MASTER PLAN
Ukrainian Gas Transmission System (UGTS)
Priority Objects
Modernisation and Reconstruction
Gas Transmission System of Ukraine

- Drozdovychi
- Bilche Volytsko
- Ternopil
- Khmelnytskyi
- Zhytomyr
- Kiev
- Orlovka
- Uzhgorod
- Beregove
- Satu-Mare
- Moldova
- Black Sea
- Sea of Azov
- Russia
- Belarus
- Poland
- Slovakia
- Hungary
- Romania
- Moldova
- Sea of Azov
- Black Sea
- Gas Transmission System of Ukraine
### Parameters of Ukrainian Gas Transmission System

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Total</th>
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<tbody>
<tr>
<td>Length of gas pipelines, total</td>
<td>thsd. km</td>
<td></td>
</tr>
<tr>
<td>including: - gas mains</td>
<td></td>
<td>37.0</td>
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<tr>
<td>- pipeline branches</td>
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<td>22.2</td>
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<tr>
<td>Throughput capacity of GTS:</td>
<td>bcm/year</td>
<td></td>
</tr>
<tr>
<td>- input</td>
<td></td>
<td>288</td>
</tr>
<tr>
<td>- output</td>
<td></td>
<td>178</td>
</tr>
<tr>
<td>including European countries</td>
<td></td>
<td>142</td>
</tr>
<tr>
<td>Number of compressor stations (compressor shops)</td>
<td>item</td>
<td>72(110)</td>
</tr>
<tr>
<td>Number of gas compressor units</td>
<td>item</td>
<td>702</td>
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<tr>
<td>Capacity of compressor stations</td>
<td>MW</td>
<td>5442.9</td>
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<tr>
<td>Number of underground gas storage facilities (UGSF)</td>
<td>item</td>
<td>12</td>
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<tr>
<td>Total working volume of UGSF</td>
<td>bcm</td>
<td>31</td>
</tr>
<tr>
<td>Number of gas distribution stations (GDS)</td>
<td>item</td>
<td>1437</td>
</tr>
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Gas Supply and Transit via Ukrainian Entry/Exit Points during 2004-2008 (bcm)

Transit via Ukraine:
- 178.1 - design capacity
  - 137.1 - 2004
  - 136.2 - 2005
  - 128.2 - 2006
  - 115.1 – 2007
  - 119.5 - 2008

Transit to European countries:
- 142.1 – design capacity
  - 120.4 - 2004
  - 121.5 - 2005
  - 113.8 - 2006
  - 112.1 – 2007
  - 116.8 - 2008

Intake in Ukraine:
- 288.0 - design capacity
  - 191.4 - 2004
  - 189.9 - 2005
  - 184.3 - 2006
  - 168.9 – 2007
  - 168.6 - 2008

Transit via Ukraine:
- 178.1 - design capacity
  - 137.1 - 2004
  - 136.2 - 2005
  - 128.2 - 2006
  - 115.1 – 2007
  - 119.5 - 2008

Transit to European countries:
- 142.1 – design capacity
  - 120.4 - 2004
  - 121.5 - 2005
  - 113.8 - 2006
  - 112.1 – 2007
  - 116.8 - 2008

Intake in Ukraine:
- 288.0 - design capacity
  - 191.4 - 2004
  - 189.9 - 2005
  - 184.3 - 2006
  - 168.9 – 2007
  - 168.6 - 2008
Strategy of UGTS Modernisation and Reconstruction

Purposes are:

• Reliability increase
• Efficiency increase
• Gas transit routes profitability
• Reduction of environmental impact
• Reduction of gas delivery risk to European consumers via Ukraine

Priority tasks are:

• Maintenance of main transit pipelines and UGSF design parameters
• Implementation of up-to-day, environmentally effective technologies
• Implementation of up-to-day control methods of technical state
• On-line gas quantity and quality monitoring
• Alignment of UGTS with relevant European standards
UGTS Priority Objects Modernisation and Reconstruction

• **Western transit corridor”**
  - Soyuz
  - Urengoy-Pomary-Uzhgorod
  - Progres

• **“South transit corridor”**
  - Elets-Kremenchuk-Kryvyi Rig
  - Ananiiv -Tyraspil-Izmail

• **Underground gas storage facilities**
  - Bilche-Volytsko-Ugerske
  - Bogorodchany

• **Gas metering stations (GMS)**
  - Uzhgorod
  - Beregove
  - Drozdovychi
  - Tekove
  - Orlovka
Main directions:

- Reconstruction of linear part of pipelines with auxiliary objects
- Modernisation and reconstruction of compressor stations
- Modernisation and reconstruction of telemechanics and communication systems
- Modernisation and reconstruction of underground gas storage facilities
- Reconstruction and construction of gas metering stations (GMS)

Main trends are determined by the following:

- Required repair of separate linear segments of pipelines
- Required updating of telemechanics and communication systems
- Expired operational time of gas compressor units on transit pipelines
- Adjustment of UGSF main equipment parameters to European standards
- Adjustment of existing and new-built Ukrainian GMS to relevant European standards
Modernisation and Reconstruction of Soyuz Gas Pipeline

Finance expenditure
730.7 mln. USD

Period of implementation
- project - 5-7 years
- separate objects - 3-4 years

Expected results
- enhancement of natural gas transportation reliability;
- reduction of fuel gas volume;
- reduction of environmental impact.

Financing

<table>
<thead>
<tr>
<th></th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
<th>6th year</th>
<th>7th year</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Linear part</td>
<td>13.1</td>
<td>12.9</td>
<td>14.9</td>
<td>13.3</td>
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<td>13.5</td>
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<td>5.0</td>
<td>81.8</td>
<td>163.7</td>
<td>136.5</td>
<td>122.8</td>
<td>122.8</td>
<td>637.6</td>
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<tr>
<td>Total:</td>
<td>18.1</td>
<td>17.9</td>
<td>96.7</td>
<td>177.0</td>
<td>149.4</td>
<td>136.3</td>
<td>135.3</td>
<td>730.7</td>
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</table>
Modernisation and Reconstruction of Urengoy-Pomary-Uzhgorod Gas Pipeline

Finance expenditure
750.7 mln. USD

Period of implementation
project - 5-7 years
separate objects - 3-4 years

Expected results
- enhancement of natural gas transportation reliability;
- reduction of fuel gas volume;
- reduction of environmental impact.

Financing

<table>
<thead>
<tr>
<th></th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
<th>6th year</th>
<th>7th year</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Linear part</td>
<td>41.0</td>
<td>38.0</td>
<td>37.1</td>
<td>36.9</td>
<td>35.5</td>
<td>36.8</td>
<td>33.2</td>
<td>258.5</td>
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<tr>
<td>Compressor stations</td>
<td>-</td>
<td>5.0</td>
<td>23.2</td>
<td>116.0</td>
<td>116.0</td>
<td>116.0</td>
<td>116.0</td>
<td>492.2</td>
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<td>Total:</td>
<td>41.0</td>
<td>43.0</td>
<td>60.3</td>
<td>152.9</td>
<td>151.5</td>
<td>152.8</td>
<td>149.2</td>
<td>750.7</td>
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</table>
Modernisation and Reconstruction of Progres Gas Pipeline

Finance expenditure
203.9 mln. USD

Period of implementation
project - 5-7 years
separate objects - 3-4 years

Expected results
- enhancement of natural gas transportation reliability;
- reduction of fuel gas volume;
- reduction of environmental impact.

Financing

<table>
<thead>
<tr>
<th></th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
<th>6th year</th>
<th>7th year</th>
<th>Total</th>
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<tbody>
<tr>
<td>Linear part</td>
<td>17.6</td>
<td>17.4</td>
<td>16.9</td>
<td>21.9</td>
<td>26.5</td>
<td>13.7</td>
<td>13.7</td>
<td>127.7</td>
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<td>-</td>
<td>10.2</td>
<td>13.2</td>
<td>13.2</td>
<td>13.2</td>
<td>13.2</td>
<td>13.2</td>
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<td>Total</td>
<td>17.6</td>
<td>27.6</td>
<td>30.1</td>
<td>35.1</td>
<td>39.7</td>
<td>26.9</td>
<td>26.9</td>
<td>203.9</td>
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Modernisation and Reconstruction of South Transit Corridor
Elets-Kremenchuk-Kryvyi Rig / Ananiiv-Tyrsapol-Izmail

Finance expenditure
366.3 mln. USD

Period of implementation
project - 5-7 years
separate objects - 3-4 years

Expected results
- enhancement of natural gas transportation reliability;
- reduction of fuel gas volume;
- reduction of environmental impact.

<table>
<thead>
<tr>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
<th>6th year</th>
<th>7th year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear part</td>
<td>19.5</td>
<td>19.6</td>
<td>22.0</td>
<td>23.6</td>
<td>20.2</td>
<td>16.3</td>
<td>15.8</td>
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<tr>
<td>Compressor stations</td>
<td>8.7</td>
<td>52.7</td>
<td>53.8</td>
<td>32.1</td>
<td>32.0</td>
<td>15.6</td>
<td>34.4</td>
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<tr>
<td>Total:</td>
<td>28.2</td>
<td>72.3</td>
<td>75.8</td>
<td>55.7</td>
<td>52.2</td>
<td>31.9</td>
<td>50.2</td>
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Modernisation and Reconstruction of Bilche-Volytsko - Ugerske and Bogorodchany Underground Gas Storage Facilities

Finance expenditure
455.3 mln. USD

Period of implementation
project -7 years
separate objects-2-3 years

Expected results
- enhancement of natural gas transportation reliability;
- reduction of environmental impact.

Financing

<table>
<thead>
<tr>
<th></th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
<th>6th year</th>
<th>7th year</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Bilche-Volytsko-Ugerske UGS</td>
<td>4.3</td>
<td>25.8</td>
<td>53.6</td>
<td>69.2</td>
<td>97.7</td>
<td>57.4</td>
<td>32.8</td>
<td>340.8</td>
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<td>Bogorodchany UGS</td>
<td>-</td>
<td>4.9</td>
<td>38.4</td>
<td>37.0</td>
<td>34.2</td>
<td>-</td>
<td>-</td>
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<td>Total:</td>
<td>4.3</td>
<td>30.7</td>
<td>92.0</td>
<td>106.2</td>
<td>131.9</td>
<td>57.4</td>
<td>32.8</td>
<td>455.3</td>
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Modernisation and Reconstruction of GMS at Exit Points of Ukraine

Finance expenditure
63.6 mln. USD

Period of implementation
project - 4 years

Expected results
- increased exactness of natural gas quality measurement;
- reduction of environmental impact.

<table>
<thead>
<tr>
<th>Financing</th>
<th>mln. USD</th>
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</thead>
<tbody>
<tr>
<td>GMS at Exit Points of Ukraine, including: Uzhgorod, Beregove, Drozdovychi, Tekove, Orlovka</td>
<td>63.6</td>
</tr>
</tbody>
</table>
Construction of Commercial (Backup) GMS at Entry Points of UGTS

Finance expenditure
448.0 mln. USD

Period of implementation
5 years

Expected results
-control of gas volume and gas quality at Ukrainian customs territory

Financing

<table>
<thead>
<tr>
<th>GMS at entry points of Ukrainian GTS (9 GMS on Russian Federation boarder, 2 GMS on Belarus boarder)</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; year</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; year</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; year</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; year</th>
<th>5&lt;sup&gt;th&lt;/sup&gt; year</th>
<th>6&lt;sup&gt;th&lt;/sup&gt; year</th>
<th>7&lt;sup&gt;th&lt;/sup&gt; year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>36.1</td>
<td>92.6</td>
<td>207.6</td>
<td>108.2</td>
<td>-</td>
<td>-</td>
<td>448.0</td>
<td></td>
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Basics of UGTS Priority Objects
Modernisation and Reconstruction

Total investment expenditure required for modernisation and reconstruction during seven years reaches 3018.5 mln. USD, including:

- Linear part - 616.3 mln. USD
- Compressor stations - 1435.3 mln. USD
- Underground gas storage facilities - 455.3 mln. USD
- GMS at exit points of Ukrainian GTS - 63.6 mln. USD
- New GMS at entry points of Ukrainian GTS - 448.0 mln. USD

Modernisation and Reconstruction leads to:

- Gas pipelines design parameters maintenance
- Reliability growth in natural gas supply to domestic consumers
- Reduction of environmental impact
- Reduction of fuel gas volume

Calculation of initial expenses shows economical preeminence and benefits.
## Total Investments Volume
for UGTS Priority Objects
Modernisation and Reconstruction

<table>
<thead>
<tr>
<th>Name</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt;</th>
<th>4&lt;sup&gt;th&lt;/sup&gt;</th>
<th>5&lt;sup&gt;th&lt;/sup&gt;</th>
<th>6&lt;sup&gt;th&lt;/sup&gt;</th>
<th>7&lt;sup&gt;th&lt;/sup&gt;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gas pipelines, total</td>
<td>104.9</td>
<td>160.8</td>
<td>262.9</td>
<td>420.7</td>
<td>392.8</td>
<td>347.9</td>
<td>361.6</td>
<td>2051.6</td>
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<td>- linear part</td>
<td>91.2</td>
<td>87.9</td>
<td>90.9</td>
<td>95.7</td>
<td>95.1</td>
<td>80.3</td>
<td>75.2</td>
<td>616.3</td>
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<tr>
<td>- compressor stations</td>
<td>13.7</td>
<td>72.9</td>
<td>172.0</td>
<td>325.0</td>
<td>297.7</td>
<td>267.6</td>
<td>286.4</td>
<td>1435.3</td>
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<td>2. Underground gas storage facilities</td>
<td>4.3</td>
<td>30.7</td>
<td>92.0</td>
<td>106.2</td>
<td>131.9</td>
<td>57.4</td>
<td>32.8</td>
<td>455.3</td>
</tr>
<tr>
<td>3. Gas metering stations at exit points of UGTS</td>
<td>2.6</td>
<td>23.7</td>
<td>16.2</td>
<td>21.1</td>
<td></td>
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<td></td>
<td>63.6</td>
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<tr>
<td>4. New Gas metering stations at entry points of UGTS</td>
<td>3.5</td>
<td>36.1</td>
<td>92.6</td>
<td>207.6</td>
<td>108.2</td>
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<td></td>
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<td>Total investments volume</td>
<td>115.3</td>
<td>251.3</td>
<td>463.7</td>
<td>755.6</td>
<td>632.9</td>
<td>405.3</td>
<td>394.4</td>
<td>3018.5</td>
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</tbody>
</table>

mln. USD
Perspective Trends of UGTS Development
Novopskov - Uzhgorod, Torzhok - Dolyna

Finance Expenditure
5.55 bln. USD

Expected results
- increase in throughput capacity at exit points of Ukraine by 60 bcm/year
- reduction of Capex comparing to new routes.

<table>
<thead>
<tr>
<th></th>
<th>Novopskov - Uzhgorod</th>
<th>Torzhok - Dolyna</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>incl. first stage - Bogorodchany – Uzhgorod</td>
</tr>
<tr>
<td>Length of pipeline, km</td>
<td>1521</td>
<td>241.4</td>
</tr>
<tr>
<td>Number of compressor stations</td>
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<td>-</td>
</tr>
<tr>
<td>Output, bcm/year</td>
<td>28.6</td>
<td>19</td>
</tr>
<tr>
<td>Installed capacity of CS, MW</td>
<td>768</td>
<td>-</td>
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</table>