ENERGY Review

August 2019
Volume 1 Issue 5

Energy Review newsletter covers issues of global relevance in the energy and climate domain. The newsletter is published by an informal network of scholars interested in energy studies.
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ADVISER'S NOTE

Energy for a Better Future

For time immemorial, energy in its various forms has been central to human society, unlocking our potential across geographies and cultural and economic boundaries. It has enabled feats of human ingenuity and provided us with light, warmth and mobility in ways never before imagined. Yet from the start, the gift of energy has also shown a darker side – as a tool for warfare and destruction, and more recently as a source of variegated risks to human health and the environment. From the suffocating air in 19th century London to the current climate crisis, we have always had to contend with the undesirable effects of energy production and consumption. Both the attendant challenges and some of the policy and technology options at our disposal are described in this latest issue of the Energy Review, challenging us to harness that same ingenuity for a better future. ■□■

- Dr. Michael A. Mehling (MIT)

Opportunities in India's Energy Sector: A View from Australia

Dr. Ashutosh Misra

Policy reforms under the Narendra Modi government, elevating India's 'doing business with ease' rankings and making it the sixth fastest growing economy, surpassing France, has captured Australia's attention as well. Former Secretary of DFAT (2012-2016) and Australian High Commissioner to India (2009-2012), Peter Varghese's 2018 timely report, "*An India Economic Strategy to 2035: From Navigating from Potential to Delivery*" crystal gazes future opportunities across ten key states and sectors in India, including energy.

Making a fossil fuel imports dependent (covering 70% demand) India, a $5 trillion economy would require increasing the share of non-conventional energy production. As the third largest consumer of electricity in the world, with an installed power capacity reaching 345.49 GW as of July 2018, India's power sector requires an 8% growth per annum. With its burgeoning population and industrialisation, power demands estimated to increase from 1160.1 TWh in 2016 to 1,894.7 TWh in 2022, will be covered under new schemes like the Deen Dayal Upadhyay Gram Jyoti Yojana, Integrated Power Development Scheme and Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya). These schemes are open for 100% foreign direct investment.

Conventional Energy

India's power sources include thermal (coal & gas, 64%), hydro (13%) and nuclear (across 7 plants, 2%), and an increasing share of renewables (21%). India's Draft National Energy Policy also is looking at making India self-sufficient in thermal coal by 2037. Currently, India is Australia's fourth largest resources and energy trading partner totalling $5 billion. The Australia-India Joint Working Group on Energy and Minerals, 2000, provides the bilateral mechanism for cooperation and implement the Strategic Action Plan, 2008. Australia supplies around 71% of the cooking coal to India which will further rise following the clearance for Adani Enterprises' Carmichael mine in North Queensland.

It is noteworthy that the first delivery of uranium has already completed by Australia, post-signing of the Civil Nuclear Cooperation Agreement, 2016. Uranium exports will grow further as India places more IAEA safeguards at the 10 new power reactors for generating 7,000 MW of clean energy. The existing reactors too, require renovation & modernisation (R&M), containing impressive returns on investments

over the next 25 years. The Varghese report reminds policymakers and businesses that the demands for energy commodities such as LNG, coal and uranium, and Australian expertise in mining equipment, technology and services (METS), will grow steadily to 2035.

Renewable Energy (RE)

India's RE target set at 175 GW [comprising wind (60 GW) and solar (100 GW)] by 2022, is due for a six-fold jump by 2030 from 70.65 GW in 2017, largely due to declining tariff and equipment costs and increasing regulatory support for RE procurement. Additionally, 40 GW of energy will be generated through solar rooftop projects by 2022. Wind energy is another promising sector in which India ranks 4th globally. But India's RE sector requires state of art load & weather forecasting tools and facilities, energy storage system, improved transmission capacity and high-quality solar panels. Large scale solar plants installed in the Eastern Ghats do not last long, and their maintenance and replacement undermine their viability and cost-effectiveness, raising prospects for foreign R&D collaboration.

Australian businesses may tap opportunities in India's RE infrastructure including, power quality management (voltage flickering, unbalanced phases voltages and harmonic distorted supply), mini and smart grids and smart meters to supply electricity to households, commercial, industrial, and institutional organisations through a power distribution network. Smart grids are on the anvil in Maharashtra, Gujarat, Tamil Nadu and Karnataka (all priority states in the Varghese report). As a founding leader in the International Solar Alliance, India is looking for joint ventures in investments and R&D with Australia. An Australian company, ITP renewables has already undertaken a feasibility study and provided 13 recommendations to India's National Solar Mission project on concentrated solar power panels. India's RE-based water supply and locomotive manufacturing can also benefit from Australia's expertise. Both sides can further advance the use of aviation fuel from sugarcane (ethanol based).

Electric Vehicles (EV)

Reflecting the rising global trends, in India the EV Sales is projected to grow exponentially and achieve 100% vehicle sale electrification by 2030. The Government of India is inviting an expression of interest under the Phase-II of the FAME India Scheme [Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India] for 3 years commencing from 1 April 2019, with the total budgetary support of Rs. 10,000

Crore. The objective is electrification of the public & shared transportation. In the EV sector, there are huge opportunities ahead for Australian based companies in investment, manufacturing of batteries and installations of charging stations at government and public places.

Australian industry bodies, businesses and research organisations are deepening their presence in India as a stable and strong supplier of commodities and services to help India meet its energy demands.

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'Climate Refugees': Sans Recognition, Sans Home

Abhilasha Singh

In 1995, a report titled 'Environmental Exodus' published by Norman Meyers and Jennifer Kant argued that by 2050, the world could have almost 200 million environmental refugees. Even today, this figure strikes a nerve. In 2017 itself, 18.8 million people in 135 countries were internally displaced owing to sudden environmental disasters. We are rapidly approaching the tipping point with no escape plan whatsoever.

In the Anthropocene era, climate change has sparked off the ultimate contest for survival as millions of living beings fall prey to it. Initially slow and gradual, it is now occurring with an accelerated pace and erraticism that is increasingly difficult to cope with. Floods, wind-storms, droughts, earthquakes, inconsistent rainfall and not to forget the progressively rising sea levels, are causing forcible displacement of innumerable people as 'climate change refugees' on an annual basis. But while the term 'climate refugees' has come in vogue in the media and popular discourse, it has no international legal validity whatsoever. Neither the 1951 Refugee Convention nor its 1967 Protocol recognizes 'Climate Refugees' as a migrant category, hence they aren't entitled to protection under any international legal frameworks. There are two primary reasons behind this hesitation towards a global, formal acknowledgment of Climate Refugees.

Firstly, besides the fact that the UNHCR (the international body for handling refugees) has already a lot on its mandate and is resistant to addressing climate migration as a whole new category, there is a considerable degree of intellectual disagreement over the 'monocausality' between climate change and migration. Ironically, environmental change was considered a primary agent of human

mobility among the founders of migration research. Juxtaposing this fact with the contemporary times we see that migration has become a complex process driven by a multitude of interlinked social, economic and political factors. As the world is experiencing a migration explosion, we find the discourse tilted in favor of the 'minimalists' who believe that *'the range and complexity of the interactions between these drivers [of migration] means that it will rarely be possible to distinguish individuals for whom environmental factors are the sole driver'*, (The Foresight Report on Migration and Global Environmental Change, 2011).

Secondly, most of the Climate Change induced displacement till now has been internal in nature i.e. within the boundaries of the country itself. Just a decade ago, more than 2 million people were internally displaced when the Cyclone Aila hit India and Bangladesh in 2009. Similarly, in 2013, the Typhoon Haiyaan led to the internal displacement of more than 4 million people within the Philippines. Even at present, parts of North East India and Nepal are getting devastated as incessant and inconsistent flooding has rendered lakhs of people homeless. While these numbers are nerve-wrenching, it is true that these internally displaced people don't exactly qualify as 'refugees' in legal terms as there isn't a change of national boundaries in the migration process.

Keeping aside the political and legal polemics around the issue, climate change induced large scale dislocation of people is a staggering reality with far-reaching socio-economic repercussions. In India itself, as experts have pointed out, such migration and displacement will not only be internal but will also involve external refugees. While increasing droughts, desertification and water scarcity drive out thousands of people from states like Bihar and Orissa, India is also receiving millions of refugees from neighboring states like Bangladesh that are even more vulnerable to climate change (Human Development Report 2007/2008). The point is, therefore, that denial of recognition to such mass displacements over the technicality of 'crossing an international border' is complete devaluation of the problem. In 2006, the Telegraph reported that submergence of the Lohachara Island in the Sunderbans caused a mass movement of the people to the Sagar Island. Sure, no international boundaries were crossed, but does it imply that such an event doesn't require international aid and protection? Moreover, keeping with the current trends, entire countries disappearing from the world map will not be an impossible reality. Tuvalu, Kiribati and other Pacific Islands are

countries see-sawing between survival and extinction as the sea is encroaching upon them. What will happen to their entire populations? Where will they go? Who will take the responsibility? The clock is ticking.

What we need is to bring into the climate change discussions its social dimensions as well. While the climate migration discourse seems to have entered the arena of high politics, it is dealt with as a security concern more than a humanitarian one. For example, Al Gore during his Nobel lecture stated that '*climate refugees have migrated into areas that are already inhabited by people with different cultures, religions, and traditions, increasing the potential for conflict*'. In 1988, Jodi Jacobson also published in his study, '*the vision of tens of millions of persons permanently displaced from their homes is a frightening prospect, one that could rival war in its effect on humanity.*' These geopolitics of fear and 'boundary-reinforcing cartographic anxieties' about climate change induced migration have led to a huge understatement of the problem keeping it confined to the Global South. However, we forget that the countries most vulnerable to climate change are those that are least prepared and equipped to deal with it. It is high time that we give legal recognition to the climate refugees and establish institutions and frameworks for their protection and safe relocation. Mitigation and Adaptation are the two swords to battle climate change and we need to use them both, going beyond the national boundaries - which won't be left to protect, if it is too late.

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Green Bonds – The Idea Whose Time has Come

Divya Akhauri

India has set forth an ambitious target of creating 175GW of renewable energy capacity by 2022. Although good in its intent, it is estimated that the funding requirements for such a gigantic upscaling would exceed $200 billion. The big question, then, is that where will the funding come from?

Budget allocations and alternate funding sources such as a robust carbon tax scheme have not been sufficient enough to meet the funding requirements The Indian banking system is ridden with non-performing assets and face asset-liability mismatch when it comes to lending short-term funds for renewable energy projects that tend to have long gestation periods. Moreover, renewable energy is clubbed in the same basket of power/infrastructure category, along with non-renewable, traditionally tested sources such as coal. Hence, the banks tend to channelize most of their funding towards reliable coal power projects, leaving the renewable energy sector without adequate funds. International sources of funding also don't appear to be promising at this stage, especially after setbacks such as USA's withdrawal from the Green Climate Fund and a shift in the orientation of the US government under President Donald Trump who has dismissed climate change as a reality.

In such a grim situation, green bonds have been touted as the best way forward to finance climate projects. Green bonds are debt instruments that enable an entity to raise money from investors specifically to finance green projects.

There are several obvious advantages to raising money through green bonds. Green bonds offer better returns as the interest rate charged is much lower than that charged for bank loans. They also encourage longer repayment schedules. Green bonds target a niche market of investors looking to invest specifically in attractive green projects. As the consciousness amongst people about the necessity of shifting to cleaner alternatives of energy increases, the market is expected to boom. Green bonds will help a company diversify its investors and garner greater capital inflow from global investors. It also enables the issuer to enhance their reputation and showcase their commitment towards sustainable development.

In India, the growth of green bond market has, in the recent past, been very promising. In 2017, Climate Transparency

Group's Brown to Green report ranked India 5th amongst all G20 countries on the basis of green bonds issuance in the overall debt market. In fact, bonds issued in India are often oversubscribed, hinting towards great enthusiasm and demand amongst the investors for such an instrument. For instance, green bonds issued by EXIM Bank of India in 2016 was oversubscribed by 3 times.

India's approach towards green bonds has been proactive. We appear eager to reap the benefits of the green bond market. Recently, Exim Bank of India issued a 5-year $500 million dollar-denominated bond to finance projects in countries such as Bangladesh and Sri Lanka. This shows our eagerness to translate the economic benefits of green bonds into soft power and improved neighbourhood relations.

In terms of regulation of the market, appropriate measures have been in a systematic manner. For example, in 2016, SEBI published Green Bonds Requirements for Indian Issuers and listed broad category of projects that are considered green. In 2017, it issued a circular to set out disclosure norms for issuance and listing of green bonds in India.

However, it is important that while we immerse ourselves into the opportunities of the green bond market, we are equally aware of its limitations. The biggest issue is that the repayment of bond is tied to the issuer and not the success of the project. Hence the risk stays with the issuer and not the investor. Further, projects funded by green bonds are often accused of not being "green" enough. For instance, Reuters reported of the French utility GDF Suez issuing green bonds to fund a dam projects that disturbed the Amazon rainforests.

Further, due to its novelty, it is perceived as risky by buyers who don't invest in any bond that is rated lower than AAA-. Another hurdle is that many investors are still conventional in nature who invest on credit fundamentals as opposed to green fundamentals.

These limitations are significant but not impossible to minimize. There exist adequate policy tools to make the green bond market more sustainable and profitable, such as specifying the exact criteria to label a project as "green", raising awareness and promoting research on the reality of global warning and how different sectors like energy contribute to it, generate confidence amongst investors and reduce risk for those investing in low-rated bonds etc.

IPCC's Special Report on Global Warming of 1.5 °C has highlighted the sombre reality that the world is not on track

to limit temperature rise to 1.5 °. Urgent evidence-based action at all level, from individuals to the international community is the need of the hour. Effective development of the green bond market is a small cog in the wheel that can help achieve climate action.

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Outcomes of the Bonn Climate Conference 2019: Implications for the Global South

Sruthi Kalyani A

'We must ask ourselves seriously whether we wish some future universal historian on another planet to say about us : "With all their genius and with all their skill, they ran out of foresight and air and food and water and ideas", or, "They went on playing politics until their world collapsed around them."'

- *U Thant, Secretary-General of the United Nations, 1971*

Taking a view from the Global South, if one has to evaluate the multilateral talks held at the Bonn Climate Conference 2019 (Bonn 2019), a wide range of contentious issues come to question. Some of these issues include concerns on the water-food-climate nexus, the Loss and Damage mechanism, and the acknowledgement of 'scientific knowledge gaps'. This article is a brief analysis of the progress at Bonn 2019 on the aforementioned themes, and their implications for the developing countries.

Water-Food-Climate Nexus:

As a sign of progress in decision 4/CP.23, under the Koronivia Joint Work on Agriculture, two expert group workshops were held at Bonn 2019. These workshops, which focused on assessing adaptation co-benefits and resilience , and on improving soil health, had participation across different stakeholders that exchanged experiences on climate adaptation and efficient water management techniques respectively.

The problem of climate adaptation in developing countries, however, majorly revolves around the lack of financial capabilities and scientific metrics to monitor policy implementations. The future of the Adaptation Fund (AF) remains unclear under the proposed replacement of Clean Development Mechanism (CDM), as AF has a major part of its inflows coming from the proceeds of the CDM. Thus, the dilution of AF can delay major adaptation projects in developing countries. While the Bonn 2019 served as a platform to share information and best practices on climate-smart

agriculture, proposals of alternative funding mechanisms and holistic measures to track collective progress in adaptation policies still remain as overlooked topics.

Loss and Damage:

The pillar of 'Loss and Damage' has always been neglected in the majority of climate negotiations. At Bonn 2019, as a small step ahead, the Terms of Reference for a review of the Warsaw International Mechanism was finalized, which outlined the mandate, objectives, and scope of the review. It called for parties to consider "barriers and gaps, challenges and opportunities, and lessons learned". This can serve as a possible scope for the developing countries to address and negotiate their long-call for compensation and legal remedies with respect to loss and damage. The depth of its progress, however, is much-awaited to be reflected at COP25.

Deferred Decisions:

The Subsidiary Body for the Scientific and Technological Advice (SBSTA) agreed to take up the methodological issues of the Kyoto Protocol that deals with land-use pattern and afforestation activities of the CDM to the 52nd session of the SBSTA. The scope of new market mechanisms and non-market-based approaches that were a part of the agenda were also deferred to the future SBSTA sessions. With the alarming rate of climate catastrophes, the parties have to realise that every delayed scientific decision can take an exponential toll on the survival of climate-vulnerable countries.

Another major setback at the Bonn conference was the lack of consensus on the take of 'science' that formed the foundation of IPCC Special Report on Global Warming of 1.5°C (SR15). As a dire outcome, scientific workshops that were scheduled for the upcoming negotiations in December 2019 were stalled.

The lesson from the exclusion of SR15 at Bonn 2019 is clear – nations still prioritize geopolitical ambitions over climate actions for survival. The result is laggardness in negotiations and an incrementalism that leaves square-bracketed drafts for future diplomatic venues. The only way ahead for us is to think beyond politics, make clarified calls on consensus, and act with swift scientific temperament before the world collapses around us.

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WELCOME NOTE

Energy Review welcomes Prof. Girijesh Pant to the Advisory Board. Prof. Pant, a renowned expert on energy and international studies, is a former Professor and Dean of the School of International Studies at Jawaharlal Nehru University. Prof. Pant, currently a National Fellow of ICSSR formerly held positions as Vice Chancellor of Doon University and GGD University, India.