GLOBAL CARBON NEUTRALITY AND NATIONAL SECURITY IN GLOBAL SOUTH: A CASE STUDY ON THAR COAL PROJECT, PAKISTAN

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Abstract

As the global climate continues to change, so does the need to shift away from fossil fuels. However, for countries in the Global South facing long-term energy crises such as Pakistan, fossil fuels provide a lifeline amidst challenging circumstances. This paper examines the impact of achieving carbon neutrality on national sovereignty, with a particular focus on the Thar project. The aim is to make a convincing case for reconciling carbon neutrality objectives with the need to meet energy requirements. Extensive research was conducted to understand the views of academicians, professionals and residents of Thar. The findings showed that the residents of Thar are in favour of the project. While there were some diverging views on the project's environmental impact, the overwhelming consensus was in favour of the continuation of the project. The results of the research also showed a predominantly positive focus on the Thar Coal Project. These findings highlight the need for a holistic approach to managing the complex relationship between environmental sustainability, energy security and energy requirements, especially in regions facing urgent energy challenges.

Keywords: National Security, Carbon Neutrality, Thar Coal, Pakistan.

Introduction

It is essential to achieve carbon neutrality by 2050 to reduce the increase in global temperature by 1.5°C. The fossil fuel that produces the most carbon emissions is coal. Developed countries can gradually reduce and eventually eliminate their reliance on coal, but this approach presents a complex policy dilemma for the developing countries of the Global South. Global climate policies sometimes clash with domestic interests and national sovereignty,

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potentially exacerbating disparities and exacerbating vulnerabilities. This approach is in stark contrast to the core idea of the 2030 SDGs, which place great emphasis on "Leaving No One Behind" (LNOB).

A group of climate campaigners and politicians in Pakistan are trying to contain the expansion of Thar Coal project. They are displaying an idealist mindset, signing coal phasing out treaties and abandoning Thar project, without taking a holistic angle. The adoption of a reductionist perspective has the potential to weaken the impact of progressive energy policy. An apt illustration is the conversion of the Kalabagh dam into a national debate. It is crucial to actively analyse the considerable potential of Thar coal in response to the increasing demands for climate action, coal elimination and the geopolitical implications of climate change.

The global push to reduce carbon emissions is evident through initiatives like the 2015 Paris Agreement, which Pakistan has signed, and Europe's progressive actions, as seen in the European Green Deal. These efforts share a common goal: achieving carbon neutrality. To meet these ambitious targets, we must reduce global carbon dioxide (CO_2) emissions by 45% from 2010 to 2030 and reach net-zero emissions by 2050. In 2020, Mother Nature provided an awakening to the world in the COVID crisis, but the opportunity seems to have been lost.[1]

Figure-1: Production based Emissions of (CO_2) by Country

Country	Production based emissions of (CO_2) - Mt
China	7,955.99
India	1,802.31
United States	1,002.30
Japan	418.82
Russia	380.23
South Africa	370.27
Indonesia	303.15
South Korea	283.91
Germany	230.22
Poland	179.50
Turkey	162.56
Australia	150.96
Pakistan	59.96
Canada	43.86
United Kingdom	23.69
Total	13,367.73

Source: Our World in Data

Natural energy sources such as solar, wind and hydro are the blessings of Mother Nature. On the other hand, excessive use of coal, oil and gas is becoming the curse of humanity. Transitioning to renewables is imperative to achieve sustainability and meet global Paris Climate Accord targets. Few nations are actively working to fulfil their emissions reduction obligations, whereas some have turned a blind eye. International Energy Agency (IEA) reported a concerning trend in 2022: CO_2 emissions from coal-fired power plants rose by over 2% compared to the previous year. Figure 1 shows global production-based emissions, with the highest levels originating from the US, China and India. Production-based emissions from coal encompass the total amount CO_2 emissions expelled into the atmosphere during the entire coal production process, which includes mining, transportation and utilisation for energy generation. In contrast, Pakistan's emissions were notably lower. In the coal CO_2 emissions per capita ranking, China and Australia top the list, while Pakistan ranks lowest at 0.26, as shown in Figure 2. Coal CO_2 emissions per capita refer to the mean quantity of CO_2 emitted per individual in a nation as a result of coal use. While developed nations predominantly constitute the significant contributors to global emissions, the international spotlight is directed towards developing countries, urging them to align with the prevailing global trend of carbon neutrality.

Figure-2: Coal CO_2 Per Capita by Country

Source: Our World in Data[2]

The juxtaposition of Pakistan with developed nations such as China and the United States, in relation to their global carbon emissions and coal

production, highlights a significant viewpoint in tackling the climate crisis. Although these developed countries actively engage in climate debates, their real efforts to reduce emissions may not be consistent with the magnitude of their emissions.

It is vital to stress that developed nations, which are at the forefront of global carbon emissions and substantial coal production, should adopt a more proactive approach in decreasing their reliance on coal before exerting pressure on developing nations. It highlights the necessity for leadership from countries who have traditionally made the greatest contributions to the issue. By giving more priority and expediting their shift from coal to cleaner energy sources, these nations may establish a stronger model and make a more significant contribution to global emissions reduction.

This is a call for equity and accountability, highlighting the need of allowing people who have made significant past contributions to take the lead on combating climate change. This strategy not only establishes a more equitable structure for dealing with worldwide emissions, but also recognizes the necessity of cooperative endeavors, wherein wealthy nations provide aid and assistance to poorer countries in their own shift away from coal and towards sustainable energy options.

The paper delves into a comprehensive exploration of the concept of achieving carbon neutrality and its implications for national security. It also delves into an in-depth examination of climate security as a facet of state security, with a primary focus on Pakistan, while incorporating illustrative instances as case studies of a few additional nations, such as Australia and Poland. The selection of Australia and Poland for comparative analysis stems from their status as significant coal dependent nations deeply entrenched in the coal industry. To investigate the societal responses to this issue, the study employs surveys to assess the perspectives of local residents in the Thar region as well as those of professionals. This methodology is aimed at gaining a holistic understanding of how society as a whole is responding to the multifaceted challenges related to carbon neutrality and climate security.

Coal has been a vital energy reservoir for Pakistan for an extended period. Presently, the nation's energy composition predominantly hinges upon coal, with coal-fired facilities contributing to over 40% of its electricity

production. According to Pakistan's 2022-23 Economic Survey, the power industry continues to be the largest user of Coal in the country. In the Fiscal Year 2022-23, from July to March, the power sector consumed a total of 7.297 million metric tonnes of coal (total how much was used).[3] Nevertheless, despite coal's affordability and extensive availability, it represents one of the most ecologically detrimental energy sources.

Reducing emissions from existing coal-fired power plants is a crucial aspect of climate mitigation but poses complex challenges for public policy. Many nations and regions heavily depend on Coal, making the closure or repurposing of coal mines and power plants economically and socially impactful. These areas often have specialised economies centered on coal, making the management of closures multifaceted. Addressing this issue effectively involves careful planning to minimise the impact on workers and communities, as well as the reuse and restoration of affected land. Achieving success in this endeavour demands sustained engagement from governmental bodies and local communities over an extended period.[4]

Resistance to ending coal energy in developing countries arises from economic significance, infrastructure costs for alternatives, job and local economy concerns and political factors favouring growth over the environment. This highlights the complexities of their transition to sustainable energy. In the context of Pakistan, the country faces large energy deficiencies. The observed electricity deficit has expanded to 7,000MW, signifying a pronounced deepening of Pakistan's energy crisis. Elevated temperatures have exacerbated the electricity demand, reaching 28,200MW, while the available power supply stands at 21,200MW.[5] Its reliance on imported fossil fuels for power generation is of great concern.[6] Notably, Pakistan allocates a substantial portion, approximately 60%, of its foreign exchange reserves to fossil fuel imports, encompassing coal, natural gas and oil.[7] Regarding coal specifically, Pakistan imports approximately 13.6 million tonnes, while domestic production stands at a modest 4.3 million tonnes, despite the country's substantial coal reserves of 186 billion tonnes.[8] This is seriously affecting Pakistan's energy security, which has implications for economic sustainability.

Pakistan's preference for imported fuels over domestically sourced options places a substantial strain on the nation's already fragile economy. As per data from the Pakistan Bureau of Statistics in April 2022, the primary imported

commodities included petroleum products, crude petroleum and liquefied natural gas, valued at Rs. 232,765 million, Rs. 98,427 million and Rs. 71,072 million, respectively. These imports played a pivotal role in fulfilling the country's energy demands during that specific period.[9] Relying extensively on foreign sources to meet essential energy needs poses a significant threat to Pakistan's energy security. Moreover, its dependence on international actors and organisations for financial assistance diminishes its ability to make sovereign decisions aligned with national interests. This heightened reliance on external support constrains the state's capacity to prioritise the nation's well-being and prosperity, as it predominantly focuses on the survival of the state apparatus.

Carbon Neutrality and State Sovereignty

Developing states have apprehensions regarding the overreach of developed states in climate policies, as seen in the Global South and North Divide. Climate policies do have geopolitical implications while the climate initiatives have been heavily politicized. The concept of sovereign states, as evolved in the Treaty of Westphalia in 1648, has undergone many extemporizations, with climate action being the most contemporary. The right of a country to govern itself is the essence of sovereignty. But what if this right starts compromising the rights of its neighboring countries and the world at large? Environmental issues and corresponding policy formulation are bigger and beyond the confines of international boundaries. They pose numerous challenges for a state's sovereignty. Seeking advisory opinion of International Court of Justice (ICJ) by United Nations (UN) on legal consequences for states in case of noncompliance to climate commitments is a precursor.

Sovereignty of a state is upholding the independence of a country to determine the matters they give importance to and their choice to form policies in response to those matters and strategies to address the environmental changes within their boundary. Consequently, sovereignty may also imply the right a country has to protect, the natural environment within their territory. Bhutan absorbs more carbon than it emits, yet it is threatened due to melting glaciers. States independent decision-making is accelerating or decelerating global climate change is still debatable. The inclusion of two additional factors CO_2 emission and material footprint in the Human Development Index from 2020 onwards further amplifies the significance of climate change in the standings and security of states.

Intriguingly, it is assessed that developed countries are the biggest emitters of carbon due to their industries and responsible for climate crisis. Unfortunately, underdeveloped countries (nations of Africa and Asia) are bearing the brunt of the carbon emissions. Additionally, the new structures being put in practice to counter the adverse effects of climate such as green technology and taxes to decarbonize are again benefiting the ones responsible.

Presently, there exist multiple documented risks to the existing global order, including nuclear proliferation, economic stability, terrorism and the misuse of Artificial Intelligence. An unexplored factor in this regard is the influence of climate change on the sovereignty of nation-states. Climate change has consequences for the domestic dimensions of the states. Several nations perceive the goals and objectives of climate response as exceeding their national ambitions and consider them to be a violation. Boutros Ghali, the former UN Secretary General dilates that time of complete and exclusive sovereignty has faded away. Additionally, he remarks that theory was never matched with reality in this aspect.[10]

States, as subjects of international law, possess the autonomy to make decisions in accordance with their domestic legislation. Nevertheless, the climate agreements impose legal obligations on governments that may conflict with their national goals. For example, Australia holds the distinction of being the leading global exporter of coal. With the coal era gradually ending in conformity with the climate regulations of the Paris Agreement, blocking coal extraction could lead to significant employment losses in the country. The mining policy continues to exert significant influence on election outcomes in Australia, and the conservative administration displayed unwavering determination to take only the minimal necessary action on climate change.

The Amazon forests serve as a great source of oxygen for the planet and absorb CO_2. Yet, they also serve as a means of livelihood for the residents, with timber extraction being an important source of revenue and land being cultivated and developed. Currently, there is a contradiction between the two; if Brazil chooses to prioritise the global benefit by adhering to climate protocols and policies, it will have a negative impact on its local people. Implementing climate policies at times are perceived to be detrimental to national interests and are considered as interference in internal matters. The former Brazilian government was criticised for its inaction regarding the Amazon forests and for

transforming the carbon sink into carbon sources. They perceived the environmental regulation as a hurdle to the economic prosperity of the nation.

In 2017, Australian Prime Minister Scott Morrison raised a piece of coal in parliament, proclaiming, "Do not be scared".[11] For those involved in the mining industry, the environmental regulations come as a death blow. This also rings true for consumers like China, India, Japan and South Korea. This is reflected in the various demonstrations where individuals denounce climate change initiatives as an interference with domestic matters.

The contemporary conception of state sovereignty is founded on four fundamental principles: authority, territory, population and recognition. Every nation has the inherent right to international personality, which refers to its status as a subject of international law. This includes the right to have its national integrity respected and the right to self-defense. Additionally, a nation has the right to freely determine and exercise its political and social system.

The regulations expected to be implemented through global climate action in the coming decades hold the tendency to diminish the sovereignty of states in the aforementioned areas. Countries are social edifices imperceptible in a natural realm that is indivisible in terms of state sovereignty. This highlights an inherent and difficult predicament that questions the established framework on which sovereignty is based. Regarding climate change, this will require neighbouring nations to radically modify their views of each other and develop a new, insightful knowledge of the place of social order as a wholly owned subsidiary of the natural world.

The global climate laws are directly challenging state sovereignty. Both realist and liberal explanations of state behavior and the prospects of international cooperation are based on the notion of interest. In the backdrop of campaigns of climate skepticism, national economic interests coupled with human security issues continue to dominate perceptions of global vulnerability.

Amidst the current socio-political context, developed nations have designated Fridays as protest days to advocate for climate action. In contrast, in developing nations, people are engaging in rallies as they perceive this as a direct threat to their means of survival. The mill workers, oil drillers and carbon-emitting manufacturing workers strongly believe that environmental regulations

will have an adverse effect. It is important to note, however, that adhering to all the protocols is essential to ensure a better future for coming generations. States need to move forward and overcome their vested interests to solve this pressing issue.

National Security as Climate Security

As climate concerns grow, security is another area that is evolving. Security now encompasses more than just military concerns. Climate change is having a significant impact on state policies and national sovereignty. This complex relationship between climate and security is playing a major role in determining future state security strategies. Even regions that have historically been stable are facing conflicts due to climate and resource issues. For instance, Poland is dependent on coal to provide energy and independence from Russia's oil and gas production, which has caused tensions with Germany. Coal accounts for 70% of Poland's electricity generation, and it is not only a source of energy but also a source of jobs and political support.

Inter-state conflicts, such as the dispute between Poland and the Czech Republic over water use and Russia's control over gas, also raise the possibility of interstate clashes. When asked about the potential closure of the well-known Polish mines “Turow” due to encumbrance, Polish Prime Minister Mateusz Morawiecki said that the closure of the mines would put “Poland’s security at risk”.[12] Water scarcity is also a major issue in South Asia. India had been draining a large portion of water, violating the Indus Basin Treaty and implicating security concerns in the region. Thus, climate and its associated issues have significant interstate implications for security measures.

Emerging trends in the domains of security and sovereignty pose novel challenges for states. Consequently, an all-encompassing policy approach is imperative to adapt to this evolving global landscape. The key lies in aligning a state's national interests with prevailing global trends to safeguard national security and sovereignty without compromise. We have the case of Tuvalu, the island state with disappearing land, envisioned to be the first digital state. Same will be the situation with Puerto Rico, Brahmos etc.

Table-1: Coal Usage and Emissions in Signatory Nations to Paris Agreement

Nation	The Energy Produced via Coal	Signatory to the Paris Agreement	Total Coal Capacity (Billion Tonnes)	Global Carbon Emissions (Percentage)
Pakistan	13%	Yes	187[13]	0.9%[14]
India	55%[15]	Yes	361.4[16]	7.3%[17]
Australia	44%[18]	Yes	75.428[19]	1.3%[20]
China	56.2%[21]	Yes	208[22]	27%[23]
United States	9.8%[24]	Yes	471[25]	11%[26]
Poland	40%[27]	Yes	26.4[28]	0.8%[29]

Source: Self Extracted

As per the data visualized in the table above, India and China clearly stand out as frontrunners in their dependence on coal, with 55% and 56.2% of their energy respectively derived from coal. However, it is important to note that all the nations mentioned are members to the Paris Agreement, which demonstrates their dedication to address climate change. Nevertheless, this dependence results in significant carbon emissions, with China accounting for 27% of worldwide emissions, the greatest proportion, followed by USA at 11%. India closely trails after, making a substantial 7.3% contribution to global emissions as a result of its extensive reliance on coal. In comparison, Pakistan and Poland have relatively lesser coal capabilities and emissions compared to other nations. Countries such as Pakistan have little contribution to carbon emissions. Thus, it is important that developed nations take lead in the phasing out process, before turning towards developing nations.

Tharparkar: A Solution to Pakistan's Growing Concerns

As per Pakistan Economic Survey 2021-22 (figure 3), coal makes up only 13% of Pakistan's total energy capacity. The majority of Pakistan's energy is generated via natural gas, making up 37%. The most recent data reveals a

significant 95.9% increase in Pakistan's oil import bill, soaring to US$17.03 billion between July and April of Fiscal Year 2022, compared to US$8.69 billion for the same period last year.[30] This surge is primarily attributed to higher global oil prices and a substantial depreciation of the Pakistani Rupee, making oil imports more expensive.

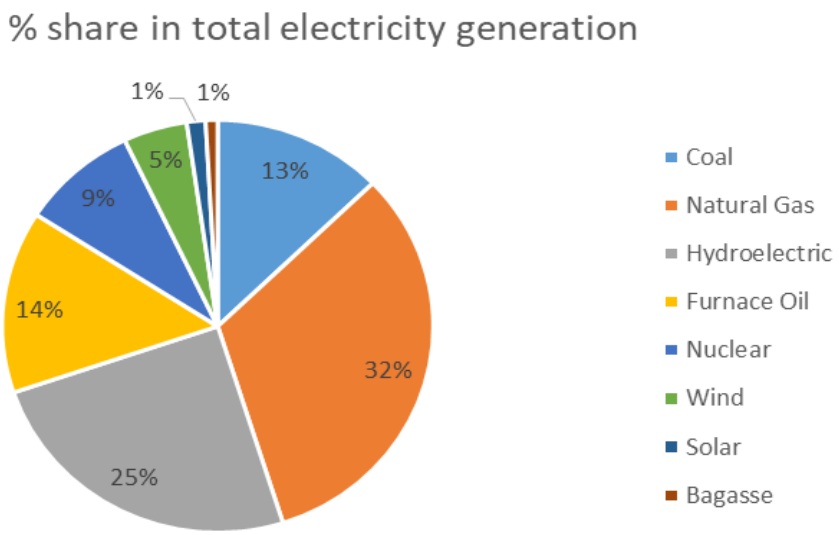


Figure-3: Source: Pakistan Economic Survey 2021–22[31]

The Pakistani economy has been significantly impacted by a substantial increase in international fuel prices associated with the Russia-Ukraine conflict. By the end of January 2023, the country's foreign exchange reserves had plummeted to US$3 billion, marking an 80% decline from the US$15 billion reserves it held just one year prior. Pakistan heavily depends on imported fuels to fulfil its energy generation requirements, with gas accounting for 29%, oil for 10%, and coal for 17% of its energy mix. Given this heavy reliance on fuel imports, the surge in fuel prices and the resulting foreign exchange crisis has led to a reduction in the operation of Liquefied Natural Gas (LNG) plants, gradually diminishing the effective operational capacity of the energy sector.[32]

The coal industry in Pakistan plays a crucial part in the country's energy sector and economic framework. The nation possesses significant coal reserves, totaling approximately 186 billion tonnes.[33] The Thar desert in southeastern Pakistan is home to the largest coalfield in Asia, with almost 175 billion tonnes of coal specifically in the Thar region,[34] not considering the rest of Pakistan.

Despite the abundance of coal reserves, Pakistan still significantly depends on imported fossil fuels, especially coal, to fulfil its energy needs.[35]

The Thar coal project is an initiative focused on the abundant coal deposits in the Tharparkar region of Sindh province.[36] This undertaking entails the extraction and utilisation of low-grade lignite coal reserves located in the Thar coalfield. The main goals of the project are to extract around 6.5 million tonnes of coal per year and produce 1,200 MW of electricity.[37] The project is crucial for Pakistan from multiple perspectives. It has the capacity to fulfil the energy requirements of the nation and substantially decrease its dependence on imported fuels.[38]

Additionally, the project is expected to boost the local economy, create employment opportunities, and stimulate industrial growth.[39] In an economy grappling with challenges like rising unemployment and a low education rate, among others, the emergence of a thriving domestic coal-based energy sector offers a ray of hope. The Thar energy project, in particular, presents an opportunity for local community development. The Thar Coal Block-1 Coal Electricity Integration Project, in light of its commitment to corporate social responsibility, has created over 18,000 direct job opportunities for the local population. Furthermore, the project has the capability to meet the electricity needs of approximately four million households in Pakistan.[40]

The project is a part of the CPEC initiative which aims to improve infrastructural and energy cooperation between China and Pakistan. The Thar coal project has the potential to generate a significant electrical capacity, with estimations suggesting a capacity of up to 100,000 MW.[41]

Table-2: Beneficial Aspects of Thar Coal

Aspects	Benefits
Fuel Imports	Reduced dependency on fuel imports
Energy Generation	Lower cost of energy production
Employment	Creation of new employment opportunities

Infrastructure	Improves and develops infrastructure capacity in realms of transport, development, etc.
Local Economy	Boost to the local economy, creating better opportunities.

Source: Self Extracted

The Thar Energy Project, in particular, presents an opportunity for local community development. As per an official presentation by Engro, the Thar Coal Project has several benefits for the local community which is catered in the Corporate Social Responsibility. Engro Project actively engages with the community providing various projects to improve the quality of life to the locals.[42]

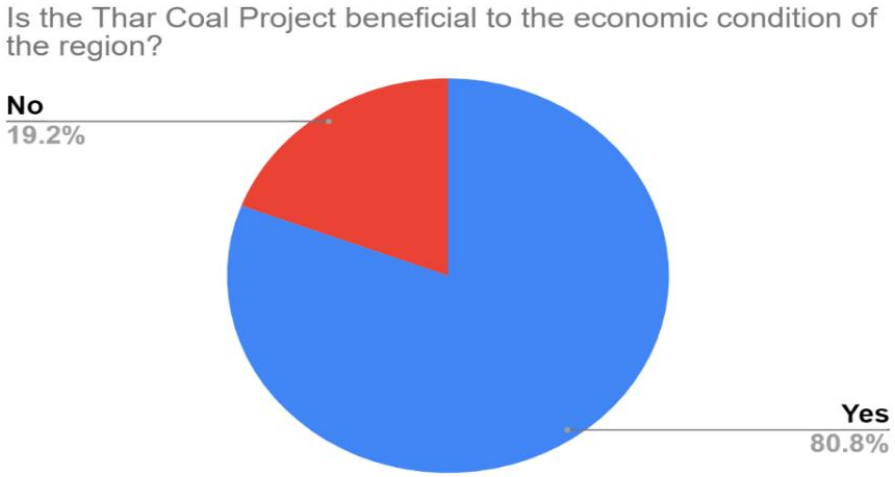
Survey Findings and Discussion

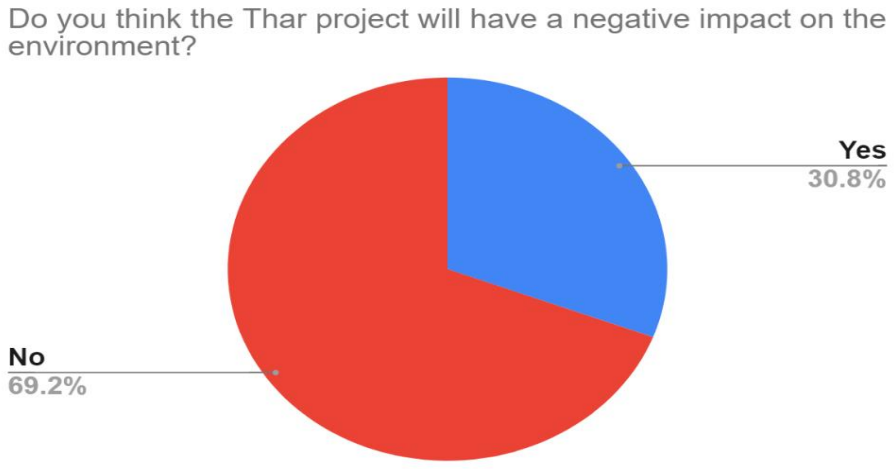
Primary data is important to validate the findings of this study. For this, a questionnaire was floated to the sample of 100 individuals, out of which 78 responses were received. Non-random purposive sampling method was adopted in this research. The survey was conducted in Tharparkar district, encompassing towns and villages. The survey yielded unanimously positive responses from residents regarding the project. It included the following basic and fundamental questions:

- Is the Thar Coal Project beneficial to the economic condition of the region?
- Do you think the Thar project will have a negative impact on the environment?
- Do you think this project will benefit the whole community and Pakistan?
- Should this project be continued?

The participants in the study were specifically selected from local villages (Tallavei, Khario Ghulam Shah, Wardai, Bhaou Bhall, Nabi Bux, Engro Morr, Islamkot, Mithi etc) within the area, primarily due to the heightened impact on these communities. Their inclusion in the study is crucial as it enables a more comprehensive examination of the viewpoints and sentiments of the local populace concerning the project. The purpose of this strategic selection of participants is to provide valuable insights into the views and experiences of the

community on the initiative. The collected data shows a strong positive sentiment regarding the economic and community impacts of the project. All 78 participants agreed that the project will bring significant economic benefits and will positively impact the community. This consensus reflects a strong conviction that the project has a lot of potential to benefit the local community in the Thar Parkar area. The overwhelming support for the project as a positive project for Pakistan shows that the participants are optimistic about the wider national impact of this project.





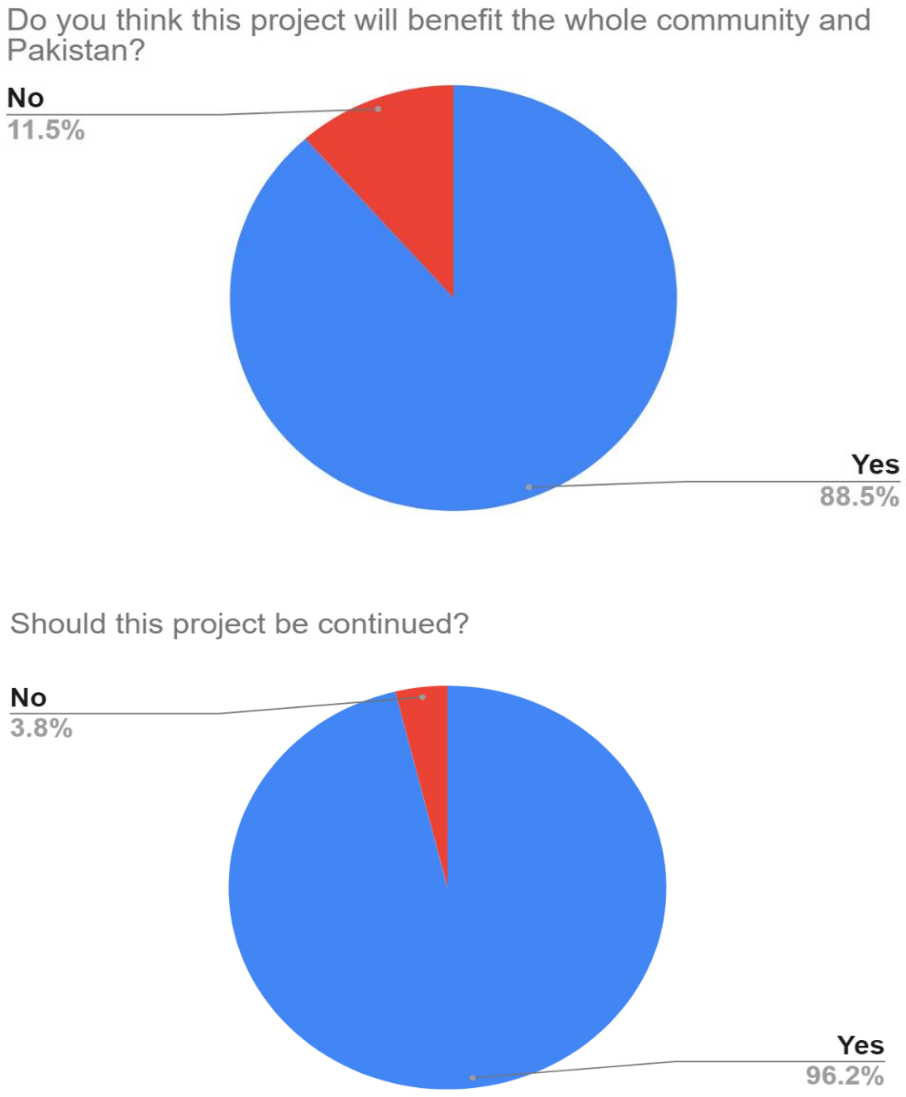


Figure-4: Survey results

Survey results show that the community is divided on the project's environmental impact. Out of the 78 respondents, 40 believe the project will have no negative environmental impacts. However, 38 respondents believe there could be some negative environmental impacts. This indicates concern about the potential environmental damage to the community. This divide within the community highlights how complex the environmental implications of the project are. It also highlights the need for thoughtful consideration and

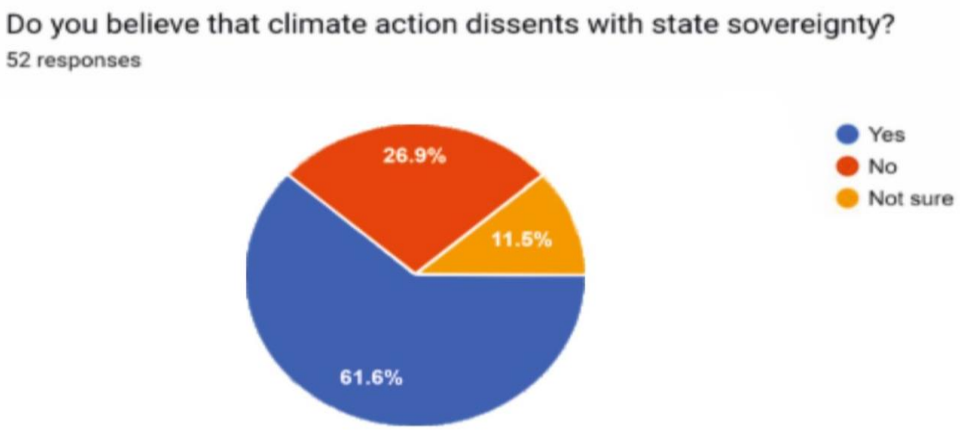
mitigation strategies that address the different viewpoints. The survey results show the nuanced perspectives residents have about the potential environmental impacts of the project. This highlights the need for a balanced approach that balances economic benefits with environmental sustainability.

The environmental implications of coal as an energy source encompass a broad spectrum of concerns. While the Thar project offers numerous advantages, there is an ongoing discourse regarding the necessity to limit the scope of these projects to mitigate environmental repercussions. However, it is essential to underscore that while environmental effects represent a crucial facet of project assessment, they should not singularly dictate the formulation of effective energy policies. To address this, in addition to local perspective, a detail survey was generated, link as below

https://docs.google.com/forms/d/e/1FAIpQLScndQlY276osE5UYd8S3GAwu8PnbFXNeqtbIal7dOWpEAqIsA/viewform?usp=sharing

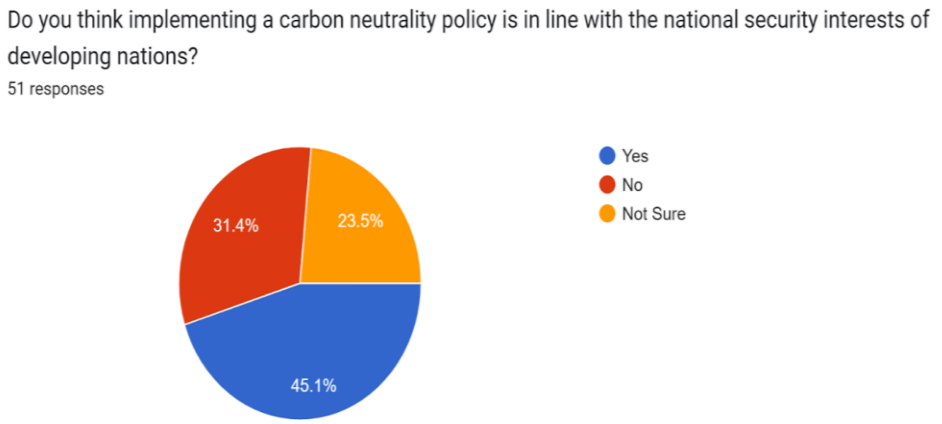
It had three parts. Part 1 dealing with state sovereignty and energy, Part 2 considers carbon neutrality and Part 3 directly concerns the Thar Coal Project. Detail survey is attached as Annex B. It was responded by professionals. A specific query was posed: "Should the Thar project be subject to limitations aimed at reducing its environmental impacts?" The survey outcomes yielded a decisive consensus against imposing restrictions on the project for environmental considerations. The pool of professionals consisted of established individuals from reputable organisations and world renowned institutions such as Harvard, the University of Aberdeen, etc. The results are crystalized below:

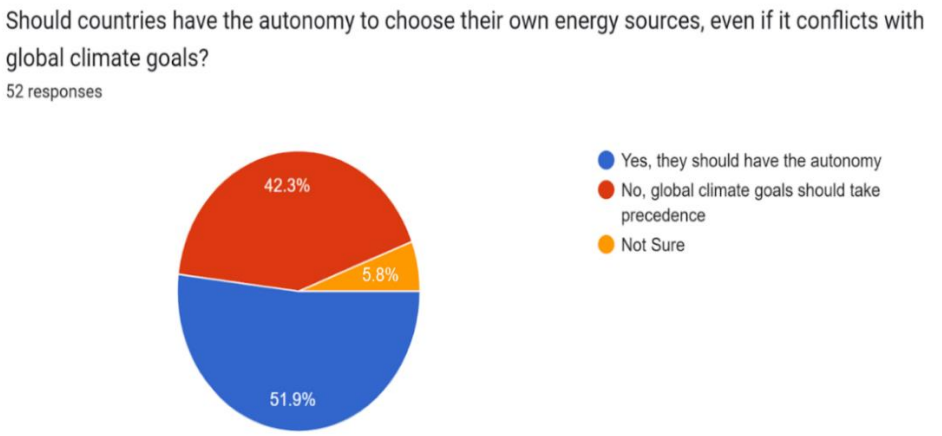
Figure-5: Results – Google Survey



Regarding the query, "Do you think climate action conflicts with the sovereignty of the state?" the participant provided the following response:

> *"The connection between climate action and state sovereignty is a matter of perspective. Climate action, aimed at addressing global environmental challenges, can either be seen as conflicting with state sovereignty due to international agreements and shared impacts or aligned with it by protecting citizens and national interests. The complex relationship requires a balance between global responsibilities and a nation's autonomy."*





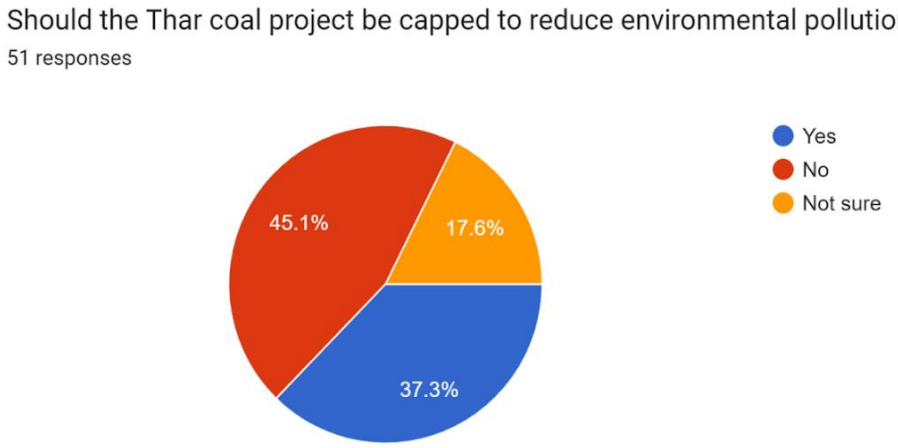


Figure-6: Results – Google Survey

One of the respondents articulated their stance in the following manner:

> *"The environment should surely be a priority, especially given the recent flooding in the country, which is a sign of the climate crisis. However, Pakistan contributes to less than 1% of the global carbon emissions and is suffering due to the carbon-heavy activities of the developed countries, which continue forward in their race for development and economic growth even when it's coming at the cost of the environment globally. Pakistan must call out these countries and itself prioritise the life and needs of its citizens by taking immediate, effective measures which can help the economy and stabilise the state and the quality of life in the country. Taking environment-friendly steps during this economic and social crisis at this very moment is not wise."*

Exploring alternative energy resources involves considering renewable and environmental friendly solar and wind power options. However, these alternatives come with challenges, particularly in terms of cost. It is worth noting that the international price of solar technology has been consistently declining, enhancing the economic feasibility of renewable energy sources. Pakistan can take advantage of this global trend by investing in solar systems, thereby reducing overall electricity production expenses and ensuring a stable energy supply.

Pakistan's geographical location offers a significant advantage for harnessing solar energy. The nation receives ample sunlight, allowing for the generation of approximately 95% of its empowering daylight hours, typically to 8.5 hours per day. Moreover, Pakistan enjoys between 185 and 290 sunny days

annually, further emphasising its solar energy potential.[43] With a solar power potential of 2.9 million MW, signifying Pakistan's potential for solar energy.[44]

Nonetheless, it is crucial to acknowledge that Pakistan currently grapples with a myriad of challenges that may impede the progress of developing and investing in green energy initiatives. The prevailing economic crisis, compounded by the persistent political instability, underscores the present difficulties Pakistan faces in venturing into and nurturing a new energy resource stream. Despite the favourable conditions, the existing environment and available resources may not be conducive to realising this objective.

In the previously mentioned survey, respondents were questioned about the economic and social ramifications of decreasing coal consumption and whether solar and wind energy could adequately substitute for coal-based power generation while meeting Pakistan's energy requirements. One of the participants provided the following response:

> *"Renewable sources of energy would have been a great option given Pakistan has great weather to support solar, wind and water energy, but solar panels cannot be afforded by much of the local population due to its high cost and its concept yet needs to be practised by larger offices, industries etc. Wind energy would require the creation and maintenance of wind turbines, which at this stage seem costly to invest in given their output wouldn't be as productive as coal or other non-renewable sources. Water energy would also be a great idea, but Pakistan lacks the infrastructure to store large bodies of water despite massive flooding, which could be worthy of use for turbine driving and energy production if we had better projects to save that standing flood water in the first place."*

There is an overarching trend where many individuals still favour coal and other non-renewable energy sources over renewables. This preference is often driven by factors such as inadequate infrastructure and resource limitations, which hinder the adoption of renewable energy. Current immediate needs often take precedence over longer-term sustainability considerations in decision-making.

In an interview with Dawn, Michael Kugelman echoed these sentiments, emphasising that for a nation like Pakistan grappling with energy insecurity and possessing significant untapped coal reserves, it remains prudent to initiate the exploration of these coal resources. Consequently, ignoring the substantial coal

reserves, which amount to nearly 200 billion tonnes in the Thar desert, would be deemed unfavourable from political and energy policy perspectives.[45]

It should be noted that the current sentiments are centred on addressing critical issues within the country, which include stabilising the economy, meeting energy needs through domestic sources, reducing reliance on foreign energy supplies and improving citizens' overall well-being. These elements combine to form the present national interests. Given the current conditions, the most practical strategy to achieve these goals is to use indigenous resources, the most significant of which are coal deposits in the Thar desert. Although this strategy runs counter to current global trends, it is in line with the country's urgent requirements. As a result, it is critical that all parties handle this issue comprehensively and sensitively. Considering the global trend, it's not a question of will but when, so Pakistan needs to enhance the pace of utilising Thar coal. Policy makers should frame tangible objectives with specific timelines to consume Thar coal in early timeframe.

Conclusion

The global climate crisis has brought forth several new issues, and to focus on economic growth and sustainable development, it is necessary to tackle these issues in a holistic manner, taking into account global and national considerations. Energy continues to play an important role in a nation's well-being, which has a significant impact on its policies and prosperity. For a country such as Pakistan, which is facing a few challenges and is heavily reliant on external energy sources, having a strong domestic energy system is essential for prosperity. To achieve sustainability, the first step is to create a stable and reliable economy and energy system. Without this, the country runs the risk of falling further into the economic and energy uncertainty trap.

Achieving a balanced policy approach is imperative, one that places the well-being of citizens and the country's prosperity at the forefront while simultaneously addressing the challenge of the climate crisis. Pakistan's susceptibility to the impacts of the climate crisis is well-documented, and it is incumbent upon the nation to harness the opportunities presented by its resources, such as the Thar region, to enhance its domestic position. Simultaneously, there is a pressing need to adopt a comprehensive strategy to shield the nation from the impending climate catastrophe.

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