



Sustainability Insights

# Decarbonizing APAC Chemicals

A Looming Competitive Differentiator

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**S&P Global**  
Ratings

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Corporate Ratings

Aug. 26, 2024

*This report does not constitute a rating action*

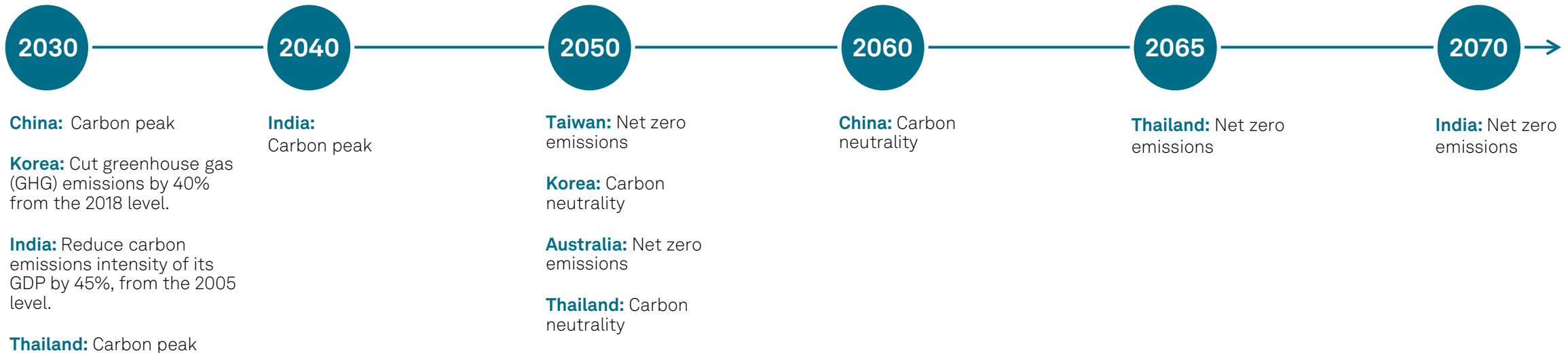
# Key Takeaways

- Rated entities in Asia-Pacific are setting **achievable carbon goals till 2030, without a material impact on their credit profiles** in the next few years. The **decarbonization path beyond 2030 is highly uncertain**, affected by regulations and new technologies. - [Slides 3-7]
- Current decarbonization actions are **unlikely to cause a significant increase in the firms' cost structures by 2030** as the cost of renewables drops. Risks may rise given the unstable supply from renewables. - [Slides 17-18]
- Rated entities, mostly large players in the region, are setting similar or more aggressive carbon goals than required by regulation, with firms **able to cover their spending on environmental initiatives** with cash flows. - [Slides 3-7, 20-21]
- The paths to decarbonization--and the credit risks involved--are similar globally. Yet **there are challenges and opportunities more specific to APAC**, such as a heavy reliance on coal chemicals (challenge) and an abundance of state-owned players that can take the lead in decarbonization initiatives (opportunity). - [Slides 9-19]
- Decarbonization could **change companies' competitive positions**, creating differentiation in costs and client perceptions.
- There are **uncertainties around the climate regulations**. Yet intensifying climate regulations should facilitate **industry consolidation** and improve industry profitability, benefiting the large players most. - [Slides 22-23]
- **Green financing** for the sector looks still underdeveloped. Banks continue to dominate the green financing market. - [Slides 24-25]

# APAC Chemical Sector: Decarbonization Remains A Key Theme

- Decarbonization will remain a key theme, given its important role in the region's climate goals and the sector's long-term competitiveness.
- The chemical sector is the largest industrial energy consumer globally, yet the third largest industry subsector in terms of direct CO2 emissions\*.
- Policy ambition is rising across countries. Most APAC countries, where our rated companies are based, do not have concrete decarbonization goals specifically for their chemicals sector, except for **China** and **Korea**.
- Yet major industry players in the region have mostly set their short to long-term carbon goals.

## Carbon goals timeline - by country / region



\*Note: This is because around half of the chemical sector's energy input is consumed as feedstock-- fuel used as a raw material input rather than as a source of energy (International Energy Agency (IEA)).

# APAC Chemical Sector: Decarbonization Remains A Key Theme (continued)

- China and Korea have set carbon goals for their chemical industry.
- China, the largest commodity chemical producer globally, has set concrete goals covering areas such as energy intensity and supply.
- In the medium to long term, this should help gradually phase out the inefficient facilities and players and improve the over-supplied industry conditions.

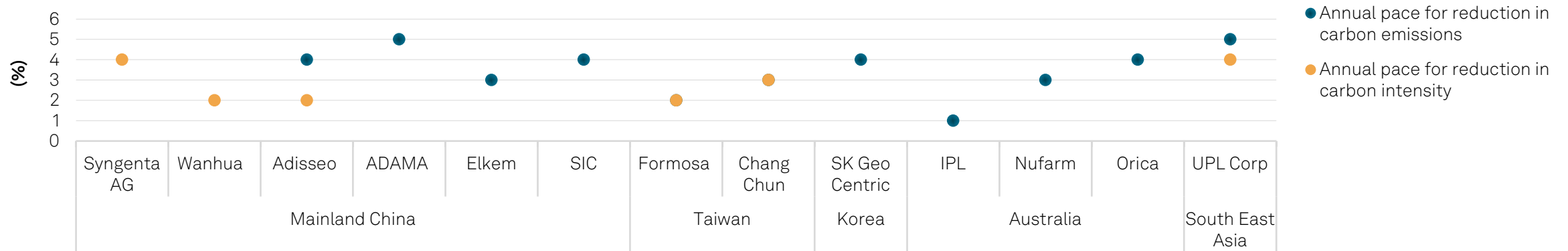
Country	Carbon goals for the chemical industry
China	<p>By 2025, reduce <b>energy intensity and carbon intensity</b> considerably:</p> <ul style="list-style-type: none"> <li>• 30% capacity of high carbon-emission sub-sectors (such as ethylene, ammonia, carbide) to meet tighter energy efficiency targets, i.e. the <b>national benchmark levels</b>.</li> <li>• Capacity with energy efficiency below the <b>national base levels</b> to complete technological upgrades or be eliminated.</li> <li>• From 2024-2025, energy-saving and carbon reduction from the oil refinery and petrochemical industry will <b>save coal</b> by 40 million tons (mt) and <b>reduce CO2 emissions</b> by 110 mt.</li> </ul> <p>Policies on the <b>supply side</b> in 2024-2025, such as:</p> <ul style="list-style-type: none"> <li>• <b>Strictly control new production capacity</b> in oil refining, calcium carbide, ammonium phosphate, and yellow phosphorus.</li> <li>• Newly built and expanded oil refining and petrochemical projects must reach <b>government-mandated</b> energy efficiency and environmental benchmarks.</li> <li>• National <b>refining capacity capped</b> at 1 billion tons per annum by 2025. A <b>phasing out of crude oil distillation units</b> (CDUs) with capacity below 2 mt per annum (mtpa), ethylene facilities with capacity below 0.3 mtpa.</li> </ul>
Korea	Petrochemical sector to <b>cut 20.2% GHG emissions by 2030</b> , compared with 2018 levels.

# Rated Entities: Carbon Goals Set, With 2030 Goals Achievable

- Almost all the rated entities have set carbon goals, mostly on scope 1 and scope 2, including at major subsidiaries levels if not at their own levels.
- Goals match those of their respective countries. Except that China-based **Wanhua** and Thailand-based **PTT Global Chemical (PTT GC)** have more aggressive goals than the respective countries.
- Rated firms are largely on track in terms of their decarbonization goals. Some have reached their carbon peak: emissions of Taiwan-based **Formosa group companies** peaked in 2007-2010.
- Medium-term (by 2030) goals should be achievable based on the tools and pathways currently available, though most did not disclose clear pathways to achieve the goals.
- Yet uncertainties exist in achieving goals towards carbon neutralization beyond 2030, given uncertainty in the regulations and the availability of technologies\*.
- It is not easy to compare the goals across rated companies, given their widely different base years and target years.

## Rated entities' annualized pace for decarbonization, for illustration purposes

2%-5% and 2%-4% reduction in emissions and intensity annually, respectively



Note: Based on their respective target years of 2025-2050 and base years of 2007-2020. Syngenta AG and ADAMA Ltd. are key subsidiaries of Syngenta Group Co. Ltd. Adisseo (Bluestar Adisseo Co.) and Elkem ASA are key subsidiaries of China National Bluestar (Group) Co. Ltd. Wanhua--Wanhua Chemical Group Co. Ltd. SIC-- Sinochem International Corp. Formosa--Formosa Group companies. Chang Chun--Chang Chun Petrochemical Co. Ltd. and Chang Chun Plastics Co. Ltd. IPL--Incitec Pivot Ltd. Nufarm--Nufarm Ltd. Orica--Orica Ltd. UPL--UPL Corp. Ltd. Source: Companies' ESG reports, S&P Global Ratings.

\*Note: This is among the major credit risk drivers amid the industry's decarbonization (slide 10). The findings are also in line with report "Decarbonizing Chemicals Part One: Sector wide Challenges Will Intensify Beyond 2030," Sept. 5, 2023.

# Rated Entities: Carbon Goals Set, With 2030 Goals Achievable (cont'd)

In addition to the general carbon peak and neutralization goals, most entities have also set more specific goals below:

Country/Region	Country/company Company	Goals--carbon emissions reduction			Goals--carbon intensity* reduction		
		by %	by which year	base year	by %	by which year	base year
Mainland China	Syngenta Group Co. Ltd. Subsidiary--Syngenta AG				>=50%	2030	2016
	Subsidiary--ADAMA Ltd.	5% annually	2030	N/A			
	China National Bluestar (Group) Co. Ltd.						
	Subsidiary--Elkem ASA	28%	2031	2020			
		95%	2050	2020			
	Subsidiary--Bluestar Adisseo Co.	21%	2025	2020	20%	2025	2015
	Sinochem International Corp.	18%	2025	2020			
	Wanhua Chemical Group Co. Ltd.				>=20%	2030	2021
					20%	2025	2016
Taiwan	Far Eastern New Century	40%	2030	2020			
	USI Corporation	27%	2030	2017			
	Subsidiary--Asia Polymer Corp.	27%	2030	2017			
	Formosa Taffeta Co., Ltd	26%	2027	2019			
	CHIMEI Corp.	42%	2030	2021			
		100%	2050	2021			
	Chang Chun Group	about 12% on average	2025	2021	30%	2030	2021
	Formosa Plastics Corp.	40%	2030	2020			
	Formosa Chemicals & Fibre Corp.	10%	2025	2020	25%	2030	2020
	Nan Ya Plastics Corp.	20%	2025	2007	35%	2030	2007
Formosa Petrochemical Corp.	22%	2025	2007	28%	2030	2007	
Korea	SK Geo Centric	25%	2025	2019			
Australia	Incitec Pivot Ltd.	25%	2030	2008			
	Nufarm Ltd.	30%	2030	2020			
	Orica Ltd.	30%	2026	2019			
India	UPL Corp. Ltd.	25%	2025	2020	64%	2035	2020

\*Carbon intensity unit varies among companies, including CO2 emissions in tons/total production output in tons, and CO2 emissions in tons/US\$ million of revenue. Sources: Company Reports. S&P Global Ratings.

# Company Example - Wanhua: Decarbonization Key Progress And Goals

## Progress



Carbon emissions reduced by **450 thousand tons** in 2023, through energy consumption improvement.\*



Increased investment in **new energy battery materials and green energy materials**.



Continues to source green energy, such as **photovoltaics, wind power, and nuclear energy**, through co-investments and cooperation.

## Goals



**Carbon peak** by 2030. **Carbon neutralization** by 2048.



Reduce scope 1 and 2 emissions by **20%** by 2025 from 2016 level, and by 20% by 2030 from 2021 level.



Proportion of clean energy to reach over **50%** in its domestic industrial parks by 2030.



Receive **14.9 billion kilowatt hours** of power from its new energy projects, which reduces carbon emissions by 8.65 mtpa, by 2030.

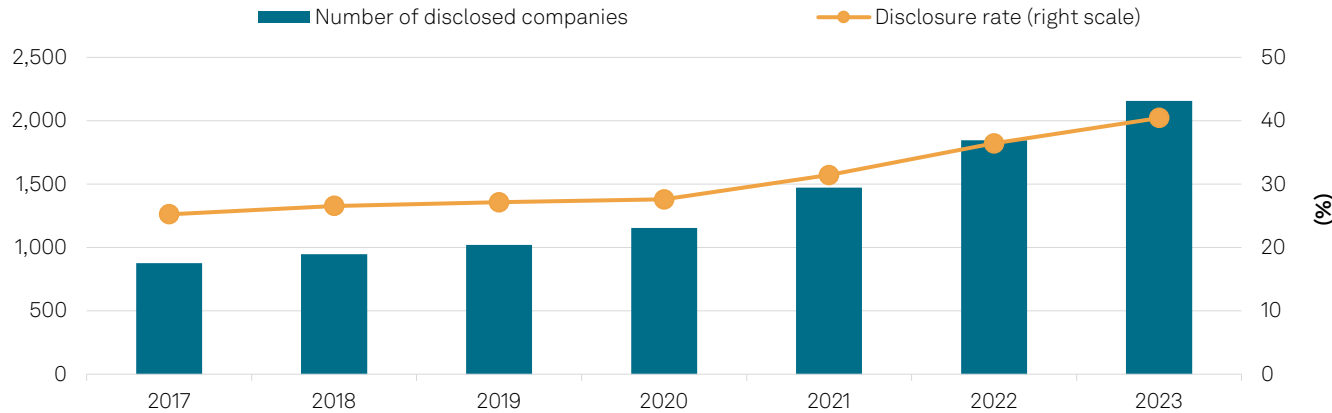


Clean energy to **fully cover** its domestic industrial parks by 2035.

\*Note: Overall emissions in 2023 still grew, despite the 450 thousand tons of emissions saving--refer to slide 12.

# ESG Disclosure: Transparency Is Improving

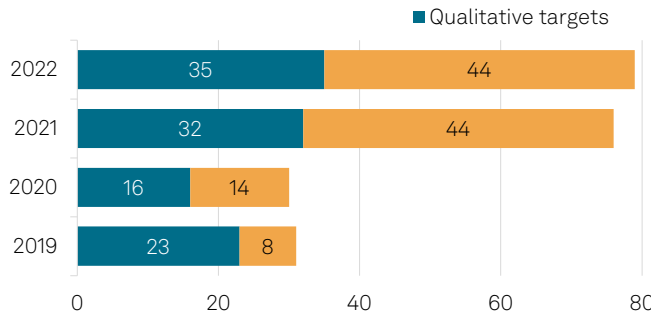
## Independent Annual ESG Report Disclosure



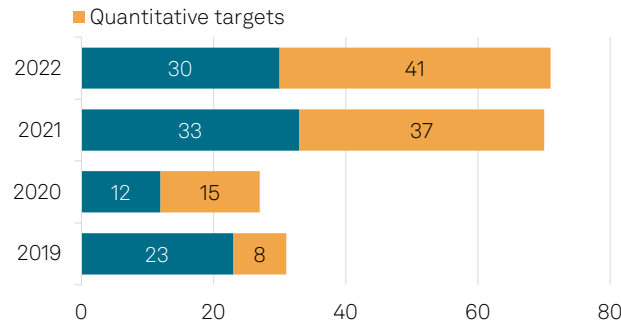
Data scope: China A-share listed companies. Sources: Wind, Huajin Securities, S&P Global Ratings.

## Disclosure of KPIs (%)

### Emissions targets



### Energy use targets



Data scope: 300 samples of Hong Kong listed companies. Sources: PwC, S&P Global Ratings.

- ESG disclosure, including **carbon related targets**, has been improving in APAC, yet generally lagging behind that in Europe where carbon initiatives started earlier and are more aggressive.
- The disclosure is not standardized, in terms of level of details and measurements.
- Listed companies generally have much more comprehensive disclosure than the private ones, due to heightened regulations on the listed entities.
- More private entities are starting to publish consolidated ESG reports. For example, **Sinochem Holdings** from 2022.
- **Scope 3 disclosure** is more challenging, given the still-developing standardization of methodologies and data-sharing platforms for product carbon footprints.
- Scope 3 emissions accounts for over 75% of the chemical industry's total emissions\*.
- About 40% of the rated§ have scope 3 disclosure: **Syngenta AG, Formosa, LG Chem**, India-based **UPL**, etc.
- A small number of rated§ entities, such as **Elkem, Orica**, and **Formosa**, have set scope 3 emissions-related goals. There is a similarly small number among rated Germany chemical names+.

\*Source: Science Based Targets initiative (SBTi). §Considering major unrated subsidiaries if no such disclosure at the rated parent level. +Source: "German Chemical Industry's Decarbonization Is A Team Effort," March 20, 2024



# Decarbonizing APAC Chemicals Sector: Pathways Are Similar Globally...

## Key decarbonization solutions feasibility and impact analysis

	Short term	Medium term	Long term			
Decarbonization technologies	Application	Scope	Development stage§	Disruptive level	Estimated cost	Impact
<b>Energy efficiency</b>	All processes	All processes	Adoption	Low	Low	Embedded in interim CO2 reduction targets at reasonable cost ≈ one third of total footprint
<b>Electric power</b>	Renewables sourcing*	All processes	Demonstration	Low	Moderate	
	Electrification	Non-intensive processes	Demonstration	Moderate	Moderate	
		Steamcracking	R&D	High	High	Unlikely to achieve net zero on olefins
<b>Low carbon fuel/feedstock</b>	Blue hydrogen > Ammonia	Steam reforming	Demonstration	Moderate	Moderate	Potential 70% reduction CO2 on ammonia (fertilizers)
	Green hydrogen* > Ammonia		R&D	High	High	Potential 90% reduction CO2 on ammonia (fertilizers)
	Hydrogen* as fuel	Steamcracking	R&D	Moderate	Moderate	Potential 75%-80% CO2 reduction on ethylene (olefin)
	Hydrogen* + CO2 > methanol-to-olefins		R&D	High	High	Potential net zero with CO2 management infrastructure
<b>Carbon capture</b>	<b>CCUS</b>	Steamcracking and reforming	Demonstration	Moderate	High	Likely in conjunction with CO2 management infrastructure

\*On sufficient supply of renewable based electricity, §Scale: R&D > Demonstration > Adoption. R&D--Research and development. CCUS--Carbon Capture, Use and Storage. Source: S&P Global Ratings (Decarbonizing Chemicals Part One: Sector wide Challenges Will Intensify Beyond 2030, Sept. 5, 2023).

- The decarbonization pathways in the region's chemical industry are broadly similar as the EU and the U.S.
- Decarbonizing the industry is not easy, especially considering it is highly complex with numerous and heterogenous products as well as different production process and inputs.
- **Currently widely available pathways** include improving energy efficiency and using natural gas and renewable energy.
- They leverage mature technology and carry low execution risk.
- **Medium to long-term pathways** include using hydrogen as feedstock and CCUS. This should help substantially reduce CO2 emissions in a sustainable way, compared with unstable renewables such as solar, wind, hydropower.
- That said, these developments are costly, need joint efforts, and still at an early stage.
- Over 35% of rated APAC companies plan to use CCUS as their medium to long-term tools, such as **LG Chem**, **Chang Chun**, **Elkem** and **CHIMEI**. Yet they don't have concrete plans now.

# ...Same For Related Credit Risks And Corresponding Mitigants

Among the below credit risk drivers, such as resource constrains, chemical companies in locations such as **Taiwan, Korea** and **Japan** could experience high medium-term risks associated with constraints in reliance on natural gas and likely short supply of renewables.

## Chemical decarbonization-related credit risk drivers

Decarbonization credit risks	Through 2024 Near term	2025-2029 Medium term	2030-2050 Long term
Uncertainty on decarbonization path	→		
Manufacturing disruptions		→	→
Rise in operating costs		→	→
Large capital outlays		→	→
Regulatory risk and demand loss			→
Technological challenges		→	→
Resource constraints		→	→
Dependence on external sources			→
Changes to competitive position			→

Source: S&P Global Ratings (Decarbonizing Chemicals Part Two: The Credit Risks And Mitigants, Sept. 5, 2023).

## Potential credit risk mitigants for chemical companies

### More time to prepare for changes:

Current regulations and policies have pushed the most onerous requirements out beyond 2030.



### New markets and applications:

Some chemicals, including ammonia and hydrogen, could find new uses as fuel or feedstock.



**Collaborations:** Working with suppliers and customers can help reduce investment costs and risks.



### Lessons learned from pilot plants:

Experimental or pilot decarbonization projects could help companies learn about new processes or technologies.



### Passing costs onto customers:

Companies with favorable market positions can, at least partially, pass on decarbonization costs.

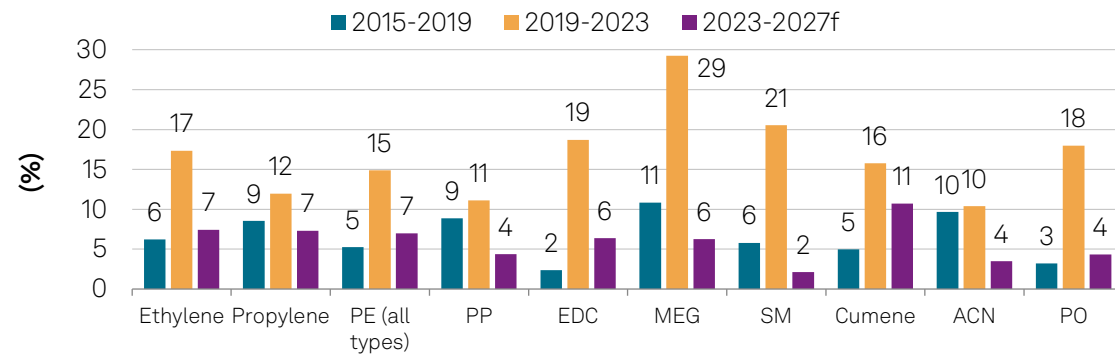


# Yet, There Are Still Some Differences Facing The APAC Sector: Challenges

- **The APAC chemical sector is growing and upgrading.** Its end user market will grow at a CAGR of 5.8% in 2024-2032, including commodity chemicals and specialty chemicals such as agrochemicals\*.
- The region has undergone significant industrialization, particularly in emerging countries, leading to growth in sectors such as manufacturing and construction and thus growth in demand for a range of chemicals.
- **China** is leading the capacity expansion in commodity chemicals globally. This is in line with China's policy of upgrading the industry through refining and chemical integration and improving self-sufficiency. Policy also supports developing materials related to energy transition and of high value-added products. Amid the capacity growth, emissions have been rising.
- The **Indian** government recognizes its agrochemical industry as one of its top-12 industries to achieve global leadership. The country targets annual growth of 8%-10% through 2025. India has become the world's second largest agrochemical exporter since 2022.

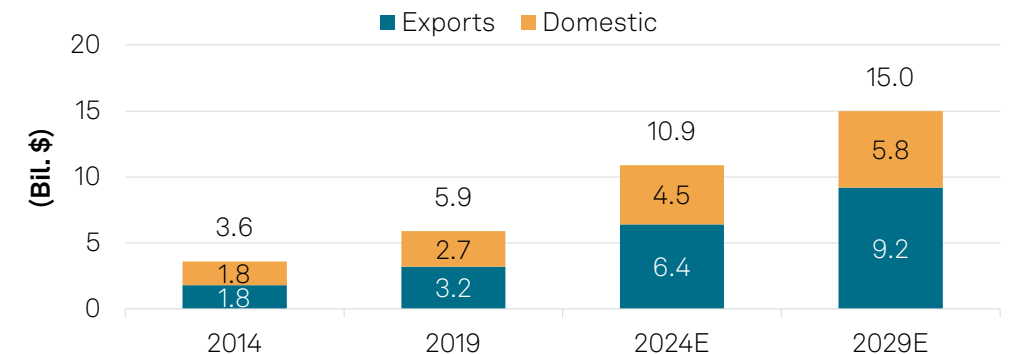
## China: commodity chemicals capacity keeps growing, at a decelerated pace

Compound annual growth rate by period



Note: Data excludes speculative capacity rationalization. f--Forecast. PE--Polyethylene. PP--Polypropylene. EDC--Ethylene dichloride. MEG--Monoethylene glycol. SM--Styrene monomer. ACN--Acetonitrile. PO--Propylene oxide. Sources: Global Polyolefins Outlook (April 2024), S&P Global Commodity Insights, S&P Global Ratings.

## India's agrochemical industry to expand in coming years



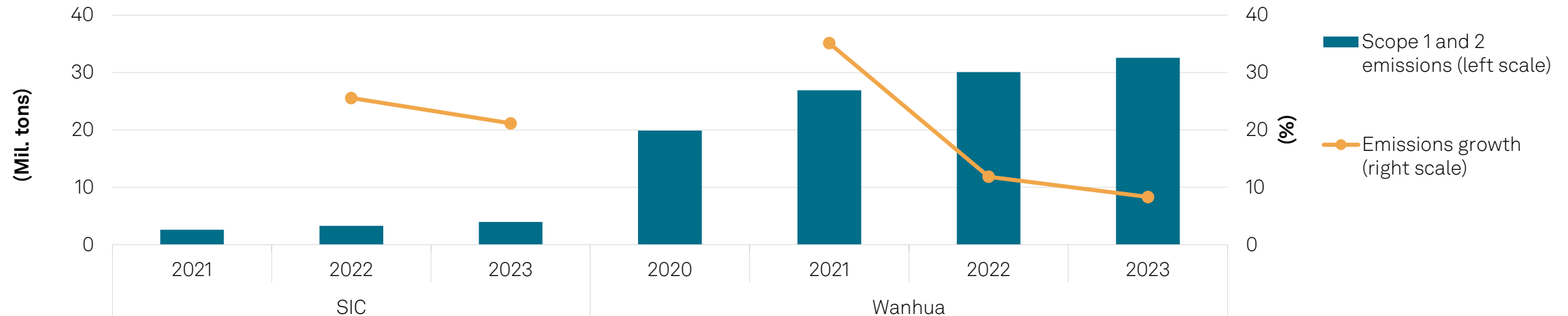
Sources: Confederation of Indian Industry, Avalon Consulting Analysis and Projections. S&P Global Ratings.

\*Source: Inkwood Research

# Challenges: Rising Emissions in China Amid Fast Capacity Expansion

- Carbon emissions from **China's** chemical industry may continue to grow amid the ongoing capacity growth, absent a meaningful phaseout of inefficient capacities.
- Emissions growth of the China-based **SIC** and **Wanhua** averaged 18%-23% over the past three-four years, with a moderating trend in 2022-2023.
- Both companies have been undertaking significant petrochemicals expansion projects in the country. Wanhua's expansion will continue in the next two years.
- Emissions in the chemical industry from some locations outside Mainland China may drop over the coming years, such as **Taiwan** and **Korea**, due to plants closures amid prolonged industry downturn. Taiwan and Korea both have also reached carbon peak in earlier years.

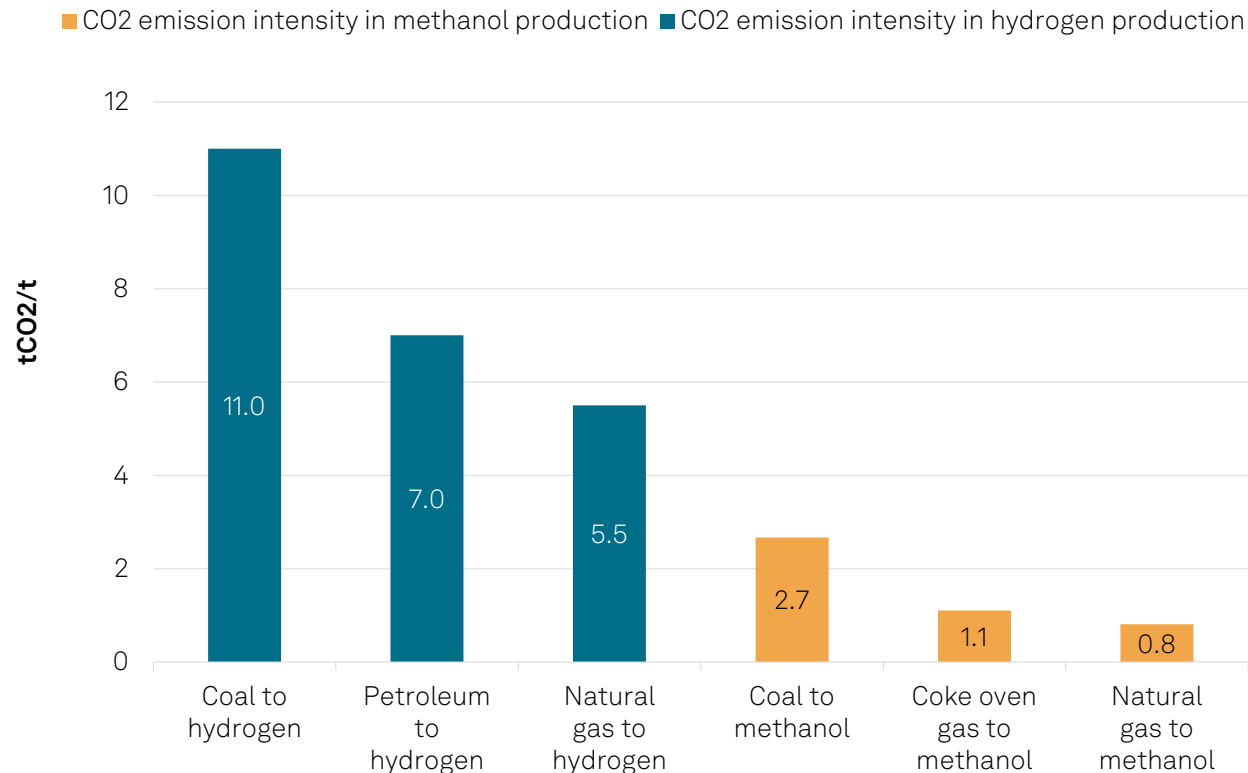
## SIC and Wanhua's emissions are increasing on sizable new projects



Sources: Companies' ESG reports, S&P Global Ratings.

# Other Challenges: Sizable Coal Chemicals

Carbon emission intensity of coal chemicals is higher



Source: Tanjiushe. Xuangubao. S&P Global Ratings.

- Carbon intensity of chemicals that use coal as a feedstock is higher than those based on other feedstocks.
- **China's** chemical industry has high dependence on coal, given its rich coal resources. For example, about 75% of its methanol production comes from the coal chemicals industry, versus 35% globally.
- China is the world's largest coal chemicals producer.
- **India's** coal chemicals industry is expanding. The Ministry of Coal initiated the country's first ever pilot project for underground coal gasification in 2024. India has abundant coal resources, with 70% of electricity generated from coal.
- The initiative aims to revolutionize the country's coal industry by transforming coal into valuable gases\* and high-value chemical products. It targets to gasify 100 million tons of coal by 2030.
- Both countries are committed to decreasing reliance on coal and other fossil fuels, yet the pace should be gradual, considering energy security.
- China may reach peak coal consumption by around 2025.

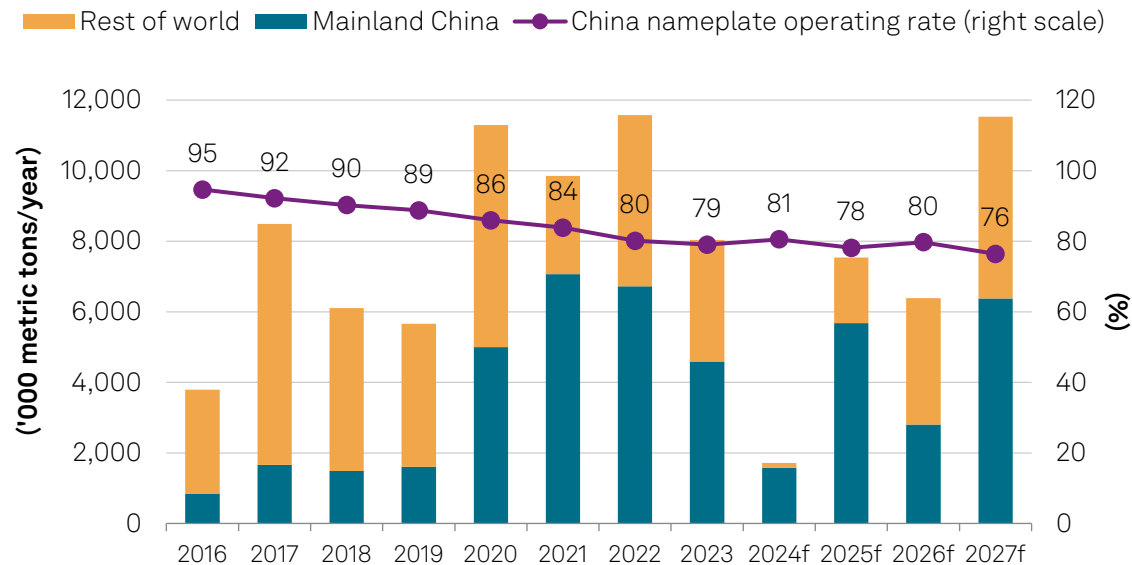
\*Note: such as methane, hydrogen, carbon monoxide, and carbon dioxide.

# Other Challenges: To Eliminate More Inefficient Capacities

- **Inefficient, older capacities, which are more costly, with high energy consumption** will continue to be phased out gradually, enabling gradual market consolidation. Chronic overcapacity and tightening environmental policies could accelerate the process.
- **China's** chemical industry is generally fragmented with supply gluts given its rapid capacity expansion.

## China's industry operating rates are trending lower for ethylene...

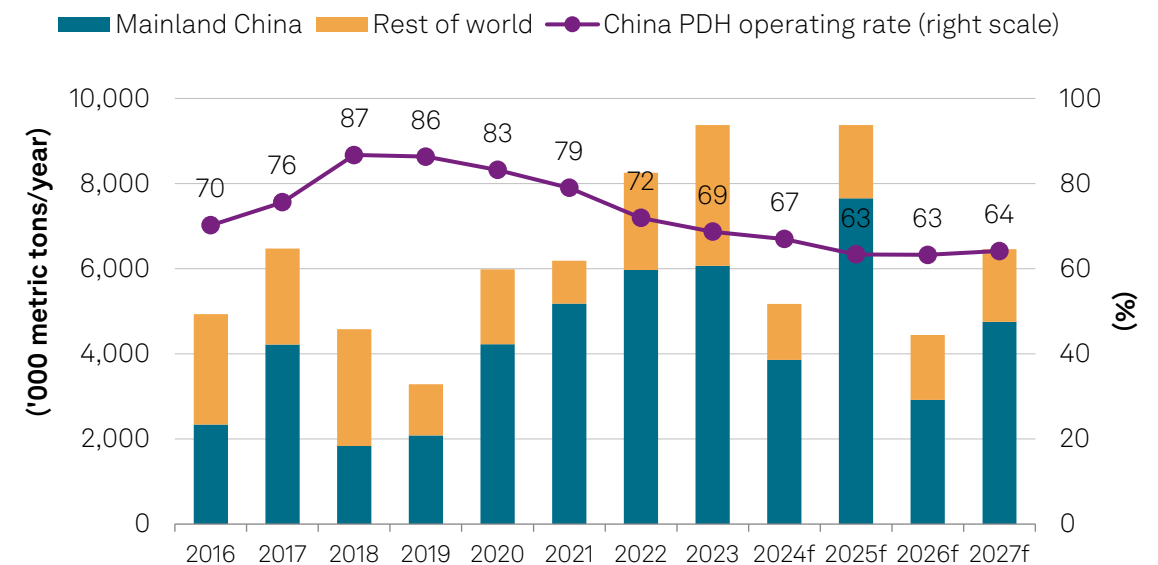
Net capacity addition by year



Note: Data excludes speculative capacity rationalization. f--Forecast. Sources: Global Polyolefins Outlook (April 2024), S&P Global Commodity Insights, S&P Global Ratings.

## ...And for propylene

Net capacity addition by year



Note: Data excludes speculative capacity rationalization. PDH--Propane dehydrogenation. f--Forecast. Sources: Global Polyolefins Outlook (April 2024), S&P Global Commodity Insights, S&P Global Ratings.

# Opportunities in APAC : Large Clustered Operations To Enhance Efficiency

## China's chemical industrial parks distribution

Number of industrial parks

Provinces	Number of industrial parks
Shandong	>80
Zhejiang, Anhui, Henan, Hubei	40-60
Hebei, Liaoning, Jiangsu, Fujian, Jiangxi, Sichuan, Shaanxi, Inner Mongolia	20-40
Others	<20

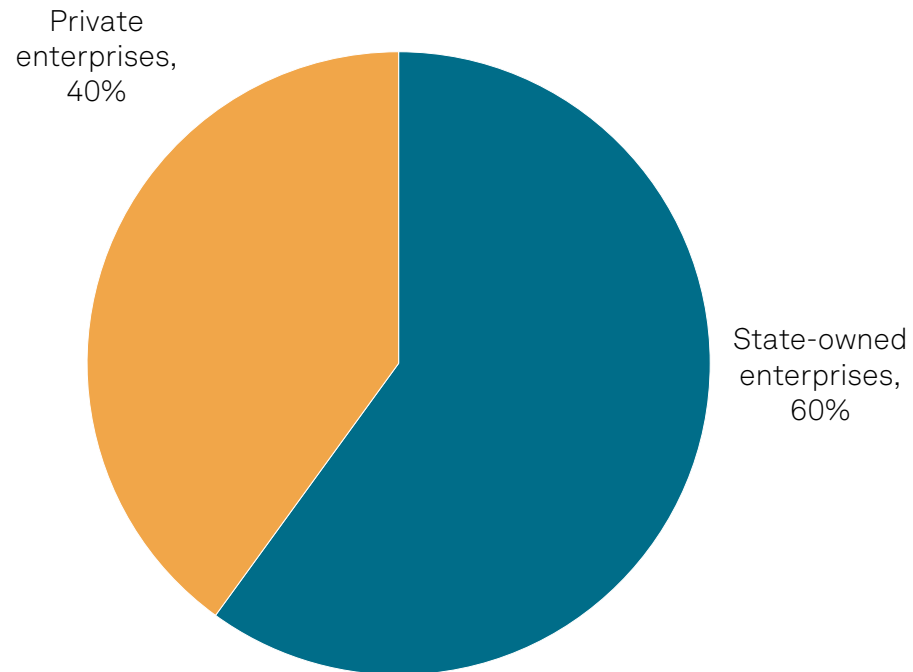
Data as of June, 2023. Source: Hangyan.co.

- **China** has sizable newly built integrated capacities.
- The country is committed to achieving its petrochemicals industry's carbon goals by promoting clustered development, among other measures.
- This includes promoting the identification of chemical industrial parks, and guiding petrochemicals companies to move in.
- Through sizable clustered operations, the country aims to build industrial chains where companies share interconnected supply, demand, and production devices.
- This should help improve resources utilization **efficiency**, create **scale effects**, and **reduce energy consumption** and carbon intensity.
- The parks, especially pilot ones identified by the country, should **take the lead** in achieving the industry's carbon goals.
- Proportion of renewable energy in the green parks will reach 15% by 2025, and over 25% by 2030\*.

\*Source: China Petroleum and Chemical Industry Federation.

# Other Opportunities: Large State-Owned Players To Take The Lead

China's Top 10 largest refining and chemical companies



Note: rank by 2023 revenue. Source: S&P Global Ratings.

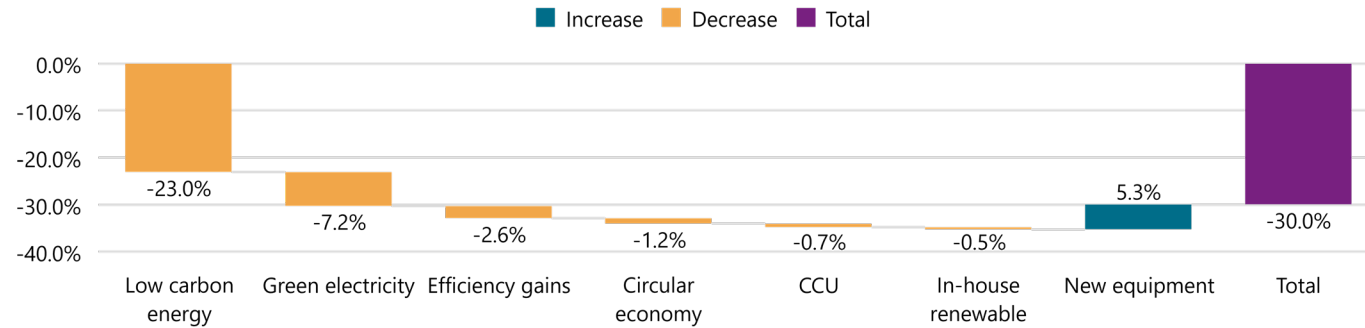
- State-owned enterprises (SOEs) comprise a major part of **China's** refining and chemical industry, notably the three national oil companies and Sinochem group companies.
- SOEs, which make up most of our rated Chinese entities, should lead and are well positioned in the decarbonation of the country and the industry, among other large private entities.
- This is due to their large, integrated operations, strong market standing and technology, and favorable access to funding from domestic financial institutions.
- They should therefore benefit most from the industry upgrade following decarbonization in the long run.
- The large **Thailand**-based **PTT GC** should also benefit from the support from its state-owned parent amid its decarbonization progress.



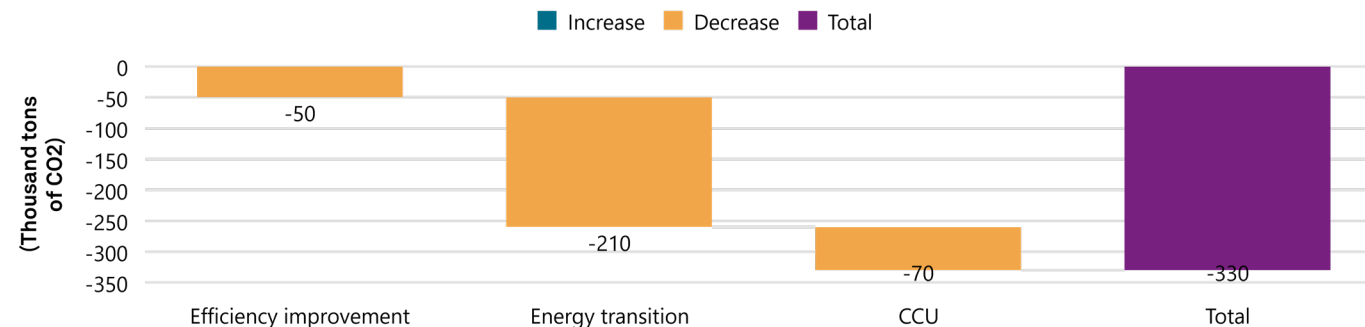
# Company Examples: Immediate Measures Focus On Energy Transition

## Chang Chun: Shift to natural gas and green power is the main measure

It aims to lower carbon emission by 30% in 2030 from 2021



## CHIMEI takes a similar pathway to lower CO2 emissions by 2030

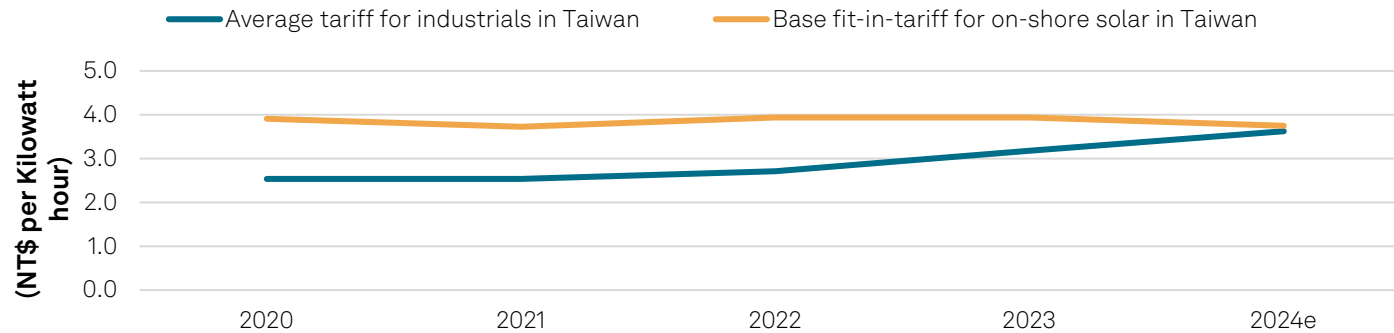


Sources: Companies' sustainability reports. S&P Global Ratings

- **A Shift to natural gas and green power** from coal is the **most effective approach** to lower CO2 emissions by 2030. Natural gas supply could be a constraint if infrastructure cannot catch up.
- Operational risks could also rise with limitations on natural gas storage capacity in major gas importers in Asia, and unstable renewables.
- The transition to green electricity is technologically achievable, through installation of in-house capacity or external procurements.
- It could be challenging to source sufficient green power for large integrated chemical companies in some locations, such as **Taiwan**.
- **Improving energy efficiency**, through the replacement or retirement of aged equipment and facilities, is **ongoing** for most rated companies.
- **Carbon capture** will only remain in the pilot phase by 2030 for most companies.
- A **circular economy** with better recycling will become a more important measure, as it is getting critical to reduce chemical wastes.

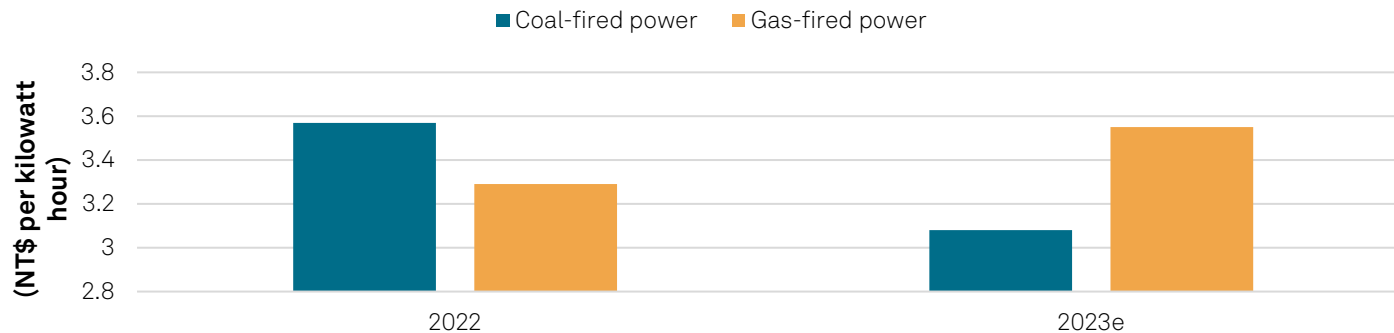
# Rising Fossil Energy Costs Facilitate The Transition To Renewables

Rising grid tariff, declining renewable costs to facilitate renewables transition



- Rising electricity tariffs from the grid and declining renewable costs will lower the cost of transitioning to renewables.
- A further decline in renewable costs, particularly solar power, will accelerate the transition.
- Nonetheless, insufficient power storage infrastructure will be the main barrier to transition to 100% green power.
- Rising coal costs diminished the cost gap between gas-fired power and coal-fired power generation over the past two years. And any carbon tax and fees will add costs to coal as the source of energy.

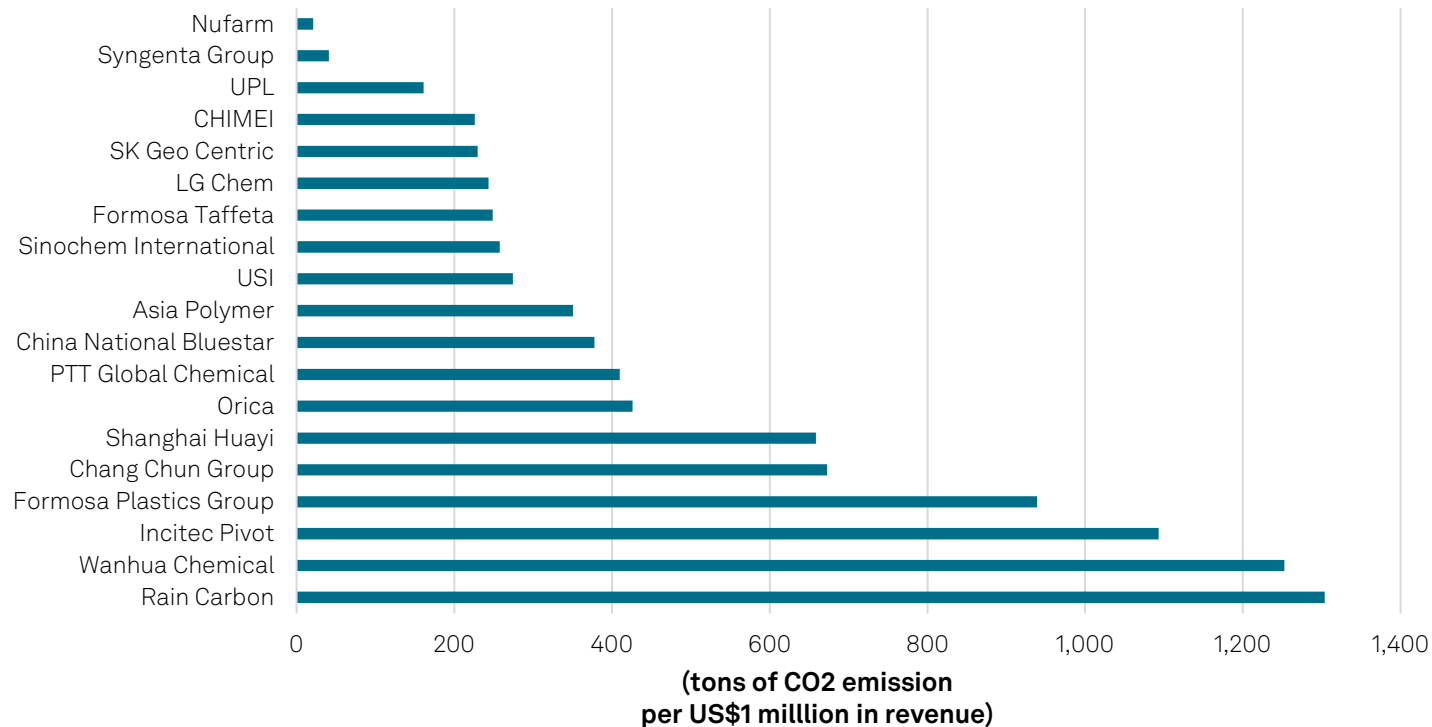
Taiwan: Cost gap between coal-fired and gas-fired electricity blurs



e--Estimate. Source: Taiwan Ratings Corp.

# Rated Entities Study: More Integrated, More Challenged In GHG Reductions

## Integrated commodity chemical companies have high GHG intensity

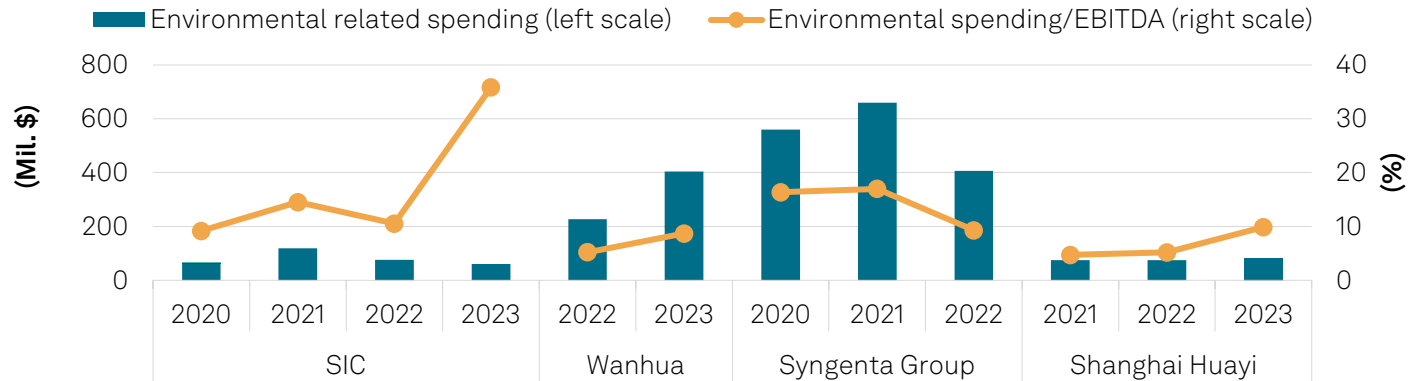


Note: 2022 data, except for Shanghai Huayi using 2023 data. Syngenta Group's carbon intensity is calculated by dividing emissions at key subsidiaries (Syngenta AG and AMADA Ltd.) by the group's total revenue. Source: S&P Global Ratings estimates.

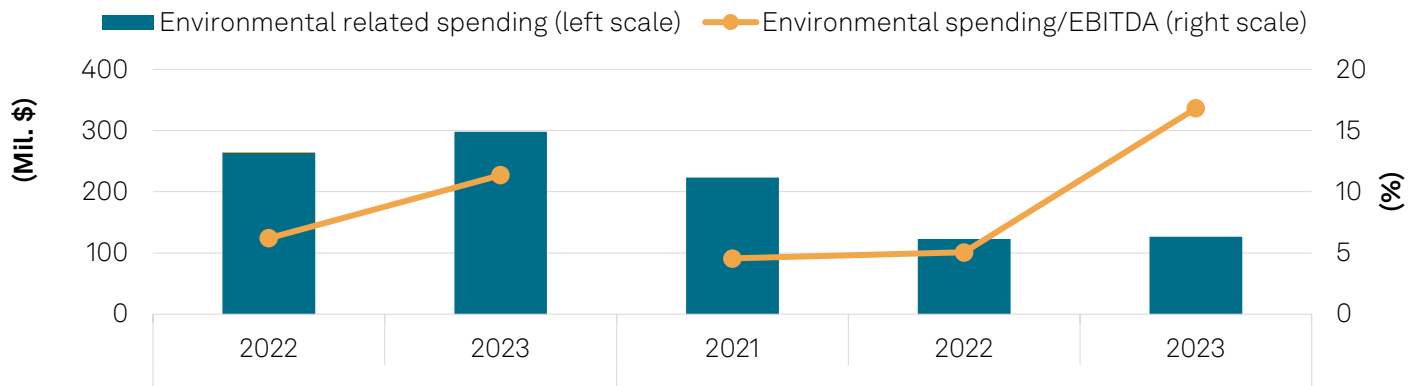
- Upstream and integrated **commodity chemical** companies face more challenges to decarbonize than downstream players, given higher energy intensity.
- It will therefore be more challenging for large integrated chemical companies to resolve availability and security issues associated with energy transition.
- **Agrochemicals**, excluding fertilizers, generally have lower GHG intensity than commodity chemicals. Agrochemicals players of **Nufarm, Syngenta Group** and **UPL** have the lowest intensity among rated chemicals names.
- Ammonia, one major base chemical for fertilizers and where rated entities have limited exposure, has very high carbon intensity, about 70% higher than ethylene.

# Sufficient Rating Buffer To Absorb Rising Environmental Spending

Mainland China: environmental spending is rising, though small versus EBITDA...



...Same for the Taiwanese rated entities



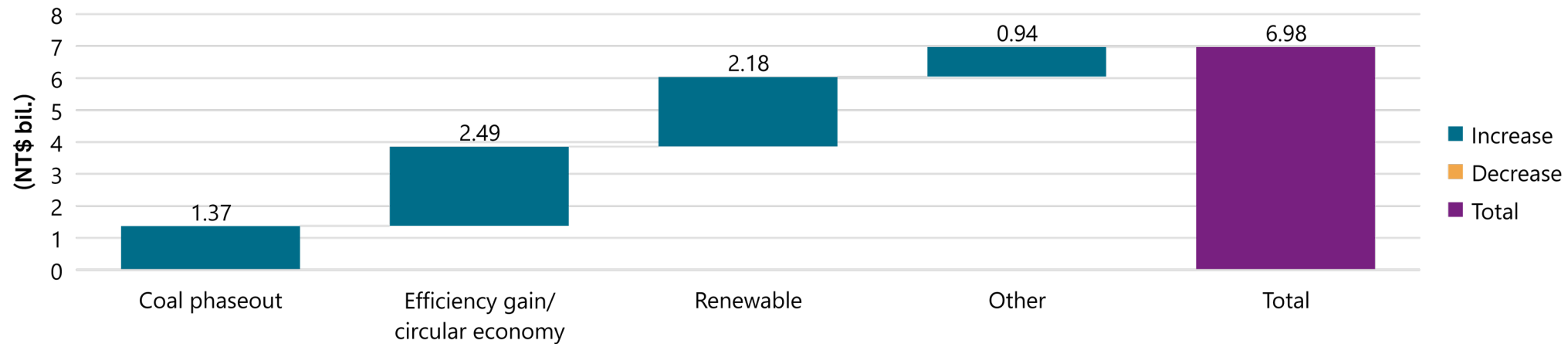
Note: capex--Capital expenditure. The ratio for Syngenta Group Co. Ltd. is calculated by dividing the sum of environmental spending at key subsidiaries (Syngenta AG and AMADA Ltd.) by the group's total EBITDA. Sources: Company Reports, S&P Global Ratings.

- Rising spending is one of the major **credit risk drivers** amid the industry's decarbonization, as discussed earlier.
- Required investments in energy transition are not particularly expensive in the short run. And the execution risk is relatively low given the mature technologies, such as gas-fired power generation and solar and wind power.
- The financial burden from environmental spending is limited for large chemical companies for now, **without material impact on their leverage**. This is thanks to their better economies of scale and stronger cash flows.
- Environmental spending's steadily increasing trend should continue as **regulations** will get stricter.
- Rated entities' environmental spending typically accounts for **less than 10% of their EBITDA**. Industry cyclicity, such as the 2023 trough, may distort the ratio.

# Sufficient Rating Buffer To Absorb Rising Environmental Spending (cont'd)

- Sustained industry downturn with overcapacity and tightened environmental requirements may drive companies to focus spending on differentiation through decarbonization and eco-friendly products.
- Capex required to improve energy efficiency as required by the government could also facilitate industry consolidation amid the downcycle, as small inefficient players may not be able to afford this cost.
- Some rated entities, including major subsidiaries, have set goals for environmental spending, such as **Formosa**.
- **Syngenta AG** also targets to spend US\$2 billion in “sustainable agriculture breakthroughs” over 2020-2025 (12% of EBITDA).

Formosa Plastics Corp.'s capex on GHG reductions is limited by 2030  
 GHG capex over 2024-2030 aims to lower carbon emission by 40% in 2030 from 2020



Note: only for Formosa's operations in Taiwan. Source: Company Reports. S&P Global Ratings.

# Carbon Tax Could Be A Game Changer For The Chemical Sector

Carbon taxes are not yet introduced in most countries in Asia

Country/Region	Carbon tax/fees in place?	Expected timeline	Notes
Mainland China	No	N/A	
Taiwan	Implement carbon fees from 2024, with the rate not yet finalized.	Postpone the implementation until 2025.	
Korea	No	N/A	
Australia	No	N/A	No firm plans yet.
Thailand	No		Data collection expected to be completed by end 2024.
India	No explicit carbon tax mechanism.  However, India has some implicit measures in place such as Green Energy Cess (now known as GST Compensation Cess), Perform Achieve Trade schemes and Renewable energy certificates.  At present, the Green Energy Cess on coal is about US\$5 per ton of coal, which translates into US\$2 per ton of CO <sub>2</sub> .	NA	

Source: S&P Global Ratings.

- Regulatory risks are also among the major credit risk drivers amid the industry's decarbonization, as discussed earlier.
- Carbon tax or fees could be one credit transmission channel through which decarbonization-related risks could affect the rated entities' creditworthiness.
- Carbon tax or fees may make decarbonization an important competitive edge for the chemical sector, given its high carbon intensity.
- Active decarbonization could earn credit through incentive programs, such as the one proposed by the **Taiwan** government, adding to cost advantages.
- Small marginal chemical producers will face difficulty in investing in decarbonization, and therefore are likely left in an even weaker cost position if a carbon tax is implemented.
- This together with tightened efficiency standards would accelerate industry consolidation.

# Carbon Trading: Limited Impact On Rated Entities For Now

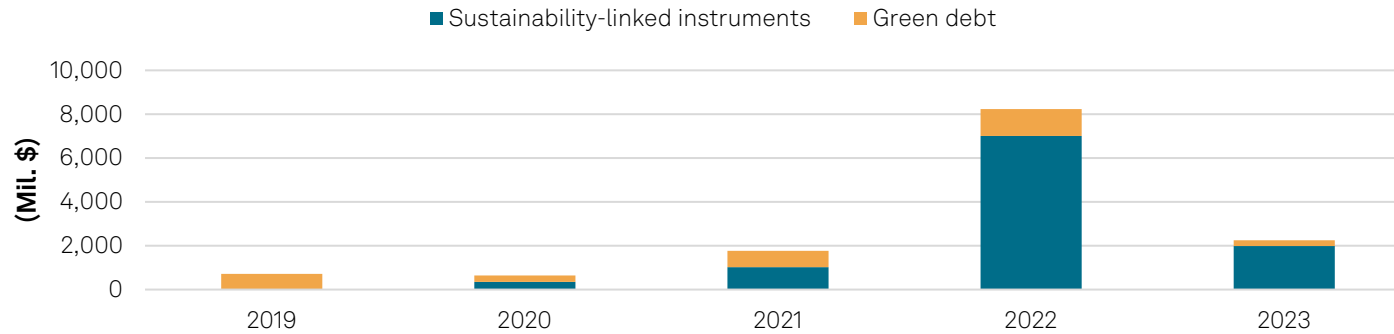
- All countries where APAC rated entities are based have launched national carbon trading schemes, mandatory or voluntary ones mostly covering across sectors.
- **China** could include the chemical sector in its national scheme over the next few years at earliest.
- As we expect most of our Chinese rated chemical companies are generally more active in emission reduction, the inclusion should not materially impact their cost structure.
- Chemical companies in **Korea** are allocated free allowances to procure uncovered emissions through its carbon trading scheme. No material cash flow effect from such requirements on rated companies is observed.

Country/Region	Carbon trading scheme in place?	Free allowances/credits available?	Notes
<b>Mainland China</b>	Power generation industry covered only.	Yes	
<b>Taiwan</b>	Launched on Dec. 22, 2023.	Voluntary before the implementation of carbon fees.	
<b>Korea</b>	- Since 2015, Korea has been operating emissions trading scheme (ETS). - It covers around 89% of Korea's national GHG emissions.	- At least 10% of allowances must be auctioned. - Free allocation is provided for Emission Intensive Trade Exposed industries based on the production cost and trade intensity benchmarks.	
<b>Australia</b>	Under the Australian Carbon Exchange Scheme, participants run projects that reduce or avoid greenhouse emissions (emissions avoidance) or remove and store carbon from the atmosphere (sequestration).	Participants can earn one credit for every ton of carbon dioxide equivalent emissions their project stores or avoids.	
<b>Thailand</b>	The first voluntary carbon credit exchange, FTIX, was launched in 2022.	No	At a very nascent stage. FTIX is not active and few participants in the exchange.
<b>India</b>	The voluntary carbon credit trading system was launched in 2023.	No	- The compliance segment will commence in 2025-2026. - Early days for carbon trading. Will take a couple of years before it becomes fully functional.

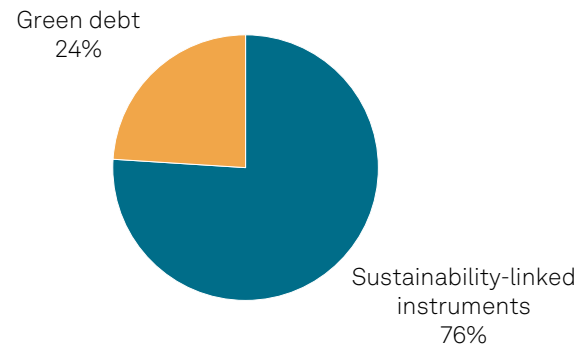
Source: S&P Global Ratings.

# Green Financing Is Growing, But Remains A Fraction Of Funding

Rated entities: Green financing jumped in 2022 on Syngenta, and cooled in 2023 amid high rates



Most of these are sustainability-linked instruments



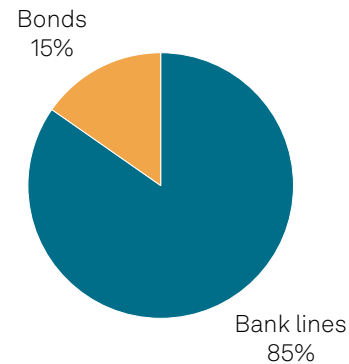
Source: company data; S&P Global Ratings estimates.

- Green financing should remain a small portion of rated companies' funding sources over the coming years, despite a generally growing trend.
- The total amount between 2019-2023 totaled about US\$13.6 billion, including unused credit lines. This is compared with about US\$273 billion total debt of all rated chemical companies.
- Most of the rated companies, typically large players in the region, accessed green financing.
- They primarily used **sustainability-linked instruments (bonds or loans)**, whose credit spread are linked to company's ESG performance, particularly the progress in decarbonization.
- These instruments will likely continue to comprise most of green financing.
- A few companies used **green debt (bonds and loans)** to fund renewables or green products, such as recycled plastics and fibers, EV and battery materials.

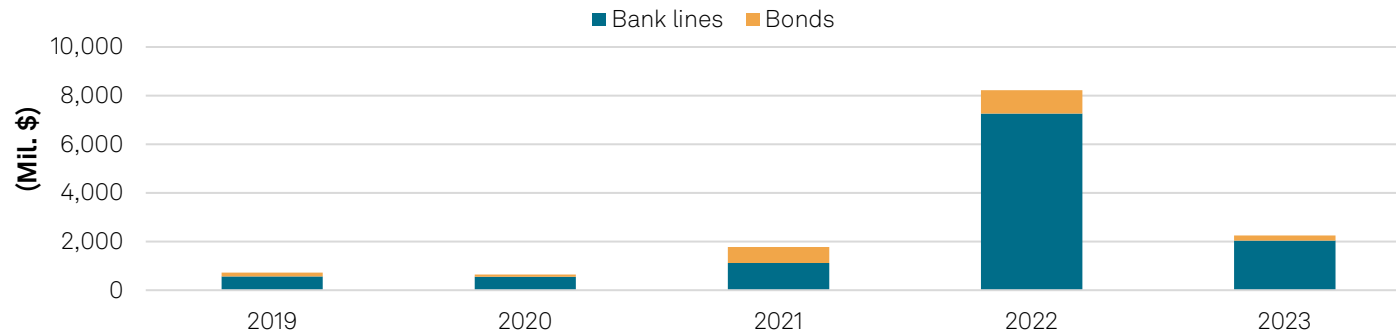


# Bank Lines Remain The Main Green Financing Vehicle

Banks still dominate green financing for rated companies



Green loans jumped in 2022 amid sizable credit lines granted to Syngenta



Source: company data; S&P Global Ratings estimates.

- **Banks** still dominate the green financing market for the chemical sector, similar to the overall financing market in the region.
- The notable increase in green loans in 2022 was mainly driven by the sizable sustainability-linked credit lines totaling US\$4.5 billion granted to **Syngenta Group**.
- **Green bond** markets in Asia are still underdeveloped.
- Green bonds are both onshore and offshore. The issuance in **Taiwan** is predominantly onshore due to low interest rates.

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## Related Research

- [Scenarios Show Potential Ways Climate Change Affects Creditworthiness](#), July 25, 2024
- [Assessing How Megatrends May Influence Credit Ratings](#), April 18, 2024
- [German Chemical Industry's Decarbonization Is A Team Effort](#), March 20, 2024
- [Decarbonizing Chemicals Part One: Sector wide Challenges Will Intensify Beyond 2030](#), Sept. 5, 2023
- [Decarbonizing Chemicals Part Two: The Credit Risks And Mitigants](#), Sept. 5, 2023

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