



ENERGY SECURITY REPORT **2023**



BRICS
ENERGY RESEARCH COOPERATION PLATFORM

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The work covers the current state of energy security within the BRICS countries, as well as analyses possible areas of cooperation within the member countries. The research focuses on having access to reliable and affordable sources of energy to meet BRICS countries energy needs, this is a crucial aspect of national and global security, essential for economic development, social stability, and national defence.

The material was prepared by experts of the BRICS Energy Research Cooperation Platform based on the national information provided and with the active participation of relevant ministries of the BRICS countries. The study consists of two chapters. The first chapter is devoted to the approaches of BRICS countries to ensuring national energy security in the BRICS countries. The second chapter outlines opportunities and prospects for mutually beneficial cooperation among the BRICS countries.

The research is intended for government officials, representatives of science and business, and can be used in education.



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The following ERCP Experts participated in the development of the Energy Security Report: (Brazil) MASILI Gustavo Santos, RAMOS Esdras Godinho, COSTA Claudir Afonso, MEDEIROS William de Oliveira, (Russia) KIUSHKINA Violetta, NIKITAEV Vladimir, BOBYLEV Petr, ORLOV Dmitry, (China) WEI Xiaowei, XIANG Qianfei, HE Zhao, LI Lan, WANG Shunchao, LIU Chen, DING Jian and LI Ren, (South Africa) YUSUF Teslim Mohammed.

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Alexandre Silveira

Minister of Mines and Energy of the Federative Republic of Brazil

FOREWORD

There is little doubt that energy security is a top priority issue globally, and in Brazil as well. Despite having a renewable energy profile that already reaches almost 50% in the energy matrix and almost 90% in the electric matrix, alongside with diversification and complementarity of options, we understand the need to have a reliable, safe, and just energy supply to sustain our economic and social needs.

Brazil has already made strong progress on the subject, aiming at the mitigation of technological lock-ins and the rational use of available energy sources, with a view to providing citizens with affordable, clean and reliable energy.

To enhance energy security, we need to put in place mechanisms to expand the supply of sources and their efficient use. Brazil's diversification and complementarity of options have already contributed to this goal. However, new challenges will arise, requiring a joint effort with other nations to consolidate mechanisms to strengthen the current global energy sector and mitigate geopolitical impacts.

I am confident that we can work together to ensure a more sustainable and prosperous future for our citizens, and this report is a step towards a collaborative work, unifying the efforts of BRICS members to face the new challenges regarding energy security.



Shulginov Nikolay

Minister of Energy of the Russian Federation

FOREWORD

Nowadays, the global community is facing serious strategic challenges, including energy security issues. Therefore, there is a need for more adaptable response to developments in global energy markets and the establishment of mechanisms to influence these processes. The BRICS countries can make a significant contribution to ensuring Energy Security of each country and the entire BRICS, as they possess considerable resources, scientific and innovative potential. A joint effort would promote an accelerated and harmonised development of sustainable energy, ahead of potential threats to the energy security.

As a result, the development of cooperation and through integration of science and innovative entrepreneurship with the participation of large businesses would ensure a strong basis for achieving and protecting the national interests of each state. Russia encourages fruitful cooperation among the BRICS countries in developing the BRICS Energy Research Cooperation Platform and welcomes the release of the research on the analysis of approaches to ensuring energy security. Nowadays, such a comprehensive analysis is more important than ever, taking into account the energy structures of each of our countries and understanding the priorities for maintaining sustainable economic development.

I would like to express my gratitude to the Republic of South Africa for its BRICS Chairmanship in 2023. A coordinated effort to share knowledge and expertise on energy security approaches is what our countries can best invest towards. This kind of integration is the most important and appropriate response to modern challenges.



Raj Kumar Singh

Minister of Power and New and
Renewable Energy of the Republic of India

FOREWORD

In an interconnected world where economic growth, technological advancement, and quality of life are increasingly intertwined with the availability and stability of energy resources, the concept of energy security has risen to the forefront of global discussions. As nations grapple with the challenges posed by rapid industrialisation, urbanisation, and population growth, the quest for a reliable, affordable, and sustainable energy supply has become paramount. Among these nations, the BRICS group – comprising Brazil, Russia, India, China, and South Africa, stands as a vital coalition that plays a pivotal role in shaping the global energy landscape.

This report stands as a testament to the collective commitment of scholars, policymakers, and stakeholders to unravel the complexities of energy security and contribute to the informed dialogue that will guide our global energy trajectory. We extend our sincere gratitude to all the contributors, researchers, and experts whose dedication and insights have enriched these endeavours.



Zhang Jianhua

Administrator of National Energy Administration, the People's Republic of China

FOREWORD

Currently, countries worldwide are striving to accelerating economic recovery, which has led to a surging demand for energy. Factors like climate change, the COVID-19 pandemic, and geopolitics are reshaping the global energy landscape, resulting in significant fluctuations in international energy market prices, impeded energy trade and transportation, and more notable energy security risks. Thus, the global energy governance is facing formidable challenges.

Energy security is a major concern shared by the entire world, including the BRICS. The international community as a whole share the collective mission to vigorously develop clean energy, collaborate to promote economic recovery, and emerge from the pandemic. According to our diverse resource endowments and energy structures, the BRICS have distinct pathways for ensuring energy security and promoting energy transition. Facing various energy security risks, enhancing exchanges and mutual learning hold great significance. China is willing to work with all parties to strengthen energy policy communication, to create an open and transparent environment for developing clean energy, to enhance cooperation in energy technology innovation, to strengthen coordination in regional and global multilateral energy governance, with the goals of jointly maintaining the stability of the global energy market and safeguarding global energy security.



Samson Gwede Mantashe

Minister of Mineral Resources and Energy of the Republic of South Africa

FOREWORD

South Africa, as the 2023 BRICS Presidency and in collaboration with the member countries, developed this report titled “BRICS Energy Security Report”. The Energy Security Report 2023 aims to address issues of access to reliable and affordable energy sources in order to meet our energy needs. Energy security is a critical component of both national security and economic stability, as energy is essential for various sectors to thrive and remain sustainable.

Like other nations, South Africa is experiencing the challenge of increasing energy cost and availability. To mitigate these challenges, South Africa has developed critical areas to ensure energy security. These areas include policies and actions targeted at achieving reliable, affordable, and sustainable energy supply. Even though South Africa faces several obstacles in terms of energy security, it must be recognised that the country has made significant progress with regard to its energy transition. In addition, South Africa actively participates in international partnerships and collaborations that enhance energy security and fosters South Africa's relevance amongst other nations.

Overall, achieving energy security requires a comprehensive strategy that includes infrastructure development, international cooperation, diversification, efficiency, and sustainable energy methods. These strategies can help countries become more resilient to energy disruptions, lower geopolitical risks, and advance a safe and secure energy future. The Energy Security Report outlines opportunities for cooperation amongst the BRICS countries, this is something we are looking forward to embarking on to ensure sustainable and sufficient supply of energy resources.

Lastly, I would like to acknowledge the authors of this year's BRICS Energy Security Report and Russia as co-organisers for the high quality and relevant inputs gathered in compiling this report.

INTRODUCTION

The role and contribution of the BRICS countries (Brazil, Russia, India, China and South Africa) is significant to the world economy in terms of population (40%), GDP (25% nominal and US\$ 16.039 trillion), land coverage (30%), world trade (18%), and global forex (US\$ 4 trillion). Given their significant contribution to the above, it stands to reason that they are responsible for a significant percentage of the global energy consumption. In fact, it is stated that the BRICS countries consume 40% of the world's energy. This is expected to grow as the contribution of the BRICS countries to global GDP increases. In accordance with the forecast of the BRICS Energy Report 2020, prepared by the BRICS Energy Research Cooperation Platform By 2040 the BRICS share in both world consumption and energy production is expected to increase to 41%.

Currently, the majority of the energy consumed by BRICS countries is generated from fossil fuels. According to an ENERDATA report (2020), the BRICS countries' total coal consumption was reported to be 5,217 metric tons in 2019. Oil consumption was 1,138 metric tons in 2019. Gas consumption was reported at 910 billion cubic meters in 2019. BRICS countries are responsible for 48% of the world's coal consumption, 22% of the world's oil consumption and 13.5% of the world's natural gas consumption.

Although most of the energy supply is fossil fuels, the BRICS countries are generating and consuming more and more renewable energy. They are currently responsible for 16% of the world's renewable energy consumption. This is expected to grow as these countries strive to meet their climate goals. According to CNPC Economics and Technology Research Institute, the BRICS groups' consumption of renewable energy has been increasing year over year, helping to drive the development of lower-carbon economies worldwide. The Institute's research shows that the percentage of electricity produced by renewable sources increased from 19 to 37% between 2010 and 2020, while the percentage of nuclear power doubled over the same period, making up the majority of the increase in global nuclear power.

The BRICS countries play an important role in the Global Energy Security System. The BRICS countries have significant weight, both in generation and in consumption of global energy resources. According to the International Energy Agency (IEA), BRICS countries account for 36.4% primary energy supply, and this is set to rise to 40–50% by 2040. The Russian Federation is an energy self-sufficient country, and according to such a basic indicator of energy security as the ratio of the production of fuel and energy resources to their domestic consumption, Russia has a significant reserve. This allows Russia to consistently become one of the world leaders in the export of key energy resources.

The BRICS countries have made commitments to reducing Greenhouse Gas (GHG) emissions. Although BRICS countries have access to fossil fuels, they also all have abundant renewable energy sources which will assist in this low carbon transition. This will make them important from a global perspective in terms of renewable energy production. Already this can be seen in China. China is currently the largest clean energy market in the world, replacing fossil fuels with renewable energy at a fast pace. In 2017, the country invested 126.6 billion U.S. dollars, accounting for 45% of the global investment in green energy, according to a United Nations report published in 2018. In China, the proportion of clean energy sources in total energy consumption increased from 14.5% in 2012 to 25.5% by the end of 2021. The fuel and energy balance of the Russian Federation is one of the most environmentally friendly (low-carbon): more than a third of electricity generation comes from nuclear power, hydropower, and other renewable energy sources, about half from natural gas.

Given their rapid growth, the BRICS countries are focused on energy security. Energy consumption affects the economic development of any country. These countries' economic growth is increasing rapidly, causing the energy demand to increase. For all countries, the interests of ensuring energy security and its concept are different and are formed from an energy point of view by categories of countries: importers, exporters, transit countries, also taking into account the category of developing countries. Approaches to achieving energy security for each country are individual but revolve around energy resources. At the same time, the historically basic concept of energy security is based on ensuring efficient and reliable energy supplies at affordable prices, with the organisation of eliminating threats to national values and goals. Purposefully, energy security is generally understood as the confidence that energy will be available in the quantity and quality that are required under given economic conditions.

This report examines the existing approaches to ensuring energy security in the BRICS countries and their tasks both now and into the future, particularly in light of their climate goals. It also highlights key areas of cooperation. It is acknowledged that the BRICS countries have energy strategies that have proven to be complementary, opening up opportunities for enhanced intra-BRICS energy cooperation to foster domestic energy security and stimulate economic growth among the bloc.

CHAPTER 1



ENERGY SECURITY SITUATIONAL PROFILE OF THE BRICS COUNTRIES

BRAZIL



[1.1]

1.1.1 GENERAL OVERVIEW

According to the International Energy Agency (IEA), energy security can be understood as “the uninterrupted availability of energy sources at an affordable price”. It relates to short-term security (aimed at responding to specific or structural alterations that affect the supply of energy on an immediate level); and long-term security (related to the adequacy of investments and expansion of the energy sector to the economic, social, and, in a more recent view, environmental development of the country). This broader concept underpins the following discussion about the Brazilian energy sector.

In this aspect, energy development in Brazil has touched multiple dimensions throughout its existence, informed by physical, economic, environmental, social, technological, regulatory, and institutional dimensions - and having the Ministry of Mines and Energy (MME) as the coordinator and guide of this development. Not by chance, the first experiences with prospective energy studies, which can be called Integrated Energy Planning (IEP), date back to the early 1970s, when in consonance with the Ministry of Planning, the project called Brazilian Energy Matrix was carried out, with the subsequent adoption of the Brazilian Energy Balance (BEB) in 1979. The same period saw a robust economic growth, demanding a great expansion of the electro-energetic sector. This resulted in the construction of several works in the country, such as Itaipu Hydroelectric Power Plant, at the time the largest hydraulic power plant in the world, and the Almirante Álvaro Alberto Nuclear Power Plant, a complex that houses the Angra I and II nuclear power plants. In this period, the expansion of the sector was monopolised by the state.

In line with the short and long-term vision of energy security, the seventies also saw the most solid steps towards the diversification of the Brazilian energy matrix, aiming at making it less dependent on oil products imports, which at the time of the second oil crisis, represented 85% of the dependence on this source.

Programs such as the National Alcohol Program (Pro-Álcool) of 1975 already indicated the willingness to follow this diversification, however, it was the Brazilian Energy Model (MEB) of 1979 that was constituted as an instrument with goals to decrease this dependence, affecting both the petroleum sector and the production of mineral coal, firewood, and alcohol until

1985. Most of the goals were achieved, with external dependence on oil reducing to 43%. Thus, an important instrument for the concretisation and presentation of the potential paths for the sector resided in the figure of integrated energy planning, with sectoral plans and policies walking together in the process.

In the 1990s, new challenges arose mainly due to the decrease in the state's investment capacity in the face of successive economic impacts that occurred between the '70s and '80s. This demanded a readjustment of the sector's structure, guided by a process of de-verticalisation, creation and strengthening of a competitive wholesale market as well as a progressive liberalisation for consumers. The Brazilian Electricity Sector Restructuring Project (Re-Seb) was created by Law 9,074/1995. That decade was also marked by the creation of several actors that constitute the current Brazilian energy sector, such as:

- The regulator of the national electricity system, the National Electric Energy Agency (Aneel) in 1996;
- The advisory body to the President for the formulation of energy policies and guidelines, the National Energy Policy Council (CNPE) and the regulator of the oil, gas, and biofuels sector, the National Petroleum, Gas and Biofuels Agency (ANP), both from 1997;
- In addition, the controller of the operation of the generation and transmission facilities of the National Interconnected System (SIN), the National System Operator (ONS), from 1998.

The 1990s would hold yet another example of the use of the IEP, with the institution of the project "Re- examination of the Brazilian Energy Matrix", released in 1991, contemplating policy guidelines in several energy areas, with projections for demand for the years 1995, 2000, and 2010. Even though the decade maintained challenges on the country's horizon and demonstrations of the need for more significant structural changes, the consolidation of the CNPE favoured the coordination of energy policy with industrial, agricultural, and transportation policies², given the interministerial character of the Council.

It is relevant to mention that in Law 9.478/1997 itself, responsible for the creation of the CNPE and ANP, there was the definition of the objectives of the National Energy Policy, and, although it is not explicitly mentioned, it is quite clear that these are aligned with the strengthening of the energy sector in the country. It covers various aspects of energy security, whether in the expansion of supply and potential energy vectors, or in guaranteeing and improving existing and established energy chains or in the alignment between expansion and the aforementioned economic, social and environmental development.

Later, in 2004, a more comprehensive legal framework was established for the new model for the electricity sector, through Law n. 10,848/2004, which sought to ensure greater competition