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Renewable Energy Cooperation for Sustainable South Asia: A Case Study of BBIN Countries

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Abstract

This paper examines the critical role of renewable energy cooperation in achieving Sustainable Development Goals (SDGs) within the BBIN (Bhutan, Bangladesh, India, Nepal) sub-region of South Asia amidst its vulnerability to climate change and low integration in trade and connectivity. By analysing the current status of SDG achievements, focusing on SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action), the paper highlights the disparity between the potential for renewable energy and its actual realisation in these countries. Despite being blessed with vast renewable resources, the BBIN countries possess a significant gap in harnessing these for sustainable development, primarily due to financial constraints, technological limitations, and lack of regional cooperation. The study underscores the importance of sub-regional initiatives like BBIN and interregional initiatives like BIMSTEC for fostering collaboration and leveraging renewable energy potential for sustainable development, offering a blueprint for peace and prosperity that aligns with the 2030 Agenda for Sustainable Development Goals. Through a detailed examination of policies, commitments (Nationally Determined Contributions or NDCs), and the current renewable energy landscape, this paper provides insights into the pathways for enhancing renewable energy uptake, addressing climate change, and achieving broader SDGs in South Asia.

Keywords: *Regionalism, Renewable Energy, Carbon Emission, Climate Change, Sustainability.*

South Asia is a region where countries prefer to avoid being called by what they are instead of what they are not (Nandy, 2005). Frequent political tensions, conflict, and hostility between India and Pakistan have derailed the Project of Regionalisation in SAARC, the South Asian Association for Regional Cooperation, a regional intergovernmental organisation and geopolitical union in South Asia. An alternative way to harness the opportunities is through sub-regional initiatives like BBIN (Bhutan, Bangladesh, India, Nepal) and interregional initiatives like BIMSTEC (the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation), where historical baggage is minor, that can prevent countries from sitting at a table. BBIN is a group of four countries, Bhutan, Bangladesh, India, and Nepal, endorsed in 1996 at the SAARC ministerial summit at Male, a formalised organisation focused on South Asia's northeast connectivity and development (Chaudhury et al., 2015).

The 2030 Agenda for Sustainable Development, adopted by all UN member countries, provides a blueprint for peace and prosperity for people and the planet. At its heart are the 17 SDGs, urgent calls for action by all developing and developed states (SDG, 2015).

Source: https://sdgactioncampaign.org/resources/

With the rising awareness of climate change, there has been a rise in people's contributions to mitigating climate change. Greenhouse Gas (GHG) emissions are vital to increasing the global average temperature. Although Earth's net gases and molecules remain constant (Profumo, 2021), a significant amount of carbon is stored and trapped below the surface in fossil fuels and minerals. When we burn these fossil fuels to generate energy, they are emitted into the atmosphere, facilitating the release of these trapped molecules to be released into the atmosphere. Energy use is the most significant percentage of GHG emissions, contributing 73.2 per cent (Ho, 2023). In the atmosphere, GHGs absorb heat generated from sunlight, increasing the global average temperature. Rising temperatures have both causal and consequential relations to global emissions. Causal since the temperature is rising because of an increase in emissions. It is Consequential because more energy will be consumed to avoid burning at high temperatures (e.g. house cooling) in the rising global warming scenario, further alleviating the emission and temperature.

Global warming can be mitigated by maintaining the appropriate proportion of greenhouse gases in the atmosphere. One way to do this is by restoring the existing atmospheric GHGs below the surface, called carbon sequestering, and the other way is to restrict the conversion of minerals and fossil fuels into greenhouse gases. Carbon sequestration can be both natural and artificial. Forests, Oceans, Cryosphere, Soil, Grassland, etc., are natural carbon sinks. Since nature's capacity for carbon sequestration is limited (actually, it is decreasing) and to make the balance of GHGs in the atmosphere, we need to amplify the rate of carbon sequestration by

adopting technologies such as Direct Carbon Capture and Sequestration Techniques because of a lack of technology and efficient techniques; artificial carbon capturing is costly, it cost nearly USD500-800 per ton therefore unsustainable (CLEAR Centre, 2019). Another way of doing the same is possible by achieving zero emissions or being carbon negative, and over time, nature will balance the surplus GHGs from the atmosphere.

No sustainable technologies can absorb the atmospheric greenhouse gases; therefore, the only option left is to stop the release of GHG from the natural sink. This can be done by shifting energy requirements to sources devoid of GHG as a byproduct, called Renewable Energy. So, transitioning energy dependence from non-renewable to renewable sources can cut GHG emissions and be an emancipatory move for human civilisation.

Therefore, transitioning from non-renewable to renewable is critical to achieving SDGs. SDGs are not water-tight compartmentalisation; Achieving one can complement the other. Pushing for renewable energy sources can help meet SDG 7: Affordable and Clean Energy and Goal 13: Climate Action. It also has enormous potential to substantiate other remaining goals.

Status of SDG in BBIN Countries

While South Asia is one of the most dynamic regions in the world (ESCAP, 2019), it is also one of the least integrated in trade and connectivity (CITEE, n.d.). In addition, it is one of the most vulnerable to the risks of climate change. According to the Global Climate Risk Index (CRI), India is among the top 10 most affected countries, scoring 16.67 CRI. Bangladesh and Nepal are among the top 10 most affected from 2000-2019, scoring 28.33 and 31.33 CRI, respectively (Eckstein et al., 2021).

The greater the integration among the BBIN countries, the more likely cooperation for significant gains is by pooling resources or mutual collaboration of their relative advantages. According to the Sustainable Development Index 2023, Bhutan, Nepal, Bangladesh, and India rank 61, 99, 101 and 112, respectively, in terms of their performance toward achieving SDGs (Sachs et al., 2023). The regional score in the Sustainable Development Index for South Asia is 67.2 per cent. Among BBIN countries, Bhutan scored 72.3 per cent, above the regional average, while India, Bangladesh, and Nepal scored below the regional average with 63.4, 65.9, and 66.5 per cent. (ibid.) The Global Climate Risk Index reflects how vulnerable we are to climate change, and the Sustainable Development Index reflects how committed BBIN is to mitigating climate change. The above Data shows we are significantly ahead in vulnerability, but left behind in mitigation, so there is a void in what ought to be and what it is.

Table 1: SDG Report. (2023)

SDGs	Sub SDGs	Bhutan	Bangladesh	Nepal	India
SDG7: Affordable and Clean Energy	1- Population with access to electricity (%)	100%	96.2%	89.9%	99%
	2- Population with access to clean fuels and technology for cooking (%)	80.2%	25.0%	34.8%	67.9%
	3- CO2 emissions from fuel combustion per total electricity output (MtCO2/TWh)	0.1	1.2	2.1	1.5
	4- Renewable energy share in total final energy consumption (%)	12.1%	0.3%	7.1	15.9%
SDG 13: Climate Action	1- CO2 emissions from fossil fuel combustion and cement production (tCO2/capita)	0.6	0.5	1.9	2.0
	2- CO2 emissions embodied in imports (tCO2/capita)	0.2	0.2	0.1	0.5
	3- CO2 emissions embodied in fossil fuel exports (kg/capita)	NA	0.0	NA	NA

Country Profiles. dashboards.sdgindex.org. Retrieved April 10, 2024, from https://dashboards.sdgindex.org/profiles

Renewable Energy Potential in BBIN Countries

The BBIN countries have abundant renewable energy sources. These include the rivers from the Himalayas, which are ideal for hydropower generation; the expansive coastline along the Indian Ocean, suitable for tidal and wind energy; and the intensely efficient Thar Desert, which is perfect for solar energy production. The following table provides information on the potential capacity of India, Nepal, Bhutan, and Bangladesh in terms of hydro, solar, and wind potential.

Table 2: Comparative Renewable Energy Potential and Explored Capacity of Energy Generation

Renewable Energy	NEPAL			BHUTAN			BANGLADESH			INDIA		
	Potential[a]	Explored[b]		Potential[c]	Explored[d]		Potential[e]	Explored[f]		Potential[g]	Explored[h]	
Hydro	50,000	2,750		33,000	2,334		755	225		145,320	46,850	
Solar	47,000	68.38		1,200	0.72		50,174	392.62		748,990	67,078	
Wind	1,700	NA		760	0.6		2,000	2		1,163,856	42,868	
Total	98,700	2,818.38	2.85%	34,960	2,335.32	6.67%	52,929	619	1.16%	2,058,166	156,796	7.61%

Nepal and Bhutan possess abundant hydropower potential, yet their current infrastructure only harnesses a fraction—less than 10 per cent. In contrast, India's extensive and varied geography and climate make it rich in all three renewable energy sources. Conversely, Bangladesh faces limitations in hydropower due to its primarily riverine topography and lack of elevation.

However, it has high solar energy production potential and a lengthy coastline that offers wind power generation opportunities, both onshore and offshore. Despite these advantages, Bangladesh is still working to fully tap into its wind and solar energy resources.

Role of Renewable Energy in achieving SDGs

Out of 17 SDGs, no single SDG directly talks about Renewable energy. However, renewable energy has a significant role in achieving SDG targets. Renewable Energy technologies have become increasingly important as the world faces the challenge of mitigating the negative impacts of climate change and reducing the dependence on finite and polluting fossil fuels (Verma, 2023).

In the coming days, threats from climate change will increase, and energy consumption will be a pivotal contributor to total GHG emissions. It is difficult for countries to grow economically and significantly reduce energy consumption per capita. Either energy consumption can be made efficient, which means its mindful utilisation or demand for energy consumption can be fulfilled from clean energy sources. As per the trajectory of the world, where, thankfully, countries are lifting their population from the poverty line, their energy consumption is rising proportionately (USEIA, 2023). The only way to keep economic growth intact along with energy consumption is to deploy clean and green energy sources; for instance, the energy produced from renewable sources emits 90-99 per cent fewer GHGs and produces 70-90 per cent fewer pollutants (Verma, 2023).

As mentioned above, SDG Goals 7 and 13 actively require the support of renewable, and its share should go up in the total energy consumption basket. Increasing renewables share in the total energy basket pushes us closer to a Sustainable Future. This paper will systematically examine the nexus between renewable energy initiatives and Sustainable Development Goals 7 and 13 within the BBIN nations.

1- SDG Goal 7: Affordable and Clean Energy

Access to electricity and clean cooking fuel has improved in many parts of the world. The pandemic, the War in Ukraine and other global disturbances have created an atmosphere of uncertainty and diverted the attention of countries to other immediate goals. Globally, 91% of the population will have access to electricity in 2021; BBIN countries are also not too bad. (SDR, 2023) However, when it comes to access to clean cooking fuel and technologies, BBIN countries are far, e.g., the Global average is 71 per cent, Bhutan 80.2, India 67.9, Nepal 34.8, Bangladesh 25.0 per cent (SDR Country Profile, 2023), i.e. except Bhutan, all countries are below average. Access to clean cooking energy reduces emissions and is also directly related to SDG3 and SDG5, which discuss Health and Gender inequality, respectively. Still, a large

population in BBIN countries relies on biomass as a cooking fuel, creating indoor air pollution (IAP). Women and children are more exposed to IAP because it is only women who are traditionally responsible for these household works; this results in more exposure to the hazardous effects of smoke and has the potential to create eye irritation and watering, respiratory problems, poor obstetric outcomes and burns (NIH-US, 2020).

The share of Renewable energy out of the total energy basket globally was 19.1 per cent in 2020, in India 15.9, Bhutan 12.1, Nepal 7.1, and Bangladesh 0.3 per cent (Refer to Table 1). The difference among the countries is enormous. The renewable energy share of India and Bhutan is close to the global average, but Nepal and Bangladesh are too distant from the global average. Overall, BBIN countries are blessed with vast renewable potential, but their contribution to renewable energy needs to be higher, and in Nepal and Bangladesh, the situation is alarming.

A country like India, which is aspiring to be a global leader in renewable energy, takes initiatives like the International Solar Alliance 2015, National Green Hydrogen Mission 2022, Global Biofuel Alliance 2023, etc., have a low renewable share, making their claim to leadership in renewable energy contested.

2- SDG Goal 13: Climate Action

It calls for urgent action to combat climate change and its impacts. The world stands on the edge of a climate crisis, and the current measures and plans to tackle it are inadequate (UN DoES, n.d.). To limit the increase in global average temperature to well below 2°C above the pre-industrial level, it becomes implicit for the energy transition to a net zero energy sector. Renewable energy, energy efficiency, and end-use electrification can provide 90 per cent of the CO2 emissions reductions needed by 2050 (IRENA, 2019). As of 2020, the existing renewable energy fleet in BBIN countries is avoiding the emission of CO2 equivalent to, in Bangladesh 0.704 million Tonnes (MT), Bhutan 9.506MT, Nepal 6.357MT, and India 277.5MT (Avoided Emissions Calculator, 2020). SDG 13 discusses three main sub-goals: Carbon emissions from fossil fuel combustion and cement production, Carbon emissions embodied in imports and Carbon emissions embodied in fossil fuel exports (SDG, 2015).

As BBIN countries are import-dependent for fossil fuel needs, the third sub-goal is not applicable in these countries. The second sub-goal discusses emissions induced from imports: Bhutan 0.5, Bangladesh 0.2, Nepal 0.2, India 0.1 (ton CO2/Capita) (see Table 1). Given India's geographical positioning and access to the coast, it has access to maritime routes and fair infrastructure connectivity in the hinterlands, and its carbon emissions from imports are relatively low. According to the above figures, Nepal and Bangladesh’s emission per capita in

import is 0.2 (see Table 1); despite Nepal being a landlocked country and Bangladesh having an enormous coastline, their footprint is equal. This poses a question about Bangladesh's port and connectivity efficiency. Less efficient and poor technologically driven equipment incur more energy to function, raising overall emissions. Bhutan's position is also challenging to digest. Given that it is also a landlocked country and far from the coast, similar to Nepal, Bhutan's per capita income is more than Nepal's. One reason for this is the vast population gap between Bhutan and Nepal. Less population means contribution shared by fewer people, therefore high per headcount.

Actions and Commitments of BBIN countries over Renewable Push

As all member countries of BBIN are members of the Paris Agreement and have submitted their NDCs, NDCs are at the heart of the Paris Agreement and SDGs; observing their NDCs can tell us many things about their approach to Energy Transition and Climate Action. Comparative analysis of NDCs can help us understand member countries' approach to Renewable energy. What promises have countries made in NDCs aligned with climate action concerning renewable energy? We will now discuss the approach of each BBIN member country.

1. **Bhutan:** Bhutan, the world's 1st carbon-negative country (VIVES et al., 2023) and the only carbon-negative country in BBIN countries, will continue to be carbon-negative, as proposed in its 1st NDC (Royal Environment Commission, 2015) and reiterated in the updated 2nd NDC (Second NDC Bhutan, 2021). Some actions and targets concerning renewable energy are mentioned in NDCs. Bhutan expressed its commitment to developing Low Emission Development Strategy (LEDS) for Human Settlement; it will lead to cumulative mitigation potential of up to 4122 Gg CO2e, LEDS for industries which will mitigate 999-1137 Gg CO2e per annum, LEDS for Surface transport have the cumulative potential of carbon mitigation of 5283 Gg CO2e by 2030 (MOAF Bhutan, 2021). These LED transitions are done only by replacing the emission sources with clean energy sources. On the Renewable energy production front, Bhutan came out with two commitments: Sustainable Hydropower Development Policy and Alternative Renewable Energy Policy. Under Sustainable Hydropower Development, Bhutan will harness its hydropower potential and anticipate the commissioning of Punatsangchuu-I (1200MW), Punatsangchhu-II (1020MW), Kholongchhu (600MW) and Nikachhu (118MW) Hydro-Electric Projects (HEP) by 2030. In addition to this, Sankosh HEP (2585 MW), Dorjilung HEP (1125 MW), and Nyera Amari (404MW) are priority projects that will be pursued based on evolving national circumstances (Second NDC Bhutan, 2021; pp13). Alternate Renewable energy

consists of mini-hydro, solar, wind, and waste-to-energy. According to medium term plan from 2020-2028, Bhutan will deploy 71.11MW of Solar and Wind, 500kW mini hydel to meet the energy demand of the remote Luana community and consider the feasibility of waste-to-energy production in Thimphu, some decentralised solar water heaters in the institutions and rooftop mounted solar plant will also add on to the Renewable fleet (ibid., pp14). Apart from reducing emissions, producing energy and being green, Bhutan is firmly committed to enhancing energy efficiency. The National Energy Efficiency & Conservation Policy and the Energy Efficiency Roadmap (NEECP) were adopted in 2019. It has the potential of 155GWh energy saving and 0.59MT CO2e emissions reduction (ibid., pp15). So, Bhutan's strategy for Renewable energy contribution to SDGs can be categorised into Emission Reduction, harnessing Renewable energy potentials, and enhancing efficiency.

2. **Bangladesh:** Bangladesh came out with its first NDC in 2015 and submitted its updated version in 2021. Bangladesh's Action and Targets for Renewable Energy to achieve SDGs can be read under two sections: Unconditional and Conditional. Unconditional targets are not dependent on any externalities; such targets are declared based on particular countries' capacity. Conditional targets are dependent on some external variables, e.g., developing hydropower if the World Bank passes a loan; the target is dependent on World Bank decisions; therefore, the target is conditional. Under the business-as-usual scenario (BAU), GHG emissions in 2030 will be 409.41MT CO2e. Still, Bangladesh's NDC targets under the unconditional scenario are to cut down 27.56MT CO2e emission to 381.85MT CO2e, but under Conditional targets, the goal is enormous, to cut down 61.9MT CO2e emission to 319.94MT CO2e (MOEFCC Bangladesh, 2021; pp7). Bangladesh targets to implement Renewable energy projects (combined of grid and non-grid connected solar energy, Wind, biomass hydropower) of 911.8 MW under the unconditional Scenario; under the conditional scenario, the target of implementing renewable energy projects of 4114.3, nearly four times more than unconditional sources (ibid. pp10). By improving traffic congestion, there is a 5 per cent unconditional scenario and a 15 per cent conditional improvement in fuel efficiency. Achieve a 10 per cent unconditional (ibid., pp9) and 20 per cent conditional scenario increase in energy efficiency in the industrial sector (ibid., pp12). The brick kiln is a primary polluting sector in Bangladesh, under unconditional 14 per cent, under conditional 47 per cent emission reduction, which is quite appreciable, by adding 5925 Solar irrigation pumps generating 176.38MW under an unconditional scenario and 4102 solar pumps generating 164MW energy for agriculture (ibid., pp3). Interestingly, the target of adding solar pumps is less in the conditional scenario than in the unconditional scenario.

Bangladesh also targets the unconditional building of 57,000 mini-bio gas plants and 107,000 plants, conditionally (ibid., pp10-13).

3. **Nepal:** Nepal is the most vulnerable country to climate change and has a high risk due to its fragile topography (Bhatta et al., 2024). Nepal submitted its first NDC in 2016 and updated the version of its second NDC in 2020. NDC of Nepal talks about expanding clean energy generation from approximately 1400MW to 15000MW, of which 5-10 per cent will be generated from mini and micro hydropower, solar, wind, and bioenergy, of which 5000MW addition is an unconditional target, and the rest is conditional. Nepal aims to supply 15 per cent of the total energy demand from clean sources (MoHP Nepal, 2020; pp3).

   Nepal targets 25 per cent of vehicles to be sold electric by 2025, which will help reduce approximately 4 million GJ of 9 per cent of total fossil fuel dependency. By 2030, Nepal targets it to be 90%, which will reduce 13.5 million GJ, resulting in a 28 per cent decrease in fossil fuel consumption. Nepal targets the transition to clean energy in residential cooking and biogas sectors to reduce emissions from 1999 Gg CO2e in the BAU scenario to 1774 Gg CO2e (ibid.; pp3-16).

4. India: India presented its first NDC in 2015 and submitted its updated version in August 2022 (MOEFCC India, 2022). It includes a vast range of issues concerning the environment, climate change mitigation, capability development, sticking to renewables, and their role in achieving SDGs. India added several things to its revised NDC, such as

a) To reduce the emissions intensity of its GDP by 45 per cent by 2030, starting from 2005: Emission intensity to GDP means a percentage increase in emission concerning the percentage increase in GDP, e.g. Indian GDP grew at an average rate of 7 per cent from 2005-2019, but emission increase by 4 per cent only, so emission was reduced to 33 per cent (The Hindu, 2023). Similarly, India wants to reduce emission intensity by 45 per cent from 2005 to 2030.

b) India is dedicated to combating climate change by employing technology transfer and low-cost international finance, including the Green Climate Fund (GCF), to achieve approximately 50 per cent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. This commitment is reflected in various programs and schemes, such as the National Action Plan on Climate Change (NAPCC), which includes missions in specific areas like solar energy, energy efficiency, water, sustainable agriculture, Himalayan ecosystem, sustainable habitat, health, green India, and strategic knowledge for climate change. One of the key initiatives under the NAPCC is the National Solar Mission,

which aims to promote sustainable growth and address India's energy security (PIB Delhi, 2022).

Challenges and the Way Forward

We have discussed the importance of renewable energy for achieving SDG potential in BBIN countries and the targets set by these countries for renewable industry. Given the actual reality, we can find the gap between targets and policies deployed because of some hindrances that come in the way.

One primary challenge not only BBIN countries face but also all major developing countries face is a *need for more funds* for infrastructural development. The call for a significant renewable push requires much investment in infrastructure such as efficient and technically advanced grids, new solar, wind, biofuel, nuclear, etc., and power generation plants, which can provide an alternative to fossil fuel-based power generating plants. Countries have two types of goals in their NDCs, one Unconditional and the second conditional, and the gap between the target unconditional and conditional is vast, which we saw above; this shows how crucial it is to fund for transition.

The second most significant issue concerning energy efficiency is the *high transmission cost of electricity* in South Asia, where the world average power transmission and electricity losses are 8 per cent, and South Asia's is 19 per cent. In the same ranking, India is at 19 per cent, the same as the South Asian average; Bangladesh is at 11 per cent, and Nepal is at 32 per cent (World Bank, 2018). Nepal's transmission lines either do not have the efficient capacity or are on the verge of collapse. To invest in developing transmission lines with the USA under MCC, a USD500 million project in grant, became a political impasse. Most of the transmission lines between India and Nepal are below 400kV, except for one cross-border transmission line between India and Nepal, the Dhalkebar-Muzaffarpur line (Shrestha, 2022). Emerging technologies like Artificial Intelligence can transform energy systems' efficiency and sustainability. For instance, Predictive Maintenance can prevent equipment failures by predicting them before they happen. On the other hand, Energy Optimization uses advanced analytics and real-time monitoring to adapt to changing environmental conditions, predict energy production patterns, and optimize resource allocations. Doing so maximises energy yield from renewable sources, making them as reliable as traditional/non-renewable ones (Shedrack Onwusinkwue et al., 2024).

The third most significant challenge is the need for *interstate regional cooperation*; one country may have an advantage in something the second country needs, and vice versa. Here comes the significance of cooperation for mutual gains. Regional collaboration can decrease the total

transaction cost of energy production. India and Bangladesh are energy-hungry nations, and in the coming days, it will increase only, but countries like Bhutan and Nepal have rich hydropower potential. India can help fund hydropower and other infrastructure development, such as an efficient grid, and in return, member countries can fulfil their energy demands. India already has several such projects, but the potential is enormous. Firstly, India is also a developing country that limits its capacity to invest in other countries. Secondly, these countries are also cautious in any collaborative infrastructure development with India, primarily because of India's Big Brother attitude (Sharma, 2020). Countries try to keep only some of their eggs in a single basket. These countries fear that as much as we depend on India, India will have more leverage to influence our internal matters. India also shows resistance when these countries try to outsource funding from third countries (Bagchi & Dasgupta, 2017). Consequently, the culmination of all these things limits regional cooperation and consequently negatively impacts energy transitions in the long run.

Conclusion

Renewable energy plays a crucial role in the shift from non-renewable to clean fuel, which is of the utmost importance for achieving SDGs and preventing irreversible damage. We have seen how much the energy sector contributes to GHG emissions by examining various data sets. The BBIN countries have tremendous potential in renewable energy, which is significant in transitioning and moving towards sustainable growth. All Member countries have signed the Paris Agreement and declared their Sustainable Development Goals for 2030. Unfortunately, there has been a gap between targets and policies due to a need for more resources.

The Conference of Parties (COP) to UNFCCC, which is supposedly the supreme decision-making body of the UNFCCC convention, also reviews national communications, e.g. NDCs and reviews emission inventories submitted by parties (UNFCCC, n.d.). COP 29, held from 11-22 November 2024 in Baku, Azerbaijan, came out with 14 significant initiatives, out of which the Global Energy Pledge, Green Energy Pledge: Green Energy Zone and Corridors, Hydrogen Declaration and The Climate Action Fund are directly aligned with the promotion of renewable energy, green transition and energy efficiency (COP29, 2024). Under the above declaration and pledge, countries need to emphasise investment in grid and transmission infrastructure, integration of renewables to enhance energy security, promoting regional integration and international cooperation (GESGP, 2024), harnessing clean energy, implementing energy efficiency applications, maximising the benefits of energy (GEP, 2024). Hydrogen, which is considered a game-changer in the clean energy sector, was also discussed in COP 29, emphasising low-carbon hydrogen production and acceleration of the

decarbonisation of existing hydrogen production (Hydrogen Declaration, 2024). However, these recommendatory benevolent ideas and policies are always part of the discussion in such forums, and countries pledge to adhere to them. However, the problem lies in its implementation side. Out of several implementation side problems, most developing countries face perennial financial problems in executing these policies and ideas. Article 9 of the Paris Agreement stipulates that developed countries should provide financial assistance to developing and least developed countries (LDCs) (UNFCCC, 2015). At COP 15, it was decided that developed countries would mobilise USD 100 billion annually to developing and LDC countries till 2020 (UNFCCC, 2015; pp7). At COP 21, this deadline was extended till 2025, and it was also decided that a new climate finance goal to succeed this would have to be decided before 2025 (The Paris Agreement, 2015; pp7). This new financial goal is called the New Collective Quantified Goal (NCQG), declared in COP29, provisioning USD 300 billion of finance mobilisation to developing and LDC countries (DownToEarth, 2024). However, the number has increased from the previous USD 100 billion pledge but is still USD 200 less than the number called by group 134 developing countries. Given the dissatisfaction with the amount, several countries walked out of the negotiation. Indian delegate criticised it, calling the agreement an "illusion" (Aljazeera, 2020). This division between the Global North and the Global South, driven by a state-centric and realist approach, would only make the transition journey more difficult. The lack of resource mobilisation from international channels further strengthens the need for regional and subregional cooperation to prevent climate apocalypse. As members of one contiguous territory, an individual approach would produce a different benefit. A territorialised state-centric approach is unsuitable since borders can divide the territory but not the climate; boundaries are designed for humans, not nature. The territory is just a tiny fraction of Mother Earth.

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