SUMMARY OF RUSSIA'S PROPOSED ROADMAP TO DEVELOP THE HYDROGEN ECONOMY

	STEP	RESULTING DOCUMENT	TIMEFRAME
1.	**Strategic Planning and Monitoring of the Hydrogen Developments**		
1.1.	Development of the concept for hydrogen energy development in Russia (the Concept)	Government Directive	1st Quarter 2021
1.2.	The drafting of proposals to set up a project office for the Concept implementation	Report to Government	1st Quarter 2021
1.3.	Formation of an inter-departmental working group (WG) for hydrogen energy project development in Russia	Government Directive	1st Quarter 2021
1.4.	Development of information procedures for hydrogen project monitoring	Order of the Ministry of Energy	4th Quarter 2021
1.5.	Roadmap monitoring, appraisal, and adjustment proposals	Report to Government	1st Quarter 2022 and annually thereafter
2.	**Steps to Incentivize and Provide State Support to Hydrogen Energy Projects**		
2.1.	Proposals to incentivize the use of hydrogen technologies in various industry sectors by amending various Russian government programs	Report to Government	1st Quarter 2021
2.2.	Development of state support for hydrogen energy pilot project including pilot plants	Report to Government	1st Quarter 2021
2.3.	Development of state support for hydrogen export	Report to Government	1st Quarter 2021
2.4.	Development of incentivizing actions to promote the domestic use of hydrogen and hydrogen-based technologies in various industry, transport, and energy sectors	Report to Government	2nd Quarter 2021
2.5.	Proposals to forms clusters and test grounds to test complex hydrogen-based energy technologies to be implemented in the energy, transport, and manufacturing sectors, as well as demonstration of best practices and estimation of financial and technological risks	Report to Government	2nd Quarter 2021

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3.	**Industrial Build-Up**		
3.1.	Proposals to select priority projects for the hydrogen energy developments	Report to Government	1st Quarter 2021
3.2.	Proposals to identify and actualize priority projects for the hydrogen energy developments	Report to Government	1st Quarter 2022 and annually thereafter
3.3.	Proposals to adjust innovative programs for state company developments with respect to hydrogen energy projects	WG decision	1st Quarter 2021
3.4.	Proposals to set up and develop hydrogen energy engineering centers	Report to Government	2nd Quarter 2021
4.	**Implementation of Hydrogen Energy Priority Pilot Projects**		
4.1.	Setup, manufacturing, and startup of carbon-free hydrogen generation plants	Report to Government	2024
4.2.	Pilot low-carbon hydrogen generation plants based on hydrocarbon refining or gas production facilities	Report to Government	2023
4.3.	Methane-hydrogen turbine development, manufacturing, and testing	Report to Government	2024
4.4.	Trial model hydrogen-powered railway vehicle	Report to Government	2024
4.5.	Trial model hydrogen generation module in a nuclear power plant	Report to Government	2023
5.	**Science and Technology Development for High-Tech Solutions**		
5.1.	Development, approval, and actualization of a register for the existing and perspective hydrogen energy technologies	Order of the Ministry of Energy	1st Quarter 2021 and annually thereafter
5.2.	Development of domestic energy-efficient technologies for the generation, transportation, and storing of hydrogen, as well as testing of hydrogen and methane-hydrogen fuel in gas turbines and vehicle power plants	Report to Government	2021–2024
5.3.	Research of technologies and greenhouse gas emissions in the production chain of hydrogen generation, transport, and use	Report to Government	2021–2024
5.4.	Methodology for the appraisal of various hydrogen generation lifecycles	Order of the Ministry of Energy	2022
5.5.	Research for the use of carbon emitted through thermal and plasmo-chemical operations	Report to Government	2021–2024

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5.6.	Proposals for a system of decarbonized hydrogen certification	Report to Government	2nd Quarter 2021
5.7.	Development of a program for research and development of technologies for nuclear energy for the period up to 2024 as applicable to hydrogen energy projects	Report to Government	2024
6.	**Improvements of the Legal Framework and the National Standardization System**		
6.1.	Identification of documents that need to be developed or actualized within the national standards system with respect to generation, transport, storing, and use of hydrogen or hydrogen-methane mixes	Report to Government	1st Quarter 2021
6.2.	Identification of laws and regulations that need to be developed or actualized with respect to hydrogen generation, support of hydrogen energy projects and hydrogen generation, transportation, storing and use safety	Report to Government	2nd Quarter 2021
6.3.	Preparation of the Russian side's position on the necessity of the development of technical regulations, or amendments of the regulations of the Eurasian Economic Union with respect to hydrogen generation, transportation, storing, and use	Report to Government	3rd Quarter 2021
6.4.	Assessment of the sufficiency of regulation, draft amendment regulations, and (if necessary) new requirements for new reactor complexes and related nuclear-hydrogen energy technologies	Report to Government	2022
6.5.	Development of a safety concept for hydrogen generation, transportation, and storing at nuclear power plants	Rosatom document	2023
6.6.	Organization of cooperation with foreign countries with respect to standardization of generation, transportation, storing, and use of hydrogen-methane mixes	Report to Government	1st Quarter 2022 and annually thereafter
6.7.	Development and approval of a methodology for the appraisal of the lifecycle and classification of hydrogen with respect to greenhouse emissions	Ministry of Natural Resources Order	2023
7.	**Human Resource Development**		
7.1.	Analysis of industry demand for hydrogen energy specialists including identification of prospective higher education coursework proposals	Report to Government	1st Quarter 2021
7.2.	Proposals for actualization of higher and continued education coursework with respect to training specialists in disciplines relevant for hydrogen energy projects	Report to Government	1st Quarter 2022

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7.3.	Post-graduate and scientist programs of internship in the world competencies centers that are hydrogen energy research leaders	Report to Government	4th Quarter 2022
7.4.	Proposals for raising scholarships for post-graduate students researching hydrogen technologies	Report to Government	3rd Quarter 2022
7.5.	Proposals for professional standards required for hydrogen energy projects and any needed amendments	Report to Government	4th Quarter 2022
8.	**International Cooperation**		
8.1.	Proposals for bilateral cooperation with hydrogen generator and consumer countries (Germany, Japan, Denmark, Italy, Australia, the Netherlands, Korea, and others)	Report to Government	2020–2024
8.2.	Proposals for international cooperation in the hydrogen energy project area	Report to Government	3rd Quarter 2022 and annually thereafter
8.3.	Proposals for the Russian Federation's participation in the multilateral cooperation in the area of hydrogen energy and participation in the relevant international organizations	Report to Government	1st Quarter 2022 and annually thereafter
8.4.	Proposals for the promotion of the reputation of the Russian Federation in the international arena as a supplier of carbon-free generated hydrogen	Report to Government	4th Quarter 2021 and annually thereafter
8.5.	Proposals for the promotion of the Russian-generated hydrogen and Russian hydrogen energy technologies at international markets	Report to Government	1st Quarter 2022 and annually thereafter