Economic Impact of India's Transition to Net Zero

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Abstract

India is one of the fastest developing countries in the world and the fourth largest global emitter (Bhattacharya 2022), as per its international alliances and treaties, it must reduce its emissions by a significant amount. Net zero emissions by 2070 is a target announced by the Indian government at UN Climate Summit COP26 on November 1, 2021. Since then, India has taken various steps through the introduction of vast policies to achieve the same. While encouraging the adoption of greener sources of energy and adoption of energy efficiency, India is also trying to reduce its emissions. In the short run, prices of commodities produced by industries dependent on the use of fossil fuels may rise and due to the high capital and operational cost, these industries might even close down completely. This would lead to a loss of employment and decreased economic activity. The economic effect of such policies is that in the long run, they would prove to be beneficial by cutting down costs to businesses and consumers and generating employment. Thus, driving up the GDP. Bhutan sets an example as the only developing country to reach carbon neutrality.

Keywords**:** Decarbonising, Fossil fuels, Energy efficiency, Carbon capture and storage, Budget

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Introduction

India is a part of the United Nations Framework Convention on Climate Change (UNFCCC), its Kyoto Protocol (KP) and the Paris Agreement (PA). As per the extant provisions under these treaties, India is not obliged to completely stop carbon emissions (PIB Delhi 2022). The UNFCCC notes that the emissions originating in developing countries, including India, will grow to meet their social and development needs. Therefore, India is uniquely placed in this, it must balance growth and transition to cleaner energy. The target of achieving net zero emissions by 2070 was also a part of the Union Budget for the year 2023-24 and thirty-five crore rupees were allocated to achieve the goal. At the same time, what net zero actually means must be understood. Does it mean net zero carbon emissions? Does it mean net zero greenhouse gas emissions? As per the United Nations, "net zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance" (United Nations, n.d.). The process then is dual, it involves reducing all greenhouse emissions and trying to offset or remove existing emissions from the atmosphere. The aim of this paper is to look at various policies that the Indian government has planned and adopted to determine the potential economic effects they might have on employment, costs and the GDP in the short run and long run. I take reference from various reports and research papers to hypothesize the potential impacts of the transition to net zero emissions.

Measures and policies

India made a pledge at the Conference of the Parties (COP) 26 climate summit in Glasgow, where it also urged developed countries to deliver on their promise of climate financing. Speaking at the conference, Prime Minister Narendra Modi announced some tough measures to curb India's share in emissions and made new climate commitments at the High-Level Segment for Heads of State and Government at COP26 (Channel 2021). At the COP27 summit, India has taken the position that all fossil fuels need to be phased out, not just coal. At the previous conference in Glasgow, the final decision document mentioned a gradual phasedown of coal (Gokhale 2022). He deemed the following climate goals as the 'five elixirs' towards limiting the rising temperatures: firstly, India aims to generate 500 GW of its energy capacity

ISSN 2581 6535
Annual Volume 9 – 2024

from non-fossil fuel sources by 2030; secondly, India aims to meet half of its electricity demand from non-fossil fuel sources by 2030; thirdly, India plans to reduce at least one billion tonnes of total projected emissions by 2030 through afforestation (which acts as a carbon sink) so as to absorb an additional 2.5-3 billion tonnes of CO2 from the atmosphere; fourthly, India declares that it would reduce the country's carbon intensity of its Gross Domestic Product (GDP) by 45% till 2030[i]; and fifthly India plans to achieve a net-zero emissions target by 2070.

To achieve these goals, India has developed a comprehensive strategy that includes a range of policy measures, technological advancements, and financial investments. Some of the key steps that India is taking to move towards zero carbon emissions include promoting renewable energy, enhancing energy efficiency, encouraging the use and production of more electric vehicles, increasing forest cover, investing in and developing carbon capture and storage (CCS) technologies and decreasing coal and fossil fuels dependency.

Promoting renewable green energy

India is rapidly expanding its renewable energy capacity, with a target of achieving 500 GW of renewable energy by 2030. The Union Budget 2022-23 has allocated 3,365 crore rupees for the solar power sector, inclusive of both, grid-interactive and off-grid projects. An additional 19,500 crore rupees have been allocated for incentives relating to the production and manufacture of high-efficiency solar photo voltaic modules ("English Rendering of PM's Address at the Dedication of 750 MW Rewa Solar Project to the Nation," 2020). Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahabhiyan (PM-KUSUM) scheme is one of the largest initiatives in the world to provide clean energy to more than 3.5 million farmers by solarising their agriculture pumps. Roof Top Solar (RTS) Program Phase-II was launched in February 2019 with a target of achieving a cumulative capacity of 40,000 MW by the year 2022. Further, India is also a part of the International Solar Alliance which is an organisation of 121 countries. The Strategic Plan of the ISA for 2021-2026 identifies three key global issues – Energy Access, Energy Security, and Energy Transition ("International Solar Alliance,"). To harvest wind energy, the government has introduced multiple policies regarding onshore and offshore wind projects. It is now moving towards the adoption of a Wind-Solar Hybrid source of energy and has provided a tariff-based competitive bidding process for procurement of

ISSN 2581 6535
Annual Volume 9 – 2024

Power from Grid Connected Solar PV and Wind Projects ("Steps by Government of India to Promote Renewable Energy in the Country", n.d.).

Enhancing energy efficiency

India is working towards improving energy efficiency in all sectors, including buildings, transport, and industry. This includes the adoption of energy-efficient technologies and the implementation of energy-efficient building codes. The Government of India has kick-started a revolution in energy efficiency with support from the Indian citizens. A comprehensive policy known as National Mission for Enhanced Energy Efficiency (NMEEE) has been introduced. It has been successful in generating demand for the same by executing various programmes for consumers and municipal corporations. A segment of this effort also includes the Unnat Jeevan by Affordable LEDs and Appliances (UJALA) programme, the implementation of which has been undertaken by Energy Efficiency Services Limited (EESL) (a company under the Ministry of Power). This programme is the world's largest zero-subsidy LED bulb programme. More than 230 million LED bulbs have been distributed across the country along with thousands of energy-efficient fans and LED tube lights. This has helped India save 19 million tonnes of coal and an annual reduction of about 25 million tonnes of coal (Kumar 2017).

Encouraging electric vehicles

India is promoting the adoption of electric vehicles through various measures, including subsidies, tax incentives, and infrastructure development. EV@30 is a promise made by India. In pursuit of such a promise, the Government has set a goal of having 30% of total automobile sales be of EVs. A project called Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) India was launched by the government on April 1, 2015 (Torgalkar 2023). FAME focuses on reducing the use of gasoline and diesel vehicles and encourages the use of alternatives. This project is a critical component of India's electric mobility. The FAME India Program intends to encourage using all types of automobiles. As Nickel Manganese Cobalt (NMC) is an essential component of lithium-ion batteries used in electric cars or EVs and due to the low supply of these ores in India, nickel alloys are mainly imported. To encourage the production of these vehicles, custom on nickel ore and concentrates will be lessened from 5% to 0%, nickel oxide from 10% to 0%, and ferro nickel from 15% to 2.5%, according to the budget. Such a reduction in taxes will help lower production costs and inevitably lowering of

ISSN 2581 6535
Annual Volume 9 – 2024

the price of the same. The government has also planned to reduce duty on import of motor parts from 10 per cent to 7.5 per cent which will also assist in reducing the overall cost of EVs (Kulshrestha and Kulshrestha 2023). The 2023-24 budget for the second phase of FAME has been doubled from Rs 2,898 crore to 5,172 crore rupees (Shyam 2023).

Increasing forest cover

India is planning to increase its forest cover to absorb more carbon dioxide from the atmosphere. The country has set a target of creating an additional carbon sink of 2.5 to 3 billion tons of carbon dioxide through afforestation and reforestation by 2030. The Ministry of Environment, Forests, and Climate Change (MoEFCC) is responsible for plantation/afforestation initiatives in forest regions. A National Afforestation Programme (NAP) was launched in 2002, with the goal of planting more and more trees in forests which have been degraded ("National Afforestation Programme", n.d.). The programme aims to restore ecologically damaged forests and develop forest resources with people's participation, with a special focus on improving the livelihoods of forest-fringe communities, particularly the poorer.

Developing carbon capture and storage (CCS) technologies

India is investing in research and development of CCS technologies to capture and store carbon dioxide emissions from industries such as power and cement. The Indian CO2 Sequestration Applied Research (ICOSAR) Network has been established by the Department of Science and Technology (DST) in 2007. It was one of the key developments to initiate and facilitate research dialogue on CCS applications among stakeholders (Malyan and Chaturvedi 2021). The government since then has come up with National Action Plan on Climate Change (NAPCC) in 2008. NAPCC mentions the CCS in reference to reducing emissions from coal power plants. India presented a demonstration project for carbon dioxide capture and storage. India presented a demonstration project for carbon dioxide capture and storage in the Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC) (MoEF 2012). Further, as a part of Mission Innovation (MI), India is collaborating with 24 member countries and the European Union (EU) to deliver on eight innovations with the theme, "Carbon capture—Enable near-zero CO2 emissions from power plants and carbon-intensive industries" (MoEFCC 2021).

ISSN 2581 6535
Annual Volume 9 – 2024

Decreasing carbon dependency

The main policy to facilitate energy transition however will be the Green Hydrogen Mission which was approved by the Centre on January 4, 2023. The mission, with a target of 5 MMT of green hydrogen production a year by 2030, has an outlay of ₹19,700 crores (Nandi and Jha 2023). This process is two-fold; carbon pricing and setting limits to power generation. Carbon pricing involves placing a fee on emissions or offering subsidies for emitting less (United Nations, n.d.). Although India does not have explicit carbon pricing, it has reduced subsidies and levied more taxes on fossil fuels (petrol and diesel) spinning a carbon subsidy regime into one of carbon taxation. This has significantly increased petrol and diesel price while serving as a price signal to reduce fuel burnt and hence CO2 emissions. In furtherance of the same, India has increased the coal cess from Rs. 50 per ton to Rs. 100 per ton ("From Carbon Subsidy to Carbon Tax: India's Green Actions," n.d.).

The Indian Power Ministry has planned to reduce the generation of power from 81 thermal coal-fired plants (EnergyWorld 2023). This is to be carried out in a phased manner over the next four years. As per the regulations, the power plants have to operate at a 55 per cent generation. The 81 chosen coal-based plants are ones which charge a higher tax. This new regulation will hence result in a reduction of prices for the consumers as well. Through the policy, it is estimated that there will be a reduction of 58 billion kWh in power generation from coal and cut carbon emissions by 60.2 million mt (Pande 2022).

Short Run

Employment

The sectors that are the most dependent on the use of fossil fuels will be directly hit. Due to a continuous effort of the government to reduce dependency on such sources for energy generation due to their high carbon and other greenhouse gas emissions. As mentioned above, in an effort to decarbonise India, India is moving towards a carbon tax from a carbon subsidy regime. The taxing of the use of fossil fuels and limiting the volume of emissions will negatively impact sectors that use thermal plants for energy generation or use machinery that uses such fuels like oil, gas, steel and so on. The primary impact that taxing and regulating the

use of fossil fuels will have is that the prices of the commodities that are produced by these industries will increase due to an increase in production cost caused by taxation. The demand for the same will then see a steady decline and shift to commodities produced through lower emissions. As a result, these industries will experience serious economic disruption. It would lead to a loss of employment for the people engaged in such industries on a big scale. As per, the McKinsey Sustainability analysis of the Net Zero 2050 scenario from the Network for Greening the Financial System (NGFS), there would be a decrease in demand for both, direct and indirect jobs by about 187 million, globally. The loss of jobs would then lead to reduced income and hence discourage people from saving and investing. Further, taxes collected from the supply of coal and other fossil fuels is a major contributor to the revenue of the government each year. Decline of such industries would result in a lower revenue generation for the government.

Costs

The transition to net-zero emissions will also require a significant investment in new technologies, such as renewable energy, energy efficiency, and carbon capture and storage. India has already begun investing in these technologies; however, no life-changing technology has been invented as of yet. The government will have to keep investing in this sector. As and when these technologies are properly developed, the initial costs of these technologies will be high. which would, again, increase the cost of energy for consumers and businesses, leading to higher costs of living and reduced disposable income. The transition to net-zero emissions can have trade impacts, as countries with strong low-carbon industries may gain a competitive advantage in global markets. This can lead to shifts in trade patterns and potential trade disputes. These trade disputes will affect the import and export. More efficient technology would have to be imported from the more developed countries, increasing India's export expenditure and capital costs of businesses.

GDP

As a result of disinvesting by the government, aggregate demand (AD) will go down, driving the economy to a potential crisis (Goodwin 2015). In the short run, the reduction in economic activity in fossil fuel industries can lead to a contraction of the economy, as these industries

are often large employers and significant contributors to GDP. This is also due to Okun's Law (Goodwin 2015).

However, such an effect can be mitigated in the long run by proper framing and implementation of strategies and policies that are projected to have a positive effect on the economy. The pace and scale of the transition from a fossil fuel dependent to a low-emission country is also a key factor in determining the economic effect of the same. While there may be short-term economic costs, the long-term benefits of transitioning to a low-carbon economy can be substantial, including increased energy security, reduced environmental damage, and improved public health.

Long run

Employment

Achieving net-zero emissions will require significant investment in new technologies, such as renewable energy, energy efficiency, and carbon capture and storage. In fact, the foundation for all countries to reach their net-zero emissions target is the development of these technologies. Increased financing of initiatives to promote the adoption of solar and wind energy, increasing forest cover, encouraging the production of EVs and developing of energy-efficient and CCS technologies, a considerable amount of employment will be generated. As per International Energy Agency, a study has found that about 0.8 million additional jobs would've been created in 2020 as an impact of efficiency measures which are a part of EU's Ecodesign Directive projects("Economic Benefits – Multiple Benefits of Energy Efficiency – Analysis - IEA," n.d.). Further, as per, the McKinsey Sustainability analysis of the Net Zero 2050 scenario from the Network for Greening the Financial System (NGFS), there would be an increase in demand for both, direct and indirect jobs by about 202 million, globally. Comparing this to the decrease in demand for jobs, a net 15 million jobs would be gained.

Costs

Initially, low-carbon technologies will be more expensive than traditional fossil fuels, leading to higher energy costs for consumers and businesses. However, as these technologies become

ISSN 2581 6535
Annual Volume 9 – 2024

more widespread, the supply increases and costs decline, they can provide cost savings in the long run. Cost savings for both, the consumer and the producer. This cost-saving is also a result of multiple subsidies being provided to these sectors as part of encouraging them. Lower capital and operational costs would inevitably lead to a fall in prices for the commodities being produced by industries. The same applies in the case of the transport sector. Transitioning to electric vehicles can reduce fuel costs for consumers. In addition, electrification can lead to cost savings in maintenance and repair, as electric vehicles have fewer moving parts than traditional gasoline-powered vehicles. The transition to net-zero emissions would also bring significant health and environmental benefits, such as improved air quality, reduced pollution, and improved public health. These benefits can have positive economic impacts by reducing healthcare costs and improving worker productivity.

GDP

According to the growth principle in neo-classical theory as well, technological development causes an increase in the income of a person and motivates savings and investments and as a result, causes an increase in real GDP (Çalişkan 2015). As a result, aggregate demand (AD) will also increase and encourage more economic activity, growth, and development of the nation (Goodwin 2015). This is also due to Okun's Law (Goodwin 2015).

Bhutan case study

Bhutan is the first country to reach carbon neutrality, in fact, it has become carbon-negative (Tzung 2022). It offsets more carbon in the atmosphere than it produces. Bhutan further plans to achieve net zero emissions and zero wastage by 2030 (Tzung 2022). The case of Bhutan is an exceptional one due to how it has achieved such goals. Bhutan, since the late 20th century, has adopted the idea that happiness is more important. Therefore, the core principle of its governance and policies became prioritising happiness. The Gross National Happiness (GNH) index has two components; sustainable socio-economic development and environmental conservation. Further, Bhutan's government has placed a special emphasis on preserving biodiversity. To make such a transition, Bhutan has developed hydroelectric energy and the total installed capacity is 2,326 MW ("What Bhutan's Failure To Meet Hydropower Goal

ISSN 2581 6535
Annual Volume 9 – 2024

Shows About the Geopolitics of Energy," n.d.). Bhutan is a developing country however it is working towards sustainability and economic growth side by side. The country is on its path to becoming a developed nation by the year 2023, in fact, it only has 8 per cent of its population living in poverty. The example of Bhutan is an inspiring one, if Bhutan can balance economic growth and sustainability, so can any other country. Although, this is not necessarily true as Bhutan's population is very low, around 771,608 ("Bhutan Population (2023) - Worldometer," n.d.), and the size of the country itself is so small. When we talk about India, due to its large size and high population, it becomes more difficult to follow the example of Bhutan and adopt its policies.

Conclusion

In conclusion, India's transition to net zero carbon emissions is a significant challenge that calls for a well-thought-out and meticulously carried-out strategy. The transformation is likely to have major economic effects on a variety of sectors and stakeholders. On one hand, the move to net zero might result in temporary economic disruptions like job losses, regional economic shifts, and higher energy bills, which might have an effect on homes and businesses. To prevent the shift from being overly disruptive, officials and businesses must carefully analyse these implications and develop mitigation methods. However, on the other hand, there are significant long-term economic benefits associated with transitioning to a net-zero economy. By adopting sustainable technologies and practices, India has the potential to lead in the development of green technologies and industries, which could create new job opportunities and bolster economic growth. Moreover, reducing greenhouse gas emissions can also lead to a reduction in healthcare costs associated with air pollution, which is a significant problem in many Indian cities. In light of these potential benefits, it is essential that India takes a proactive approach to the transition to net zero. The government needs to create policy frameworks that incentivize and promote the adoption of sustainable technologies and practices, while businesses must invest in research and development to spur the growth of new industries. By doing so, India can position itself as a leader in the global shift towards a low-carbon economy while reaping the economic benefits that come with it.

ISSN 2581 6535
Annual Volume 9 – 2024

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ISSN 2581 6535
Annual Volume 9 – 2024

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ISSN 2581 6535
Annual Volume 9 – 2024

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Endnote

[i] This is India's declaration of its Nationally Determined Contributions (NDC) as an obligation per COP26. This is a measure of the amount of greenhouse gas emitted per unit of economic activity.

ISSN 2581 6535
Annual Volume 9 – 2024