METHANE EMISSIONS REDUCTION IN UKRAINE: PRE- AND POST-WAR PRIORITIES

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Naftogaz is Ukraine’s national integrated company with 3 business platforms – Gas Business, B2C/Utility and Low Carbon Business.

Naftogaz in numbers

Naftogaz Group is a leading integrated oil and gas company, with more than 20 years of experience in oil and gas operations.

As a result of our business model, Naftogaz Group has established competitive advantages that are evident across all three of our business platforms – Gas Business, B2C/Utility, and Low Carbon Business.

<table>
<thead>
<tr>
<th>EMPLOYEES</th>
<th>∞ 51 947 ∞</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL REVENUE</td>
<td>∞ 5.8 USD billion ∞</td>
</tr>
<tr>
<td>(2019, excl. gas transmission)</td>
<td></td>
</tr>
<tr>
<td>TOTAL ASSETS</td>
<td>∞ 18.0 USD billion ∞</td>
</tr>
<tr>
<td>(2019, excl. gas transmission)</td>
<td></td>
</tr>
<tr>
<td>TAX AND DIVIDEND PAYMENTS</td>
<td>∞ 4.7 USD billion ∞</td>
</tr>
<tr>
<td>Ukraine’s largest taxpayer</td>
<td></td>
</tr>
<tr>
<td>GROSS GAS PRODUCTION</td>
<td>∞ 14.2 bcm ∞</td>
</tr>
<tr>
<td>76% of total Ukrainian production</td>
<td></td>
</tr>
<tr>
<td>OIL AND GAS CONDENSATE</td>
<td>∞ 1.94 million tons ∞</td>
</tr>
<tr>
<td>More than 80% of Ukraine’s total production</td>
<td></td>
</tr>
</tbody>
</table>
Naftogaz energy transition timeline

- **Oil & gas company exploring new areas**
  - 2020

- **Oil & gas company securing energy independence with diversified demand for gas transit and share of green businesses in portfolio**
  - 2030

- **Sustainable energy company with a focus on renewable and bio energy with minimized impact on environment and climate**
  - 2050

Notes: E&P – Exploration and Production
Source: Naftogaz Group
Naftogaz priorities of energy transition on its pathway for climate neutrality

- Hydrogen, biofuel and biogas
- Renewable power
- Energy Efficiency
- Climate Neutrality
- Reduce Methane Emission
- Carbon Capture, Utilization and Storage
- Offsetting & Environmental Protection

Notes: E&P – Exploration and Production
Source: Naftogaz Group
Naftogaz supported joining Global Methane Pledge by Ukraine that sets a goal of 30% emissions reduction by 2030 at the country level:

“Naftogaz welcomes the joining Global Methane Pledge by Ukraine and notes that GHG reduction, including methane, is one of the Company’s priorities, which is stated in Naftogaz Corporate Strategy.”

Yuri Vitrenko, CEO of Naftogaz
In a letter to the Ministry of Environment of Ukraine on joining Global Methane Pledge
Impact of hostilities on the natural gas market

- Mass migration, decrease in number of subscribers
- Destroyed combined heat and power plants (CHPs) / heat generation stations (HGSs) and gas transmission infrastructure
- Reduced production, problems with gas sales, asset loss risks
- Suspended businesses, dwindling economy, impoverished population
- Increased arrears, degraded payment collection rate
- Increased maintenance cost for housing and utilities facilities (HUF) due to hostilities
- Growth in cost of basic energy resources
- Inability to raise H&U / DSO tariffs to provide for coverage of previous period expenses, wartime expenses, increased arrears and dwindling subscriber base
- Consumers’ inability to pay market prices and wartime extra costs
94% of daily UGV production is exposed to high risk, the production may halt if aggression on the Eastern flank continues.

32.1 mmcm of UGV’s current daily production is in the Eastern Ukraine bordering on the combat zone. Out of them, 18 mmcm are very close to the hostilities in Kharkiv oblast.
Half of the consumers will have problems paying their bills, a third will be unable to pay…

< 4,4 mn
Ukrainians were forced to leave for Europe (10% of the population)

< 11,4 mn
forced internally displaced persons

< 300 k
subscribers left with no natural gas supplies

34% subscribers are at risk of inability to pay for their utilities

70% of oblasts (regions) suffered from the hostilities

1.6 times is the increased arrears for the natural gas supplied, up to UAH 7 bn as at 1 April 2022.

Source: adapted data of the Ministry of Economy of Ukraine
Targeted shelling by the Russian occupiers damaged at least 4 CHPs and HGS, one occupied.

Largest CHPs and HGSs of Ukraine that generate 90% capacity

19 of 36 CHPs in Ukraine are in active combat areas and generate 43% of the total capacity.

10 of 15 HGSs are in active combat areas and generate 65% of the total capacity.

Damaged and lost CHPs and HGSs:
- Okhtyrka CHP – almost totally destroyed
- Chernihiv CHP – hit by shells
- Kremenchuk CHP – hit by shells
- Trypillia HGS – shelled
- Luhansk HGS – under occupation
Timeline of Naftogaz methane emissions reduction before the war

It was planned to submit level 3 report in 2022. However, because some objects got damaged or are on occupied territories, data on them are limited. **Naftogaz will submit level 1 report in 2022**, and continue to gather data and **prepare level 3**.

- **2018**: Signed memorandum on methane emissions reduction with EBRD and Ministry of Environment
- **2019**: First stage of measurement campaign:
  - UGV
  - UTG
  - Kirovogradgaz
- **2020**: Second stage of measurement campaign (winter):
  - UGV
  - UTG
  Investment program and Roadmap prepared Naftogaz joined **OGMP**
- **2021**: Submitted level 1 report under **OGMP 2.0**
- **2022**: Compliance with Level 3 of OGMP requirements

**Partners**

- European Bank for Reconstruction and Development
- Ministry of Environment and Natural Resources of Ukraine
- CARBON LIMITS
Methane emissions reductions at UGV

Business-as-usual
As gas deposits get depleted and liquid starts to accumulate, unloading well to atmosphere is needed. This is usually done with gas* that is then burned.

Alternative
There are around 15 technologies of artificial extraction that do not require gas to remove liquid. UGV launched the process of wells modernization, using the technologies of plunger-lift and capillary systems.

Wells modernization

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Wells</th>
<th>Spending (~$mn)</th>
<th>Gas Losses Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>10</td>
<td>~$1 mn</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>44</td>
<td>~$3 mn</td>
<td>8.5 mn m³ of gas losses during well blows was reduced</td>
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<tr>
<td>2021</td>
<td>90</td>
<td>~$6.5 mn</td>
<td>43.5 mn m³ of gas was additionally extracted</td>
</tr>
<tr>
<td>2022</td>
<td>230</td>
<td>~$17 mn</td>
<td>20 mn m³ of gas losses during well blows was planned to be reduced</td>
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</table>

*75-95% of methane in gas
## Comparison of emission categories between OGMP and Naftogaz

<table>
<thead>
<tr>
<th>Source</th>
<th>OGMP</th>
<th>UGV (Production)</th>
<th>UGV (Processing)</th>
<th>UTG</th>
<th>Ukrburgaz</th>
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</thead>
<tbody>
<tr>
<td><strong>Equipment:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pneumatici</td>
<td>✓</td>
<td>✓</td>
<td>?</td>
<td>✓</td>
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<tr>
<td>Glycol absorbers</td>
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<td></td>
<td>-</td>
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<td>USB condensate storage tanks</td>
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<td>✓</td>
<td>O</td>
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<td><strong>Other venting:</strong></td>
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<tr>
<td>Flares’ blowout</td>
<td>✓</td>
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<td>Compressors (mt)</td>
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<td>Compressors (ops)</td>
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<td>Equipment blowout</td>
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<tr>
<td>Purging</td>
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<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

### Legend:
- ✓ Activity, methodology, and data exist
- O Activity exists but the methodology is under development
- ? Requires clarification
- - No activity
OGMP reporting: obstacles and data issues

War circumstances
Lack of data, since some objects got ruined, damaged or are on occupied territories
Some employees responsible for data gathering serve in the army

Discrepancies with practice
Some categories are overestimated
Some categories are underestimated

Differences in reporting between legal entities
Sometimes there is no unified database

Completeness
There are some OGMP categories that are currently not covered

Difficulty
Some of the not estimated categories are difficult to quantify to a good level of accuracy

Materiality
Bringing Level 3 reporting to Level 4 reporting will require materiality analysis across emission
Summary

• For Ukraine, war has changed priorities from development to security with high level of uncertainties;
• Methane emissions are not the biggest polluter to tackle. We have new sources – military equipment, ruined infrastructure, such as oil bases and gas transmission systems;
• Before war, environmental and climate push from EU was a motivation to reduce CH4 emissions, now it is resource-efficiency and energy security;
• European integration will be a focus as well, Ukraine will get these requirements in the new portion of regulation to align with;
• Ukraine will face financing problems to attract investment to increase the production of gas and reduce CH4 emissions due to the emerging green taxonomies of IFIs. Ukraine needs a waiver from them for investments in gas infrastructure;
• In the case of restrictions/embargo of russian fossils will be investments in new production facilities and infrastructure that emit less CH4 than russian ones
Thank you!