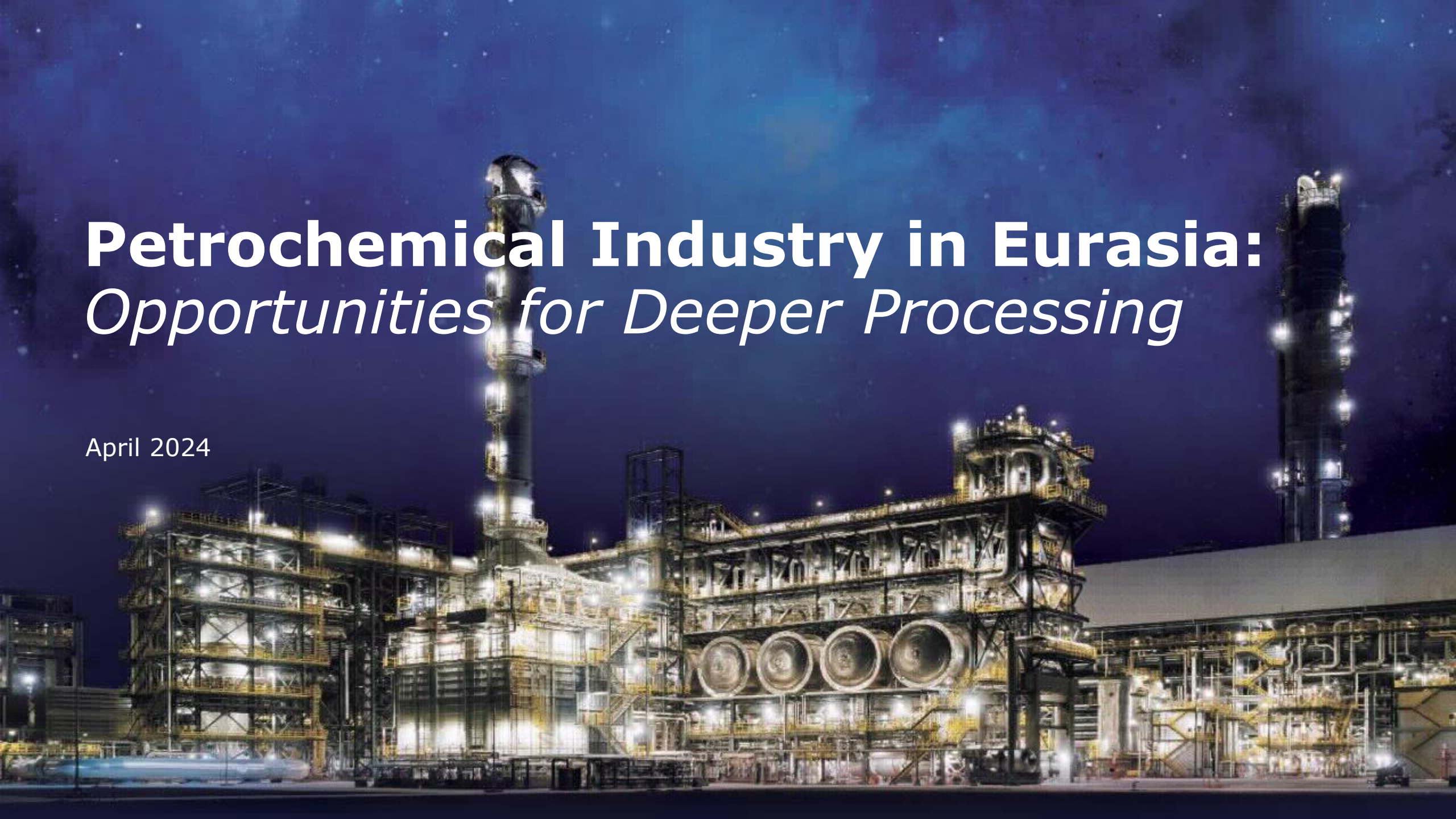




Petrochemical Industry in Eurasia: *Opportunities for Deeper Processing*

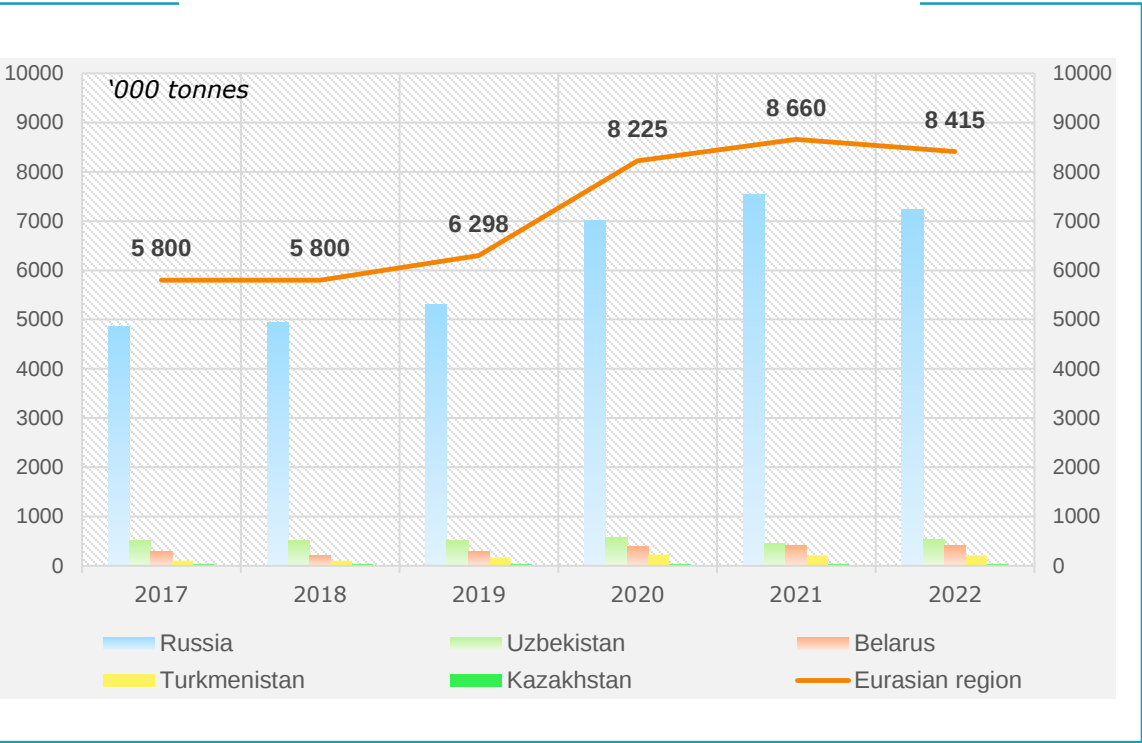
April 2024

The Eurasian region holds substantial potential in the petrochemical sector

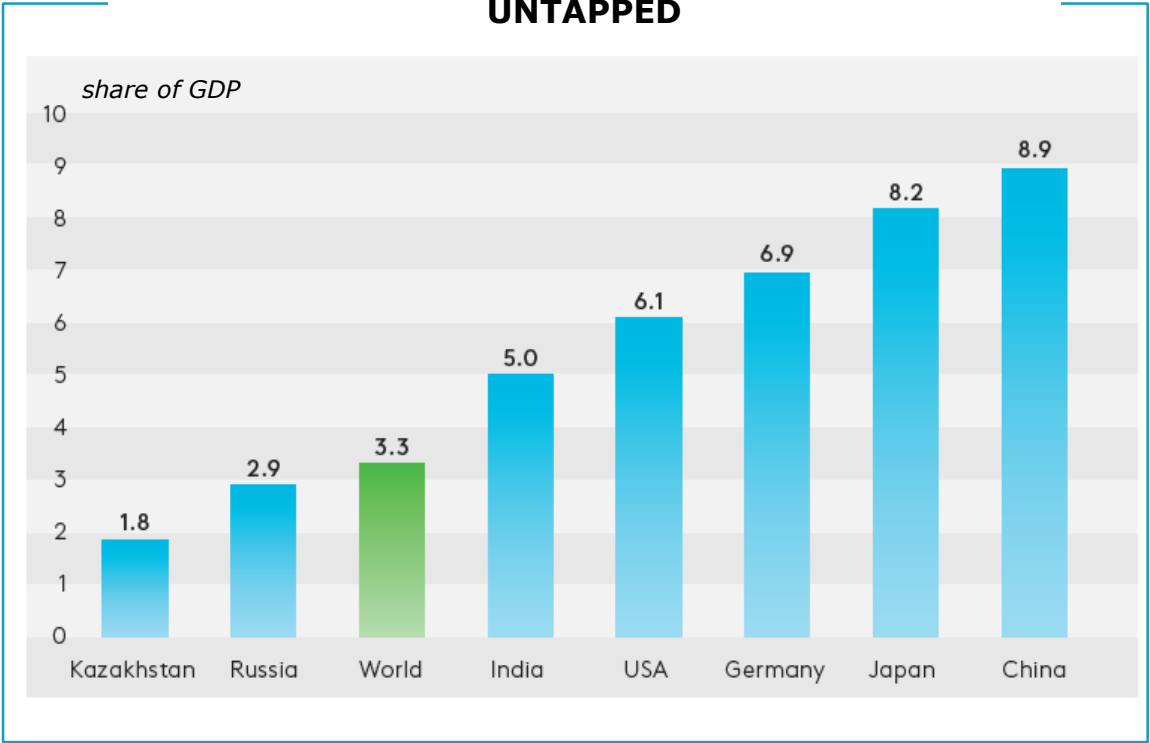


Eurasian countries plan to unlock the potential of their petrochemical industry

POLYMER PRODUCTION



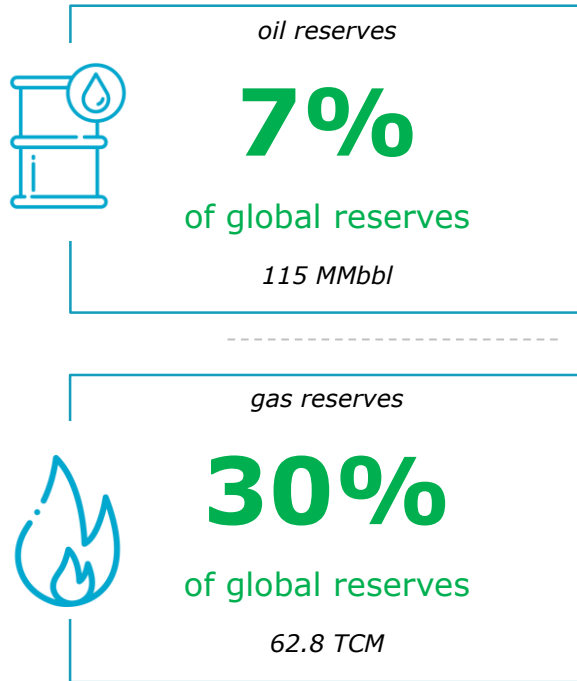
THE PETROCHEMICAL POTENTIAL REMAINS UNTAPPED



OVER THE PAST SIX YEARS, THE PRODUCTION OF BASIC POLYMERS IN THE EURASIAN REGION HAS INCREASED BY A FACTOR OF 1.5

The Eurasian region holds significant resource potential to further develop the petrochemical industry

THE REGION HAS A SOLID RAW MATERIAL BASE



THE EURASIAN REGION ALREADY HAS IN PLACE:



LARGE-TONNAGE PRODUCTION
of basic polymers



TRANSPORT AND LOGISTICS CHAINS to deliver raw materials and products

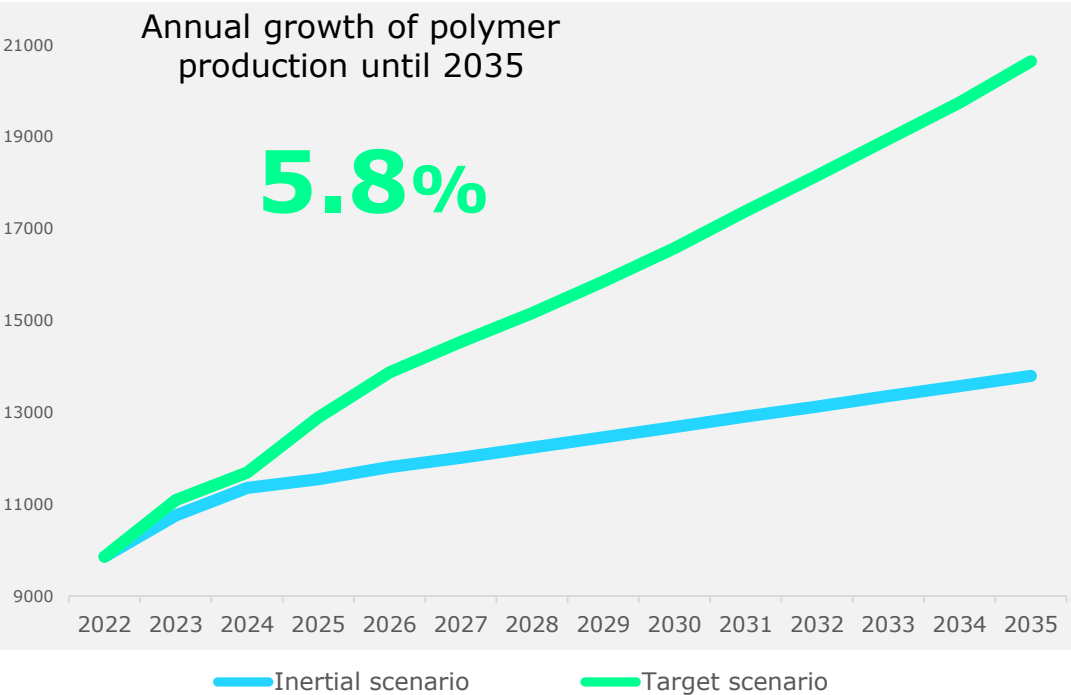


GOVERNMENT POLICIES aimed at advancing petrochemical projects

THE EURASIAN REGION COULD BECOME A MAJOR CENTRE OF POLYMER PRODUCTION IN THE GLOBAL DIVISION OF LABOUR

Projected petrochemical production in the Eurasian region until 2035

PROJECTED PETROCHEMICAL PRODUCTION IN THE EURASIAN REGION
'000 tonnes



DEVELOPMENT SCENARIOS

- INERTIAL SCENARIO** – the industry’s average growth rates remain consistent with those of the past five years, while dependence on imported technology and equipment persists
- TARGET SCENARIO** – proactive government policies to stimulate domestic demand, attract investment, expand production capacities within the sector and capitalise on export opportunities for producers

KEY CONTRIBUTORS TO OUTPUT INCREASE IN THE EURASIAN REGION

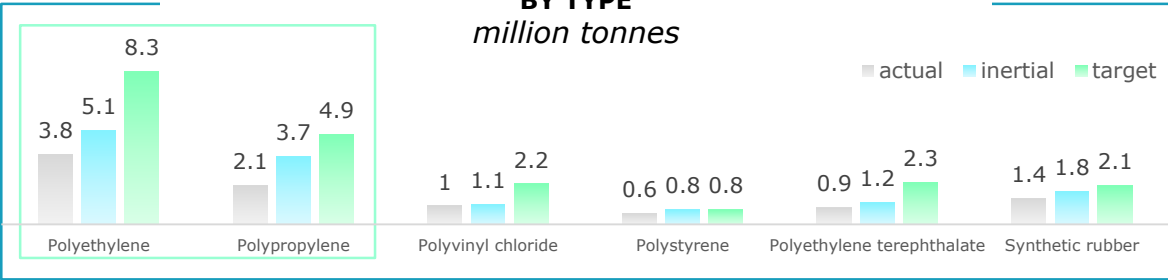


Russia



Kazakhstan

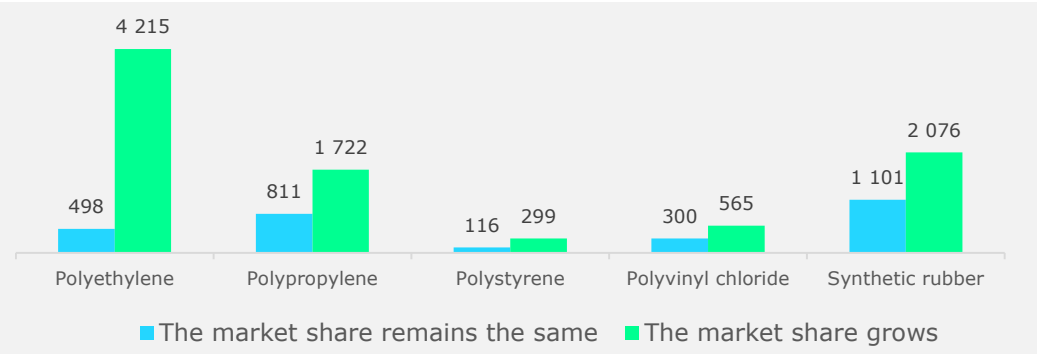
THE HIGHEST CONTRIBUTION TO POLYMER PRODUCTION BY TYPE million tonnes



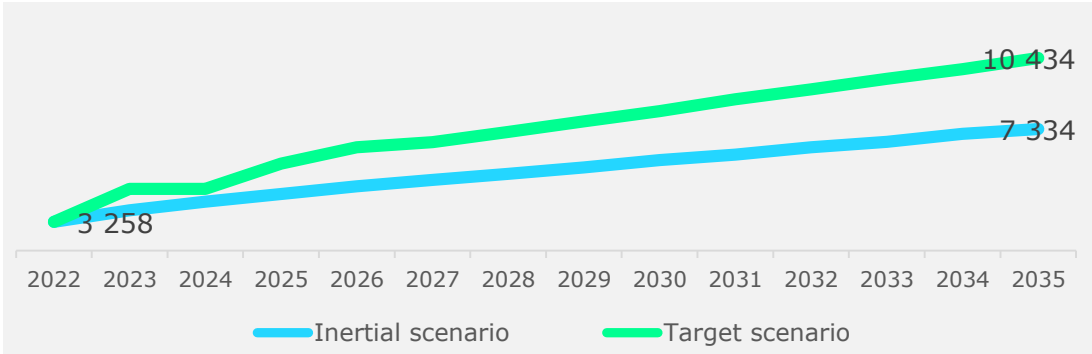
THE EURASIAN REGION CAN MEET ITS DEMAND AND EXPAND POLYMER EXPORTS

Projected petrochemical exports from the Eurasian region until 2035

PROJECTED CAPACITY OF PETROCHEMICAL EXPORT MARKETS FOR EURASIAN COUNTRIES BY 2035
'000 tonnes



POTENTIAL PETROCHEMICAL EXPORTS FROM THE EURASIAN REGION
'000 tonnes



THE FASTEST GROWING MARKETS IN TERMS OF POLYMER CONSUMPTION



Asia-Pacific Region



India

by 2035
40%
of the global petrochemical market

KEY EXPORTERS FROM THE EURASIAN REGION AND THEIR SHARE IN THE REGION'S TOTAL EXPORTS



Russia

65.6%



Kazakhstan

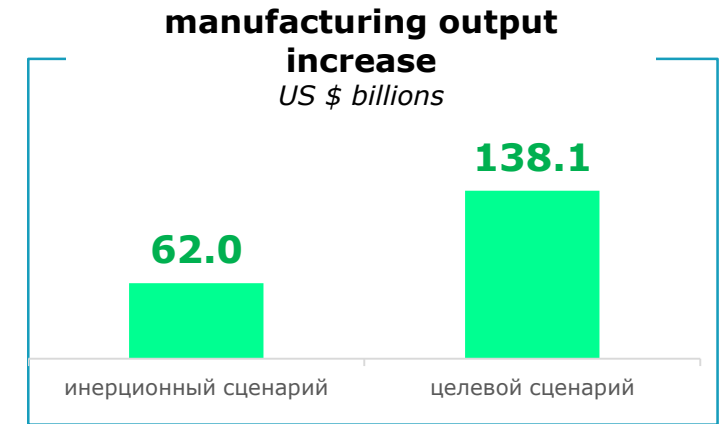
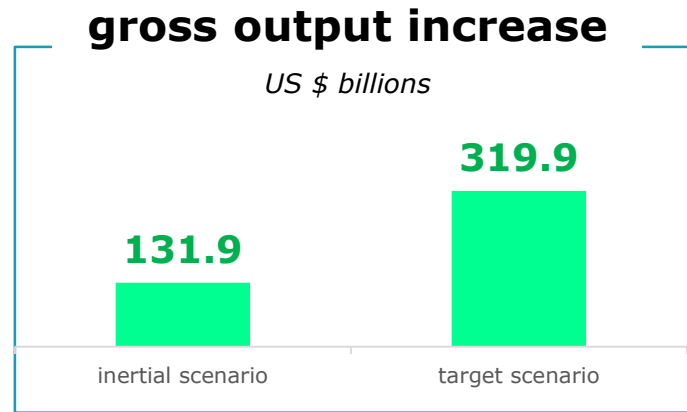
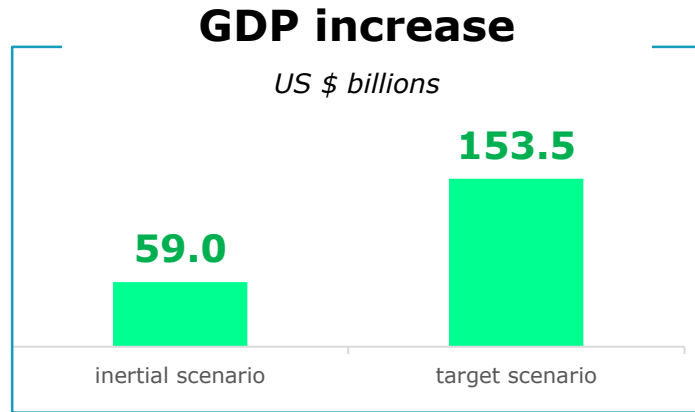
22.5%

by 2035

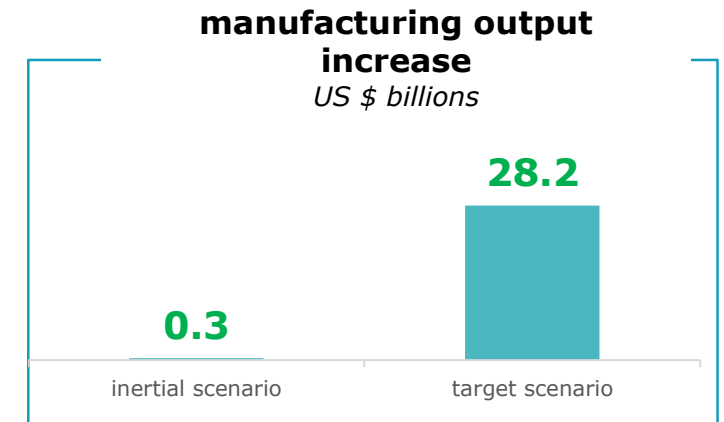
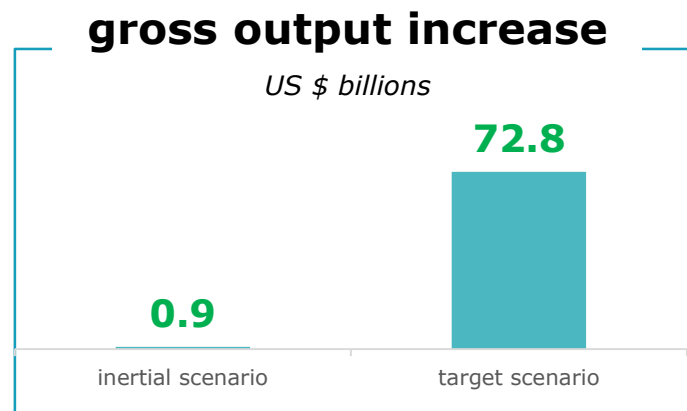
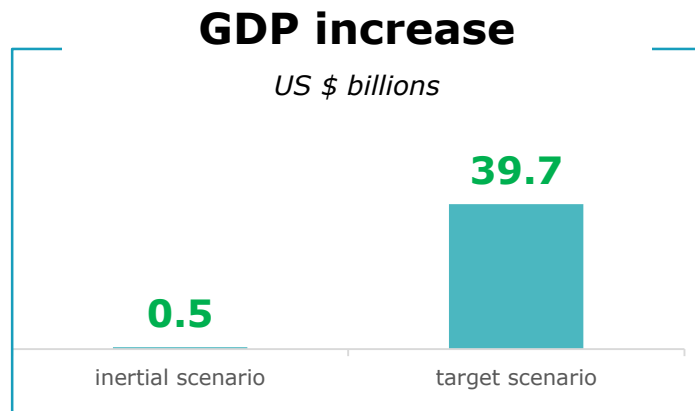
**THE REGION'S PETROCHEMICAL EXPORTS CAN POTENTIALLY GROW
3.2-FOLD**

Petrochemical development will contribute significantly to the Eurasian region's growth

total by 2035



KAZAKHSTAN IS AMONG THE KEY BENEFICIARIES, ACCOUNTING FOR UP TO 25% OF THE RELATED EFFECTS

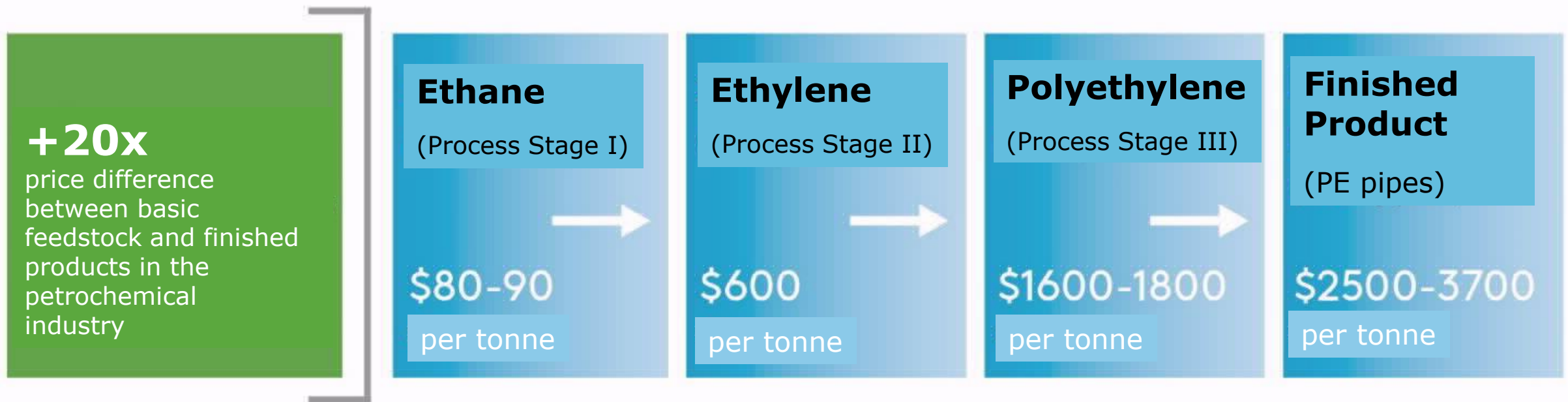


Why is the petrochemical industry promising?



The petrochemical sector is characterised by a rapid increase in added value along the process chain.

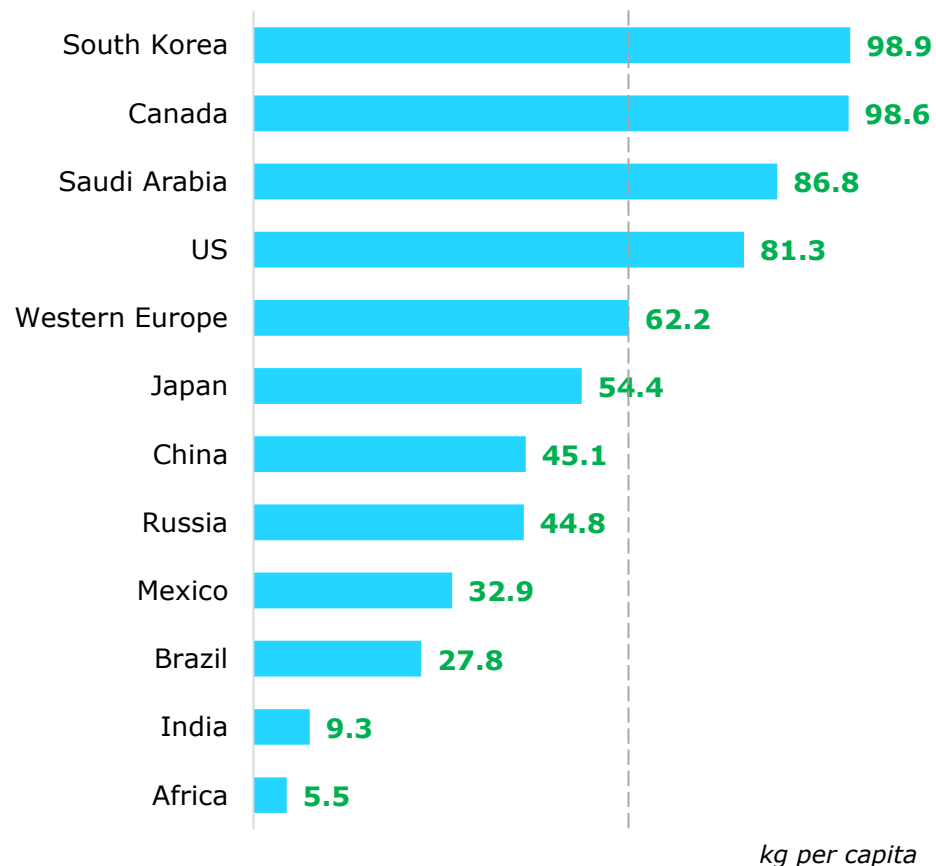
Product value per tonne at each process stage



**ADVANCING FROM ONE PROCESS STAGE TO THE NEXT IN THE PETROCHEMICAL INDUSTRY
WILL GENERATE HIGHER ADDED VALUE WITHIN THE EURASIAN REGION**

Significant potential to expand global demand for petrochemical products

Polymer consumption per capita



Source: IEA, Statista

Developed economies currently consume more petrochemicals per capita than developing countries:

20x more polymers per capita

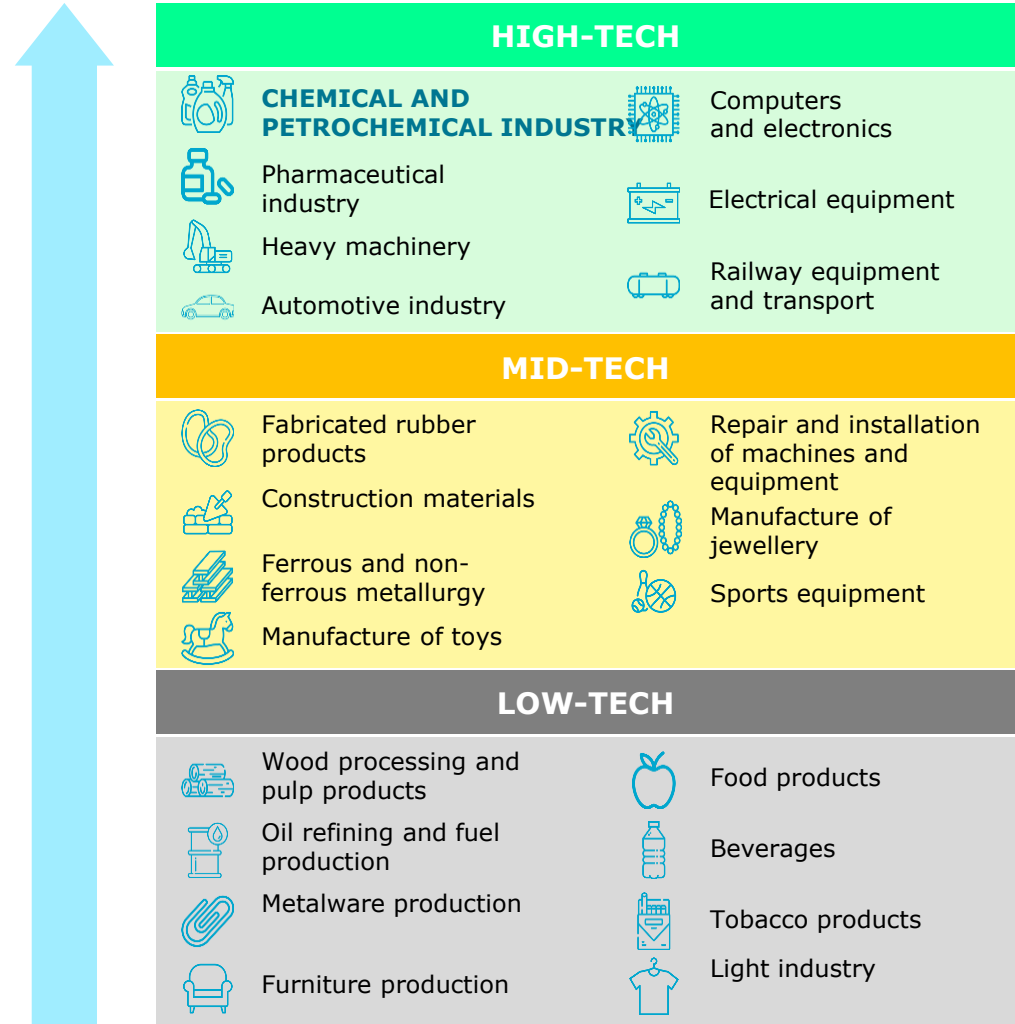
10x more fertilisers per capita

Developing countries (including fast-growing India, Indonesia and China) will increase polymer consumption by 2050.

The petrochemical industry will be the primary driver of oil demand by 2050.

50% of growth in global crude oil demand will come from the petrochemical sector (14% today)

The petrochemical industry can contribute significantly to economic diversification



* According to the UNIDO classification

DEVELOPMENT OBJECTIVES FOR HIGH-TECH SECTORS:

- **ECONOMIC GROWTH DRIVER**
- **HIGH-QUALITY DIVERSIFICATION**
- **OVERCOMING "PATH DEPENDENCE"**

THE PETROCHEMICAL INDUSTRY

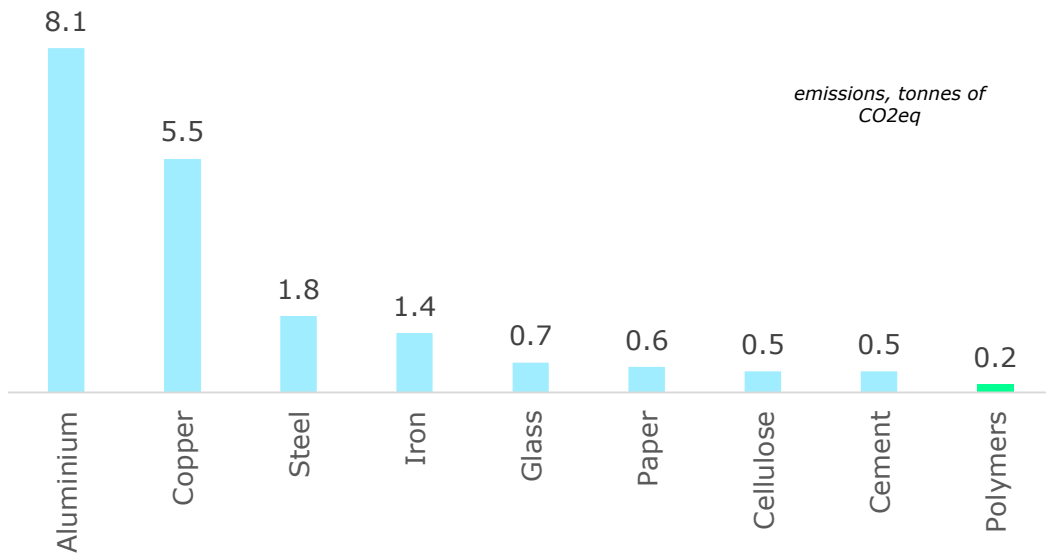
- ranks 1st** *in terms of capital investment per employed person among manufacturing industries*
- ranks 2nd** *in terms of value added, after the pharmaceutical industry*
- \$1.95–2.62** *increase in gross output per \$1 of output in the industry***
- 2–7** *new jobs in related sectors per new job in the industry*

multiplier effects from the development of the petrochemical industry

** For Eurasian countries

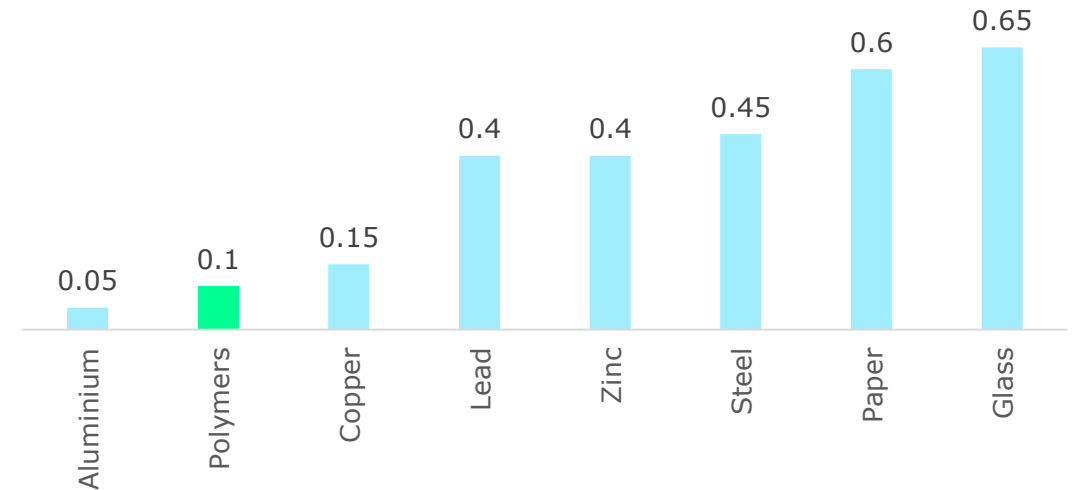
The environmental impact of polymers should be assessed comprehensively

CARBON FOOTPRINT FROM PRODUCTION OF 1 TONNE OF PRIMARY MATERIAL



Substituting energy-intensive materials will decrease the carbon footprint of industrial production

SHARE OF ENERGY CONSUMPTION DURING PRODUCTION OF 1 TONNE OF SECONDARY MATERIAL IN TOTAL ENERGY CONSUMPTION DURING PRODUCTION OF PRIMARY MATERIAL



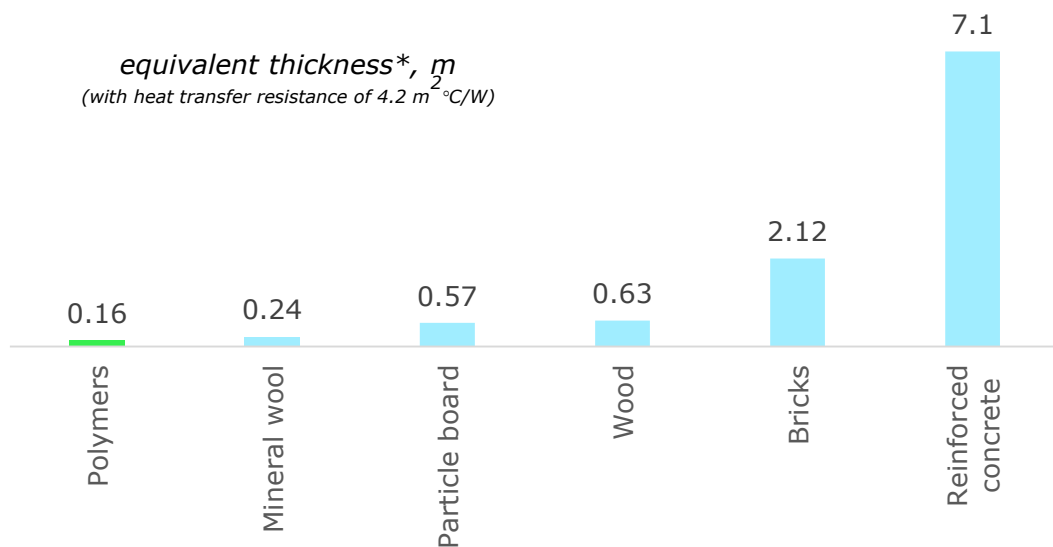
Recycling and re-recycling of polymers are profitable as they significantly reduce energy consumption, while maintaining practically the same quality and properties as primary polymers

LIMITED ENVIRONMENTAL IMPACT: PRIMARY INDUSTRIAL EMISSIONS COMPARED TO SECONDARY PROCESSING

Case study: Replacing metal with polymers in the housing and utilities sector has a positive environmental impact

EQUIVALENT THICKNESS OF VARIOUS MATERIALS TO ACHIEVE HEAT TRANSFER RESISTANCE

equivalent thickness*, m
(with heat transfer resistance of $4.2 \text{ m}^2\text{C/W}$)



A 1 cm-thick polymer thermal insulation board has the same heat transfer resistance as a 50 cm-thick concrete board



CAST IRON PIPES

POLYMER PIPES

example of material substitution with polymers

advantages of polymer pipes compared to cast iron pipes:



up to **11x**
cheaper



up to **70%**
lighter in weight



100%
corrosion-resistant



chemical resistance
to reagents and soil



environmental friendliness
polymers prevent infestation by biological life forms and are biologically stable

THE USAGE OF POLYMERS PROVIDES ADDITIONAL ENVIRONMENTAL AND ECONOMIC EFFECTS

Applied aspects of petrochemical
development: clustering, low-tonnage
petrochemicals, financing



Clustering as an element of industrial policy in the petrochemical industry

GLOBALLY, THE PETROCHEMICAL SECTOR IS CLUSTERED



JURONG LAKE
(Singapore)



AL JUBAIL AND YANBU
(Saudi Arabia)



ASSALUYEH
(Iran)



JAMNAGAR
(India)



TEXAS
(US)

WHY CLUSTERING IN INDUSTRY?

- An **INSTRUMENT FACILITATING** industrial and innovative development
- **ENHANCED COMPETITIVENESS** and production efficiency
- **STRONGER INDUSTRIAL COOPERATION** among petrochemical enterprises and related industries

WHAT DO CLUSTER ENTERPRISES GET?

- **ONE INTEGRATED** infrastructure
- **LOWER COSTS FOR TRANSPORTING** raw materials and goods between companies
- **STRONGER LINKAGES** among small and medium-sized enterprises
- **LOWER COSTS** of knowledge spillover and higher innovative activity

Case study: Petrochemical cluster in the Island of Jurong – an instrument to modernise Singapore’s economy (case study 1)

1984

1st PETROCHEMICAL FACILITY — JV by Shell and Sumitomo Chemical

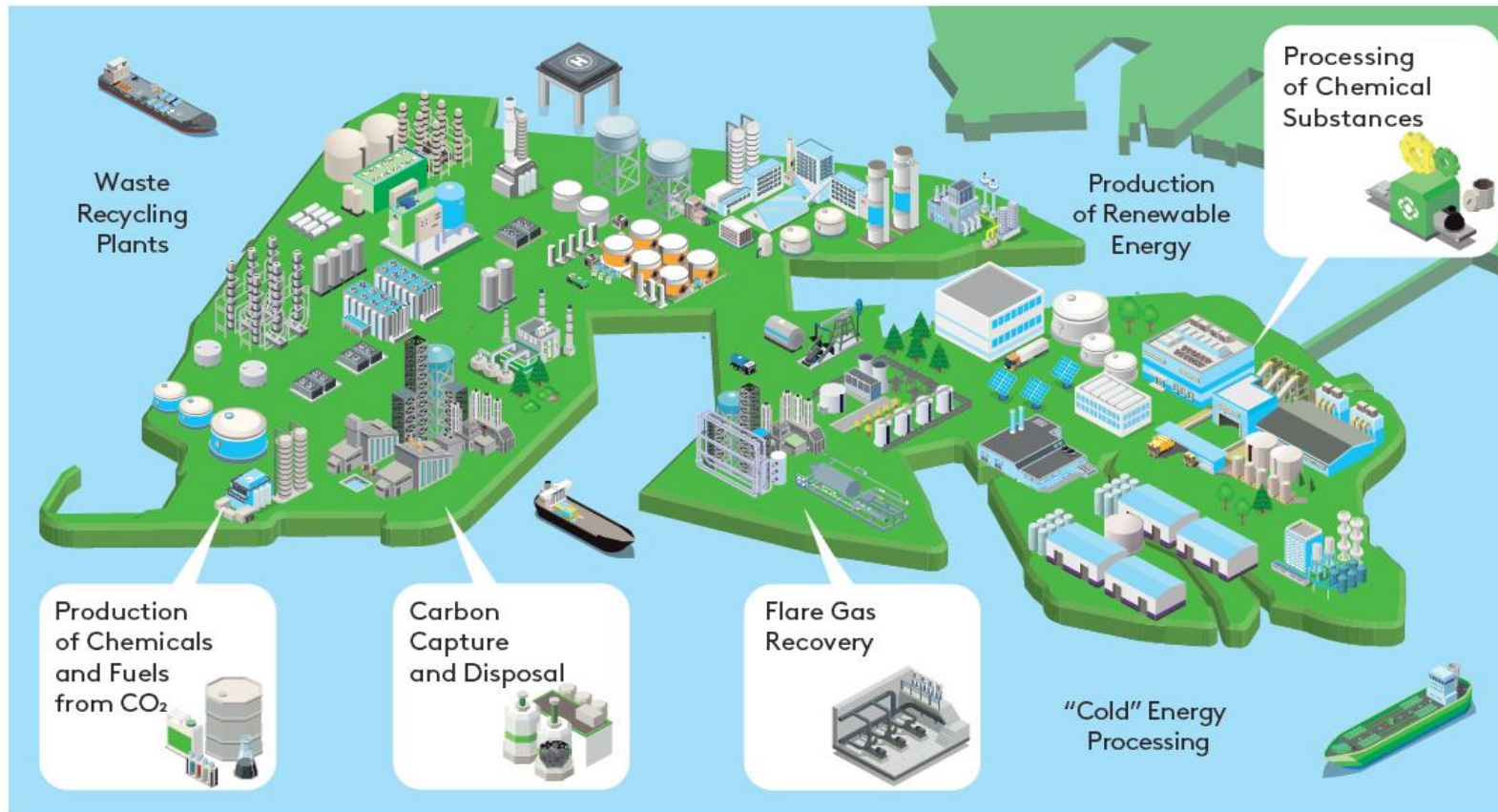
LAUNCH OF THE CLUSTER

2000

NEW INFRASTRUCTURE
(an artificial island, a network of oil and product pipelines, an 80-hectare logistics hub, etc.)

STATE BENEFITS/PREFERENCES and INVESTMENT INCENTIVES

today



SINGAPORE'S PETROCHEMICAL CLUSTER



~ 7%

cluster's share of Singapore's GDP



> 100

oil and petrochemical enterprises



~ 2%

R&D funding of Singapore's GDP

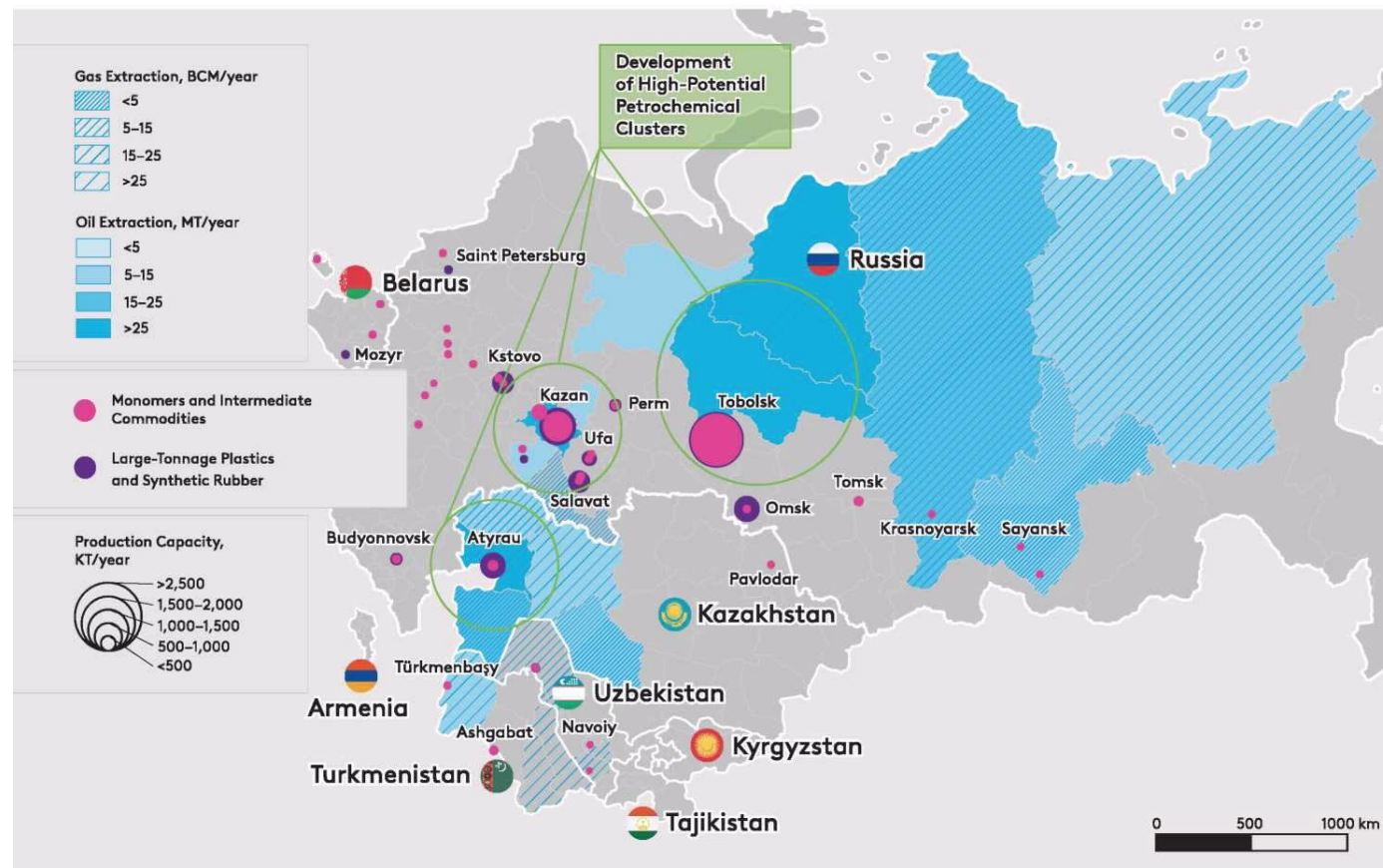


\$12bn

Singapore's petrochemical exports



Petrochemical clusters in the Eurasian region around major hydrocarbon sources



PECULIARITIES OF CLUSTER DEVELOPMENT IN THE EURASIAN REGION:

- Relative **PROXIMITY TO SOURCES OF RAW MATERIALS**
- **FOSTERING** oil refining, petrochemical and related industries
(mechanical engineering, biopharmaceuticals, geotextiles, oilfield services, education, science, etc.)
- **FOCUS** on the manufacture of **HIGH-MARGIN POLYMER PRODUCTS**
- A **POLYMER PRODUCTION BASE** in place
- **GOVERNMENT DEVELOPMENT POLICIES** in place

CLUSTERING IN CENTRES OF ECONOMIC ATTRACTION IS THE BEST WAY TO UNLOCK THE POTENTIAL OF THE PETROCHEMICAL INDUSTRY

Eurasian countries have initiated clustering in their petrochemical industry



NATIONAL INDUSTRIAL PETROCHEMICAL TECHNOPARK

Atyrau Region, Kazakhstan

ESTABLISHED IN	2007
AREA	3,475 hectares
KEY BUSINESS ACTIVITIES	Chemical and petrochemical production <i>(Polymer Production LLP, KPI LLP, etc.)</i>
RELATED BUSINESS ACTIVITIES	Manufacture of plastic products, light industry, construction <i>(Air Liquide Karabatan Tech Gases LLP, Karabatan Utility Solutions LLP, etc.)</i>
BENEFITS AND PREFERENCES	Pre-established infrastructure, 0% customs duties, 0% land tax, 0% VAT, 0% corporate income tax, 0% property tax, simplified procedure for hiring foreign nationals
CHALLENGES	Prolonged implementation period of anchor projects in basic polymers, limited priority activities in the technopark

OTHER PETROCHEMICAL CLUSTER INITIATIVES IN THE EURASIAN REGION

- 1. Petrochemical Territorial Cluster of Bashkortostan** (Russia)
established in 2012
- 2. Tyumen Petrochemical Cluster** (Russia)
established in 2021
- 3. Novopolotsk Innovation and Industrial Petrochemical Cluster** (Belarus)
established in 2017

Low-tonnage petrochemicals as the basis for knowledge-intensive and technologically advanced production in the Eurasian region

KEY ELEMENT FOR FINISHED PRODUCTS

Examples of usage of low-tonnage petrochemicals:

- **Catalysts** for new PP and PE grades
- **Surfactants** for household chemicals
- **Glycoluril** (*linking agent*) for the manufacture of paints and protective coatings
- **Additives** for the fuel and energy sector

AN IMPORTANT SECTOR IN PETROCHEMICAL CLUSTERING

The low-tonnage petrochemical sector **consumes products manufactured by medium- and large-tonnage production facilities**

(propylene, ethylene, benzene, toluene and their derivatives)

Derivatives **are components for medium- and large-tonnage petrochemicals** and a crucial raw material for finished products

PRODUCTION AND SCIENCE INTEGRATOR

Product variety and **a higher final cost** of low-tonnage chemicals are only achievable with science-based technology

Example: The Institute of the Chemistry of New Materials (Belarus) can synthesise low-tonnage chemicals at a cost of \$1,000 to \$2,500 per gramme

Low-tonnage chemical production involves

- **low capital expenditure**
- **a lot of research**
- **a high final cost of products**

A PRIORITY FOR DEVELOPED COUNTRIES

40%

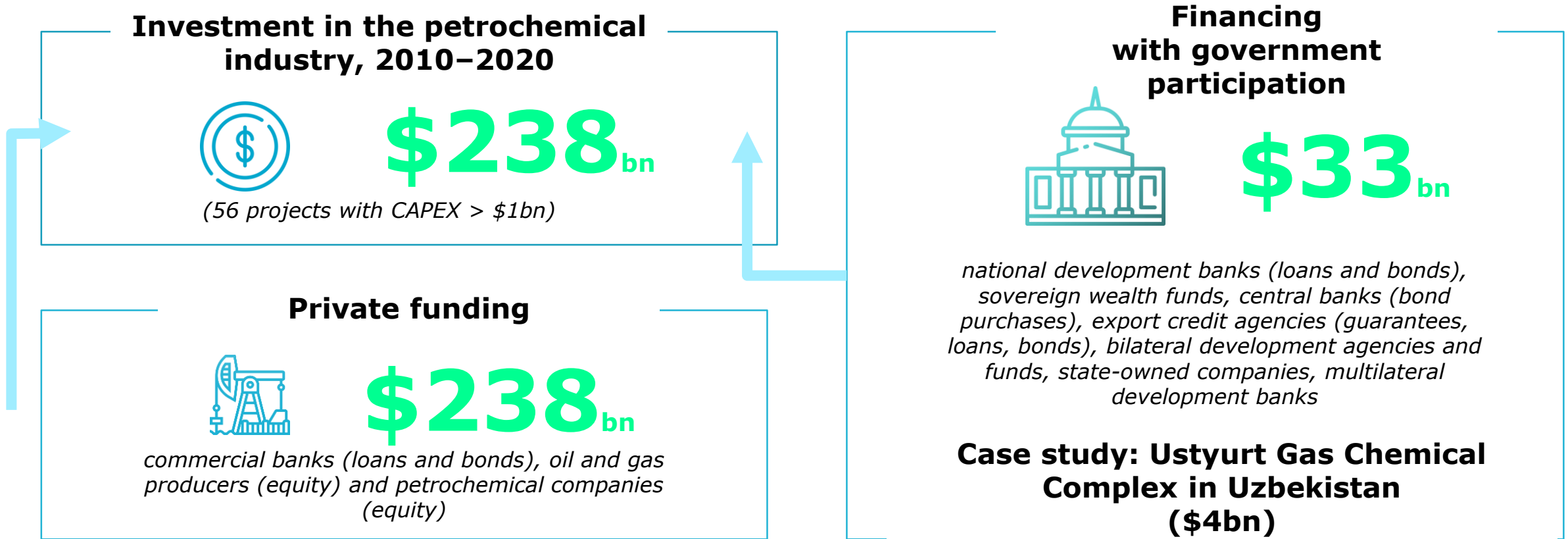
share of low-tonnage facilities in total chemical production is merely 15% in developing countries

70%

of the value of total production

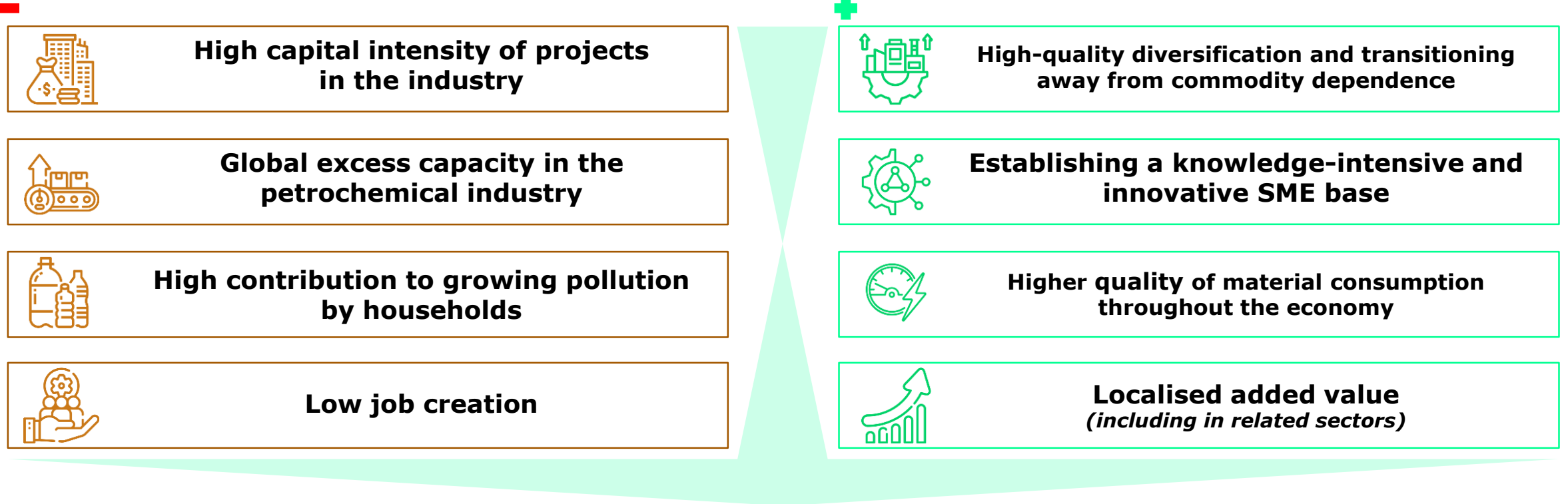
AS PART OF THE CLUSTER APPROACH, LOW-TONNAGE CHEMICAL PRODUCTION PROJECTS HOLD PROMISE IN CONJUNCTION WITH LARGE-TONNAGE CHEMICAL PRODUCTION

The petrochemical industry is financed primarily by upstream oil and gas companies and the government



DE FACTO, THE BOUNDARIES BETWEEN PUBLIC AND PRIVATE FUNDING ARE BLURRED. SYNDICATION IS ACTIVELY USED

The dilemma surrounding the development of the petrochemical industry in Eurasian countries' policies



UNLOCKING THE POTENTIAL OF THE PETROCHEMICAL INDUSTRY WILL HELP THE REGION OVERCOME "PATH DEPENDENCE," BUT COMES WITH ITS OWN PRICE

Շնորհակալութիւն ուշադրութեան համար.

Дзякуй за ўвагу!

Назар аударғандарыңызға рахмет!

Назар салганыңыздарга рахмат!

Благодарим за внимание!

Раҳмати калон!

Thank you!



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