



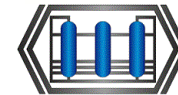
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**Modern isomerization and
reforming technologies
for enhancement of quality and yield
of Euro-5 compliant motor gasoline**



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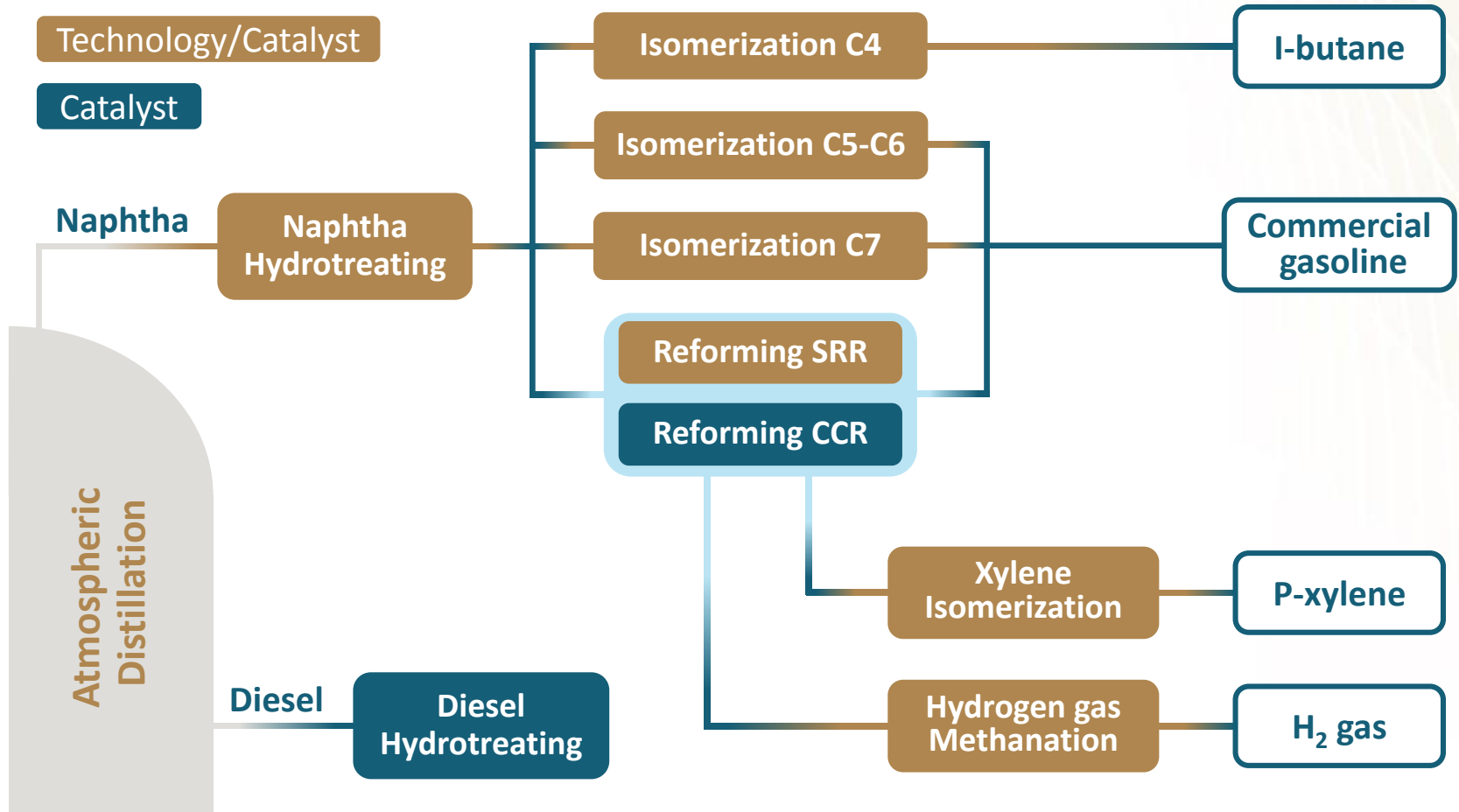
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Technology of SIE NEFTEHIM



REF series catalysts for fixed bed reforming units

Catalysts REF-125 operating experience **17** units 
REF-130

- RON boost up to 99
- Possible operation at low pressure
- Longer service cycle up to 4 years
- High stability for severe operation

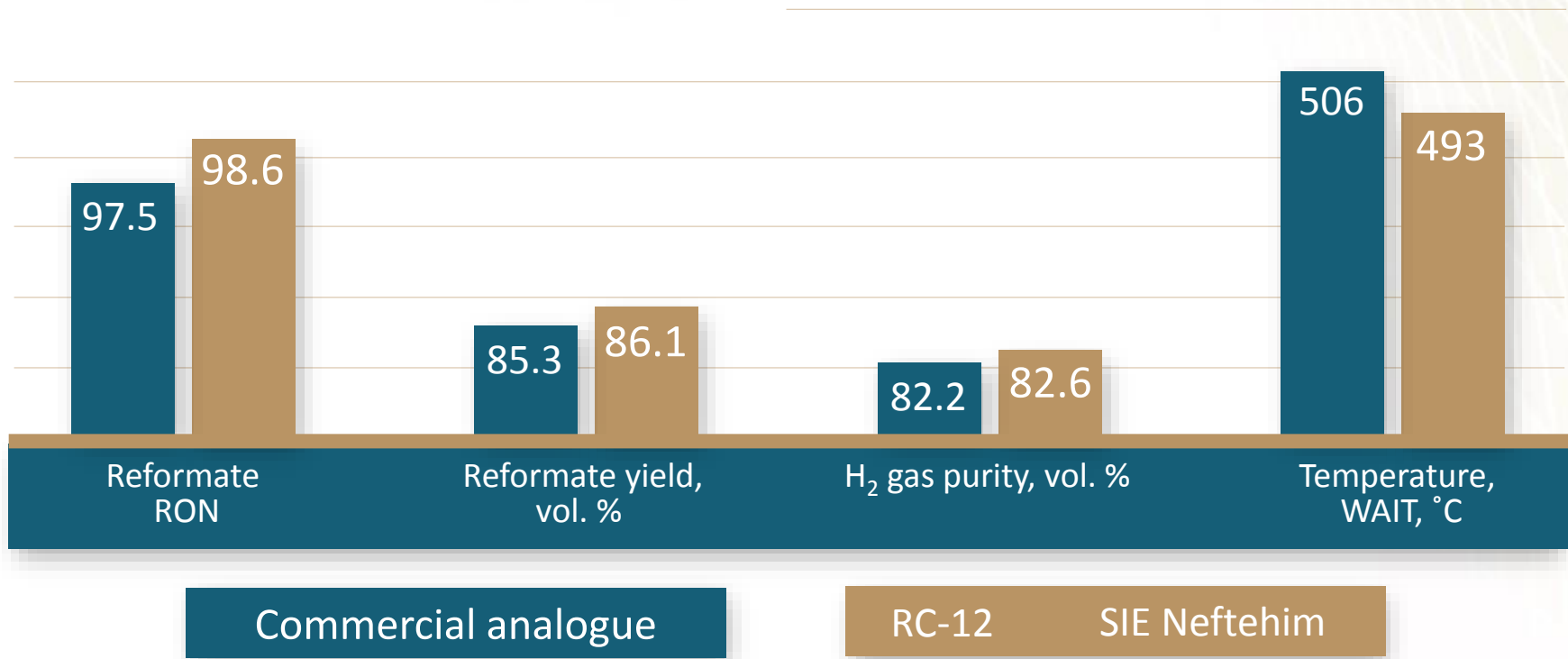


Possible catalyst replacement in operating SRR units

SRR catalysts. Comparative analysis

	Conventional commercial catalyst	REF ^{Ultra}	Benefits
RON	96-98	98-99	Reformato up to 99 RON
Service cycle, years	2-3	3-4	High stability = Service cycle - 4 years
Reformato yield, wt. %	85-89	86-90	Enhanced reformato yield
Hydrogen yield, wt. %	2.3-2.6	2.3-2.7	High selectivity = enhanced H ₂ yield

Commercial experience of CCR unit conversion to RC catalyst



Total catalyst change-out in operating CCR units and existing catalyst make-up

Pentane-hexane cuts isomerization technology **Isomalk-2**



More than 15 years of commercial experience

More than 30 references (Russia, USA, EU, China, India, Ukraine, Romania, Middle East countries), **more than 1,000,000 hours** of total commercial operation of SI-2 catalyst



Maximum efficiency

Isomerase production with **more than 93 RON** in operating units.
Once-through isomerase **PIN 130+**



Maximum stability

High catalyst tolerance to catalytic poisons, activity restoration after excursions of water up to 100 ppm and sulfur up to 5 ppm
Actual **catalyst service life** in operating units is **more than 14 years**



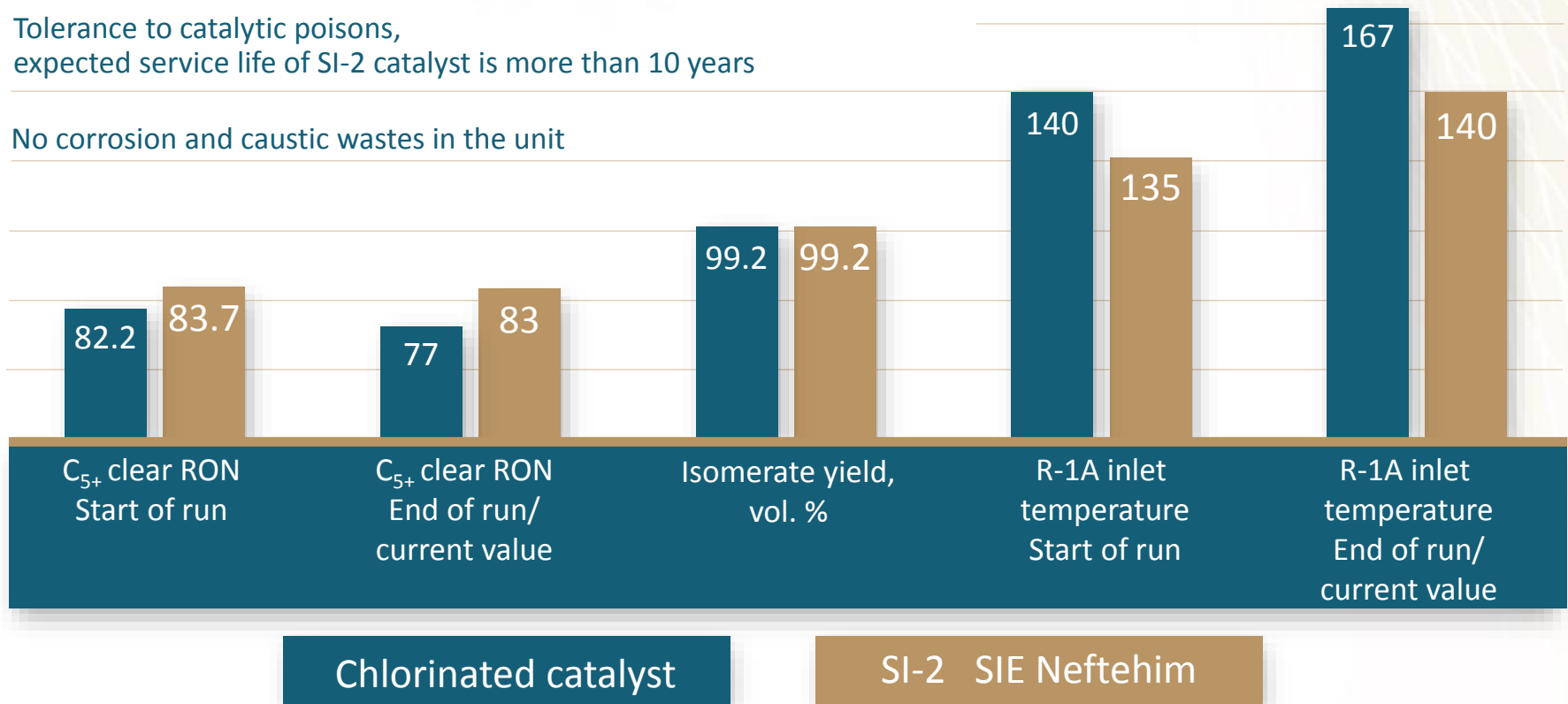
Maximum ecological safety

No acid reagents and caustic wastes.
No corrosive media within the entire catalyst operating life cycle

Isomerization unit conversion from chlorinated catalyst to SI-2 catalyst

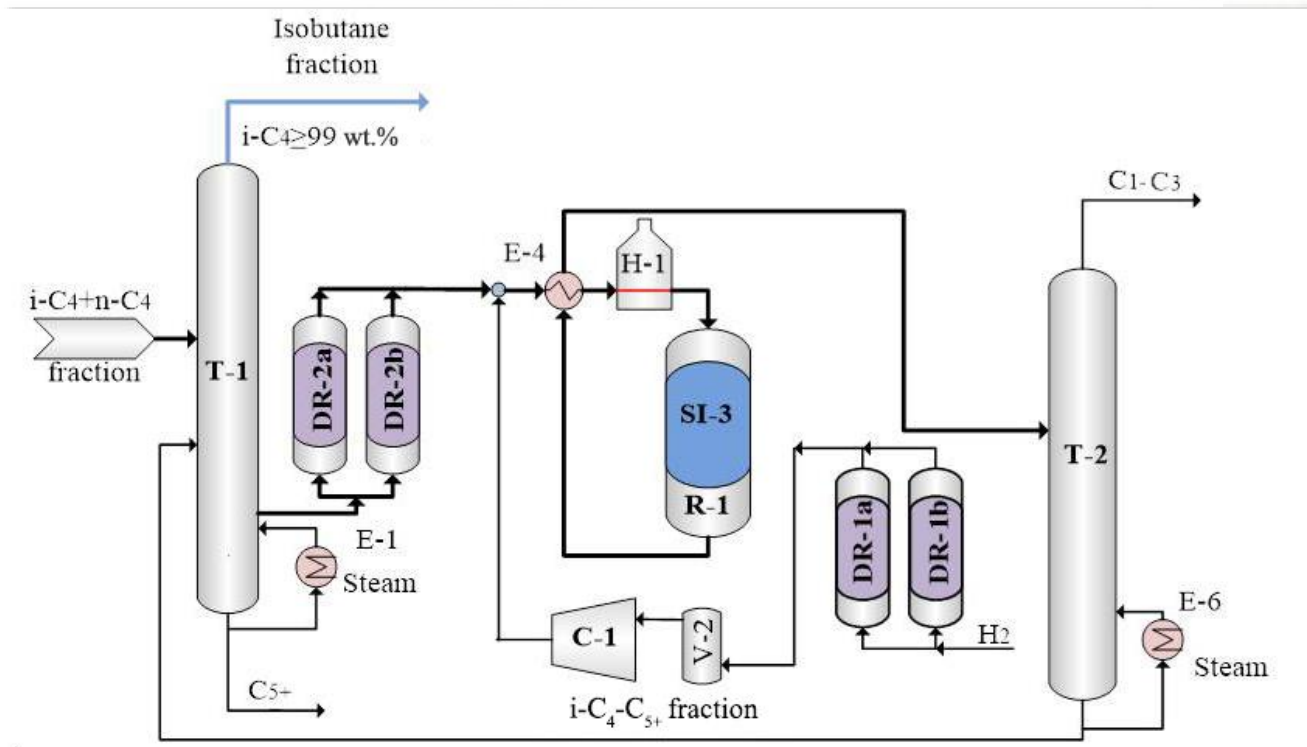
Tolerance to catalytic poisons, expected service life of SI-2 catalyst is more than 10 years

No corrosion and caustic wastes in the unit



In 2019, SIE Neftehim has completed research and developed SI-2B catalyst modification for direct change-out of chlorinated catalyst without revamp

Innovative technology of n-butane isomerization **Isomalk-3** based on oxide catalyst **SI-3**



2015

First commercial unit
200 KTA

2019

4 operating
commercial units

2020...

Implementation of new
projects and catalyst
replacement in existing units

Prospective C₇ hydrocarbons isomerization technology (70-105°C cut)

C₇ hydrocarbons processing



Distribution of 70-105°C cut between these two units reduces their operating performances

↓
Low conversion
High cracking


↓
Low aromatization level
High cracking

Isomalk-4

Selectivity 95%

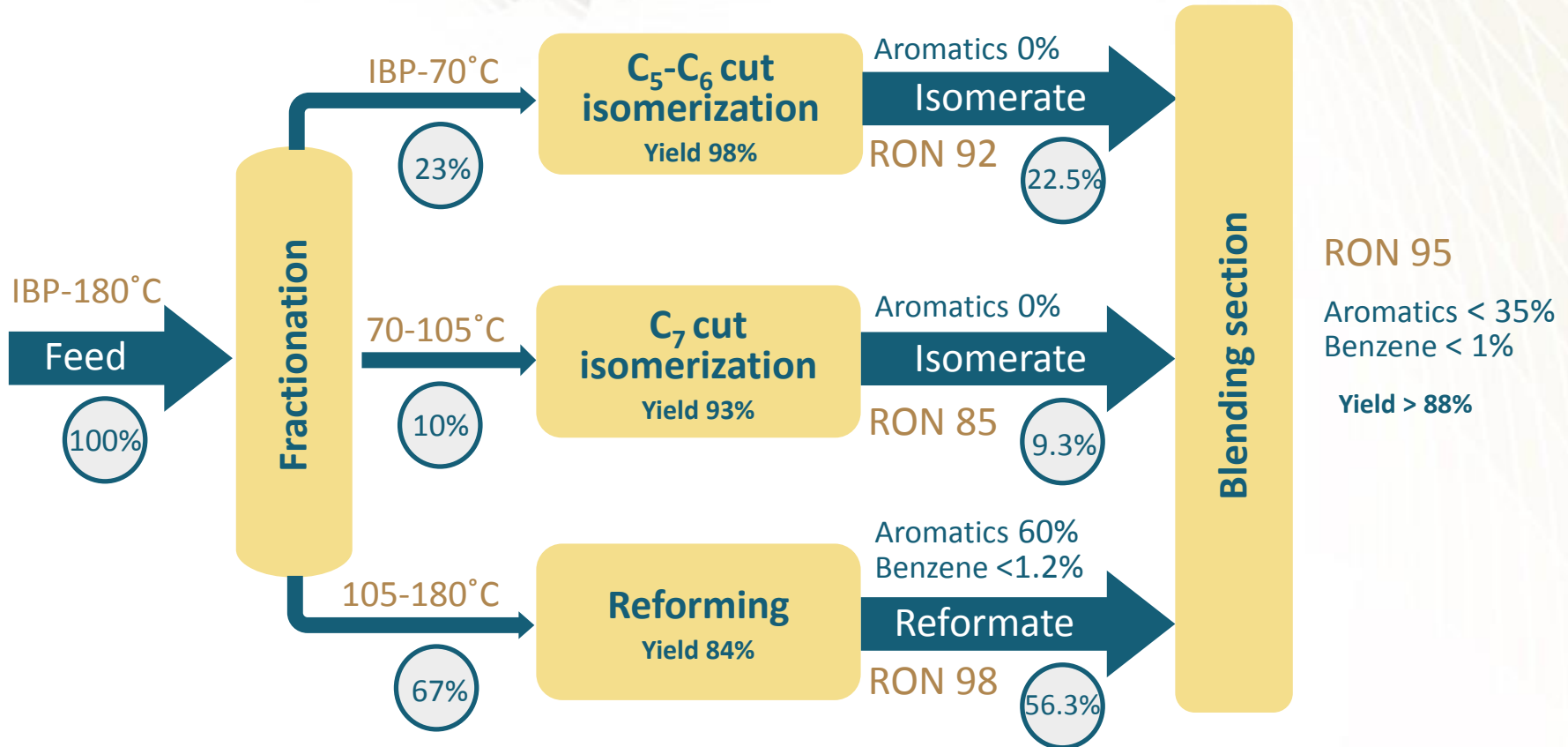
Yield 93-95%

RON 85-87

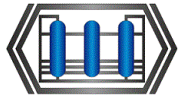


! Oxide Catalyst SI-4

Prospective configuration of Euro-5 motor gasoline production



- Production of additional amount of non-aromatic fuel component
- Enhanced reformate yield in reforming unit
- Reduced benzene content in reformate until 1.0-1.5 wt. % due to reforming feed upgrade



SIE NEFTEHIM, LLC

- **Creation and introduction of oil processing technologies – more than 60 years**
- **Catalyst production facilities – up to 900 tons/year**
- **Number of workers – more than 100**

We will find the optimum solution for your production

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THANK YOU!

ANY QUESTIONS?

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