Argus report sample

Propylene Analytics

3 May 2024

Spotlight: PDH capacity growth

Globally there are PDH plants operating — pc of global propylene capacity — with a further in the pipeline, taking the share of global capacity to pc by 2028





- Most of the investment is in China 38 units already built and ar her 21 planned.
- Much of this investment is taking place against the assumed tightening of planning rules from 2030 and likely closure of older, smaller and more polluting plants. But this overinvestment means that plant profitability is highly dependent on upstream and downstream integration, and we anticipate some industry consolidation or even closures.
- Elsewhere, PDH investments are replacing propylene production lost to lighter feedstocks and refinery/steam cracker closures.
- With the growing reliance on PDH as a source, propane is likely to become the price setter for regions reliant on PDH-produced propylene

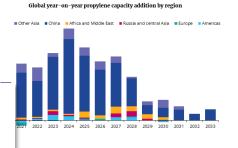


Wave of new capacity additions will peak this year

2024, more than double the pre-pandemic average

Capacity additions will slow from 2025, with the global market rebalancing in the following years

PDH capacity in China accounts for over half of new rapacity additions in 2024-26. But steam cracking will remain the primary form of propylene production at the end of the forecast period



About this report

Argus Propylene Analytics is a data-driven evaluation of supply and demand fundamentals forecasts for propylene and derivative markets, published twice a year.

The service includes a 10-year forecast and five-year history covering balances and capacities, organized by country and region.

In this sample, we share insights from North America and Northeast Asia.

Subscribers receive a PowerPoint PDF written by our experts plus the accompanying Excel data files.

To find out more, <u>click here to get in touch</u>.



Key features



10-year forecast and a five-year history Covering capacities, supply and demand, trade, and feedstock forecasts for leading derivatives, by country and region, published twice a year.



Detailed report
In an easy-to-read PowerPoint format
focusing on new plant capacities, growth
rates in relevant markets, and regulatory
developments.



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Covering capacities and operating rates
based on global trade and economics.



Downloadable datasets
With data on supply, demand, capacities,
operating rates and trade balances, by
country and region.



Access to specialists
Speak to the experts behind Argus' longterm analytics forecast services.



Associated data

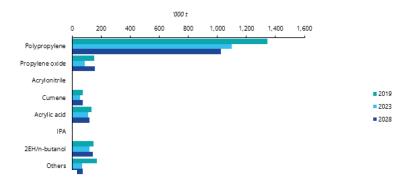
Propylene country/regional balances

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2019-23	2023-28	2028-33
Capacity																		
Coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Metathesis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Methanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Propane dehydro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Refinery	553	553	478	478	478	478	478	478	478	478	478	478	478	478	478	-3.6%	0.096	0.096
Steam cracker	1,665	1,665	1,665	1,665	1,665	1,617	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	0.0%	-3.8%	0.096
Speculative	-	-	-	-	-	-	-	-	-60	-60	-60	-60	-60	-60	-60			0.0%
Total capacity	2,218	2,218	2,143	2,143	2,143	2,095	1,853	1,853	1,793	1,793	1,793	1,793	1,793	1,793	1,793	-0.9%	-3.5%	0.0%
Production																		
Coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Metathesis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Methanol	-	-	-	-	-	-	-	-	-	-	-	-	-		-			
Propane dehydro	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Refinery	360	340	287	398	282	271	291	285	310	298	321	326	316	329	341	-5.9%	1.196	2.7%
Steam cracker	1,470	1,413	1,398	910	1,026	1,067	948	1,026	1,102	1,121	1,134	1,155	1,168	1,168	1,168	-8.6%	1.8%	0.8%
Total production	1,831	1,753	1,685	1,308	1,308	1,339	1,239	1,311	1,412	1,418	1,455	1,481	1,484	1,497	1,509	-8.1%	1.6%	1.3%
Operating rate	8396	79%	79%	6196	6196	6496	67%	7196	79%	79%	8196	83%	83%	84%	84%			
Imports	376	340	365	360	300	326	350	303	220	225	210	190	183	182	182	-5.5%	-5.6%	-4.2%
Total supply	2,207	2,093	2,050	1,668	1,608	1,665	1,589	1,614	1,632	1,643	1,665	1,671	1,667	1,679	1,691	-7.6%	0.4%	0.6%
Derivative capacity (propylene)																		
2 Ethyl hexanol	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	0.096	0.096	0.096
Acrolein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Acrylic acid	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	0.0%	0.0%	0.096
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Allyl chloride	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	0.0%	0.0%	0.096
Cumene	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	0.0%	0.096	0.096
E/P Rubber	44	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-100.0%		
Isobutanol	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	0.0%	0.096	0.096
Isopropanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Normal butanol	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	0.0%	0.096	0.096
Polypropylene	1,500	1,500	1,500	1,500	1,500	1,455	1,230	1,230	1,230	1,230	1,230	1,230	1,230	1,230	1,230	0.0%	-3.9%	0.0%
Propylene oxide	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167	0.096	0.096	0.096
Propylene tetramer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Propylene trimers	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	0.096	0.096	0.096
Speculative PP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Speculative (non-PP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total capacity	2,353	2,331	2,309	2,309	2,309	2,264	2,039	2,039	2,039	2,039	2,039	2,039	2,039	2,039	2,039	-0.5%	-2.5%	0.0%
Derivative consumption (propyl	lene)																	
2 Ethyl hexanol	73	70	70	66	62	62	67	69	70	71	71	72	72	72	71	-4.0%	2.6%	0.2%
Acrylic acid	130	120	125	111	110	111	113	115	117	118	119	121	122	123	124	-4.196	1.5%	1.0%
Acrylonitrile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Cumene	74	71	75	56	55	58	67	71	71	72	72	73	73	73	73	-7.0%	5.7%	0.196

Subscription includes detailed Excel downloads



propylene demand by derivative



propylene demand, 2023

propylene demand, 2028



Associated data, cont.

Subscription includes detailed Excel downloads

Propylene and its first-line derivative capacities

						-					
	ylene and its first-line derivative	es, '000t									
	√t Region ~	Country	Location	- Country Subdivision -	Operating Company	- Source/Process - Grade - 2019	- 2020 - 2021 - 2022 -	2023 - 2024 - 2025 -	2026 - 2027 - 2028 -	2029 - 2030 - 2031 -	2032 - 2033
2 Ethyl Hexanol	Africa	South Africa	Secunda	Mpumalanga	Sasol						
2 Ethyl Hexanol	Central and Eastern Europe	Poland	Kedzierzyn-Kozle	Opolskie	Grupa Azoty						
2 Ethyl Hexanol	Central and Eastern Europe		Kedzierzyn-Kozle	Opolskie	Grupa Azoty						
2 Ethyl Hexanol	Central and Eastern Europe	Romania	Ramnicu Valcea	Vâlcea	Chimcomplex						
2 Ethyl Hexanol	Latin America and Caribbea	ır Brazil	Camacari	Bahia	Elekeiroz						
2 Ethyl Hexanol	Middle East	Iran	Arak	Markazī	Arak Petrochemicals						
2 Ethyl Hexanol	Middle East	Saudi Arabia	Al Jubayl	Ash Sharqīyah	Al Bayroni						
2 Ethyl Hexanol	Middle East	Saudi Arabia			Unspecified						
2 Ethyl Hexanol	North America	US	Freeport	Texas	BASF						
2 Ethyl Hexanol	North America	US	Longview	Texas	Eastman Chemical						
2 Ethyl Hexanol	North America	US	Pasadena	Texas	BASF						
2 Ethyl Hexanol	North America	US	Texas City	Texas	Dow						
2 Ethyl Hexanol	Northeast Asia	China	Anging	Yunnan	Sinopec Anging						
2 Ethyl Hexanol	Northeast Asia	China	Baling	Hunan	Sinopec Baling Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China	Chengdu	Sichuan	Sichuan Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China	Daqing	Heilongjiang	Daqing Refining & Chemicals						
2 Ethyl Hexanol	Northeast Asia	China	Dongying	Shandong	Lihuayi Weiyuan Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Heze	Shandong	Heze Dongming Dongfang Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Huizhou	Guangdong	CNOOC Shell Petrochemicals						
2 Ethyl Hexanol	Northeast Asia	China	Jilin City	Jilin	Jilin Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China	Liaocheng	Shandong	Luxi Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Liaocheng	Shandong	Luxi Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Liaocheng	Shandong	Luxi Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Nanjing		Nanjing Chengzhi						
2 Ethyl Hexanol	Northeast Asia	China	Tianjin	Tianjin	Tianjin Soda						
2 Ethyl Hexanol	Northeast Asia	China	Tianjin	Tianjin	Tianjin Soda						
2 Ethyl Hexanol	Northeast Asia	China	Zhangjiagang	Jiangsu	Jiangsu Huachang						
2 Ethyl Hexanol	Northeast Asia	China	Zhanjiang	Guangdong	BASF Zhanjiang (Verbund)						
2 Ethyl Hexanol	Northeast Asia	China	Zibo		Shandong Hualu Hengsheng Chemical						
2 Ethyl Hexanol	Northeast Asia	China	Zibo	Shandong	Shandong Jianlan Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China	Zibo		Shandong Jianlan Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China	Zibo	Shandong	Shandong LanFan						
2 Ethyl Hexanol	Northeast Asia	China	Zibo		Sinopec Qilu Petrochemical						
2 Ethyl Hexanol	Northeast Asia	China		Ningxia	Ningxia Baichuan						
2 Ethyl Hexanol	Northeast Asia	China			Unspecified						
2 Ethyl Hexanol	Northeast Asia	Japan	lchihara	Chiba	JNC Corporation						
2 Ethyl Hexanol	Northeast Asia	Japan	Kawasaki		ENEOS						
2 Ethyl Hexanol	Northeast Asia	Japan	Mizushima	Okayama	Mitsubishi Chemical						
2 Ethyl Hexanol	Northeast Asia	Japan	Yokkaichi	Mie	KH Neochem						
2 Ethyl Hexanol	Northeast Asia	South Korea	Naju	Jeollanam-do	LG Chem						
2 Ethyl Hexanol	Northeast Asia	South Korea	Yeosu	Jeollanam-do	Hanwha Solutions						
2 Ethyl Hexanol	Northeast Asia	Taiwan	Mailiao	Yunlin	Formosa Plastics						
2 Ethyl Hexanol	Russia and Central Asia	Russia	Perm	Permskij kraj	Sibur-Khimprom						
2 Ethyl Hexanol	Russia and Central Asia	Russia	Salavat		Gazprom Neftekhim Salavat	(11)					
2 Ethyl Hexanol	Southeast Asia	Indonesia	Gresik	Jawa Timur	Petro Oxo Nusantara						
3731 111 1		1 .									



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Executive Summary

Global capacity additions – led by China – outpace demand growth and operating rates will fall for an extended period. Weak margins and carbon reduction to lead to closures

Northeast Asia

- Regional capacity increases by t from 2023 to 2033, most of which is in China
- PDH capacity additions will peak in 2024 but there will be another wave of capacity additions from steam in 2027-28
- Investments are ahead of a change of government guideline in 2030
- China will be close to self sufficient
- Other countries in the region will seek alternative export markets

Middle East

- Capacity investment continues both from mixed-feed steam cracking and on-purpose PDH
- Most of the countries in the region export propylene derivatives and are vulnerable to global oversupply and weak margins.
- PDH projects in Turkey and Egypt will be included in the forecast if they make progress

Western Europe

- Capacity rationalisation continues to be balanced by the start-up of t/yr of PDH capacity in 2025.
- Propylene demand expected to increase with the economic outlook but dependent on European prices being competitive with other regions
- Challenges of carbon reduction require political support to secure investment

South Asia (India)

- India has the highest GDP growth forecast of all the regions and is a major importer of PP
- Capacity will increase by mn t in the next five years, but PP imports will remain high as demand growth outpaces capacity investment
- Indian ethylene investments are in some cases from ethane, so the region relies heavily on refinery sourced supply
- Limited investment in non-PP derivatives

North America

- Propylene capacity gains stagnate post-2024 providing additional on-purpose production opportunities
- Propylene demand expected to rise on positive economic outlook and healthy derivative market growth
- Long-run cash costs remain globally competitive owing to feedstock advantage

Southeast Asia

- Southeast Asia will add mn t of capacity between 2023 and 2033, taking the total to mn t/yr by the end of the forecast
- The region is squeezed between the Middle East and northeast Asia, and is targeted by both for exports
- This will continue while global oversupply persists
- The region has firm demand growth prospects given its population size and demographics



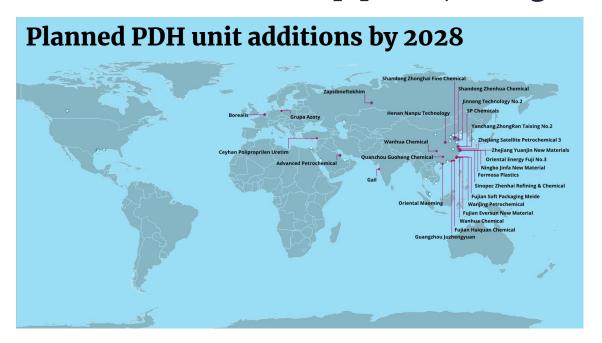
1. Executive Summary

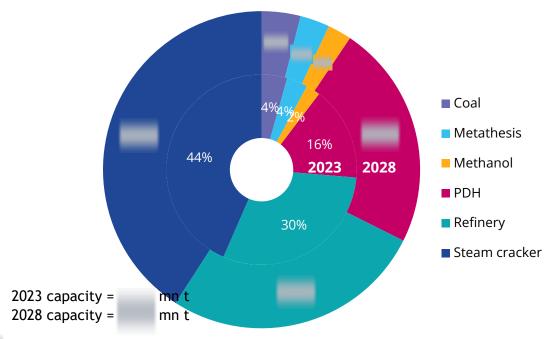
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Spotlight: PDH capacity growth

Globally there are PDH plants operating — pc of global propylene capacity — with a further in the pipeline, taking the share of global capacity to pc by 2028





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- Much of this investment is taking place against the assumed tightening of planning rules from 2030 and likely closure of older, smaller and more polluting plants. But this overinvestment means that plant profitability is highly dependent on upstream and downstream integration, and we anticipate some industry consolidation or even closures.
- Elsewhere, PDH investments are replacing propylene production lost to lighter feedstocks and refinery/steam cracker closures.
- With the growing reliance on PDH as a source, propane is likely to become the price setter for regions reliant on PDH-produced propylene.



Global: Economy

Central banks appear to have tamed inflation for now. Global GDP forecast continues to be revised lower for longer as growth in China remains weaker than previous estimates

GDP Forecast Assumptions

Inflation

Inflation to be more volatile than before the pandemic. Central banks likely to keep inflation close to target in the medium and long term.

Monetary policy

Central banks to cut rates this year. They will move cautiously to bring rates down slowly.

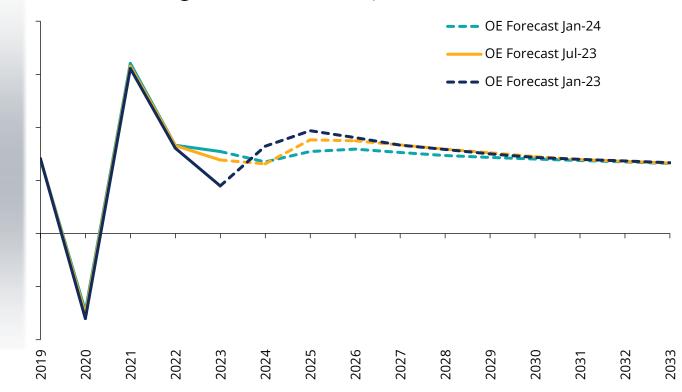
Ukraine conflict

Sanctions on Russia persist long after any ceasefire. Europe avoids any future energy problems during winter months.

Globalisation

No meaningful change in the global trading system or US-China relationship. Recent tariffs and other trade barriers stay in place.

Global GDP growth rate forecast, Oxford Economics (OE)





Source: Oxford Economics

Global: Supply

Wave of new capacity additions will peak this year

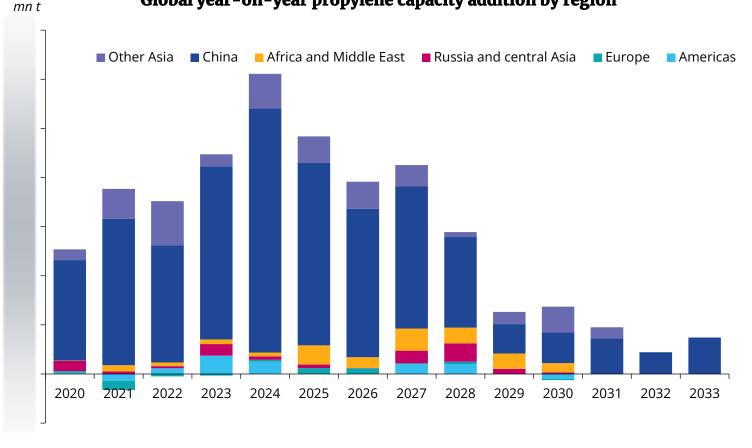
Global capacity will increase by over mn t/yr in 2024, more than double the pre-pandemic average of less than mn t/yr of new capacity.

Capacity additions will slow from 2025, with the global market rebalancing in the following years.

PDH capacity in China accounts for over half of new capacity additions in 2024-26. But steam cracking will remain the primary form of propylene production at the end of the forecast period, accounting for pc of capacity in 2033.

The volume of propylene produced from the refinery sector will shrink to a quarter of global capacity by the end of the forecast period, from a third of the total in 2021. Refining will remain important in the US, providing pc of capacity in 2033, and in India, providing pc of capacity in 2033.

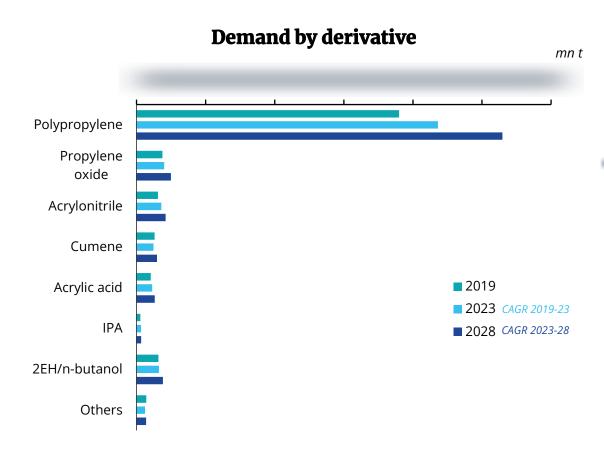
Global year-on-year propylene capacity addition by region





Global: Demand

World GDP growth rate fell in 2022 and 2023 but recovers from 2024 onward. Revised demand improves in the short-term, while from 2027-2032 demand has been reduced



The outlook for the global economy has worsened since our last update in September. Some consuming sectors, such as food packaging, are relatively robust but others, including durable goods and auto, are discretionary purchases and suffer more during economic downturns, especially with higher interest rates and inflation impacting consumer spending.

The revised world GDP growth rate for 2022 and 2023 increased by and percentage points, respectively, compared with *Argus*' previous view in September. But for 2024-33, revised GDP growth is reduced marginally by an average of percentage points. World GDP growth increases until 2026 before gradually falling by an average rate of percentage points/yr. Modelled demand is driven by GDP and propylene derivative demand growth.

The upward revision to the global GDP growth rate increased global propylene demand by mn t in both 2022 and 2023. Around mn t has been removed from the 10-year revised global demand growth outlook, or an average reduction of mn t/yr. *Argus* expects global demand to grow by mn t/yr over the 10-year forecast period.

Announced global polypropylene capacity expansions rise by mn t by 2028, compared with our November forecast. Speculative polypropylene capacities increase by mn t by 2032.



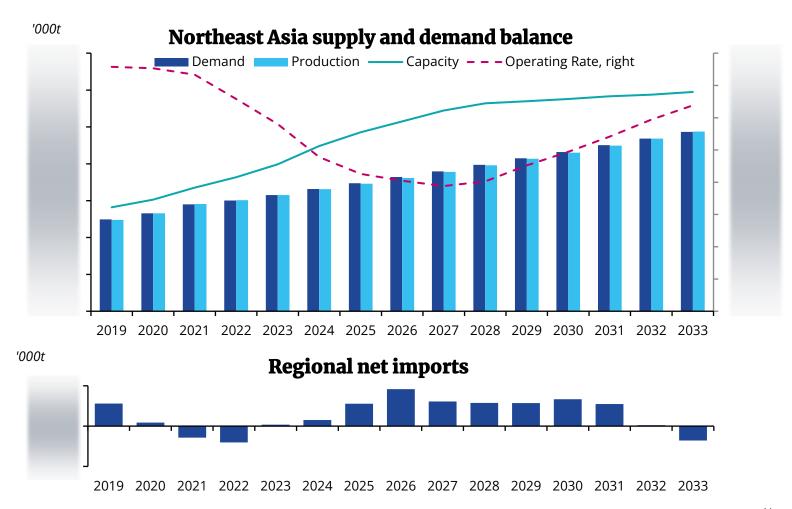
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Northeast Asia: Key Updates

Capacity expansion to ease only by 2029, with operating rates bottoming out in 2027

Key Market Changes						
Supply	Propylene capacity additions will only slow down from 2029 onwards. PDH additions will peak in 2024 and ease by 2027, while steam crackers will see a second wave peaking in 2027-28.					
Demand	Expanding integrated downstream capacity will keep demand fairly robust. But the short-term economic outlook in China might weigh on downstream operating rates, capping demand.					
Trade	China's reliance on imported propylene and downstream products will fall as it moves towards self-sufficiency. Exports from South Korea, Taiwan and Japan expected to decline and to shift to neighbouring regions.					



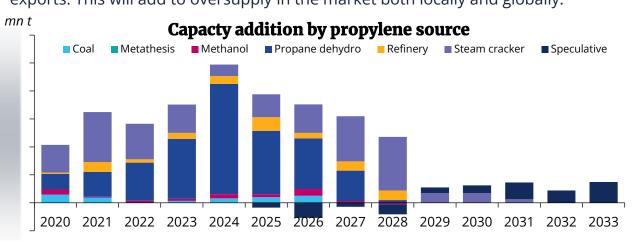


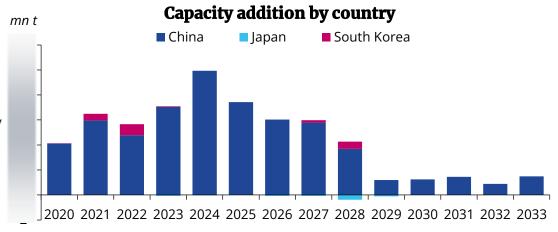
Northeast Asia: Supply

Chinese PDH investment continues, weighing on overall operating rates

Northeast Asia propylene production rose by 5pc from a year earlier to mn t in 2023, with propylene from PDH plants seeing the biggest growth, at pc. China will lead capacity increases in the region, adding nn t by 2028, with a pc CAGR for 2023-28, before easing from 2029 onwards. Operating rates will decline over the next four years, bottoming out in 2027 at pc before rising from 2028, once demand starts absorbing supply.

PDH capacity additions will peak in 2024 and gradually ease by 2027, while capacity additions from steam crackers will experience a second wave peaking in 2027-28. PDH and steam cracker capacity will increase by mn t and mn t, respectively, while refinery capacity will increase by mn t by 2028. The majority of the PDH units being built in China will be integrated with polypropylene, with any surplus propylene going either to merchant sales or exports. This will add to oversupply in the market both locally and globally.



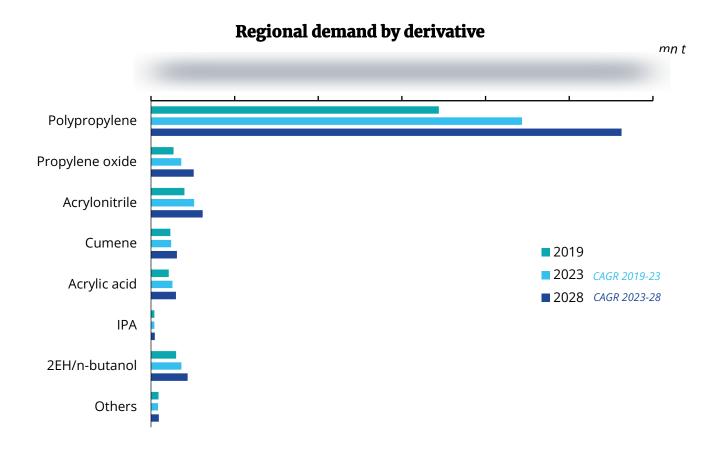


As the market rebalances and PDH production becomes prevalent, PDH / propane will start to set the floor price for propylene. PDH operating rates will remain subdued in the short term because of margin pressures. In the longer term, concerns over PDH competitiveness, especially for units that have smaller capacities, might result in the rationalisation or ownership consolidation of PDH units.

Apart from China, South Korea will be the only country in the region adding new steam cracker capacity— the S-Oil steam cracker complex — while we expect some rationalisation to take place in Japan, which includes Idemitsu Kosan in Chiba. Rationalisation among older and uncompetitive Chinese steam crackers is also expected within the timeline of the forecast period.

Northeast Asia: Demand

Downstream expansions continue to grow, but demand still much depending on China's economic growth



Total northeast Asian propylene demand was — mn t in 2023, up by pc from a year earlier. PP remains the highest propylene-consuming derivative, but consumption of most derivatives grew, especially propylene oxide, acrylonitrile and normal butanol.

Propylene demand is still expanding owing to increases in downstream capacity, with CAGR growth rates of pc in 2023-28 and pc in 2028-33.

The weaker short-term outlook for economic growth in China will cap demand for propylene. Slow infrastructure investment and a low birth rate across northeast Asia over the long term will result in slower polymer growth. Downstream units will continue to run at reduced rates because of margin issues, prompting stable-to-weak demand of propylene.

PP exports from South Korea, Taiwan and Japan to China will fall, with excess volume to be diverted to neighbouring regions, especially southeast Asia and India.

China's reliance on PP imports fell to pc in 2023 from pc in 2019. Argus anticipates that Chinese PP imports will fall to pc by 2032 as new domestic production replaces imported PP. But China will continue to import PP grades that are not produced locally.

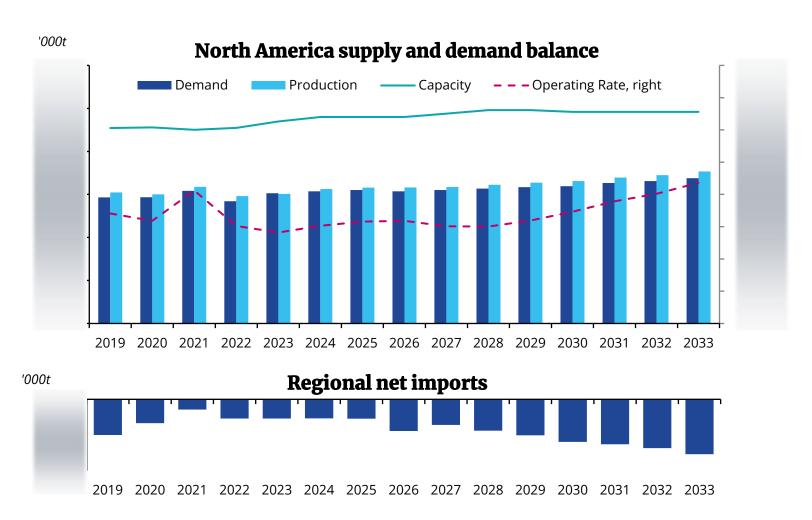
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North America: Key Updates

Limited capacity additions and growing derivative demand support a positive propylene outlook over the forecast period

Key Market Changes							
Supply	Following 10 years of steady growth, primarily from PDH additions, supply in North America is expected to remain relatively unchanged over the 10-year forecast period.						
Demand	Demand is forecast to grow by pc/yr over the next 10 years, nearly doubling the historical CAGR of pc. Demand will be driven by gains in primary derivatives such as polypropylene, acrylic acid, and acrylonitrile.						
Trade	North America will remain a net exporter over the 10-year forecast period. Exports will grow by an impressive pc/yr, but the share of exports in total demand will remain relatively low at just pc.						

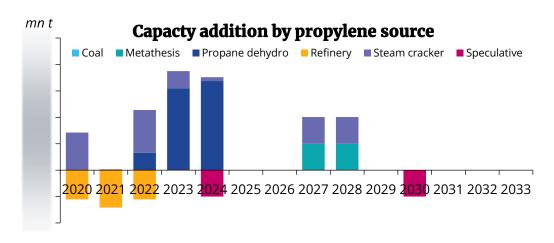


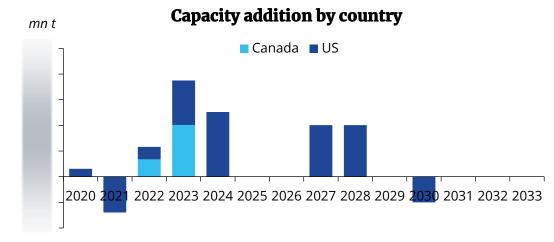


North America: Supply

Propylene capacity gains stagnate post-2024 providing additional on-purpose production opportunities

North America propylene capacity has increased by mn t over the past 10 years, driven primarily by PDH start-ups. In the coming 10 years, propylene capacity will remain relatively static with an estimated net gain of mn t. Minimal capacity additions coupled with tepid demand growth will keep the market mostly balanced through to 2028. We anticipate that there will be more refinery rationalisation. Demand will begin to outpace supply from 2029, with operating rates rising to pc by the end of the forecast period.



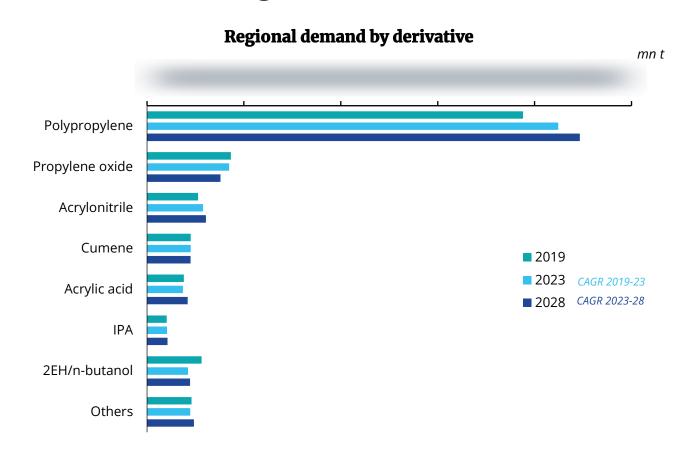


High compression/high-efficiency (turbocharged) vehicles accounted for pc of new vehicle sales in 2010, but their share of the market increased to pc by 2023, according to the US Department of Energy. The change in engine configurations has forced US refiners to produce higher-octane fuel in response to the change in consumer demand and fuel efficiency requirements. Turbocharged engines are projected to account for more than half of the market by 2025. The trend towards higher-octane gasoline use will continue, providing a potential gain in propylene use for alkylate, but this is expected to be offset by the increasing proliferation of electric vehicles.



North America: Demand

Propylene demand expected to increase on positive economic outlook and healthy derivative market growth



Following two years of above-average expansion, the North American economy is poised for slower growth in 2024 and 2025 as high interest rates continue to weigh on overall demand. GDP is expected to return to the long-term trend beyond 2026. *Argus'* modelled propylene demand is driven by GDP and propylene derivative growth.

Total propylene demand is forecast to rise marginally this year and into 2025, supported by a slight increase in consumer expenditure and stabilisation in the construction sector. Polypropylene will continue to post solid growth across a wide range of applications, while acrylonitrile will be boosted by a growing fibers market. Acrylic acid will also outperform other propylene derivatives by 2033, as an ageing population will drive demand for superabsorbent polymers. We have forecast an overall —pc demand reduction in 2026, based on Dow's announced closure of its ——t/yr propylene oxide plant in Freeport, Texas.

Propylene demand in North America will be driven by polypropylene with a pc share in 2024. The PP share will rise to pc of total demand by 2033 owing to the loss of demand from propylene oxide as a result of the asset closure. Other derivative demand shares will remain stable at 2024 levels until the end of the forecast period.



We hope you found this sample report for Argus Propylene Analytics valuable.

The Argus Propylene Analytics service is for anyone engaged in the propylene market and seeking insight into the fundamentals driving key trends, including global supply, demand growth, exports, operating rates, etc.

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Becky works as an editor for Asian olefins and methanol markets. She has 10 years experience of real-time market editor work. She also spent two years in consulting services as a project manager focusing on the Chinese market and led projects in various industries, including refining, olefins, polymers, coal and methanol. Becky is a chemical engineering graduate from the East China University of Science and Technology and has two masters' degrees, in environmental and energy engineering from the University of Sheffield and in Entrepreneurship from the University of Nottingham.



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