



OAO VNIPIneft

CHALLENGES FACING RUSSIA IN THE EFFORTS TO MODERNIZE THE PETROCHEMICAL AND GAS CHEMICAL INDUSTRY

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IN GLOBAL PETROCHEMICAL INDUSTRY

- ❖ Annual investment into the global petrochemical industry is ~ USD 25 bln.
- ❖ Main trends of the global petrochemical and gas chemical industry:
 - The global petrochemical and gas chemical industry will continue its development with the pace exceeding the world GDP growth rates; the “lead factor” will be 1.1 to 1.2 for well-developed countries and 1.4 to 1.5 for developing countries, including India and China.
 - Large-scale petrochemical and gas chemical production is moving to regions with non-expensive raw materials, convenient logistics and fast-growing demand (Middle East, North-Eastern Asia).
 - Major petrochemical and gas chemical clusters will continue to be built in China, India, and the USA.

RUSSIAN PETROCHEMICAL INDUSTRY

- ❖ The investments to the RF gas chemical industry increased by 4.3% and amounted to 12 bln Rbls in 2013.
- ❖ Petrochemical throughput increased by 19.3% and amounted to 9.9 MTA.
- ❖ A share of the petrochemical industry in the industrial sector is 2% in Russia, while it is 30% in China and 25% in the USA.
- ❖ The maximum pyrolysis unit capacity ~ 650 kTA (over 1 MTA in the world).
- ❖ Produced: (% to 2012)
 - olefins – 4.3 MTA (+13%)
 - polyethylene – 1.64 MTA (+18%)
 - polypropylene – 0.90 MTA (+36%)
 - PVC – 0.62 MTA (0%)

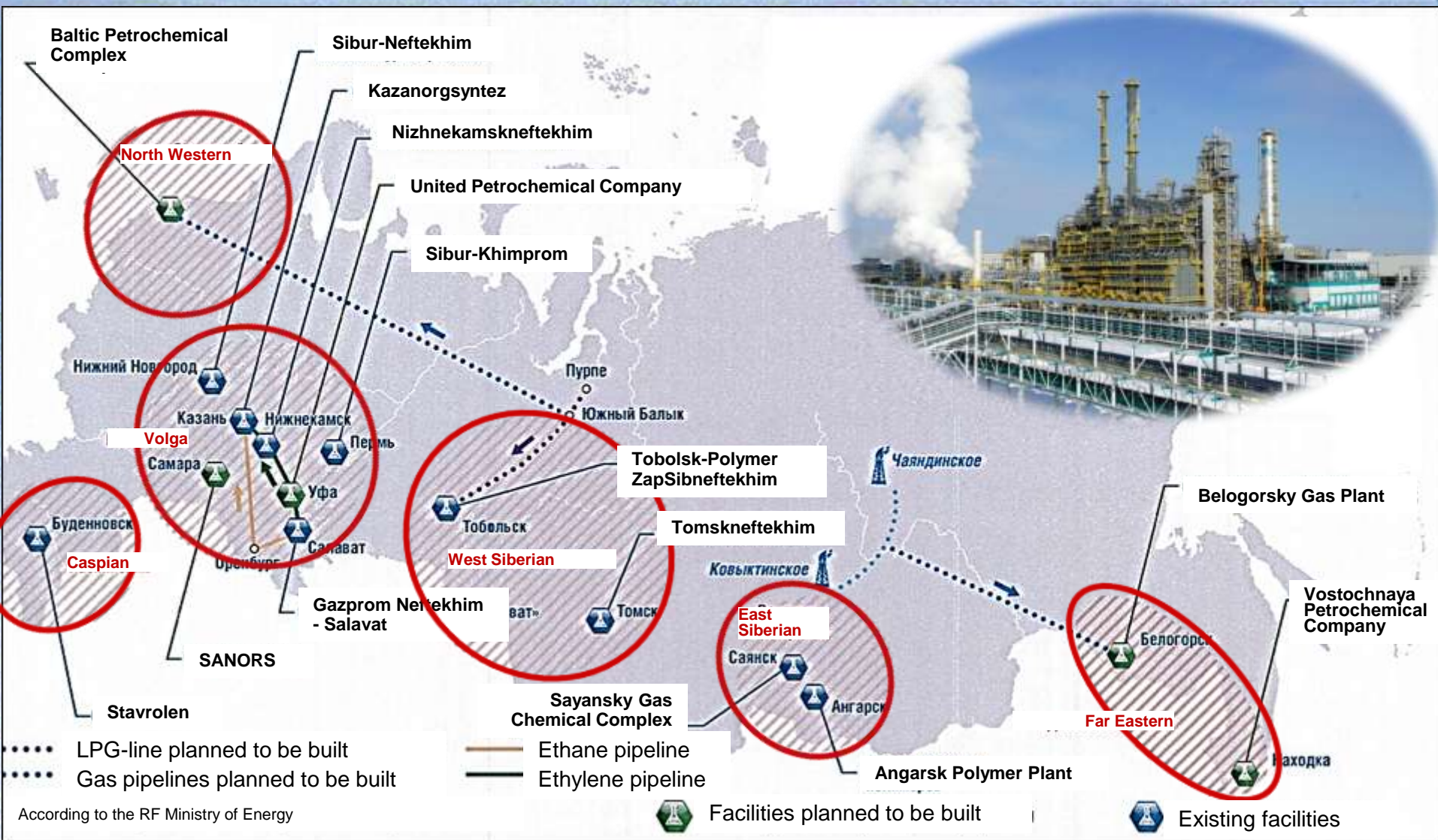


- ❖ Approval of a plan for the gas chemical and petrochemical industry development till 2030, including:
- ❖ Ethylene capacity expansion;
- ❖ The establishment of six new oil and gas chemical clusters in the North-Western, Volga, West-Siberian, Caspian, East-Siberian and Far-Eastern regions.





PETROCHEMICAL SECTOR OF THE RUSSIAN FEDERATION





- ❖ **General Designer: OAO VNIPIneft**
- ❖ **Configuration:**
 - Propane dehydration and propylene plant - 510 kTA (Licensor: UOP, USA)
 - Polypropylene plant - 500 kTA (Licensor: INEOS, USA)
- ❖ **OAO VNIPIneft's scope of work:**
 - **PD Development**
 - **Development of Operating Manual and Emergency Localization and Response Plan**
 - **Participation in the development of Detail Engineering for process units**
- ❖ **Project Status: The plant was opened in October 2013.**





- ❖ **General Designer: OAO VNIIneft**
- ❖ **Configuration:**
 - Ethylene Plant - 1,500 kTA (Licensor: Linde)
 - Polyethylene Plant - 1,500 kTA (Licensor: INEOS)
 - Polypropylene Plant - 500 kTA (Licensor: LyondellBasell)
- ❖ **OAO VNIIneft's scope of work :**
 - **Pre-project work**
 - **Participation of the development of FEED and PD for Ethylene Plant**
 - **Development of PD for the complex as a whole**
- ❖ **Project Status:**
 - **Complex FEED and PD have been developed (Ethylene Plant - Linde; Polyethylene Plant - Technip; Polypropylene Plant - Uhde)**
 - **OAO SIBUR have not yet made any final decision as regards the Project.**



- ❖ **General Designer: OAO VNIPIgazdobycha**
- ❖ **Configuration:**
 - **Ethylene Plant - 420 kTA (Licensor: Linde)**
 - **LDPE Plant - 400 kTA (Licensor: Basell)**
- ❖ **OAO VNIPIneft's scope of work:**
 - **Updating of Civil & Construction Detail Design for Ethylene and Polyethylene Plants and warehouses**
 - **Participation in Field Supervision**
- ❖ **Project status:**
 - **Construction of the process units is underway; the Complex is ~ 60% ready.**
- ❖ **To be put into operation in 2017**





❖ **Configuration:**

- Ethylene plant - 1 MTA (Licensor: CB&I)
- Polyethylene plant - 600 kTA (Licensor: INEOS)
- Polyethylene plant - 400 kTA (Licensor: Basell)

❖ **OAO VNIIneft's scope of work:**

- **Pre-project work**

❖ **Project Status:**

- Ethylene plant FEED (CB&I) has been developed;
- FEED for Polyethylene plant and Polypropylene plant (Tecnimont) has been developed;
- PD has been developed

❖ **To be put into operation in 2018**





- ❖ In 2012, a 220-kTA ethyl benzene plant (Licensor – Badger) and a 100-kTA expandable polystyrene plant (Licensor – Sunpor) were put into operation.
 - **General Designer: OAO VNIIneft**
 - **OAO VNIIneft's scope of work:**
 - **Complex PD development**
 - **Participation in the development of PD for process units and Off-Site facilities, Field Supervision**
- ❖ Development of styrene-chain production plants is working out, specifically:
 - Expansion of the 60-kTA ethylene plant up to 73 kTA;
 - Expansion of the 220-kTA ethyl benzene plant up to 270 kTA;
 - Construction of a new 250-kTA styrene plant;
 - Construction of a new 100-kTA polystyrene plant suitable for a phased expansion to 50+50 kTA.





- ❖ **Project: Revamping of the 300-kTA ethylene plant.**
- ❖ **Capacity: expansion from 240 to 360 kTA.**
- ❖ **Licensor: Technip.**
- ❖ **Project Status:**
 - **PD and Detail Engineering have been developed;**
 - **Equipment and Material procurement has been completed;**
 - **Construction is at the final stage.**





❖ **Configuration:**

- **Pyrolysis complex for producing 1.2 MTA of ethylene, 600 kTA of propylene and 120 kTA of butadiene**
- **MTBE plant (150 kTA)**
- **Benzene plant (300 kTA)**
- **Toluene plant (140 kTA)**

❖ **Project Status:**

- **Business-plan for developing the existing plants and building new plants (Technip)**
- **A joint-venture with OAO NK Rosneft has been established to implement the project.**

❖ **To be put into operation in 2020**



- ❖ **Project: Grass-root petrochemical complex**
- ❖ **Configuration:**
 - **Ethylene plant - 1 MTA**
 - **HDPE plant - 450 kTA**
 - **LLDPE plant - 415 kTA**
 - **Polypropylene plant - 500 kTA**
 - **Butadiene - 85 kTA**
 - **MEG plant - 300 kTA**
- ❖ **Project Status:**
 - **A tender for a General Designer of the Complex is under way.**
- ❖ **To be put into operation in 2020**



- ❖ Client: OAO LUKOIL
- ❖ Projects in progress:
 - Revamping of a 350-kTA ethylene plant
 - Construction of a new petrochemical complex:
 - Ethylene pyrolysis unit - 600 kTA
 - Polyethylene plant - 600 kTA
 - Polypropylene plant - 300 kTA
- ❖ OAO VNIIneft's scope of work:
 - Detail Engineering for EP-350 Unit recondition has been developed jointly with OOO LUKOIL-NizhegorodNIINefteproyekt.
 - Feasibility Study for the Complex has been developed.
- ❖ Project status: Selection of Licensors is underway.
- ❖ To be put into operation in 2017.





- ❖ **Client: OAO NK Rosneft**
- ❖ **Phase I configuration:**
 - Ethylene plant – 1.4 MTA
 - Polyethylene plant – 1.4 MTA
 - Polypropylene plant – 600 kTA
 - Butadiene plant – 190 kTA
- ❖ **Throughput: 3.4 MTA**
- ❖ **General Designer: OAO Angarskneftekhimproyekt**
- ❖ **Project status:**
 - Licensors have been selected: CB&I for pyrolysis, INEOS for polyethylene and polypropylene
 - PD development is in progress
- ❖ **To be put into operation in 2017**



- ➔ Lengthy construction period
- ➔ High financial expenses and low payback of projects
- ➔ Increased project execution periods due to the fact that engineering and equipment procurement are executed by different contractors
- ➔ Small fraction of Russian technology and Russian equipment procurement



TECHNOLOGY PLATFORM “DEEP CONVERSION OF HYDROCARBON RESOURCES”

Science and Education

56 industry-based and
academic institutes
and
universities

Business

46
state and private
companies

TECHNOLOGY PLATFORM
Purpose: development of fundamentally new
technologies for hydrocarbon resources refining and
processing and catalyst production

State
assistance

Research and
Development

Key Lines

- Hydrogen and synthetic gas production process
- Ecologically clean motor fuel production process
- Natural and produced gas processing
- Heavy oil and oil fractions refining processes
- Processes and catalysts for petrochemistry
- Polymer materials production



85 years in the engineering service market

Production personnel of OAO VNIPIneft numbers 872 employees

ОАО VNIPIneft's scope of services

Pre-project work

Design

Procurement

Construction
management

OAO VNIPIneft has a wide experience in designing pyrolysis units, polyethylene and polypropylene plants:

- ➔ 22 pyrolysis units of capacities from 60 to 1,500 kTA;
- ➔ 8 polyethylene plants of capacities from 48 to 500 kTA;
- ➔ 9 polypropylene plants of capacities from 110 to 550 kTA.



- ➔ The RF Government adopted a plan of the development of gas chemical and petrochemical industries of Russia until 2030.
- ➔ The plan envisages a growth of ethylene production capacities from 2.3 to 14.2 MTA.
- ➔ Work began to establish new petrochemical and gas chemical clusters, including Volga, West-Siberian, East-Siberian and Far-Eastern clusters.
- ➔ Technology Platform “Deep Conversion of Hydrocarbon Resources” has been established to develop and implement domestic technologies.
- ➔ OAO VNIPIneft, being a leading Russian engineering company, is ready to provide the entire complex of engineering services required for the modernization and the construction of new gas chemical and petrochemical projects.



ОАО «ВНИШнефть»

*Thank you for your kind
attention*