FUTURE ROLE OF GAS IN THE EU

GAZPROM’S VISION OF LOW-CARBON ENERGY FUTURE

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LOW-CARBON DEVELOPMENT TARGETS

THE PARIS AGREEMENT ON CLIMATE CHANGE

GHG EMISSION REDUCTION TARGETS
(of 1990 levels)

REDUCE BY

25-30%  40%

2030  2050

LONG-TERM DEVELOPMENT STRATEGIES WITH LOW GREENHOUSE GASES EMISSIONS

Source: UN FCCC (Nationally determined contributions for the EU and Russia)
RUSSIAN EXAMPLE OF LOW-CARBON DEVELOPMENT

THE RUSSIAN EXAMPLE OF DEVELOPMENT WITH LOW GHG EMISSIONS

COAL CONSUMPTION

GASIFICATON

GHG EMISSIONS

THE ANNUAL RATE OF GAS INFRASTRUCTURE EXPANSION IN RUSSIAN REGIONS (PJSC Gazprom Annual Report 2017 data)

Total GHG emissions reduced by 29.7 %*,
Inter alia thanks to coal power stations switch to natural gas

Sources: IEA; 1990 – 2016 National report on the inventory of anthropogenic emissions by sources and GHG removals by sinks not controlled by the Montreal Protocol

* Ex LULUCF
ACHIEVING THE TARGETS: RES and/or NATURAL GAS
ENVIRONMENTAL RISKS OF THE RES

IMPACT OF VARIOUS ENERGY SOURCES ON ECOSYSTEMS

(Week respect to the Global Energy Mix 2010)

GAS POWER GENERATION HAS A SMALL EFFECT ON ECOSYSTEMS

100

21

61

66

127

166

235

%

Energy mix, 2010

Natural gas

Natural gas (CCS)

Photovoltaics

Wind generation

CSP

Coal

Coal (CCS)

THE ADVERSE IMPACT OF WIND ENERGY ON WILDLIFE

Wind turbines emit low frequency noise, including dangerous infrasound. In the sea, these vibrations are transmitted to a distance of 50 km

Disorientation of animals and birds

CONSUMPTION OF VALUABLE RAW MATERIALS AND CHEMICAL ELEMENTS

In seeking to improve the solar energy efficiency, valuable and rare (rare-earth) materials are used, new materials are produced and consumed, many of which consist of toxic substances: solar panels are a source of 300 times more toxic waste than nuclear power plants.

Sources:

CSP – concentrated solar power
ENERGY DANGER OF RES

TIME AND AGAIN WE HAVE ALREADY FACED WITH THIS

CLIMATE CHANGE – SHAKY FOUNDATIONS FOR RES

THE NEED FOR AN UNMANAGEABLE POWER GRID SYSTEM (the refusal of land owners)

THE NEED FOR SUBSTANTIAL ENERGY STORAGE CAPACITY

Illustrated by Germany’s example: full electrification will require energy storage systems with the capacity of approx. 35 TWh. For comparison, the current capacity of all electricity storage systems in Germany is about 0.04 TWh. The need to increase is more than 800 times.

Source: Fraunhofer, FNB Gas e.V. (THE IMPORTANCE OF THE GAS INFRASTRUCTURE FOR GERMANY’S ENERGY TRANSITION), пиктограммы – Clean Edge research
THE IMPORTANCE OF THE CHOICE OF STRATEGY

- DEATHS FROM TOXIC EMISSIONS
- THE OZONE LAYER DEPLETION
- RAPID DEVELOPMENT OF CAR INDUSTRY
- MASS ADOPTION IN REFRIGERATION
- TETRAETHYL LEAD (fuel additives)
- HYDROCHLOROFLUOROCARBON (coolant)
- MISTAKES OF THE PAST
- MASS ADOPTION AND 100% ELECTRIFICATION
- RES
METHANE-HYDROGEN SCENARIO FOR LOW-CARBON DEVELOPMENT OF THE EU

TOTAL GHG EMISSIONS IN THE EU, 2016

4.3 bln t CO₂-eq.

- Carbon intensity from different fuels (U.S. Energy Information Administration estimates);
- Carbon footprint of various motor fuels (European Natural Gas Vehicle Association report, 2014-2015);
- EU GHG emissions (1990–2016 National report on the inventory of anthropogenic emissions by sources and GHG removals by sinks not controlled by the Montreal Protocol, IEA)

Rapid reduction of GHG emissions

13-18 %

THE SWITCH FROM COAL POWER GENERATION AND PETROLEUM MOTOR FUELS TO NATURAL GAS

Achieving the EU’s 2030 climate targets based on the existing gas infrastructure

25-35 %

THE USE OF METHANE-HYDROGEN FUEL IN ENERGY AND TRANSPORT W/O COSTLY INFRASTRUCTURAL CHANGES

~80 %

Transition to hydrogen energy based on efficient low-emission technologies of hydrogen production from methane

The feasibility of the EU's challenging 2050 targets
ADIABATIC METHANE CONVERSION

CONVENTIONAL TECHNOLOGY
Methane as fuel gas in gas pumping units

NEW TECHNOLOGY
ADIABATIC METHANE CONVERSION (AMC)
Methane-hydrogen mix (MHM) as fuel gas in gas pumping units

Patents: Russia, Japan, China, South Korea

EXPERT REVIEW by the Center for Integrated Development of Technologies and Energy Technology Systems (KORTES Center LLC), Gazprom-Geotekhnologii LLC
HYDROGEN PRODUCTION IN A LOW-TEMPERATURE NON-EQUILIBRIUM PLASMA

The impact of low-temperature non-equilibrium microwave-induced plasma on hydrocarbon gas molecules

The hydrocarbon gas conversion takes place in a closed plasma-chemical flow reactor in the absence of oxygen and at ambient pressure

CARBON-FREE TECHNOLOGY

- Hydrogen – up to 1 м3/h;
- Carbon material – up to 80 g/h

Source: NATIONAL RESEARCH TOMSK POLYTECHNIC UNIVERSITY
PROPOSITIONS TO THE EU STRATEGY FOR LOW EMISSIONS

1. NATURAL GAS
   - Decarbonisation of EU energy and transport sectors by nearly 2 times

2. MHM
   - Methane-Hydrogen energy source
   - Achievement of EU climate targets for 2030
   - Establishing of acceptable conditions for the development of hydrogen energy from natural gas

3. HYDROGEN
RANKING ENERGY COMPANIES ON CLIMATE

The Carbon Majors Database

CDP Carbon Majors Report 2017

Gazprom

! the best
THANK YOU FOR YOUR ATTENTION!