



25th world gas conference  
"Gas: Sustaining Future Global Growth"

# Fugitive emissions at gas distribution networks: mitigation options

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**Natural gas  
(methane emission)**

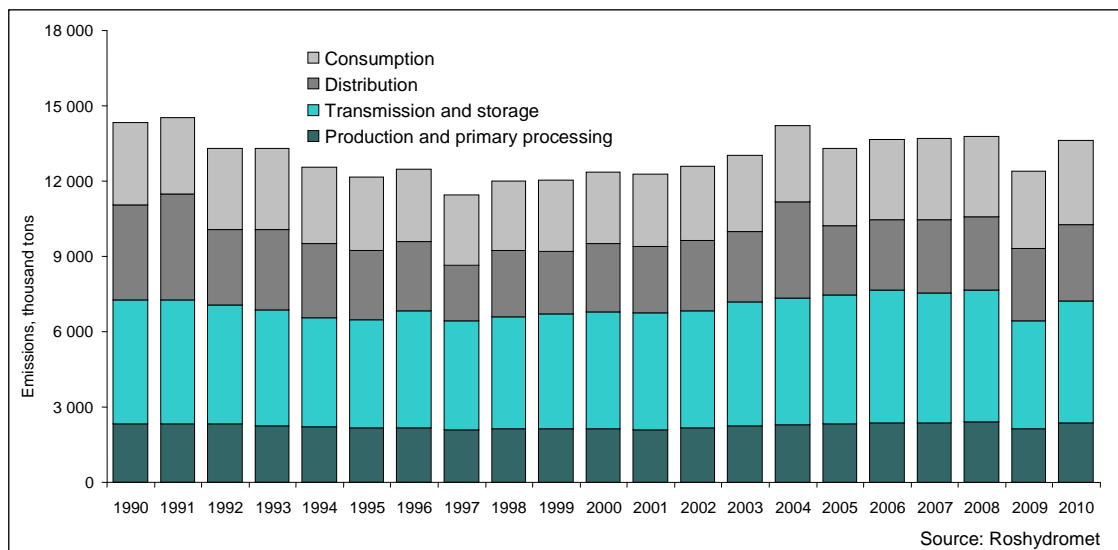
- operations for own needs
- accidents without ignition
- leaks from fittings and butt joints of pipelines

**Carbon oxides and dioxides,  
nitrogen oxides,  
non-methane volatile organic  
compounds, sulfur dioxide  
emissions**

- natural gas combustion
- accidents with ignition

- 351,7 BCM of gas supplies to domestic consumers in Russia
- about 400 regional gas distribution organizations, 206 of which are subsidiaries or associated companies of Gazprom
- the total length of surface gas pipelines amounts to 744,4 thousand km, 632,7 of which are operated by Gazprom

The volume of fugitive emissions from gas **distribution** and **consumption** amounted to **22,5 %** and **23,7 %** correspondingly from the total volume of methane emissions when operating with natural gas



Methane fugitive emissions, including emissions related to gas distribution and consumption



**Human and industrial safety**



**Resource saving and enhancement of energy efficiency**



**Decree of the Russian Federation Government on fee ratio for contaminant emissions into the atmosphere**



**International obligations of Russia in stabilizing and reduction of greenhouse gas emissions**



- The basic research and methodical support of Gazprom's activities is provided by R&D companies

**Gazprom VNIIGAZ**

and

**Gazprom Promgaz**



- assessment of the volume of unaccounted gas
- development of regulations, methods of control and accounting of unaccounted gas
- development of technical solutions aimed at reduction of gas losses
- taking best decisions for management of unaccounted gas



## 1 Scheduled operations at gas pipelines, gas control points (GCP):


- Gas release from gas pipeline during shutdown for repair
- Air displacement during gas pipeline filling by gas after repair
- Gas pressure reduction in gas pipeline by gas release to the atmosphere through the stand for welding operations
- Gas release from GCP gas pipelines during shutdown for repair
- Air displacement during GCP gas pipelines filling by gas after shutdown for repair or filling of new commissioned pipelines
- Set-up and commissioning of GCP process equipment and inspection of safety valves parameters
- Start-up and commissioning of new gas pipelines

## 2 Losses during gas distribution network operation:

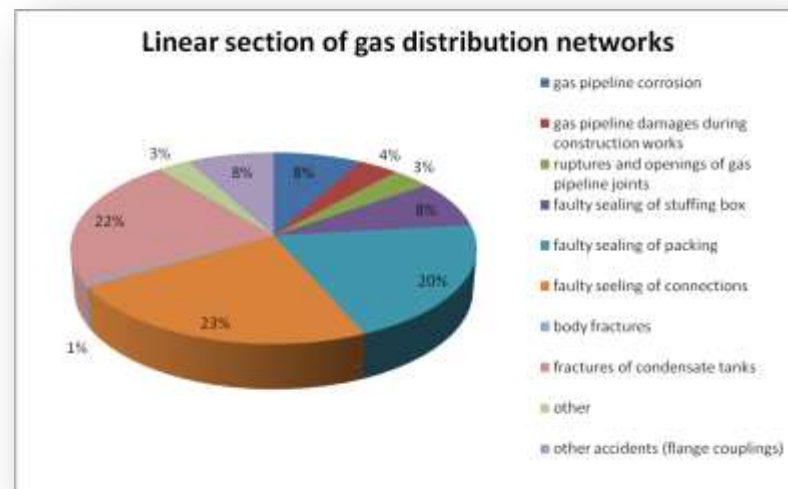
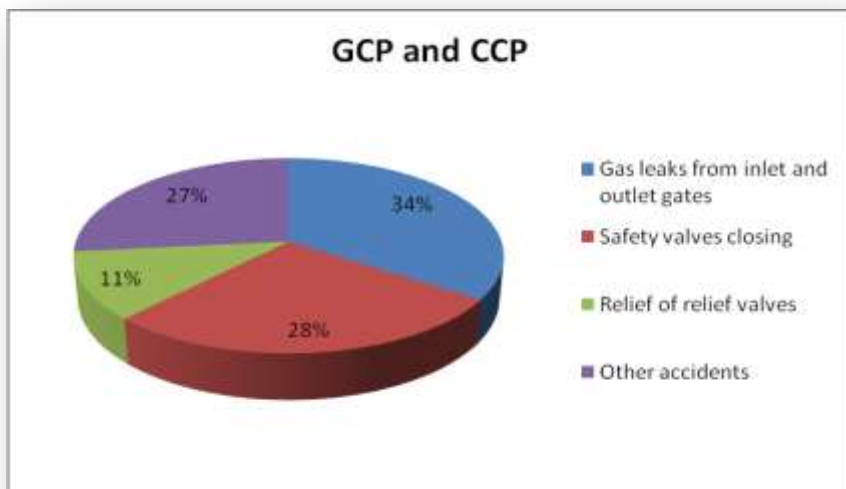
- Network leaks
- Release to GCP during pressure increase
- Corrosion



## 3 Losses during accidents and emergency recovery operations

The aim  to substantiate the development of the system for accounting, monitoring and management of fugitive methane emission from gas distribution network facilities to mitigate it

- Methods: systematization, generalization, calculation and analysis of data from measurement studies to determine sources and volumes of methane emissions from different process equipment, and processing of data by mathematical statistics methods



## Quantity and properties of accidents related to natural gas leaks:

at gas control points (GCP) and cabinet-type gas control points (CCP)

at GCP and CCP  
gas leaks from:

- inlet and outlet gates – 34 %
- closed safety valves – 28 %

at the linear section of gas distribution networks

at the liner section  
gas leaks from:

- sealing of connections – 23 %
- condensate tanks – 22 %
- stuffing box packings – 20 %



Regular estimation methane emissions from operated technological objects



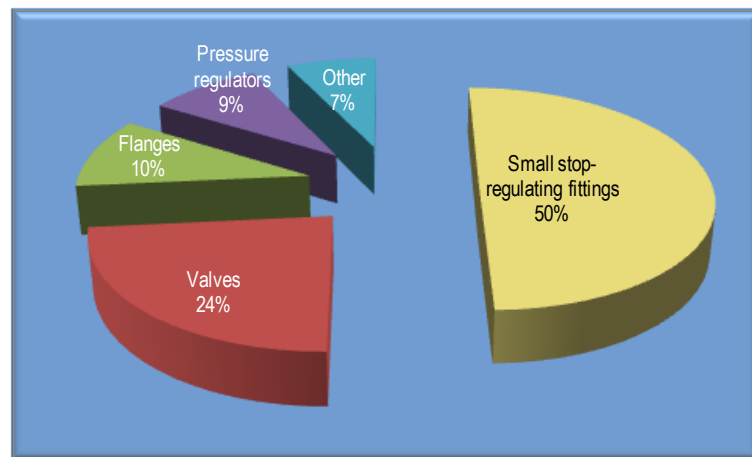
Instrumental analysis for leakage measurement to detect methane emission sources and assess their amounts

Methane leak sources at different technological facilities were roughly divided into two groups:

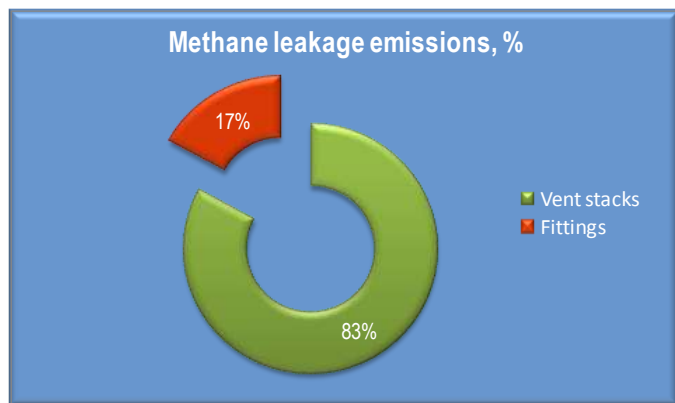
fittings

and

vent stacks



Breakdown of methane leaks by the type of fittings



Breakdown of methane leaks from surface equipment

The main methane share from the total amount from gas distribution equipment is provided by **technological stack vents – 83 %**



The largest volume of fugitive methane emissions occurs during **venting operations at gas pipelines** under repair and accidents

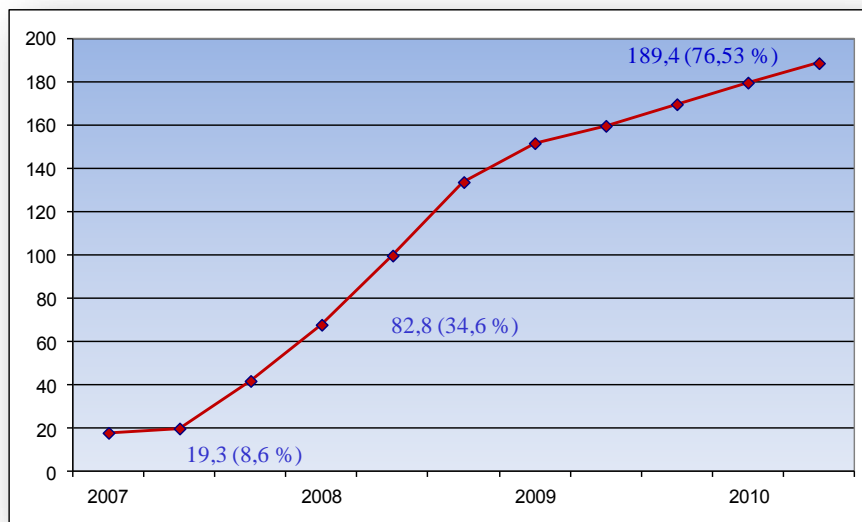
Technical, engineering and other **measures** ensuring pipeline repair without gas venting to the atmosphere:

- application of “hot tapping” technology at repairs and commissioning of new pipelines
- use of modern sealing materials
- improvement of flows and modes of gas transmission via gas distribution systems, including development of inter-system and intra-system connections
- reduction of natural gas process consumption during operation and repair
- application of new efficient methods and development of the best workover schedules for the facilities of the linear section of gas pipelines



**Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet)**

**Development of the system for estimation and registration of greenhouse gas emissions is one of the corporate obligations of Gazprom**



Supplied gas controlled by automated commercial gas metering system (BCM)

## The Program will:

- improve measurement precision
- allow to quickly detect defects and unauthorized changes of gas metering equipment settings
- allow to issue invoices and receive money for actual volume of gas supplied to consumers
- allow to control “daily excess supplies”
- minimize the impact of the “human factor” on the precision of gas metering

- construction of gas metering points
- equipment of gas metering points with telemetry systems
- construction of chromatographic complexes
- creation of dispatching stations

## The Program should provide:

- **4000** modern metering points with telemetry
- **1100** gas metering points with telemetry systems

- Actions taken by gas distribution companies and aimed at studying and reduction of fugitive emissions facilitate resource saving and reduction of the environmental load on gas industry activities
- Installation of telemetry systems will provide the on-line real-time control over gas flow and main process parameters of gas supply and gas consumption
- Continuous monitoring, including by specially developed software systems, allows to automatically identify “challenging” zones of gas consumption (gas distribution), reduce the volume of unaccounted gas and improve the efficiency of gas supplies
- Instrumental measurements are the most reliable method to define fugitive emissions of methane due to leaks from surface gas process equipment. It’s results are used for development of measures intended for reduction of fugitive methane emissions at Gazprom’s gas distribution facilities and assessment of measures efficiency



- Installation of advanced control and measurement equipment will allow to organize systematic registration and quantitative control of methane emissions and take managerial decisions to reduce them
- One of the effective measures to eliminate leaks is to replace aged sealing material of shut-off and control valves with modern fluoroplastic material
- Knowledge of unbiased estimates and forecast of fugitive emissions is the key to corporate solutions related to taking necessary measures and achieving final targets to stabilize and reduce emissions



**Thank you for your attention!**