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BRICS Countries' Progress in Achieving the Climate and Environmental Goals of Agenda 2030[1]

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Abstract

The BRICS countries have repeatedly expressed their commitment to the goals of multilateral climate and environmental agreements such as the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement, and the United Nations (UN) Agenda for Sustainable Development. Large developing economies play an important role in global climate efforts, and their potential contribution to these efforts will only increase as their share of the global economy, resource consumption patterns, and greenhouse gas emissions increase.

The article examines the BRICS agenda and the national policies of the five pre-expansion countries (Brazil, Russia, India, China, and South Africa) in the environmental-climate sphere. The article analyzes both institutional (collective) and national contributions of each of the five countries in comparison with the dynamics of environmental and climate indicators, which allows the identification of both the points of greatest progress and the areas that need additional efforts, including through the expansion of BRICS cooperation.

Keywords: BRICS, Sustainable Development Goals, Agenda 2030, climate policy, environmental policy.

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Introduction

The issues of combating climate change and mitigating anthropogenic impacts on the environment represent one of the three key aspects (pillars) of the United Nations 2030 Agenda for Sustainable Development (Agenda 2030).

The major developing economies of BRICS (Brazil, Russia, India, China, and South Africa), realizing their increasingly important role in the global efforts to combat climate change, have repeatedly expressed their support for the environmental and climate priorities of Agenda 2030 and the implementation of the sustainable development goals (SDGs) at annual summits and in other formats. At the first BRIC summit in Yekaterinburg in June 2009, the leaders expressed their readiness to engage in a constructive dialogue on climate change issues [BRIC, 2009]. At the 2023 Johannesburg summit, the leaders of the five countries reiterated the importance of integrated and holistic implementation of the SDGs, including through poverty eradication, combating climate change, promoting sustainable land and water use, biodiversity conservation, and sustainable use of its components [BRICS, 2023].

Nevertheless, in addition to BRICS' institutional commitment to responsible climate policy priorities, it is useful to assess the direct contribution and the progress of individual BRICS members against the dynamics of actual environmental sustainability indicators. This article analyzes the progress of the BRICS countries in implementing the climate and environmental goals of the 2030 Agenda for Sustainable Development by comparing the stated priorities of BRICS, the national environmental policies of the five countries, and changes in the values of key indicators in this area since 2015. The analysis includes both the indicators directly included in the global indicator framework for the SDGs and targets of Agenda 2030 [UN, 2017] and complementary data collected by specialized international institutions.

Analysis of the dynamics of environmental and climate indicators at the national level in the BRICS countries demonstrates a number of divergent trends. On average, the BRICS countries are making progress in reducing greenhouse gas emissions into the atmosphere, improving energy efficiency and reducing carbon intensity in certain industries, and increasing the share of renewables in energy generation. However, persistent negative socio-economic trends over the last decade observed in some BRICS states have led to stagnation or regression on key environmental indicators. Despite the priorities stated in national strategies and international agreements, the adoption of effective measures at the national level has been hampered by a lack of funds and/or political will. In this regard, a certain degree of contradiction between the social and environmental components of the concept of sustainable development is also an important factor hindering the achievement of positive dynamics on climate indicators. A striking example of this dichotomy is the issue of fuel subsidies, on which the BRICS countries, as well as many developed economies, have, on average, shown very limited progress.

The topic of environmental policy of the BRICS countries is widely discussed in the scientific literature, both from institutional and national-level perspectives. Y. Y. Kovalev and O. S. Porshneva [2021] consider national climate strategies and BRICS decisions, among other things, as stimulating factors for the modernization of the Russian economy. M. O. Ryazanova [2014] analyzed energy cooperation between the BRICS countries using the methods of institutional and content analysis of the association's documents. This article applies the methodology of institutional analysis used by researchers from the Center for Research on International Institutions of the Russian Academy of National Economy and Public Administration [Larionova, 2018; Popova, 2018; Sakharov, Andronova, 2021] to analyze the decisions and agendas of global governance institutions. In particular, an analysis of the agenda and key collective decisions of BRICS in the field of environment and climate change, as well as the national policies of the member states of the association, is

presented. The results of the analysis are also correlated with the real dynamics of statistical indicators on the issues under consideration since 2015 (the adoption of Agenda 2030), which makes it possible to identify both the points of greatest progress and areas that require additional efforts, including through the expansion of BRICS cooperation.

The BRICS Climate and Energy Agenda

Environmental issues were first raised at the inaugural BRIC summit in Yekaterinburg in 2009. The leaders of Brazil, Russia, India, and China expressed their readiness "to engage in a constructive dialogue on climate change issues based on the principles of common but differentiated responsibilities, taking into account the need to combine climate protection measures with steps to address the challenges of socio-economic development of our countries" [BRIC, 2009]. Thus, the BRIC agenda prioritized gradual transformations in the environmental sphere, while avoiding negative spillover effects of climate policy on citizens' socio-economic well-being, with a specific focus on vulnerable groups. In general, the BRICS climate and environmental agenda is characterized by the breadth of thematic coverage inherent in informal global governance forums. At the same time, a distinctive feature of the BRICS cooperation agenda is the definition of areas and modalities of direct cooperation among the forum participants.

The BRICS agenda has branched into two distinct key areas: sustainable energy and combating climate change.

Sustainable Energy

At the 2010 Brasilia summit, the BRIC leaders committed to "strive to develop cleaner, affordable and sustainable energy systems, promote access to energy sources, energy-efficient technologies and their practical application in all sectors of the economy" [BRIC, 2010]. In addition, the four countries expressed their intention to "diversify ... energy structures by increasing, where appropriate, the share of renewable energy sources, and ... promote cleaner and more efficient use of fossil and other fuels" [BRIC 2010]. Similar commitments were repeated at almost every subsequent summit and were also included in the BRICS Energy Cooperation Road Map 2025, adopted in 2020 during the Russian presidency. In particular, the road map's cross-cutting priorities included energy efficiency, renewable energy, bioenergy and biofuels, sustainable transportation, and smart grids. The document envisages, among other things, exchange of experience and best practices, joint research, and promotion of "energy-efficient lifestyles" [BRICS, 2020b].

The first BRICS Energy Ministers' Meeting, in 2015 in Moscow, approved a memorandum of understanding on energy saving and energy efficiency. The BRICS agreed to: define a list of "energy efficient and clean technologies in which all BRICS countries are interested;" create a register of existing energy efficient-technologies in the BRICS countries; intensify cooperation between "the public sector, private companies and international development banks to attract investments in energy efficient projects and technologies in the designated areas;" approve a list of energy sector cooperation modalities; and create a Working Group on Energy Saving and Energy Efficiency.

In 2018, at the initiative of the Russian side, the BRICS Energy Research Platform was established to ensure sustainable energy development by promoting cooperation between the five countries in the field of energy research, implementation of technologies and innovations, and development of universal access to affordable, reliable, and modern energy sources.

The priority of developing cooperation in the field of sustainable energy was also outlined in the BRICS Economic Partnership Strategies 2015 and 2020. The 2015 document stated the following priorities: introduction of environmentally friendly technologies for the production, storage, and consumption of energy resources, promotion of renewable energy sources, and increasing the efficiency of clean energy sources such as natural gas [BRICS, 2015a]. The Strategy Until 2025,

adopted during the Russian presidency in 2020, provided for "developing cooperation and promoting research aimed at developing the energy sector and stimulating energy transition in the BRICS countries, including mechanisms for using the BRICS Energy Research Platform and the BRICS Energy Cooperation Road Map to 2025," as well as "stimulating cooperation in the field of renewable energy within BRICS, promoting the wider use of renewable energy sources, promoting the use of renewable energy sources in the BRICS countries, and promoting the use of renewable energy in the BRICS countries" [BRICS, 2020a].]. In addition, the strategy set goals to enhance cooperation in nuclear energy "as an important source of clean energy with virtually no pollutants and greenhouse gas emissions." With these decisions, BRICS expressed the commitment to ensure a smooth and sustainable energy transition by improving the energy efficiency of existing energy systems and energy sources, along with the introduction of new renewable energy solutions in order to minimize the socio-economic impact and ensure the energy security of the population.

Combating Climate Change

In this area, BRICS has consistently emphasized the central role and expressed its commitment to the mechanisms of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) and the principles of the Paris Agreement. Global climate change was considered by the BRICS countries as one of the "global threats that call into question the very foundations of life of societies and countries." At the same time, in line with the socio-economic orientation of the association, it was noted, in particular, at the 2011 summit in Sanya that the achievement of sustainable development and the implementation of climate agreements should "become an important means of promoting economic growth" [BRICS, 2011]. In the same vein, BRICS' main priority in the climate sphere was expressed at the March 2012 meeting in New Delhi: "We are determined to play our role in the global fight against climate change and contribute to the global effort to address climate change through sustainable and inclusive growth, not through imposing restrictions on development" [BRICS, 2012]. Thus, BRICS consolidated the desire to express the interests of a wide range of developing countries in accordance with the principle of common but differentiated responsibility for the state of the environment on a global scale. This priority was reinforced at the 2022 summit in Beijing, where leaders noted that "developing countries will need more time to achieve an appropriate level of greenhouse gas emissions" and also opposed the introduction of "green" trade barriers and "shifting the burden of addressing climate change to other trading partners, developing countries and BRICS members" [BRICS, 2022].

The 2015 Russian presidency initiated ministerial-level meetings to intensify cooperation. In 2015, the first meeting of BRICS ministers responsible for the environment took place. The practice of holding such meetings annually was consolidated, and a Working Group on the Environment was established "to share best available practices and promote environmentally friendly technologies" [BRICS, 2015b].

BRICS has also addressed the linkages between climate change and food security, notably by committing at the 2014 Fortaleza summit to promote cooperation on "mitigating the negative impacts of climate change on food security and adapting agriculture to climate change" [BRICS 2014]. At the 2023 summit in Johannesburg, BRICS emphasized the need for developed countries to support developing countries in providing access to modern technologies and additional financial resources to reduce greenhouse gas emissions and enhance adaptation measures [BRICS, 2023].

The BRICS Economic Partnership Strategy 2025 devotes a separate section to climate change. Among other things, the BRICS countries pledged to strengthen cooperation on climate change to ensure full and effective implementation of the UNFCCC; to create conditions for the development, deployment, and production of technologies and practices that reduce greenhouse gas emissions; and to promote the use of low-carbon technologies [BRICS, 2020a].

National Policies of the BRICS Countries and the Dynamics of Environmental and Climate Indicators

Brazil

Brazil's national sustainable development and environmental policies were severely impacted by the 2014 economic crisis, leading to a prolonged recession in 2015 and 2016. The recovery rate in 2017–20 did not exceed 1.8% and was effectively offset by the decline caused by the COVID-19 pandemic in 2020. Post-pandemic recovery, however, has been strong and, according to the International Monetary Fund (IMF), gross domestic product (GDP) had already surpassed 2014 levels in 2021 [IMF, 2022].

Multi-year plans are an important tool for long-term strategic planning in Brazil. In 2015, a plan was developed for 2016–19, and in 2019, for 2020–23. Both plans contained several programmes dedicated to energy with specific targets and indicators. The 2016–19 plan included the following programmes: biofuel development, electricity, oil and gas, climate change, nuclear energy policy, and sustainable agriculture [Government of Brazil, 2015].

Improving resource efficiency has become one of the most important goals of the programme to ensure sustainable agriculture. The objectives are to promote education, extension and incentives for low-carbon agriculture, agro-ecological transition, and organic agro-ecological production through sustainable use of natural resources and consumption of healthy food. Another programme that sets a goal and objectives that correlate significantly with the SDGs is the Electricity Programme. Its main objectives are: developing and promoting technological solutions for the country's electricity sector through the implementation and application of research, development and innovation and promoting the rational use of electrical energy through energy efficiency and optimization of generation, transmission, distribution, and consumption [Government of Brazil, 2015].

In 2021, the National Programme for Green Growth was adopted, with goals to integrate economic growth and development with sustainable initiatives; improve natural resource management to stimulate productivity, innovation, and competitiveness; create green jobs; conserve forests and protect biodiversity; reduce emissions; and transition to a low-carbon economy [Government of Brazil, 2021].

The Oil and Gas Programme also had the objective of rationalizing the use of hydrocarbons in order to preserve the environment. It aimed to promote the sustainable development of the natural gas industry through actions aimed at job creation, skills, competitiveness, research, development, and innovation. The document also emphasized the need to promote environmental sustainability in oil and gas exploration and production processes [Government of Brazil, 2015].

Among the priorities of the plan until 2023 are sustainable agriculture, fossil fuels, electricity, oil, and gas; in the new plan, biofuels and climate change are included in the title along with them. Also included were the programmes Conservation and Sustainable Use of Biodiversity and Natural Resources, Quality of the Urban Environment, Applied Technologies That Provide Innovation for Sustainable Development, and Hydropower Resources [Presidency of the Republic of Brazil, 2019].

In general, over the period 2015–21, the country made progress in the indicators characterizing the level of emissions and the state of atmospheric air—the level of emissions per unit of GDP decreased from 0.3 to 0.2 kg of CO2 per dollar (the best indicator among the BRICS countries). Brazil is the leader among the five countries in terms of CO2 emissions per capita—the country managed to achieve the most significant reduction of this parameter, from 2.2 to 1.8 tons per capita. CO2 emissions per unit of value added decreased from 0.472 to 0.426 kg of CO2 per dollar.

The social dimension of environmental policy remains at the centre of attention of the Brazilian authorities. On 5 February 2020, Decree No 10.221 was published, aimed at providing clean renewable energy (electricity) to 70,000 households in remote areas of the Amazon region. The

Amazon region as a whole occupies a central place in national environmental policy. Thus, in March 2017, the National Bank for Economic and Social Development (BNDES) approved special financing conditions for renewable electricity generation projects in isolated Amazonas Energia systems. The financed project items can use 15% of the resources from the National Fund for Climate Change, with an annual rate of 1% [Presidency of the Republic of Brazil, 2020].

In the context of the Amazon region, one of the most important components of sustainability is water use and the ecological state of aquatic ecosystems. Brazil demonstrates negative dynamics in a number of indicators in this area. Thus, according to UN data, the efficiency of water use decreased from $23.29 to $21.29 per cubic meter in the period 2015–21. A decrease in the area of aquatic ecosystems (the share of rivers and lakes in the total area of the state territory) from 0.008% to 0.007% was also recorded. At the same time, Brazil's water stress (freshwater withdrawal as a share of available freshwater resources) decreased from 3.02% to 1.480% over the period 2015–21.

Brazil has enormous natural and geographic resources that create the potential for a successful transition to a sustainable consumption pattern. Also, Brazil is a recognized leader in the production of biofuels and has a technological advantage in exploiting this energy source. In December 2016, the Ministry of Mines and Energy (MME) launched RenovaBio, an initiative aimed at increasing the participation of renewable fuels in the energy mix to meet the needs of a growing economy and fulfil Brazil's international commitments under COP-21.

The programme is implemented in four main areas: discussing the role of biofuels in the energy matrix; ensuring environmental, economic, and financial sustainability; setting marketing rules; and being attentive to new biofuels [Government of Brazil, n.d.].

In March 2017, the MME published the first four decrees to develop priority projects in the biofuels sector in order to issue incentive debt. This measure encourages investment expansion by raising funds for infrastructure projects aimed at implementing, expanding, maintaining, rehabilitating, adapting, or modernizing plants with tax exemptions for investors, and stimulating employment and income growth in the sector. Since 2019, the country has implemented a policy to support biofuel producers through the mechanism of the decarbonization credit, a tradable environmental asset issued by a biofuel producer or importer.

In March 2022, the Ministries of Mines and Energy and Environment launched an incentive package for the production and sustainable use of biomethane. This initiative contributes to the country's commitments made during the 26th UN Climate Change Conference (COP-26). Order of the Ministry of Mines and Energy No 71, dated 21 March 2022, establishes the National Programme for the Reduction of Methane Emissions and a special incentive regime for infrastructure development [Government of Brazil, 2022].

In general, the key areas of Brazil's sustainable development policy are: improving the energy and resource efficiency of extractive industries, infrastructure, and households; reducing emissions in the transport sector; rationalizing waste management; developing solar energy; and adapting territories to climate change. Brazil continues to be the leader in most environmental indicators among the BRICS countries, and in terms of the use of renewable energy sources it is ahead of most developed economies. According to the UN, their share in Brazil's final energy consumption increased from 43.62% to 50.05% from 2015 to 2020 [UN, n.d.]. According to the International Energy Agency (IEA), the share of renewable sources in electricity generation increased from 2015 to 2020 from 74% to 84.1%. For low-carbon sources, this figure was 76.5% and 86.3%, respectively [IEA, n.d.]. The carbon intensity of final energy consumption also decreased from 47.9 g CO2/MJ to 43.2 g CO2/MJ.

Russia

In the period 2015–23, Russia implemented measures within the framework of national and federal projects, state programmes, and special documents in the field of climate policy. Under the

current conditions characterized by the presence of external constraints, the Russian government is solving the tasks to ensure macroeconomic stability and conditions for economic activity. Nevertheless, the tasks of maintaining the trajectory of sustainable development also remain relevant. In general, in the context of sustainable development, the following tasks are priorities for Russia: ensuring macroeconomic stability and preserving the potential for growth in the short and medium term; continuing the implementation of federal projects and national programmes in the field of environment and climate; developing regional transport, energy, and utilities infrastructure; creating a legal and regulatory framework for combating greenhouse gas emissions; creating a basis for the development of promising energy technologies; and ensuring the sustainability of the Russian economy.

Despite the shift in priorities toward ensuring socio-economic conditions for sustainable growth, Russia is implementing a wide range of measures in the environmental sphere.

Since 2014, the programme Environmental Protection has been in effect, which aims, among other things, to halve emissions of hazardous pollutants that have the greatest negative impact on the environment and human health, eliminate the most dangerous objects of accumulated environmental damage, and pursue ecological improvement of water bodies. As the main priority of the state policy in the sphere of environmental quality regulation, the goal of introducing a closed cycle economy is declared [Government of Russia, 2014]. Since 2019, the national project Ecology has been implemented, aimed at achieving the strategic objectives in terms of environmental well-being of Russia for the period up to 2024 [Russian Ministry of the Environment, n.d.]. In 2019–23, the range of activities and the amount of financing of the state policy in the field of ecology expanded, in particular, in August 2020. The Ministry of Natural Resources of Russia announced an increase in the number of activities and funding under the federal project Conservation of Unique Water Bodies, part of the Ecology project, in 2020. Twelve additional activities were envisaged in eight regions [Russian Ministry of the Environment, 2020].

On 4 January 2020, the National Action Plan of the First Phase of Adaptation to Climate Change (Until 2022) was approved. The document defines economic and social measures to be implemented by federal and regional executive authorities in order to reduce the vulnerability of the Russian population, economy, and natural objects to the effects of climate change, as well as to take advantage of favourable opportunities caused by such changes. The approved national plan is the first stage of measures to adapt the economy and population to climate change and includes institutional, organizational, and methodological measures aimed at forming state approaches to adaptation to climate change [Government of Russia, 2020]. In March 2023, the government approved the National Action Plan for the Second Phase of Adaptation to Climate Change for the Period Until 2025 [Government of Russia, 2023].

In October 2021, the government approved the Strategy for Socio-Economic Development of the Russian Federation With Low Greenhouse Gas Emissions Until 2050 [Government of Russia, 2021a]. The strategy provides for the creation of a national system to reduce greenhouse gas emissions and support sustainable development, creation of a system of public non-financial reporting of companies, improvement of energy and environmental efficiency of economic sectors, finalization of information and technical manuals on the best available technologies, taking into account the practice of energy and resource saving, promotion of recycling and reuse of energy resources and goods, promotion of the practice of waste reduction and reuse, reforestation of forests and forestry products, and the creation of a system of public non-financial reporting of companies. The ultimate goal of the strategy is to ensure that Russia fulfils its international obligations to reduce greenhouse gas emissions [Government of Russia, 2021b].

Hydrogen is considered to be one of the promising energy carriers capable of achieving the goals of reducing carbon intensity while minimizing socio-economic risks. In August 2021, the Concept of Hydrogen Energy Development was published, which implied diversification of exports, reduction of the carbon footprint of industrial products supplied for export, and attraction of investments in

projects of hydrogen production and application, as well as the development of hydrogen transport, robotics, and the local production and application of hydrogen [Government of Russia, 2021c]. In October 2021, the Russian government signed an agreement with Gazprom on cooperation in the field of hydrogen energy. The agreement is aimed at accelerating the development of natural gas-based technologies in the field of hydrogen energy and the creation of pilot projects [Gazprom, 2021].

In general, the Russian government's policy in this area is focused on maintaining the positive dynamics in key environmental indicators of sustainable development that have emerged in recent years. For example, since 2015, Russia has managed to reduce the carbon intensity of energy consumption from 80.9 to 75.1 grams of CO2 per MJ. The share of renewable and low-carbon energy sources in power generation has also increased, from 7% to 8.8% and from 15% to 17.6%, respectively. CO2 emissions per unit of value added fell from 1.36 to 1.28 kg/$. Russia also shows the best result among BRICS countries in SDG 11.6.2, average annual level of fine particulate matter in the urban atmosphere—9.49 micrograms per cubic meter in 2015 and 8.88 micrograms in 2021.

Nevertheless, over the period 2015–22, there was a deterioration of the situation in a number of environmental and climatic indicators, including those from the SDG indicator system. Thus, the level of pressure on water resources (freshwater withdrawal as a percentage of available freshwater reserves) increased from 3.97% to 4.12%. CO2 emissions per capita increased from 10.6 to 10.8 tons of CO2 per person. The environmental efficiency of economic activity also decreased—energy intensity (ratio of primary energy consumption to GDP) increased from 7.77% to 8.15%, and the carbon intensity of energy consumption in industry increased from 42.9% to 45.9%. At the same time, the ratio of fossil fuel subsidies to GDP increased from 0.459% to 1.944%. The World Bank also records a decline in the availability of clean fuels and cooking technologies from 92.3% to 86.3% (% of population) [World Bank, n.d.].

India

Objective factors such as high population size and density, high levels of poverty and inequality, and the high dependence of India's economy on hydrocarbons define the challenges facing the country on its path to a sustainable growth model. The Indian government's key climate policy priorities at this stage are: decoupling economic growth from environmental degradation, building sustainable and accessible infrastructure, and creating a sustainable lifestyle for environment. India's efforts are focused on accelerating the expansion of non-fossil energy production, particularly solar and hydrogen, decarbonizing the transport sector, and using green bonds to finance the necessary transformation.

Sustainability has been on India's agenda for decades. Thus, as early as 2001, the country adopted the Energy Conservation Act [Government of India, 2001] and in 2008, the Climate Change Action Plan. The plan was aimed at minimizing the effects of climate change and improving adaptation to it and contained eight "missions:" solar energy development, energy efficiency, sustainable habitat, water conservation, maintenance of the Himalayan ecosystem, protection of forest cover, sustainable agriculture, and building knowledge on climate change [Government of India, n.d.a.].

In 2022, two key documents defining the parameters of the energy transition in this decade—the Climate Plan and the Long-Term Low Carbon Development Strategy—were adopted. The Climate Plan states a goal of achieving carbon neutrality by 2070, with an interim target of reducing the carbon intensity of GDP by 45% by 2030. The climate policy measures adopted in 2022–23 generally demonstrate the commitment of the country's leadership to realize the goal. Thus, the budget for 2022–23, presented on 1 February 2022, provided for a number of public policy measures to promote sustainable development. Among them: measures to encourage the transition to greater use

of public transport in cities, as well as support for the use of technologies such as electric vehicles; allocation of additional funds to promote domestic production of solar panels; a plan to transition to a circular economy; and introduction of a 5–7% share of biomass in the fuel used in thermal power plants, which is expected to lead to CO2 savings of 38 million tons per year [Government of India, 2022].

Also in 2022, the draft National Electricity Supply Plan 2022–2027 was published and in February 2023, the decision to introduce renewable energy quotas for TPPs was published. Under the provisions of the plan, companies commissioning coal-fired thermal power plants between 1 April 2023 and 31 March 2025 are required to ensure that renewable energy capacity is installed with a share of at least 40% of the capacity of the thermal power plant constructed [Government of India, 2023a].

As part of its efforts to realize its commitment under the nationally determined contribution of achieving 50% of installed power generation capacity by 2030 from non-fossil energy sources, the Government of India is directly financing the construction of renewable energy generating capacity. For example, in March 2023, the Government of India approved the construction of seven solar parks with a total capacity of 3730 MW [Government of India, 2023e]. The intention to add 50 GW of renewable energy capacity each year for five years and to reach the target of 500 GW of renewable energy capacity by 2030 has been stated [Government of India, 2023b].

Taking into account the need to ensure the availability of energy carriers, including in energy-poor regions of the country, India is implementing the Green Energy Corridor project, which implies the creation of an extensive infrastructure for transportation of electricity from RES-based generation facilities in seven Indian states [Government of India, 2023c].

The institutional system of stimulating the introduction of renewable energy sources by business is also being formed. In February–May 2023, the Indian Renewable Energy Development Agency and the Ministry of New and Renewable Energy implemented a number of measures to reduce regulatory, administrative, and financial barriers for solar PV module manufacturers, aimed at increasing domestic production of solar PV modules [Government of India, n.d.b].

The Indian government is also taking measures aimed at introducing new technologies in the energy sector. For example, in January 2023, the Government of India approved the National Green Hydrogen Mission, which aims to produce five million metric tons of hydrogen fuel per year by 2030. The mission includes the following objectives: stimulation of demand through exports and domestic use; provision of incentives for electrolyzer and green hydrogen production; pilot projects for steel, mobility, shipping, decentralized energy, hydrogen production from biomass, and hydrogen storage; development of green hydrogen centres; support for infrastructure development; creation of a robust framework of regulations and standards; research and development programmes; a skill development programme; and a programme for the development of new energy technologies [Government of India, 2023d].

In terms of absolute values of environmental-climate indicators, India still lags Russia and Brazil, as well as most developed nations. However, the Indian government's climate efforts in recent years have yielded significant successes. The emission rate per unit of GDP has fallen from one to 0.9 kg CO2 per dollar. India has surpassed other BRICS countries in reducing the carbon dioxide emissions per unit of value added, reducing the value of the indicator from 1.487 to 1.247 kg CO2 per dollar since 2015. Over the same period, the share of low-carbon and renewable energy sources in electricity generation increased from 18.1% to 22.9% and from 15.3% to 20%, respectively. Carbon intensity of final energy consumption and carbon intensity in industry decreased from 89.1 to 87.6 grams of CO2 per MJ and from 59.3 to 56.4 grams of CO2 per MJ, respectively. Progress was also fastest among BRICS countries in the availability of clean cooking fuels, increasing from 48.2% to 67.9% since 2015.

China

Today, China is the world's largest consumer of fossil fuels and emitter of greenhouse gases. As climate change is a significant medium- to long-term threat to China's economic growth and prosperity, the country faces the challenge of reversing the upward trend in emissions over the past decades due to the rapid development of its hydrocarbon-based industry and energy sector. In 2020, China committed to peak emissions by 2030 and carbon neutrality by 2060. In October 2021, China unveiled its Long-Term Low Greenhouse Gas Emissions Development Strategy [UNFCCC, 2020]. With the goals outlined in it, China is pursuing a policy to transform the entire economy, largely in line with the focus of the UN's Agenda 2030.

According to the statement of President Xi Jinping on 12 December 2020, by 2030 China intends to reduce carbon dioxide emissions per unit of GDP by more than 65% compared to 2005 levels, increase the share of non-fossil fuels in primary energy consumption to about 25%, increase the volume of forest reserves by six billion cubic meters compared to 2005 levels, and increase the total installed capacity of wind and solar energy to more than 1.2 billion kilowatts [China Meteorological Administration, 2020].

In 2022, several policy documents were published defining the long-term vision of the state policy in the field of sustainable transformation, including a focus on renewables development. In January 2022, the National Development and Reform Commission published a plan to promote green consumption transformation, containing measures to encourage green consumption by raising public awareness, curbing "wastefulness," and increasing the market share of green and low-carbon products. The government plans to incorporate energy conservation and environmental protection measures in areas such as food production, clothing, housing construction, transportation, tourism, and electricity consumption [Xinhua, 2022a].

The Integrated Work Plan for Energy Conservation and Emissions Reduction was published in January 2022, detailing the country's efforts to create and improve an economic structure "conducive to green, low-carbon and circular development within the framework of ongoing pollution control to achieve carbon peaking and neutrality goals" to be achieved by 2060. The document is part of the 14th Five-Year Plan and contains 10 measures to save energy and reduce emissions, including improvements in the construction and infrastructure sectors, transportation and logistics, curbing energy consumption, promoting green technologies, encouraging industrial enterprises to improve waste pollution management and control, and combating waste accumulation. According to the plan, by 2025, China aims to reduce energy consumption per unit of GDP by 13.5% from 2020, keeping overall energy consumption "at a reasonable level" [Xinhua, 2022b].

In May 2022, the State Council of the People's Republic of China issued a circular "On the Implementation Plan for Promoting High-Quality New Energy Development in the New Era" prepared by the National Development and Reform Commission and the National Energy Administration. The plan calls for accelerating the construction of a clean, low-carbon, safe, and high-efficiency energy system with a total installed electric capacity of 1.2 billion kilowatts of wind and solar power by 2030 [Xinhua, 2022c].

In January 2023, China's Green Development in the New Era was published, containing seven priority areas of China's green transformation—"commitment to green growth," green territorial configuration, adjustment and improvement of industrial structure, application of green production methods, green lifestyle, institutions and mechanisms for green development, and "efforts to make the Earth a beautiful home" [Xinhua, 2022d].

These documents, part of the ambitious structural transformation programme laid out in the 14th Five-Year Plan, characterize the Chinese leadership's comprehensive approach to addressing sustainability challenges. The Chinese government is not just aiming for an energy transition but for a complete transformation of the country's entire socio-economic model, both on the production and consumption sides. In fact, it is trying to build a circular economy.

The Chinese government has also taken narrower sectoral measures aimed at ensuring a sustainable transition in certain areas. For example, in the context of the transformation of the transportation sector, in January 2022, the Civil Aviation Administration of China published a green development road map for the 14th Five-Year Plan period (2021–25). The plan aims to "make civil aviation smarter, low-carbon and resource-efficient to achieve green transformation," including by optimizing aviation fuel consumption

and reducing CO2 emissions at airports [Xinhua, 2022e].

Hydrogen power is also a focus of Chinese authorities. In March 2022, the National Development and Reform Commission and the National Energy Administration released a hydrogen energy development plan for 2021–35. The plan calls for a full-cycle hydrogen energy development system "with greatly improved innovation capabilities and basic technologies and production processes" [Xinhua, 2022f].

The Chinese government has taken measures to subsidize and directly finance the construction of new renewable energy generation capacity. In September 2022, the State Council of the People's Republic of China (PRC) announced the delivery of the first offshore wind power installation platform for use in the Nansha area of Guangzhou City, Guangdong Province. According to the announcement, this is the first offshore wind energy installation platform that meets China's fourth-generation offshore wind energy equipment standards [Xinhua, 2022f].

In March 2023, the State Council of the PRC announced that China's renewable energy capacity expanded by 8.5% year-on-year in the first two months of 2023. According to the State Council, in January–February 2023, the total investment of China's major power companies in solar nearly tripled year-on-year to CNY 28.3 billion [Xinhua, 2023a]. In May 2023, China's National Energy Administration reported that 62.51 million kW of new wind and photovoltaic capacity was installed in the country between January and April 2023. China's wind and photovoltaic power generation during this period reached 482.8 billion kWh, up 26.8% year-on-year [Xinhua, 2023b]. In August 2023, it announced a "batch of demonstration projects utilizing advanced green and low-carbon technologies that will provide strong support for achieving carbon peaking and neutrality goals." According to the announcement, the projects aim to develop the use of non-fossil energy in industry and construction, new and efficient types of energy grids and energy storage, and carbon dioxide capture [Xinhua, 2023c].

Thus, the main priorities of China's environmental policy are: development of energy saving in a wide range of sectors, from heavy industry and construction to transportation and tourism; development of hydrogen energy; transformation of industry to combat pollutant emissions; development of technologies and integration of renewable energy sources into power generation; and minimization of anthropogenic impact on the natural environment.

The large-scale and systemic nature of the measures taken by China has been reflected in the dynamics of climate indicators since 2015. The level of fine particulate matter pollution decreased from 51.76 to 38.15 micrograms per cubic meter—marking the greatest progress among the BRICS countries. Emissions per unit of GDP fell from 0.8 to 0.7 kilograms of CO2 per dollar, as did emissions per unit of value added, from 0.911 to 0.691 kilograms of CO2 per dollar. The energy intensity of GDP decreased from 7.21 to 6.37 MJ per dollar. The share of low carbon and renewable energy in electricity generation increased from 22.5% to 26.3% and from 20.1% to 22.4%, respectively.

Nevertheless, China recorded an increase in the carbon intensity of final energy consumption, from 110.7 to 112.7 grams of CO2 per MJ. As in India, per capita CO2 emissions rose from 6.7 to 7.1 tons per capita.

South Africa

The Republic of South Africa (RSA) faces significant challenges as it transitions to a more sustainable economic growth model. The economy remains dependent on hydrocarbons, predominantly coal (about 84% of the country's electricity is generated using coal) [IEA, n.d.]. In addition, since the early 2000s, the country has been in a state of virtually permanent energy crisis, characterized, among other things, by regular rolling blackouts of power supply to households and businesses (since 2007), which has affected both the welfare of citizens and the growth rate of the South African economy. For example, in 2018–19, the agricultural sector lost 4.8% of growth due to power cuts [Nova Economics, 2020]. The rate of renewable energy deployment has been low. The share of renewables in electricity generation was 5.1% in 2020. This is the lowest among the BRICS countries.

The situation is also complicated by the traditional South African challenges related to the unequal distribution of wealth (across gender, race, and ethnicity). Thus, the key priorities stated by

South Africa in the context of achieving the SDGs are: combating inequality (including ethnic and gender inequality); combating climate change; combating energy poverty; developing the urban environment; and developing science, technology, and innovation.

Solving the entrenched energy crisis and reforming the country's energy system are the top priorities of the country's leadership. Thus, in his 2022 budget speech on 23 February 2022, South Africa's finance minister Enoch Godongwana announced the government's plans to transform the electricity sector. Among the measures envisaged are amendments to the Electricity Regulation Act 2006 [Government of South Africa, 2022a] that would allow the private sector to undertake renewable electricity generation projects of up to 100 MW without licensing [Government of South Africa, 2022b]. Obviously, this measure is aimed at decentralizing electricity generation in the country by encouraging the private sector and industrial enterprises to build their own renewable energy capacity.

On 1 August 2022, it was announced that the committee, comprised of representatives from relevant ministries and the state-owned energy company Eskom, would work primarily on the following tasks: reducing the intensity and frequency of load shedding by taking urgent measures to stabilize the grid, improving the efficiency of existing Eskom power plants, and commissioning new generators. Among the measures announced were: restarting the renewable energy procurement programme, building 2,205 MW of new solar and wind generation capacity, and procuring 6,800 MW of solar and wind power. According to stated plans, this additional generation capacity should be connected to the grid by the end of 2023 [Government of South Africa, 2022c].

On 21 January 2023, the National Energy Crisis Committee released a six-month progress report on the implementation of the Energy Action Plan. The report highlights key steps taken during the six-month period of the plan, including the ordering of an additional 14,771 MW of generating capacity from wind and solar power, as well as an additional 300 MW imported through the South African Power Pool, with negotiations underway for an additional 1,000 MW from neighbouring countries in 2023 [Government of South Africa, 2023a].

In parallel with efforts to address the crisis, measures to combat climate change are also being implemented. In September 2020, the South African government approved three key mechanisms to combat climate change and reduce emissions—the South African Low Emissions Development Strategy, the revised National Waste Management Strategy 2020, and the establishment of a Presidential Climate Change Coordination Commission. The commission, with a provisional budget of R50 million over five years, was to agree on South Africa's nationally determined contribution. South Africa's Low Emissions Development Strategy, also endorsed by the National Waste Management Strategy 2020, is an update of the 2011 strategy. The new version focuses on waste prevention and landfill avoidance by utilizing the circular economy concept to achieve sustainable, inclusive, economic growth and development in the waste sector, as well as reducing its social and environmental impacts [Government of South Africa, 2020a].

In February 2022, the Climate Change Bill [Government of South Africa, 2022f] was tabled in the South African Parliament. The bill was intended to develop "an effective response to climate change and, in the long term, to ensure a just transition to a low-carbon and climate-resilient economy and society in line with the SDGs. The bill provides for the establishment of a special commission on climate change under the president of South Africa whose mandate would be to advise public authorities on climate policy, take measures to address and adapt to climate change, and monitor and evaluate progress toward the government's targets. As of January 2024, the bill has not been approved.

South Africa also has a system to incentivize renewable energy production. Launched in 2011, the Independent Renewable Energy Service Provider Support Programme provides access to financing through public procurement worth 209.6 billion rand (about $11.4 billion) [Government of South Africa, n.d.].

The South African government has also made efforts to minimize human impacts and preserve the natural environment. On 18 February 2020, Environment, Forestry and Fisheries Minister Barbara Creasy announced plans to allocate 1.9 billion rand ($100 million) to make infrastructure and

communities more resilient to storms, flooding, and sea level rise [South African Government, 2020b]. In May 2022, a national waste management technology park was announced at an estimated cost of 44.5 million rand ($2.87 million [Government of South Africa, 2022d].

A revised national list of ecosystems at risk and in need of protection was published in November 2022. The list includes information on the status of terrestrial ecosystems, environmental pressures, and key drivers of climate change. A total of 120 of the 456 terrestrial ecosystem types on the list are categorized as threatened. Collectively, these ecosystems make up about 10% of the country's animal habitats. According to the report, 55 of the 120 terrestrial ecosystems are critically endangered, 51 are endangered, and 14 are vulnerable [Government of South Africa, 2022e].

In April 2023, the South African government endorsed the White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity. The document contains recommendations from a high-level panel advising the minister of Forestry, Fisheries and Environment on issues related to the management, hunting, breeding, trade and treatment of several species such as elephant, lion, leopard, and rhino. According to a go,ernment statement, the white paper envisions "the conservation of rich, diverse biodiversity and ecological infrastructure that supports ecosystem functioning for the livelihoods and well-being of people and nature" [Government of South Africa, 2023b].

The main priorities of South Africa's sustainable development policy to date are: developing a legislative framework to incentivize RES-based generation by the private sector, developing the availability of basic water and sanitation services, and protecting ecosystems and biodiversity. It is important to note that the shortage of electricity generation and distribution capacity is a chronic problem in South Africa, which has been the main focus of the government's efforts for at least two decades. This fact exacerbates South Africa's dependence on hydrocarbon energy sources and complicates the transition to a more sustainable model of economic growth, which is reflected in the dynamics of key climate indicators.

South Africa lags the BRICS average in terms of absolute values of environmental sustainability indicators. In addition, the country demonstrates negative dynamics in most of them. For example, water stress increased from 59.75% to 65.03%, annual average fine particulate matter in the urban atmosphere increased from 19.14 to 19.75 micrograms per cubic meter, emissions per unit of value added increased from 1 to 1.108 kg CO2 per dollar, and energy intensity of GDP remained unchanged at 6.95 MJ per dollar.

There was, however, a decrease in the carbon intensity of final energy consumption, from 151.4 to 149.9 g CO2 per MJ and in the carbon intensity of industrial energy consumption, from 46.6 to 44.2 g CO2 per MJ. Another success was the effective doubling of the share of renewables in electricity generation, from 2.4% to 5.1% since 2015.

Conclusion

Overall, BRICS countries, individually and collectively, have demonstrated substantial yet uneven progress toward a transition to a sustainable growth model. The collective contribution of BRICS to the global sustainability agenda is reflected both in its continued commitment to the goals and principles of the UN Framework Convention on Climate Change and the Paris Agreement and in the gradual expansion of the cooperation agenda. The range of issues and the number of mechanisms of interaction in the field of combating climate change have been growing over the period of the institution’s existence. A positive signal in this regard is the inclusion of climate and energy issues in the BRICS Economic Partnership Strategy.

The BRICS countries have demonstrated their commitment to the realization of their nationally determined contributions and the climate goals of Agenda 2030. Their potential contribution to the achievement of the Paris Agreement goals remains high, tempered by the guiding principle of differentiated responsibilities and climate policies that take into account national socio-economic

circumstances and growth priorities.

At the national level, the BRICS countries have also made significant progress. There has been an improvement in BRICS' average values for such indicators as level of fine particulate matter in the atmosphere of cities, CO2 emissions per unit of value added, carbon intensity of energy consumption, and the share of low-carbon and renewable energy sources in electricity generation.

Nevertheless, progress has not been uniform. Overall, Brazil leads the way in environmental and climate sustainability indicators, well ahead of not only other BRICS countries but also most developed nations. Moreover, by showing above-average rates of progress, Brazil continues to consolidate its leadership. China and India have demonstrated high rates of progress, particularly in reducing air pollution, improving water use efficiency, reducing pressure on water resources, and reducing CO2 emissions. Such achievements by China and India are due to systemic efforts and large-scale government investment in implementing low-emission development strategies, integrated into national economic and social development plans.

Russia showed improved results in indicators such as water use efficiency, area of water-related ecosystems, forest area, share of renewable sources in energy consumption, emissions per unit of value added, carbon intensity of final energy consumption, and share of renewable sources in electricity generation. South Africa's progress was the least significant, with regression in most indicators.

The uneven progress of the BRICS countries, and the fact that Russia, China, India, and South Africa are still lagging most developed nations on climate-related indicators, incentivizes further development of the BRICS cooperation agenda. Thus, the BRICS countries need to enhance cooperation on issues related to the implementation of the nationally determined contributions, the climate goals of Agenda 2030, and the Paris Agreement. Given the important role of the BRICS countries as large, industrialized economies in global climate processes, it is necessary both to ensure that climate policies are consistent with national socio-economic commitments and to support the principle of differentiated responsibilities at the international level in order to promote the interests of developing and least-developed countries.

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