Executive Summary

Under India's BRICS Presidency in 2026, this Joint BRICS Report on the Hydrogen Value Chain delivers the first structured, member-driven assessment of hydrogen development across BRICS nations. Prepared through the BRICS Energy Research Cooperation Platform (ERCP), the report examines production pathways, policy frameworks, infrastructure, trade potential, and cooperation opportunities using a pathway-based, carbon-intensity classification rather than colour labels. It treats renewable-electrolytic, biomass-derived, nuclear-based, and fossil-with-CCS routes as equally valid contributions, consistent with technological neutrality.

Collective Hydrogen Production Potential

BRICS countries collectively hold some of the world's largest and most diverse endowments for hydrogen development. Abundant high-quality solar and wind resources (India, UAE, South Africa, Brazil, China, Indonesia), substantial biomass and bioenergy feedstocks (Brazil, India, Indonesia), large natural gas reserves with CCUS potential (Russia, UAE, China), established nuclear programmes (Russia, China, India, UAE, South Africa), and mature industrial bases in ammonia, methanol, steel, refining, and fertilisers position the bloc as a pivotal future supplier and demand centre.

Current low-carbon and renewable hydrogen production is at an early commercial stage in most members, though scaling rapidly. China leads with >250 KT operational renewable hydrogen capacity and >1 MMt/yr installed or under construction. India has ~8 KTPA operational green hydrogen under the National Green Hydrogen Mission, with ~1 MMtpa incentivised or contracted through SIGHT. The UAE has commenced certified low-carbon ammonia exports and targets 1.4 MMT/yr total hydrogen (1 MMT green + 0.4 MMT blue) by 2031. South Africa projects 2 Mtpa export-oriented capacity by 2040 alongside 2–3 Mtpa domestic demand. Brazil and Indonesia are advancing hub-based development with significant long-term export surpluses projected. Russia is prioritising 550 KT low-carbon hydrogen by 2030 for domestic use while retaining export readiness to friendly markets via existing ammonia and pipeline infrastructure. Ethiopia has one of Africa's strongest green hydrogen prospects, supported by an electricity grid that is nearly 100% renewable and vast untapped resources—around 45 GW hydropower potential, 10 GW geothermal, nearly 100 GW wind, and high solar

availability. The country has formally integrated green hydrogen into its national energy policy and established a dedicated national green hydrogen association to advance research, innovation, and technology adoption.

National targets signal strong collective momentum. By the early 2030s, BRICS nations are positioned to contribute materially to global low-carbon hydrogen supply while decarbonising hard-to-abate sectors (fertilisers, refining, steel, heavy transport, shipping, and high-temperature industrial heat) and building new export industries.

Key Areas of Complementarity

BRICS hydrogen strategies exhibit powerful complementarities across pathways, capabilities, and trade orientation:

Production Pathways: Renewable-electrolytic routes dominate in solar/wind-rich members (India, UAE, South Africa, Brazil, China, Indonesia). Biomass and bio-derived pathways offer near-term cost and feedstock advantages in Brazil (ethanol/biomethane reforming), India, and Indonesia. Nuclear-based hydrogen provides reliable baseload supply potential in Russia, China, India, and the UAE (leveraging Barakah). Blue hydrogen with CCS is advancing fastest in the UAE (operational Al Reyadah facility and certified exports) and Russia, with scope in China. This diversity enhances supply resilience and allows each country to optimise its resource base.

Supply Chain and Manufacturing: China drives global electrolyser manufacturing scale. South Africa's HySA programme has generated valuable IP in platinum-group metal (PGM) catalysts, membrane electrode assemblies (MEAs), and metal-hydride storage — offering BRICS-wide opportunities for local beneficiation and component supply. India and Russia are building domestic manufacturing capacity. Established Haber-Bosch and methanol synthesis infrastructure across India, China, Russia, Brazil, and the UAE provides a ready foundation for derivative production (green/blue ammonia, methanol, sustainable aviation fuels).

Trade Orientation and Infrastructure: Several members are natural exporters. The UAE has already delivered certified low-carbon ammonia to Japan and is developing five strategic export corridors, leveraging world-class ports and certification leadership (COP28 Declaration of Intent on mutual recognition). India, Brazil, South Africa, and

Indonesia project substantial green ammonia and methanol export surpluses, supported by developing coastal hubs. Russia offers unmatched pipeline infrastructure (181,000+ km gas network) and ammonia logistics for Eurasian and Arctic routes. These strengths enable coordinated BRICS supply to European and Asian demand centres alongside potential intra-BRICS trade.

Principal Cooperation Opportunities

The report identifies several high-value areas for BRICS collaboration that can deliver mutual benefit:

Joint R&D to accelerate cost reduction and technology maturation in electrolysers (PEM and SOEC), advanced storage (LOHC, metal hydrides), bio-hydrogen pathways, hydrogen internal combustion engines, CCUS integration, and derivative synthesis.

Harmonisation or mutual recognition of Guarantee of Origin (GoO) and certification schemes — building on operational or advanced national systems (India's GHCI, Brazil's SBCH$_2$, UAE's ISO/TS 19870-aligned framework, China's standards) and the COP28 Declaration — to enable credible trade and avoid duplicative barriers.

Coordinated development of trade corridors and infrastructure, including port-to-port ammonia/methanol shipping, potential pipeline interconnections or blending roadmaps, and bunkering hubs, with the UAE well-placed as a potential transhipment and certification gateway.

Supply-chain localisation and manufacturing partnerships, including joint ventures for electrolyser components, PGM catalyst and MEA production, and balance-of-plant equipment to reduce external dependencies and create shared industrial value.

Knowledge exchange on effective policy instruments (competitive auctions, production incentives, demand aggregation, skilling programmes) and financing models, including the role of the New Development Bank (NDB).

Summary of Chapter 4 Recommendations

Chapter 4 proposes a practical cooperation framework under the ERCP that can be advanced even before all country data are finalised:

Establish joint R&D programmes focused on priority technology gaps and complementarities identified across member submissions.

Create a dedicated BRICS working group on standards and certification to advance mutual recognition and harmonised carbon-intensity accounting methodologies.

Identify and develop priority bilateral and multilateral trade corridors and supporting infrastructure.

Engage the NDB to support feasibility studies, infrastructure financing, and blended-finance structures for first-of-a-kind projects.

Share best practices on fiscal incentives, Contracts for Difference, viability-gap funding, public–private partnerships, and workforce development.

Develop an institutional mechanism — potentially a BRICS Clean Hydrogen Network or standing ERCP working group — for ongoing data sharing, project coordination, and policy dialogue.

With the incorporation of outstanding country chapters and further quantitative synthesis, this framework can be operationalised rapidly. By combining resource endowments, technological strengths, manufacturing capabilities, and market access, BRICS nations can simultaneously advance domestic energy security and industrial decarbonisation while emerging as a leading, reliable, and diversified supplier bloc in the global hydrogen economy. This positions BRICS to make a substantial contribution to a just, orderly, technology-diverse, and secure global energy transition.

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