



Exploring the intertwining relationship between PO and polyether polyols

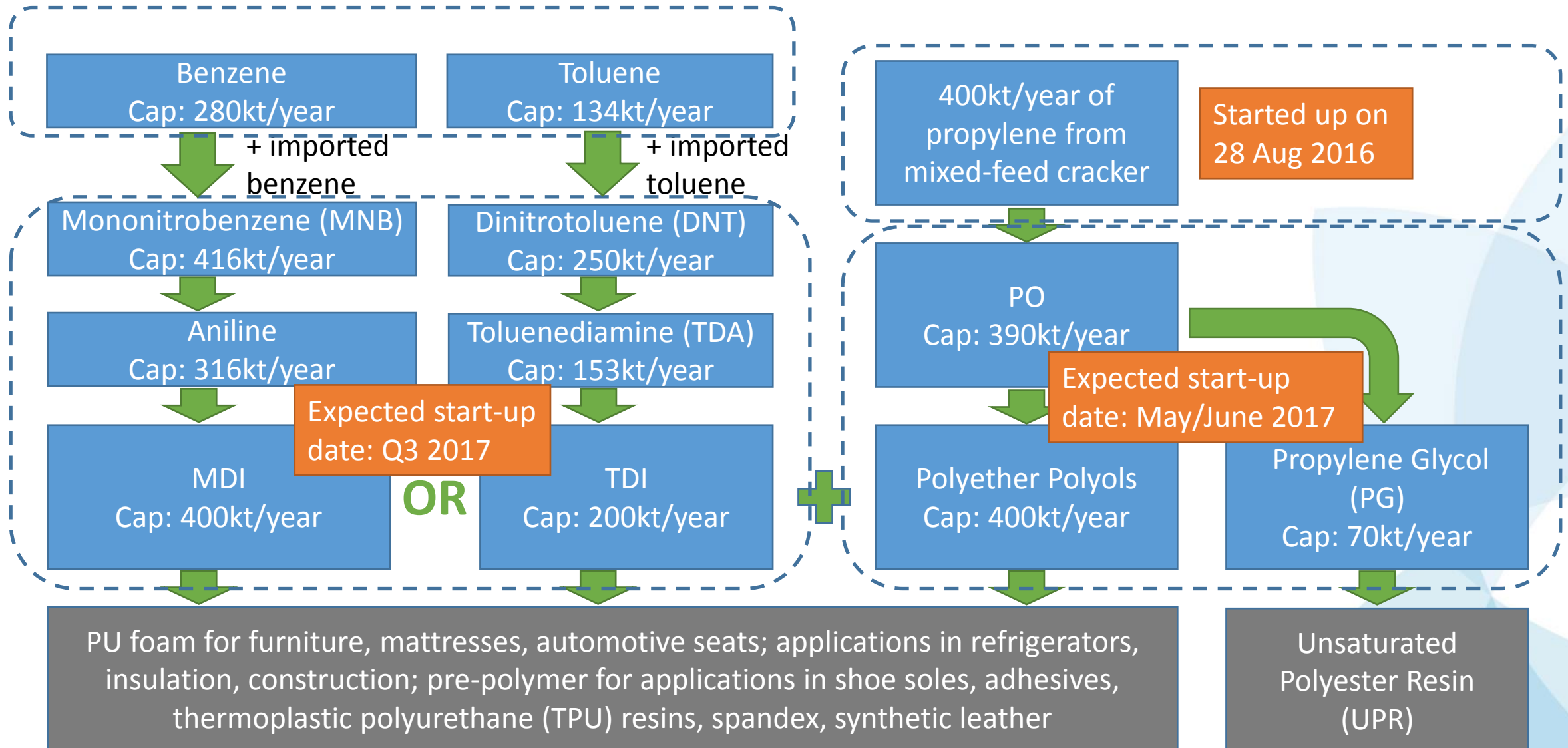
Matthew Chong
Markets Editor

Asia Petrochemical Industry Conference
19 May 2017
Royton Sapporo, Japan

Agenda

- ▶ Sadara updates
- ▶ Propylene oxide (PO) and polyether polyols
 - ▶ Consumption by application
 - ▶ Price trend analysis
 - ▶ Supply-demand analysis
 - ▶ Changing share in PO technology production processes
 - ▶ PO plant expansions
 - ▶ Trade flow analysis

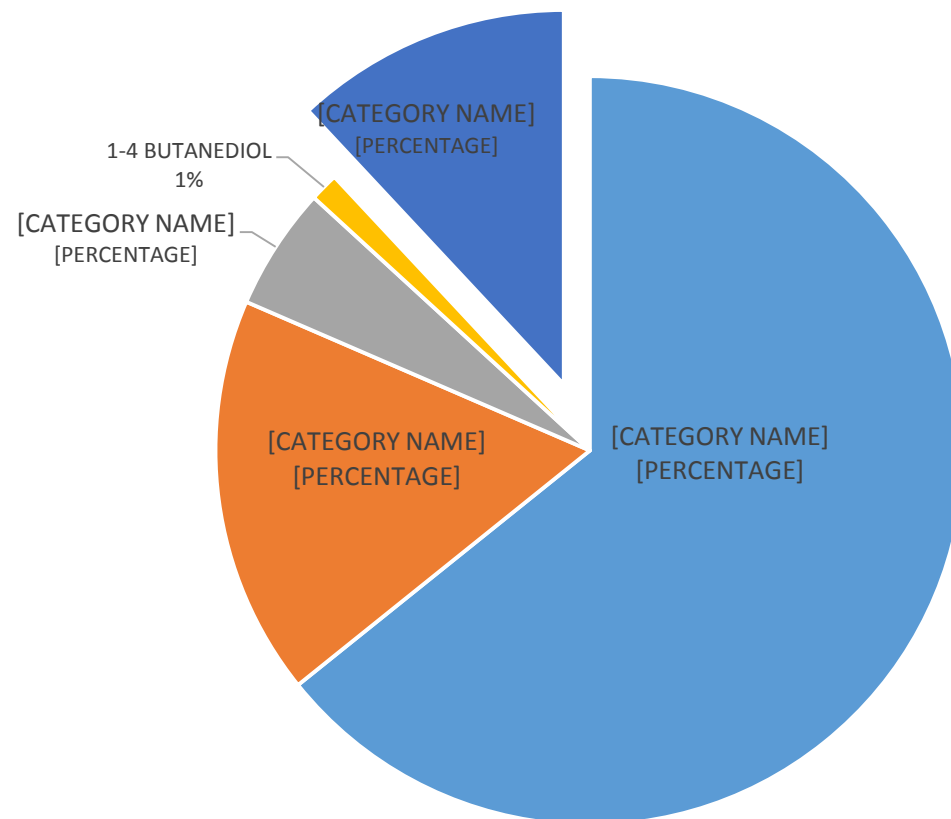
Sadara's PU Chain Facilities



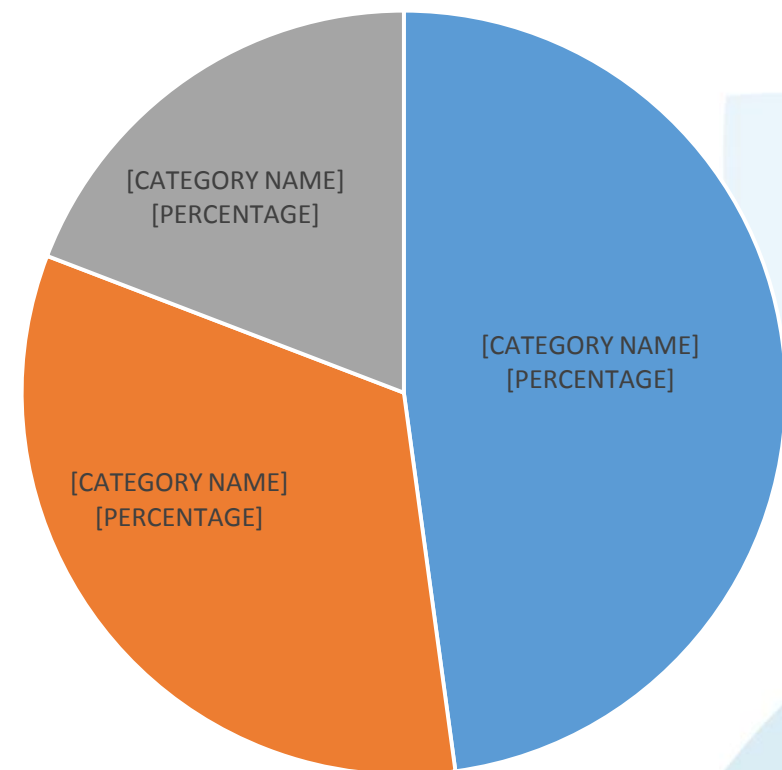
Sources: Sadara, industry

PO-Polyols Consumption by Application

PO Consumption by Application, 2016



Polyols Consumption by Application, 2016

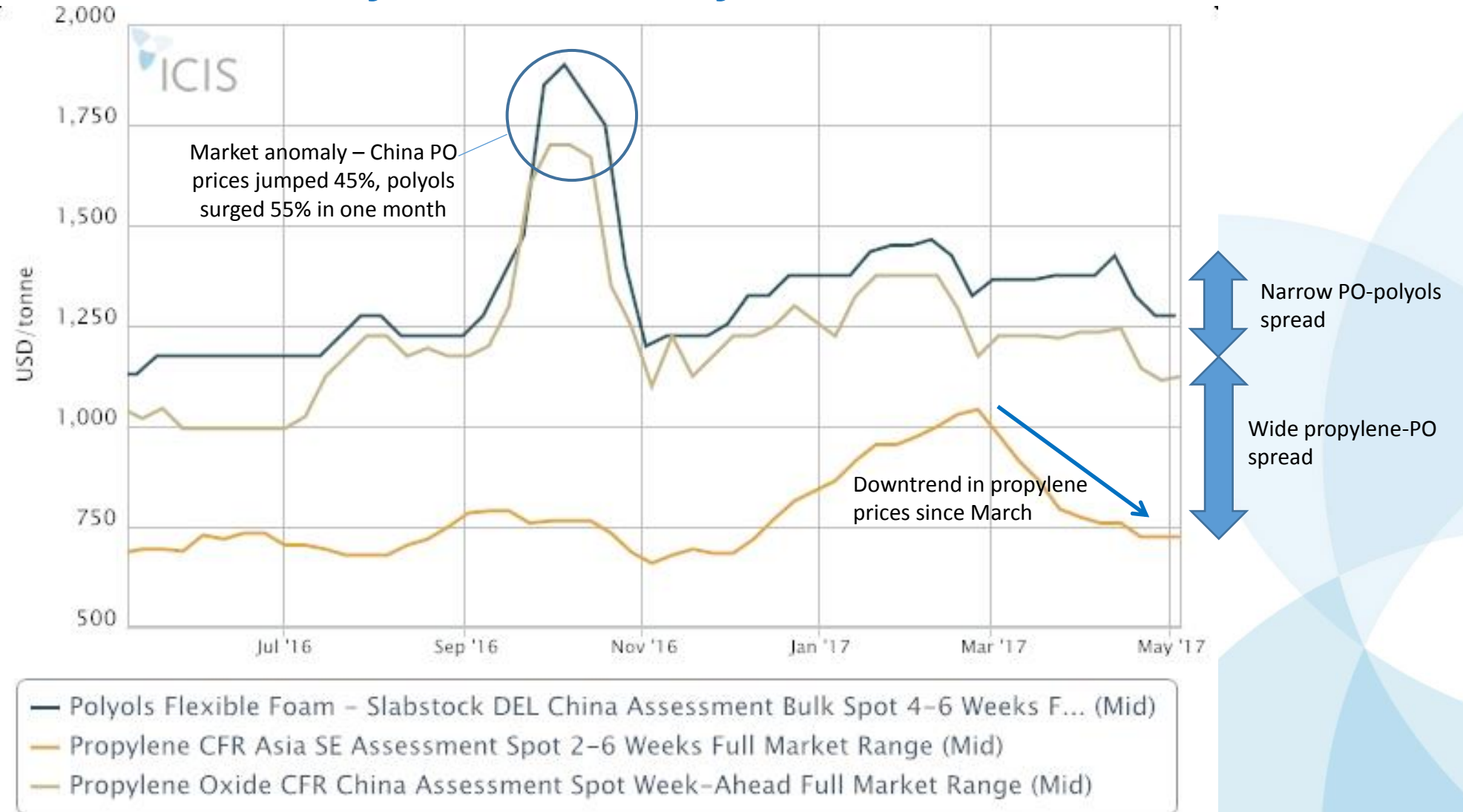


Source: ICIS Supply-Demand Database

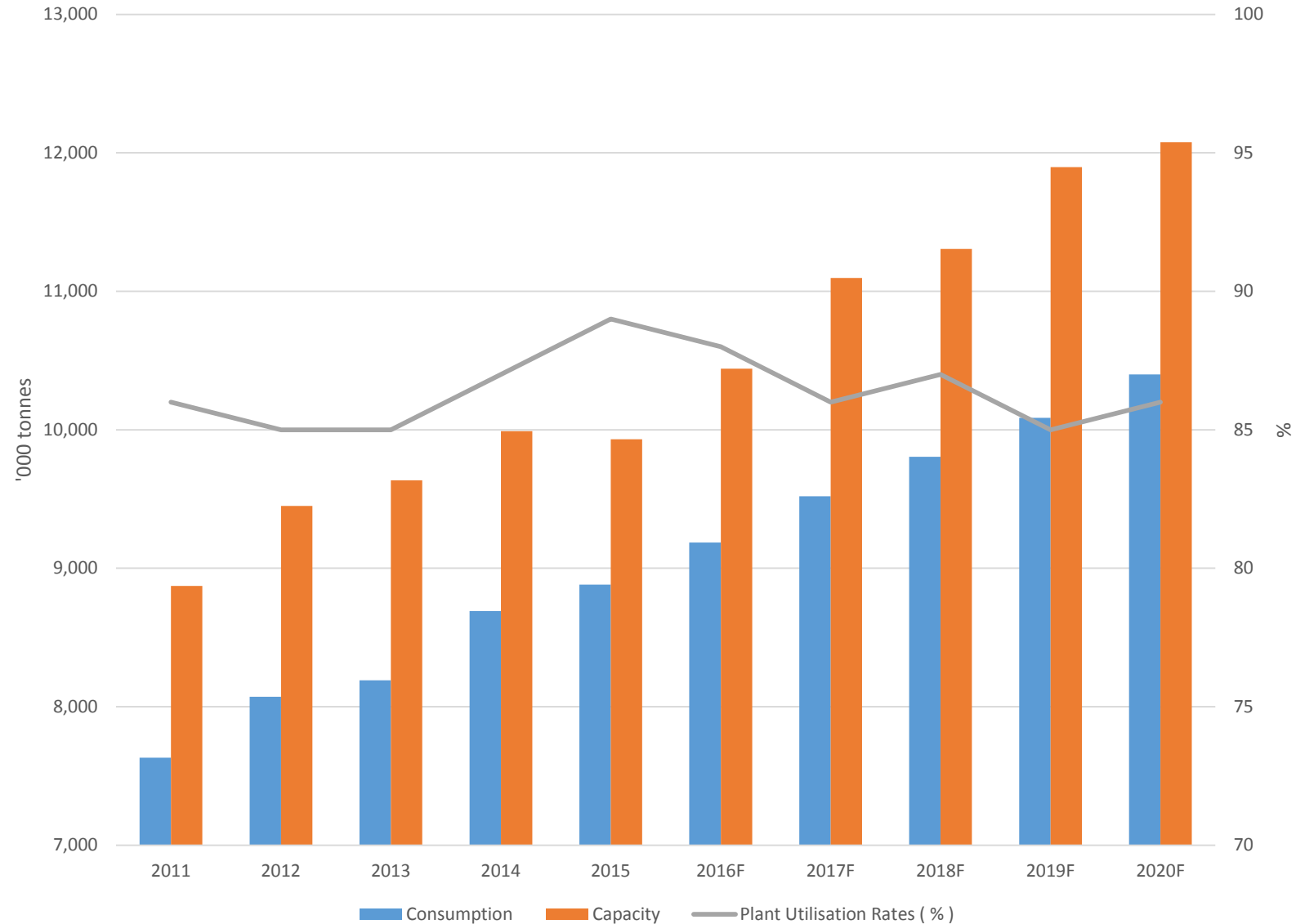
Asia Propylene-PO-Polyols Price Trend Analysis May 2007 – May 2017



Asia Propylene-PO-Polyols Price Trend Analysis May 2016 – May 2017

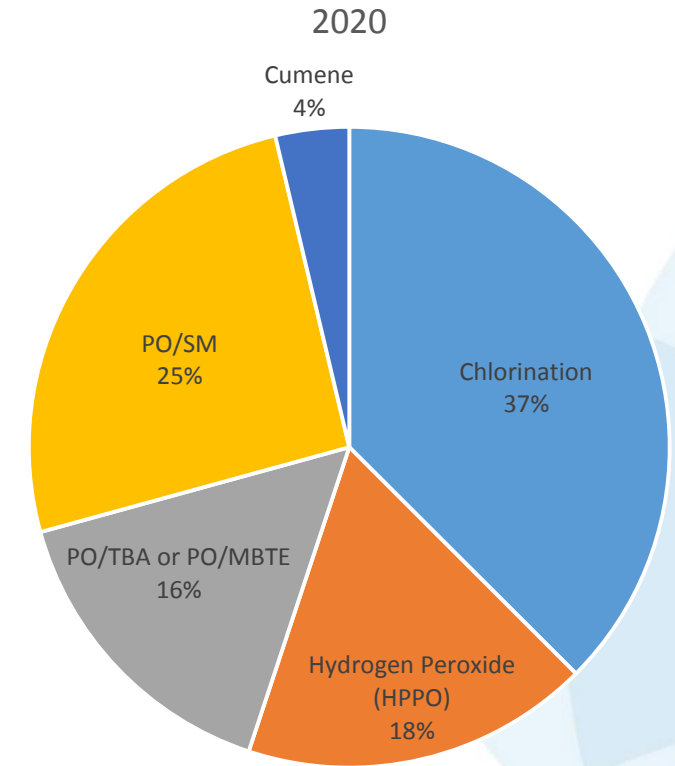
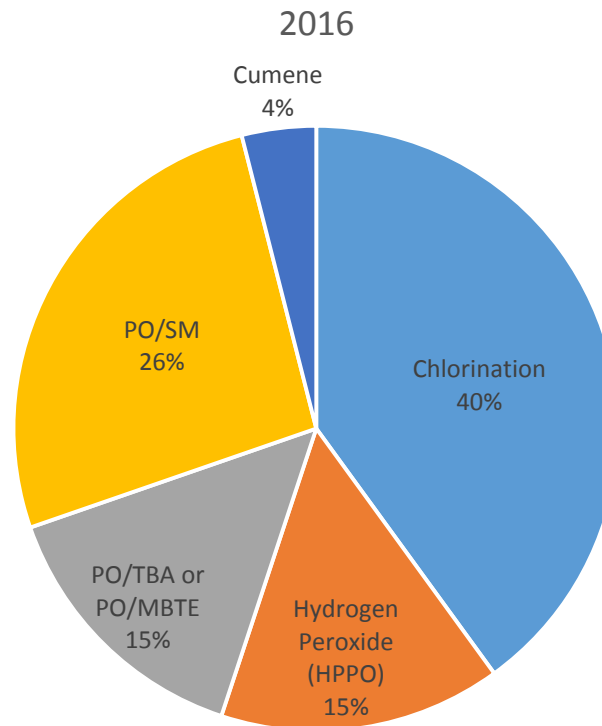
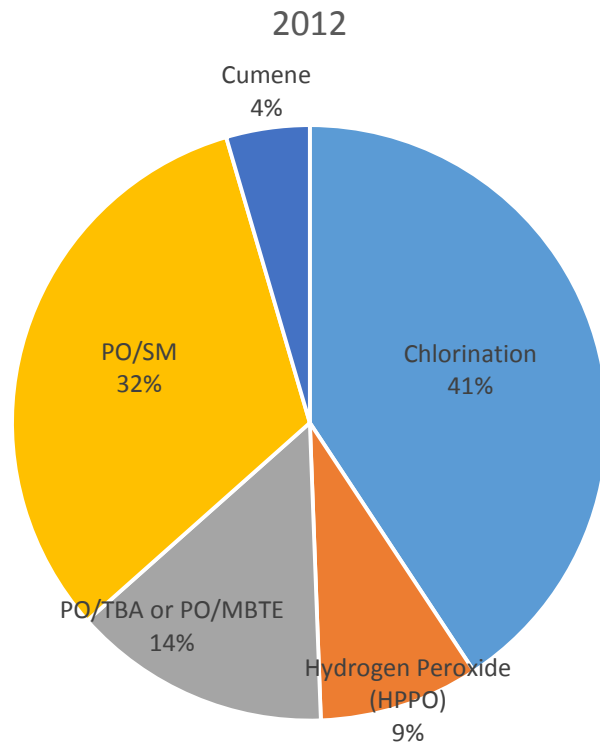


Global PO Supply-Demand Analysis



- Capacity growth projected to rise faster than consumption growth in coming years.
- Plant operating rates on a declining trend since 2015 due to new capacity additions.

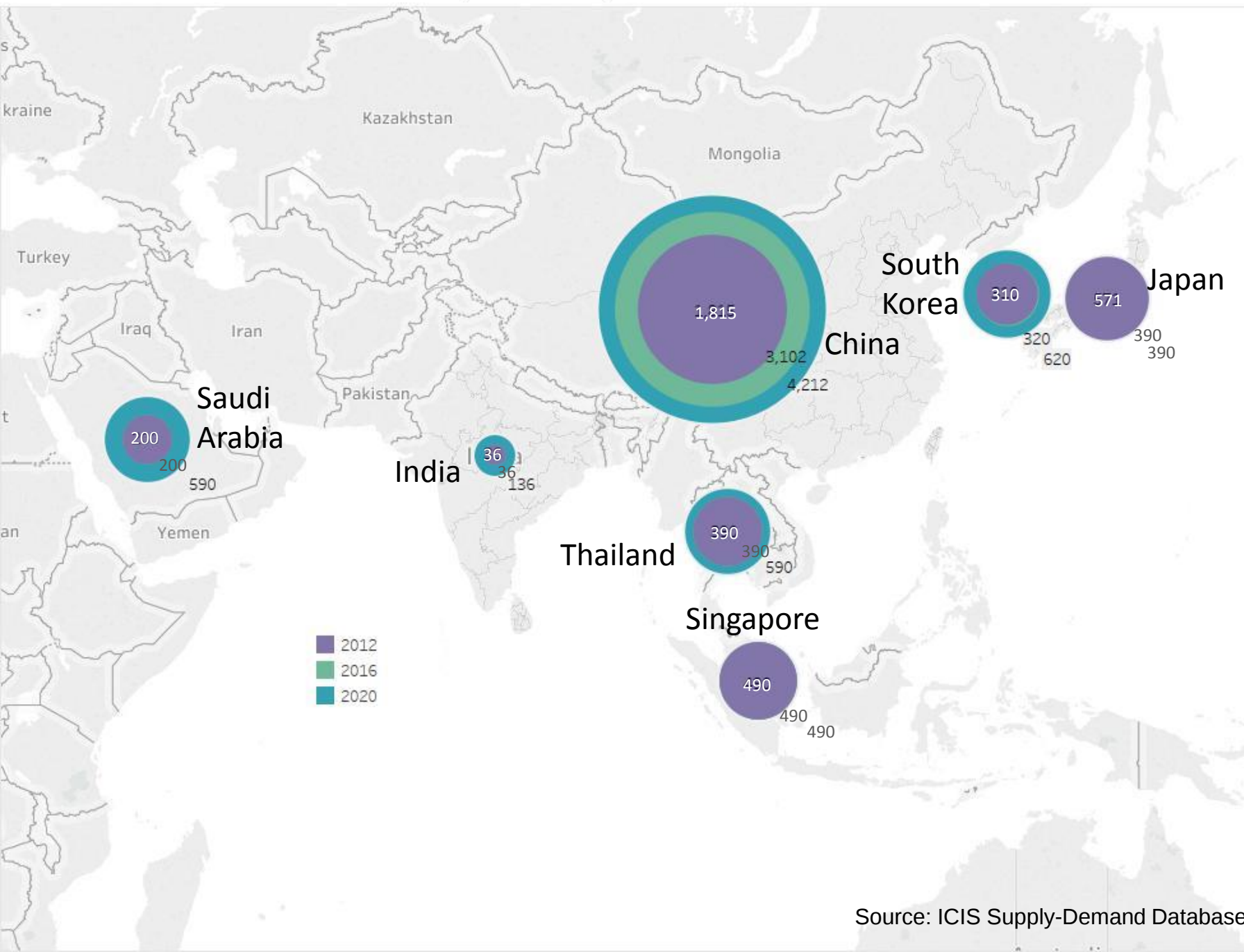
Global PO Production Process



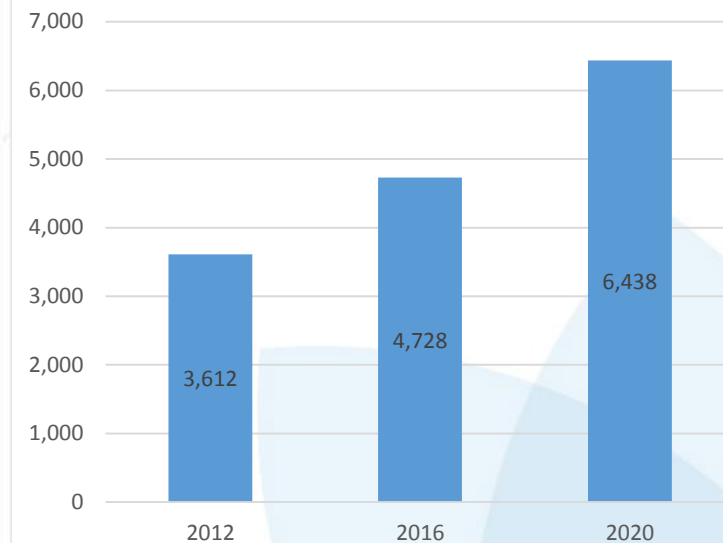
Source: ICIS Supply-Demand Database

- Environmental regulations in China result in declining share of chlorination route
- HPPO route gaining popularity for new capacity expansions
- Proprietary technologies (e.g. Sumitomo Chemical's cumene route) that are difficult to replicate creating barriers of entry for small players

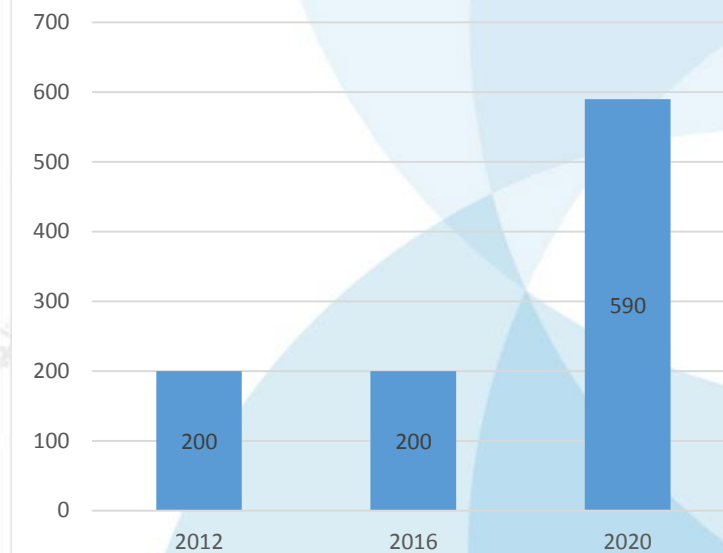
Propylene Oxide Production Capacity ('000 tonnes)



Asia Pacific PO Capacity

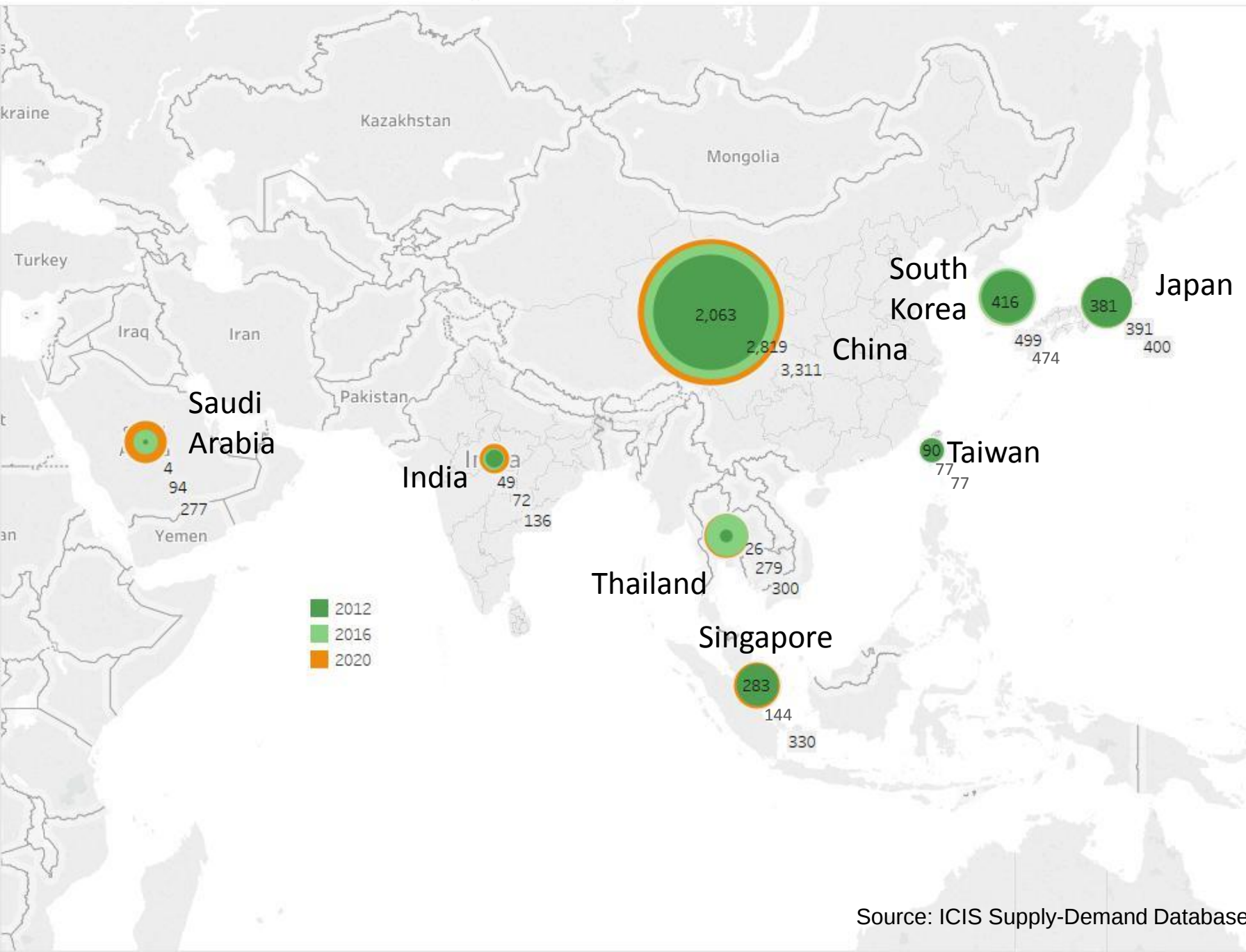


Middle East PO Capacity

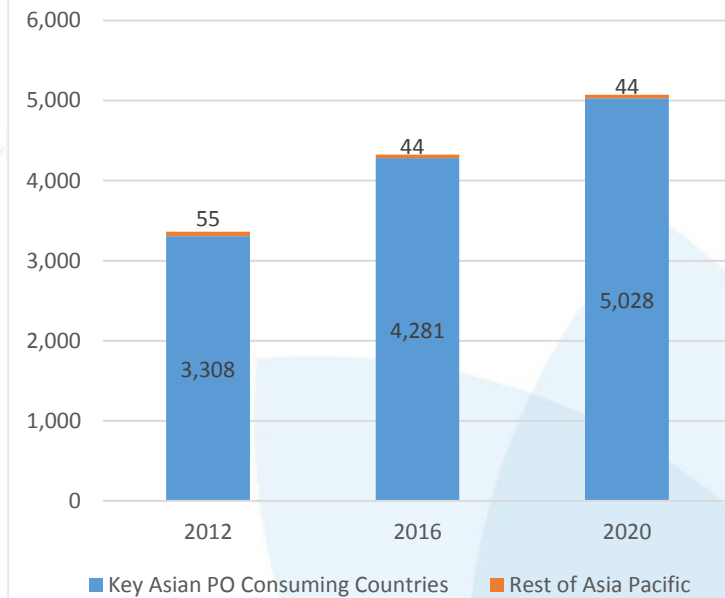


Source: ICIS Supply-Demand Database

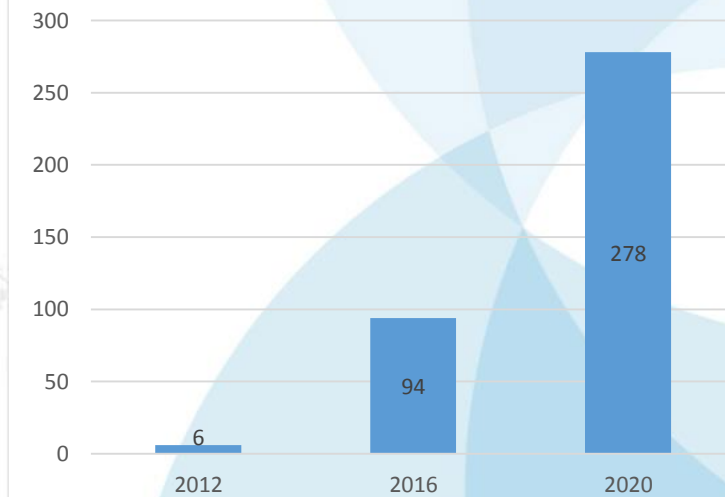
Propylene Oxide Consumption Growth ('000 tonnes)



Asia Pacific PO Consumption



Middle East PO Consumption



Source: ICIS Supply-Demand Database

China PO Expansion

Company	Location	Capacity ('000 tonnes)	Production process	Target onstream date	Status	Comment
CNOOC and Shell Petrochemicals Co (CSPC)	Huizhou, Guangdong, China	320	PO/SM	2018	Planned	Expansion
Shandong Sanyue Chemical	Wudi, Shandong, China	80	Chlorination	H2 2017	Completed	New unit; has another two 80kta units which are running
Blue Planet Eco New Materials	Changzhou, Jiangsu, China	400	Unknown	2018	Construction underway	New unit
Nanjing Hong Bao Li Group	Nanjing, Jiangsu, China	120	Unknown (to be developed in-house)	End-2017 or later	Construction underway	New unit
Jinling Huntsman New Materials	Nanjing, Jiangsu, China	240	PO/MTBE	June/July 2017	Construction underway	New unit
Jiangsu Yida Chemical	Taixing, Jiangsu, China	150 + 220	Unknown	2018 or later	Planned	New unit

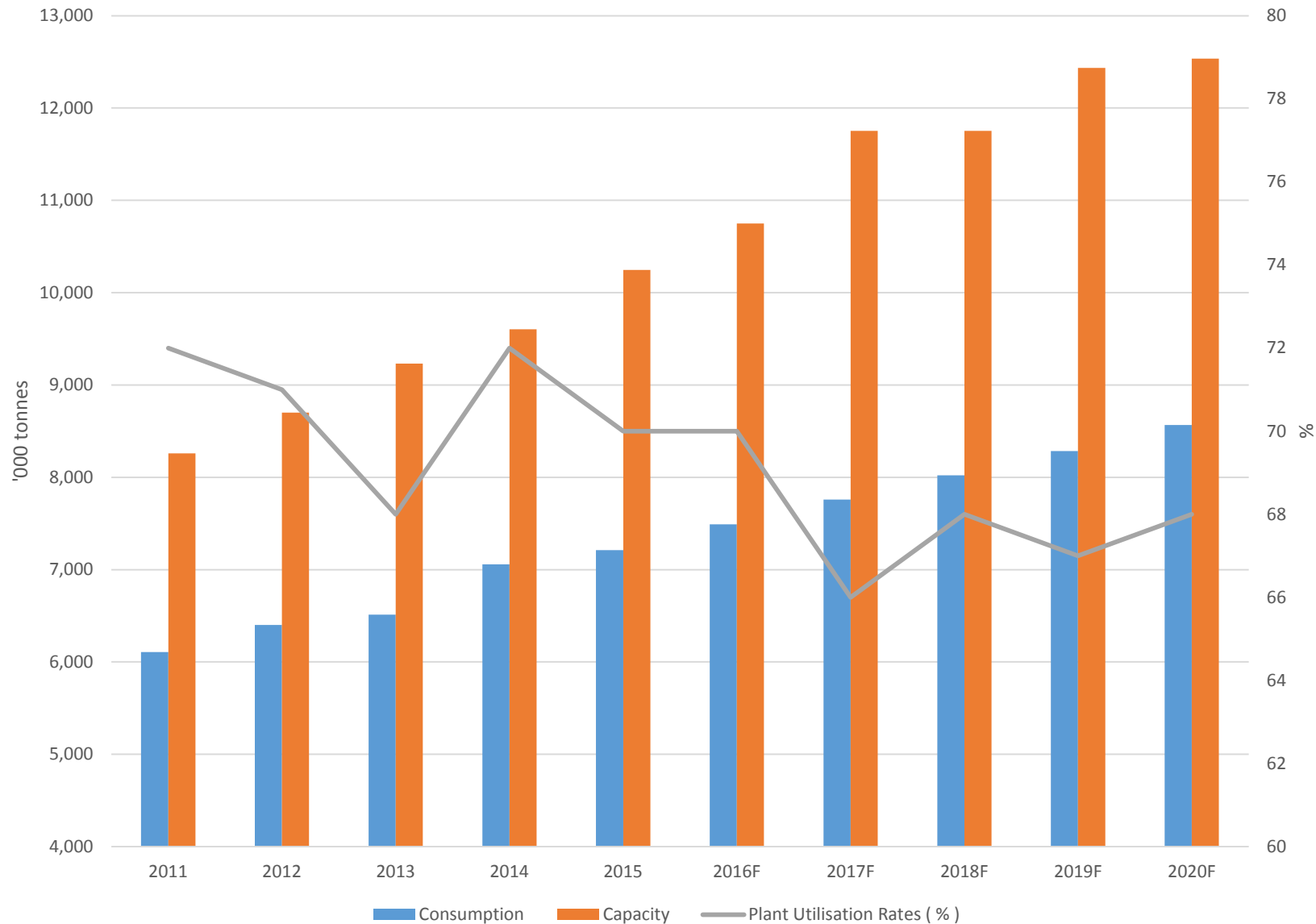
Sources: ICIS, market

Global ex-China PO Expansion

Company	Location	Capacity ('000 tonnes)	Production process	Target onstream date	Status	Comment
Sadara Chemical	Al Jubail, Saudi Arabia	390	HPPO	End-May 2017	Construction underway	New unit
SKC Chemicals Group	Ulsan, South Korea	300	HPPO		Cancelled	New unit
S-Oil	Ulsan, South Korea	300	Cumene	Q2 2018	Construction underway	New unit
PTTGC	Rayong, Thailand	200	Cumene	2019	Planned	New unit; collaboration with Toyota Tsusho and Sanyo Chemical Industries
LyondellBasell	US Gulf Coast, USA	450	PO/TBA	2019	Planned	New unit

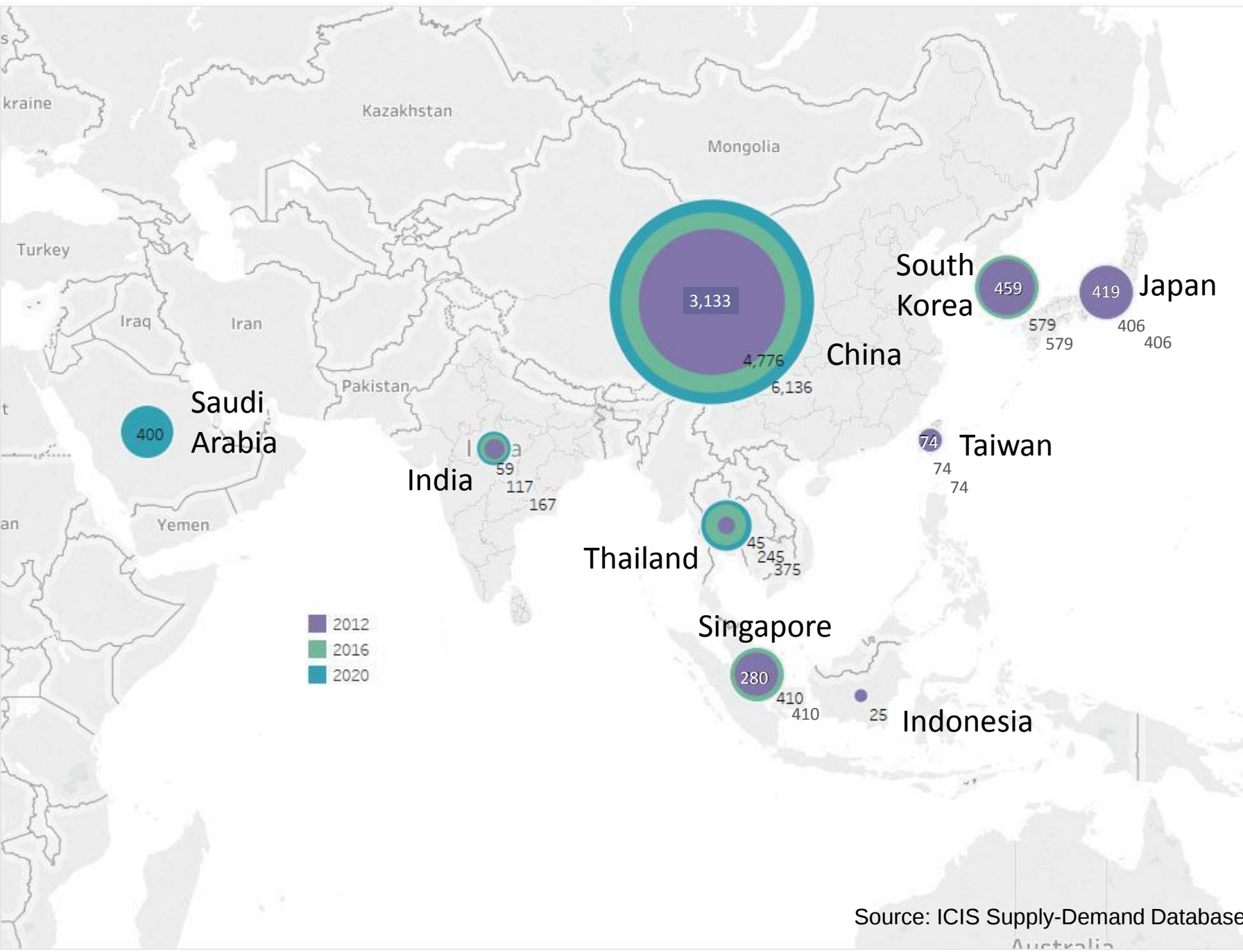
Sources: ICIS, market

Global Polyether Polyols Supply-Demand Analysis

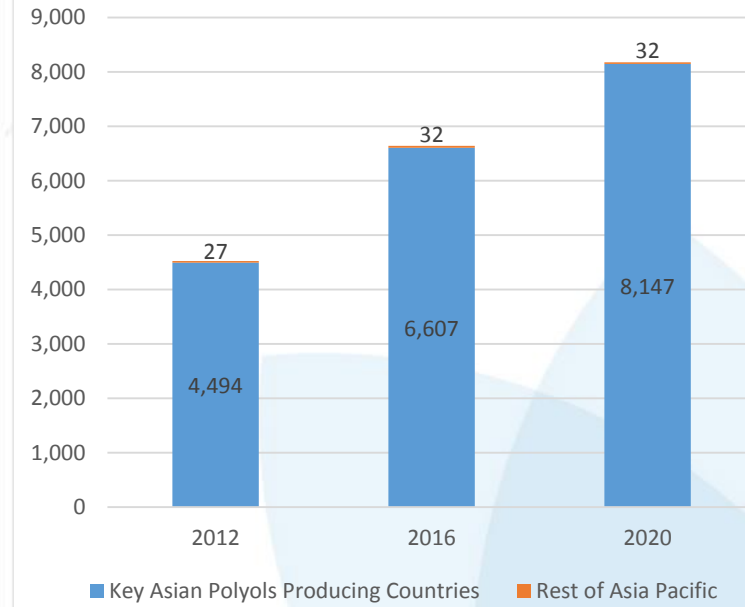


- Market oversupply as capacity far outstrips consumption
- Plant operating rates on a downtrend since 2014
- Capacity growth to reach a plateau by 2020

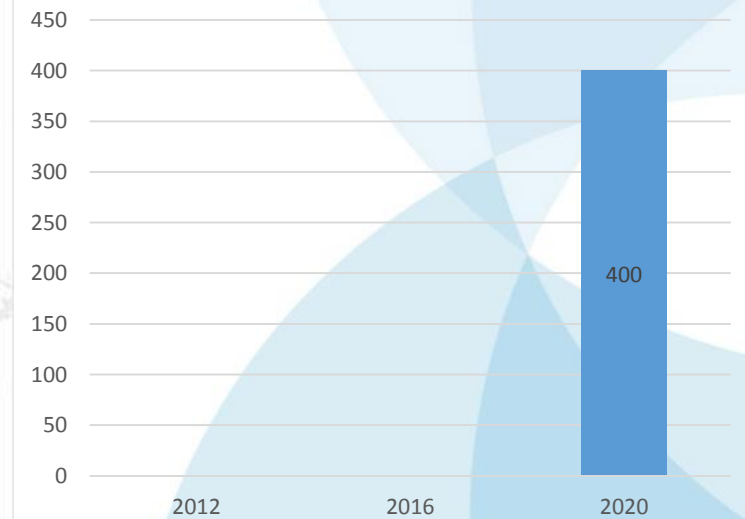
Polyols Production Capacity Growth ('000 tonnes)



Asia Pacific Polyols Capacity

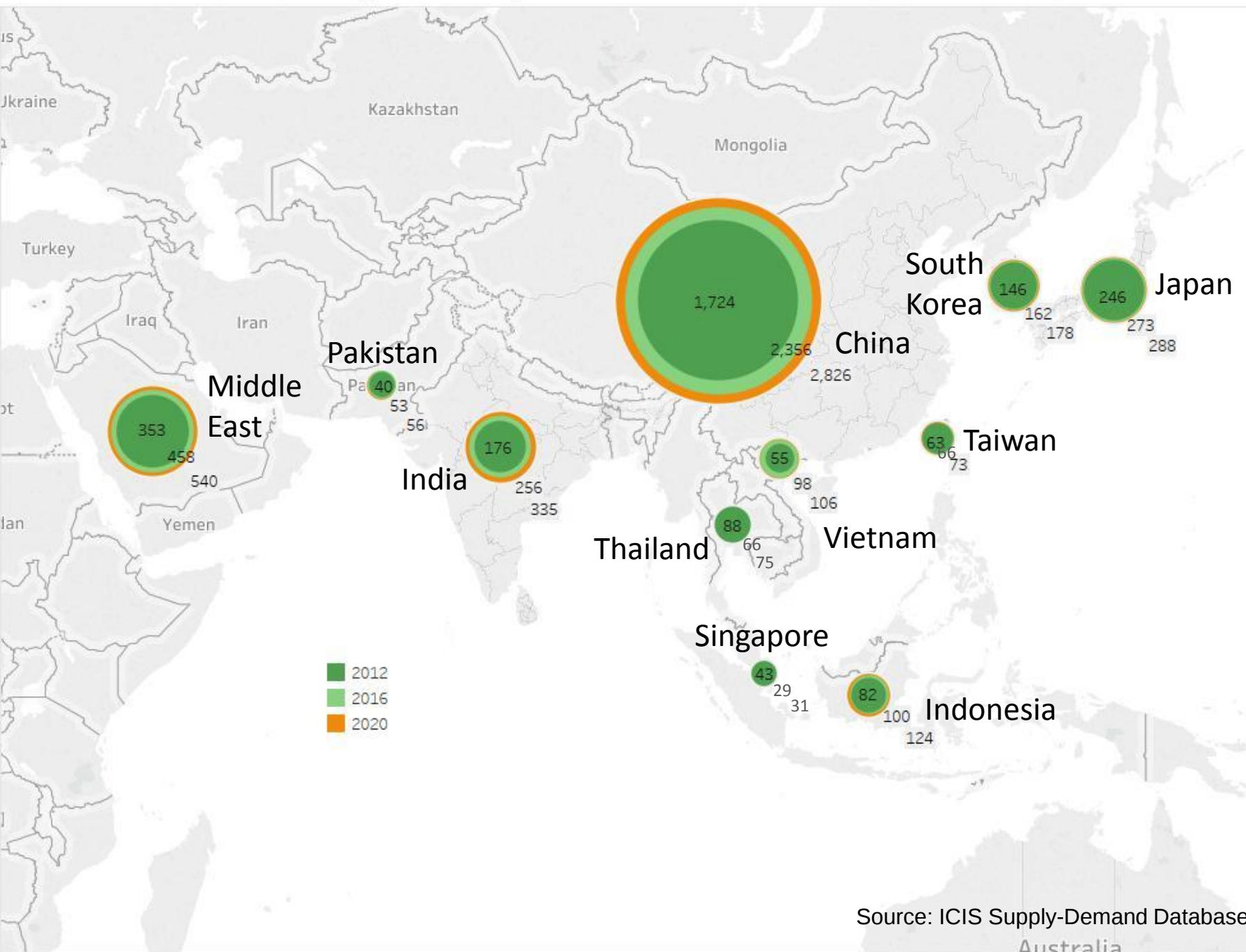


Middle East Polyols Capacity

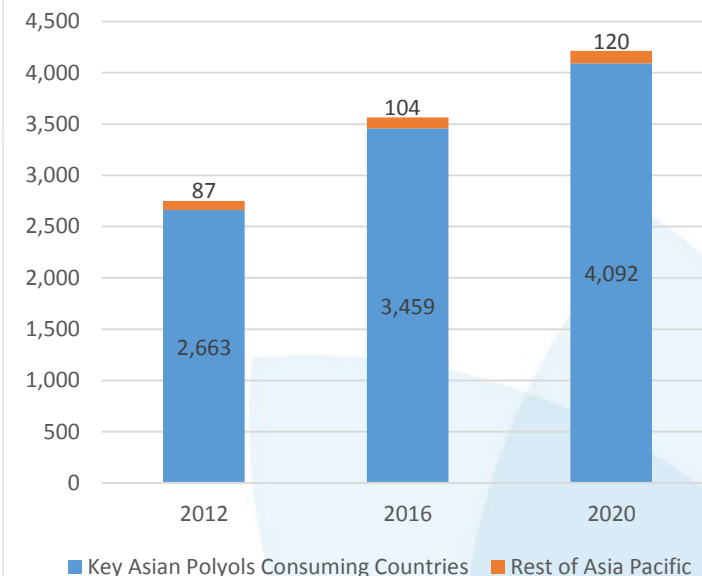


Source: ICIS Supply-Demand Database

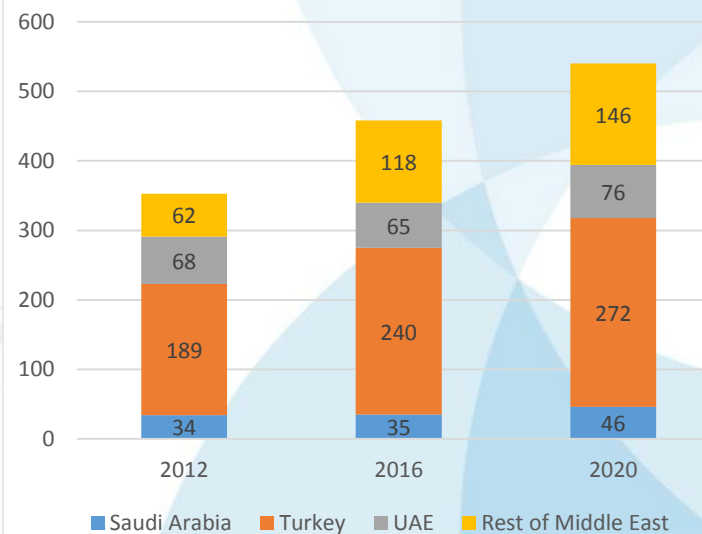
Polyols Consumption Growth ('000 tonnes)



Asia Pacific Polyols Consumption



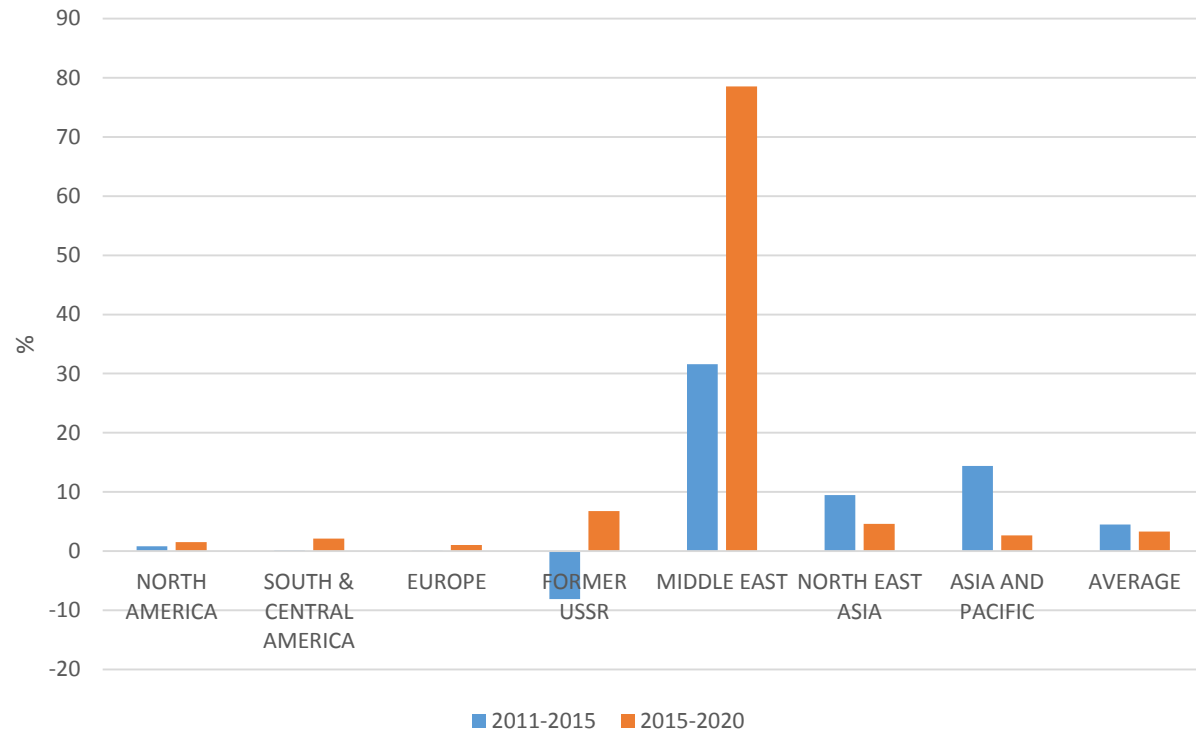
Middle East Polyols Consumption



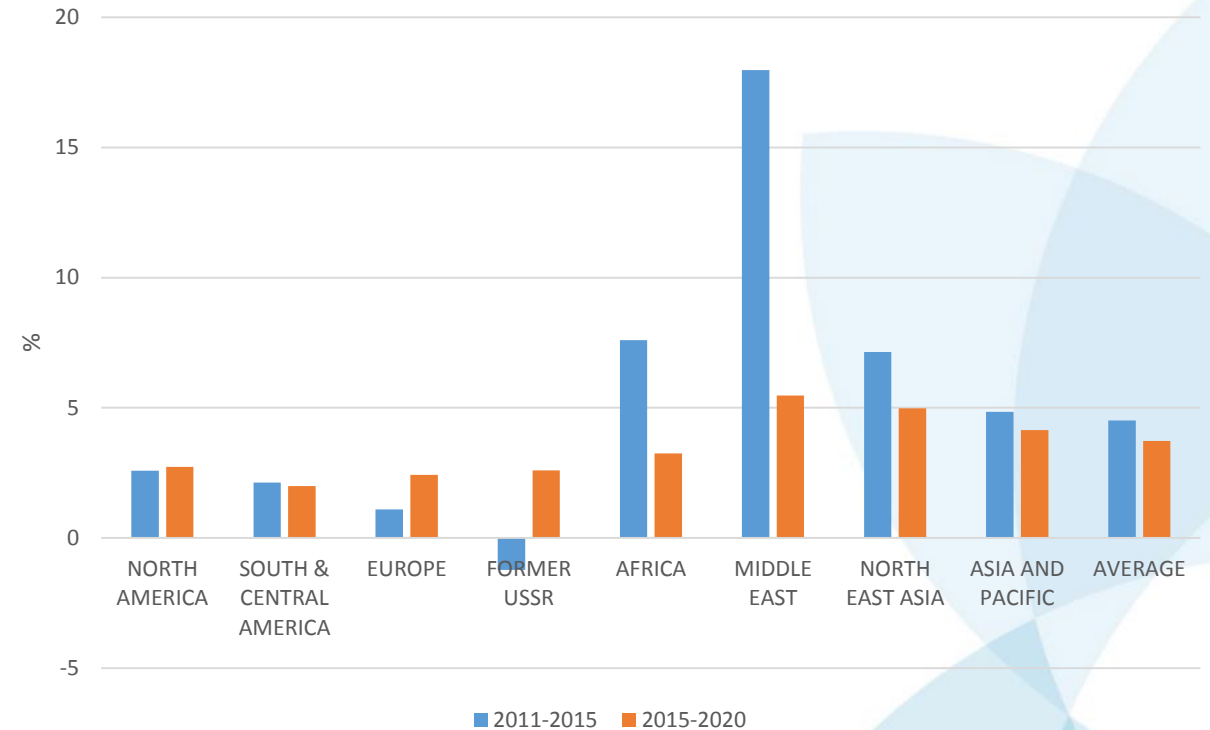
Source: ICIS Supply-Demand Database

PO-Polyols Annual Consumption Growth Rate

PO Annual Consumption Growth Rate



Polyols Annual Consumption Growth Rate



Source: ICIS Supply-Demand Database

- Middle East to see high PO and polyols consumption growth with Sadara start-up, albeit from a small base
- Asia and African polyols consumption growth projected to be higher than Europe and the Americas

PO Global Trade Flow

2016 ('000 tonnes)									
EXPORTS	NORTH AMERICA	SOUTH & CENTRAL AMERICA	EUROPE	FORMER USSR	AFRICA	MIDDLE EAST	NORTH EAST ASIA	ASIA AND PACIFIC	TOTAL IMPORTS
IMPORTS									
NORTH AMERICA		4	6	-	-	-	-	-	10
SOUTH & CENTRAL AMERICA	20		-	-	-	-	-	-	20
EUROPE	73	14		-	-	-	1	10	98
FORMER USSR	-	-	-		-	-	-	-	-
AFRICA	-	-	-	-		-	-	-	-
MIDDLE EAST	-	-	-	-	-		-	-	-
NORTH EAST ASIA	81	5	39	-	-	90		246	461
ASIA AND PACIFIC	64	-	52	-	-	48	5		169
TOTAL EXPORTS	238	23	97	-	-	138	6	256	758
2020 ('000 tonnes)									
NORTH AMERICA		4	6	-	-	-	-	-	10
SOUTH & CENTRAL AMERICA	43		-	-	-	-	-	-	43
EUROPE	61	14		-	-	5	1	11	92
FORMER USSR	-	-	-		-	-	-	-	-
AFRICA	-	-	-	-		-	-	-	-
MIDDLE EAST	-	-	-	-	-		-	-	-
NORTH EAST ASIA	22	5	15	-	-	71		206	319
ASIA AND PACIFIC	19	-	53	-	-	50	33		155
TOTAL EXPORTS	145	23	74	-	-	126	34	217	619

Source: ICIS Supply-Demand Database

Polyether Polyols Global Trade Flow

2016 ('000 tonnes)									
EXPORTS	NORTH AMERICA	SOUTH & CENTRAL AMERICA	EUROPE	FORMER USSR	AFRICA	MIDDLE EAST	NORTH EAST ASIA	ASIA AND PACIFIC	TOTAL IMPORTS
IMPORTS									
NORTH AMERICA		4	23	3	-	-	40	6	76
SOUTH & CENTRAL AMERICA	181		33	1	-	-	78	8	301
EUROPE	68	1		17	-	3	80	11	180
FORMER USSR	1	-	89		-	-	11	-	101
AFRICA	15	-	179	-		25	100	9	328
MIDDLE EAST	3	-	85	-	-		83	5	176
NORTH EAST ASIA	103	5	35	2	-	23		216	384
ASIA AND PACIFIC	74	3	62	1	-	12	356		508
TOTAL EXPORTS	445	13	506	24	-	63	748	255	2054
2020 ('000 tonnes)									
NORTH AMERICA		4	23	3	-	-	40	6	76
SOUTH & CENTRAL AMERICA	183		33	1	-	-	78	13	308
EUROPE	50	1		17	-	3	80	11	162
FORMER USSR	1	-	85		-	-	15	-	101
AFRICA	10	-	147	-		67	100	38	362
MIDDLE EAST	3	-	46	-	-		55	5	109
NORTH EAST ASIA	88	3	35	2	-	23		216	367
ASIA AND PACIFIC	64	2	42	1	-	19	308		436
TOTAL EXPORTS	399	10	411	24	-	112	676	289	1921

Source: ICIS Supply-Demand Database

Conclusion

- ▶ Proliferation of integrated units the way forward
 - ▶ 50% of PO units integrated into a cracker and 50% are downstream integrated
 - ▶ Standalone polyols units to come under intense cost pressure
- ▶ Changes in PO trade flow expected
 - ▶ Overall trade volumes to decline as increasingly more polyols units are likely to have their own captive PO
- ▶ Likely impact of Sadara on polyols trade flow
 - ▶ Middle East imports from Europe and northeast Asia to be cut by up to half
 - ▶ 60% of exports from the Middle East will go to Africa
 - ▶ Middle East exports to Asia-Pacific (ex-northeast Asia) will almost double
 - ▶ Middle East exports to northeast Asia will remain stable

Thank you

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