DEVELOPMENT OF ACHIMOV DEPOSITS, URENGOY OIL, GAS, CONDENSATE FIELD

OLEG KABANOV
DEPUTY DIRECTOR GENERAL
FOR THE PRODUCTION AND TREATMENT
OF GAS CONDENSATE, OIL
GAZPROM DOBYCHA URENGOY LLC
AREA is more than 5,000 km²
ca. 3,000 wells
16 UKPGs for Cenomanian gas
5 UKPGs for Valanginian gas
2 oil production facilities
2 UKPGs for Achimov gas

EXTRACTED FROM THE START OF THE DEVELOPMENT:

- 6.8 trln m³ gas
- 159 mm tonnes of gas condensate
- 14 mm tonnes of oil
GAS RESERVES OF THE CENOMANIAN, VALANGINIAN AND ACHIMOV DEPOSITS OF THE FIELDS OF GAZPROM DOBYCHA URENGOY LLC

RECOVERY OF RESERVES

Cenomanian

27% extracted reserves
73% current reserves

Valanginian

49% extracted reserves
51% current reserves

ACHIMOV DEPOSITS RESERVES (CATEGORIES A+B1)

<table>
<thead>
<tr>
<th>Area</th>
<th>Dry gas, bcm</th>
<th>Recoverable condensate, mm tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I area</td>
<td>406</td>
<td>76</td>
</tr>
<tr>
<td>II area</td>
<td>456</td>
<td>78</td>
</tr>
<tr>
<td>III area</td>
<td>145</td>
<td>23</td>
</tr>
<tr>
<td>IV area</td>
<td>197</td>
<td>35</td>
</tr>
<tr>
<td>V area</td>
<td>363</td>
<td>71</td>
</tr>
<tr>
<td>Overall</td>
<td>1 567</td>
<td>285</td>
</tr>
</tbody>
</table>

License blocks of Achimov deposits are owned by Gazprom dobycha Urengoy LLC:

Block I is developed by AO Achimgaz (Shareholders: Gazprom dobycha Urengoy LLC – 50%, Wintershall – 50%);

Blocks II, III, VI are developed by Gazprom dobycha Urengoy LLC;

Blocks IV, V are developed by LLC «Achim Development» (Shareholders: Gazprom - 74.99%, Wintershall – 25.01%).

DEVELOPMENT OF ACHIMOV DEPOSITS, URENGOY OIL, GAS, CONDENSATE FIELD
GAZPROM DOBYCHA URENGOY LLC
GAZPROM DOBYCHA URENGOY LLC owns:
- 56% reserves of dry gas
- 55% reserves of condensate
- 25% reserves of oil
## SPECIFICATIONS OF THE RESERVOIR SYSTEM OF ACHIMOV DEPOSITS

### CENOMANIAN DEPOSITS

<table>
<thead>
<tr>
<th>Depth, m</th>
<th>Formation pressure, MPa</th>
<th>Formation temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1030-1280</td>
<td>~12.2</td>
<td>~31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth, m</th>
<th>Formation pressure, MPa</th>
<th>Formation temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700-3340</td>
<td>~30</td>
<td>~75</td>
</tr>
</tbody>
</table>

### ACHIMOV DEPOSITS

<table>
<thead>
<tr>
<th>Depth, m</th>
<th>Formation pressure, MPa</th>
<th>Formation temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3550-4000</td>
<td>~60</td>
<td>~106</td>
</tr>
</tbody>
</table>
BY 2025 TOTAL ANNUAL PRODUCTION OF HYDROCARBONS ON ACHIMOV AREAS WILL REACH:
- 40 bcm of separation gas
- 9 mm tonnes of liquid hydrocarbons

BY 2030 THE COMPANY WILL PRODUCE:
- 480 bcm of separation gas
- 110 mm tonnes of condensate
DEVELOPMENT OF ACHIMOV DEPOSITS
GAZPROM DOBYCHA URENGOY LLC

START OF THE ACHIMOV DEPOSITS DEVELOPMENT

UKPG-31
- commissioning – 2008
- well stock – 82 units

UKPG – 22
- commissioning – 2009
- well stock – 45 units

DEVELOPMENT PARAMETERS

I area:
- 111 wells
- design production – 10 bcm/year

II area (expansion in 2019):
- 130 wells
- design production – 9.5 bcm/year

III area (after 2025):
- 97 wells
- design production – 5.5 bcm/year

IV area (commissioning in 2020-2021):
- 61 wells
- design production – 5.9 bcm/year

V area (commissioning in 2020-2021):
- 87 wells
- design production – 9.6 bcm/year
PROSPECTS FOR THE DEVELOPMENT OF THE ACHIMOV AREAS, URENGOY FIELD

I area: (AO ACHIMGAZ)
- commissioning of 29 wells

II area:
- commissioning of 85 wells
- expansion of UKPG–22
- commissioning of UKPG–21

III area:
- commissioning of 97 wells
- commissioning of UKPG–30

IV area: (LLC “Achim Development”)
- commissioning of 61 wells
- commissioning of UKPG–41

V area: (LLC “Achim Development”)
- commissioning of 87 wells
- commissioning of UKPG–51
1. VERTICAL DRILL-IN OF THE FORMATION

**PROS:**
- Low cost of construction
- Opportunity to perform volumetric fracturing

**CONS:**
- Low productivity
- High draw-downs

2. VERTICAL DRILL-IN OF THE FORMATION + HYDROFRACTURING

**PROS:**
- Proven technology
- High and stable productivity

**CONS:**
- Uncontrollable growth of vertical cracks
- Small drainage area of the deposit
3. HORIZONTAL WELLBORE

**PROS:**
- Possible reduction of well stock
- Remote zone connection

**CONS:**
- High construction cost
- High cost of studies

4. HORIZONTAL WELLBORE + MULTI-STAGE HYDROFRACTURING

**PROS:**
- Possible reduction of well stock
- Big drainage area

**CONS:**
- High construction cost
- High cost of studies
- A geomechanical model is needed
WELLHEAD PIPING OF A GAS CONDENSATE WELL

AFK6-80x700 K1HL
OKK2-700-245x324x426K1HL

Control line of WV
Control line UMV
Control line USV

NOTE:
WV – wing valve
UMV – upper master valve
USV – underground safety valve
EQUIPMENT OF WELLS PIPING

VALVE UNIT

CONNECTION UNIT OF INTERFIELD PIPELINE AND METHANOL PIPELINE

PIPING UNIT OF HORIZONTAL FLARE

TEST SEPARATOR CONNECTION UNIT
1 proposal.
Liquid discharge from C-2 into the pipeline of passive gas to the ejector from P-1 and P-2

2 proposal.
WMS discharge from P-1 into the stream of UC, directed to the additional divider P-3

IMPROVED SCHEME OF LOW-TEMPERATURE SEPARATION UNIT WITH METHANOL RECYCLING
COMPLEX ALGORITHMS OF THE PROCESS CONTROL

INTERACTION OF LOCAL ALGORITHMS OF SINGLED UNITS OF GTP

GTP START

PRODUCTION CONTROL

TRANSFER INTO REPAIR

DIAGNOSTICS OF TROUBLESHOOTING
ENVIRONMENTAL PROTECTION

SIMULTANEOUS INJECTION OF UTILITY AND INDUSTRIAL WASTEWATER

INDUSTRIAL AND ECOLOGICAL MONITORING

PITLESS DRILLING METHOD

STUDY OF WELLS WITHOUT GAS DISCHARGE INTO THE ATMOSPHERE
THANK YOU FOR YOUR ATTENTION