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Energy

Sustainability in the PVC Market: Challenges and Opportunities

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The International Vinyl Sustainability Forum 2025

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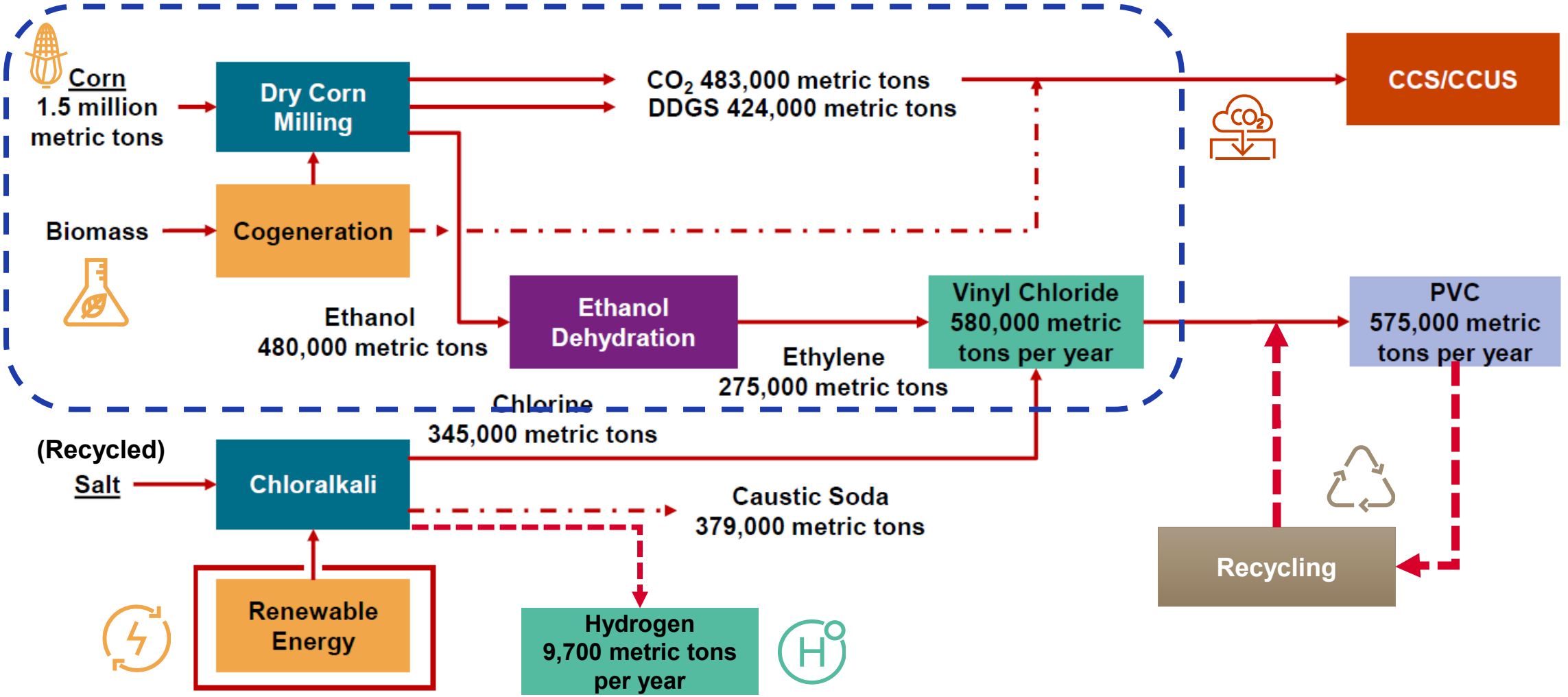
Sustainable Chlor-alkali to PVC production involves numerous components

Implementing parts or in phases help support sustainability and receptivity towards the value chain



Bio-based PVC: important to consider the benefits and limitations

Benefits
Renewable feedstock.
Encourage the use of 2G and 3G bio-fuels.
Non-biodegradable: i) does not disintegrate into micro-plastics, ii) does not contaminate the recycling pool, iii) therefore, PVC made from bio-based ethylene can be recycled the same way as traditional PVC, iv) which also means the lifecycle assessment is more favorable.

Limitations
Suitable for plantations with high yield, e.g. adequate land and water (non-competition with food crops and protected land), intense solar radiation and climate diversification.
Ensure efficient use of resources: e.g. converting bagasse into electricity, vinasse as fertilizer.
Harvesting occurs during the dry season.
Third-party auditing to ensure compliance.

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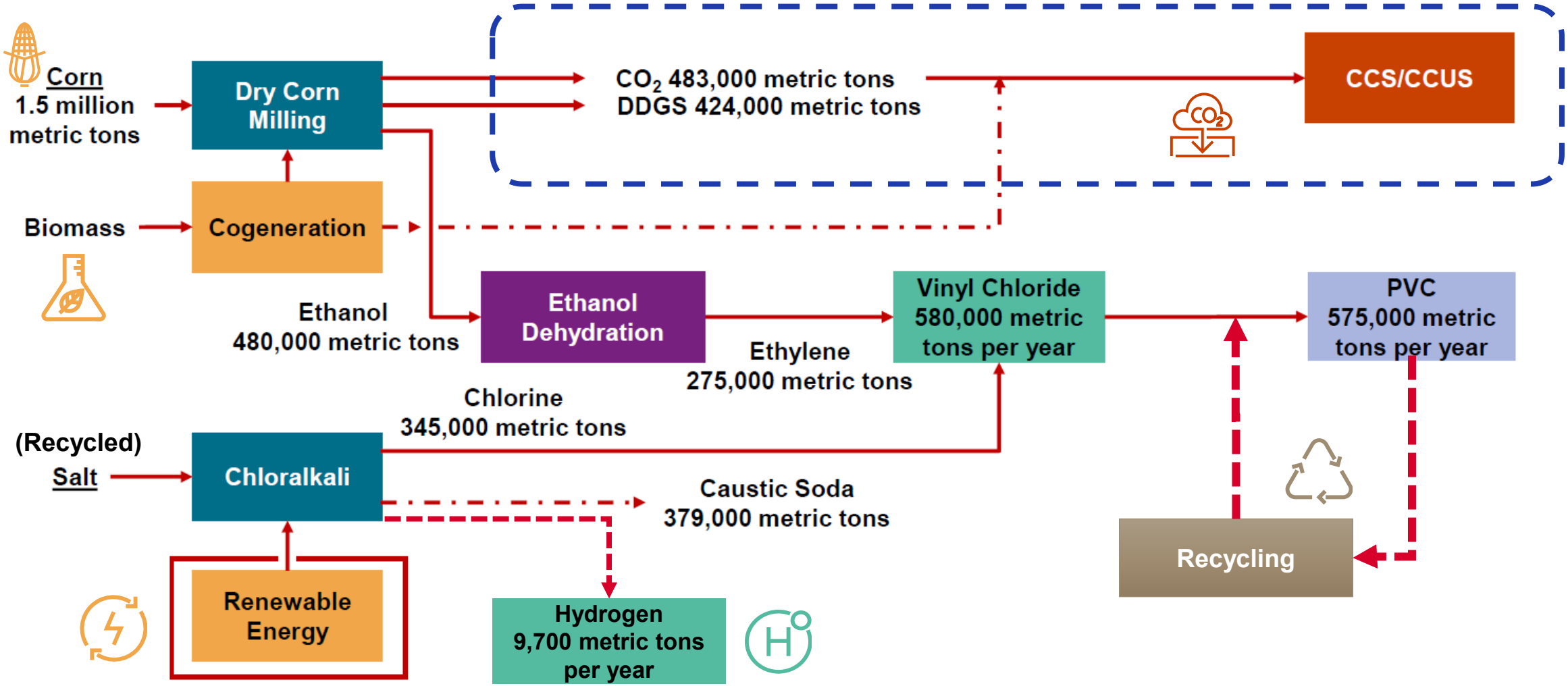
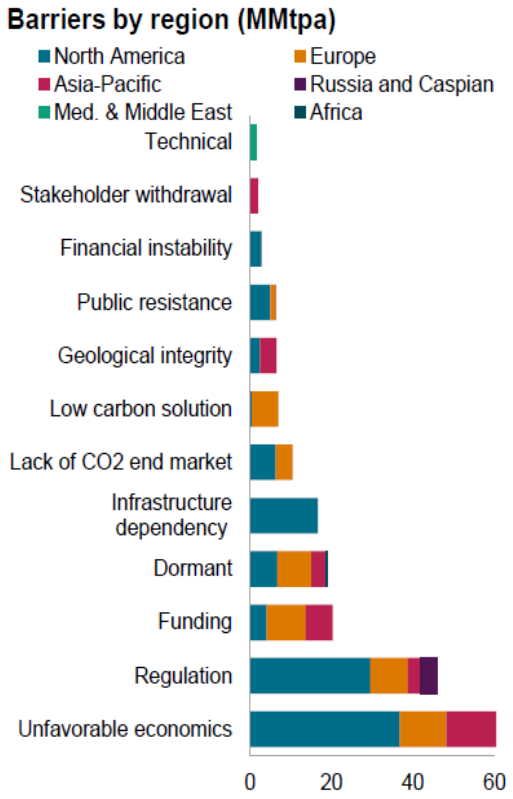
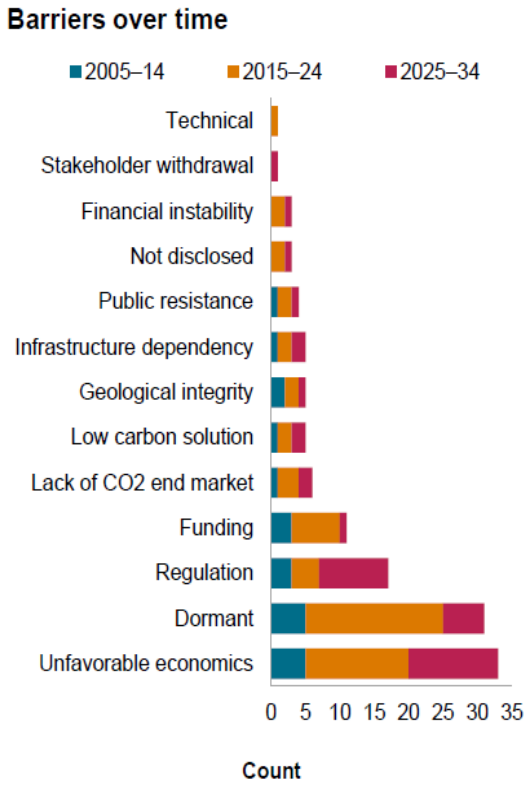


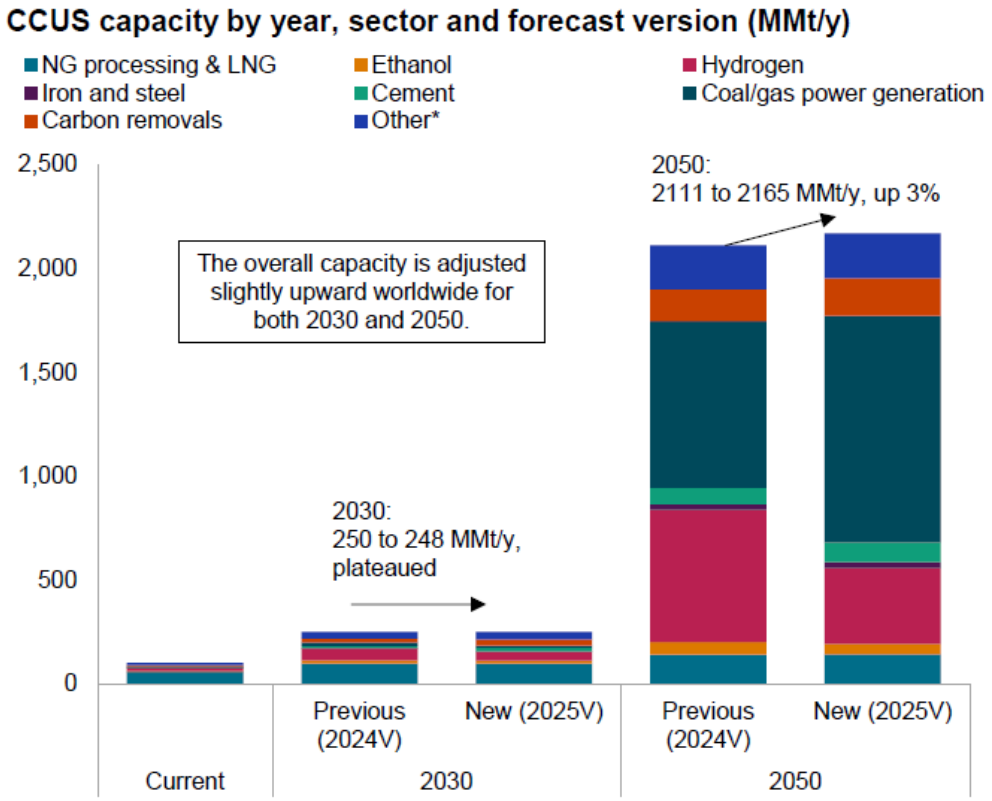
CCUS projects face myriad challenges but long-term expectations intact

Unfavorable economics and regulation are key contributors to cancellations; 2050 forecast revised upwards





Data compiled October 2025.
Years are based on the announced startup year for projects.



Data compiled September 2025.
NG = natural gas; V = vintage.
"Other" includes refinery, chemical and nonferrous metal.

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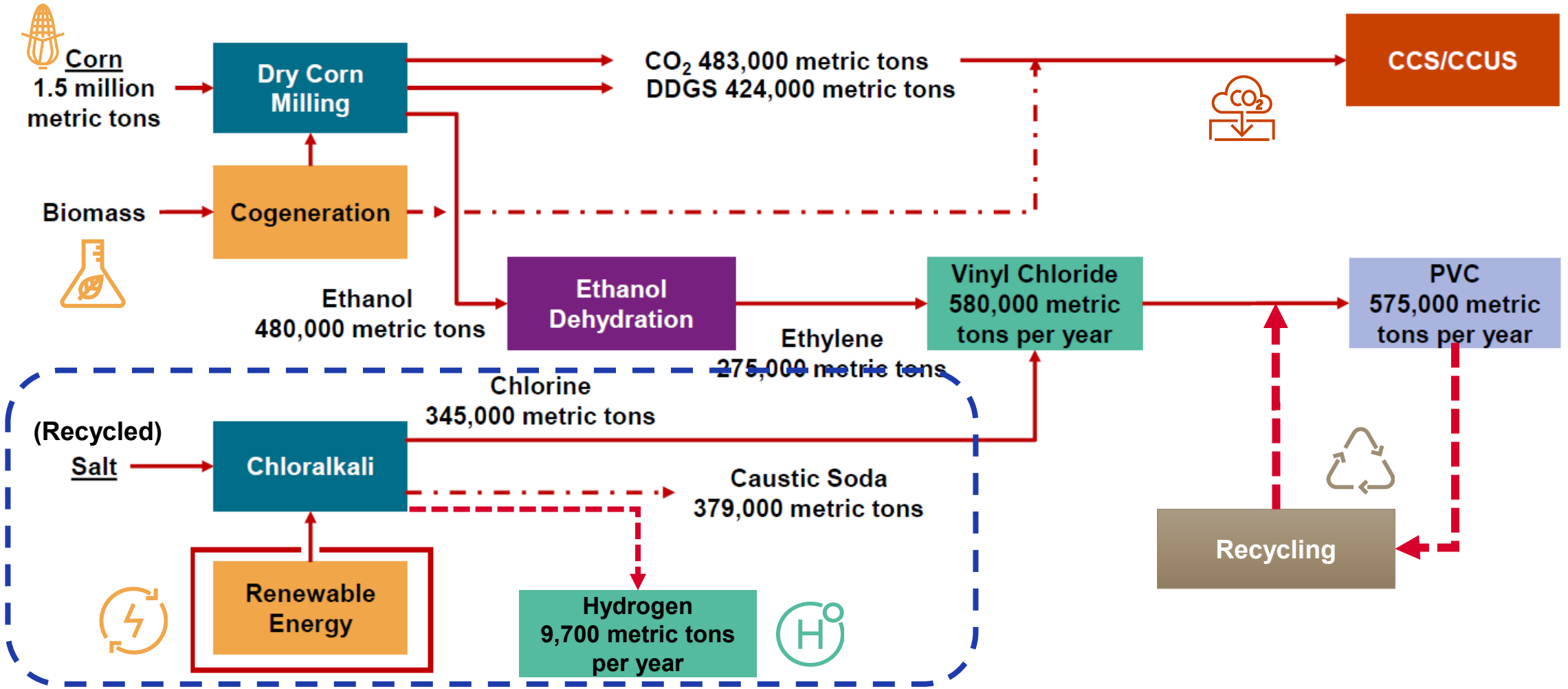
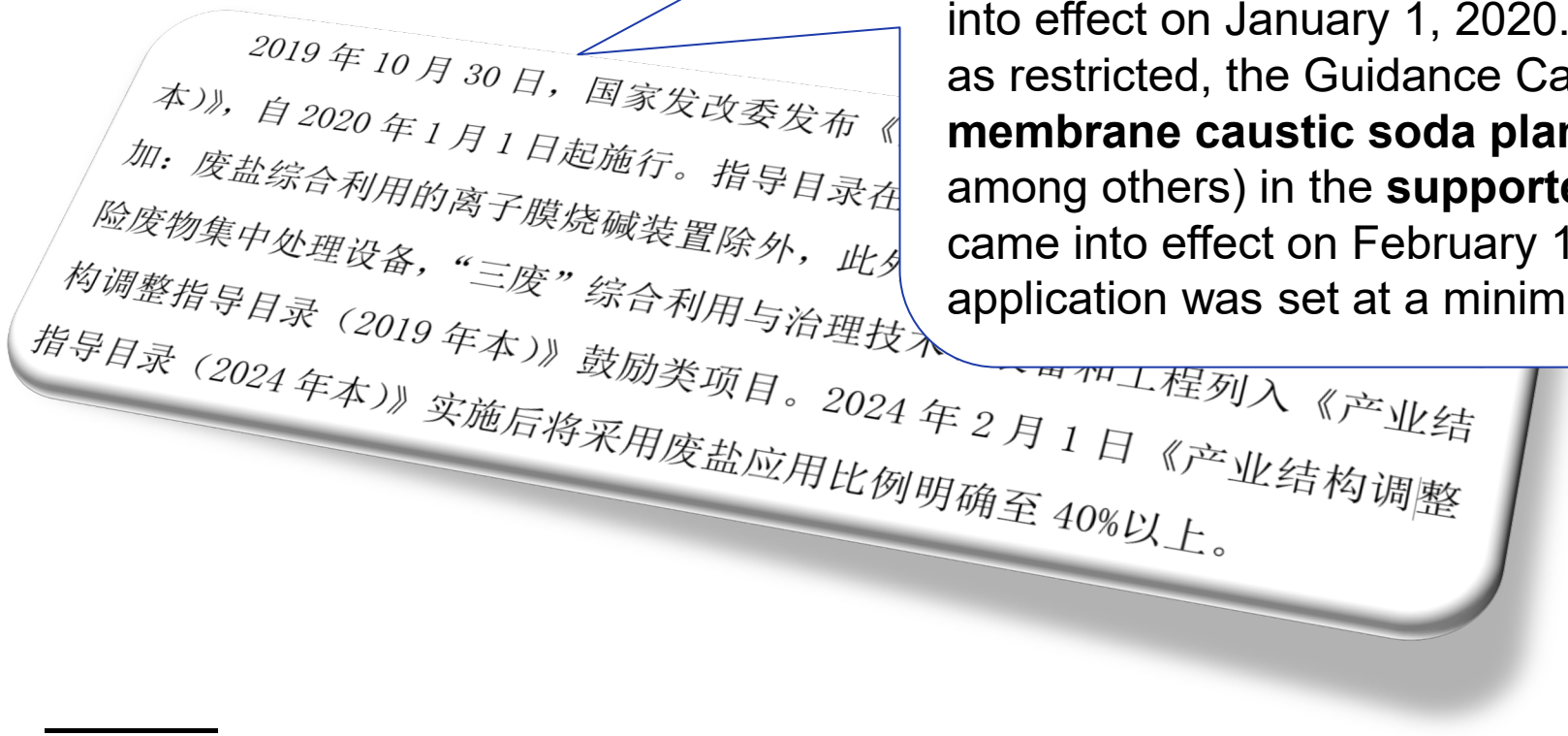


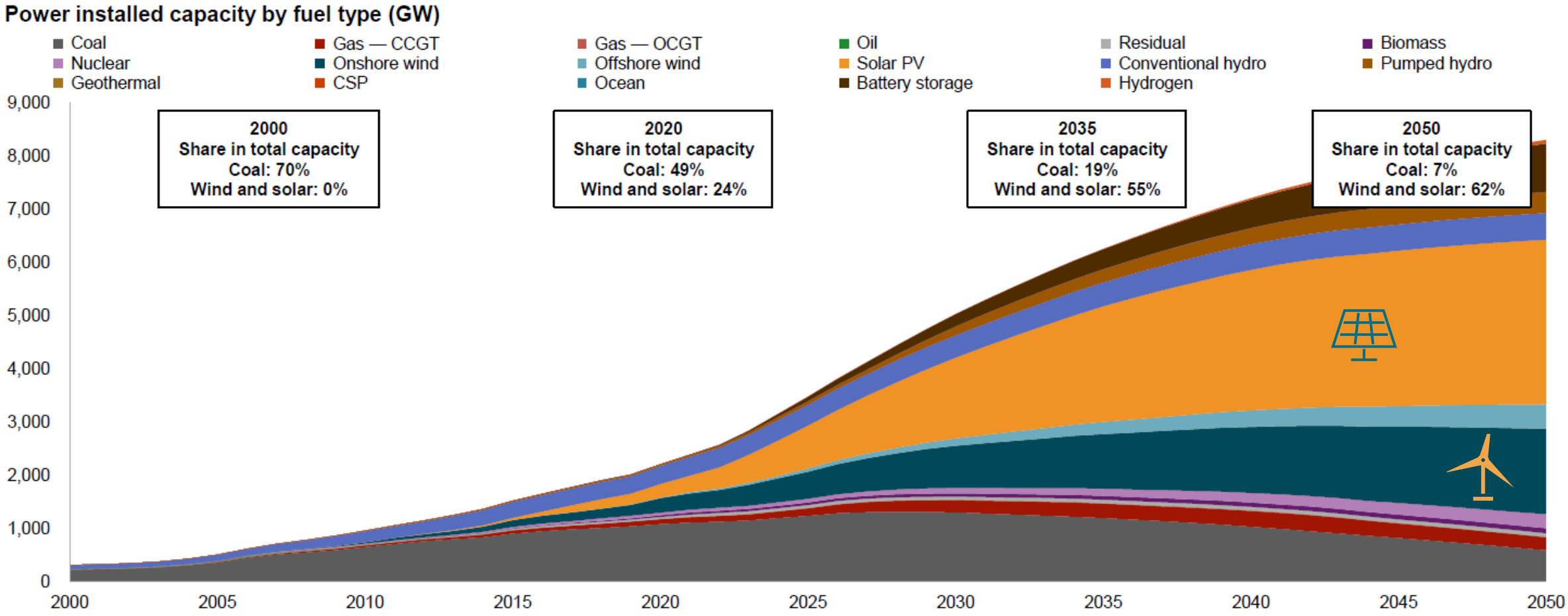
China has mandated the use of waste industrial salt for new CS plants

Depending on location and conditions, it's challenging to source adequate waste salt and purify economically



On October 30, 2019, the National Development and Reform Commission (NDRC) released the "Guidance Catalogue for Industrial Structure Adjustment (2019 Edition)," which came into effect on January 1, 2020. While classifying caustic soda as restricted, the Guidance Catalogue listed ion-exchange **membrane caustic soda plants utilizing waste salt** (… among others) in the **supported** category. After the "Guidance" came into effect on February 1, 2024, the **waste salt** application was set at a minimum of **40%.**

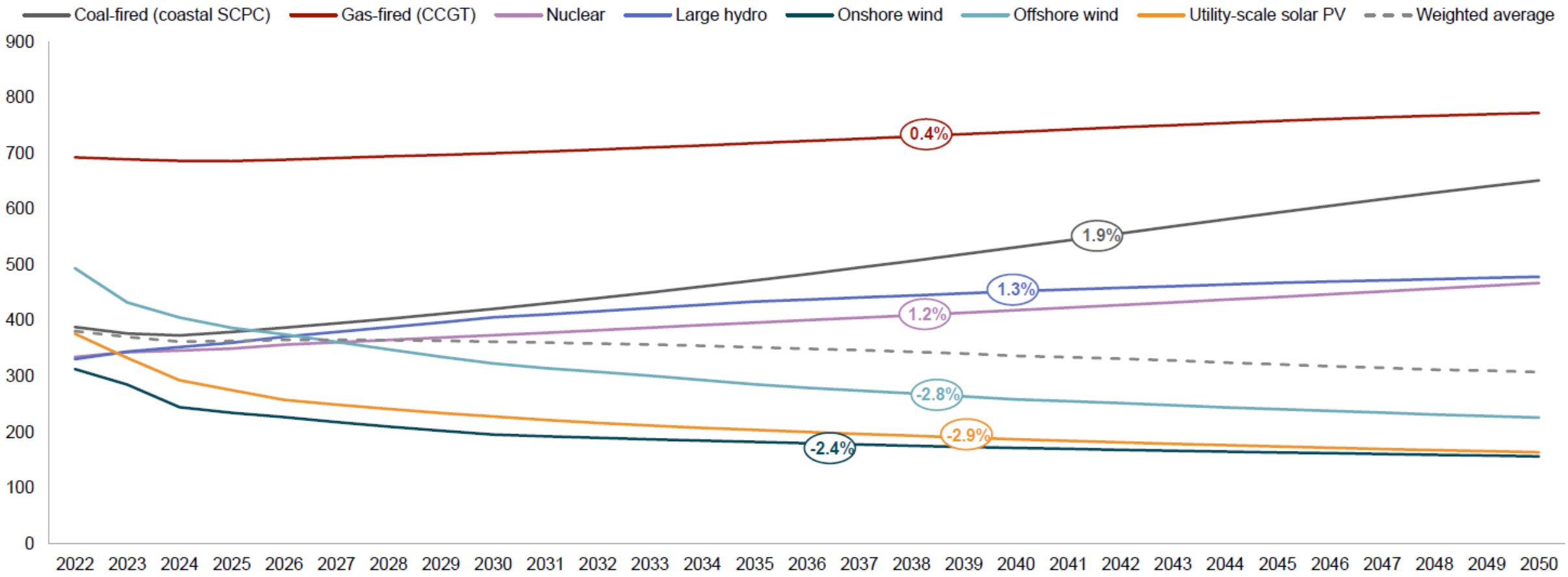
China's power fleet is already the largest in the world and will almost triple in size by 2050; coal's share will steadily decline



Source: S&P Global Energy CERA.

Declining LCOE and capacity growth of renewable power will drive down weighted-average generation cost, despite the uptick in conventional power

China LCOE outlook, 2022–50 (yuan/MWh)

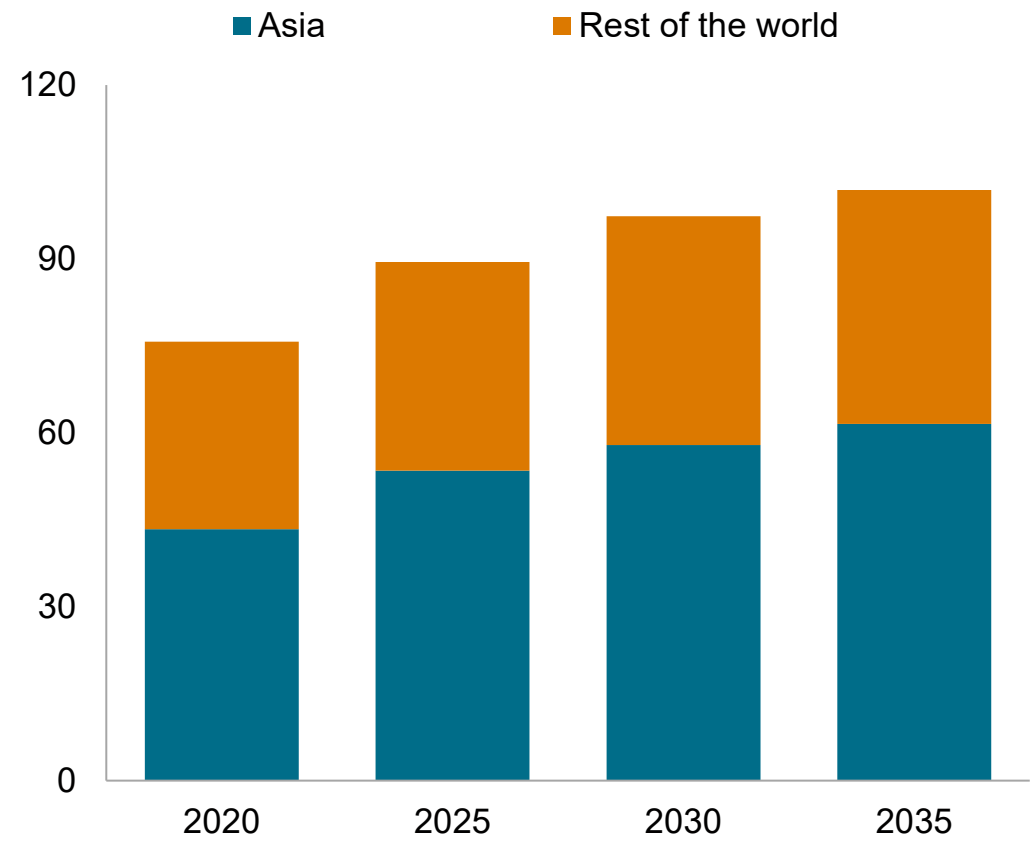


LCOE = levelized cost of electricity.
Source: S&P Global Energy CERA.

EV-specific PVC demand and margins supercharged by electrification

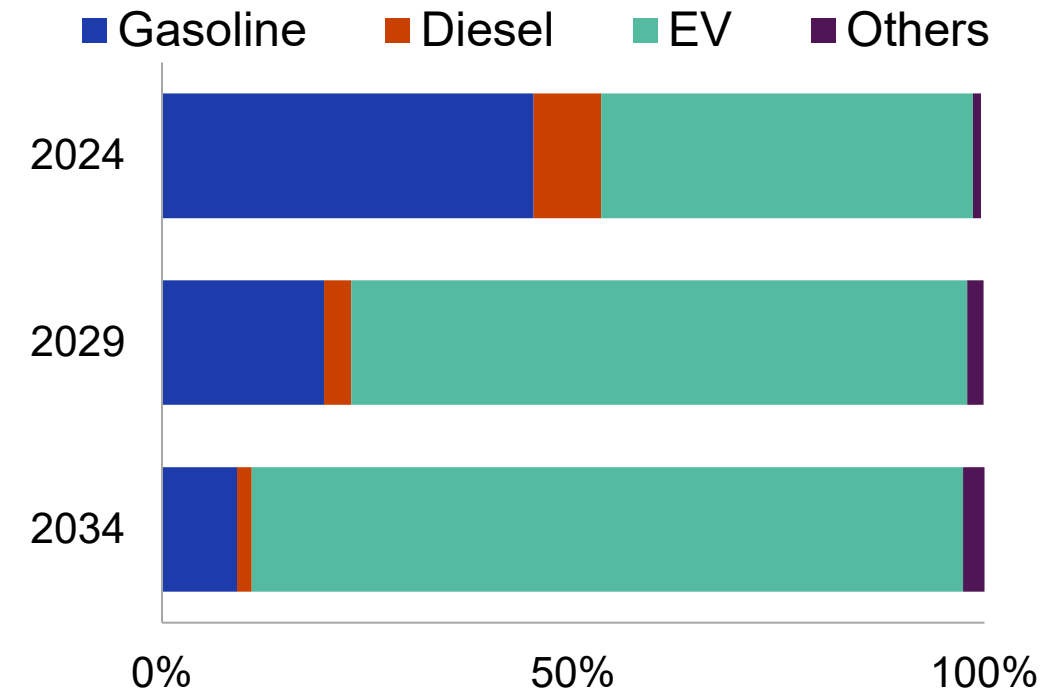
Higher production volumes meet enhanced per-vehicle PVC content

Vehicles production, million



Source: S&P Global Energy CERA.

EV share forecast of new LV sales of four regions



* Four regions include US, Europe, China, India

Data compiled August 2024
Source: S&P Global Commodity Insights.

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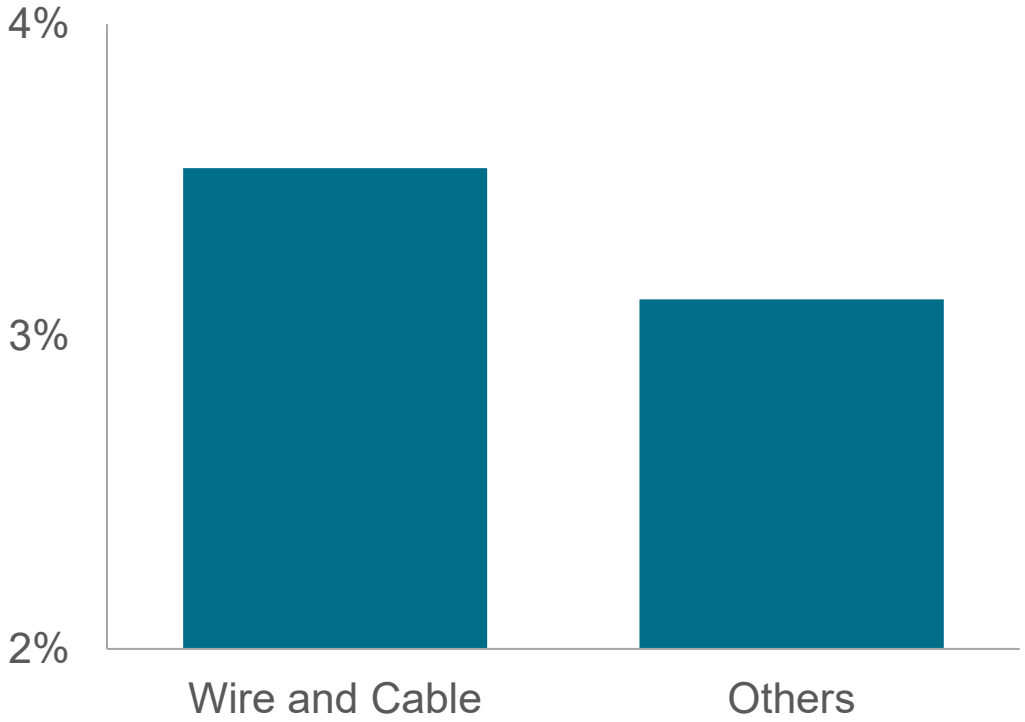
Energy transition fuels PVC demand growth

PVC electrical segments see faster than average expansion

Wire & cable to enjoy superior growth rates

Asia PVC demand by application, CAGR 2025-2030



Source: S&P Global Energy CERA.

PVC substituting TPE for EV charging cables

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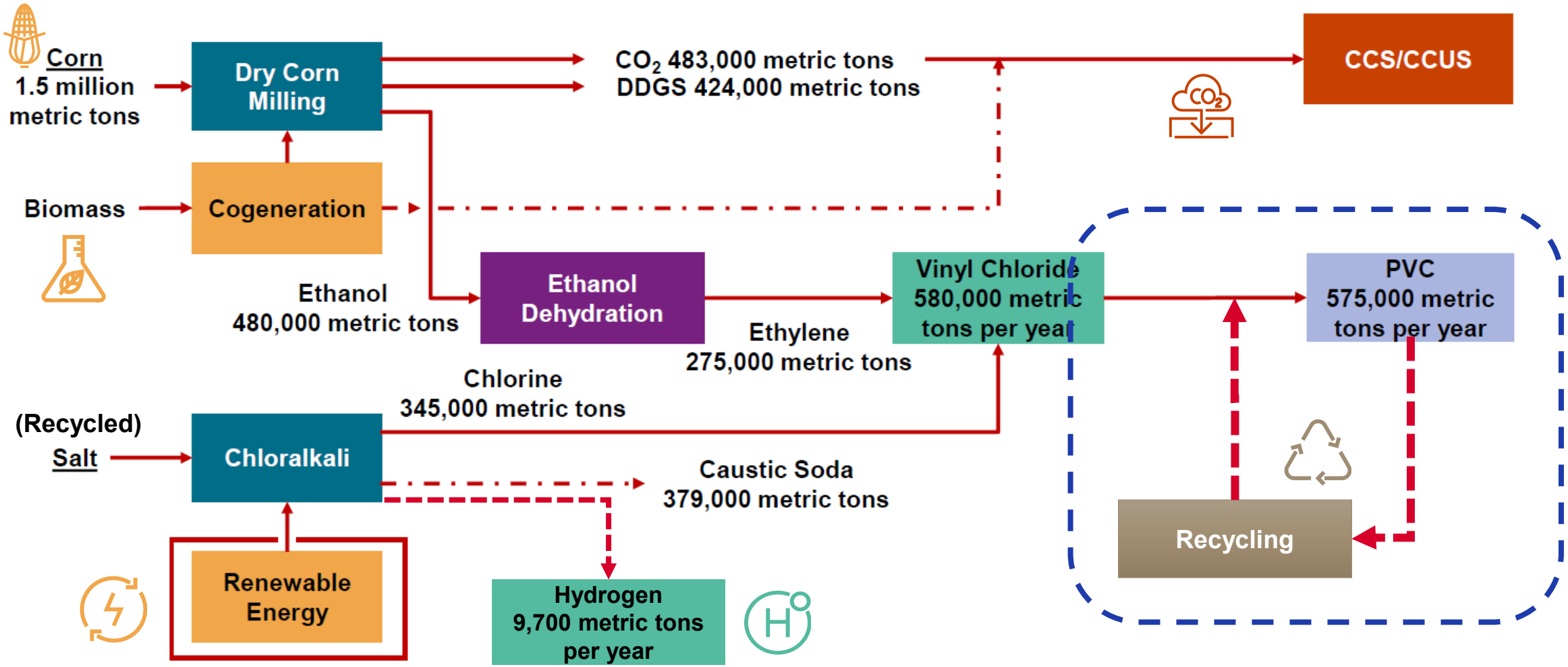
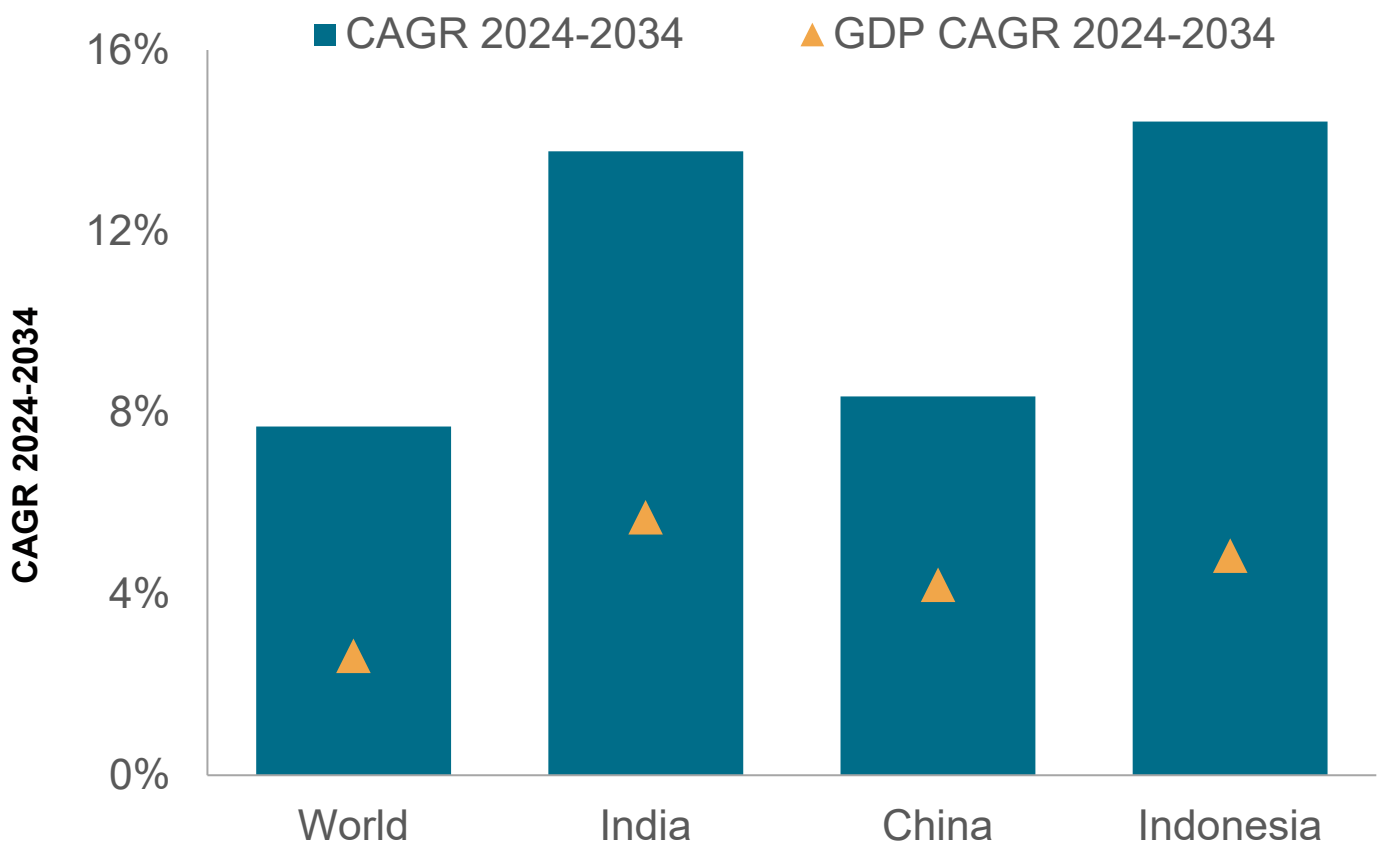


PVC’s infrastructure advantage: riding the global water investment wave

Superior performance and enhanced green credentials fuel PVC market leadership in pipes

Infrastructure spending on water and sewer



Source: S&P Global Market Intelligence.

PVC is the leading material in large-scale water, irrigation, and sewage projects on a favorable balance of competitive upfront cost, installation ease and low failure rate.

PVC’s low lifecycle carbon footprint, resource efficiency, durability, and recyclability (pipe-for-pipe) make them a preferred choice for going green.

Ongoing innovations (e.g., bio-attributed PVC, lead-free stabilizers, renewable plasticizers) will further enhance its green credentials.

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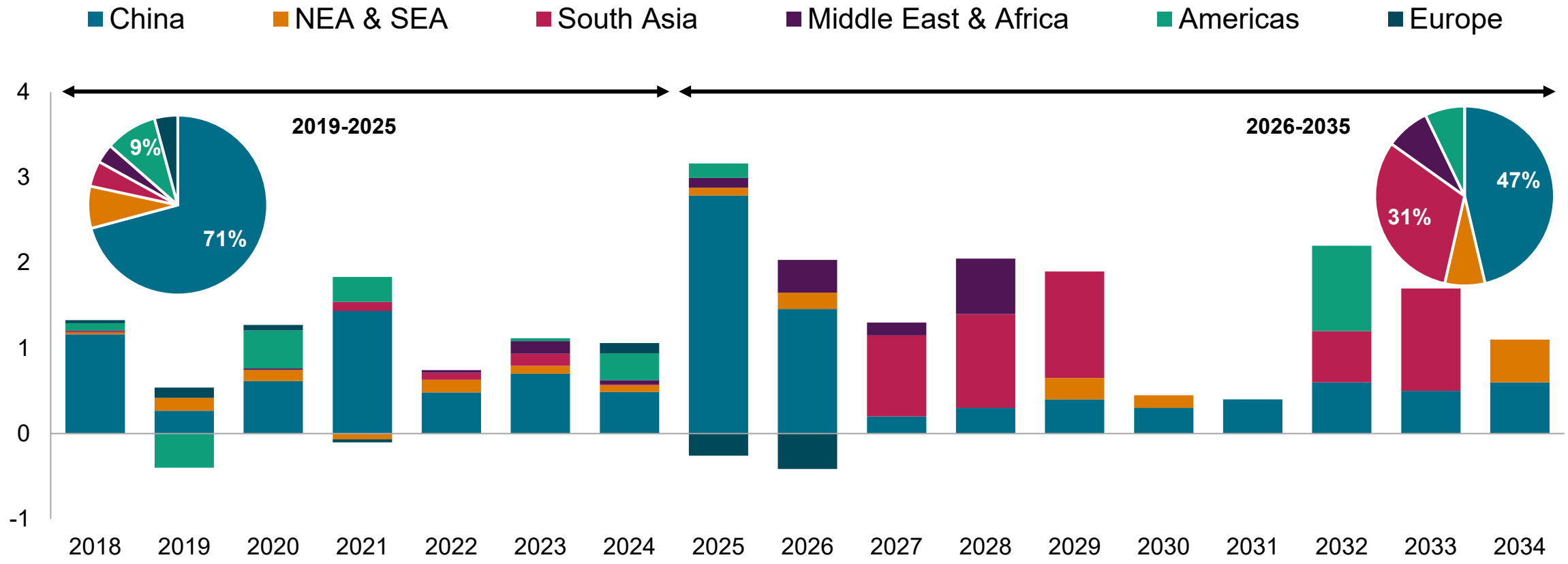
Global PVC capacity expanding faster in 2025 – 2029, especially in India

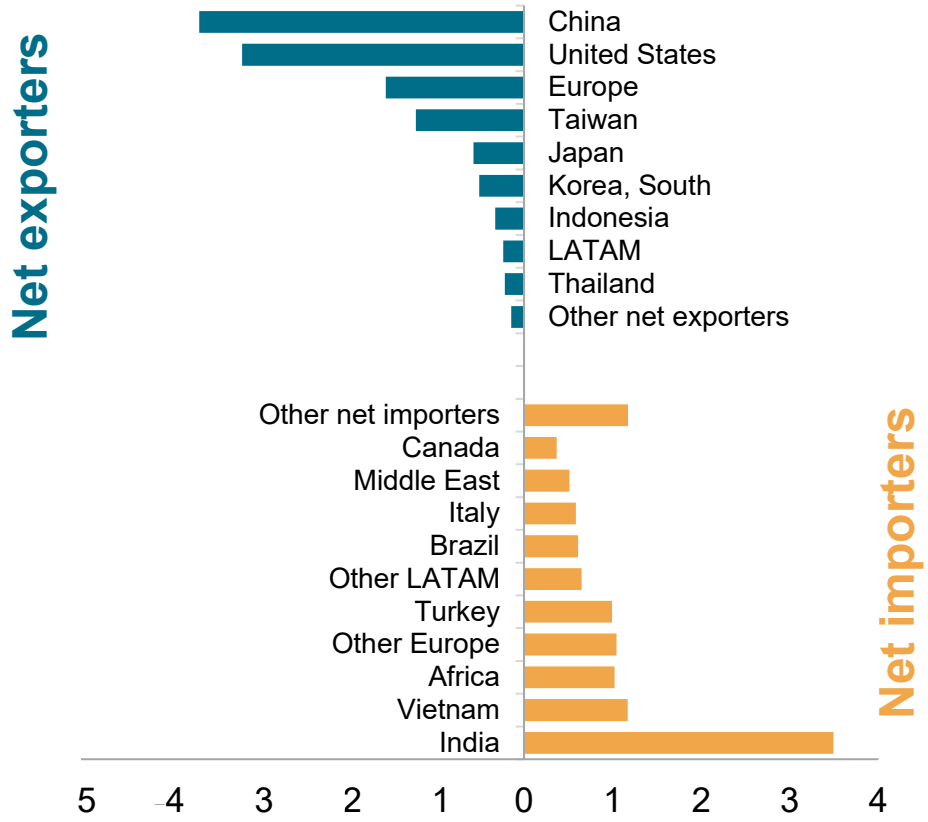
PVC capacity growth by region, MM MT



As of Oct. 2025.
Source: S&P Global Energy CERA.

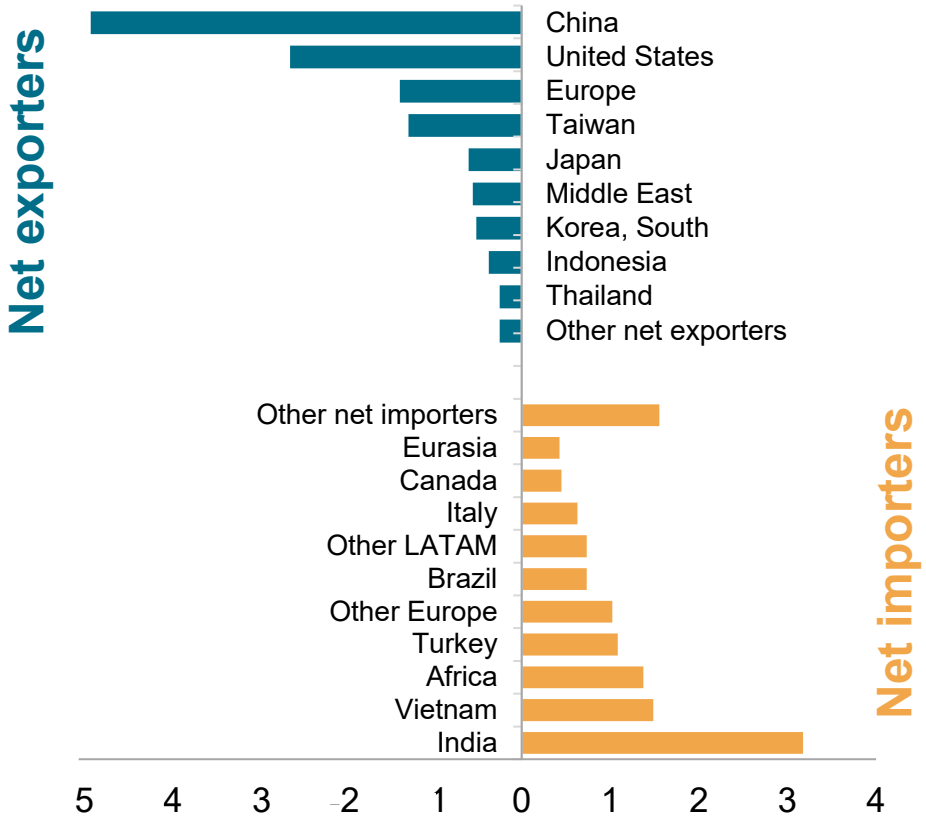
Despite new capacities, India to remain top importer through 2030; China to extend lead as top exporter globally

2025 PVC net trade, MM MT



As of Dec. 2025.
Source: S&P Global Energy.

2030 PVC net trade, MM MT

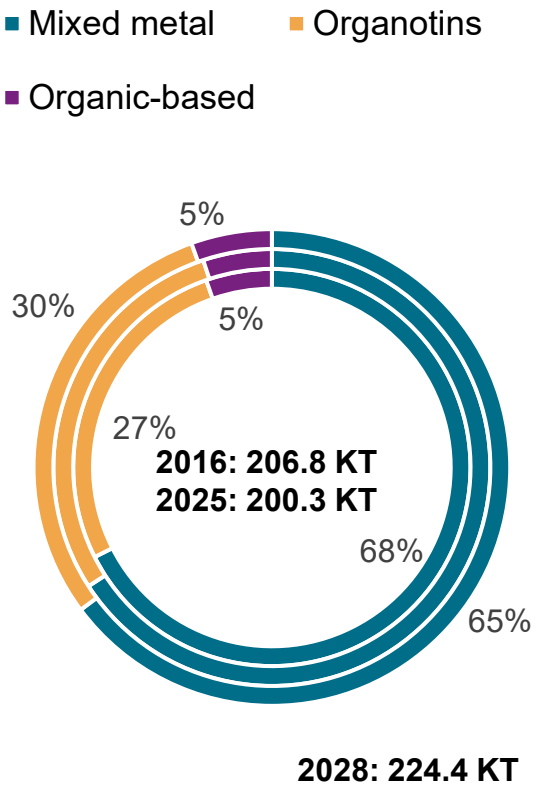


As of Dec. 2025.
Source: S&P Global Energy.

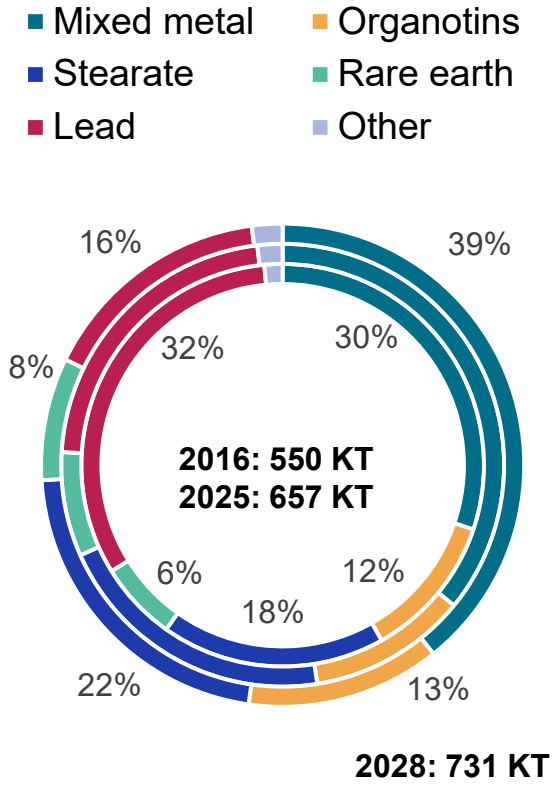
Heat stabilizers transformation boosts affinity for PVC products

Low-cost lead alternatives in China facilitate the eco-friendly transition

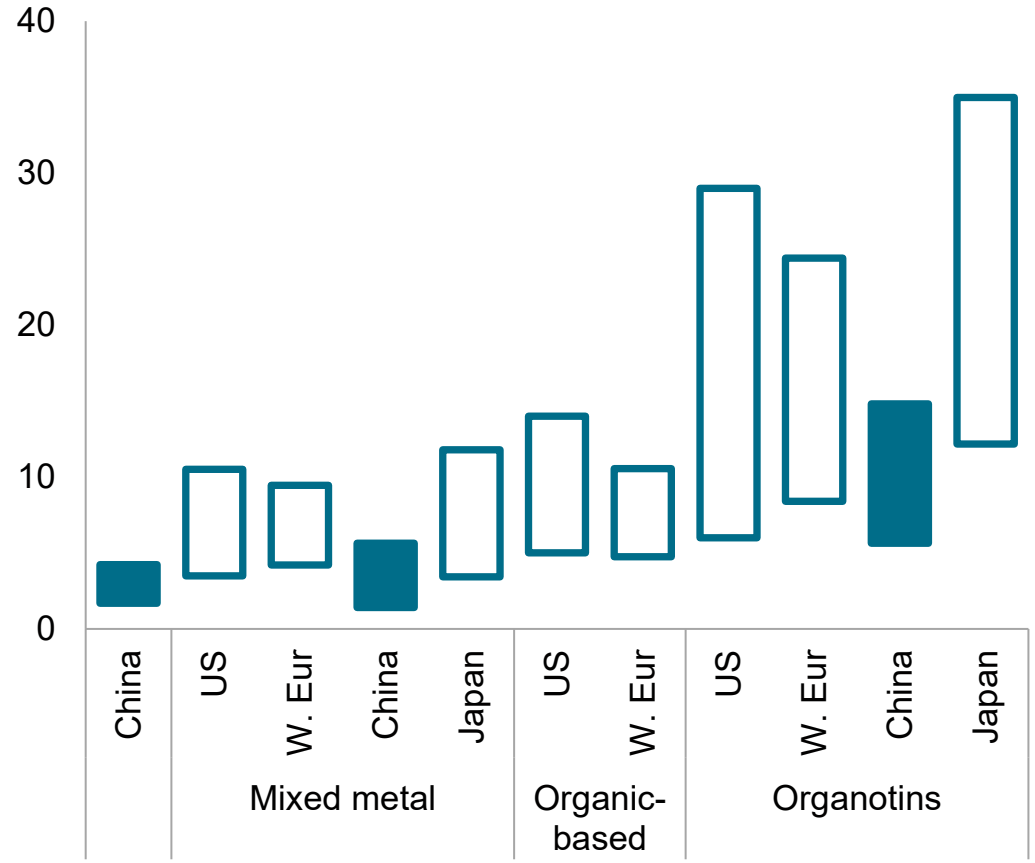
N. America and W. Europe



Mainland China



Prices of primary PVC heat stabilizers, US$/kg



Source: S&P Global Energy CERA.

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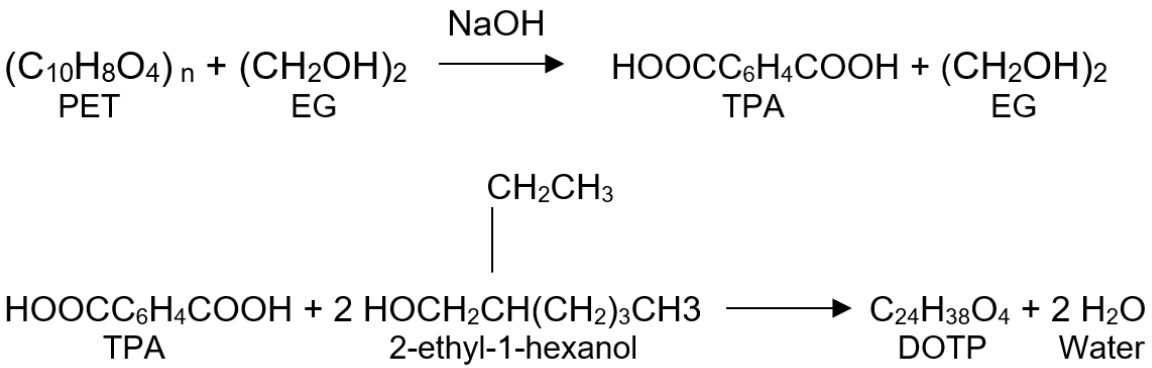
PET waste-to-DOTP conversion boosts green credentials of PVC products

Growing PET production creates expanding feedstock for sustainable plasticizer manufacturing

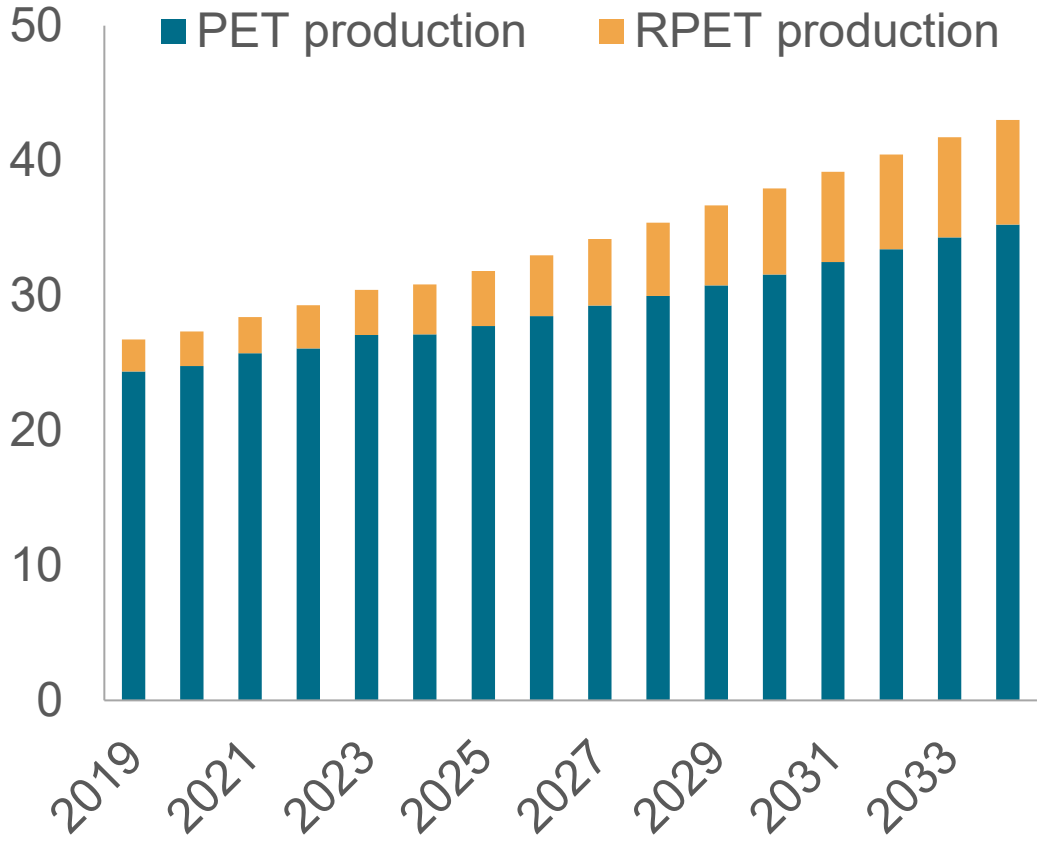
Alkali hydrolysis of PET for depolymerization into TPA



Early study: Synthesis of a Plasticizer for PVC from Terephthalic Acid Based on the Chemical Recycling of Postconsumer PET Bottles, Terasak Thavornsetawat et. al., J. Sci. Res. Chula. Univ., Vol. 27, No. 1 (2002)

Source: S&P Global Energy CERA.

World PET & RPET production, million metric tons

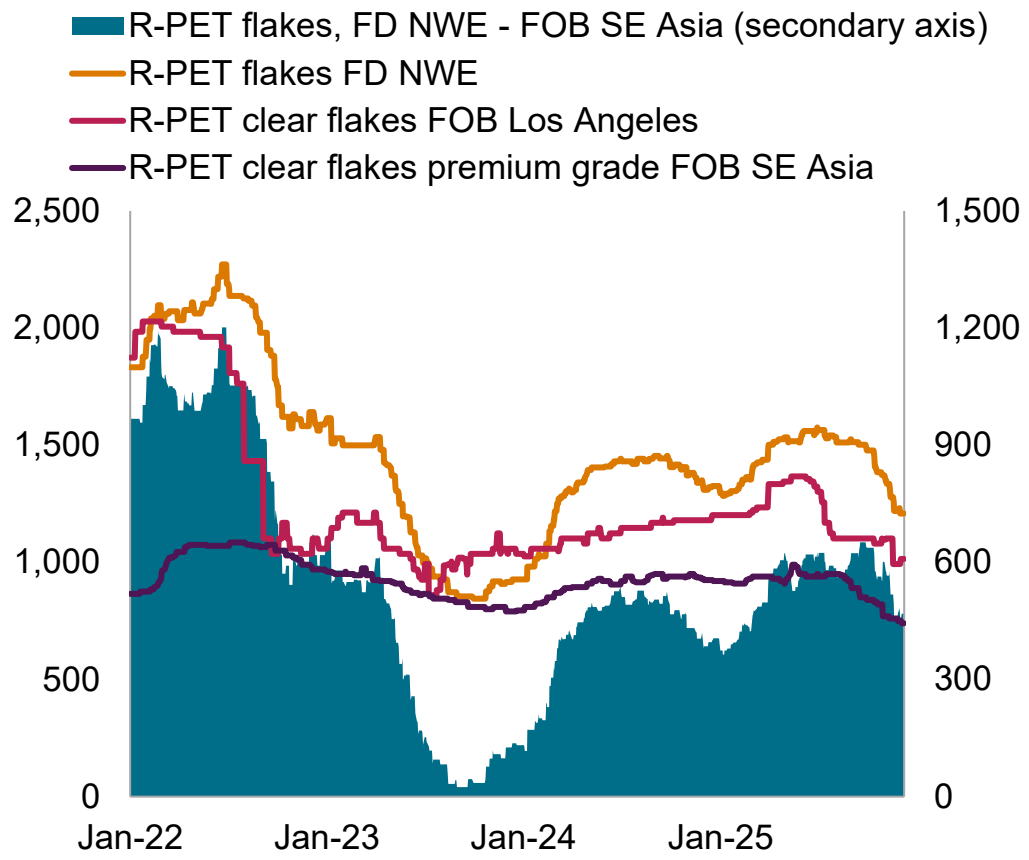


Source: S&P Global Energy CERA.

Arbitrage opportunities for Asian recycled resin exports to Europe/U.S.

Windows of high premiums where recycled-content mandates are stepping up and S/D imbalances

Global recycled-PET prices, USD/MT



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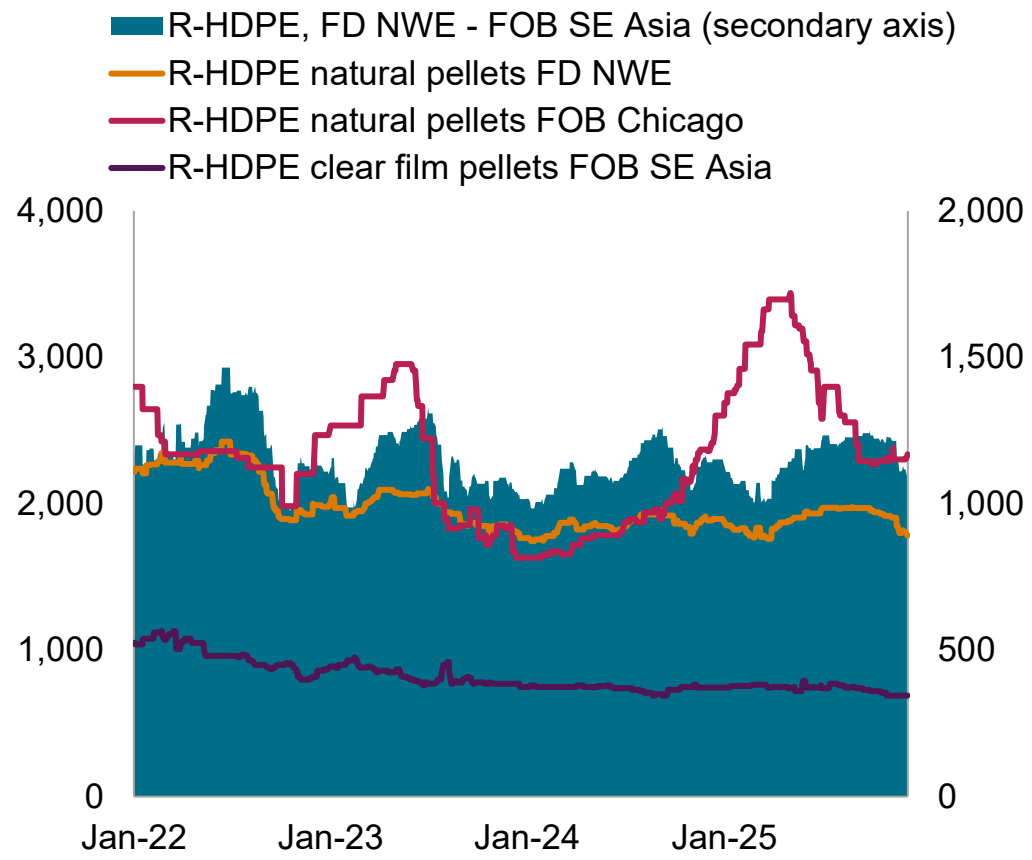
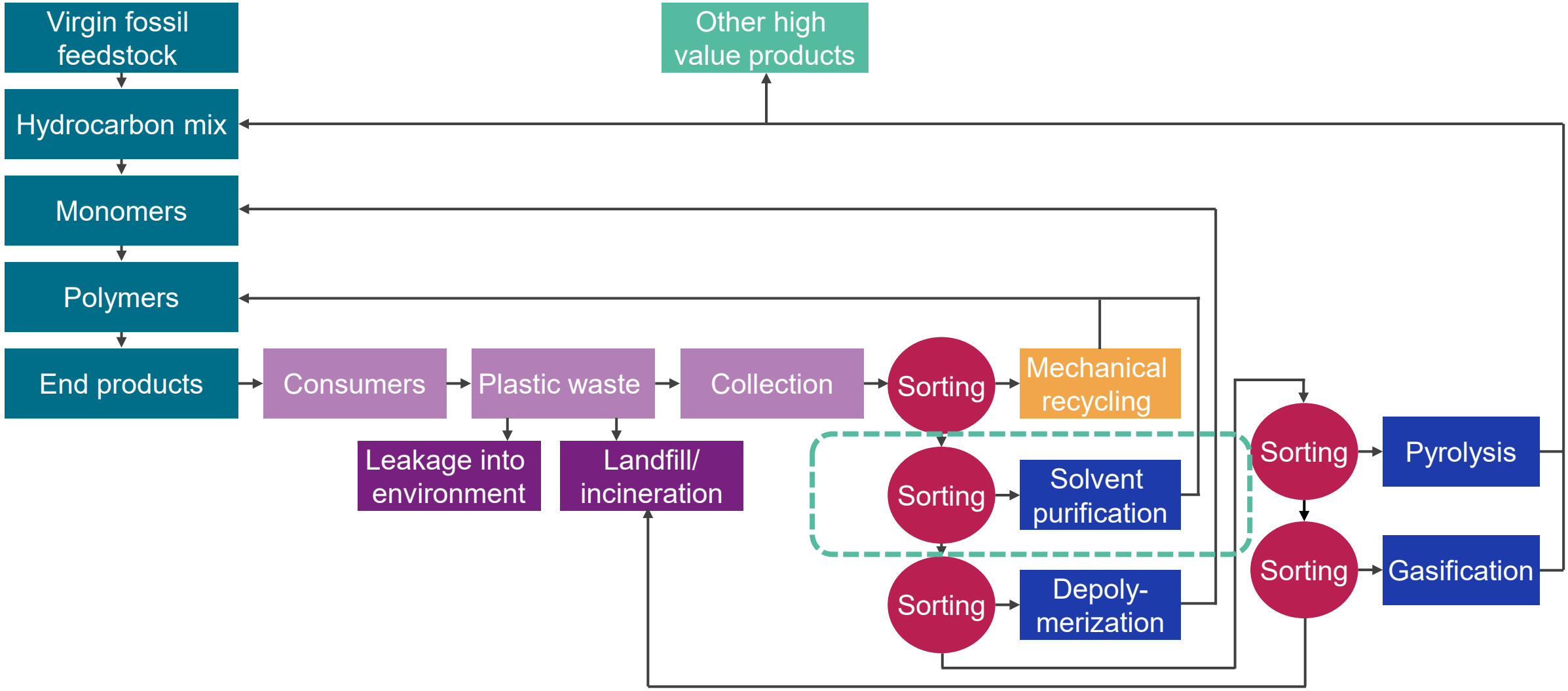


Source: S&P Global Energy CERA.

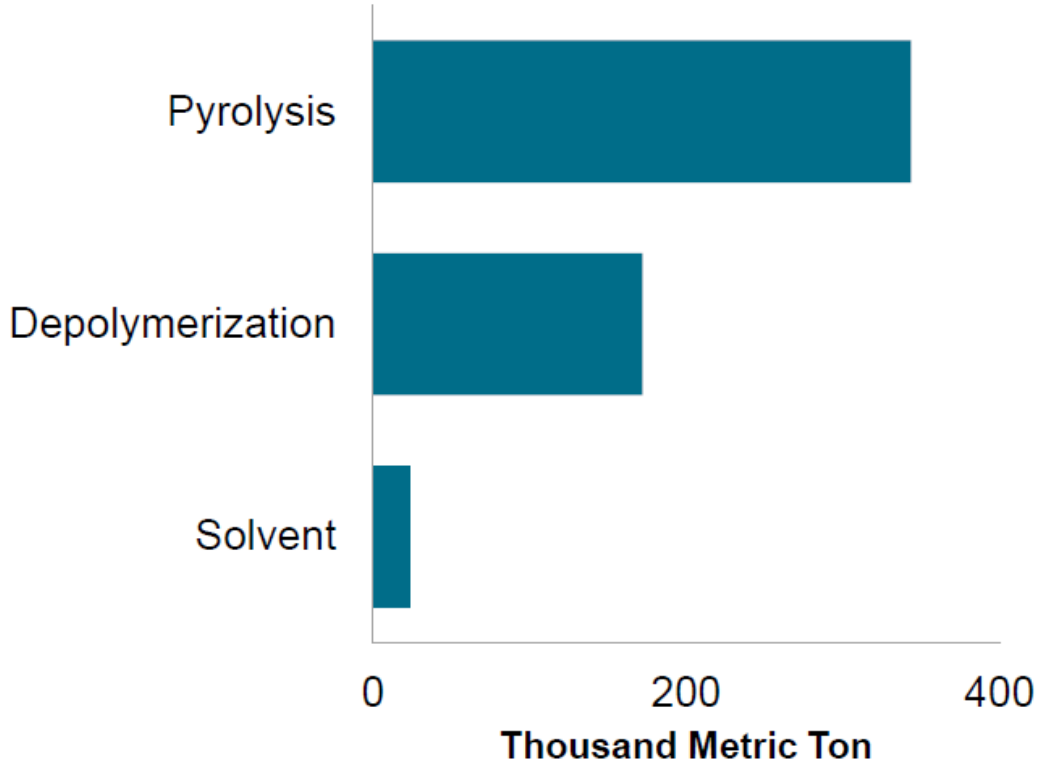
Chemical recycling options to supplement mechanical recycling



High investment costs make chemical recycling prohibitive to build

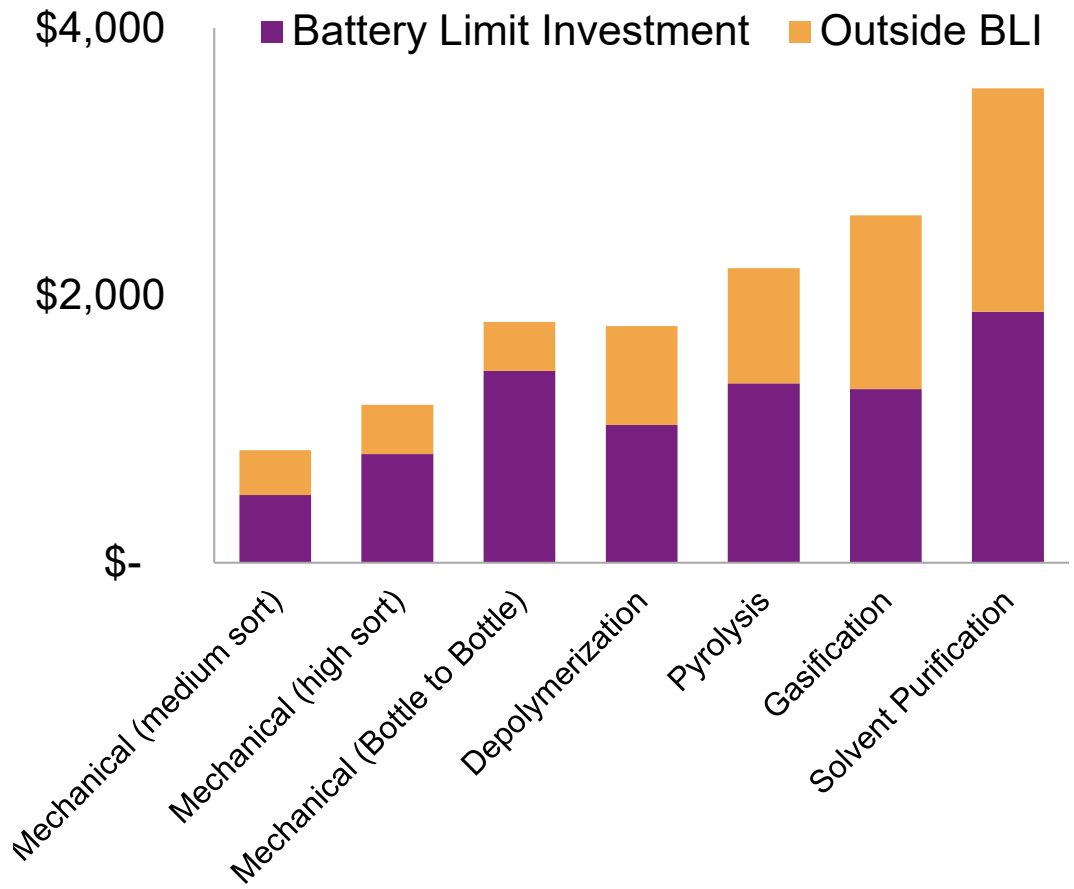
Solvent purification is suitable for PVC but the high cost limits its deployment

2025 Advanced Recycling Capacity by Process



As of February 2025
Source: S&P Global Commodity Insights, Company Publications

Investment cost (USD per tonne plastic waste)



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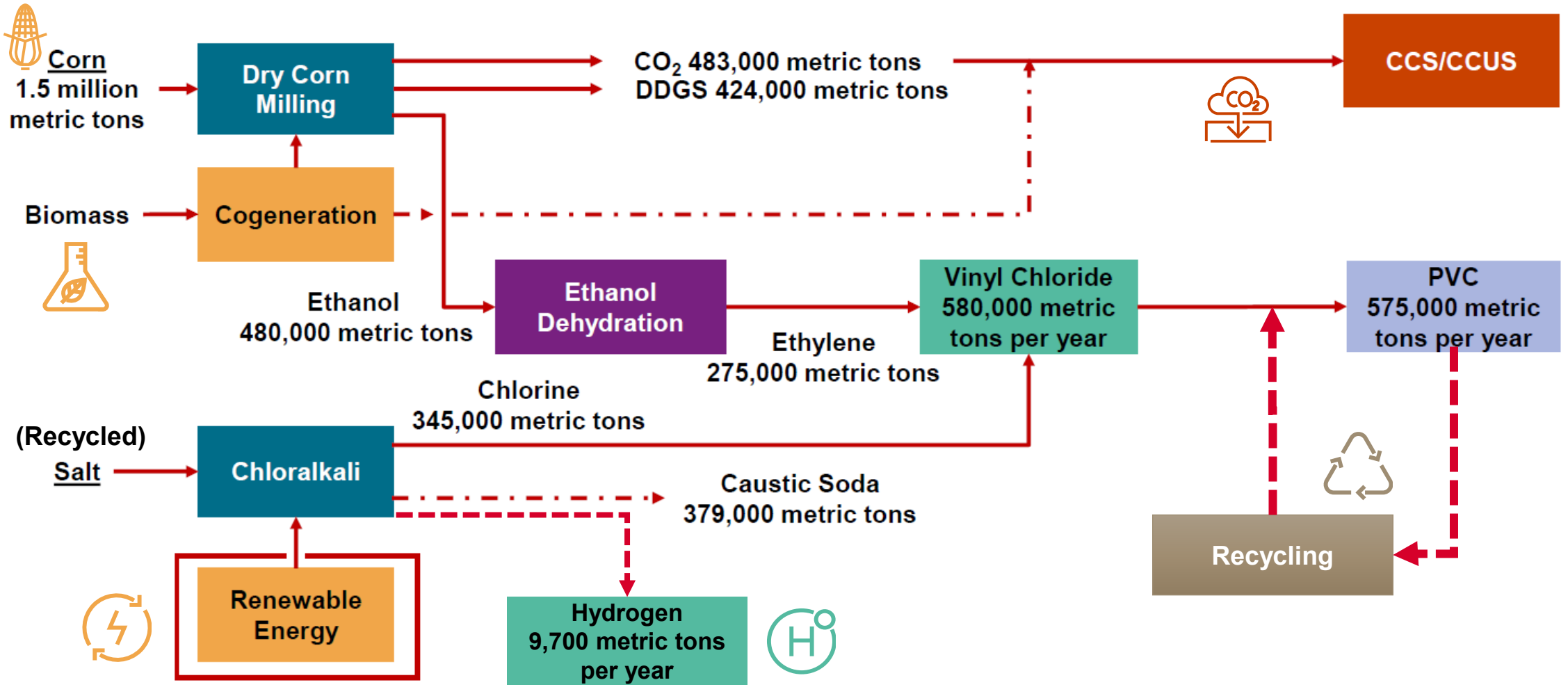
Green PVC is not a myth

Integrated Chlor-alkali to PVC production can be constructed with sustainability in mind



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