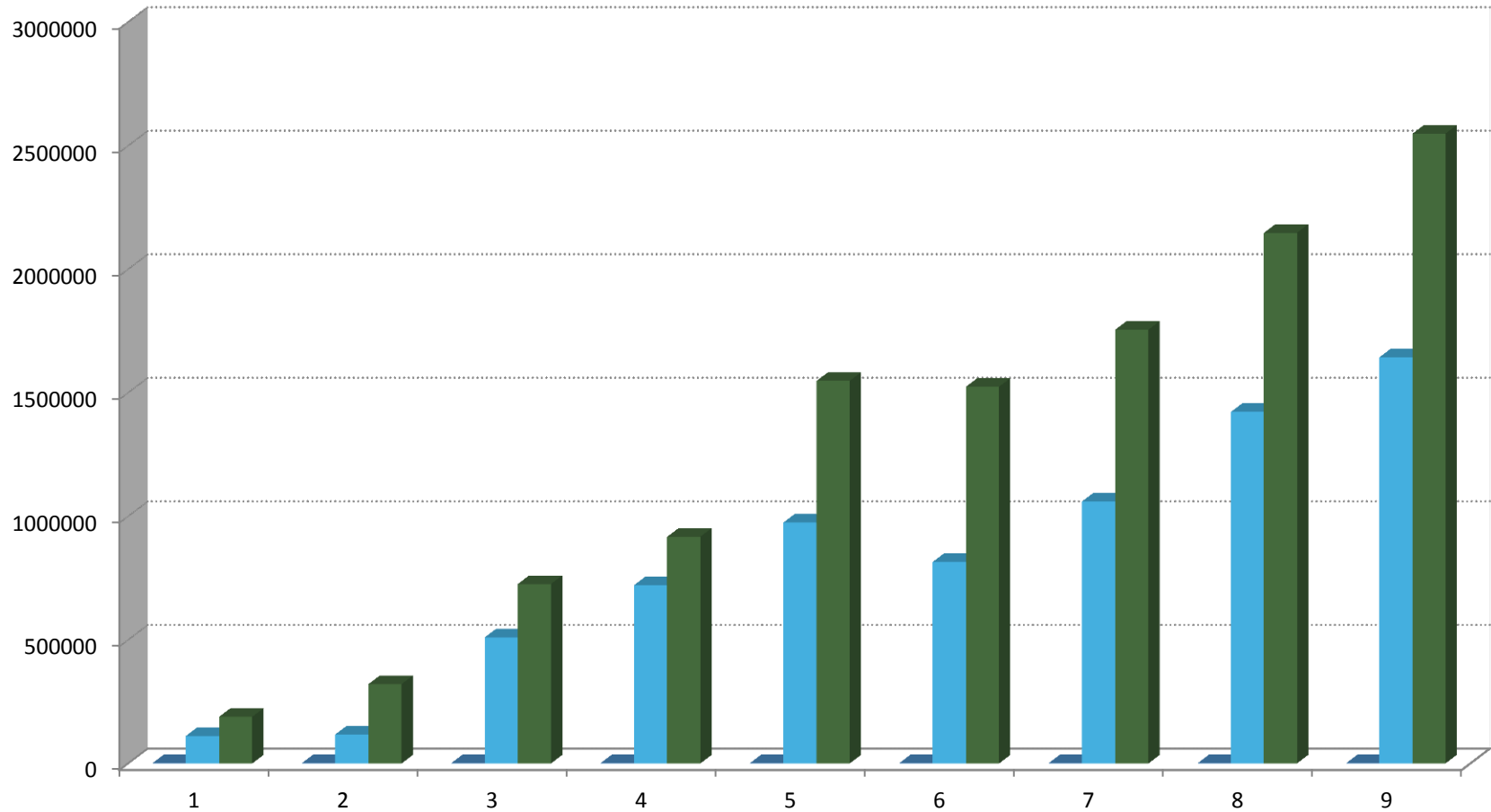
China PE demand drives olefins



MT/year

Source: China Customs

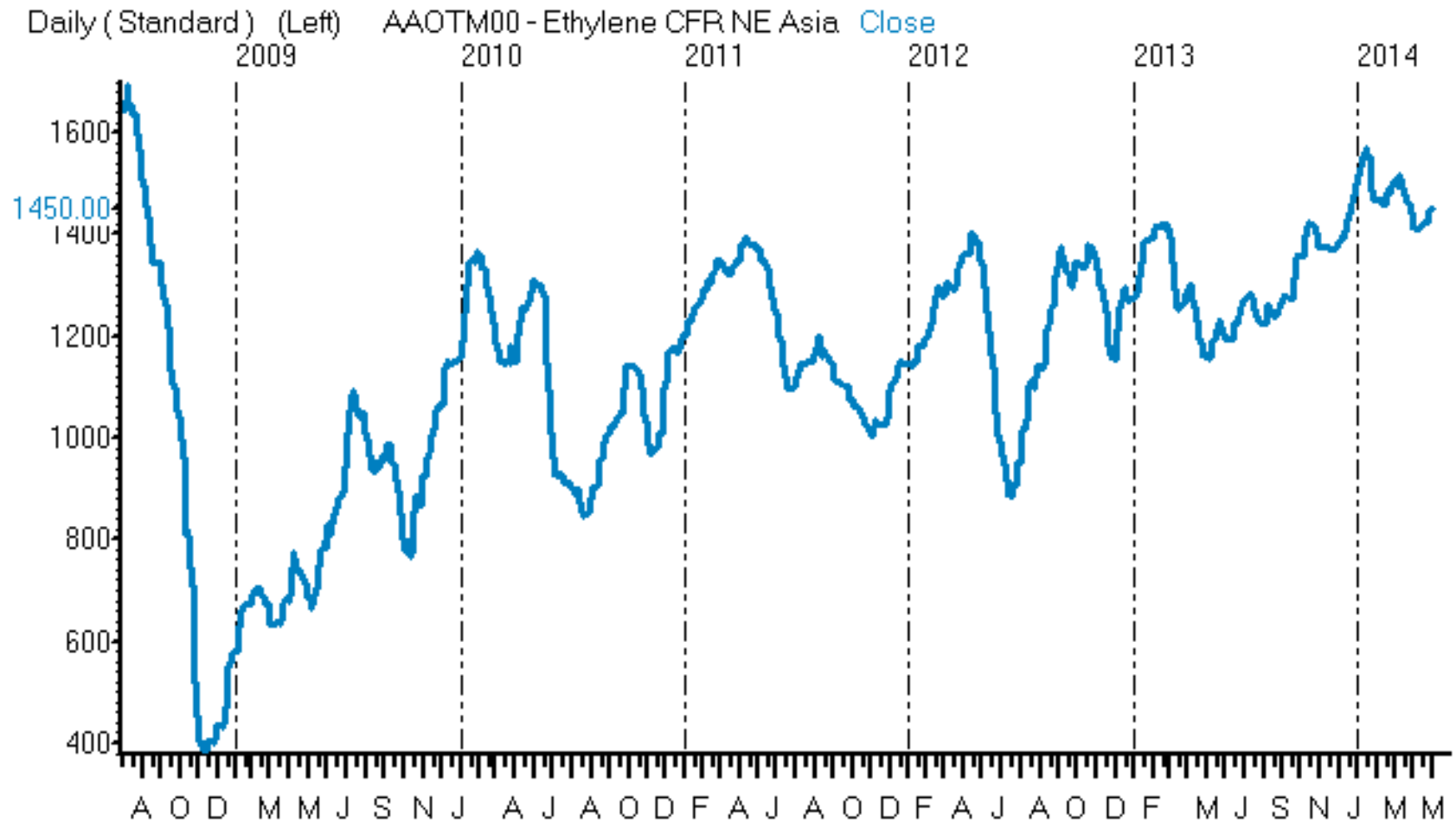
China olefins imports



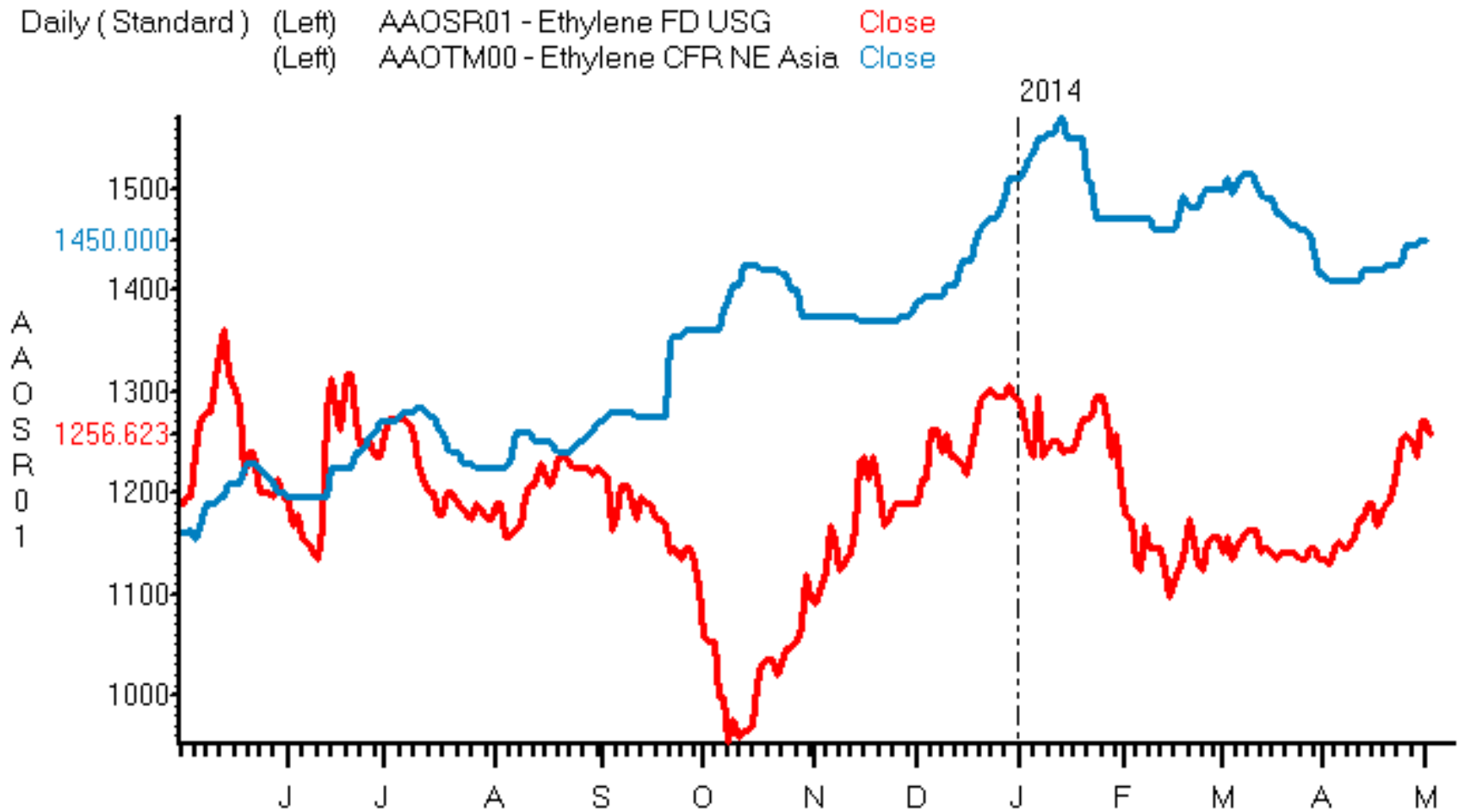
MT/year (2005-2013)
Source: China Customs

■ YEAR ■ Ethylene ■ Propylene

2014 opens with near 6-year highs



Asia ethylene vs. US Gulf Coast price



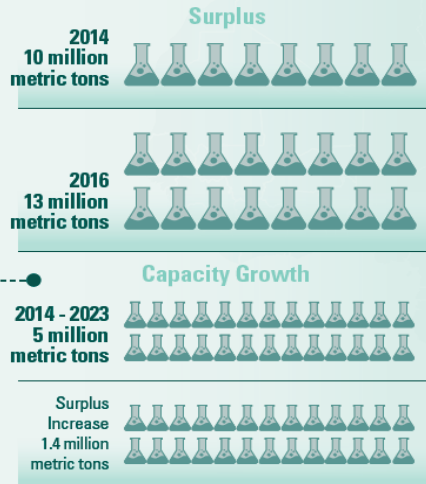
For more information visit:
www.platts.com/ppa

What options does the Middle East have to export its PE surplus?

MIDDLE EAST OUTLOOK *for* POLYETHYLENE

Caught between the US Shale Gas revolution & China's drive for CTO/MTO expansions.

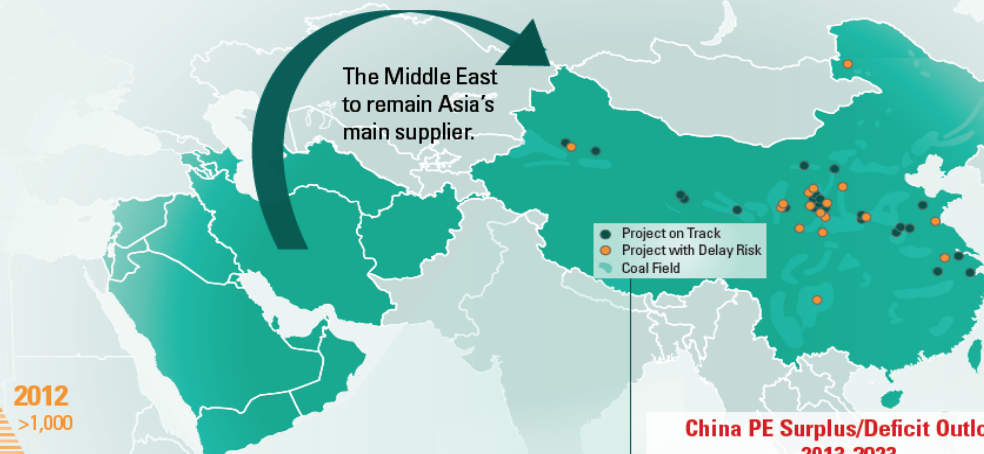
Middle East Expected Material Growth



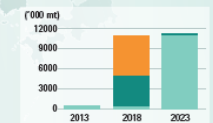
→ Middle Eastern polyethylene capacity to grow rapidly, more than 5 million metric tons of new capacity expected online by 2023.



→ With the US becoming a more dominant force in Central and South America and Europe, the Middle East will have to compete with the new supplies in these regions.



→ In the medium term China's deficits could decrease due to CTO/MTO coming on stream.

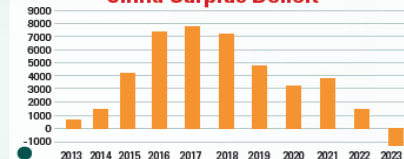


China PE Surplus/Deficit Outlook 2013-2023



→ Asia is projected to be PE net short by 13 million tons by 2023 and through the forecast period, China will be the main driver.

Middle East Surplus/Deficit Minus China Surplus Deficit



The total ethylene capacity from CTO/MTO projects is expected to be 15.5 million tons, while the PE capacity is 11.5 million tons.

→ The Middle East will be the main supplier of PE to Asia, particularly China. However there could be some lean years when CTO/MTO additions come online.

Muito obrigado!

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