CLUSTER DEVELOPMENT OF BASHKORTOSTAN REPUBLIC ENTERPRISES IN THE ENGINEERING FIELD OF FUEL AND ENERGY COMPLEX

UFA-2016
THE PRODUCTION POTENTIAL OF THE BASHKORTOSTAN REPUBLIC

Leadership in oil processing:
- 92% (Bashneft-Ufaneftekhim)
- 90% (Bashneft-Novoil)
- 74% (Bashneft-UNPZ)
  (about 70% on average in RF)

1st place in Russia for primary crude oil processing, for the production of motor gasoline, diesel fuel

Leadership in Nelson Index:
- 9.46 (Bashneft-Novoil)
- 8.97 (Bashneft-Ufaneftekhim)
- 7.41 (Bashneft-UNPZ)
  (about 4.22 on average in RF)

Processing of raw materials of varying quality from gas condensate to heavy high sulfur crude

Rating:
- BBB – “standard” forecast (Standard & Poor's)
- Ba2 - “standard” forecast (Moody's)

1st place in Russia for the production output of baking soda and soda ash

2nd place in Russia for the production output of synthetic rubber

3d place in Russia for the production output of caustic soda

More than 120 items of products of chemical production delivered for export
Cluster objectives:
• Creation and development of innovative infrastructure platforms, bringing together the maximum number of competencies in the field of petrochemistry and oil and gas processing.
• Growth of international competitiveness of Cluster’s members.
• Support for small and medium enterprises in the fields of petrochemistry and oil and gas processing.
BLOCK-SCHEME OF PETROCHEMICAL TERRITORIAL CLUSTER OF BASHKORTOSTAN REPUBLIC

CLUSTER OF LOW-TONNAGE PETROCHEMISTRY OF RB
- SUE INKhP RB
- SBE RB NITIG AN RB
- LLC Bashplast
- OJSC NPO Tekhnolog
- LLC Innovatsionnyy tsentr Khimtek
- LLC Sintez TNP
- LLC ZPI Alternativa
- CJSC OZNH
- LLC HTC UAI
- LLC Eksperimentalnyy zavod Neftekhim
- LLC NTC Salavatnefteorgsintez etc.
- 61 participants

MANUFACTURING COMPANIES
- OJSC Sterlitamak petrochemical plant
- OJSC Synthez-Kauchuk
- OJSC Bashkir soda company
- LLC Ishimbay Specialized Chemical Plant of Catalysts etc.

PETROCHEMICAL TERRITORIAL CLUSTER OF RB

ENGINEERING CENTER

CENTER OF MULTIPLE ACCESS TO HIGH-TECH EQUIPMENT

CENTER OF PROTOTYPEING IN PETROCHEMISTRY

OIL AND GAS ENGINEERING CLUSTER OF RB
- SUE INKhP RB
- PJSC Salavatneftehimproekt
- SUE Bashgiproneftekhim
- LLC BashNIPineft Corporation Uraltechnostroy
- FSBEI HPE USPTU
- FSBEI HPE BSU
- FSBEI HPE USATU
- LLC IK OZNA-GazInterAvto
- LLC NPO Ufaneftegazmash
- SUE BashNIIneftemash
- LLC Neftepromavtomatika etc.
- 40 participants

OIL AND GAS MACHINE ENGINEERING CLUSTER OF RB

CONSTRUCTION AND ASSEMBLY CLUSTER OF RB
More than 40% of the oil refining capacities located in Privolzhsky Federal district

CONTROLLING STOCKHOLDERS

- Gazprom
- Gazprom neft
- LUKoil
- Rosneft
- Surgutneftegaz
- AFK Sistema
- NK Alyans
- Etc.

PROCESSING CAPACITY (MLN TONNES)

- More than 15
- 10-15
- 5-10
- 1-5
- Less than 1

OIL-PRODUCTS PIPELINES

- Active main
- Under construction

Source: "Expert" on the basis of the companies and the Ministry of Energy
The center of multiple access to high-tech equipment of the low-tonnage petrochemistry cluster of Bashkortostan Republic (CMA LTPC RB) was established in 2013. The basic company of the center is SUE Institute of Petroleum Refining and Petrochemistry of Bashkortostan Republic.

During the period of 2013 – 2014 more than 70 unique units of scientific-analytical, laboratory and experimental pilot equipment have been delivered.
PROTOTYPING STAGES

- INTERPRETATION OF CHEMICAL COMPOSITION
- DISCOVERY OF THE PRINCIPAL "IDEA" OF THE PRODUCT
- REPRODUCTION IN LABORATORY CONDITIONS (EVIDENTIARY STAGE)
- CREATION OF A PILOT TECHNOLOGY
EXAMPLES OF DEVELOPED PROTOTYPES

The mastic prototype is created for rubber bonding to the concrete surface. Mastic is used for bonding and sealing the rings’ seams for construction of underground tunnels, also prevents vibration destruction of preserving the integrity of the surface.

Industrial production at JSC "UZEMIK“ is organized.

The development of domestic analogue of the "soil strengthenener" in the interests of road construction and military-industrial complex of the Russian Federation. It is used for preparation of the "road cake" on the roads of the highest category as well as for operational (within a day) preparation of ground temporary roads.
Engineering resources of cluster – more than 7 000 specialists
Profit of cluster members - more than 10 billion rubles per year
RANGE OF SERVICES PROVIDED BY ENGINEERING CENTER

**Engineering**
- Conceptual preliminary study and Master-plan of business development
- Estimating the cost of the project, economic and financial studies
- Feasibility study and examination
- Static and dynamic modeling
- Examination of production facilities
- Process engineering design (PED)
- Providing the own licenses
- Basic engineering design (BED)
- Front-end engineering and design (FEED)
- Design and detailed documentation development

**Procurement organization**
- Vendor selection, procurement, delivery of equipment and manufacturing inspection
- Procurement management
- Selection of third-party licensors and integration of technologies

**Construction**
- Installation and construction of the production site
- Construction Project Management
- Supervising installation
- Supervision of start-up works and the commissioning procedure
- Commission and service maintenance

**Management**
- Project management consultant (PMC) and customer training
- Acting as general contractor
End-to-end solution of layout, architectural, technological, assembly problems by implementing dedicated program complex, which combines the qualities of systems: CAD system, Product Data Management (PDM) and Database Management System (DBMS) by using program products AVEVA PDMS and AVEVA NET Portal.
CUSTOMERS

- OAO NK Rosneft (OJSC)
- PAO ANK Bashneft (PJSC)
- PAO Gazprom (PJSC)
- OAO Gazprom neft (OJSC)
- OAO Surgutneftegaz (OJSC)
- PAO Tatneft (PJSC)
- PAO SIBUR Holding (PJSC)
- OAO Novatek (OJSC)

- PAO LUKOIL (PJSC)
- AO Antipinskiy NPZ (JSC)
- OOO Ilskiy NPZ (LLC)
- OOO Izhevskiy NPZ (LLC)
- ПАО Nizhnekamsknفتекхим (PJSC)
- OOO Mariskiy NPZ (LLC)
- AO NNK Khabarovskiy NPZ (JSC)
- OAO Slavneft-YANOS (OJSC)
## Reference-list of Cluster’s Members

<table>
<thead>
<tr>
<th>Description</th>
<th>Feasibility study and estimate</th>
<th>Licenses/basic projects</th>
<th>Construction project</th>
<th>Reconstruction project</th>
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<tbody>
<tr>
<td><strong>Primary processes, residue conversion</strong></td>
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<td>Oil, gas condensate and their fractions rectification</td>
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<td>Delayed coking and coke burning</td>
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<td>Visbreaking and thermal cracking</td>
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<td>Bitumen production</td>
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<td>41</td>
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<td>Deasphalting</td>
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<td><strong>Secondary processes, gas treatment</strong></td>
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<td>Isomerization and alkylation</td>
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<tr>
<td>Reforming</td>
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<tr>
<td>Oil production</td>
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<tr>
<td>Elemental sulfur production</td>
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<td>Diesel fuel, vacuum gasoil hydro treatment</td>
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<tr>
<td>Hydro cracking</td>
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<td>Airport fuel complex</td>
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<td>Fuel station</td>
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<td>Offsites’ objects</td>
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<td>Waste water treatment, Oil sludge utilization</td>
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<td>Monomers production</td>
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<td>Aromatic hydrocarbons production</td>
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<td>Polymers production</td>
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<td>Refinery tank farm</td>
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<td>Discharge rack</td>
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<td>Main pipelines</td>
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P Petrochemical Territorial Cluster of Bashkortostan Republic

Key Participants

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<tr>
<th>Company</th>
<th>Specialization</th>
<th>Foreign Partners</th>
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<tr>
<td>OJSC Bashkir soda company</td>
<td>Chemistry, petrochemistry</td>
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<td>OJSC Synthez-Kauchuk</td>
<td>Chemistry, petrochemistry</td>
<td></td>
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<tr>
<td>ГУП «Институт нефтехимпереработки Республики Башкортостан»</td>
<td>Oil and gas chemistry, petroleum refining, engineering</td>
<td></td>
</tr>
</tbody>
</table>

Specialization

- Chemistry, petrochemistry
- Oil and gas chemistry, petroleum refining, engineering

Foreign Partners

- AVEVA
- APS
- KELLER AND HECKMAN LLP
- Fujitsu
- Petrochemical Holding GmbH

22,3 27,9 31,5

The volume of shipped goods, works and services (billion rubles annually)

- 2013
- 2014
- 2015

> 30 joint projects in research, development and design, modernization of existing and creation of new industries

The number of SME participants, which use the equipment of the center of multiple access

- 60
- 98
- 119

The volume of projects realization in the Engineering center (mln rubles annually)

- 2013
- 2014
- 2015

- 597
- 775
- Σ32 projects
DEVELOPMENT STRATEGY OF PETROCHEMICAL TERRITORIAL CLUSTER OF BASHKORTOSTAN REPUBLIC

- Creation of petrochemical territorial Cluster of Bashkortostan Republic
- Creation of an effective system of the Cluster management
- Creation of the center of multiple access to high-tech equipment
- Creation of the Engineering center
- Creation of hardware and software complex
- The development of effective interaction between Cluster participants
- Improving the competencies of the Cluster participants
- Active work of the Cluster participants in the sectorial projects of the FEC
- Marketing activities on the world market entering
- Support of projects of domestic oil and gas companies abroad
- Active work on the international markets for foreign customers
- Top 20 in the world segment of designing objects in oil and gas industry

2012-2013
2014-2015
2016-2017
Further on
VISBREAKING UNIT AT OJSC «TANECO»

Capacity- 2,4 mln.t/y

License, basic design, design, exploitation documentation, main technological equipment procurement, supervision
– GUP INKhP RB

200 positions of equipment
1200 positions of instrumentations and controls
7000 positions of fittings
50 km extent of pipelines
IIIId STAGE OF CONSTRUCTION OF CJSC «ANTIPINSKY REFINERY»

CDU -3
Capacity - 5 mln.t/y
Basic design - GUP INKhP RB
Design:
   - GUP INKhP RB

119 positions of equipment
1200 positions of instrumentations and controls
3400 positions of fittings
39 km extent of pipelines
Elemental sulfur production unit
Capacity - 30 thous. t/y
Licensor - GUP INKhP RB
Design:
- GUP INKhP RB
- «NefteKhimInzhiniring» LLC

220 positions of equipment
1025 positions of instrumentations and controls
4300 positions of fittings
29 km extent of pipelines
Processing of natural and associated gas into synthetic liquid and solid hydrocarbons

**Purpose** - use of associated petroleum gas fields

**Location of implementation** – JSC "Novokuybyshevsky Oil Refinery"

**Status of the project:**
- the initial data for designing is developed (author -"RN-CIR" LLC)
- engineering surveys are performed ("EnergoProektStroylzyskaniya" LLC)
- design documentation is developed (GUP INKhP RB)
- the sanitary protection zone project is being developed (GUP INKhP RB)
- documentation package for passing the state examination is being prepared

**ASSOCIATED GAS PLANT SCHEME**
HEAT TREATMENT OF THE SUPER-VISCOUS OIL (SVO)

Purpose of the process:
Production of synthetic oil with a viscosity of no more than 100 cSt.

Ecological solutions:
- conversion of the process resulting hydrogen sulfide into elemental sulfur;
- the complete recovery of hydrocarbon gases.

Location of implementation:
PJSC TATNEFT Ashalchinskoye SVO field.
Unit of SVO preparation «Chumachka»

Status of the project:
1. Basic design of technology is completed.
2. The basic design solutions regarding technology, equipment selection, layout and design solutions are developed.
3. The project is on hold until market conditions improve.
In 2011, 18 four-way agreements between oil companies are signed. The FAS, Rostec

Corporation and Rosstandart, which provides 34 units to reconstruct and 99 process units to build.

According to the Ministry of Energy, 1.9 trillion rubles in 2014 prices are planned by oil companies for 133 units. By the beginning of 2016 the plan is made up of 50%, at the same time 90% of the used technologies are foreign.