

Gathering Momentum for BRICS Cooperation on Climate change

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1. Introduction

In current world, two transformations are likely to dominate the first half of the twenty-first century. One is the shift in economic power from the West to the East (especially the BRICS countries – Brazil, Russia, India, China, and South Africa). The rise of the BRICs is linked to their dramatic growth rates in recent years. As of 2014, the five BRICS countries represent approximately 40% of the world population, approximately 20% of the world output and even higher territory, and an estimated US\$4 trillion in combined foreign reserves. Globally and politically, the influence of the BRICS is rapidly increasing. The second is the transition from a high to low carbon economy. The average temperature has been gradually increasing throughout the entire world. Global warming is recognized as the most important risk factor that threatens the very existence and the advancement of humanity. Stern (2006) famously called climate change the greatest market failure of all time. Combining growth patterns and sustainability in terms of economic, social and ecological development is a key challenge for any Nation State¹.

How can economic growth be shaped in a sustainable way? An increasing

¹ IMF, 2011, New Growth Drivers for Low-Income Countries: The Role of BRICs, www.imf.org

number of countries are elaborating national strategies for sustainable development that base economic growth on a long-term foundation, balancing the interests of the economy, society and the environment. The urgency of the crisis gives governments of the world developing nations the chance to redirect resources to more efficient economic growth that's better for the environment, more socially equitable, and more promising over the long term, by promoting growth in relevant sectors – including energy efficiency, sustainable agriculture and off-grid renewable power. It may not automatically solve the current poverty and climate imperatives². It will however, provide multiple social, economic and environmental dividends and constitute much-needed first steps towards low-carbon social and economic development.

In the process of defining such strategies, the visions and practical experiences of countries such as the BRICS countries regarding sustainable development are of crucial global importance³. While the impacts of industrially advanced countries remain at the heart of the world's sustainability challenge, a marked shift from the 1992 Rio Earth Summit to the 2012 Rio+20 Summit has been the role of emerging economies, and BRICS in particular. Although the five countries have different economic endowment, they are at similar economic development stage and are facing increasing challenge to sustain economic growth, save natural resources, and protect eco-environment. BRICS countries' cooperation provides a platform to share experience and tackle challenge as

² Philip Schellekens, 2013, A Changing China: Implications for Developing Countries, World Bank <http://web.worldbank.org/>

³ Mlachila, M. and M. Takebe, 2011, "FDI from BRICs to LICs", IMF Working Paper,

they have different competitive advantages and their economies are highly complementary.

This paper first discusses the lens through which BRICS approaches climate change, and then examines the actions BRICS have taken separately and jointly or planned to address GHG emissions. The article then discusses the relationship of bilateral cooperation to multilateral negotiations. Finally, the obstacles posed by a variety of constraints on effective implementation of environmental policy in BRICS are considered, and some options for enhanced cooperation to contribute to overcoming these obstacles are proposed.

2. BRICS' approach to climate change

2.1 Emission and energy

According to World Resources Institute (WRI), China, India, Russia, Brazil and Russia respectively rank 1, 4, 5, 6 and 12 of global greenhouse gas emissions in year 2013.

Brazil is the 8th largest total energy consumer and 10th largest producer in the world in 2013. Brazilian emissions represent about 5% of global emissions. In Brazil 75% of emissions occurs in land-use activities such as deforestation and burning for agriculture use.

Russia is the second biggest oil producer in the world after Saudi Arabia and the world's second largest coal reserves. It was about 5% of the global total emission. Natural gas in Russia's energy consumption is almost 54%, oil and coal are 21% and 13% by 2012 (Table 1). The energy consumption per unit in

Russia is 1.5 times of the world average, 3.5 times that of developed industrial countries, and 16 times more than Denmark and Japan⁴. Renewable energy in Russia is largely undeveloped although Russia has many potential renewable energy resources (Table 2).

India already is a greenhouse gas giant and contributed more some 5 percent of human-sourced carbon dioxide emission. India's Carbon emissions will rise in tandem, by about two-and-a-half times between 2010 and 2030 according to McKinsey. Fossil fuels dominate the energy mix of India. In year 2012, Coal accounts for 52% of India's energy consumption. Oil and natural gas respectively 30.4% and 8.7%, and hydropower and nuclear power only 5.1% and 0.8%. About 65 percent of India's carbon dioxide emissions was from heating, domestic uses and power sector. About 9 percent of India's emissions were from transportation⁵.

China leads the world in coal production and consumption. It mines over 3 billion tonnes of coal a year, 3 times more than the next-biggest producer (America). Over four-fifths of China's electricity comes from coal-fired power plants. Burning coal is a big cause of the severe air pollution afflicting parts of China, and, through waste from coal-washing and underground leakage, of contaminated water and degraded soil. China is working hard to develop other sources of energy and to lessen the "energy intensity" of its growth (the energy needed per extra unit of GDP). It is already much the world's biggest user of hydroelectric power, has almost as many new nuclear-power plants planned as

4 BRICS : joint statistical publication : 2014 ; Brazil, Russia, India, China, South Africa /IBGE. - Rio de Janeiro : IBGE, 2014

⁵ Dubash N, Raghunandan D, Sant G, Sreenivas A (2013) Indian climate change policy. Econ Polit Wkly 48(22):47-62

the rest of the world put together, and is expanding solar and wind energy. But, according to projections by McKinsey, a consultancy, even taking all this into account, China is still likely to consume 4.4 billion tonnes of coal in 2030, when its carbon emissions are expected to have increased from 6.8 billion tonnes of carbon-dioxide equivalent in 2005 to 15 billion tonnes. Of these nearly 40% will come from power generation. The energy consumption per unit of GDP in China is high, about 8 to 10 times greater than that of Japan or Germany.

South Africa's per capita emissions are high as compared with other countries on the African continent and even globally. The bulk of GHG emissions in South Africa come from the energy sector, which contributed 78 percent of South Africa's total GHG in 1994, and more than 90 percent of carbon dioxide emissions.

Table 1 Energy consumption of the BRIC countries in year 2012

Million tons of oil equivalents

	type	coal	oil	Nature gas	Clean energy	Total
Brazil	Consumption	13.5	125.6	26.2	110.65	275.95
	Ratio (%)	4.89%	45.52%	9.49%	40.10%	100%
Russia	Consumption	93.9	147.5	374.6	78.2	694.2
	Ratio (%)	13.53%	21.25%	53.96%	11.26%	100%
India	Consumption	298.3	171.6	49.1	44.9	563.9
	Ratio (%)	52.90%	30.43%	8.71%	7.96%	100%
China	Consumption	1873.7	483.7	129.5	248.9	2735.8
	Ratio (%)	68.49%	17.68%	4.73%	9.10%	100%
South Africa	Consumption	89.8	26.9	3.4	3.7	123.8
	Ratio (%)	72.54%	21.73%	2.75%	2.99%	100%

Source: "BP world energy statistics yearbook June -2013"

Table 2 BRICs countries renewable energy utilization (2002-2012)

Million tons of oil equivalents

Year	Brazil	Russia	India	China	South Africa
2002	3.1	0.05	1	0.8	0.1

2003	3.5	0.1	1.2	0.8	0.1
2004	3.7	0.1	1.9	0.9	0.1
2005	4.2	0.1	2.3	1.1	0.1
2006	4.3	0.1	3.3	1.5	0.1
2007	5	0.1	4	1.9	0.1
2008	5.5	0.1	4.8	3.6	0.1
2009	5.9	0.1	6.3	6.9	0.1
2010	7.3	0.1	7.6	14.1	0.1
2011	9	0.1	9.2	25.4	0.1
2012	11.2	0.1	10.9	31.9	0.1
Ration in 2012	4.70%	0.10%	4.60%	13.40%	0.10%

Note: Renewable energy (wind, solar, geothermal, biomass power generation and waste generation)

Source: "BP world energy statistics yearbook June -2013"

2.2 Vulnerability to climate change

Statistically, the world's average temperature over a hundred year period (1906-2005) showed an increase of 0.74°C, and it is expected to show an increase of about 6.4°C by the end of the 21st century. Global warming is expressed in the form of climatic disasters and ecosystem destruction, and thus identified as the factor that threatens human survival. An economic loss from climate change is predicted to be as much as 5~30% of global GDP every year.

Brazil is vulnerable to climate change due to its fragile, biologically diverse ecosystems. As a country rich in biodiversities and vast tropical forests, Brazil faces considerable amount of challenge from the impacts of climate changes. One of the biggest threats in Brazil is the high probability of desertification in the semi-arid region of the North East. Severe droughts in this region only aggravates the situation with drying up of major rivers, lack of vegetation, increase in temperatures and its cumulative impact on populations.

In recent years, the impact of global warming is increasingly apparent in Russia⁶. Especially in the summer of 2010, Russia appeared a rare extreme heat and dry weather. Forest fire area is more than 190,000 hectares.

India is one of the world's most vulnerable countries to climate change (Cruz et al. 2007; INCCA 2010). About half of its population is dependent on agriculture or other climate sensitive sectors (Bureau of Labour Statistics 2010). India increasingly sees the local impacts of climate change and growing coal use. The biggest climate impact has been on changing weather patterns in South Asia. Over the last 50 years, rising temperatures have led to a nearly 10 percent reduction in the duration and rainfall levels of the annual monsoons that are vital to nearly all Indian agriculture.

Climate change has already produced visible adverse effects on China's agriculture and livestock-raising sectors, manifested by increased instability in agricultural production, severe damages to crops and livestock breeding caused by drought and high temperatures in some parts of the country, aggravated spring freeze injury to early-budding crops due to climate warming, decline in the output and quality of grasslands, and augmented losses caused by meteorological disasters. The State Council's 2012 white paper on climate change began by noting that "China is one of the countries most vulnerable to the adverse impact of climate change."

Climate change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and

⁶ Boris Porfiriev, 2013, Green economy: realities, prospects, and limits to growth, 2013 Carnegie Endowment for International Peace

biodiversity. Considering South Africa's high levels of poverty and inequality, these impacts pose critical challenges for national development.

2.3 Outside pressure

As the largest and most rapidly growing global emitter, outside pressure on BRICS to deepen its commitments to addressing climate change is mounting. The BRIC persist on "common but differentiated principle", while the developed country—"common and shared" responsibility. Country like China has been argued to accept binding commitments of its own.

While, the same pressure also provides BRICS opportunities to influence the outcomes of global negotiations through coalitional activities. It is helpful to improve the soft and hard ability and the position of BRICS countries in global climate governance. It is a good start that BRIC countries agreed on the Durban Platform for Enhanced Action (ADP), a set of commitments on global warming that were established at the 2011 UN Climate Change Conference.

3. BRICS' Action on energy and emission

3.1 local efforts

Brazil recognizes that it is part of the solution to the problem of climate change. In 2010, Brazil took the necessary steps to advance its climate change commitments made at the COP-15 in Copenhagen and detailed its official emissions reduction commitment of 36.1% - 38.9% by 2020. Brazil has had a

great deal of success slowing deforestation through a policy push over the last decade and produced positive results. According to Environmental Defense Fund (January 2013), Brazil has reduced its deforestation about 76%, the lowest deforestation rate in over 20 years. At this rate, Brazil's goal of reducing greenhouse gas emissions by 38.9% could be reached by 2016 rather than 2020. In June 2012, Brazil adopted national targets for its heavy industrial, transportation, and mining sectors of 5%, 2%, and 4% emissions reductions, respectively, relative to BAU by 2020.

Beyond national policies, there is subnational climate action in Brazilian states and cities. Brazil also faces the challenge of meeting its growing energy demand with low-carbon energy sources. In addition to protecting forests, meeting increasing energy demand is also on Brazil's climate policy agenda. Brazil's current Ten-Year Energy Expansion Plan foresees the addition of 69 GW of installed generation capacity (an additional 58%) from 2011 through 2020. Brazil has a diversified portfolio of potential resources for generation expansion, including hydropower, biomass cogeneration (mainly from sugarcane), and wind power. The International Energy Agency (IEA) projects that, over the next 10 years, installed new capacity additions in Brazil will be provided mainly through hydropower and natural gas, and only to a lesser extent by biomass and wind (IEA 2012)⁷. Opportunities to explore clean energy developments will thus be of great importance over the next decade

Since 2009, Russia stepped up the intensity of actions on climate issues. In

⁷ IEA, 2012, "Tracking Clean Energy Progress", <http://www.iea.org/>

July 2009, Russia announced to reduce greenhouse gas emissions by 10%-15% in 2020 than in 1980, and 50% in 2050. At the end of 2009, Russian President Dmitry Medvedev formally approved the "Climate Doctrine of the Russian Federation" to deal with the climate problems and enhance international climate cooperation. According to Russian "Climate Doctrine," Russia will implement short-term and long-term climate policy, participate in the international community to address the problem of climate change, and strengthen Russia's scientific and technological strength, and provide a scientific basis for addressing climate issues. Specific content also includes: improvements in energy efficiency in all economic sectors, the development of renewable and alternative energy sources, reduce the adverse effects of the market economy through the implementation of financial and tax policies, protect forests and reservoirs, and strengthen afforestation and reforestation. In September 2013, the Russian President signed a decree adopting a target for GHG emissions, stating that by 2020 they must not exceed 75% of the total emissions of 1990. Meanwhile, Russia will vigorously develop clean energy, by using of "green technology.

India has targeted a 20-25% reduction over the 15 years from 2005 to 2020. India pursues renewable energy and energy efficiency, it also pursues the largest build-out of coal-fired power plants, coal mining, and related infrastructure anywhere outside of China. Energy security is a paramount concern due to India's reliance on imported energy sources and increasing demand for energy. In 2008, India's National Action Policy on Climate Change

set a target of producing 15% of the country's electricity with renewable energy sources by 2020. In 2010, India launched the Jawaharlal Nehru National Solar Mission, which aims for 4,000-10,000 MW of grid-connected solar PV by 2017 and 20,000 MW by 2022. A desire to improve industrial energy efficiency has spawned another new policy. Launched in 2012, the Perform, Achieve and Trade scheme assigns mandatory energy efficiency targets for 478 energy-intensive enterprises across eight sectors that account for around 80% of India's industrial energy use (British High Commission New Delhi 2012). India's 12th Five Year Plan (2012 to 2017) contains a target that 50% to 60% of coal plants use SC technology. Early indications of India's longer-term policy direction suggest that the 13th Five Year Plan (2017 to 2022) will stipulate that all new coal-fired plant constructed be least SC.

Since 2013, the Chinese government has followed the goals and targets of addressing climate change during the Twelfth Five-Year Plan, and adopted such measures as adjusting industrial structure, saving energy, increasing energy efficiency, optimizing energy structure, controlling the emission of greenhouse gas induced by non-energy activity, and increasing carbon sinks. In May of 2014, the Chinese government issued the 2014-2015 Action Plan for Energy Conservation, Emissions Reduction and Low Carbon Development, which committed China to cutting carbon dioxide emissions per unit of GDP by 4 percent in year 2014 and 3.5 percent in year 2015. China's National Plan on Climate Change for 2014-2020 was issued in September, 2014, and identified the guiding principles, main goals, roadmap, key targets, and policy directions

necessary to address climate change. Recently, for the very first time, China pledges its emissions will peak around 2030, and intends to increase the non-fossil fuels share in its primary energy consumption to around 20 percent. Renewable energy in China continues to play an increasingly important and strategic role in the country's energy development.

At the UN climate change conference held in Durban, South Africa committed itself to achieving a 34 percent deviation below the "business as usual" (BAU) emission trajectory by 2020, and 42 percent deviation by 2025. In pursuit of this goal and a green economy, the government has finalized a National Climate Change Response White Paper and South Africa's Second National Communication under the United Nations Framework Convention on Climate Change (SNC) that serves as government's vision for an effective climate change response and the long-term transition to a climate resilient and low-carbon economy and society. Policies of the Renewable Energy Independent Power Producer Procurement Programme and more recently National Treasury consideration and planned implementation of carbon taxes have been developed. South Africa's new National Development Plan 2030 goes some way toward reframing climate change as a development challenge. Several government departments across all three spheres of government—national, provincial, and local—are now developing climate change strategies and/or plans.

3.2 Bilateral and joint cooperation

Bilateral cooperation within the BRICS countries is an important path to climate change, and has made a lot of achievements. In India and China, for example, as early as 2005, the two sides began to cooperate on climate change issues in the field of energy security and energy cooperation. From 2004 to 2007, China and India held several rounds of consultations on climate change. Beginning in 2009, the two sides strengthen exchanges and signed a Memorandum of Agreement (MoA) on cooperation in dealing with climate change. The two countries also set up a Joint Working Group to exchange views on major issues in global climate talks, domestic policies and measures, and implementing related cooperative projects. In 2010, the strategic partnership between the People's Republic of China and the Federative Republic of Brazil grew further with cooperation deepened on all fronts. They signed the Joint Action Plan 2010-2014, and The China-Brazil Center for Climate Change and Energy Technology Innovation was set up at Tsinghua University. China and Russia both took the bilateral relationship as the priority of their foreign relations, and the political mutual trust was constantly strengthened. Cooperation in Economic, Trade, Finance and Energy at national and local Levels were persistently deepened.

The five countries currently are strengthening cooperation to fight climate change through a series of joint resolutions. i.e. BRICS representatives issued a joint statement containing the resolutions at the 16th BRICS Ministerial Meeting on Climate Change.

3.3 Barriers

Many barriers must be overcome to make BRICS' green transformation financially viable by closely cooperation. These barriers include:

--Competitiveness barriers of traditional fossil fuels in the current market environment;

--Institutional and regulatory barriers, the lack of a legal and regulatory framework to stimulate the use of renewable energy

--The lack of the necessary infrastructure for the successful development of green energy;

--The inadequate level and quality of climate-friendly technology support;

--The inadequate level of green financing

--The lack of appropriate information, including information about available renewable energy resources and inadequate human resources.

4. Future climate cooperation: elevate and re-frame efforts

Key issue of global climate governance is energy structure transformation. Alternative Energy is the core of the green economy. In the short- and medium-term, the green sector of the economy and particularly its clean energy component may become increasingly important.

4.1 Re-framing the climate issue in terms of clean energy

The BRICS countries are looking at the opportunities for economic development in future that help to address the resource constraints through the development of renewable energy. The prospects for the green industry and for BRICS's general economic development are closely related to progress in the energy sector. Collaboration on clean energy and greater efficiency offers a real opportunity to deepen the overall BRICS relationship.

The BRICS countries have different advantages in the development and utilization of clean energy at the present stage (see following tables).

SC and USC. By 2014, global SC and USC capacity account for 28% of total installed capacity, Given their rapid expansion, China and India will account for more than one-half of combined SC and USC capacity (IEA, 2012).

Nuclear energy. Since 2011, the earthquake and tsunami damage to the Fukushima-Daiichi nuclear power plant in Japan has cast some uncertainty over the future of nuclear power. Some countries are choosing to phase out nuclear reactors; most confirmed that they are keeping nuclear in their energy mix or will develop it further, including BRICS, with the stringency of safety standards.

Solar power. Progress in concentrated solar power (CSP) has been less impressive. China, India, South Africa are finalising or considering projects. While the project pipeline is impressive, the economic recession and lower PV costs show evidence of diverting and slowing CSP projects. China is currently building the most reactors globally; their reactor construction times have decreased impressively, and are likely to become the fastest in the world.

Offshore wind. China and Germany, plus other governments, are making offshore wind a policy priority. The next few years will determine the future success of this technology

Hydropower. Hydropower provided about 82% of all electricity from renewable energy sources in 2010, increasing at an average rate of about 3% per year between 2000 and 2010. China, Brazil, Canada, the United States and Russia are the world leaders. In Brazil (80%) and Canada (60%), hydropower provides the largest share of power generation. In the next decade, the installed capacity of hydropower will increase by approximately 180 GW, if projects currently under construction proceed as planned (a 25% increase of current installed capacity). One-third of this increase will be in China and Brazil alone; India also has large capacity under construction (IEA, 2011c). Delivering these projects on time and in a sustainable way is essential to achieve the 2DS goal, and additional projects should be identified and developed to offset any delays or cancellations.

In accordance with the principles of mutual complementarity and mutual benefit, the BRICs countries can make full use of their respective advantages to advance cooperation in hydropower, nuclear power, wind power, solar power and other clean, renewable energy sources, and to jointly strengthen technical cooperation in the field of green energy by setting up a new energy cooperation mechanism. For example, BRICs countries can host BRICS clean energy forum, or jointly establish technology research and development center, or encourage the cooperation between well-known universities and research institutes. BRICS

can set up task forces with senior government officials, independent experts, industry and financial community leaders, and NGOs to develop programs and guide implementation

Table 3 BRIC countries nuclear power utilization (2002-2012)

Million tons of oil equivalents

Year	Brazil	Russia	India	China	South Africa
2002	3.1	32.1	4.4	5.7	2.9
2003	3	33.6	4.1	9.8	3
2004	2.6	32.7	3.8	11.4	3.4
2005	2.2	33.4	4	12	2.9
2006	3.1	35.4	4	12.4	2.7
2007	2.8	36.2	4	14.1	2.8
2008	3.2	36.9	3.4	15.5	2.7
2009	2.9	37	3.8	15.9	3.1
2010	3.3	38.6	5.2	16.7	3.1
2011	3.5	39.1	7.3	19.5	2.9
2012	3.6	40.3	7.5	22	3.2
Ration in 2012	0.60%	7.20%	1.30%	3.90%	0.60%

Source: "BP world energy statistics yearbook June -2013"

Table 4 BRIC countries Hydropower utilization utilization (2002-2012)

Million tons of oil equivalents

Year	Brazil	Russia	India	China	South Africa
2002	64.7	37.1	15.5	65.2	0.5
2003	69.2	35.7	15.7	64.2	0.2
2004	72.6	40.2	19	80	0.2
2005	76.4	39.5	22	89.8	0.2
2006	78.9	39.6	25.4	98.6	0.3
2007	84.6	40.5	27.7	109.8	0.6
2008	83.6	37.7	26	132.4	0.2
2009	88.5	39.9	24	139.3	0.2
2010	91.2	38.1	25	163.4	0.3
2011	96.9	37.9	29.8	158.2	0.4

2012	94.5	37.8	26.2	194.8	0.4
Ration in 2012	11.40%	4.50%	3.10%	23.40%	0.10%

Source: "BP world energy statistics yearbook June -2013"

4. 2 Gathering new momentum and elevate the climate issue in BRIC relations

4.2.1 Cooperation to Negotiations

The negotiation process of the UNFCCC and its Kyoto Protocol and the Bali Roadmap has identified the action targets and measures for various parties by 2020. This is crucial for reaching an agreement in 2015. The five BRICS countries can take more forceful measures, and enhance practical cooperation, Foster cooperation by developing trust and forging common ground on important matters in order to make new efforts and contribution for addressing climate change. Bilateral meetings help to address key sticking points before the U.N. Climate Change Conference.

4.2.2 To promote “green” progress in BRICS Development Bank’s investment activity

At the 5th BRICS summit held in Durban, South Africa on 27 March 2013, a New Development Bank was agreed to by BRICS leaders. On 15 July 2014, the first day of the 6th BRICS summit held in Fortaleza, Brazil, BRICS economies signed the long-anticipated document to create the \$100 billion BRICS Development Bank and a reserve currency pool worth over another \$100 billion to promote economic and technological cooperation among members and with non-members, especially developing countries. Its

establishment provides new momentum for BRICS green cooperation. Clean energy infrastructure in many BRICS countries is weak and the government financing capacity is limited. BRIC Development Bank can provide long-term and low-cost financing support to promote the development of clean energy in BRICS or other developing countries. At the same time, the signing of the Memorandum of Understanding on Cooperation among BRICS Export Credit and Guarantees Agencies will improve the support environment for for the BRIC countries for future cooperation on clean energy.

A green fund under BRICS Development Bank can be set up to finance green projects and Assist in deployment of renewable energy sources and technologies. Furthermore, in the financial activities, BRICS Bank should have more attention on local eco-environment conserving and biodiversity protection.

4.2.3 To consider the feasibility of establishing a free trade area, with clean energy trade, clean energy and environmental technology as a priority.

The economic and trade relations among BRICS countries have developed very rapidly. The trade volume among the BRICS countries hits US\$ 300 billion in 2011, six-fold in the past decade to 300 billion U.S. dollars, but the proportion is still small and need to strengthen trade and investment cooperation in many aspects, including clean energy trade.