# Margins redefined: Looking beyond the steam cracker

Bernardo Fallas
Associate Editorial Director – Americas
S&P Global Platts





#### Agenda

US Gulf Coast projects at a glance C2, ethylene impact on cracker margins Shifting profits to polymerization unit Resin exports as the end game

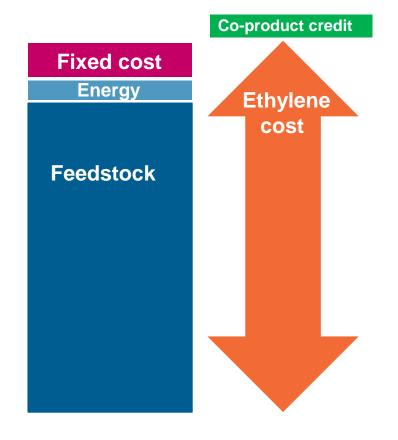








#### US cracker margins at a glance

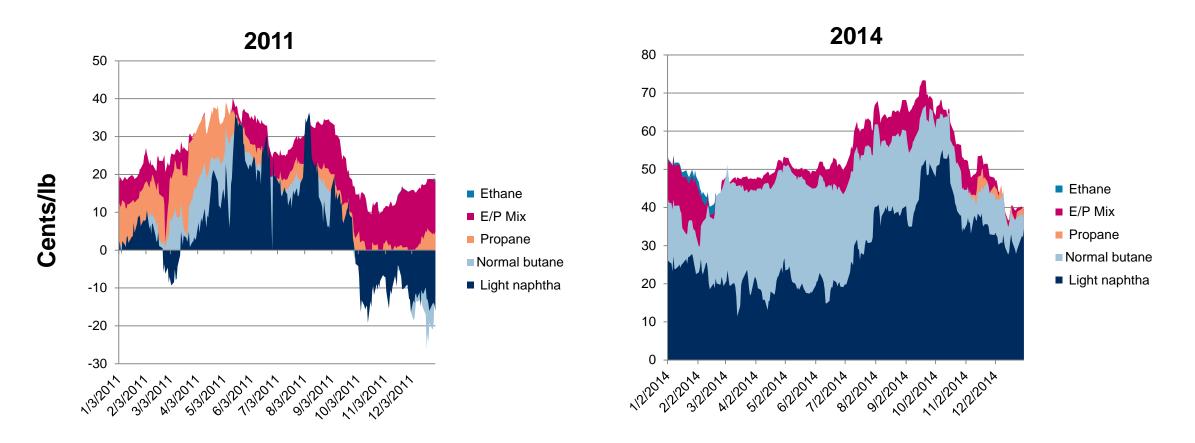


**Cracker margin:** Calculation showing the value for producing a unit of ethylene from a specific feedstock, inclusive of coproduct credits and fixed and variable costs

**Did you know?** In 2004, the US had the highest ethylene production costs of any major producing region, with many forecasting that chemical and polymer imports from the Middle East would become customary

And just 10 years ago, with the financial crisis in full swing and demand and prices plummeting, US producers resorted to shutting/mothballing crackers and derivative units

#### Cracker margins: From rags to riches – to rags again?

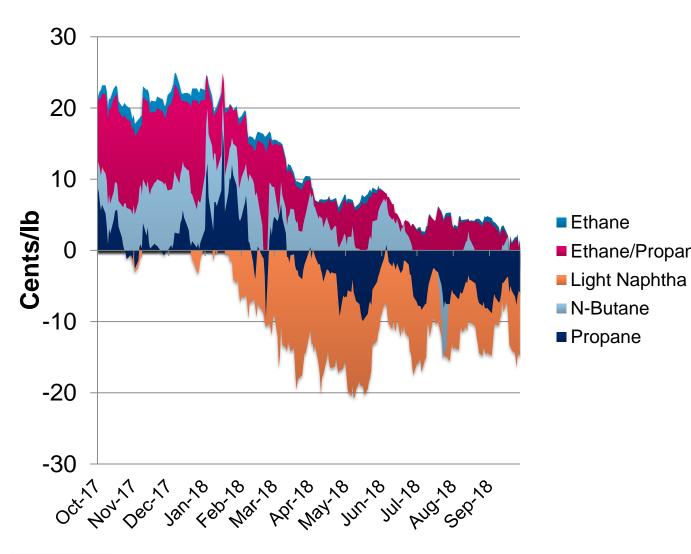


In 2011, a wise man told me: "Remember when 10 cents/lb was a good margin?"

In 2014, another wise man told me: "It is almost as if we are printing money, but we will take it – while it lasts"

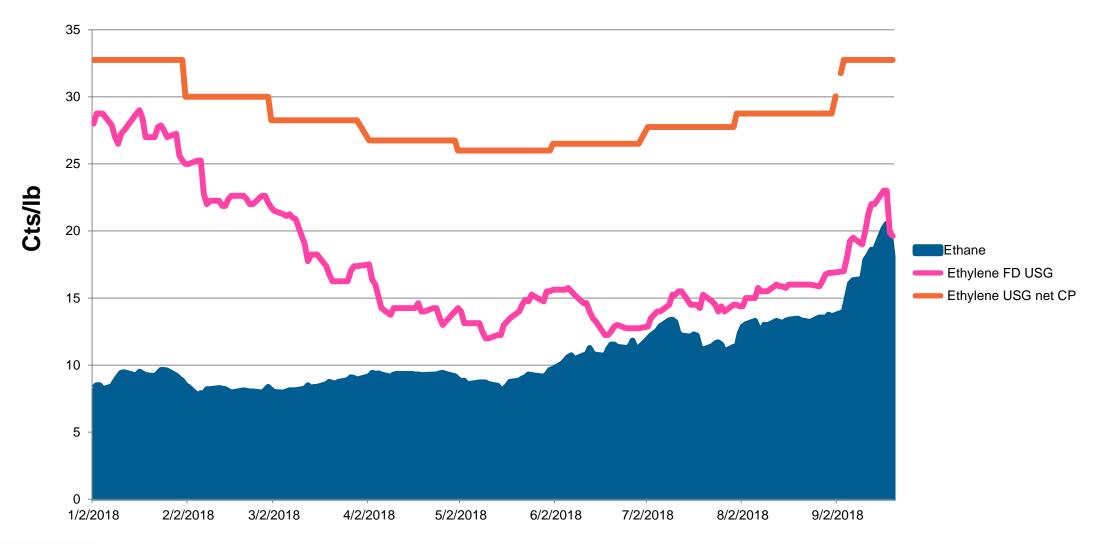


#### 2018 US cracker margins sink on ethylene glut



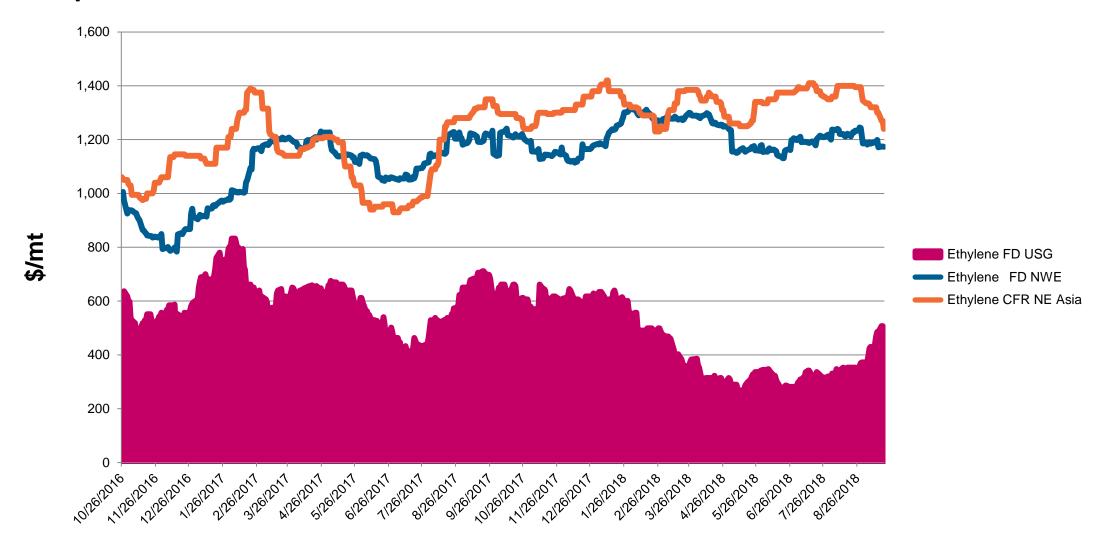
- With ethylene sub-20 cents/lb
   (\$440/mt) but spot PE for export
   around 50 cents/lb (\$1,102/mt),
   integrated producers are not sweating it
- ROI, however, remains consideration
- Ethane/Propane Mix Depressed margins are affecting
   Light Naphtha merchant sellers, such as Nova and
   N-Butane Flint Hills Resources
  - Some rationalization under way in the form of shutdowns, extended turnarounds/retrofits and reduced rates

### US ethylene long; nearly 7 million mt/year of additional capacity through 2020

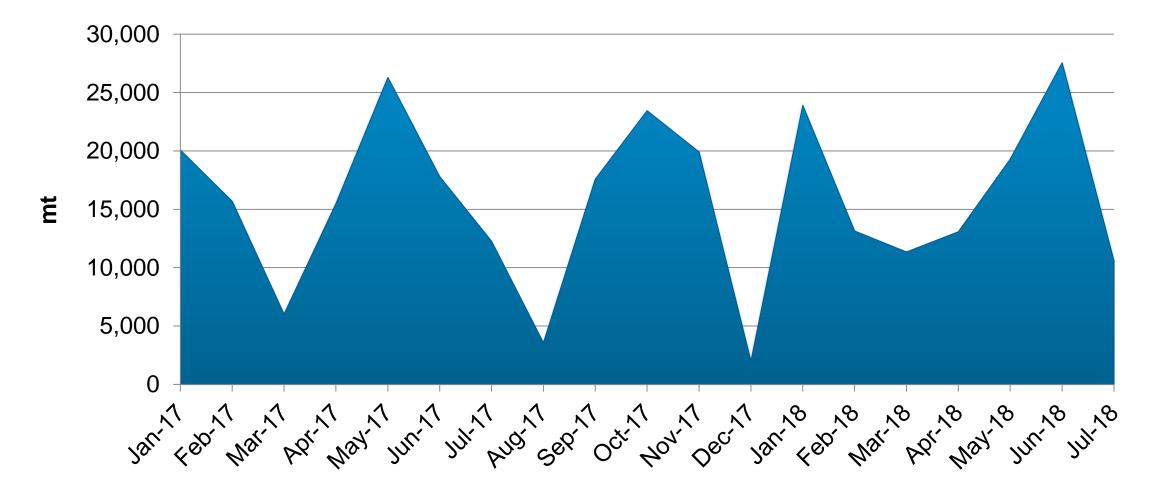




# Despite ethane-driven rebound of late, US ethylene deeply discounted to Asia, Europe



#### US ethylene exports maxed out – for now; new terminal(s) on tap



Source: USITC



#### Ethylene exports: Competing projects at Houston Ship Channel



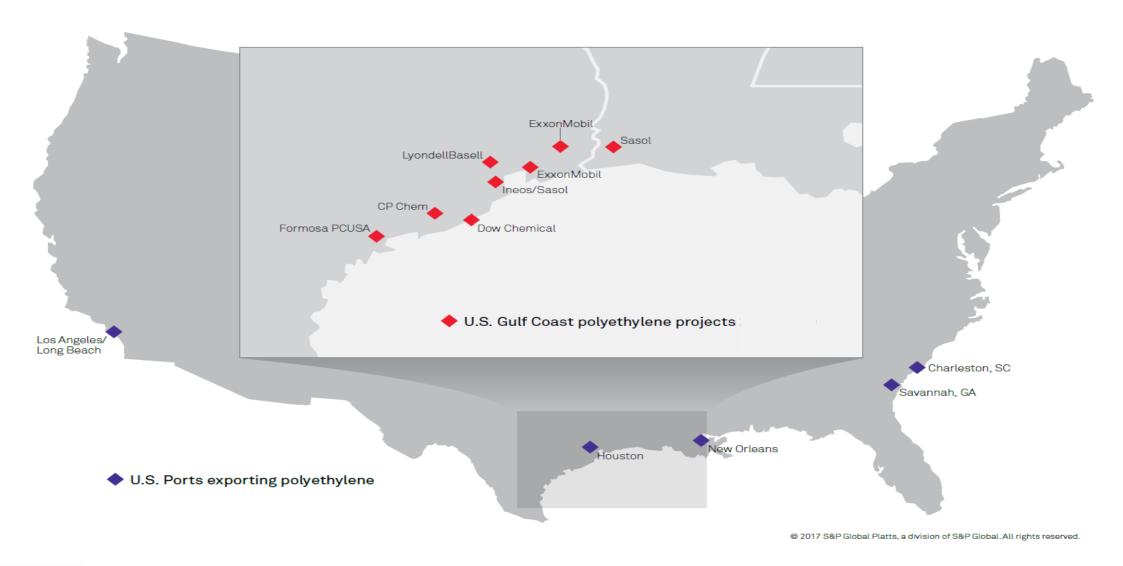




- 1 million mt/year export-capacity terminal under construction; 1,000 mt/hour loading rate
- 30,000 mt on-site refrigerated storage
- Long-term contracts from anchor shippers include Flint Hills Resources; startup 1Q 2020
- Converting ethane cavern to hold up to 272,000 mt ethylene; operational 1Q 2019
- 24-mile bilateral ethylene pipeline connecting
   Mont Belvieu and Bayport, startup 2020

- 750,000 mt/year export capacity and 900 mt/hour loading rate
- 2,000 mt/day chilling train to liquefy ethylene
- 45,000 mt on-site refrigerated storage
- Facility would be at Odfjell's Bayport terminal
- Terminal is near ethylene pipelines run by Shell, Chevron, INEOS, Lyondell and FHR
- FID pending commitments; CEO said in early 2018 if EPD goes forward, Odfjell less likely

# Ethylene/PE projects in USG 2017-2020: Zoomed in on exports





# US PE capacity expansions to triple surplus by 2028

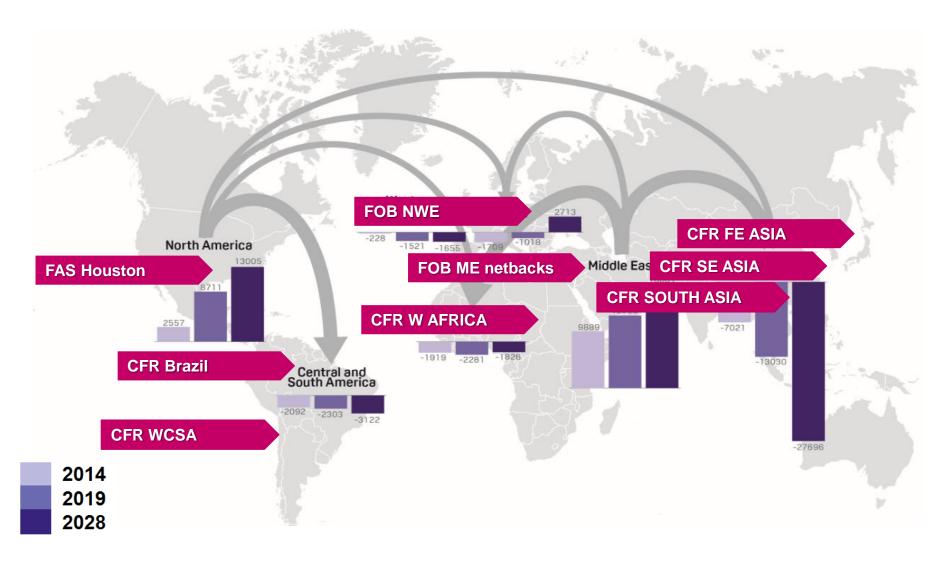
#### US PE PROJECTS 2017-2020s

Company	Location	Capacity (mt/yr)	Product	Startup	Status
OPERATIONAL					
Dow Chemical	Freeport, Texas	400,000	LLDPE	Sep-17	Operational
Chevron Phillips	Sweeny, Texas	500,000/500,000	HDPE/LLDPE	Sep-17	Operational
Exxon Mobil Chemical	Mont Belvieu, Texas	650,000/650,000	LLDPE/HDPE	Oct-17/Q-4	Operational
Ineos/Sasol	La Porte, Texas	460,000	HDPE	Nov-17	Operational
Dow Chemical	Plaquemine, Louisiana	350,000	LPDE	Q1-18	Operational
CONSTRUCTION					
Sasol	Lake Charles, Louisiana	450,000/450,000	LLDPE/LDPE	H2-18/H1-19	Construction
Formosa Plastics	Point Comfort, Texas	400,000/400,000	LDPE/HDPE & LLDPE	H1-19	Construction
LyondellBasell	La Porte, Texas	549,000	HDPE	2019	Construction
Exxon Mobil Chemical	Beaumont, Texas	650,000	LLDPE	2019	Construction
Shell Chemical	Monaca, Pennsylvania	550,000/550,000/500,000	HDPE/LLDPE/LLDPE	2021/2022	Construction
PLANNING					
NOVA Chemical/Borealis	Bayport, Texas	625,000	HDPE	2021	Planning
PTTGC/Daelim	Belmont County, Ohio	TBD	TBD	2021	Planning/FID-18
Exxon Mobil/SABIC	Corpus Christi, Texas	TBD	TBD	2020s	Planning/FID-18
Dow Chemical	US Gulf Coast	600,000	TBD	2020s	Planning
FG LA LLC	St James, Louisiana	400,000/400,000	HDPE/LLDPE	2022	Planning
FG LA LLC	St James, Louisiana	400,000/400,000	HDPE/LLDPE	2027	Planning

Source: Company announcements, regulatory filings



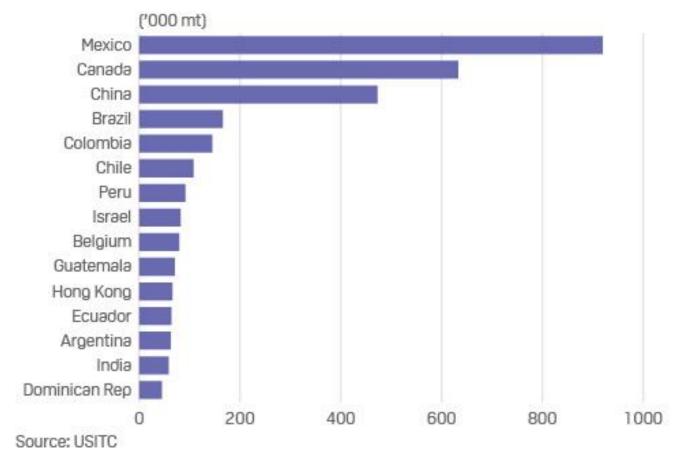
# Understanding global PE pricing, trade flows is key





#### Latin America to remain key destination for US exports

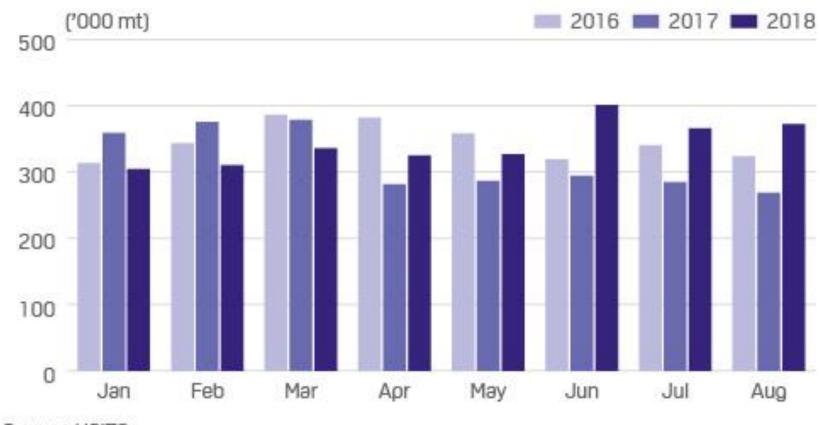
#### **TOP DESTINATIONS FOR US PE IN 2017**



- Mexico remains top buyer; nearly
   1 million mt/year despite recent
   capacity addition (Braskem Idesa)
- China third at 18% in 2018; US market share was expected to grow
- Six of 15 top destinations are in South America; Central America cracks Top 5, led by Guatemala
- In 2017, US exported 3.5 million mt, down from 2016 because of Harvey
- First wave of PE expansions adding nearly 6.5 million mt/yr through 2019

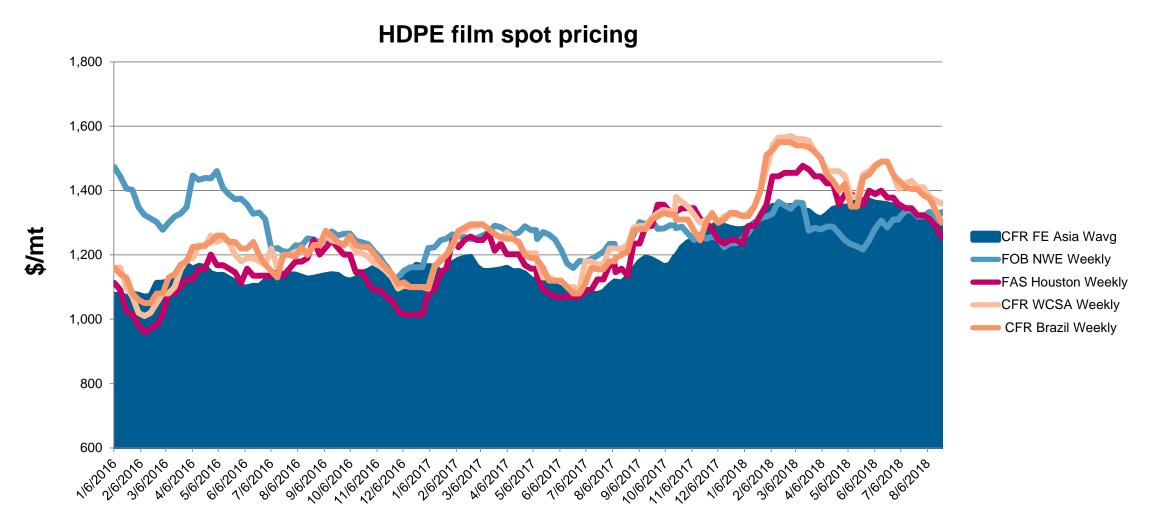
#### US exports on the rise as PE capacities come online

#### TOTAL US PE EXPORTS



Source: USITC

#### Naphtha-based regions set global PE price





# US-China trade tensions add potentially huge wrinkle to PE strategy

#### TARIFFS AFFECTING US-CHINA PETROCHEMICAL TRADE

US \$250 billion in Chinese goods includes:		China \$110 billion in US goods includes:		
Petrochemicals Uses		Petrochemicals	Uses	
Caustic soda	Alumina, pulp, paper feedstock	High-density polyethylene	Milk jugs, grocery bags, combs	
Ethane	Ethylene feedstock	Linear low density polyethylene	Plastic wrap, detergent bottles	
Butane	Lighter fuel, aerosol propellant	стујене	Feedstock for resins	
Ethylene	Resin feedstock	Butadiene	Precursor to rubber	
Propylene	Resin feedstock	Benzene	Chemical feedstock	
Butadiene	Precursor to rubber	Styrene	Fiberglass, rubber, plastic feedstock	
Benzene	Chemical feedstock	Ethylene dichloride	Precursor to polyvinyl chloride	
Toluene	Gasoline additive	Acetone	Solvent	
Mixed xylenes	Octane enhancer	Purefied terephthalic acid	Plastic bottles	
Styrene	Fiberglass, rubber, plastic feedstock	Acrylonitrile	Synthetic rubber, fibers, plastics	
Cumene	Chemical feedstock	Methanol	Fuel, antifreeze, solvent	
Normal butanol	Coatings, adhesives, solvent	Propylene	Precursor to polypropylene	
Ethylene glycol	Precursor to PET	Toluene	Gasoline additive	
Ethylene oxide	Precursor to ethylene glycol	Paraxylene	Precursor to PET, polyester fiber	
Acetic acid	Feedstock for industrial chemicals	Mixed xylenes	Octane enhancer	
		Propane	Heating, propylene	
		Paraffin wax		
		Petroleum asphalt		
FINISHED PRODUCTS FROM CHINA NO	W FACING US TARIFFS			
Vinyl flooring	Conveyor belts	Handbags	Toilet tissue	
Sacks and bags	Rubber hoses	Insulated lunch bags	Synthetic fibers	
Spools	Truck and bus tires	Bamboo flooring panels	Carpet	
baseball gloves	Trunks and suitcases	Cork	Floor and wall tiles	
Rainwear				

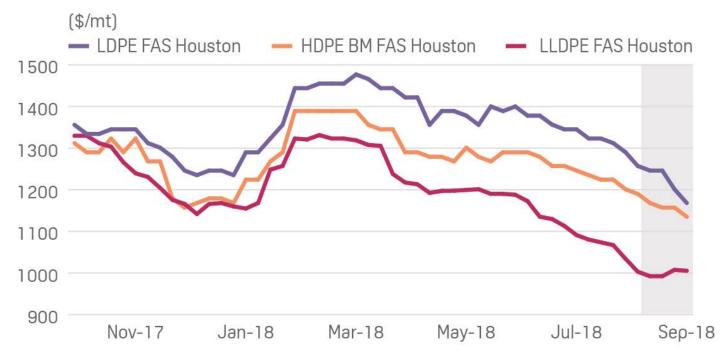
Source: Office of the US Trade Representative, American Chemistry Council



#### US export prices already under pressure from surplus

- US export pricing of key PE grades has fallen 13-17% since early June; domestic pricing has remained range-bound
- Trend has continued since tariff enforcement by China; has affected grades beyond listed
- Some US producers argue drop will be temporary, perhaps 6 months, as trade flows adjust
- Buyers, particularly in Latin America, feel emboldened, await further decreases in Q4

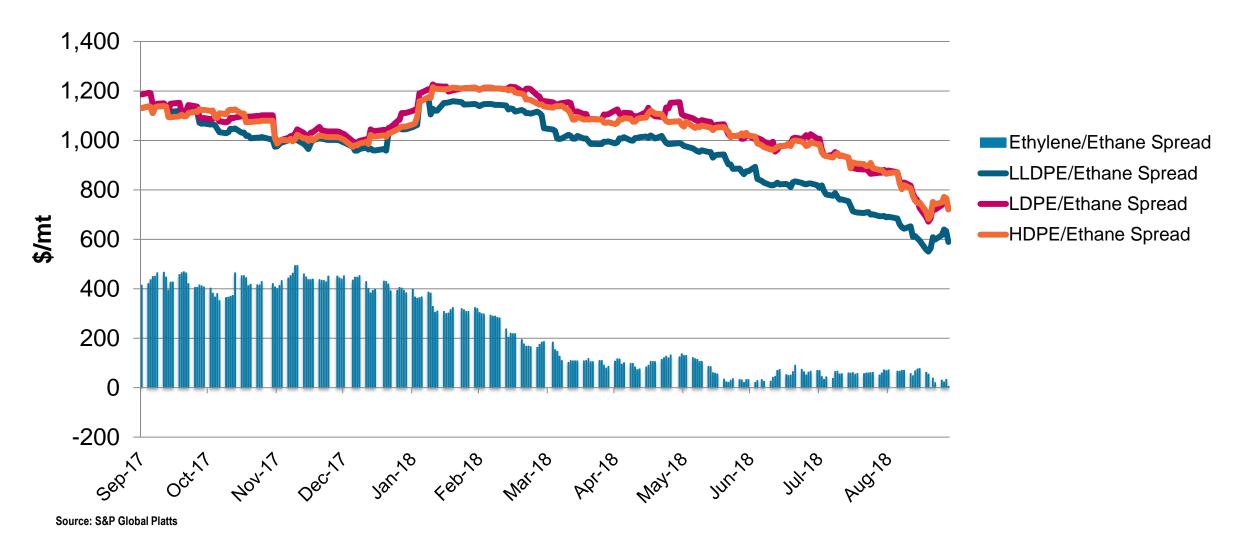
#### **US PE EXPORT PRICING**



Note: Shaded area refers to China's implementation of tariffs on select US PE grades Source: S&P Global Platts

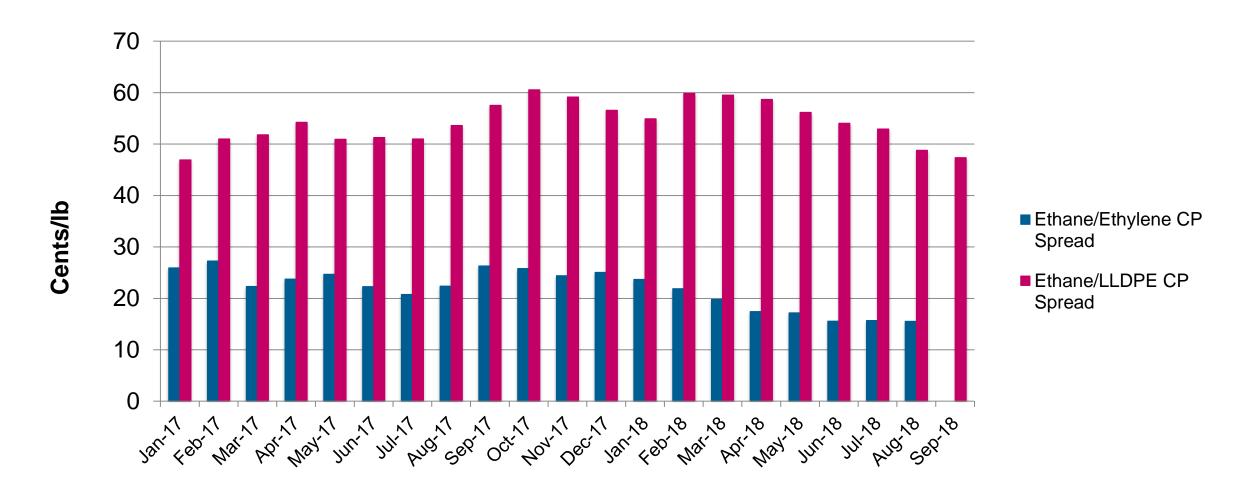


#### Derivative spreads still healthy, but slipping



S&P Global Platts

#### US producers look to protect PE margins



Source: S&P Global Platts



#### Key takeaways

- C2, ethylene fundamentals yielding major margin compression at cracker level
- Margin shifts to polymerization unit, with integrated PE producers benefiting most
- PVC, other downstream producers in USGC also seek to back-integrate
- Higher-cost, naphtha-based regions including Asia set global PE pricing
- However, margin erosion evident as capacities ramp up, US market lengthens
- Further, US-China tensions have global markets on edge (HD, LLDPE)
- CFR LLDPE pricing in Latin America falls to record lows, other grades also slide
- Dollar strength stifles imports in South America, boosts appetite for domestic product
- Bottom line: Monitoring of global polymer markets critical going forward

#### Join us Thursday at the S&P Global Platts Workshops

#### Agenda

Petrochemical Workshop – Grand Ballroom I						
9 am	Registration Opens					
9:30 am	Workshop Opening Remarks					
9:35 am	Aromatics – Demand Drivers at a Glance					
	Kevin Allen, Petrochemical Analyst, S&P Global Platts					
	<ul> <li>Effect of China antidumping duties on US styrene</li> <li>Gasoline blending in USGC region</li> </ul>					
	PTA feedstocks and derivatives					
10 am	Polymers – Pricing Dynamics Explained					
	Bernardo Fallas, Associate Editorial Director, Americas Petrochemicals, S&P Global Platts					
	<ul> <li>Update on expansions, projects in USGC</li> </ul>					
	<ul> <li>Domestic vs. export markets</li> </ul>					
	Importance of Asia, Latin America					
10:25 am	Logistics – Identifying, Overcoming Hurdles to Exports					
	Kristen Hays, Senior Editor, Petrochemicals, S&P Global Platts					
	Make it, move it – Accommodating more exports					
	<ul> <li>East Coast, West Coast ports battle for a piece of the action</li> </ul>					
	<ul> <li>Truck driver shortage, lack of shipping space a</li> </ul>					

growing squeeze



www.platts.com Now online at pmc.platts.com

	<b>S&amp;P Global</b> Platts
O/Octo	POLYI LATIN AM Volume 3 / Issue 40 / 0 LATIN AMERICAN SPOTI
	Domestic serverses
	Demostic assessments  Mexico Delivered Mexico City (\$/mt) Delivered Mexico City (MON\$/mt)  Brazil Delivered Sao Paulo (Rf/mt) Delivered Sao Paulo (Rf/mt)
	Colombia Delivered Bogota (\$/mt) Delivered Bogota (\$CUL\$/mt)
	Argentina Delivered Buenos Aires (\$/mt) Delivered Buenos Aires (AR\$/mt)
	Import assessments CFR West Coast South America (\$ CFR Brazil (\$Imt)
	Export assessments FOT Brazil (\$/mt) FAS Houston (\$/mt)* Note: CFR West Coast South Americ
essments r i. ^basis L/I	(Argentina, Paraguay, Uruguay). Don published daily on Platts Petrochemi Source: SEP Global Platts
OR-ALK	FOREX US\$1 equals:
	MARKET HIGHLIGHTS
	<ul> <li>PVC import pricing sl</li> <li>Brazilian market slov</li> <li>LLDPE import pricing</li> <li>Ecopetrol's LDPE line</li> <li>WCSA import LDPE p</li> </ul>
	COMMENTARY
	HDPE
FOB NE / 41! ices, and US ice month. "	Demand in WCSA, Co     Upcoming elections:
ow onlin	Import pricing for high-de American regions held sta level of 2018 amid continu

Along South America's Pa at \$1,255-1,265/mt CFR We offers heard in the range \$

www.platts.com Now

www.platts.com Now online at omc.platts.com

	<b>&amp;P Globa</b> atts	al					ERO EN ST	At.
POLYI P	OL	<b>YME</b>	ERSO	CAN			* Reg	A CONTRACTOR
_	ume 41 / Issue							
lume 3 / Issue 40 / 0 AME	ERICAS POLYM	ER SPOT PRICE	ASSESSMENTS					
TIN AMERICAN SPOT I		FAS Houston (\$/mt)	US Contract dlvd ralicar (cts/lb)	US Domestic (\$/mt)	FOT Brazil* (\$/mt)	CFR Brazili (\$/mt)	CFR WC South America (\$/mt)	
PVC S	SUSP	760-770	47.00-49.00	1036.16 -1080.25	_	870-880	830-840	
LDPE	C-D	1113-1135	78.50-79.50	1730.61 - 1752.66	1210-1220	1195-1205	1195-1205	
	E (Butene)	981-1003	64.50-65.50	1421.97 -1444.01	1070-1080	1065-1075	1035-1045	
ico LLDPE		1003 -1025		_	_	_	_	
ered Mexico City (\$/mt) LLDPI ered Mexico City (MXN\$/mt)	E metallocene	1124 -1146	-			_	_	
HOPE	Ini	1069-1091	66.50-67.50	1466.06 -1488.11	1130-1140	1125-1135	1165-1175	
Brok Broke B	idg	1113-1135	66.50-67.50	1466.06 -1488.11	1230-1240	1205-1215	1195-1205	
ered São Paulo (\$/mt)		1157-1179	69.50-70.50	1532.20 -1554.24	1250-1260	1245-1255	1255-1265	
ered Sao Paulo (R\$/mt) Yarn		_						
mbia								
	omo Inj	1620-1642	77.50-78.50	1708.57 -1730.61	1480-1490	1375-1385	1345-1355	
ered Bogota (COL\$/mt) Fibe			79.50-80.50	1752.66 - 1774.70			_	
ntina Cop	iol	1686-1708			1550-1560	1440-1450	1400-1410	
ered Buenos Aires (\$/mt) PS G-	D	1543-1565	94.00-96.00	2072.32 -2116.42	_			
ered Buenos Aires (AR\$/mt) HPS		1631-1653	103.00-105.00	2270.74 -2314.83				
ort assessments ABS In		1031-1033	105.00-107.00	2314.83 -2358.92	_			
West Coast South America (\$	-,							
Brazil (\$/mt) PET 6	ottle grade	1951-1973#	1940-1962##					
Brazil (\$/mt) Ameri Houston (\$/mt)*  CFR West Coast South Americ entina, Paraouay, Uruouay), Dorr		ts in Chile, Peru, Color	mbia and Ecuador. # US Pl	ontract Delivered raicat." FET bottle grade refers to DD				coast sout
REX		(\$/mt)	(S/mt)	South Asia	Domestic	B-1		
1 coupls		(writing)	(army	(\$/mt)	(Yuan/mt)	Polymers Polyvinyl Chl	14-	
PVC S	SUSP	869-871	859-861	919-921	^7140-7160			
RKET HIGHLIGHTS					^^6790-6810		Polyethylene lensity Polyethylene	
VC import pricing st LDPE	0.0	1119-1121	1139-1141		9630-9670		Polyethylene	
	E (Butene)	1109-1111	1129-1131	1109-1111	9630-9670	Polypropyler		
II not	E (C6 metallocene)	1239-1241	1249-1251	1269-1271		Polystyrene	-	
LDPE import pricing							Butadiene Styrene	
copetrol's LDPE line HDPE		1169-1171	1189-1191	1179-1181	_			
VCSA import LDPE p Bmi		1274-1276	1284-1286	1274-1276	_	Poryetnylene	Terephthalate	
Film		1279-1281	1274-1276	1269-1271	11080-11120	Dahamar Fac	detecks Olefice	
MMENTARY Yarr	1	1219-1221	1239-1241		_		dstocks: Olefins	
PPRa	-66-	1239-1241	1249-1251	1254-1256	10430-10470	Ethylene		
	ection	1239-1241	1249-1251 1239-1241	1254-1256 1254-1256	10430-10470	Ethylene Gly	col	
IPE Fibe		.234-1230	1609-1641	1694-1690		<ul> <li>Propylene</li> </ul>		
Cop		1269-1271	1279-1281	1279-1281	_	Butadiene		
	Film	1244-1246	1269-1271	1274-1276	-			

			(\$/mt)	(Yuan/mt)	Polyvinyl Chloride	4
	869-871	859-861	919-921	^7140-7160	Low Density Polyethylene	5
				^^6790-6810	Linear Low Density Polyethylene	7
	1119-1121	1139-1141	_	9630-9670	High-Density Polyethylene	9
)	1109-1111	1129-1131	1109-1111	9630-9670	Polypropylene	n
allocene)	1239-1241	1249-1251	1269-1271		Polystyrene	13
	1169-1171				Acrylonitrile Butadiene Styrene	15
		1189-1191	1179-1181	_	Polyethylene Terephthalate	15
	1274-1276	1284-1286	1274-1276		- Polyediylerie rerepitatalate	10
	1279-1281 1219-1221	1274-1276 1239-1241	1269-1271	11080-11120	Polymer Feedstocks: Olefins	
	1219-1221	1239-1241			Ethylene	18
	1239-1241	1249-1251	1254-1256	10430-10470		
	1234-1236	1239-1241	1254-1256	10430-10470	Ethylene Glycol	19
					- Propylene	20
	1269-1271	1279-1281	1279-1281	-	Butadiene	21
	1244-1246	1269-1271	1274-1276	-		
	1239-1241	1274-1276	1274-1276	-	Polymer Feedstocks: Aromatics	
					Paraxylene	23
	1484-1486	1534-1536		-	Styrene	24
	1544-1546	1599-1601				
	1554-1556*				Polymer Feedstocks: Intermediates	
	1599-1601*				Purified Terephthalic Acid	26
	1799-1801	1829-1831	_	_		
					Acrylonitrile	27
le	1294-1296*	1364-1366**			Ethylene Dichloride / Vinyl Chloride Monomer	28
				re basis L/C 0-30 days Credit carbide-based production.		
o fire retard	ant grade, "Denotes FI			enotes FOB Southeast Asia	News	29
esia , Vietna	ım, Mələysiə).					



Petrochemicals

# Innovative market insights

Driven by analytics, powered by fundamentals

