

Who will lead the global hydrogen market?

In the context of global trend on decarbonization and moving away from oil and gas as energy carriers, hydrogen is called to become the green fuel of the future. Key industrial countries have already claimed the right to compete in this promising market and have joined the competition, including Russia. CREON Market Monitor analyzed the opportunities and risks.

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Russia will produce and export hydrogen due to the global trend to abandon hydrocarbon energy because of its negative impact on climate change and environmental situation. Russia's Ministry of Energy coordinates with the government corresponding road map under the title "Development of hydrogen energy in Russia for 2020-2024", [informed RBC on July 22](#).

The global trend towards decarbonization poses a direct threat to Russia's energy security as one of the largest suppliers of hydrocarbons in the world, as per explanation to the road map. Therefore, beginning with 2021 government will build a reputation of Russia as a supplier of hydrogen - one of the "green" alternatives to oil and gas, which many countries are planning to phase out. Russia's state corporation for atomic energy Rosatom, gas giant Gazprom and LNG producer Novatek could produce hydrogen on industrial scale.

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Novatek is also interested in the hydrogen business. The company is not named in the road map, but Novatek's interest in hydrogen was expressed by Mark Jetway, deputy chairman of the company. According to RBC, it is about production opportunities of "blue" hydrogen (from gas, but with emission and subsequent burial of CO₂).

Competition of players and technology

The natural advantages of hydrogen as an energy carrier are that it can be produced anywhere in the world with sufficient power capacity and the gas itself can be stored for a long time. Thus, "hydrogen OPEC" is not possible: exporters will not be able to use hydrogen as a bargaining tool, and importers are unlikely to become cartel victims.

For Russia's hydrogen producers, this presents a technologically much more complex and tough competition than with conventional hydrocarbon suppliers in the oil and gas market, as it will have to

compete with high-tech companies of major powers like Germany, South Korea, Japan, China and the US. And new big players keep coming into this market.

Who will invest more

A few years ago, Japan announced to become the first hydrogen society in the world. For the current year only, the Japan Ministry of Economy has invested more than \$850 million in the development of hydrogen sector. Primarily they invest in transport solutions. For example, Kawasaki Heavy Industries is building a Suiso Frontier [marine tanker](#) that will supply liquefied hydrogen from Australia to the domestic market beginning 2021. At the end of 2019, Japanese government arranged [cooperation](#) with Rosatom, and a joint export-oriented project of hydrogen production by electrolysis for Japanese market is under discussion.

Saudi Arabia [announced](#) the launch of the world's largest production of green hydrogen. A joint venture of ACWA Power and Air Products in the NEOM Special Economic Zone will cost \$5 billion and produce 650 tons of hydrogen per day for export. Thyssenkrupp's electrolyzers and "more than 4 GW of solar, wind and energy storage capacities" will be installed on production facilities. The new plant will also produce 1.2 million tons of green ammonia per year, as well as nitrogen by air separation.

Ultimately, the United States also announced its interest to the global hydrogen market and in March published its [hydrogen road map](#), developed by McKinsey and Fuel Cell & Hydrogen Energy Association. In addition to decarbonizing the economy, US seeks technological leadership and the export opportunities of its own technology. To that end, the country should develop a large-scale hydrogen economy, which by 2030 would account for \$140 billion and employ 700,000 people. By 2050, these numbers should rise to \$750 billion and 3.4 million people employed, and the share of hydrogen in the US energy mix should rise to 14%.

To implement ambitious plans, the US Department of Energy (DOE) will fund expensive hydrogen projects at federal level. Since 2017, DOE has allocated \$150 million per year to the development of hydrogen.

Investing in costs

Almost all countries that betting on hydrogen are willing to provide state subsidies of hundreds of millions to several billion dollars per year. However, the road map of Russian Ministry of Energy states that implementation of the plan will not require federal budget expenditures.

"The hydrogen economy does not emerge easily and free of charge. In addition to significant state injections (for instance, in Japan, R&D budget expenditures and subsidies reach 300 million euros per year), governments are making other efforts: develop long-term incentives for investors and tech companies, system of benefits and indirect support measures", - [says](#) Yuri Melnikov, senior analyst at Skolkovo Energy Center.

For example, Rosatom raised state money for hydrogen. This year the Russian president approved the program "Nuclear science, engineering and technology" by Rosatom, which includes development of hydrogen technologies. Funding will be 88.5 billion rubles, about half of this amount will come from the federal budget.

Global governance

To reduce costs and fully marketize hydrogen requires enormous investments in appropriate infrastructure, that are still risky due to lack of clear parameters: market volume, supply and demand, supply capacity, stated in joint article by European scientists "The new oil? The geopolitics and international governance of hydrogen", [released June 30](#).

According to scientists, the creation of clean global hydrogen market requires fully renewed value chains: “Choosing the right path will be the subject of controversy and conflict amongst key players - governments that export and import energy, renewables suppliers, gas producers, power generators, automotive concerns, oil and gas companies, logistics operators and cities with large ports”.

Experts paid special attention to the risks that may arise from the numerous bilateral agreements concluded recently between both countries and corporations. If this practice will continue, the hydrogen market may become too fragmented and repeat the fate of the LNG market at its inception with inflexible, bilateral, long-term contracts tied to oil prices. To keep away such distortions, the authors call for the creation of global regulation system to avoid the mistakes of the past and save resources in the future: “Key strategic decisions on the development of hydrogen industry should be made by whole world”, says in the document.

Hydrogen diplomacy for geopolitical interests

However, political competition poses almost the greatest risks to hydrogen energy. “In the development of the hydrogen economy, geopolitical interests should not be underestimated”, - [stated](#) the analytical center Germany Trade & Invest at Germany’s Ministry of Economy and Energy.

According to Bloomberg New Energy Finance (BNEF), the production of electrolyzers in China is 83% cheaper than in the West, which could lead to tensions between the EU and the US over Chinese dominance in another high-tech industry. [In the end of July](#), Donald Trump proudly announced that US are now the world’s largest net exporter of oil and gas. The US is already claiming to be the major producer of hydrogen, that is a direct competitor of two countries – Russia as a supplier of hydrogen and Germany as an exporter of technology: Germany has outlined a focus on technology excellence and export in its [National Strategy](#) for the Development of Hydrogen Energy.

In this context, the discussion around the sanctions against the North Stream-2 pipeline are particularly relevant as the USA uses sanctions measures to prevent Russian energy supplies to Germany and the EU. Gazprom is working on technology allowing to mix up to 70% of hydrogen in natural gas delivered through the pipeline. Peter Altmaier, Germany’s minister for Economy and Energy, also mentioned after a meeting with Russian delegation in February 2020, that part of the NS-2 capacity could be used for direct deliveries of hydrogen from Russia to Germany. Handelsblatt [reported](#), that Gazprom’s decision to pump hydrogen into the NS-2 will take the pipe out of the EU gas directive and allow to operate at full capacity. Europe will receive sustainable natural gas; Russia will retain supplies on the continental energy market and will gradually move toward clean energy through North Stream-2.

Thus, the issue of future direct deliveries of hydrogen to the EU may escalate conflict around the North Stream-2 and lead to a new round of sanctions. US will get double benefit: they restrict not only deliveries of Russian gas to Europe, but create serious obstacles to Russia’s hydrogen supplies to the EU, and at the same time increase the EU’s dependence on alternative energy supplies, primarily on US LNG.

In these circumstances Russia might need a hydrogen analogue of “Gas in exchange for pipes” program together with Germany as a strong European partner. A similar initiative is supported by German lobby organizations. Thus, the Eastern Committee of the German Economy [spoke](#) in favor of Russia’s integration into the EU hydrogen market. The potential of the country as a supplier of “turquoise” and, in the perspective, “green” hydrogen to Europe is enormous. Russia’s inclusion in the Eastern European map of hydrogen energy would be beneficial to entire European continent. And the Russo-German Chamber of Commerce (AHK Russland) [has called](#) for creation of a joint Russian-German industrial hydrogen production facility.

A venture project

Unlike oil, gas, and even latest renewable energy markets, hydrogen energy will not develop gradually, following the rules of market, but from scratch and accelerated under political pressure from several industrial powers at once. These countries and their companies will compete for technological leadership, trying to capture and exploit the new market first.

The hydrogen economy is showing signs of venture startups at this stage. On the one hand, they are attractive for investments due to the rapid growth, and many investors are willing to invest significant funds. On the other hand, it is easy to miscalculate in this situation, because start-ups are also characterized by mistakes and false starts, the pursuit of investments, ruthless competition, inflated performance, not the best results and, finally, inevitable bubbles and bankruptcies.

The first part of the CREON Market Monitor dedicated to hydrogen market is available at [CREON Group website](#).

The leading industry experts will discuss the prospects for hydrogen at the “Hydrogen 2020” conference in Moscow on November 2. [Register](#) at CREON Conferences website.