Russian hydrogen energy industry

December 2021

The Center for Energy Research of Russian Energy Agency
of the Energy Ministry of the Russian Federation

The Center for Energy Research consults on energy industry in Russia and abroad

The Center for Energy Research:

established in 2015 at Russian Energy Agency under the Ministry of Energy

The Center for Energy Research provides analytic support to the Ministry of Energy and leading Russian companies on energy strategy:

- stabilization of the global petroleum market,
- stimulation of oil production in Russia,
- tax policy in petroleum refinery,
- incentives for petrochemical industry.

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The channel informs on the global and Russian fuel and energy markets and publishes analytical notes, key news for the day, as well as interesting new research from external international agencies, as well as its own reports on various topics from reviews of the world oil market to petrochemical digests.

Possible areas of work

Market Research

- ✓ Assessment of the market structure, supply and demand balance, key participants, transport and logistics infrastructure and regulatory framework
- ✓ Short-, medium- and long-term forecasting

Strategic planning

- ✓ Consulting support for companies and design of corporate strategies for industrial development
- ✓ Assessment of opportunities for entering new markets and launching new products, marketing analysis and investment research

Supply chain and trade strategy

- ✓ Analytic support of trade transactions (sales and purchases of energy commodities and products), estimates of cargo base and key trading partners, assessment of logistic costs

Valuation of investment projects

- ✓ Evaluation of investment projects, analysis of the feasibility of their implementation, development of financial and economic models
- ✓ Analysis and evaluation of capital and operating costs
- ✓ Evaluation of the marketing plan and product sales plan

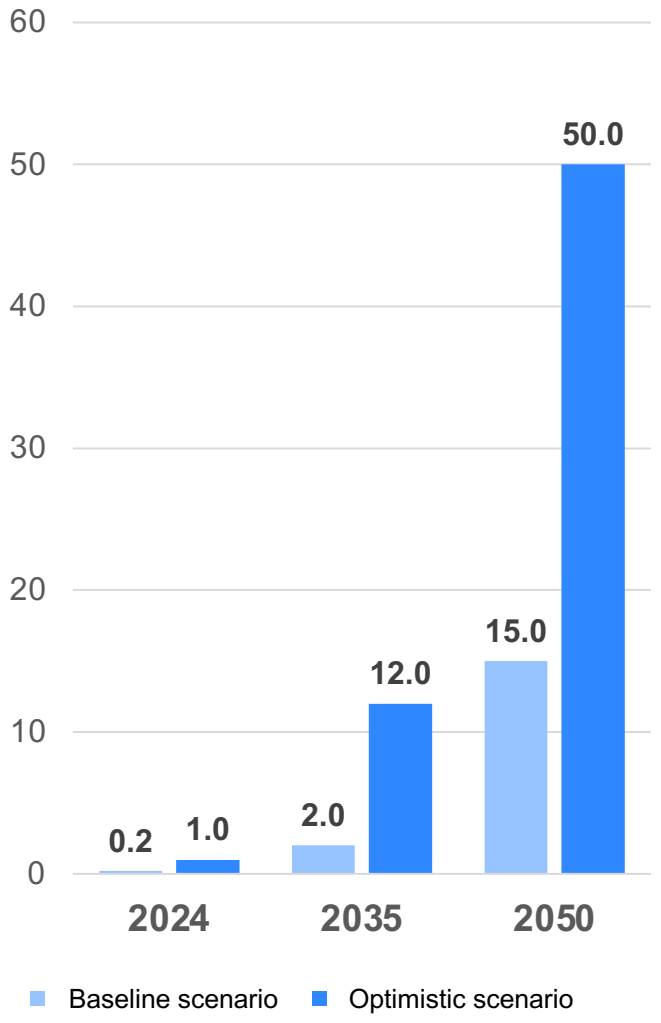
Hydrogen strategy in Russia: paperwork is mostly done, proceeding to the pilot projects

Document	Status
Energy strategies	
Russian Energy strategy 2035	Approved by RF Government Decree No. 1523-p of 09.06.2020
Russian hydrogen energy roadmap sector to 2024 (План мероприятий)	Approved by RF Government Decree No. 2634-r of 12.10.2020
Russian hydrogen energy development program (Концепция развития водородной энергетики)	Approved by RF Government Decree No. 2162-p 05.08.2021
Russian low-carbon hydrogen strategy	In development since Sept 2021, Expected by 1Q 2022
Organization activities	
Creation of a project office for implementing the Russian hydrogen energy development program	The project office has been established at the Russian Energy agency (under Energy ministry of RF)
Creation of the Joint government working group and R&D Committee on hydrogen technology	3Q 2021
Creation of a non-profit organization «Hydrogen infrastructure developers and equipment manufacturers»	1Q 2022

Investors

Oil and gas complex - "blue" hydrogen	Nuclear power plants – "yellow" hydrogen	RES – "green" hydrogen
GAZPROM	ROSATOM	RUSNANO
NOVATEK		En+ Group
ROSATOM		
Other petroleum companies		

Hydrogen export KPIs, Mt



Potential hydrogen clusters in the Russian Federation

1 North-Western cluster (Leningrad region)

- Hydrogen export to European countries
- Reduction of carbon footprints of export-oriented enterprises
- Hydrogen sales for the domestic market (transport, energy, industry)

4 Southern cluster (regions of Southern Russia)

- Hydrogen export to southern Europe
- Reduction of carbon footprints of export-oriented enterprises
- Green hydrogen production
- Hydrogen sales for the domestic market

2 Arctic cluster (Murmansk Region, YNAO, Kamchatka Territory)

- Power supply to remote and isolated territories
- Using the natural gas reserves of the Yamalo-Nenets Autonomous District for the production of blue hydrogen and derivatives
- Green hydrogen production powered by wind generation (Murmansk Region)
- Yellow hydrogen production powered by nuclear power plants (Murmansk Region)

3 Eastern cluster (Sakhalin Region)

- Hydrogen export to Asian markets (Japan, South Korea)
- Hydrogen sales for the domestic market

Initiatives and policies for developing hydrogen economy in Russia

1	**Creation of hydrogen clusters**	• Deployment of infrastructural hydrogen solutions • Gaining hydrogen engineering and industrial expertise • Export-oriented hydrogen production
2	**Scientific and technological infrastructure**	• R&D in hydrogen energy technology • Creating regulatory and legal framework for hydrogen economy • Establishing the transfer of know-how and IP from public R&D bodies to corporate project entities
3	**State support mechanisms**	• Investment incentives for new production facilities • R&D incentives in hydrogen technology • Promotion of hydrogen as an energy carrier and low-carbon fuel for the Russian market • Regulatory and legal framework for hydrogen economy and management of GHG emissions
4	**Deployment of RES**	• Increasing the necessary RES capacities for the production of green hydrogen • Cutting the cost of CapEx and OpEx in renewable energy sources, reducing the price of renewable electricity
5	**International hydrogen trade cooperation**	• Cooperating with future hydrogen importers, eliminating the barriers for international hydrogen trade • Development of common hydrogen economy and technology standards • Establishing international transfer of know-how and IP

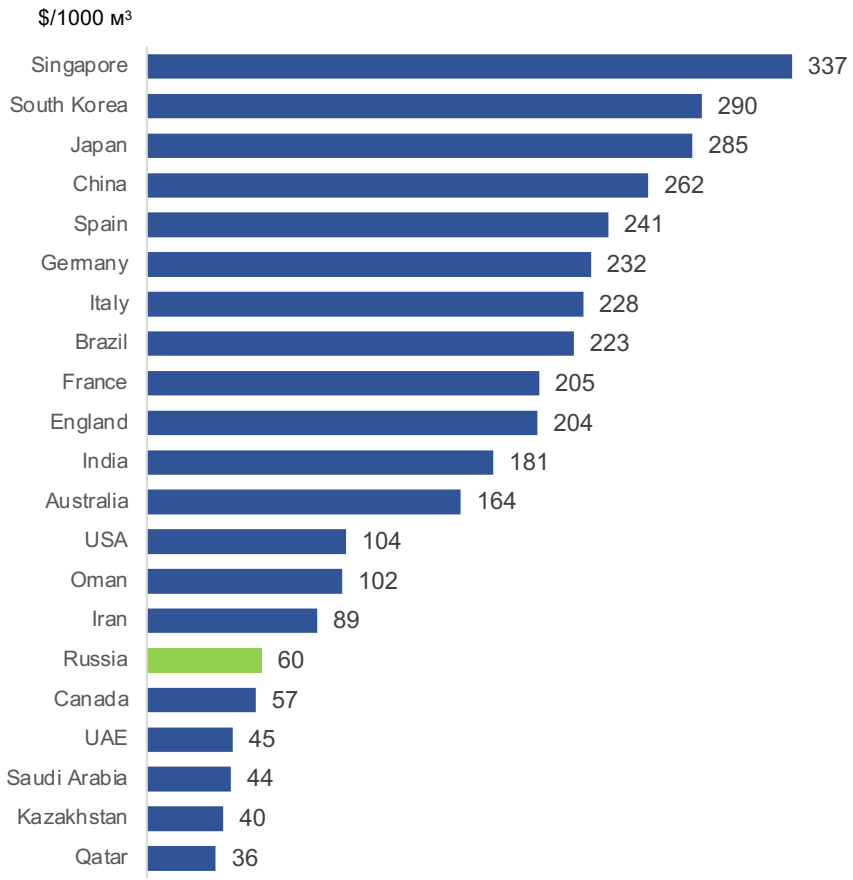
Opportunities for cooperation on the H_2 market

Barrier	Description	Potential action required
Technologies have not been widely deployed	Wide deployment of many technologies for H_2 production, storage and transportation has just begun	• Investment in R&D on green and blue hydrogen production including CO_2 capture and storage/utilization • Launching demo and pilot projects • Creating industrial clusters and test sites for technology deployment
High costs	Low-carbon hydrogen has not been traditionary considered as an energy carrier. It is more expensive than fossil fuels There is uncertainty regarding the future cost reduction for hydrogen and hydrogen solutions	• State intervention: capital investment grants, tax incentives, etc. • Co-investing in hydrogen infrastructure • Promoting market competition • Putting the economies of scale to work • Developing the proper pricing for CO_2
The chicken-or-egg problem	No clients until there's infrastructure, and no infrastructure until there are clients who buy from it Starting from scratch: there had been little or no "trade hydrogen" until recently	• Selecting proper market niches for early hydrogen technology commercialization • Developing strategies for hydrogen technology deployment • Phasing the projects from a pilot stage to a full-scale deployment • International cooperation on hydrogen energy projects
Insufficient regulatory environment	Lack of regulations, especially concerning open data exchange on H_2 origin and carbon traces	• Creating regulatory environment for hydrogen economy in cooperation with international partners

Hydrogen colors and technology market demand

Russia has the world's largest natural gas reserves, 19% of the global reserves and an extensive gas infrastructure

Russian natural gas is one of the cheapest NG resources in the world



Bottlenecks:

- **cost-efficient CCUS technology, industry and infrastructure,**
- **fuel cell and electrolysis – technology and manufacturing**
- **international & long-distance H_2 logistics**
- **still no clear-cut incentives for Russian H_2 projects**