



LAND OF THE CURIOUS



 FUTURECHEM EUROPE 2026 - FCE2026, HELSINKI 1.10.2026

INTRODUCTION TO THE EUROPEAN CHEMICAL INDUSTRY

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Chemical reactions and process engineering

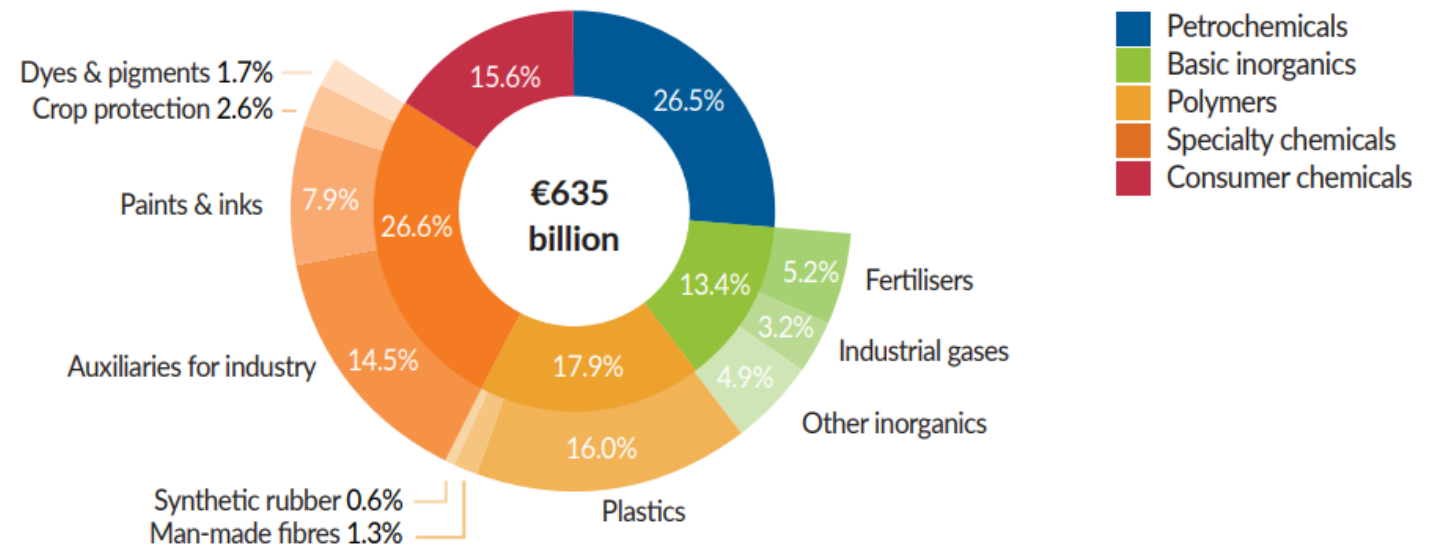
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INTRODUCTION

» The most impacted chemical industry sectors in EU are:

- » Polymers and polymers for plastics
- » Petrochemicals
- » Specialty chemicals

EU27 chemical sales, 2024



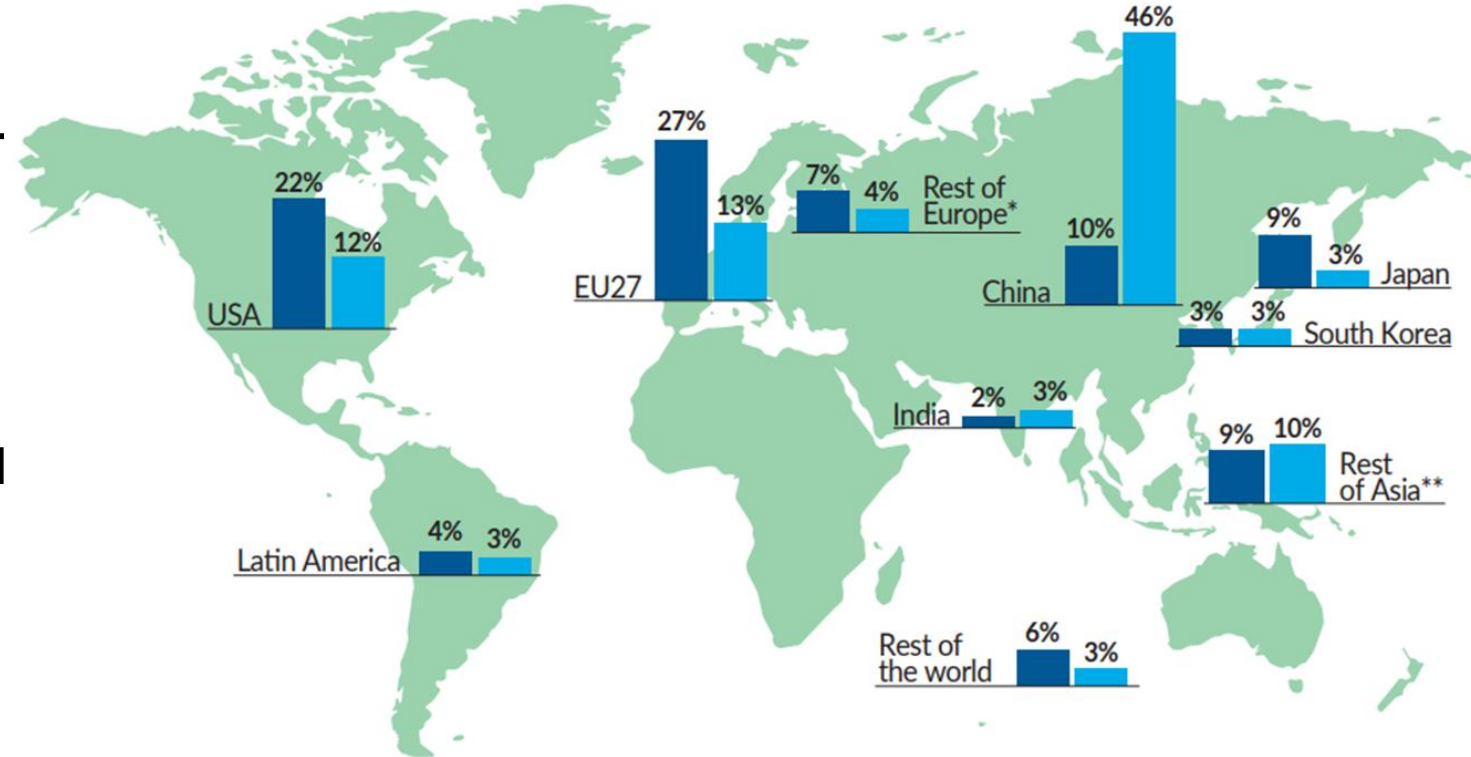
Source: Dr Moncef Hadhri, Catherine Tuerlinckx: "Cefic Facts and Figures 2025, Cefic Chemdata International"

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INTRODUCTION

Evolution of chemical sales (2004 vs 2024)

- » In EU and US chemical sales decreased between the years 2004-2024
- » China (and Asia) overtakes Europe and US as global leader in chemical sales.



Source: Cefic Chemdata International

* Rest of Europe covers UK, Switzerland, Norway, Türkiye, Russia and Ukraine

** Asia excluding China, India, Japan and South Korea

Sales market share

2004 2024

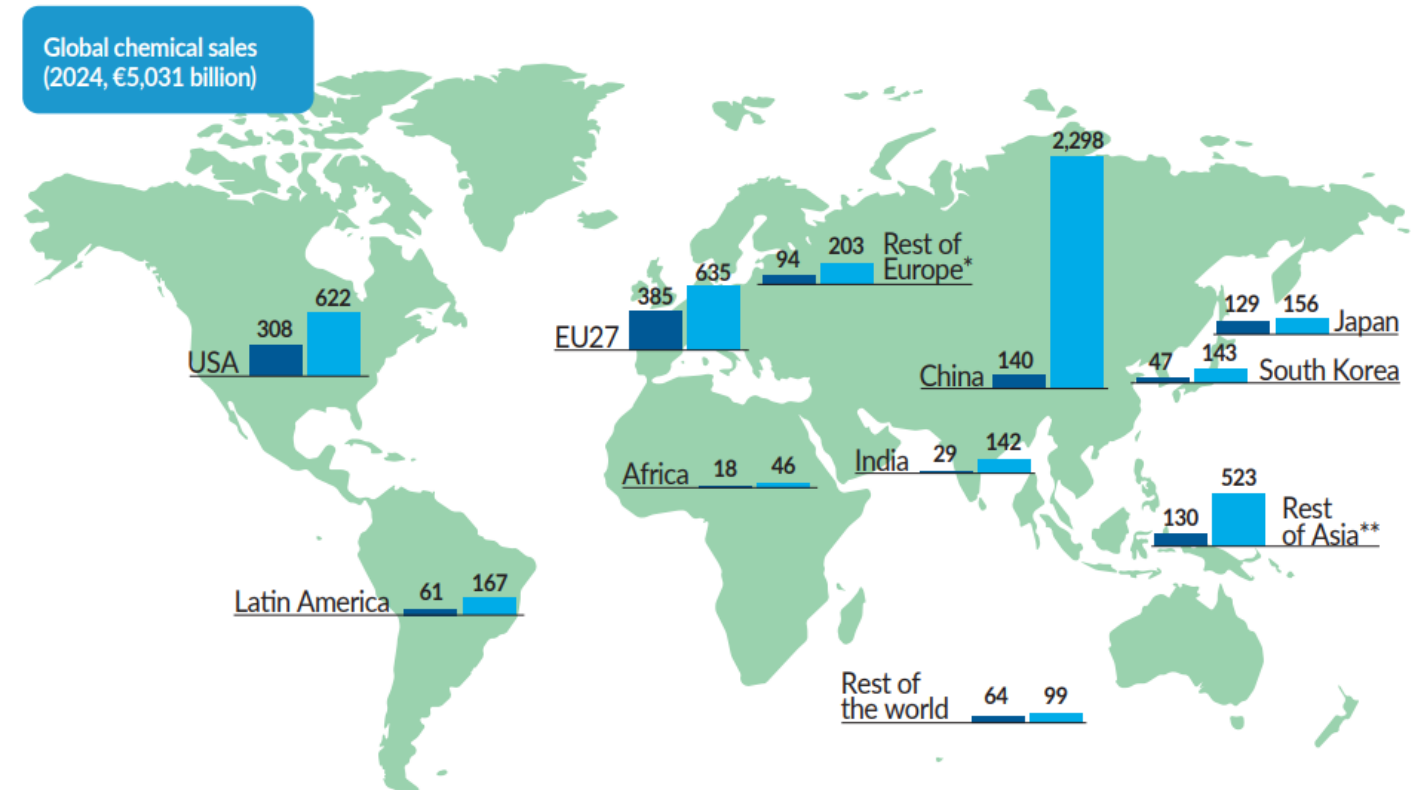
Source: Dr Moncef Hadhri, Catherine Tuerlinckx: "Cefic Facts and Figures 2025, Cefic Chemdata International"

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INTRODUCTION

- Chemical sales increased 3,600 billion in 20 years
- Sales has increased in EU
- Sales growth has been strongest in China and Asia

World chemical sales (2004, €1,406 billion)



Source: Cefic Chemdata International

* Rest of Europe covers UK, Switzerland, Norway, Türkiye, Russia and Ukraine

** Asia excluding China, India, Japan and South Korea

Sales market share

2004 2024

Source: Dr Moncef Hadhri, Catherine Tuerlinckx: "Cefic Facts and Figures 2025, Cefic Chemdata International"

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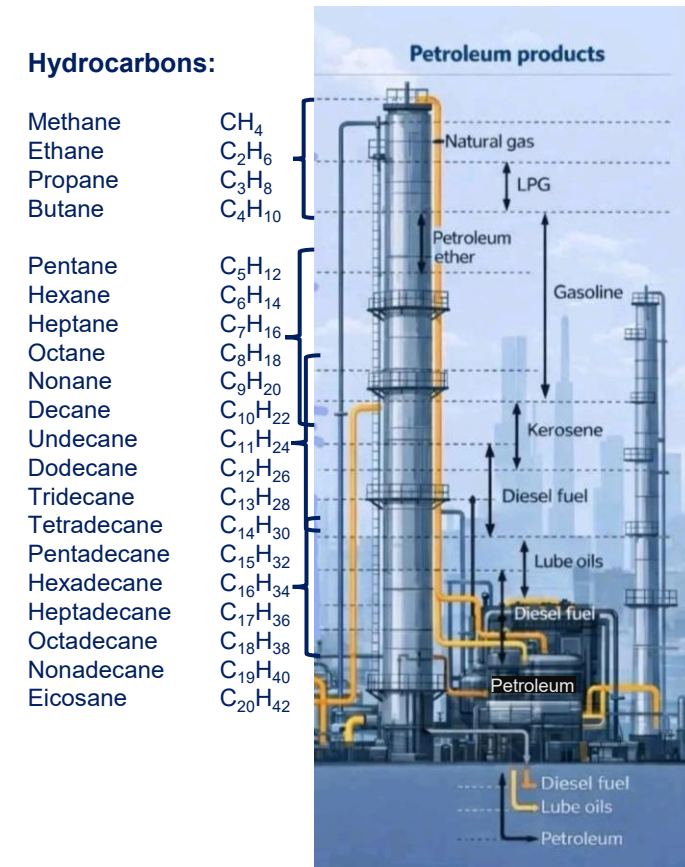
RAW MATERIALS IN CHEMICAL INDUSTRY

» Crude oil is fraction distilled

» Different fractions corresponds to

- » Different fuels
- » Chemicals
- » Feeds for further refining

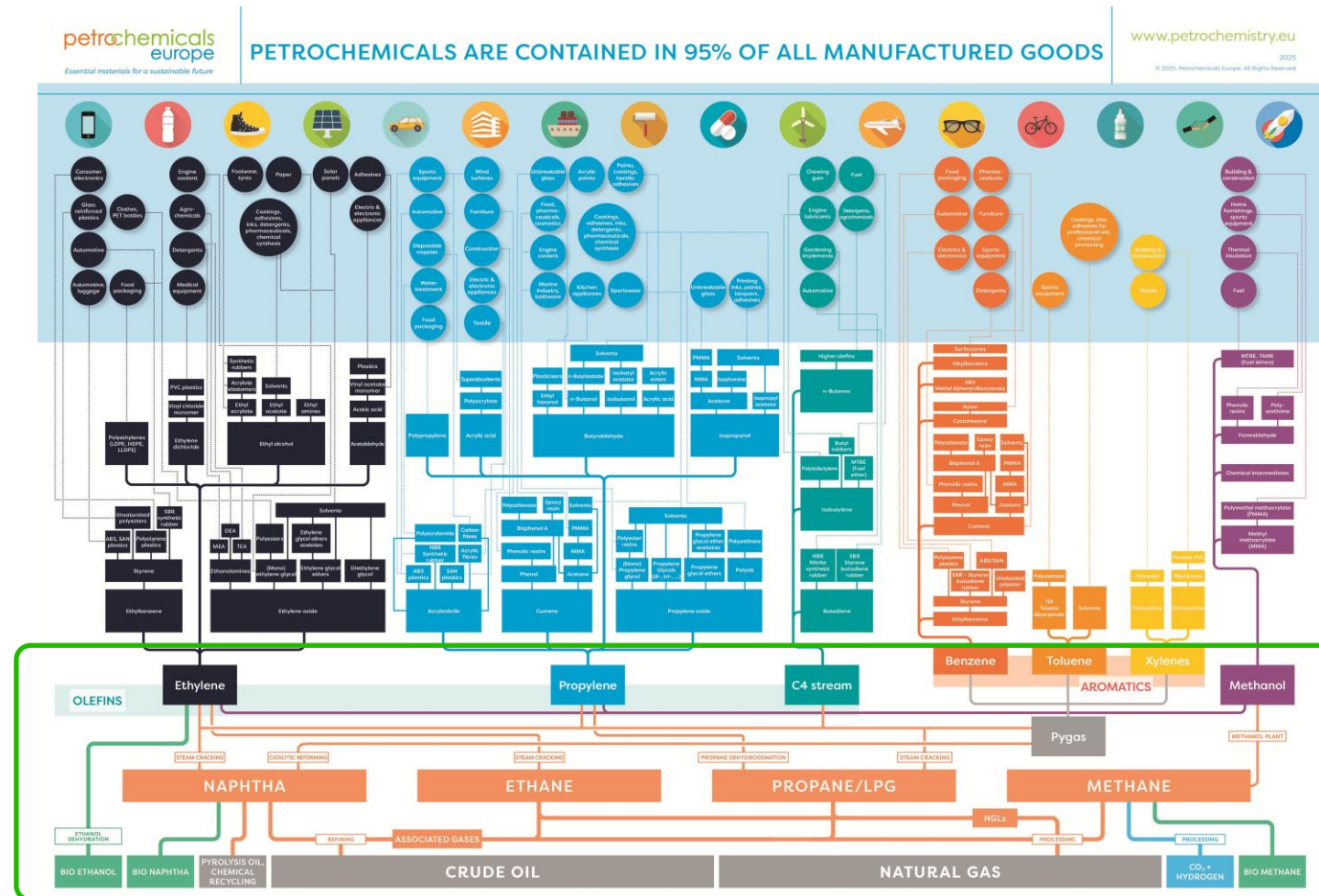
» Further fractions are refined with specific catalytic processes into products



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CHEMICAL INDUSTRY

- » Complex network of processes
- » Focus on platform chemicals
 - » Can be used as feeds in the present processes
- » Olefins and platform chemicals
 - » Ethene
 - » Propene
 - » Butene (C4 hydrocarbons)
 - » Aromatics
 - » Methanol



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FEEDSTOCKS FOR CHEMICAL INDUSTRY

Present feedstocks

» Crude oil (C_nH_m)

» Methane (CH_4)

» Carbon monoxide (CO)

» Hydrogen (H_2)

» Nitrogen (N_2)

» Ammonia (NH_3)

» Hydrogen (H_2)

Future feedstocks

» Carbon dioxide (CO_2)

» Methanol (CH_3OH)

» Carbon monoxide (CO)

» Hydrogen (H_2)

» Recycled plastics

» Plant and algae oils

» Lignin

» Aromatics

» Bio- Methane (CH_4)

» Carbon monoxide (CO)

» Hydrogen (H_2)

» Bio- Ethanol (C_2H_5OH)

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CHEMICAL INDUSTRY

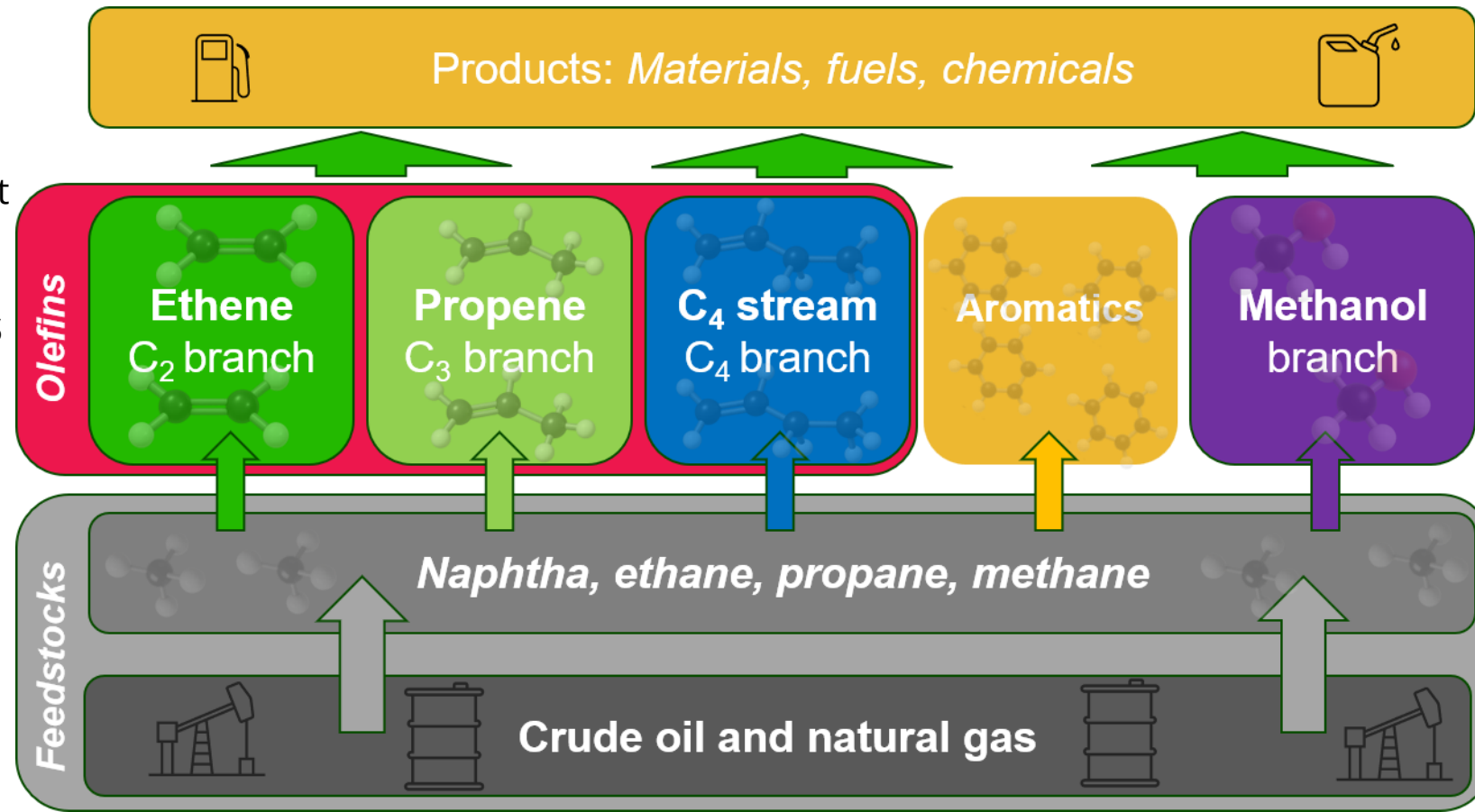
» Complex network of processes

» Focus on platform chemicals

- » Can be used as feeds in the present processes

» Olefins and platform chemicals

- » Ethene
- » Propene
- » Butene (C₄ hydrocarbons)
- » Aromatics
- » Methanol



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FUTURE CHEMICAL INDUSTRY

» Methanol route

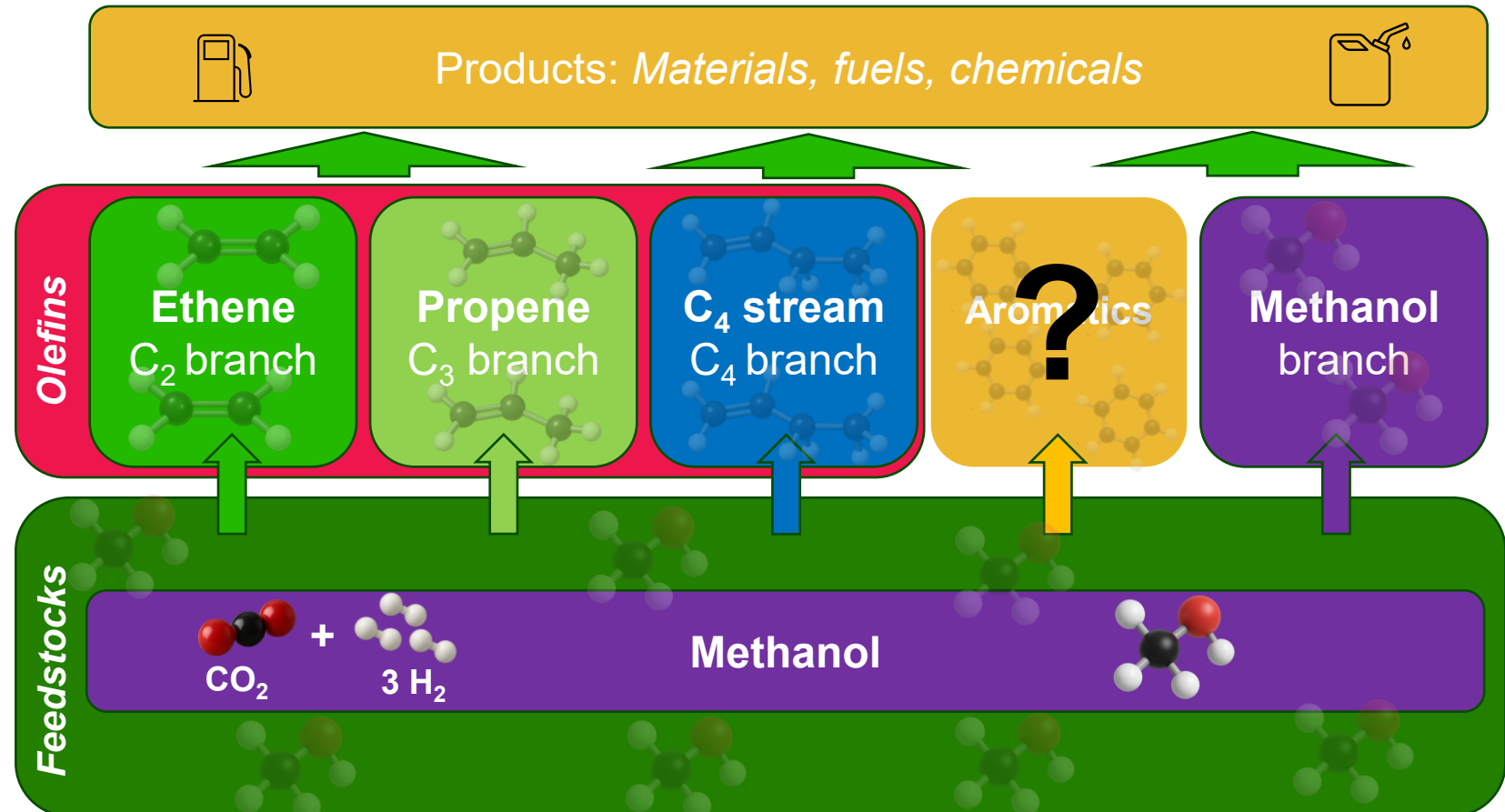
» Produced directly from CO_2 and H_2

» Methanol-to-Olefins

- » Olefins
- » Ethene
- » Propene
- » C_4 stream olefins

» Longer hydrocarbons

- » Isomerization



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FUTURE CHEMICAL INDUSTRY

» Methanol-lignin route

» Methanol-to-Olefins

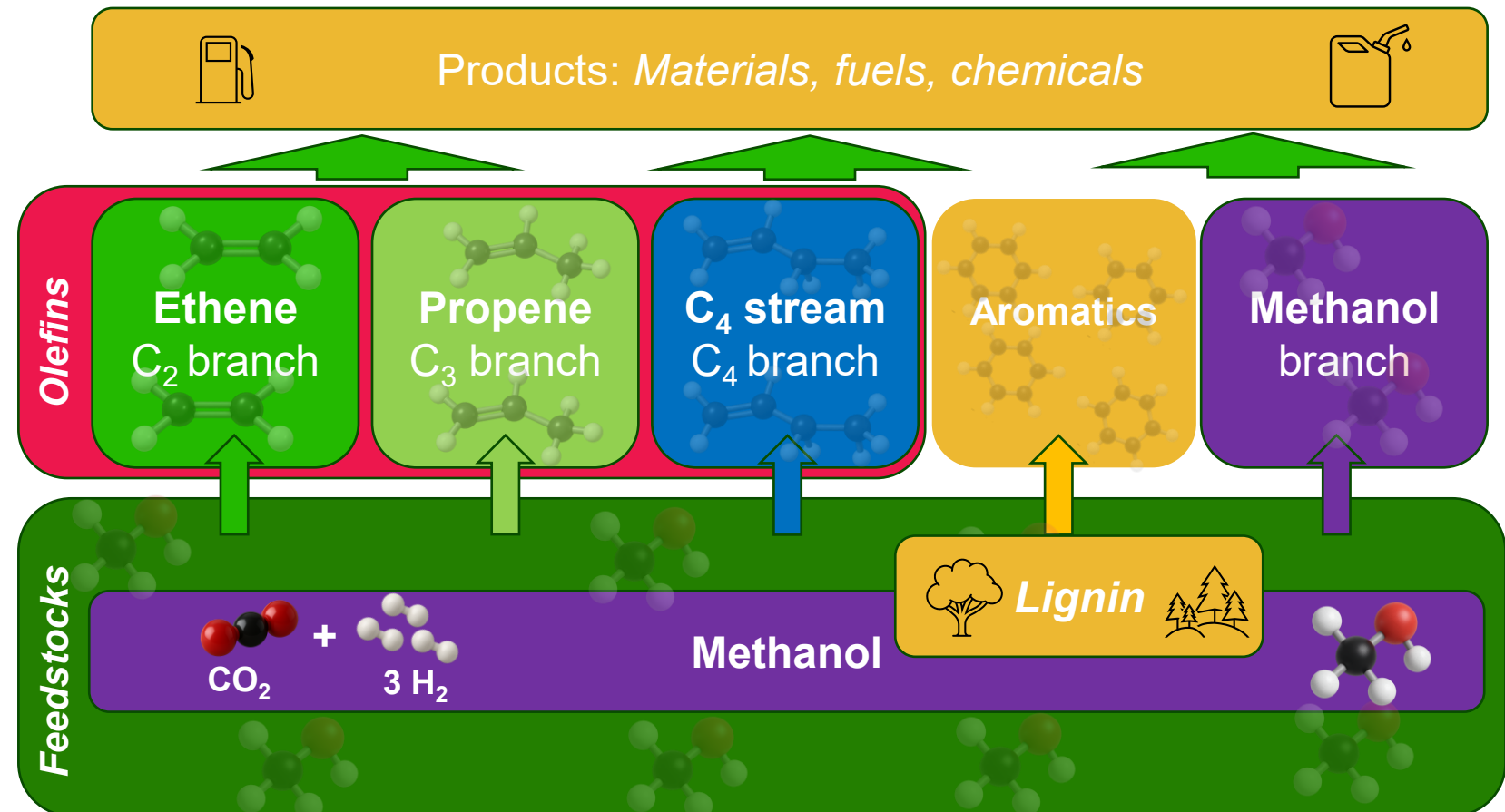
- » Olefins
- » Ethene
- » Propene
- » C₄ stream olefins

» Longer hydrocarbons

- » Isomerization

» Aromatics from lignin

- » Rich in phenols



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FUTURE CHEMICAL INDUSTRY

» $\text{CO}_2 + \text{H}_2$ to crude fraction

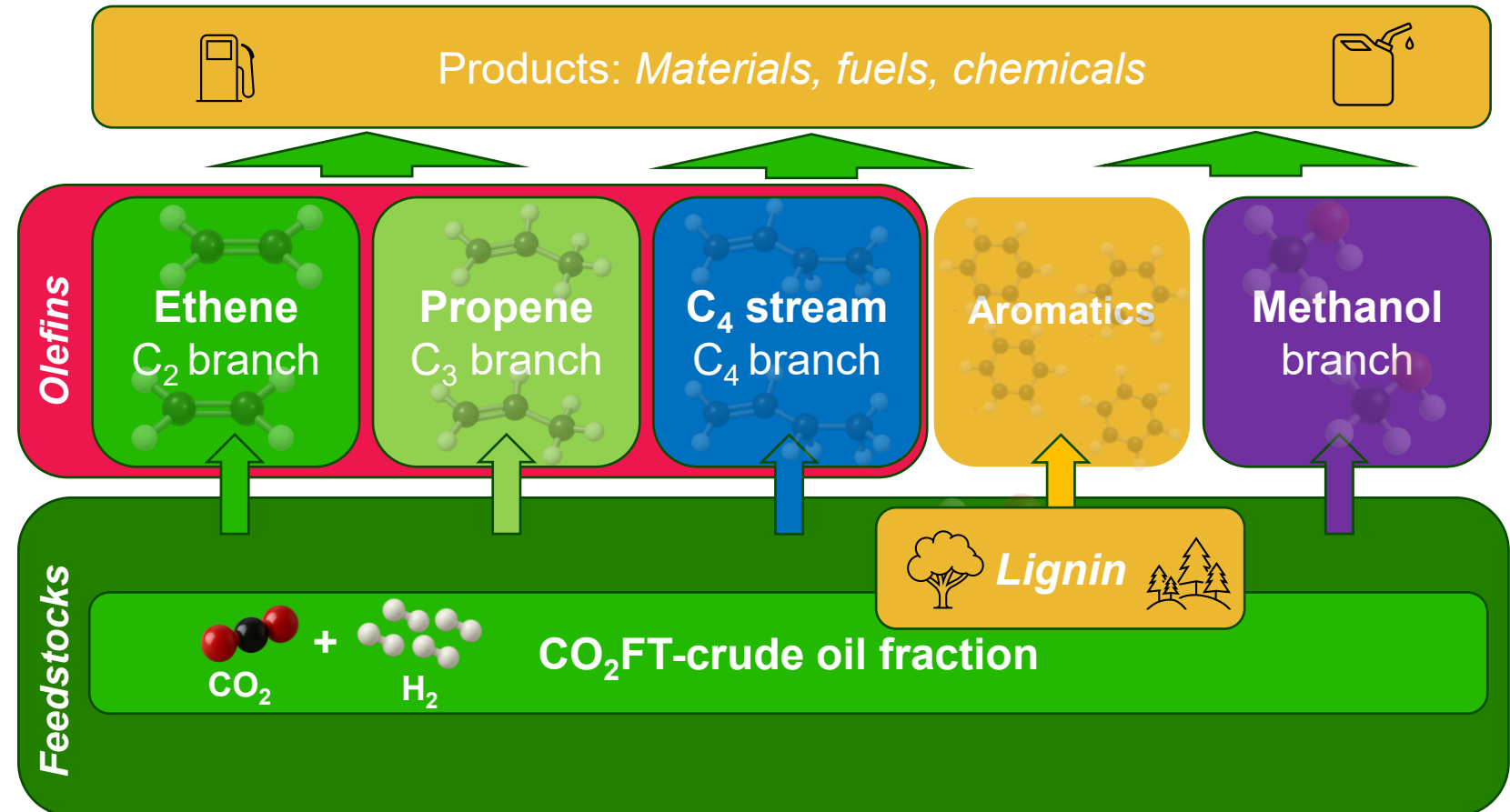
- » Oil production from CO_2 and H_2

» Crude fraction distillation

- » Various distillation fractions
- » Hydrocarbon chain length varies

» Gas phase hydrocarbons

- » Olefins and feedstock to olefin production



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QUESTIONS TO BE RESEARCHED/SOLVED/??? ?

- »» **What will be the type of feedstock(s) in future chemical industry?**
 - »» Methanol?
 - »» Renewable oil for regular processes?
 - »» Biogas as a methane source?
 - »» Biomass?
- »» **Do we have separate new processes in chemical industry in the future OR do we need to adjust feedstock for conventional processes?**

