

## EMISSIONS

# How well are BRICS meeting carbon targets?



**The BRICS\* countries of Brazil, India and South Africa are tackling greenhouse gas emissions reduction and moving towards better sustainability with varying degrees of success and commitment to the Paris Agreement, reports Nic Newman.**

Limiting global warming is dependent on a rapid transition away from fossil fuels. This, in turn, requires a technological advance in renewable energy and electricity storage, strong government commitment, stable and transparent regulatory frameworks, and a business environment that is attractive to investment.

After the 2015 Paris Agreement, countries have committed to various reductions in greenhouse gas (GHG) emissions according to circumstances. For example, India aims to have 40% of power generated from non-fossil fuels by 2030. However, the country faces a number of challenges, including the imperative of economic growth, the pressure of urbanisation and an infrastructure deficit.

Meanwhile, South Africa and Brazil have different hurdles to tackle. South Africa's immediate priorities, for example, are to eliminate poverty by creating employment and achieving sustainable economic development. But over-reliance on coal, dominated by GHG emissions by state-owned utility Eskom, is a huge challenge to achieving sustainable energy.

South Africa, Brazil, and India are each starting from different resource endowments, ensuring that their performance in delivering their commitments will vary.

## India to hit target

The seventh largest economy in the world, India has over 1.3bn people, with GDP per head of \$1,982, the lowest of the BRICS countries. Nonetheless, the Global Carbon Project's December 2018 report on the global carbon budget claims India is the fourth highest emitter of carbon dioxide (CO<sub>2</sub>) in the world.

Under the Paris Agreement, India committed to reducing CO<sub>2</sub> intensity in its energy system to 33% below 2005 levels by 2030. At the same time, the country will create an additional 'carbon sink' of 2.5–3bn tonnes equivalent of CO<sub>2</sub> through a tree planting programme.

India has done much to increase use of 'cleaner' gas and renewable energy, and has reduced coal's contribution to 56% of electricity generation. Renewable energy in the form of hydro-power (14.3%), wind (10.1%), solar (7.4%) and biomass (2.6%) now accounts for 34.4% of power generation. Although reducing reliance on coal-fired generation is seen as a priority, some 50,025 MW of coal power plants under construction more than offset the retirement of 48,000 MW of old coal-fired plants.

The success of the Indian government's renewables programme has resulted in 350 GW of installed renewable capacity, which is targeted to rise to 437 GW by 2022. The country is now China's largest market for solar panels. However, in a bid

to protect domestic solar panel manufacturers, the government has imposed a 25% tariff on solar panel imports.

Hydroelectricity is also set to rise by 15 GW by 2030.

Pumped storage hydro, thermal storage and battery storage capacity is currently being developed across India and the government's ambitions have attracted the attention of foreign investors. Andres Gluck, Chief Executive of US energy firm AES, is on record saying that India presents a potential investment opportunity of \$50bn for battery storage facilities, for example.

Meanwhile, electrification of transport is both a necessity and an opportunity. India's domestic car manufacturers Tata and Mahindra are building electric cars and buses, and Australia's Magnis Energy Technology has received approval to build India's first of many Giga-plants (able to produce battery cells at the gigawatt-hour level), which are likely to attract additional investment in associated technologies such as domestic and grid-scale energy storage.

India has also made it easier for foreign investment, but better transparency of regulations and terms of business are needed to inject confidence in the bankability of projects.

In addition, to support economic growth, access to electricity for the rural population and the transition to cleaner energy, India's high voltage electricity grid is being upgraded and expanded to meet the needs of distributed power generation. The gas pipeline network is also being extended

South Africa is looking to develop an additional 5,670 MW of solar power as part of its renewables expansion plans  
Photo: Shutterstock/Douw de Jager

to cover the country and gas peaking power plants will be built to support the expected increase and penetration of intermittent renewable energy.

The rate of improvement in the energy sector to date and an enabling environment to support the transition to a low carbon economy suggests that India could reach its Paris Agreement target ahead of the 2030 deadline.

### South Africa to miss target

South Africa, with a population of 60mn and a GDP per head of \$6,179, is the world's 14th largest GHG emitter. Its carbon emissions arise largely from coal-fired power generation by the troubled state utility Eskom, which provides 89% of the 40,000 MW of electricity produced domestically. Despite the government's success in attracting foreign investment in its wind and solar power programme, renewables still provide less than 3% of South Africa's power and the gas-to-power programme is yet to make an impact.

South Africa's target to reduce its GHG emissions to between 398 and 614mn tonnes equivalent of CO<sub>2</sub> by 2030 is ambitious given its reliance upon the availability of cheap coal, a heavily unionised coal mining industry and a virtual state monopoly of the power sector.

A change in leadership, with the accession of Cyril Ramaphosa in February last year, offers the prospect of some degree of market liberalisation. Coupled with an expanding renewable energy sector, this could make some inroads into the country's emissions. There are ongoing discussions to break up Eskom into three parts – generation, transmission and distribution – to gain efficiency and accountability whilst also creating room for independent power producers (IPPs) like Sasol, Globeq and BioTherm Energy to sell power directly to the cities. In addition, there are proposals to build gas power plants fed with imported LNG or by pipeline from northern Mozambique. Recent reports of major offshore gas discoveries off the coast Cape Town could help reduce reliance on coal in the 2020s.

Eskom is investing in increasing high voltage power capacity to strengthen the reliability of the grid in distributing intermittent renewable energy and new supply from IPPs. This investment will accommodate an additional 8,100 MW each of wind and natural gas power, 5,670 MW of solar and 2,500 MW of hydropower if all goes to plan. This dwarfs the planned increase of 1,000 MW of



Brazil's installed wind power capacity could reach 30 GW by 2030 according to Rystad Energy forecasts

Photo: Shutterstock/Dihandra Pinheiro

coal but is insufficient to make a significant dent in coal reliance. To accommodate the intermittency of renewable energy there are also plans for distributed energy storage projects totalling 1,400 MWh to be completed by 2021.

For South Africa, the overwhelming reliance on coal and political hesitancy to market liberalisation makes it unlikely that the country will meet its Paris commitments.

### Brazil and enviro-sustainability

Brazil, with a population of 207mn has the eighth largest economy in the world. With a GDP per head of \$9,894, it is richer than both South Africa and India thanks to the size of its oil and gas reserves, whilst industrialised agriculture has propelled it into becoming the world's second-largest ethanol fuel producer. Hydroelectricity today provides 70% of Brazil's 87 GW electricity generating capacity, augmented by biomass, which contributes around 12 GW, and natural gas power 13 GW. Consultant Rystad Energy forecasts that Brazil's installed wind power capacity could reach 30 GW in 2030.

Brazil has pledged a 43% reduction in emissions by 2030 compared to 2005.

Global transport emissions must be curbed significantly if there is any chance of keeping temperature rises to within 1.5°C. British battery specialist OXIS Energy is constructing a battery production plant factory in Minas Gerais in south-eastern Brazil, to serve electric cars and buses supplied by Tesla, BMW and Hyundai.

Extensive drought over the years has resulted in severe water shortages that have reduced hydro generation significantly. As a result, Brazil has increased investment in gas-powered plants, with feedstock imported from Bolivia and Argentina. Meanwhile, economic and population growth have provided attractive opportunities

for oil majors including Shell, Total and Equinor to invest in wind and solar electricity projects in Brazil.

However, the new government, major landowners and industry are weakening Brazil's resolve towards sustainability. President Jair Bolsonaro has cancelled hosting of the 25th United Nations Conference on Climate Change (COP25) due in December 2019. The Amazon rainforest – a massive natural resource for carbon capture – is being shredded by land-hungry farmers and loggers who are depleting this invaluable carbon storage system. Moreover, red tape, corruption and political problems are damaging the bankability of new energy projects.

Despite these setbacks, due to its reliance on hydroelectricity, 'clean' natural gas and expansion of wind and solar electricity, Brazil is considered to be environmentally sustainable compared to the other BRICS countries.

### Challenges ahead

India, Brazil and South Africa need to increase power capacity rapidly to meet demand from growing populations, urbanisation and to meet the needs of fast economic development. All three are handicapped by energy nationalism, corruption and various degrees of government insecurity. Increasing gas-fuelled electricity alongside renewables, at the expense of coal, is a challenge for both South Africa and India. In all three BRICS, hydroelectricity is vulnerable to drought.

Investment opportunities lie in helping these economies adapt to the physical consequences of climate change and measures to mitigate emissions such as transitioning to cleaner fuels, grid-scale energy storage, electric vehicles and potentially hydrogen for transport.

The World Economic Forum's *Fostering effective energy transition* report published in March 2019 ranks 115 countries on how well they are placed in making the transition towards energy security and access, environmental sustainability and affordability of electricity. On environmental sustainability, Brazil ranks eighth out of the 115 and is best amongst the BRICS, followed by India at 86 but second best in its peer group. South Africa lies towards the bottom of the league, ranked at 114 out of 115 with regard to environmental sustainability and transition readiness. ●

\*BRICS is an association of the five major emerging national economies of Brazil, Russia, India, China and South Africa.