

ROLE OF PUBLIC SECTOR ENTERPRISE IN ENVIRONMENTAL CONSERVATION AND SUSTAINABLE DEVELOPMENT: A CASE STUDY OF NTPC

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Abstract: The World Environment Day 2022 campaign slogan 'Only One Earth' focuses on "Living Sustainably in Harmony with Nature". We all know that the very existence of Human beings is impossible without the presence of a healthy ecosystem consisting of all living and non-living components. Environmental conservation is a pertinent issue that needs to be addressed to fight climate change, global warming, overpopulation, hydrological issues, ozone depletion, deforestation, pollution, poverty etc. Sustainable development is the need of the hour that can save the Mother Nature from the hazardous effects of industrialization. Thus, in the current scenario, it has become innately important to work towards environmental conservation.

Our present study focuses on the efforts made by National Thermal Power Corporation (NTPC), India's largest electricity producer, a Maharatna Public Sector Enterprise towards Environmental Stewardship and Sustainable Development. The study attempts to provide a glimpse of the initiatives taken by NTPC in minimising its environmental footprints through state-of-the-art intervention and process innovations thereby bringing a change in organisational behaviour, process, strategy and outlook that has helped it to achieve a greener and resourceful future. The methodology involved both quantitative and qualitative techniques. The different departments, functional groups and company executives committed towards environmental conservation were interviewed. The assessment was based on the innovations and policies developed by NTPC in the last 3 years towards environment conservation thereby reducing ecological footprints.

Key Words: Environment Conservation, Sustainable Development, Public Sector Enterprises, Initiatives, Policies, Innovation

1. Introduction

1.1 Environmental conservation

Environmental conservation is a practice or we can say an act that paves the way for protecting the environment and natural resources through careful management. Thinking about environmental problems, there is only one living planet earth, and so we have to be very careful not to destroy nature's potential. Talking about India, factors like rapid growth in population, urbanization, industrialization, and destitution are liable for hurting the climate which have further caused severe environmental issues like Deteriorating Air Quality Index (AQI), Environmental Degradation, Biodiversity consumption, Urbanization in the precipitous areas, Loss of Versatility in Ecosystems, Lack of Waste Management, Depletion of Natural Resources (land, air, and water), and Growing Water Scarcity. It is the responsibility of each and every citizen of the country to safeguard the environment. There are many ways of conserving the environment like conservation of soil & forest, recycling of commodities, managing the solid waste thereby keeping the environment clean and healthy, preventing water wastage/ pollution, creating awareness among people by educating them, controlling pollution etc. For curbing the environmental issues, the government has a vital role to play in finding solutions to the problems. The Government of India (GOI) has taken many initiatives to tackle Environmental degradation thereby safeguarding the environment. Some of them are: Conservation of Natural Resources & Eco-systems; Compensatory Afforestation Fund Act (CAMPA); Programme on Green Skill Development; Namami Gange; National Mission for Green India; National River Conservation Programme; Swachh Bharat Abhiyan.

As per Article 48A of the Directive Principles of State Policy "the state shall endeavour to protect and improve the environment and safeguard the forests and wildlife of the country"

1.2 Sustainable Development

Talking about **Sustainable Development**, the Brundtland Commission in its report on "Our Common Future" in 1987 has defined Sustainable Development as "*the development that meets the needs of the present generation without compromising with the needs of future generations.*" It calls for a collaborative effort by all the stakeholders to build an inclusive, sustainable, and strong ecosystem for the planet and its habitants. Again talking about the features of sustainable development, it would include: maximization of the per capita income, cautiously and wisely using our natural resources and also protecting and saving the resources for our forthcoming generations. As per the Johannesburg Summit on Sustainable Development, 2000, they have primarily laid stress on Sustainable Development as the process to eradicate human poverty and regenerate the environment rather than destroying it. Moreover, they have emphasised on empowering the people rather than marginalizing them thereby giving higher priority to the poor, expanding and increasing the scope of their choices and at the same time providing opportunities for them to participate in decisions which have a direct bearing on their own lives. Sometimes it has been seen that there are question which have arisen as to whether the economic, social, political and environment factors have any kind of important and dominant role as far as their search on sustainable development is concerned. The answer is yes; all these four are the pillars of sustainability. This is mostly because the continuing existence of mankind depends on the preservation of the biosphere (Tisdell, 1991, Ch.1).

It was in the month of June 2022, when leaders from all over the world met together to take a stock and assess whether individuals, government, local communities and international and national organizations have been working towards achieving the 17 Sustainable Development Goals (SDG) which have been adopted by all the members of the United Nations States in 2015 having a total of 169 targets to reach by the year 2030 or maybe even earlier.

In terms of environmental conservation/ sustainability, there is a need for the planet to go for a paradigm shift which means shifting to renewable sources of energy as compared to the thermal or hydropower plants which lead to climatic degradation. Solar energy is another effective alternative that we can harness which is less costly and environmentally friendly. A shift to wind energy is also a useful option. This can be done by setting up windmills in areas with high-speed winds which can help convert the natural resource into electricity for commercial or household usage. Another effective solution is the use of natural manure or bio-compost as a substitute for chemical fertilizers. This helps stop soil erosion and pollution. The usage of subsidized LPG as a fuel in rural areas and CNG as a fuel for vehicles in urban areas could lead the way forward.

The rest of the change can come majorly through conscious efforts, awareness programmes and moral responsibility of the forthcoming generations to build a healthy and greener environment.

1.3 Role of Public Sector Enterprises in Environmental Conservation and Sustainable Development

The Department of Public Sector Enterprises have listed that there are 366 PSE in India and they have been categorised on the basis of their operations and assigned the status of Maharatna, Navratna or Miniratna. The Indian Public Sector Enterprises (PSEs) have had a significant contribution in the economic development of the country thereby contributing nearly 13% to the Indian GDP in terms of turnover. They have a very important and powerful role to play with their strategic presence across key sectors and areas like energy, oil, gas, metals and minerals, steel, petroleum, fertilizers, chemical and pharmaceuticals, textiles and infrastructure in achieving the sustainable development goals committed to by the country.

Their success and dominance can be seen in the various sectors like coal (92%), gas (83%), crude oil (71%) and installed power capacity (54%) which jointly form the energy sector. This means that if we talk about carbon emissions, they are an unavoidable part of their operations and this is what makes PSEs key contributors to the Greenhouse Gas (GHG) emissions in the country thereby making the process of decarbonisation not only slow but also difficult. It is mentioned in a Reuters' report on 'Global 250 Greenhouse Gas Emitters' (October 2017), that 250 global companies have significantly contributed to global GHG emissions and of these three Indian PSEs feature in the top 100 list of companies with highest CO₂ emissions.

This implies that public sector enterprises (PSE) have a key and vital role to play and have to take significant steps in reducing GHG emissions which is of paramount importance to make meaningful progress towards meeting India's climate goals. To achieve this goal, there are many PSEs who have already adopted "Environmental Policy Statement" as a part of their corporate strategy thereby integrating climate change mitigation into corporate policy.

Further, in addition to mass-scale awareness campaigns across various levels, significant steps have been taken by PSEs in various sectors to contribute to the national commitment of climate change mitigation. Some concerted efforts of the PSE are as follows:

- In order to reduce the usage of fossil fuel which is required for power generation, the base for renewable power generation has been increased.
- By increasing the grid storage capacity of renewable sources, public sector enterprises are ensuring more practical usage of the renewable resources.
- PSEs are moving their efforts towards use of clean coal technology and alternate use of coal. For this purpose, a consortium of select PSEs in the power sector is developing a highly efficient Advanced Ultra Super Critical Technology (AUSC) – first of its kind in the world which is expected to enter operation in the coming decade and its target will be to approach 50% net electricity generation efficiency [14] and this will be done by using the advanced metal alloys which are capable of withstanding steam temperatures and pressures over 700 °C and 350 bar [15, 16]. These advanced alloys are being developed by adding chromium (Cr), nickel (Ni), cobalt (Co), vanadium (V), wolfram (W), and molybdenum (Mo) to ferritic steels to obtain higher temperature- and corrosion-resistance [13,15].
- In the area of transport and logistics, public sector enterprises are promoting the use of electric vehicles and systems to reduce carbon emissions. In this direction, Indian railways are also taking initiatives to make the network 100% electrified by 2024.
- In another instance, charging stations are being set up by many public sector undertakings and possibilities of manufacturing and developing technology for e-vehicles are being explored.
- As far as the oil and gas sector is concerned, PSE have been exploring the use of biogas plants and at the same time developing flare gas recovery systems which will help in reducing flaring and fuel consumption.

While PSEs are working towards a greener environment, it is also necessary to direct their efforts in an effective way to increase their engagement in the climate change agenda by ensuring adoption of a more informed and result oriented approach.

The beginning has already been made by PSEs primarily in the energy and transport sector, more such initiatives will be needed to chart the way for transitioning to a low carbon economy.

1.4 National Thermal Power Corporation (NTPC)

NTPC is India's largest power utility Maharatna public sector enterprise having an installed capacity of 68,961.68 MW (including JVs) and it plans to become a 130 GW company by 2032. NTPC aims to be the world's largest and best power conglomerate and is ranked at No.2 as an Independent Power Production (IPP) in the Platts Top 250 Global Energy Company ranking. From fossil fuels, the corporation has ventured into generating electricity using different sources like hydro, nuclear and other renewable energy sources. This will help NTPC play a significant role in lowering its carbon footprint by reducing greenhouse gas emissions. At the same time, to strengthen its core business, the corporation has diversified and spread its wings into the fields of rural electrification, ash utilisation, consultancy, power trading, training of power professionals, and coal mining.

Today, NTPC has a total installed capacity of 68,961.68 MW (including JVs) as on 01st July 2022. It has its own 23 coal based power stations (48,120 MW), 7 gas based power stations (4,017 MW), 1 Hydro (800 MW), 1 Wind, 18 Solar and 1 Small hydro plant (1749.68MW). Under the JV, NTPC has 9 coal based power stations (8,754 MW), 4 gas based power stations (2,494), 8 hydro based (2925 MW) and 5 renewable energy projects (192 MW). The capacity will have a diversified fuel mix and by 2032, non-fossil fuel based generation capacity shall make up nearly 30% of NTPC's portfolio.

2. Objectives

Against this backdrop, the below study has been undertaken to find how the initiatives and policies developed by NTPC in the last 3 years towards environment conservation have helped in reducing its ecological footprints.

The specific objectives were:

- To study the efforts of NTPC in the last three years (2019-2021)
- To study the initiatives and policies developed by NTPC
- To study the outcome of the efforts

3. Methodology

To accomplish the above stated objectives, a mix of qualitative and quantitative techniques was used. While the last three years Environment Conservation and Sustainable Development initiatives of the organization were studied in detail, the different departments, functional groups and company executives committed towards environmental conservation were interviewed.

✓ Interview:

The focus points of the interview were the areas in which the company has ventured viz water efficiency, energy efficiency, resource/ material efficiency, renewables, waste management, and biodiversity and emission control and the initiatives and policies taken by the organisation.

✓ The survey/data:

A structured Questionnaire containing 10 questions were prepared and information across different locations of NTPC was randomly obtained on the different initiatives and policies of the company in achieving the goal towards environment conservation which have helped in reducing ecological footprints.

4. Findings and Discussions

The feedback with regard to the questionnaire received from the senior officials of NTPC had maximum of Male respondents (95%) and (5%) Female respondents out of which 64.9% were in the age group of 51 years and above and 35.1% were in the age group of 30-50.

The findings are:

The response related to awareness of NTPC's effort in different efficiency measures clearly depict that 91.9% knew about energy efficiency, 86.5% were aware about renewable followed by 78.4% on waste management and emission control, 73% on water efficiency. There were only 40.5% who knew about resource / material efficiency and lastly 37.8% were aware of efforts in the Bio-diversity areas. This could be due to the fact that such kind of Bio-diversity initiatives are not taking place in the urban areas.

(Refer Table 1)

Are you aware of NTPC efforts in the following areas

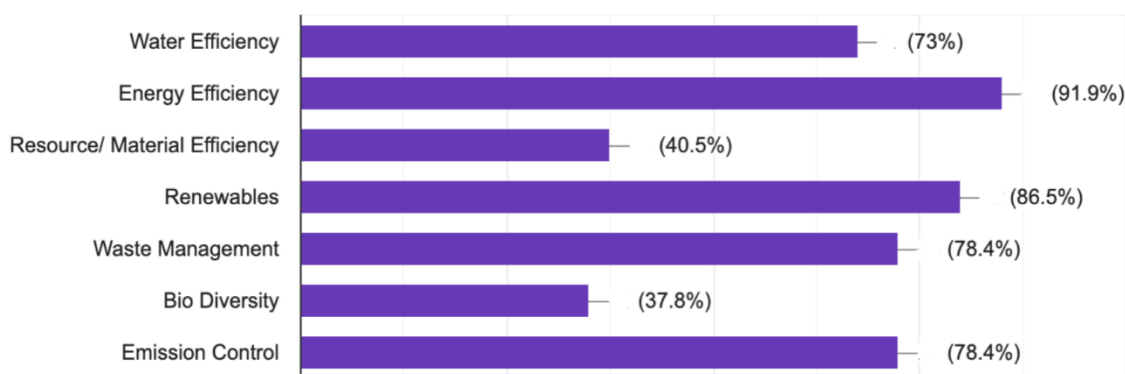


Table 1

When asked about NTPC's Environment Policy, 2021, there were 83.8% who were aware about it and 16.2% did not know anything about it. Also on the awareness of COP21 guidelines (Paris Accords), 62.2% were aware about the same and 37.8% did not know about it.

The response on whether NTPC has been able to achieve the targets towards Environment Conservation (EC) and Sustainable Development (SD) since 2019-2021, the same has been depicted in **Figure 1** where 54.1% have said yes and 45.9% have said can't say.

Do you think NTPC has been able to achieve the targets towards Environment Conservation (EC) and Sustainable Development (SD) since 2019-2021

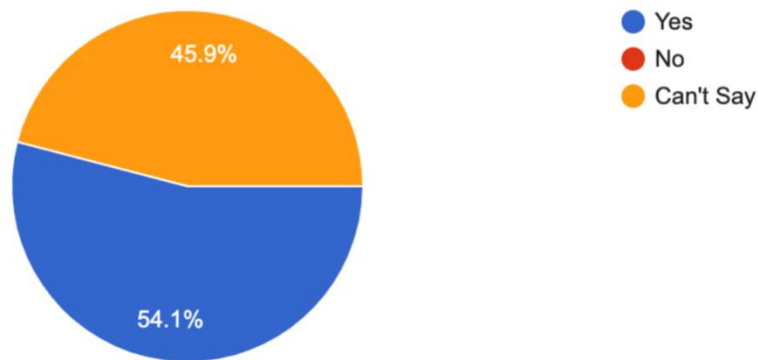


Figure 1

The response related to the satisfaction level with regard to company’s effort towards environment conservation shows that 54.1% were completely satisfied, 37.8% were somewhat satisfied and 8.1% were neutral in their response.

The response on NTPC’s efforts towards Environment Conservation and Sustainable Development has been rated excellent by 56.8%, good by 37.8%, and fair by the remaining 5.4% respondents.

When officials were interviewed on what other initiatives NTPC can undertake to build its image towards Environmental Conservation and Sustainable Development, there were many suggestions which came from them. Some suggested that local movement in the townships/ plants using e-rickshaw (solar panel) can be very effective in saving both environment and fuel. Some officials were of the view that capacity building programme and awareness programmes of 3-4 days can be very effective to bridge this gap of knowledge on energy conservation and climate change. Another suggestion was that NTPC should take the initiative to educate people by creating awareness in them, promoting more research and studies in the areas of environmental conservation, use of Environment Friendly Goods and Recycled Goods, Rain Water Harvesting in Townships and Plants etc. Also, stress was laid on green energy, water conservation, and renewable energy. Some were of the opinion that though the initiatives taken up by the company in the form of rules and regulation are more than enough, but implementation is the part where NTPC may focus more.

NTPC has been striving towards various energy efficiency measures and increased production from non-fossil sources including Biomass. They have devised “*The Brighter Plan 2032*” which is an integral part of their core business strategy. This corporate plan of NTPC is aligned with the United Nations 17 Sustainable Development Goals and India’s INDCs and other commitments for Sustainability. The following initiatives throw light on the steps taken by NTPC’s for a greener and cleaner environment.

i. Biomass Co-firing Utilization of Agro residue: Power Generation & Pollution Reduction

The Company has taken a new initiatives to utilise agro residue(all organic material produced as by-products after harvesting and processing agricultural crops which include stalk, cane, seed pod and leaves) for the purpose of power generation. NTPC has become first company in the country to commercialise biomass co-firing with up to 10 per cent of agro-residue-based bio fuel, co-firing along with coal. This unique method of Biomass Co-firing will help to replace coal with biomass based fuel which is done by utilizing coal based power plant infrastructure to produce renewable energy. This technology is recognized by UNFCCC as a measure to reduce greenhouse gas emission (being carbon neutral fuel). It will also help in cutting down the carbon emission thereby helping the farmers by discouraging crop residue burning after harvesting by adding economic value to the crop residue and providing both income and employment to the farmers in rural sector.

NTPC has procured 4.56 LMT of biomass pellet in the year 2020-21 and procurement of Bio Mass Pellets has increased to 12.35 LMT for the year 2021-22. See (Figure 2) below.

From figure 3, it can be depicted that NTPC, has already fired 28,500 metric tonnes of biomass pellets at its various stations in the year 2020-2021, 6000 tons in the year 2019-2020 whereas it was zero in the year 2018-2019.

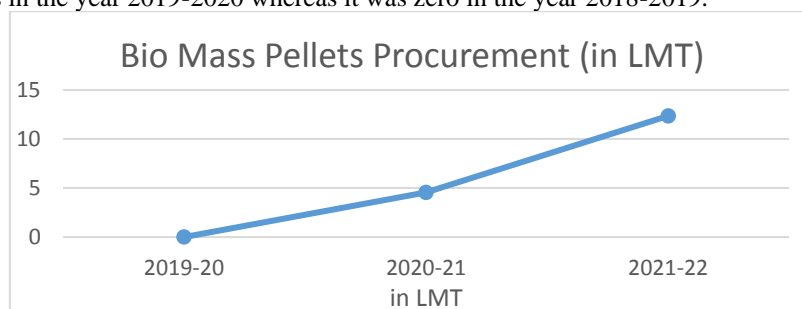


Figure 2

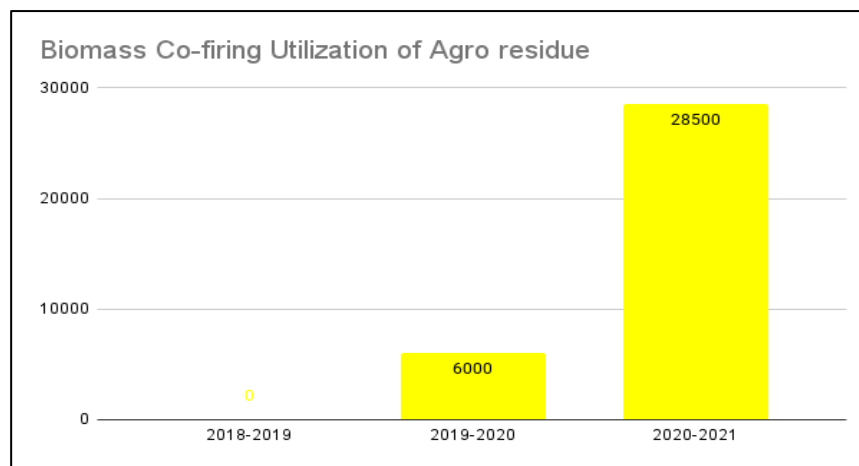


Figure 3.

ii. Waste to energy (WtE) and disposing Municipal Solid Waste (MSW)

NTPC has taken several steps and initiatives to support Government of India's effort towards realising Swachh Bharat Mission/ Abhiyan (SBM) thereby ensuring a carefree, pollution free environment to improve people's health and their wellbeing.

Some of the important initiatives towards this are as follows:

- NTPC has been able to re-create and remake the "Waste to Compost" plant at Karsara, Varanasi functional and now the Operations & Maintenance (O&M) of this entire 600 Tons per Day (TPD) of MSW capacity plant after processing is generating about 60-80 TPD of compost.
- Also Sanitary land fill facility and Leachate treatment facility have been created at Varanasi to ensure scientific disposal of municipal solid & liquid waste.
- NTPC has successfully commissioned 24 TPD thermal gasification-based demonstration scale WtE plant at Varanasi. The Municipal Solid Waste (MSW) is first converted to produce gas, which is then used to generate approximately 200 KW of electric power.
- Further, a MoU by the company was signed with IOCL (Indian Oil Corporation Limited) and SDMC (South Delhi Municipal Corporation) for development of Waste to Energy (WtE) as a pilot plant at Okhla landfill site thereby utilizing Municipal Solid Waste (MSW). Under this MOU, the company has proposed to set up Plasma Enhanced Gasification (PEGS) technology-based Waste to Energy pilot plant at SDMC Okhla Landfill site, utilising 50 treatment, storage and disposal (TSD) refuse derived fuel (RDF) and generating one MW of Electricity.

iii. Renewable energy

Renewable energy is one of the key areas and NTPC is exploring all avenues for renewable capacity addition to look beyond conventional large scale solar and wind parks. It has taken initiative to make its energy portfolio greener by adding significant capacities of renewable resources and small scale hydro –power plant. The other steps taken by NTPC in this regard include the following:

- Utilization of roofs of power plant building for solar power generation and integrating to the existing plant infrastructure.
- The company is moving a step towards saving of land and water conservation by reducing water surface evaporation and this is done with the help of floating solar at reservoirs of its projects.

iv. Use of Treated Sewage Water from Municipal Sewage Treatment Plants (STP)

NTPC aims at utilising waste water to ensure a sustainable ecological balance by minimizing waste and reusing treated wastewater at its power stations. This is in line with the tariff policy amendment by Ministry of Power to mandatorily use treated sewage water from Sewage Treatment Plants of municipal body. The company has already taken toll of it and taken initiative to use the treated sewage water from Municipal STPs nearby for their bulk water requirement at their power plants thereby replacing fresh water from dams/ reservoirs/ rivers and lakes which was otherwise meant for other priority uses like agriculture, drinking, pisciculture, water body preservation, etc. This Treated sewage water will be used for Condenser Cooling Water system make-up for the power stations wherever Municipal STPs are within 50 km distance from Power station.

In 2018-2019, for Dadri STP, the Company has already signed in-principle MOU with NOIDA authority for utilization of 80 MLD treated sewage water from Noida STPs as a flagship project.

In 2019-2021, agreements with Nagpur Municipal Corporation, Ramagundam Municipal Corporation, Korba Municipal Corporation, Bilaspur Municipal Corporation, Solapur Municipal Corporation, Ranchi Municipal Corporation, Prayagraj Municipal Corporation are under discussions for further implementations.

v. Eco Park

NTPC has made efforts to develop an Eco Park on the ash disposal area on one of its plants. This park has been created on the pattern of the surroundings of River Yamuna thereby making it an environmentally sustainable neighbourhood. Also it is being developed as a green island to become a breathing space for the urban area including Delhi, NCR apart from becoming a lively and attractive space. This shall also help in conservation of natural ecosystem and protection of environment.

vi. Zero Liquid Discharge (ZLD) from Thermal Power Plants

NTPC has been the first of its kind to have taken initiative to become a Zero Liquid Discharge company. This is a concept where all the industrial and domestic waste water can be reused after recycling. In this direction, NTPC has adopted the process whereby the plant effluent water is being segregated from storm water and is thereafter reused after treatment to a large extent in the area of

Ash handling plant, Coal Handling Plant, FGD make up, Service Water etc. Some stations of NTPC have already become zero liquid discharge compliant and implementation is under progress in balance stations. As per the data, out of 40 stations (37 closed cycle and three open cycle except TTPS), 20 stations of NTPC have already achieved ZLD specifications in FY 2020-21, 19 stations are likely to complete the ZLD related work by July 2021/ December 2021 and balance one station will become ZLD compliant by March 2022. The ZLD plan includes the following systems:

- Ash Water Recirculation system (AWRS) and Toe Drained Recirculation system (TDR)
- Liquid Waste Treatment Plant (LWTP)
- Separate Drainage System for storm water and processwater

vii. Biodiversity Conservation

NTPC in the last three years has undertaken massive measures towards afforestation programmes, wildlife conservation, emission control and pollution control.

- Till date about 34 million trees have been planted throughout the country which has helped to mitigate the GHG emissions.
- NTPC is playing a crucial role in wildlife conservation. Wildlife plays an important role in balancing the ecosystem and providing stability to the different natural resources of nature. NTPC has been strictly adhering to the norms framed by State forest departments, NGO's and academic institutes for the implementation of Wild Life Conservation by taking the initiatives as under
 - ✓ Conservation of Great Indian Bustard
 - ✓ Conservation of Marsh Lands and Birds Sanctuary
 - ✓ Saving the Turtle and Creating Coral Leaf
 - ✓ Development of Eco-parks
 - ✓ Black Buck Conservation Plan
- Almost all the NTPC power stations are equipped with Ambient Air Quality Monitoring stations (AAQMS). These help to keep a track of the real time data of PM10, PM 2.5, SOX, NOx. The company is in the process of phasing out the ozone-depleting substances by reducing its usage. NTPC is also taking measures in reducing the problem of fugitive emissions from Ash pond.
- NTPC has been taking initiatives in pollution control also. The company is constructing a Hybrid Solar Thermal Plant which will have an electrical output contribution of 3.6 MW. This would result in coal saving of approx. 3825 tonnes/year and of CO2 emission reduction of 4000 tonnes/year.
- Carbon Capture and Utilisation (CCU) activities at NETRA

5. Conclusion

In line with their vision of Brighter Plan 2032, NTPC have doubled up on their efforts in leading the energy transition to a decentralised, decarbonised and digitalised energy future on TBL (Triple Bottom Line) framework. At the same time they are also focussing their efforts towards Decarbonisation & Air emissions control, Circular Economy, Community Development, Water & Biodiversity Conservation, Health and Safety, Strong Finance & Ethics and Sustainable Supply Chain. This will help to ensure a better, cleaner, greener and sustainable environment thereby leading to a progressive and profitable business and reduced costs.

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