วารสารรัฐศาสตร์และรัฐประศาสนศาสตร์ ปีที่ 15 ฉบับเพิ่มเติม 1 (มกราคม-มิถุนายน 2567): 217-246

Green Energy Diplomacy in the Post Covid-19 World: India's Efforts towards Climate and Energy Security in the Global South

Aditi Basu[1]

Received: 31 May 2024
Revised: 24 June 2024
Accepted: 25 June 2024

Abstract

India currently faces a situation where economic growth and citizens' welfare depend on factors like access to energy. Under these circumstances, it becomes critical to examine the need of renewable energy in India. With its commitments on dealing with climate security issues and its own Nationally Determined Contributions, India now banks on clean and renewable sources of energy as the best option available at its disposal. Amidst the Covid-19 and the ongoing Russia-Ukraine conflict, energy security has, therefore, become the key concern of India's foreign policy. India's excessive reliance on coal and petroleum led to its increase in emissions generating environmental havocs. To avert these crises, India is boosting up its renewable energy sector as the best option for a sustainable future. It has also taken progressive steps in the promotion of renewable energy through multilateral partnerships like the International Solar Alliance. At the 27th Conference of Parties (CoP-27) held in Egypt in 2022, India stated how it had achieved great heights in RE through its updating of the Nationally Determined Contributions in August 2022. Therefore, the paper answers an important question in the literature on renewable energy politics: "In which ways has India linked climate diplomacy with energy security after Covid-19 through the promotion of renewable sources at the international and national levels?" The paper is significant for researchers to view India's role as a Global South climate leader in a post-pandemic world order by bridging the Global South and the global north divide through renewable sources promotion. The paper also explores the close relationship between climate change and energy security, especially in a post Covid-19 world, where climate change and energy crises are no more national issues but global issues.

Keywords Global South, Loss and Damage Fund, Panchamrit, Renewable Energy, Net-Zero

[1] India-based Independent Researcher, India. E-mail: aditibloyolajsr@gmail.com

1. Introduction

The GS, in the 21st century, faces challenges of meeting the energy needs of growing population with "limited sources" where sustainability, climate issues and waste management are often compromised (Gavankar, 2023). Hence, a post-pandemic world has "renewed" its focus on RE and climate-resilient infrastructure in four sectors, namely, RE, electric vehicles, green buildings and waste management (Gavankar, 2023). Since decades, it has been witnessed that the GS bears the burden of increasing greenhouse gas (GHG) emissions due to rampant anthropocentric activities which makes them vulnerable to climate disasters like earthquakes, droughts, sea-level rise that result in widespread population displacement, thereby, threatening the socio-economic development of a nation. This was the central argument of the United Nations (UN) 27th Conference of Parties (CoP) (See Footnote 6) held at Sharm-el-Sheikh, Egypt in 2023 which was concluded with an "extended period of negotiations". Although critics opine that it failed to arrive at concrete decisions on fossil fuels' phase-down, it argued for the establishment of a Loss-and-Damage (L&D) fund framework that would be financed by the world's "historical emitters", that is, the Global North (GN)[2] who have been contributing to an overall increase in GHG emissions because of which the crunch of climate disasters is being borne by the GS. Henceforth, it was decided that the GN would "compensate" the GS for its environmental disasters by bearing the responsibility of transferring climate finance to the L&D fund. India had been long advocating for the L&D fund that would finance infrastructure rebuilding and economic recovery in the disaster-struck GS countries. Such global initiatives reflect India's important role in negotiating climate change mitigation strategies as a GS country which is one of the world's fastest growing economies.

As the world struggles through an energy crisis, it looks up to RE to meet its rising demands. With the Russo-Ukraine conflict further pushing up fuel prices since 2022 (Kolaczkowski, 2022), the global energy crisis has "motivated nations" (International Energy Agency, 2022) to switch over to renewables like solar and wind electricity that reduce imports costs and meet energy demands. International Energy Agency (IEA) Director Mr. Fatih Birol states that quick expansion of renewables has "kicked an extraordinary new phase of even faster growth" (International Energy Agency, 2022) with the world set to increase its RE capacity within the upcoming five years at a rate equivalent to that of the last 20 years, with

[2] The Global North comprises of the western world with countries like Canada, Israel, Russia, Turkey, United Kingdom, United States of America and the entire European continent with Asian and Pacific countries like Australia, Hong Kong, Japan, Macau, New Zealand, Singapore, South Korea and Taiwan (Japan and South Korea are the only Asian countries that do not form the Global South). They are characterised by high income levels, economic development, political education, industrialisation, existence of human rights, minimum socio-economic disparities and wealthier than the Global South countries. Some of the nations share a history of being colonisers if Global South which has been historically responsible for the existing inequalities (Worldatlas.com, 2022)

wind and solar energy projects contributing to 90 percent of the total RE capacity over the next five years. While Europe and USA show "emerging diversification signs" in solar photovoltaic (PV) projects, India, as an emerging economy, has set an example for the GS in boosting RE through its ambitious climate targets through renewables to achieve net-zero[3]. Such targets would enable India to achieve its multidimensional goals of climate change mitigation strategy, energy security, import costs reduction, waste management and employment generation.

However, since the late 20th century, India's "renewed focus" on climate change can be found through measures like electricity generation from wastes and switching over to renewables that reduce its reliance on conventional fuel sources. This has been accelerated during Covid-19 when global supply chains were disrupted that affected universal access to electricity, especially in the GS (World Health Organisation, 2022). It is in this backdrop that India has widened its global outreach to solve both climate and energy security multilaterally through its grassroots' level ratification of international climate commitments. Such an opportunity is offered by G-20 (Group of 20)[4] whose presidency was wielded by India between December 2022 and November 2023 respectively. Of late, India has become an inspiration for both the GN and the GS, given its ambitious climate targets and their achievement before deadlines, thereby, offering the lowest prices of solar-powered renewables and green hydrogen at competitive prices globally (ET Energyworld, 2023a) which attract foreign investors and set an example of sustainable development. Such achievements prove India's potential in leading global RE projects which adds to employment opportunities, strengthens economies and enables it to become a global exporter of RE. After India, with Brazil and South Africa all set to assume G-20 presidency, the world's geopolitics shows a shift of focus from the GN to the emergence of the GS for investment and L&D fund mobilisation, climate and energy security (Nodo, 2022). India's South-South cooperation on these issues is instrumental for the GN since the GS is a fertile ground for solar energy production, given its geographical location in the Tropic of Cancer (Rongmei, 2022). Thus, India's clean energy strategies call for sustainable urbanisation, innovative low-emission industrial system, energy and carbon-free transportation through innovations in solar, wind and hydro power projects, green hydrogen along with green fuel manufacture. As a growing economy of the GS, energy security and stability remains on India's forefront which it aims to fulfil through renewables as it needs to secure 50 percent of its

[3] The term "net-zero" means reducing emissions to a minimum. It aims to limit temperature rise by greenhouse gas emissions reduction by cutting down coal consumption, switching over to renewables, efficient waste management strategies, afforestation measures and promoting e-vehicles usage. While the EU aims to achieve net-zero by 2050, India targets to achieve it by 2070.

[4] Formed in 1999, the Group of 20 (or G-20) is an organisation of world's largest economies from both Global North and South including 19 countries and the European Union. It addresses global issues like climate change, energy crisis, financial stability and sustainable development.

energy requirements from them by 2030 (ET Energyworld, 2023a). At this stage, what India needs is finance and technology transfer from the GN countries to address its climate and RE targets as reiterated by the L&D fund and such targets will drive international cooperation towards achieving RE targets (ET Energyworld, 2023a). It is since 2014 that the Indian economy is the world's fastest growing energy hub (PIB, MNRE, 2022b) in terms of "renewable capacity transition" (Anand, 2023) to have achieved 40 percent of its installed electricity capacity through renewables in 2021, nine years before its deadline that indicates its ambitious and consistent global efforts towards net-zero.

Therefore, the paper is divided into two broad sections: in the first section, it talks of India's role as a vital GS nation in bridging the North-South divide and allowing each country to explore avenues in RE promotion, so that all are mutually benefited in terms of meeting net-zero goals, tackling rising energy requirements and climate challenges. It explains how the GN is responsible for GS' climate challenges and how it can collectively work for securing the GS' future through fund transfer like the L&D fund, while in the second section, it focuses on how India has achieved RE transition at the national and local levels by bridging climate challenges and energy security with a focus on its various schemes and initiatives. The analysis of India's green energy projects calls for a case study to highlight its role in renewables promotion for emission reduction and energy security through self reliance that transforms its global image from a GS coal-based economy to an emerging GS climate and RE leader.

2. Objectives

(1) to analyse India's role as a GS climate leader in bridging the North-South divide and opening avenues for greater cooperation through RE promotion;

(2) to analyse India's national and domestic RE commitments through its initiatives that link its climate goals with green energy.

3. Methodology

This paper highlights India's vision for attaining its international climate goals through multilateral cooperation and setting up of RE projects at the domestic level. Based on qualitative research sources like reports by the international organisations and the Indian government, conceptual analysis of terms like Global South[5] and North, CBDR, net-zero and Panchamrit, is applied

[5] Global South broadly refers to the developing and underdeveloped countries of Latin America, Africa and Asia where the world's highest population resides (mostly, in the Tropics) excluding Israel, Japan and South Korea. The region is characterised by low-income, high poverty levels, poor educational and healthcare facilities, dense population and political or cultural marginalisation (Arbab, 2019). These have been historically subjected to European colonialism

as a framework to analyse the role of RE as an alternative to petroleum in India's climate diplomacy and to address the GS' climate challenges articulated at macro to micro levels in the post Covid-19 world order. While content analysis is often applied in discourses of India's international climate negotiations, this research offers a novel insight into rethinking a link between climate change and energy security that emphasises the role of RE in India's commitments towards attaining net-zero. The research uses qualitative method analysis in an exploratory case study to develop a more comprehensive understanding of the North-South divide, the GN's historic responsibilities towards the GS, India's role as a GS climate leader in bridging the divide and its domestic initiatives that call for multilateral cooperation to meet global commitments. It has collected data through a literature review using political and economic approaches. Secondary data has been obtained by analysing government reports, articles, books, research papers, journal chapters, websites and newspapers. Official reports uploaded in government sites have been studied. The methods allow a better understanding of the relationship between India and the globe in RE diplomacy in the 21st century, in general, and in the post-pandemic world, in particular.

The main official sources can be best demonstrated through the following table:

Table 1: Sources used in the research

Levels	Official Sources
International/Global	International Energy Agency (2022), World Population Review (2023) and World Health Organisation Departmental News (2022)
National/Domestic	Reports and data released by the Government of India through the Press Information Bureau (Cabinet, Ministry of External Affairs, Ministry of Environment Forest and Climate Change, Ministry of New and Renewable Energy, Ministry of Consumer Affairs, Food & Public Distribution and Ministry of Petroleum and Natural Gas) between 2020 and 2023

Source: Author

and, until recently, they were not industrialised because they sustained their livelihood on agricultural practices.

4. Literature Review

While there are numerous studies examining India's climate and green energy diplomacy in specific fields such as green hydrogen, biofuels, solar and other forms of RE, a comprehensive examination of India's holistic alignment strategies between climate challenges and energy security as a GS country is noticeably absent from the existing literature. The literature possesses India's diplomatic strategies in bringing the GS and the GN together at the international level and RE transition initiatives at the domestic level which significantly influences its global standing. Moreover, the literature review reveals a crucial gap in the understanding of intrinsic ways by which India has bridged the North-South divide through climate and RE diplomacy by aligning its domestic goals with the global ones, especially in the post Covid-19 world order. In this paper, the term "climate diplomacy" and "renewable energy diplomacy" have been repeatedly used to talk of India's negotiations, discussions and deliberations on global platforms and through bilateral agreements to to stress the need of RE as a vital climate change and energy crisis mitigation strategy that needs to be implemented on joint basis through technological know-how and finances from the GN and cheap labour, land and other natural resources readily available in the GS.

Existing studies predominantly focus on India's policy discussions and deliberations on the global stage, neglecting the comprehensive analysis of internal policies leading to their landmark achievements that draw parallels with India's efforts as a GS climate leader. Therefore, there is a pressing research gap calling for a more nuanced approach to study the alignment of India's international commitments with its domestic ones after Covid-19. This approach should consider both the internal and external dimensions of these strategies, encompassing the distinct diplomatic, political, social and economic aspects of each initiative. By filling this gap and adopting a multi-dimensional approach, this research aims to shed light on the comprehensive and interconnected factors of climate change and energy crisis that shape the international dynamics and domestic initiatives of India. India's climate diplomacy, originally started by the former Indian Prime Minister Smt. Indira Gandhi in the 1980s to highlight the GS' climate challenges caused primarily by the GN nations since colonialism, has been continually applied while India has voiced the GS' climate challenges to counteract the GN's stakes. However, it has also been meticulously studied by the scholars in the domains of climate finance and energy security.

For example, Mohan (2017) highlights India's evolution in climate politics from being a 'protest voice' to one who shapes its own ways to combat climate change as a 'subset of its foreign policy agenda'. He analyses the active drivers of India's climate negotiations and argues that the shifts in India's stance in climate change negotiations have resulted in its 'greater responsibility in the management

of global commons'. In the end, he concludes by saying that India's geopolitical strategies have shifted towards pragmatism which is reflected in its engagement in climate negotiations. His paper analyses gradual changing roles of India in climate politics internationally but all in a pre-pandemic context. On the other hand, Thaker and Leiserowitz (2014) have written that India's concerns about environmental degradation, energy crisis, climate vulnerable and its ambitious climate goals have led to a "plurality of discourses" highlighting its "potential implications". They describe India's approach to climate diplomacy as the one centred on "co-benefits" that is progressed by the existence of different non-governmental institutions. Climate change has become a "discursive weapon" for the grassroots organisations who try to "reinforce and amplify their critique of Indian government's developmental policies" and that the policies involve a "closed-door" legislation. However, little does their paper focus on India's achievements as a GS country in climate diplomacy in a post-pandemic world. While this literature cover interesting and crucial themes, they fail to offer a holistic approach. Hence, this article seeks to provide a broader lens through examining internal and external dimensions from political, socio-economic and diplomatic considerations. On a positive note, this set of literature has accentuated the saliency of India's diplomatic and national strategies for the GS countries. However, none has focused on the implications for bridging the North-South divide on other GS countries and on India, in specific. Besides, as these scholarly works place greater emphasis on external factors in foreign policy adjustments, there is a neglect in the examination of India's adherence to the Panchamrit strategies while analysing its diplomatic execution of domestic climate and RE strategies. Besides, these issue-based researches do not comprehensively consider the multiplicity of political, economic, societal and diplomatic factors. Hence, this article aims to fill the lacuna by adopting a parallel diplomatic-domestic approach to the study of holistic climate change challenges and RE strategies of India.

5. Bridging the North-South Divide

India, as a GS country, houses 20 percent of the global population (Intergovernmental Panel on Climate Change, 2022) and has been prone to climate catastrophes, given its geopolitical strategic location in the tropical South Asia. This makes climate a global common and requires the responsible action of bridging the North-South divide to mitigate its disastrous effects, constituting the global public good. Having clearly articulated its position in acknowledging the "historical responsibility of the North" for its emissions (Dubash, 2013), India, in its climate negotiations at the United Nations Framework Convention for Climate Change (UNFCCC)[6] Rio Summit in 1992, urged the GN to strengthen its financial

[6] The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted at the Rio Summit of 2992 to combat GHG emissions in climate

and technologies' framework (Dasgupta, 2012) in assisting the GS as climate crisis reparations. It led to the formulation of "an equitable agenda", thereby, institutionalising the "Common but Differentiated Responsibilities"[7] (CBDR) principles (Hurrell & Sengupta, 2012) (Thaker & Leiserowitz, 2014). As India's first diplomatic victory, the GN's responsibility was further channelised in the 1997 Kyoto Protocol which confirmed its initiatives of reducing their emissions while India and other GS nations were exempted from bearing the burden of climate change mitigation costs. The world's largest democracy has, of late, been an "emerging economic power"[8] and adhered to the principle of CBDR, the definition of which was further elaborated at the CoP- 25 (PIB Delhi, 2019) in Madrid in which India reiterated its claims that the GN was primarily responsible for the ecological damages caused to the GS nations because of the former's rapid industrialisation and that it should take a lead in making up for the damages by "fulfilling climate finance commitments" of 100 billion dollars annually by 2020. These indicate the GN's "deeper pockets of responsibilities" (Oguntuase, 2023) to fulfil "pre-2020 commitments" that stands for the promises to be fulfilled by the it under the Kyoto Protocol, leading to the establishment of the loss-and-damage (L&D) fund mechanism (also known as the Warsaw International Mechanism) (UNFCCC, 2016) during the CoP-21 in 2015. However, the L&D fund was formally agreed to by the GN nations at the CoP-27 held at Sharm-el-

change. It lays down several policy agreements to check climate change, ensure food security and sustainable economic development. Its yearly conferences are called Conference of Parties (CoPs) where members meet annually to discuss progresses on climate change mitigation strategies.

[7] The CBDR principle, the first international legal instrument advocated in UNFCCC Rio Summit of 1992 to address climate change, states that all nations are obliged to address environmental destruction and climate change, however, the obligations are not equal. The developed world, being the most industrialised, responsible for climate change which allows less opportunities for the developing countries to industrialise. Hence, the developed world should pay compensation for the damages incurred and reduce their industrial emissions, hence, allowing the Global South for industrialisation.

[8] The world's economic hegemony seems to shift "from west to the east" and it is expected that by 2030, the top three economies of the world shall be China, India and Japan, all being Asian. According to reports by Morgan Stanley, India is currently the world's sixth largest economy and is the fastest growing economy in the world. It is predicted to take over Japan in Asia with its second largest projected GDP exceeding 8.4 trillion dollars and might also exceed that of Germany and UK in the world by 2030. Consequently, its per capita income is expected to cross 15 thousand dollars by 2047 with its GDP exceeding 26 trillion dollars. It shall become a global manufacturing and technology hub to diversify its supply chains, owing to its investment-attracting policies and reforms, renewable energy transitions, digitalised infrastructure, sustainable transition procedures and global competitiveness. Many Multinational Corporations (MNCs) look towards India as "an investment destination" with its "entrepreneurial, English-speaking and digitally literate" working-age population exceeding 900 million. Therefore, in the post-pandemic world, the World Bank, IMF and the Global Consulting Firms claim that India "is on the verge of becoming an important world economic power in the near future" (Deshpande, 2023) because of which it can be called an "emerging economic power".

Sheikh when India reiterated on an L&D framework that focuses on "the inclusion of 1.5°C temperature limit" (Harvey & Goldenberg, 2015) for the GS through the co-operation of the GN which was responsible for climate change and environmental catastrophes in the GS and, therefore, would "compensate vulnerable countries suffering from climate change" (Wyns, 2022). Thus, India was seen as a "cooperative" (Oguntuase, 2021), a negotiating partner and a "climate-enthusiast" that "staked" (Oguntuase, 2021) the GS' claims of "climate reparations" which the GN owes to the GS. It indicates India's "renewed focus" on climate change through measures like reducing reliance on conventional fuel sources and switching over to renewables which has been accelerated during Covid-19 when global supply chains were disrupted that affected universal access to electricity, especially in the GS (World Health Organisation, 2022). It is in this backdrop that India has widened its global outreach to solve both climate and energy security multilaterally through its "grassroots' level ratification" of international climate commitments. Such an opportunity is offered by the G-20 which was presided over by India between 2022 and 2023 through which it inspired both the GN and the GS with its ambitious climate targets and their achievement before deadlines by offering the lowest prices of solar-powered renewables and green hydrogen at competitive prices globally (ET Energyworld, 2023a). These prove India's potential in leading global RE projects which adds to employment opportunities, strengthens economies and enables it to become a global exporter of RE by attracting global energy players to invest in India's RE projects that are mutually beneficial.

India announced that it had already achieved its first set of Intended Nationally Determined Contributions (INDCs), according to the Paris Agreement in 2015 that aimed towards achieving its 40 percent of its cumulative electric power requirements from non-fossil fuel sources and "reducing its emissions intensity of GDP by 33 to 35 percent" (PIB Delhi, 2022c) by 2030 as compared to 2005 levels. However, it achieved its targets of fulfilling 40 percent of its installed electricity from renewables in 2021 (seven years before the deadline) that prove India's pursuit of advocating the "energy-economy" dichotomy through Mission LiFE (Lifestyle for Environment) and the five-fold Panchamrit[9] (Down To Earth, 2021) strategy, focused on renewables. Hence, in 2022, India updated its INDCs submitted to the UNFCCC through the achievement of the Panchamrit

[9] The Panchamrit principles (five nectar elements of India's renewable energy goals towards net-zero) were announced by PM Modi at CoP-26 in 2021. A mixture of five natural foods like milk, ghee, honey, curd and jaggery, the Panchamrit is traditionally offered to Gods in Hinduism and Jainism and as a medicine in Ayurveda. Therefore, the Panchamrit principles reflect India's pious ambitions towards net-zero. These include attaining net-zero by 2070, obtaining 500 gigawatts of renewable energy, meeting 50 percent of its energy requirements from non-fossil fuels, reduce its projected carbon emissions by one million tonnes and reduce the carbon intensity by 45 percent within 2030.

goals announced at CoP-26 in Glasgow to reach net-zero by 2070. It indicates an increased emission intensity upto 45 percent of its GDP to be reduced (10 percent more than its previous INDCs) and upto 50 percent of its cumulative electric power installed capacity from non-fossil fuels (10 percent more than what was outlined in its previous INDC clauses) by 2030 which articulate its continuous adherence to the principle of CBDR with Respective Capabilities (CBDR-RC) and its commitments towards net-zero through clean energy initiatives. However, it is to be noted that India's updated framework needs more technological know-how and more investments to increase RE manufacturing and low emission products like electric vehicles and green hydrogen which enhance employment opportunities for the local population at the grassroots level and international exports, at the macro level. To sum up, at this stage, what India needs is finance and technology transfer from the GN to address its climate and RE targets as delineated by the L&D fund which will drive greater international cooperation towards achieving RE targets.

In a post-pandemic world, energy crisis has led to a climate change-green energy dichotomy (Oguntuase, 2021) especially in the GS, which requires collaboration between investments, projects, rapid industrial decarbonisation measures and transition towards renewables. Such collaborations between the GN and the GS are based on "long lasting concerns" about the anthropocene, leading to the emergence of the global climate action and energy security regime. Therefore, the emergence of a tripartite relationship involving climate change, emission reduction and energy security through renewables is clearly indicated by the presence of multilateral partnerships like the India-led International Solar Alliance (ISA) (Hristova & Chankova, 2020) and the European Union (EU)[10] Green Deal. However, India's entry into the United Nations Security Council (UNSC) as a non-permanent member marked the birth of "a reformed multilateralism" (Vachhatani, 2020) as outlined by its "Five-S" vision of "Samman" (respect), "Samvaad" (dialogue), "Sahyog" (cooperation), "Shaanti" (peace) and "Samriddhi" (global prosperity) which are reflected in its foundation of multilateral organisations like the ISA. Born under India's ambitious "One Sun, One World, One Grid" (OSOWOG) at the CoP-21 in 2015, the ISA reiterates India's importance as a global leader in solar energy promotion by displaying the potential of the "sunshine countries" or the Suryaputras (the countries lying fully or partially between the Tropics" (Oguntuase, 2021). Since its inception, France has partnered with India in the ISA that has strengthened the ties between the two and furthered deep engagement in the post-pandemic era through technological

[10] The European Union (EU) is a political and economic organisation of 27 European countries. Headquartered in Brussels (Belgium), the EU, which was initially founded for establishing economic and monetary union of countries which have euro as their official currency, has, of late, been vocal in RE projects with Indian cooperation, especially, through multilateral platforms like the ISA.

transfer on solar, wind, hydrogen and biomass energy in a post-pandemic world (PIB Delhi, 2021). Therefore, it is to be noted that the ISA promotes solar energy as a viable renewable through cooperation, technology transfer and financial investments to achieve net-zero targets globally that consequently leads to emission reduction, an increase in employment opportunities and improved energy access to the rural livelihoods which is set to make energy "affordable and universally accessible by 2030" (Oguntuase, 2021). It reflects India's pragmatic multilateral engagement in RE is reflected in its leadership in the ISA, adhering to its 5-S principles and elevating its international status as an emerging global RE hub that connects both the GN and the GS.

Similarly, with India having gained G-20 presidency for 2023, it is gradually undergoing a transition towards solar energy deployment and green hydrogen development. Being one of the countries to have achieved Paris Agreement targets, it is expected that India shall fulfil 80 to 85 percent of its energy requirements from renewables by 2050, before which India has already committed to fulfil 40 percent by 2030. Adhering to its CoP-27 long-term low-emission development strategy on natural resources utilisation for energy security, India requires 6 million tonnes of hydrogen to produce ammonia and methanol for industries, refineries and agricultural industry annually which is expected to increase upto 28 million tonnes by 2050. India's G-20 leadership in 2023 has various implications: on one hand, it is committed to mitigating climate challenge by emission control and, on the other hand, tackling energy security challenges in the GS to provide affordable RE that ensures clean energy transition. This includes collective efforts by the ISA, the ASEAN and the BIMSTEC members as well as international organisations like the IEA, United Nations Economic and Social Commission for the Asia and Pacific (UNESCAP)[11] and the Organisation of the Petroleum Exporting Countries (OPEC).

It has inspired the GN for a RE transition, especially the EU that needs to achieve its net-zero goals by 2050[12]. Therefore, India's "proactive and cooperative internationalist approach in recent climate engagements" gives a touch of pragmatism in its transition to RE and upholds it as a "global powerhouse of renewables" with its high solar energy and green hydrogen potential. These include many significant multilateral groupings like the G20, the G-77[13] and the

[11] "Asia-Pacific" (also known as the Indo-Pacific) refers to the Asian continent located near the Pacific ocean and includes Eastern, Southern and East Asian countries (Philippines, Brunei, Indonesia, Malaysia, etc.) along with the Oceania countries (Australia, New Zealand, Fiji, French Polynesia, Palau, Hawaii, Kiribati, Papua New Guinea, Tonga, Tuvalu, Vanuatu and Western New Guinea. Although "Asia-Pacific" does not have any clear and concise definition, the region has gained prominence, of late, owing to its strategic, economic and geopolitical significance.

[12] European Commission. 2050 long term strategy.

[13] Headquartered in the United Nations Headquarters of Geneva since 1964, the Group of 77 presently comprises of 134 Global South economies to promote their economic interests. It was initially founded by 77 countries to address apartheid and global disarmament.

Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation (BIMSTEC)[14], that were instrumental in the UN Conference of Parties (CoP) held at Copenhagen and Paris where India announced the creation of the ISA in 2015 (Krishnankutty, 2021), along with the submission of its Intended Nationally Determined Contributions (INDCs) that focused on emission reduction through RE (Harvey & Goldenberg, 2015). Therefore, it is said that India's ambitious RE targets kick-started in the Paris Agreement through the ISA, on the international front and the INDCs' formulation, on the domestic front. Such improvements in the RE investment sector attract GN members like the USA which has promised to assist India in clean energy technologies, critical carbon power cycles and to "strengthen and accelerate clean, secure and just energy transition" in a post-pandemic world to boost renewables and achieve climate change mitigation goals in the age of "volatile global energy markets" by enhancing technological transfer, innovative solutions, industrial decarbonisation and deployment of clean energy technologies, under the Climate and Clean Energy Agenda 2030 Partnership and the U.S.-India Strategic Clean Energy Partnership (SCEP) (PIB Delhi, 2022e). This reflects the increasing bilateral RE trade of both the countries and greater investment with opportunities for capacity-building, technological research and development. At the same time, it also offers India a great opportunity to engage with the GN to balance global energy markets along with achieving net-zero targets. Similarly, as the world struggles to recover from the widespread economic and environmental devastation of Covid-19, the Indo-EU cooperation on green development calls for a "renewed, global, green multilateral" (Jaspal, 2022) approach towards attaining RE targets for net-zero and with the EU being India's third largest trading partner and its second-largest export destination (The Print, 2022). The "EU-India Strategic Partnership: A Roadmap to 2025" of 2020 calls for strengthening clean energy transition initiatives towards implementing the EU-India Clean Energy and Climate Partnership involving the operationalisation of the Paris Agreement till 2023 through investments in green hydrogen, development of smart grids and climate financing. Furthermore, the EU's joining of the India-led ISA (European Commission, 2022) to promote solar energy reflects a North-South cooperation on RE with the former aspiring to achieve a net-zero by 2050. Its membership facilitates greater technology transfer, standard and certification development for disaster-resilient infrastructure. As India and the EU strengthen their ties multilaterally, other G-7 countries have reiterated their commitments towards "coal phase-out" through "carbon-free electricity production by 2035" when the Indian Minister of Environment Forest and Climate

[14] The BIMSTEC, formed in 1997, comprises of Bangladesh, India, Myanmar, Sri Lanka, Thailand, Nepal and Bhutan, that is, the countries around the Bay of Bengal region. It is headquartered in Dhaka, Bangladesh and meets annually to discuss about trade and investment, counter-terrorism, climate change, energy, tourism, agriculture, public health, poverty alleviation, cultural exchanges, transport and communication.

Change Shri Bhupender Yadav, who was invited as the EU's most important RE partner in 2023, argued for a “coal phase-down” instead of “phase-out” since the GS is “significantly dependent on coal for electricity”. Hence, all have agreed to mobilise more investments in the RE sector to limit the temperature upto 1.5°C of pre-industrial levels by the end of 21st century and to assist the GS with technological know-how, finances and investments for GHG emissions reduction to combat climate change, according to the “equity” principle of climate justice. Consequently, the G-7 emphasises on renewables to achieve energy security and accelerate clean energy transition to “achieve a “predominantly decarbonized power sector” by 2035 (Koshy, 2023). Therefore, India seeks to ensure higher investments in the RE sector to reduce GHG emissions, phase out coal and other disaster mitigation strategies (Roche, 2021) to achieve its net-zero goals, by enhancing cooperation with the GN through RE projects. Also, these partnerships clearly indicate India’s adherence to its “Samvad-Sahyog-Samriddhi” approach in adopting multilateralism to work with the GN economies to fulfil its Panchamrit principles towards net-zero attainment.

India's adoption of a Five-S approach to multilateralism in climate diplomacy is clearly reflected in its engagement with the BIMSTEC countries to strengthen its maritime security and rejuvenate the region’s potential for blue economy in the Indian Ocean Region (IOR) through technical and technological assistance to promote climate resilient ports and RE (Joshi, 2021). Focused on solar energy, offshore wind energy, biofuels, energy efficiency in buildings and green hydrogen, both of them reiterated in 2022 to “ensure the transition towards a green future” through India-led global initiatives like the ISA wherein more EU member states have joined the ISA. Such partnerships are also furthered in India’s other multilateral disaster management mechanisms in its neighbourhood (other GS countries) such as Agreement on South Asia Rapid Response to Natural Disasters (2011), the BIMSTEC Centre for Weather and Climate (2014), the South Asian Cooperative for Environment Protection (2018) and the establishment of the BIMSTEC Technology Transfer Facility (BIMSTEC-TTF) in 2022 that have strengthened international cooperation on climate change mitigation measures and RE promotion in ports and shipping industry. The initiatives reflect India’s emerging focus on multilateral engagement to tackle environmental emergencies that the neighbourhood faces. Such measures strengthen joint disaster response mechanisms through prevention and mitigation plans so as to rapidly respond to the climate disasters without further damages, promoting RE for all projects and attracting climate finance through the L&D fund as the region is geographically one of the worst-suffering locations of the GS. Furthermore, India’s Act East Policy strives to strengthen ties with the ASEAN (Association of Southeast Asian Nations known as India’s “extended neighbourhood”) which are integral to the GS for their geostrategic location near the Pacific ocean. Therefore, the Indo-ASEAN cooperation ensures facilitating

RE transitions to mitigate climate change and the ASEAN's decision to join the ISA has allowed greater knowledge-sharing, technology transfer and RE infrastructure development that gear up grid integration under the OSOWOG initiative, based on Indo-ASEAN historical and cultural ties (PIB Delhi, 2022a). Therefore, a clear relationship is evident that shows how India is a strategically important partner for BIMSTEC and the ASEAN because of its geopolitical location, its workforce, its potential as a "global manufacturing hub for green hydrogen" and as a fertile ground for RE investments, especially towards solar grids in the Indo-Pacific region.

Amongst other GS states, the African continent also possesses an "arguably limitless" (Oguntuase, 2021) solar energy capacity given its geostrategic location which needs to be utilised to the fullest. As a tropical continent, Africa offers ample opportunities for India towards a South-South cooperation in economic and technical spheres under the UNFCCC. Consequently, India has invested in its solar projects under the ISA in African nations like Ghana, Madagascar, South Sudan, Republic of Congo, Mali, Burkina Faso, Nigeria, Uganda, Tanzania, Nigeria, Senegal and Ghana (Oguntuase, 2021) to share solar energy deployment practices in projects including rooftop solar panels, solar mini-grids, solar PV power plants, rural electrification, street lighting, solar cooling systems, solar-powered irrigation systems and urban infrastructure like schools, colleges, hospitals and public establishments. This has led to poverty alleviation, job creation and increased incomes, improving access to quality education and healthcare, social security and met Africa's rising energy demands through ecological sustainability. These reflect India's dynamism, under the ISA, in Africa's solar power plants and green technology transfer, followed by bilateral trade and investment, scientific and technological cooperation as outlined by PM Modi in the ten Kampala principles of India-Africa engagement in 2018 to prioritise Africa's development and foster South-South cooperation (Viswanathan & Mishra, 2019) in their net-zero targets.

6. Transition to Renewables: Bridging Climate Crisis and Energy Security

India is the world's third largest producer of RE, thereby, ranking fourth in both installed wind and solar power capacity (PIB Delhi, 2022f). The India Energy Outlook 2021, released by IEA ranks India as "the world's third-largest energy consuming country", China and the USA being at the first and second positions respectively (as per BP Statistical Review of World Energy published in 2022) (PIB Delhi, 2022b). Therefore, achieving net-zero targets by 2050 is indeed a challenging task for 130 countries, in general, and by 2070 for India, in particular and, therefore, requires multilateral engagement for its energy transition goals. However, critics like Manchanda (2022) regard India's net-zero target achievement as an "uphill task" (Manchanda, 2022) because its energy needs were

primarily met by coal and other fossil fuels since its independence and RE has been an expensive affair during all these years. Under such circumstances, Prime Minister Modi's announcement of the global initiative for LiFE at the CoP-27 in 2022 to "encourage an eco-friendly lifestyle" and making "pro-planet people" (Triple-P) (Business Standard, 2022), has several connotations. It outlines India's stand on a cooperative framework to secure a sustainable lifestyle by boosting agroforestry, agro-farming, using electric vehicles, banking on non-fossil fuels to reduce emissions and many more. Applying such initiatives both at the national and local levels, India, therefore, explores the close relationship amongst climate challenges, energy and food security through initiatives like manufacturing ethanol-blended fuels, electric vehicles, utilising solar and wind energy, encouraging investments in green hydrogen as an "alternate energy source" through the ISA, that keeps it adhered to its guiding principles of equity, humanity, climate justice (Mohapatra, 2022) and "Vasudhaiva Kutumbakam"[15]. Herein, it is seen that India looks forward to principles that are economically suitable to an agro-based nation that ensures sustainable future for not only itself but also for its allies, based on "Sahyog" and "Samriddhi" which makes it an inspiration for other GS nations.

India's ambitious energy transition projects, that aim for self-reliance or "Atmanirbharta", are inclusive, ambitious, action-oriented and significant for both the GS and the GN that direct its geopolitical footing in the post-pandemic world as a "global superpower of green energy". Recently, the Union Minister of Environment, Forest and Climate Change stated that India, under the Modi government, has emerged as one of the important "global forerunners" (PIB Delhi, 2023a) to bring the GS and the GN together to resolve challenges of climate crisis and energy security by strengthening global energy supply chains with a "whole-of-society" approach (in consonance with India's ancient principle of Vasudhaiva Kutumbakam). This means that the Central and state governments engage at all levels - national, regional and local levels soliciting the cooperation of private sector, civil society groups and indigenous communities. However, housing the world's largest population (World Population Review, 2023) necessitates the need for India to meet the rising energy requirements and control GHG emissions. Therefore, it is in this backdrop that India, being the centre of the global energy transition, has combined its economic and energy needs with a holistic and sustainable[16] approach towards tackling climate crisis. With its transition towards

[15] The theme of India's G20 Presidency is "Vasudhaiva Kutumbakam" or "One Earth · One Family · One Future". The Sanskrit phrase, meaning "The Whole World is A Family", is borrowed from Chapter 6 of Maha Upanishad VI.71-73 and is considered the most important moral value in the Indian society (Hattangadi, 2000).

[16] The United Nations defines Sustainable Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". See "The Sustainable Development Agenda", UN.

renewables, India's achievement of its INDCs according to the Paris Agreement (n.d.) ahead of other countries reflects its sincerity and consistency in its pollution-mitigation and clean energy strategies. However, with its first set of INDCs (in 2015), it aimed towards achieving its 40 percent of its cumulative electric power requirements from non-fossil fuel sources and "reducing its emissions intensity of Gross Domestic Product (GDP) by 33 to 35 percent" by 2030 (PIB Delhi, 2022c) as compared to the 2005 levels. Surprisingly, much before 2030, it achieved its targets in 2021 that calls for India's pursuit of advocating the "energy-economy" dichotomy through Mission LiFE and its five-fold Panchamrit (five nectar-elements) strategy, focused on renewables. Therefore, it was in 2022 again that India submitted its updated INDCs by achieving its Panchamrit goals announced at the CoP-26 for attaining net-zero goals by 2070 (as promised by India). Having formally updated its NDCs in 2022 has various implications for India. It means India has to gear up its RE projects to fulfill 50 percent of its energy requirements from them that confirms to the UNFCCC. Under it, it has increased its emission intensity upto 45 percent of its GDP to be reduced (10 percent more than its previous INDCs) and upto 50 percent of its cumulative electric power installed capacity from non-fossil fuels (10 percent more than what was outlined in its previous INDC clauses) (PIB Delhi, 2022d) by 2030. This is why PM Modi, in one of his speeches, referred to India's green energy potential as a "gold mine or oil field" (Anand, 2023) that shall bear high yield to investors which indicates how India is willing to collaborate with both domestic and international players to boost its green economy, based on solar, hydro and wind energy projects. With its highly ambitious climate targets for attaining net-zero within 2070 to "establish itself as lead player in the global green energy market", India's energy transition initiatives are based on three pillars: reducing reliance on fossil fuels, enhancing RE production and focusing on a "gas-based" economy that work towards "exacerbating fuel poverty" to facilitate a just, stable and sustainable energy transition. These reflect India's continuous adherence to the principle of Common But Differentiated Responsibilities with Respective Capabilities[17] (CBDR-RC) and its commitments towards net-zero through clean energy initiatives and become a GS climate leader.

At the CoP-26, PM Modi announced that India would fulfil 50 percent of its energy requirements from non-fossil fuels by 2030 as part of its Panchamrit commitments, focused on renewables and has already achieved a total of 168.96 GW by 28 February 2023 (PIB Delhi, 2023c). This includes an installation of about 168 GW of RE projects that include solar, wind and hydro energy projects (Mukherjee, 2023) in Andhra Pradesh (Economic Times, 2023) (Ojha, 2023)

[17] The principle of CBDR-RC acknowledges the responsibility of every member country under the UNFCCC in addressing climate change which includes measures like emission reduction, waste management, disaster management and increasing the use of renewables, to name a few.

(Janyala, 2023), Gujarat (ET Energyworld, 2023b), Madhya Pradesh (Mint, 2022), Rajasthan (Sharma, 2022), Tamil Nadu (BW Businessworld, 2023) and RE parks in Ladakh (Saxena, 2023) (Goswami, 2023) (Hussain, 2023). Such RE advancements advocate for India's strong voice as a GS country for energy transition and developing new sources. India's explorations of the "four verticals" in the energy sector (biofuels, vehicular decarbonisation through electric vehicles, industrial decarbonisation by green hydrogen and solar, wind and hydro power) has been further developed by its GOBARdhan (Galvanising Organic Bio-Agro Resources-Dhan) project that utilises cattle dung and biodegradable waste, thereby, ensuring rural cleanliness, minimising air pollution due to farm stubble burning (Manchanda, 2022) and electricity generation. India has launched many such waste-to-energy (WTE) plants that are working on tonnes of solid wastes daily for which industrial machinery is being imported from countries like Germany (ET Energyworld, 2022). This means that India's ambitious RE targets, in the form of energy reduction initiatives and green initiatives like the GOBARdhan, are wider research issues as they are no longer confined to the national boundaries (Thakker, 2018), rather call for international collaborations since India is a member of many multilateral organisations of both the GN and the GS. Thus, sectors like bio-manure and biofuels production (as outlined under the GOBARdhan initiative), solar energy production, EV manufacturing industry and waste management strategies have boosted employment since 2022 because they saw an "eight-fold increase" as compared to that of 2021, according to a working report by the Indian Council on Energy, Environment and Water (CEEW), Natural Resources Defense Council (NRDC) and Skill Council for Green Jobs (SCG). For example, India's solar capacity has witnessed a rise in 197 percent since 2018 (from 21,651 to 64,380 MW) (PIB Delhi, 2023b). Such innovations in RE have led to green electrification of villages, towns and cities in India that are equipped with solar pumps for agricultural uses, along with total electrification of railways, airports and other public buildings. Therefore, India's "continued growth of RE" has revealed its potential to achieve the government's multiple priorities of emission reduction, RE expansion, cost-cutting measures of enhancing energy security and robust economic development through employment generation to "create a more equitable workforce while transitioning to a low-carbon economy" (Longkumer, 2023) which adhere to India's commitments at CoP-26 for a "pro-planet, pro-people" way of life and comprise of policies and regulations to connect India's carbon market globally.

In the global race for renewables, India has also become a global market of green hydrogen which influences India's global leadership to attain energy self-reliance, given its "large landmass and low renewable energy costs" (Kumar, 2023b). Under its National Green Hydrogen Mission, the government aims to achieve five million metric tonnes of green hydrogen within 2030, an ambitious target for a GS country in the emerging world order. Therefore, in the near future,

it is expected that green hydrogen will "enable the emergence of a domestically-produced energy carrier" to reduce natural gas, petroleum and fertiliser import dependency. Similarly, the evolution of the E-10[18] and the E-20[19] fuels from ethyl alcohol (by fermenting sugar and food grains) (PIB Delhi, 2023d) has also incentivised farmers to opt for sugar production that adds to their incomes and national savings of about 4 billion US dollars per annum. Being produced domestically, the fuels are cheaper than petroleum which make them "not only a national imperative but also a strategic requirement for India", by showing a 5 percent reduction in carbon emissions (Kumar, 2023a). Further researches reveal that the E-20 fuel-resilient two-wheelers have shown a 50 percent lower carbon monoxide emissions while four-wheelers have emitted 30 percent lesser, apart from a fall of 20 percent of hydrocarbons emissions (Kumar, 2023a). Therefore, it can be safely concluded that the Indian government's ambitious initiative of E10 and E-20 petroleum are directed not only towards attaining net-zero but also to add to meet rising energy requirements and increase national income by saving import costs, strengthen grassroots economy by incentivising farmers to grow sugarcane for ethanol production and creating more employment opportunities. It reflects the Indian government's strict adherence to PM Modi's LiFE principles that broadly apply to all the G-20 countries that form the GS and how India is working towards collaboration with them through its GOBARdhan and green hydrogen programmes. As India imports 85 percent of crude oil and 55 percent of natural gas, high fuel prices challenge its economic and energy security which has led to its attainment of self-reliance or Atmanirbharta in RE transition initiatives like ethanol-blending and engaging in multilateral partnerships with both the GN and the GS (Anand, 2023).

Similar progress has been made in its National Green Hydrogen Mission that was announced in January 2023 and has captured the attention of the USA and the EU, in general, and EU countries like Germany and France (Anand, 2022), in particular. India's target to achieve 5 MMT green hydrogen not only requires huge investments but also manufacturing electrolysers, green steel and long-haul fuel cells that opens up a plethora of investment opportunities for the West. As a key partner in Saudi Arabia's "Vision 2030" for its sustainability, India also catalyses its aspirations to "turn Middle East into 'Europe of the Future'"

[18] In 2022, the Indian Oil Corporation Limited (IOCL) rolled out the E10 petroleum in north-eastern states. Comprising of 10 percent ethanol blended in petroleum, the E10 has been implemented in 2022 (Sharma, 2023) has reduce the nation's reliance on fuel imports, besides being a pollution-resilient and affordable fuel. It reduces vehicular GHG emissions by undergoing complete combustion

[19] In 2023, PM Modi formally announced the launch of the E-20 Fuels which is a landmark initiative in India's transition towards attaining net-zero. The E-20 initiative calls for a 20 percent ethanol-blended petroleum that are to produced by Public Sector Undertakings like the Hindustan Petroleum Corporation Limited (HPCL) by 2025.

(Rodrigues, 2023). Lying in the Tropical region, the latter (like Africa) also possesses "impressive natural potential for solar and wind power" that are furthered by investments in technological advancements to diversify its energy resources. As a member of the Gulf Cooperation Council (GCC) and the ISA, it seeks to invest in India's Green Hydrogen Mission since the GCC countries possess affordable land and water resources to help in manufacturing green hydrogen and solar power projects (Rodrigues, 2023). Therefore, it focuses on areas for collaboration like reducing RE installation costs, diversifying its supply chains, low emission, green fuels that result in a sustainable energy transition. Henceforth, it can be safely stated that India aspires for collaborative projects in RE in its ambitious net-zero targets which will be accelerated during its G-20 presidency. Such trilateral and multilateral collaborations indicate gap-bridging between the GN and the GS with India's catalysing role as a GS climate and RE leader. Along with that, it is noteworthy that India aligns its domestic RE goals with its international commitments through bilateral and multilateral cooperation with its partner countries to successfully initiate its projects at the grassroots level.

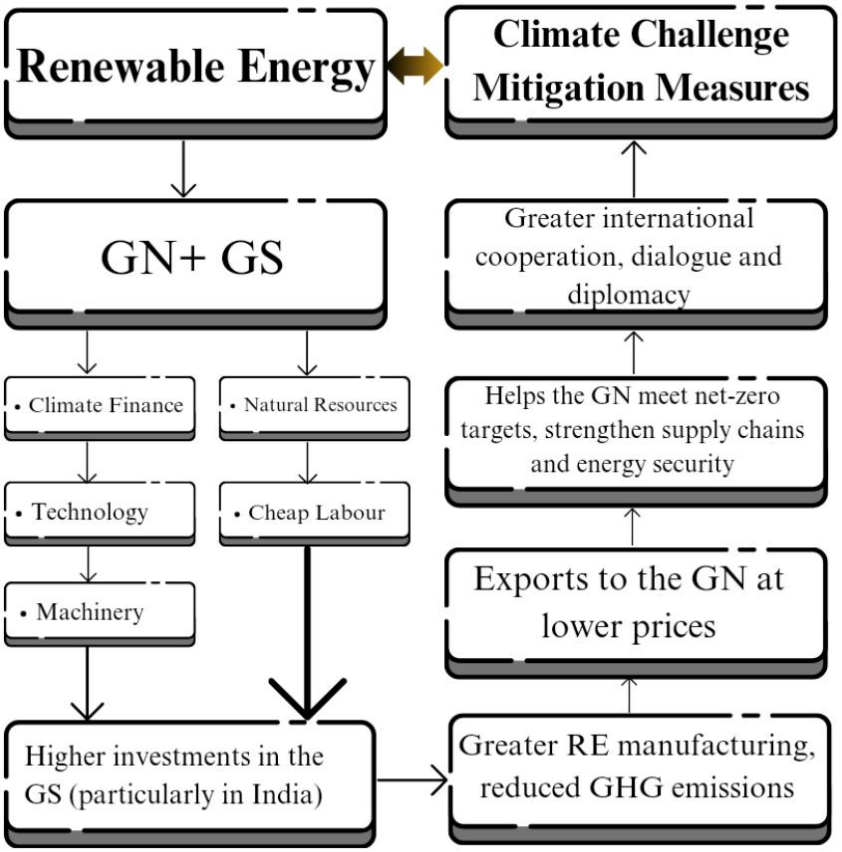
7. Findings

Using content analysis approach from international (multilateral and bilateral) and national perspectives, this paper highlights India's Panchamrit vision and strategies to employ them for international collaboration in proposing to bridge the North-South divide towards energy security through sustainable means and mitigate climate catastrophes. India is undergoing several emission control mechanisms for which its transition from the conventional petroleum-based fuels towards biofuels is understood as mitigating temperature rise-related climate catastrophes in the post Covid-19 world. From its transition as a critic of the GN's excessive anthropocentric activities to being a GS leader, India's current RE strategies using solar energy and biofuels indicate that it is capable of leading the global climate regime towards emission reduction and prevention of temperature rise since they have successfully responded to the need of the hour. They have been successful in reducing India's energy crisis in the form of installation of solar panels at regular intervals, biogas plants and ethanol-blended fuels usage that are not only cost-cutting but also environmentally sustainable. India's adoption of the Panchamrit principles in its foreign negotiations and domestic commitments have led to greater opportunities for cooperation not only with itself but also towards bridging the North-South divide and memorising the idea of energy and climate as "glocal (global & local) commons". By equipping the ports of BIMSTEC members with solar panels, collaborating with the ASEAN and the African Union nations, India has clearly shown that its commitments are not just on paper but have been successful in strengthening India's ties with other GS nations. As the risks of climate change are expected to increase further in the

future and more co-operation on RE promotion is the need of the hour, the future researches could be conducted to find answers to the following questions:

- In which ways can biofuels strengthen India's climate and energy diplomacy? What is its role in community development?
- How does India help the GN meet its net-zero goals through its RE promotion initiatives?
- Can India's Panchamrit strategy help the EU in attaining net-zero by 2050 through its low-cost solar grids and photovoltaic cells?
- What does the GS, in general, and the African Union, in particular, offer to India in terms of RE?

Figure 1: A Diagrammatic Representation of the Close Relationship between Renewable Energy and Climate Security



Source: Author

By studying the reports uploaded by the Indians government, it is evident that India's ambitious climate and RE projects are marked by continuous research in areas like waste management, for example, using plant and animal wastes in

manufacturing biofuels. However, more researches are required in plastic waste management which is a pressing concern in India. India has shown that waste management is not only about minimising waste generation but also to sustainably use in order to end electricity crisis issues, especially in rural areas. This research also demonstrated the importance of Indian electrolysers, solar panels and photovoltaic cells for the GN because of its reduced costs that highlights bioenergy development rooted in the local communities' upliftment. The concepts of INDCs, Panchamrit, L&D fund and net-zero are important to realise the reconstruction of the global climate and energy regime after Covid-19. For this reason, India's RE projects should work more towards achieving net-zero goals through community development that sets an example for other GS nations. By this proposed model, the government can initiate efforts to mitigate the GHG's emission impacts by promoting better waste management techniques from the national to the local level with the extensive support of the GN. The state governments are also participating actively to prevent the common threat of energy crisis by improving sustainable lifestyles in daily activities.

8. Conclusion: Future of India's RE

Recently, the U.S. Department of Energy and the Lawrence Berkeley National Laboratory predicted India's "energy independence by 2047" (India Today, 2023) by minimising fuel imports reliance, leading to 100 percent vehicular electrification by 2035, complete industrial decarbonisation, attaining 80 percent of clean grid by 2040 and 90 percent by 2047, consequently achieving net-zero targets ahead of 2070 which means that India's "green growth strategy" is focused on its LiFE and Panchamrit principles, thereby, aimed at creating a "cleaner, greener and more prosperous future" (Pullokaran, 2023) not only for India but for the entire world. These shall be facilitated by smarter technologies like agro-photovoltaics that would enable land usage for "both agriculture and power generation" that include "development of new educational programmes on renewables, targeted training, and skill development, including upskilling or reskilling, to keep up with the pace of technological advancement" (Mehta & Simi, 2023). Hence, India's investments in RE and waste management projects directed towards emission reduction and greener nation show that it is en route to net-zero and has played an important role in bringing both the GN and the GS together to act on rising temperatures, GHG emissions and industrialisation. Therefore, together with the international and national stakeholders involved in India's RE promotion, the Indian government is working on its well-crafted diplomacy of ensuring greater cooperation with the GN that will lead to greater technological advancements, along with offering its labour resources to utilise its natural resources for the betterment of the community that are concomitant to its agreements with the GN and the GS (being a voice of the GS) since Covid-19.

However, the government should also work more towards environmental restoration, including the preservation of forests and natural habitats that are essential for sustainable development and manufacture of biofuels which will inspire the other GS nations to explore their resources. Therefore, co-operation amongst multi-stakeholders (the international organisations, the national government, local governments, business sectors, civil society and the local communities) on deforestation control initiatives to respond to the intensification and frequency of climate catastrophes and energy security challenges.

The future of RE in India is a bright one with the GN's renewed interest in the nation's low cost solar panels, PV cells, cheap labour and readily available natural resources required for RE production. This would bring down the costs of electricity in the GN nations and help them accelerate their investments in the GS' RE manufacturing units, apart from vehicular emission reduction. At the same time, India would also be able to improve the common people's living conditions and the national economy of GS parties like the African continent. Greater RE manufacturing units means higher employment opportunities, poverty alleviation measures, improved living standards of people, reduced chances of electricity crisis and greater community engagement through sustainable development in the GS. Furthermore, India's role as a GS climate leader opens doors for greater cooperation and dialogue after the North-South divide has been bridged. Therefore, along with its own development, India's RE strategies, based on the 5-S principles, strives to work towards mitigating global challenges like increasing vehicular GHG emissions, rising temperatures, climate change challenges, waste management and energy security issues caused by supply chain disruption. Also, they have been successful in exploring the close relationship between climate change and energy security not only in the local levels but also in international agreements, dialogues and negotiations based on RE investments and transfer of L&D funds under which it has brought policy and diplomacy closer to each other, especially after Covid-19.

References

Anand, S. (2022, October 18). *France and India Adopt Joint Roadmap on Green Hydrogen.* Retrieved May 20, 2024, from https://www.google.com/amp/s/www.livemint.com/industry/energy/france-and-india-adopt-joint-roadmap-on-green-hydrogen/amp-11666106317794.html

Anand, S. (2023, February 23). *India's Potential in Green Energy No Less Than a Goldmine, Invest Here: PM Modi*. Retrieved May 3, 2024, from https://www.google.com/amp/s/www.livemint.com/news/india/indias-potential-in-green-energy-no-less-than-a-goldmine-invest-here-pm-modi/amp-11677143366844.html

Arbab, P. (2019). Global and Globalizing Cities from the Global South: Multiple Realities and Pathways to Form a New Order. *Perspectives on Global Development and Technology, 18*(3), 327-337. Retrieved May 4, 2024, from https://doi.org/10.1163/15691497-12341518

Business Standard. (2022, June 27). *India's Resolve for Climate Commitments Evident from Performance: PM to G7*. Retrieved April 18, 2024, from https://www.google.com/amp/s/wap.business-standard.com/article-amp/economy-policy/india-s-resolve-for-climate-commitments-evident-from-performance-pm-to-g7-122062700896_1.html

BW Businessworld. (2023, March 20). *Gujarat, Tamil Nadu Take Lead in Wind Power Generation*. Retrieved May 8, 2024, from https://www.businessworld.in/article/Gujarat-Tamil-Nadu-Take-Lead-In-Wind-Power-Generation/20-03-2023-469731/

Dasgupta, C. (2012). Present at The Creation: The Making of The UN Framework Convention on Climate Change. In Dubash, N. (Ed.). *Handbook of Climate Change and India: Development, Politics and Governance* (pp. 142-156). New Delhi: Routledge. Retrieved May 21, 2024, from https://doi.org/10.1093/oso/9780199498734.003.0008

Deshpande, P. (2023). *Prospect of India Emerging a Major Economic Power in 2047*. Retrieved May 3, 2024, from https://www.google.com/amp/s/timesofindia.indiatimes.com/blogs/truth-lies-and-politics/prospect-of-india-emerging-a-major-economic-power-in-2047/

Down To Earth. (2021, November 2). *CoP26: Modi offers 'Panchamrita' Concoction for Climate Conundrum at Glasgow*. Retrieved May 6, 2024, from https://www.google.com/amp/s/www.downtoearth.org.in/news/climate-change/amp/cop26-modi-offers-panchamrita-concoction-for-climate-conundrum-at-glasgow-80001

Dubash, N. K. (2013). The Politics of Climate Change in India: Narratives of Equity and Co-benefits. *Wiley Interdisciplinary Reviews: Climate Change, 4*(3), 191-201.

Economic Times. (2023, March 3). *Reliance to Invest in 10 GW Solar Energy in Andhra Pradesh: Mukesh Ambani.* Retrieved May 3, 2024, from https://www.google.com/amp/s/m.economictimes.com/industry/renewables/reliance-to-invest-in-10-gw-solar-energy-in-andhra-pradesh-mukesh-ambani/amp_articleshow/98385786.cms

ET Energyworld. (2022, December 24). *India's Largest Waste-To-Energy Plant to Come Up in Gurugram.* Retrieved May 10, 2024, from https://www.google.com/amp/s/energy.economictimes.indiatimes.com/amp/news/power/indias-largest-waste-to-energy-plant-to-come-up-in-gurugram/96478813

ET Energyworld. (2023a, March 10). *India Fastest in Renewal Energy Capacity Addition Among Major Economies*. Retrieved May 10, 2024, from https://www.google.com/amp/s/energy.economictimes.indiatimes.com/amp/news/renewable/india-fastest-in-renewal-energy-capacity-addition-among-major-economies/98530834

ET Energyworld. (2023b, May 8). *KP Energy Commissions 29 MW Wind Energy Project in Gujarat*. Retrieved May 26, 2024, from https://www.google.com/amp/s/energy.economictimes.indiatimes.com/amp/news/renewable/k-p-energy-commissions-29-mw-wind-energy-project-in-gujarat/100067790

European Commission. (2022). *Speech by President von der Leyen at the International Solar Alliance*. Retrieved May 29, 2024, from https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2050-long-term-strategy_en

Gavankar, A. (2023, February 20). *Rethinking Urban Green Financing for Accelerating India's Cleantech System.* Retrieved May 18, 2024, from https://www.google.com/amp/s/www.orfonline.org/expert-speak/rethinking-urban-green-financing-for-accelerating-indias-cleantech-system/

Goswami, S. (2023, February 1). *Budget 2023: First-of-its-kind Green Energy Transmission Line from Ladakh to Haryana Announced.* Retrieved May 24, 2024, from https://www.google.com/amp/s/www.moneycontrol.com/news/business/budget/budget-2023-first-of-its-kind-green-energy-transmission-line-from-ladakh-to-haryana-9981811.html/amp

Harvey, F., & Goldenberg, S. (2015, December 7). *The Key Players at the Paris Climate Summit.* Retrieved May 29, 2024, from https://www.theguardian.com/environment/2015/dec/07/paris-climate-summit-key-players

Hattangadi, S. (2000, June 24). *महोपनिषत्*[Maha Upanishad]. Retrieved January 20, 2016, from http://sanskritdocuments.org/doc_upanishhat/maha.pdf

Hristova, A., & Chankova, D. (2020). Climate Diplomacy – A Growing Foreign Policy Challenge. *Juridical Tribune, 10*(2), 194-206. Retrieved May 20, 2024, from https://oaji.net/pdf.html?n=2021/5275-1617447586

Hurrell, A., & Sengupta, S. (2012). Emerging Powers, North-South Relations and Global Climate Politics. *International Affairs, 88*(3), 463-484.

Hussain, Z. (2023, April 9). *India Gets Closer to Meeting 2030 Renewable Energy Targets with New Transmission Plan.* Retrieved May 21, 2024, from https://www.google.com/amp/s/timesofindia.indiatimes.com/blogs/voices/india-gets-closer-to-meeting-2030-renewable-energy-targets-with-new-transmission-plan/

India Today. (2023, March 20). *India Can Achieve Energy Independence by 2047: US Study.* Retrieved May 28, 2024, from https://www.google.com/amp/s/indianexpress.com/article/india/india-achieve-energy-independence-by-2047-us-study-8507267/lite/

Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Retrieved April 24, 2024, from https://www.ipcc.ch/report/ar6/wg2/

International Energy Agency (IEA). (2022, December 6). *Renewable Power's Growth Is Being Turbocharged as Countries Seek to Strengthen Energy Security.* Retrieved May 30, 2024, from https://www.iea.org/news/renewable-power-s-growth-is-being-turbocharged-as-countries-seek-to-strengthen-energy-security

Janyala, S. (2023, March 6). *Investments in Green Energy to Make Andhra Manufacturing Hub of Renewable Energy Products': AP Chief Secretary.* Retrieved May 28, 2024, from https://www.google.com/amp/s/indianexpress.com/article/cities/hyderabad/investments-green-energy-andhra-manufacturing-renewable-energy-products-ap-chief-secretary-8481465/lite/

Jaspal, M. (2022, February 17). *Green Multilateralism: Partnerships, Finance, and Innovation: 2021 India-Germany-EU Dialogue.* Retrieved May 26, 2024, from https://www.orfonline.org/research/green-multilateralism-partnerships-finance-and-innovation/?amp

Joshi, M. (2021, April 26). *Strengthening Climate Diplomacy: An Imperative for Indian Climate in the New Decade.* Retrieved May 28, 2024, from https://www.google.com/amp/s/www.orfonline.org/expert-speak/strengthening-climate-diplomacy-imperative-indian-climate-new-decade/

Kolaczkowski, M. (2022, March 4). *How Does the War in Ukraine Affect Oil Prices?* Retrieved May 14, 2024, from https://www.weforum.org/agenda/2022/03/how-does-the-war-in-ukraine-affect-oil-prices/

Koshy, J. (2023, April 16). *G77 Ministers Commit to Move to Carbon-Free Power by 2035.* Retrieved April 30, 2024, from https://www.thehindu.

com/news/international/g7-vows-to-step-up-moves-to-renewable-energy-zero-carbon/article66743606.ece

Krishnankutty, P. (2021, January 29). *All About International Solar Alliance, Co-Founded by France & India, to Promote Solar Energy.* Retrieved May 2, 2024, from https://www.google.com/amp/s/theprint.in/theprint-essential/all-about-international-solar-alliance-co-founded-by-france-india-to-promote-solar-energy/594010/%3famp

Kumar, C. (2023a, February 6). *What is Ethanol Blending Petrol and India's E20.* Retrieved May 28, 2024, from https://www.google.com/amp/s/m.timesofindia.com/india/explainer-what-is-ethanol-blending-petrol/amp_articleshow/97641187.cms

Kumar, M. (2023b, February 9). *Union Budget Gives India's Green Hydrogen Mission a Shot in the Arm*. Retrieved May 14, 2024, from https://india.mongabay.com/2023/02/union-budget-gives-indias-green-hydrogen-mission-a-shot-in-the-arm/

Longkumer, Y. (2023, February 11). *India Sees 8-Fold Rise, Adds Over 52k Workers in Solar & Wind Energy Sectors in FY22, Study Shows.* Retrieved February 18, 2024, from https://www.google.com/amp/s/theprint.in/economy/india-sees-8-fold-rise-adds-over-52k-workers-in-solar-wind-energy-sectors-in-fy22-study-shows/1366773/%3famp

Manchanda, H. K. (2022, December 13). *Why Natural Gas Is a Strategic Fuel in India's Energy Transition.* Retrieved April 16, 2024, from https://www.google.com/amp/s/energy.economictimes.indiatimes.com/amp/news/oil-and-gas/why-natural-gas-is-a-strategic-fuel-in-indias-energy-transition/96196767

Mehta, P., & Simi, T. B. (2023, February 25). *The Future Is Renewables: Transit Fast but Smarter.* Retrieved April 20, 2024, from https://www.google.com/amp/s/m.economictimes.com/industry/renewables/the-future-is-renewables-transit-fast-but-smarter/amp_articleshow/98233851.cms

Mint. (2022, December 29). *Madhya Pradesh Aims to Play a Big Role in India's Energy Transition.* Retrieved April 10, 2024, from https://www.google.com/amp/s/www.livemint.com/news/india/madhya-pradesh-aims-to-play-a-big-role-in-india-s-energy-transition/amp-11672285218128.html

Mohan, A. (2017, December 14). *From Rio to Paris: India in Global Climate Politics*. Retrieved May 10, 2024, from https://www.orfonline.org/research/rio-to-paris-india-global-climate-politics/?amp

Mohapatra, S. (2022, December 4). *CoP 27: How Developed World Has Taken the Lead for Climate Change*. Retrieved May 12, 2024, from https://www.google.com/amp/s/www.theweek.in/theweek/current/2022/11/25/climate-change-responsibility-taken-by-the-world-at-COP27.amp.html

Mukherjee, O. (2023, March 16). *India's Clean Energy Transition Gathers Pace, But Long Road Ahead to 2030 Goal for Renewable Power*. Retrieved March 28, 2024, from https://www.google.com/amp/s/www.news18.com/amp/india/major-share-of-renewable-energy-capacity-comes-from-solar-power-indias-clean-energy-story-so-far-7303417.html

Nodo, S. (2022, November 24). *India Can Catalyse Climate Financing*. Retrieved May 9, 2024, from https://www.thehindubusinessline.com/opinion/india-can-catalyse-climate-financing/article66179797.ece?tpcc=BLDGLA&gclid=CjwKCAiAjPyfBhBMEiwAB2CCIk_hsktVuF950SJdj66zo_YHhjKOd8s6Rrv_iWC90X6ISSUDFOK8gxoCMFUQAvD_BwE

Oguntuase, O. (2021, August 16). *A Climate Emergency: What the IPCC's 2021 Report Means for Africa.* The Republic. Retrieved May 5, 2024, from https://republic.com.ng/august-september-2021/a-climate-emergency/

Oguntuase, O. (2023). *India and Africa Leverage Climate Diplomacy.* Retrieved May 4, 2024, from https://www.hindustantimes.com/ht-insight/international-affairs/india-and-africa-leverage-climate-diplomacy-101681366706102.html

Ojha, N. (2023, May 3). *NTPC to install 20 GW Renewable Power Capacity in Andhra Pradesh for Green Hydrogen Manufacturing.* Retrieved April 20, 2024, from https://www.energetica-india.net/news/ntpc-to-install-20-gw-renewable-power-capacity-in-andhra-pradesh-for-green-hydrogen-manufacturing

PIB Delhi. (2019, December 20). *Outcome of COP25 Balanced, With the Exception of Climate Finance Issues: Shri Prakash Javadekar.* Retrieved March 14, 2024, from https://pib.gov.in/PressReleasePage.aspx?PRID=1597047

PIB Delhi. (2021, March 3). *Cabinet Approves Memorandum of Understanding between India and France on Renewable Energy Cooperation.* Retrieved February 6, 2024, from https://pib.gov.in/Pressreleaseshare.aspx?PRID=1702152

PIB Delhi. (2022a, February 7). *ASEAN-India High Level Conference on Renewable Energy Commences.* Retrieved May 5, 2024, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=1796246

PIB Delhi. (2022b, March 24). *India Has Been Ranked Third Largest Primary Energy Consumer in The World.* Retrieved February 18, 2024, from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1809204

PIB Delhi. (2022c, August 3). *Cabinet Approves India's Updated Nationally Determined Contribution to Be Communicated to the United Nations Framework Convention on Climate Change.* Retrieved May 6, 2024, from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1847812

PIB Delhi. (2022d, September 9). *Renewable Energy in India*. Retrieved May 18, 2024, from https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151141&ModuleId%20=%202

PIB Delhi. (2022e, October 7). *U.S.-India Strategic Clean Energy Partnership Ministerial Joint Statement*. Retrieved May 5, 2024, from https://pib.gov.in/PressReleasePage.aspx?PRID=1865953

PIB Delhi. (2022f, December 20). *Year- End Review 2022- Ministry of New and Renewable Energy.* Retrieved May 20, 2024, from https://pib.gov.in/PressReleasePage.aspx?PRID=1885147

PIB Delhi. (2023a, February 7). *India Stands Committed to Reducing Emissions Intensity of GDP by 45% by 2030 and Reach to Net-Zero by 2070, While Developing Sustainably: Shri Bhupender Yadav.* Retrieved May 3, 2024, from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1897093

PIB Delhi. (2023b, March 16). *Solar Energy Capacity Has Nearly Tripled in Last 5 Years from 21651 MW to 64380 MW – Union Power & NRE Minister Shri R. K. Singh.* Retrieved May 1, 2024, from https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1907701

PIB Delhi. (2023c, April 5). *Government Declares Plan to Add 50 GW of Renewable Energy Capacity Annually for Next 5 Years to Achieve the Target of 500 GW by 2030.* Retrieved May 2, 2024, from https://www.pib.gov.in/PressReleasePage.aspx?PRID=1913789

PIB Delhi. (2023d, May 2). *Growth of Ethanol sector is an example for the world: Shri Goyal.* Retrieved May 2, 2024, from https://pib.gov.in/PressReleasePage.aspx?PRID=1921493

Pullokaran, J. J. (2023, February 1). *Budget 2023: FM Announces PM-PRANAM Scheme to Promote Alternative Fertilisers.* Retrieved May 2, 2024, from https://www.google.com/amp/s/www.cnbctv18.com/economy/budget-2023-fm-announces-pm-pranam-scheme-to-promote-alternative-fertilisers-15821391.htm/amp

Roche, E. (2021, March 18). *EU Joins India's Disaster Resilient Infrastructure Initiative.* Retrieved April 14, 2024, from https://www.google.com/amp/s/www.livemint.com/news/world/eu-joins-india-s-disaster-resilient-infrastructure-initiative/amp-11616062901369.html

Rodrigues, S. (2023, January 12). *India, Saudi Arabia Tango to 'Renewable Energy'.* Retrieved April 12, 2024, from https://goachronicle.com/india-saudi-arabia-tango-to-renewable-energy/

Rongmei, P. (2022, December 13). *Follow the Tropic of Cancer for the Most Unique Travel Experiences in India.* Retrieved April 14, 2024, from https://www.google.com/amp/s/timesofindia.indiatimes.com/travel/destinations/follow-the-tropic-of-cancer-for-the-most-unique-travel-experiences-in-india/amp_articleshow/96187267.cms

Saxena, A. (2023, March 24). *PM Gati Shakti: Renewable Energy Project in Ladakh Approved Under Six Major Infrastructure Projects, Marking Significant Progress of India's Clean Energy Target by 2030*. Retrieved April 28, 2024, from https://www.google.com/amp/s/swarajyamag.com/amp/story/infrastructure%252Fpm-gati-shakti-renewable-energy-project-in-ladakh-approved-under-six-major-infrastructure-projects-marking-significant-progress-of-indias-clean-energy-target-by-2030

Sharma, A. (2022, December 15). *Solar Energy Generation Capacity Touches 16,000 Mw in Rajasthan.* Retrieved April 24, 2024, from https://www.google.com/amp/s/www.business-standard.com/amp/article/current-affairs/solar-energy-generation-capacity-touches-16-000-mw-in-rajasthan-122121500818_1.html

Thaker, J. & Leiserowitz, A. (2014). Shifting Discourses of Climate Change in India. *Climatic Change, 123*, 107-119. Retrieved April 20, 2024, from https://doi.org/10.1007/s10584-014-1059-6

The Print. (2022, September 8). *India, EU to Step Up Cooperation on Clean Energy and Climate Action*. Retrieved May 6, 2024, from https://www.google.com/amp/s/theprint.in/world/india-eu-to-step-up-cooperation-on-clean-energy-and-climate-action/1121112/%3famp

UNFCCC. (2016, January 9). *Report of the Conference of the Parties on Its Twenty-First Session, Held in Paris from 30 November to 13 December 2015*. Retrieved May 2, 2024, from https://unfccc.int/resource/docs/2015/cop21/eng/10a02.pdf#page=2

UNFCCC. (n.d.). *The Paris Agreement.* Retrieved May 20, 2024, from https://unfccc.int/process-and-meetings/the-paris-agreement

Vachhatani, J. (2020, July 18). *MEA Highlights PM Modi's '5S Vision' At UNSC After Being Elected, Outlines 4-Point Mission.* Retrieved May 14, 2024, from https://www.google.com/amp/s/www.republicworld.com/amp/india-news/general-news/mea-highlights-pm-modis-5s-vision-at-unsc-after-being-elected-outl.html

Viswanathan, H.S & Mishra, A. (2019, June 25). *The Ten Guiding Principles for India-Africa Engagement: Finding Coherence in India's Africa Policy.* Retrieved May 2, 2024, from https://www.google.com/amp/s/www.orfonline.org/research/the-ten-guiding-principles-for-india-africa-engagement-finding-coherence-in-indias-africa-policy/

World Health Organisation. (2022, June 1). *Report: COVID-19 Slows Progress Towards Universal Energy Access*. Retrieved May 4, 2024, from https://www.who.int/news/item/01-06-2022-report--covid-19-slows-progress-towards-universal-energy-access

World Population Review (2023). *Total Population by Country 2023*. Retrieved May 3, 2024, from https://worldpopulationreview.com/countries

Worldatlas.com. (2022, November 4). *What Is The North-South Divide?*. Retrieved May 4, 2024, from https://www.worldatlas.com/articles/what-is-the-north-south-divide.html

Wyns A. (2023). COP27 Establishes Loss and Damage Fund to Respond to Human Cost of Climate Change. *Planetary health, 7*(1), e21-e22. Retrieved May 28, 2024, from https://doi.org/10.1016/S2542-5196(22)00331-X