

Clean energy in Russia: Background and technologies

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1. Introduction

Russia has been one of the world's major energy exporters for more than 50 years. During this time, many ambitious projects in the fuel and energy sector were brought onstream, from the first field development in the Volga-Urals to modern projects such as Yamal LNG.

The main development vectors are laid down in the "Energy Strategy until 2035", that is now being reviewed. It enshrines provisions on the transition to clean energy and the basic principles of energy efficiency of the country. Russia also focuses on the gas export, especially LNG projects and clean coal production.

On September 23, Russia ratified the Paris Agreement, thereby reaffirming commitments to reduce CO₂ emissions to 70-75% of 1990 levels by 2030.

2. R&D activities related to clean energy technology

The technology development center of the Ministry of Energy has been formed in early 2019 by a decree of two ministers and has been conducting the analytical study aimed to support the development of the full set of technologies for the energy sector including digital, clean energy and energy efficiency technologies to reduce greenhouse gas emissions and achieve targets for the country's economic growth. The center has identified the set of key technologies that are necessary in order to meet countries' targets according to the Paris Agreement.

The mission of the center is to become an integrator of industries' technology demand through collaboration between research institutes, manufacturers, corporations and international partners. The main clean energy research themes for the center are to demonstrate new technologies in solar and wind power generation, hydrogen energy, smart grids, and LNG technologies.

3. Specific research activities in hydrogen, CCUS, and related technologies

Due to an economic slowdown post 1990, deindustrialisation, and implementation of cleaner technologies, the output of GHG emissions dropped by about 30-32% between 1990 and 2017. In a sense, modern Russia is advantaged by the industrial collapse of the early 1990s and the huge CO₂ absorption potential of its forests. GHG emissions from energy industries represent about 38% of the total output. This is the largest contributor. As of September 2019, Russia is on target to respect its commitment and can still increase emissions by 6-11% (based on a 25% cut). However, if it opts for a 30% cut, it would be very close to the limit.

In Russia, there are competitive technologies for the capture of CO₂ using monoethanolamine. The technology has proven itself in the fight against H₂S and is no less effective in combating CO₂. The increase of CO₂ emissions by 2025 and 2035 by 5% and 7%, respectively, is due to industry and non-energy use. Russia can provide CO₂ capture services, as it has excess capacity and modern technologies.

Russia is betting on gas as an energy transition fuel in Europe and Asia and on its natural gas production. The Ministry of Energy has set targets for natural gas in all areas: production, exports, LNG, and compressed natural gas (CNG) transportation. Hydrogen is also gaining the momentum. The conservative scenario in the 2035 Energy Strategy aims for 750 bcm/a of gas production and about 250 bcm/a of exports. The optimistic scenario aims for about 865 bcm/a of gas production and about 360 bcm/a of exports. In parallel, the Russian Ministry of Energy is

setting ambitious LNG targets for domestic companies. Russia could produce 120-140 million tons of LNG by 2035 thanks to NOVATEK and Gazprom. In terms of compressed natural gas, the Ministry of Energy forecasts an increase of consumption from 0.6 to almost 11 bcm by 2030. At the same time, the number of filling stations is expected to reach 2,400. Arctic cascade (NOVATEKs) technology of gas liquefaction will be tested further this year on Yamal LNG train 4.

In August 2019, the Ministry of Energy decided to develop a program for the development of hydrogen energy in Russia. Russia is capable to supply about 3.5 million tons of hydrogen per year to the world market in the short term.

There are several Russian hydrogen technologies which can help to achieve targets:

- Steam Methane Conversion based on nuclear energy (GK «Rosatom»)
- Double decreases methane consumption Water electrolysis (GK «RusHydro»)
- Steam Methane Conversion (GK «Gazprom Neft»)

4. International collaboration

4-1 International alliance/networking development

The center has been formed at the beginning of the year but there are already successful cases of collaboration with other countries. We are communicating with BRICS countries, G20 countries and CIS countries to identify technological needs of our partners and areas where we can cooperate. Our target is to set up long standing technological partnership and complement each other in areas of common interest.

5. Future perspectives

Russia is committed to strong economic and technological growth. As the world is now cooperating around global warming issues; Russia is and will maintain the leadership role in the topic. Russia supports international agreements and strive to diversify and green our own energy sources. To achieve common goals, Russian companies are cooperating with international partners to develop breakthrough technologies and services. The technology development center of Ministry of Energy provides the necessary assistance for such partnerships to ensure flawless transfer of technologies between countries.

Dr. Oleg Zhdaneev



PROFESSIONAL EXPERIENCE

01.2019 – Present: Head of technology development center of Ministry of Energy of Russia
Schlumberger Technology Corporation
01.2016 – 01.2019: Russia and Central Asia Manufacturing Manager, Russia
01.2014 – 12.2015: Engineering and Sustaining Manager, France
08.2010 – 12.2013: Principal TST Project Manager HQ, Norway
01.2009 – 07.2010: Russia Far East Schlumberger Field Service Manager, Russia
04.2006 – 12.2008: Senior Research Scientist, US
08.2003 – 03.2006: Intern, Field Engineer, US/Norway

ACADEMIC BACKGROUND

2018: RANEPА, Executive Master in Public Management, Russia
2017: INSEAD, Global management diploma, France
2012: Heriot-Watt University, MSc Management for the oil and gas industry, UK
2004: Russian Academy of Science, PhD in physics, Russia
2001: Tomsk polytechnic university, Economics and management in industry, Russia
2001: Tomsk polytechnic university, MSc in electronics and microelectronics, Russia
2000: Moscow state university, International laser center, Laser physics, Russia