THE URGENCY AND POTENTIAL OF
AVIATION IMPACT MITIGATION IN INDIA

A CALL TO ACTION FOR IT COMPANIES, POLICYMAKERS, ADMINISTRATORS AND CIVIL SOCIETY.

CBALANCE
carbon • cost • community • climate

fair travel

Month and Year of publishing : June 2025

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It aims to facilitate balance in carbon, ecological cost and local communities to enable balance in global climate. It does this by building decision-support tools and creating, maintaining and organically growing framework-changing programs that bridge the gap between climate-crisis knowledge and action. It works either directly with individual pioneering organizations or provokes framework-change through handholding interconnected actors in an ecosystem through the process of integrating science-based greenhouse gas emission reductions, climate justice and the climate-emergency into their actions.

We seek to foreground the value of embeddedness and change-with-the-people rather than for-the-people in our change-making praxis. cBalance sees technocracy, technological utopianism and the hubris of elites, the 'few dreaming for the many' with unwavering skepticism. It does not merely develop plans and methodologies and recommend policies for scaling up based on abstract policy analysis – it engages in direct evidence building through participatory dialog and design processes situated within the community directly. It does not rely upon outside 'specialist' experts who've erected careers based on remote engagement with communities mediated through abstract knowledge production processes. It seeks to meaningfully situate itself in an ecosystem of subversive, organized, mobilized practitioners engaged in service of addressing our planetary emergency, through the rubric of a praxis-oriented knowledge-action gap bridging organization working in the interstitial space between the sciences and humanities.

Acknowledgments

We are immensely grateful to the community members from villages in Karnataka and Tamil Nadu for sharing their stories on the reality of the injustices they are at the receiving end of and their courageous actions towards resisting the same in the context of airport development for the Kempegowda International Airport(KIA), Bengaluru and the proposed airport at Parandur, Kancheepuram District Tamil Nadu. Their knowledge, hospitality and lived experiences formed the backbone of this work. This research would not have been possible without their trust and participation.

We are deeply grateful to all those who generously contributed their time, insights, and expertise to this research but preferred to remain anonymous. Their input has been invaluable.

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Executive Summary

The Indian IT industry is a major contributor to business-driven air travel. According to a study on 40 technology companies conducted by the National Association of Software and Service Companies (NASSCOM), Scope 3 emissions account for 60% of the total Greenhouse Gas (GHG) emissions, wherein, business travel is the 2nd highest component contributing to these emissions.

Over a 1,000 km journey, an air traveler emits 285 kgs of CO2 kilometer while a railway passenger in even an Air Conditioned executive-class compartment emits 30 kgs, in a comfortable AC bus the same passenger emits 70 kgs. These conclusions are unanimously accepted by members of the science community and by the airline industry as well; they are in no way disputable. Clearly, Air Travel, irrespective of its efficiency benefits, is the most climate-polluting way to travel devised by humankind. Aviation contributes to approximately 1 billion tons of CO_2 emissions globally per year. While CO_2 emissions from aviation are widely recognized, the sector's climate impact is significantly amplified by non-CO_2 emissions, which result in a net warming effect that is approximately 'three times greater' than that of CO_2 emissions alone. In addition to its GHG emission impacts, aviation's impacts also encapsulate the consequences of airport infrastructure expansion, which, while often seen as a driver of economic growth, necessitates extensive land acquisition impacting the lives of humans and the biosphere in and around the location of airport projects, propelling a host of perturbing socio-ecological and economic challenges. India's aviation sector is currently ranked as the third-largest domestic aviation market globally and is experiencing unprecedented growth. In the year 2024, Indian airports handled 376 million passengers, with domestic air travel growing at an average annual rate of 8.7% over the past two decades. Given this unprecedented growth, it is crucial to understand the multifaceted impacts of aviation and explore alternatives to mitigate its negative impacts.

This report, therefore:

- Provides an overview of India's sustainable development commitments and evaluates the country's progress in fulfilling the same from the aviation impact perspective.
- Assesses progress made by 8 leading Indian IT companies towards meeting their Scope 3 commitments and the reduction mechanisms adopted by them, in addition to analyzing each organization's potential to enhance aviation emission mitigation efforts.
- Evaluates the socio-economic and biosphere impacts of airport construction, in addition to the land acquisition and compensation process for the same, by studying 2 airport construction projects in India.
- Evaluates Indian airline and airport growth models from the perspective of their socio-economic viability.
- Conducts a comparative study of rail and air transport, focusing on parameters such as environmental impacts, employment generation, job security, traveler demographics, and the budgetary allocation and expenditure for both modes of transportation, to explore which mode of transport is socio-economically, ecologically, and climatically viable.
- Provides recommendations to IT companies to set reduction target roadmaps and adapt best practices to meet the targets for mitigating climate pollution caused by business flying.

- Provides recommendations to policymakers on creating and implementing policies that can effectively reduce climate pollution due to aviation.

Assessment of the 8 IT companies (Infosys, Wipro, HCLTech, Tata Consultancy Services (TCS), Accenture, Cognizant, Tech Mahindra, and Thoughtworks) has been conducted by reviewing their annual reports, Environmental, Social, Governance (ESG) reports accessed from the respective company or the Carbon Disclosure Project (CDP) websites. The non-emission impacts of aviation have been evaluated based by studying two airport expansion projects: Kempegowda International Airport (KIA)/ Bengaluru International Airport (BIAL) in Bengaluru, Karnataka and an airport proposed in Parandur situated in Kanchipuram district, Tamil Nadu. The study was conducted through site visits, interviews, and surveys with affected communities, as well as analysis of official documents on land acquisition, compensation, and resettlement. Secondary data from government reports, policy documents, media coverage, and academic literature provided further context and validation for the findings. The research is limited to information available in the public domain.

Key findings:

1. The IT industry and its aviation impact status: Research was conducted between *April 2024 and Dec 2024.* Therefore, company reports available up to this period were reviewed for the analysis. The analysis revealed the following:
    - Among the 8 IT companies studied, Wipro Technologies has proven to be a pioneer in reducing business travel emission among the Indian-headquartered IT companies since 2015. Its travel policy is found to be inclusive of train travel.
    - Thoughtworks has managed to adhere to its targets set for Scope 3 emission reduction in the last 2 FY 2022-23, 2023-24. Thoughtworks is another pioneer company making efforts in the direction of experimenting with behavioral change and sustainable travel policy co-creation with its employees by partnering with the FairTravel program.
    - LTIMindtree, although not assessed as part of these case studies, is among the list of companies evaluated by the *Travel Smart campaign* showcasing exemplary performance. It has set targets specific to business travel emissions and has exceeded in meeting the reduced targets.
    - HCLTech has reduced its business travel emissions compared to its base year by 39% and not exhibited growing trends from its previous FY 2022-23. HCLTech can perform better by setting specific business travel reduction targets.
    - Infosys, Tech Mahindra, and Accenture have managed to keep business travel emissions from peaking to pre-COVID-19 levels; however, their recorded emissions in FY 2023-24 represent substantial growth, indicating that specific reduction targets are necessary to cap business travel emissions growth.
    - Cognizant has witnessed an increase in business travel emissions. This is in spite of its interventions as per the last disclosed ESG report in the FY 2023.
    - Tata Consultancy Services (TCS) has exhibited an increase in business travel emissions, almost equalling its pre-COVID-19 levels of travel. It is pivotal to set short-term Scope 3 emissions reduction targets to meet its climate goals.
    - The study includes business emission intensity modeling, which has provided an insight into how efficiently a business can minimize its GHG emission impact while generating revenue as defined by its growth roadmap. Emission reduction targets for each company have been modeled based on revenue projections.

- Despite the existence of emission reduction commitments and mechanisms within leading Indian IT organizations, there is considerable variation in the ambition, transparency, and effectiveness of these strategies, with some companies demonstrating robust tracking and mitigation efforts, while others lag behind or focus predominantly on direct and energy-related emissions (Scope 1 and 2).

Among the IT companies studied, most have demonstrated a growing trend in business travel emissions, almost equivalent to their emissions recorded in 2019. This indicated that these companies should have made more efforts to lock in business flying emission reduction benefits experienced during the COVID-19 pandemic years (2020 and 2021). A lack of standardized methodologies for measuring and reporting aviation emissions (particularly Scope 3 emissions) hampers the ability of IT companies to set ambitious, science-based targets and credibly track progress towards emission reduction goals. This overarchingly also impacts India's progress towards meeting its sustainable development commitments.

2. Land acquisition for airports and its impacts: The Bengaluru International Airport (BIAL) and the proposed Parandur airport studies reveal the consequences of airport construction on the lives of local communities -
    - Human communities in Parandur are at the receiving end of displacement, which threatens their traditional livelihoods, health, social cohesion, culture, and their access to essential services like water and healthcare. Communities impacted by BIAL have already endured these consequences. Additionally, the process of land acquisition for both airports is marred by policy gaps, implementation challenges, and inadequate consultation with stakeholders, resulting in compensation and resettlement packages that fail to restore the socio-economic status and dignity of displaced families, resulting in persistent grievances and resistance from affected populations.
    - The Parandur airport construction will impact the interconnected network of rivers, channels, tanks, and lakes that provide water for irrigation and supply water to Chennai city by managing and storing excess rainwater during monsoon, also acting as a major flood carrier for the city. The airport will disrupt this network and threaten water security increasing the city's vulnerability to flooding. It will threaten the survival of all life forms by causing habitat fragmentation and pollution, among other impacts, thereby undermining regional ecological resilience and food security. The construction of the BIAL airport has already had a significant impact on the local water systems in the region. With their loss, migratory birds and other life forms that once thrived in the area have been displaced. The loss of wetlands has left the region more vulnerable to environmental stresses such as droughts and floods.
    - Deprivation of land and resource rights, inadequate compensation, the loss of community identity, and the absence of meaningful participation in decision-making processes fuel local resistance to airport projects.
    - Locals protesting against unjust land acquisition are being ignored and subject to threats aimed at silencing their resistance.

> ***A voice from the ground:*** *During a community focus group discussion with communities who will be impacted by the airport at Parandur, 86-year-old Krishnamurthy, raised critical questions. He asked, "What is the state gaining from this project?" He outlined that the land, once belonging to the people, is being leased to private entities for a mere fraction of its worth, with the income generated shared with the government, who will receive only a small percentage. The adverse effects on local communities, including the closure of schools and hospitals, livelihood and family disruptions, and increased poverty, were also emphasized. Krishnamurthy argued that there isn't a pressing need for a new airport, as reports indicate low passenger turnout and cancelled flights. Additionally, he warned that the construction would disrupt natural water flow, exacerbate flooding, and negatively impact local biodiversity. He expressed concern that the airport's development serves the interests of the wealthy, who already have access to existing infrastructure, while the community suffers the consequences.*

3. The viability of Indian airline and airport growth models: The current airline and airport growth models warrant scrutiny given that -
    - The Ministry of Civil Aviation has detailed strategies for the industry's growth over the next twenty years. It is anticipated that approximately 250 new airports will be necessary, with around 30 cities that already have airports needing another one. 2000 to 5000 acres of land will be required for each new airport.
    - Airlines are increasing ticket prices and enacting stringent, cost-cutting strategies which compromise the health and safety of their staff to meet fuel, leasing and Maintenance, Repair and Operations (MRO) costs.
    - The Ude Desh ka Aam Nagrik (UDAN) scheme has had some success in improving regional connectivity; however, its heavy reliance on subsidies, challenges with route viability, lack of sufficient infrastructure, and limited airline participation raise questions about its long-term sustainability. Operational challenges, safety concerns, and environmental impacts further complicate its execution. UDAN also negatively impacts established airlines that are not benefiting from the scheme's subsidy structure.
    - The widely adopted Public Private Partnership (PPP) airport development model allows the government to leverage private sector expertise and financing while sharing both the risks and rewards. While local communities endure injustices due to displacement, the revenue generated from the airport's operation flows to private companies or consortiums who manage and profit from the facility once it is built.
4. Comparative analysis of rail and air travel:
    - Railways offer a more emission-friendly, socially equitable, and economically inclusive alternative for domestic mobility, with the potential to serve a broader cross-section of society.
    - Employment generation in the rail sector is characterized by greater job security and better working conditions compared to the aviation sector, which tends to rely more on precarious, contractual, and informal labor arrangements, thereby influencing the broader socio-economic outcomes of transportation infrastructure choices.
    - There is a need for higher budgetary allocation to railways to enhance their services given that they serve the mobility needs of the majority of the country's population as opposed to the few socio-economically privileged populations who have the option of choosing air

travel. Low-cost train ticket compartments must enhance their standards to ensure dignified travel conditions for all travelers irrespective of their socio-economic position.

- In the context of infrastructure expansion, it is crucial to note that, wherever rail infrastructure expansion might be necessary, similar to airport expansion projects, there are socio-economic and ecological impacts that need to be assessed and accountably managed by the government and contractors to ensure that the expansion process is equitable and just.

Overarchingly, there is a critical need to pay attention to 'who' makes aviation expansion decisions, 'who' benefits from these decisions, 'who' is disadvantaged by them, and how equitably these decisions are implemented, to enable stakeholders including businesses, governments, and citizens to make transportation related decisions that are in the interest of the people and the planet as a whole.

Based on the above mentioned learnings, following are the recommendations made in this report:

1. For IT organizations:

- Measure and benchmark business travel emissions.
- Enforce a sustainable travel policy that promotes options like economy-class flying, non-stop flights, modal shifts to trains/buses, and capping frequent flyers to reduce emissions effectively.
- Implement travel booking systems with emissions data and tools such as the *Travel Decision Tree*, and impact dashboards.
- Motivate employees via incentives e.g. bonuses for adhering to targets, using low-carbon travel modes, and pre-planning trips to support meeting emission reduction goals.
- Embed individual and business unit emissions targets, super-flyer rankings, and sustainable travel preferences into travel approval workflows, enabling informed decisions aligned with company reduction pathways.
- Integrate business travel carbon price as part of business opportunity cost to make informed decisions that are not solely based on business opportunity but are also inclusive of climate impact.

2. For policy making and administration service entities:

- Enhance the current Environment Impact Assessment (EIA) procedure for infrastructure projects by introducing multiple public consultations to ensure that there are adequate opportunities for local communities to share their input.
- Make space for indigenous community member representation on EIA expert committee panels.
- Introduce policies to cap aviation emissions, levy carbon taxes on air travel and discourage airlines from operating short-distance flights.
- Prioritize investment in high-speed and enhancement of regional rail infrastructure to encourage train travel instead of short-distance flights.
- Integrate 'earth law principles' in existing infrastructure development policies to ensure that the rights of nature's elements (waterbodies, land etc) are recognised and protected.

- Adopt non-aviation centric urban development lenses e.g. redirecting resources from airport construction to green infrastructure and sustainable urban planning to reduce dependence on air travel.
- Support a just transition for aviation workers by offering sustainable livelihood training and providing social security provisions.
- Optimize existing airport infrastructure to prevent new airport construction.

3. For citizens:
    - Prioritize surface travel over air travel.
    - Avoid travelling for 'leisure' on routes that cannot be accessed by surface modes of transport (i.e. reserve air travel on such routes only for family, health and other non-negotiable visits).
    - In cases where air travel is non-negotiable travel by economy class, choose best-in-class airlines and non-stop flights.
    - Contribute to peoples movements that resist airport construction projects to ensure that projects are implemented in a just manner.

Introduction

'An average medium-haul domestic return flight from Bangalore to Mumbai emits greenhouse gases equivalent to the climate benefit of 100 trees – essentially, cut down forever. This is akin to chopping down one tree for every return trip taken.[1]'

India stands as the third-largest domestic aviation market, marked by a 15% year-on-year surge in total air passengers managed at Indian airports[2], reaching 376 million in FY2024. Domestic air passenger traffic totaled 306 million, while international air passenger traffic accounted for 70 million[3]. Domestic air travel has outpaced international capacity, achieving an average annual growth rate of 8.7% (from 2005 to 2024), compared to 6% annually for international travel[4].Each day, over 3,100 flight carry more than 500,000 passengers within the country, with even greater number travelling globally[5].

Ballooning aviation growth warrants scrutiny, as the aircraft have the highest climate impact relative to other modes of mass transportation[6]. Fossil fuels burned by aircraft emit carbon dioxide (CO2) along with significant non-CO2 emissions[7] (see Fig.1), such as nitrogen oxides (NOx), sulfur dioxide (SO2), water vapour and particulate matter (soot), which form contrail clouds when aircraft operate at high altitudes. These contrails contribute to a net warming effect–three times worse than the warming caused by aviation's CO2 emissions[8] (see Fig.2)–thereby intensifying the climate crisis. In 2023, aviation emissions reached almost 950 Mt CO2,[9] meaning the climate impact of aviation has been grossly undercounted.

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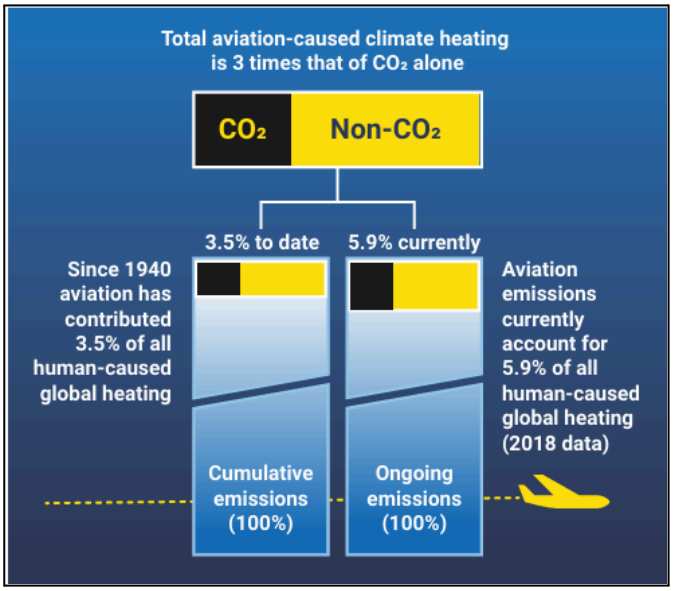

Fig. 1: Global Climate Heating due to Aviation (Source: Stay Grounded, 2022[10])

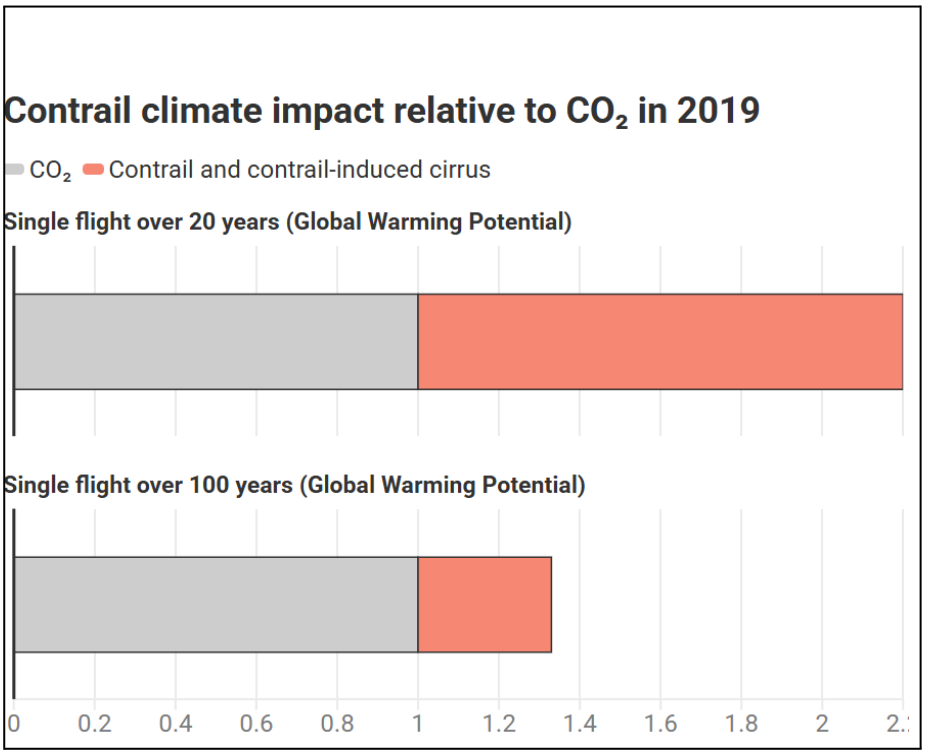

Fig. 2: The Global Warming Potential of Contrails (Source: Transport and Environment)

The high climate impact of aviation is a glaring contributor to social injustice since a very small fragment of the global population flies. In 2018, 11% of people traveled by air, and at most 4% took international flights[11]. Therefore, a minority of socio-economically privileged individuals are

[10] STAY GROUNDED. (2022). *Fact Sheet*. https://stay-grounded.org/wp-content/uploads/2020/10/SG_Factsheet_Non-CO2_2020.pdf

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responsible for exacerbating aviation-related injustice and climate disruption. The richest 10% of the world's population produced 52% of cumulative carbon emissions between 1990 to 2015, while the poorer half contributed just 7%.[12] The impacts of the climate crisis, catalysed by climate pollution, are disproportionately borne by communities least responsible for it. For example, communities dependent on traditional livelihoods such as agriculture, fisheries, and livestock rearing are directly affected by unprecedented seasonal variations and resource scarcity. There is therefore an urgent need to address the inequitable climatic impacts of aviation.

Industry narratives often cite efforts to make aviation 'greener' through carbon offsetting and technological innovation.

A factsheet by Stay Grounded (2020) [13] shows that carbon offsets face multiple limitations such as delaying authentic emissions reductions, limited scalability due to land constraints, and injustice towards indigenous communities affected by offsetting activities. For example, in land or forest-based projects like REDD+[14], smallholders and indigenous people are restricted from using forest lands according to ancestral practices required to store a prescribed amount of carbon in trees[15].

Technological innovations such as solar-powered aircraft, biofuels (SAF), electric, and hydrogen powered aircraft are widely cited as decarbonization solutions. However, progress towards implementing these at a meaningful scale is farfetched (see Fig. 3). The International Civil Aviation Organization (ICAO) anticipates fuel consumption to increase 1.9 to 2.6 times the 2018 value by 2050. In 2018, international aviation consumed approximately 188 Mt of fuel, resulting in 593 Mt of CO2 emissions.[16] By 2050, global annual SAF production is estimated to reach 26 million tons (32.5 billion liters,[17] with China expected to be a significant producer). Despite encouraging growth, SAF still faces technical and cost barriers, with feasibility dependent on feedstock availability, cost-effectiveness, and suitable production routes. Additionally biofuels raise concerns about deforestation and food security[18]. Therefore, offsetting and technology innovations alone are insufficient to address the ginormous climate impact of aviation.

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[12] Gore, T. (2020). Confronting carbon inequality. In O. Gössling (Ed.), *Xfam media briefing* https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621052/mb-confronting-carbon-inequality-210920-en.pdf

[13]STAY GROUNDED. (2023, July). Factsheet 7 - Carbon offsets. *Greenwashing fact sheet series* https://stay-grounded.org/wp-content/uploads/2022/01/factsheet-offsets.pdf

[14] United Nations Climate Change. (n.d.). What is REDD+? *United Nations Framework Convention on Climate Change* https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd.

[15] Stay Grounded. (2024, November 19). *Report degrowth of aviation — Stay grounded*. https://stay-grounded.org/report-degrowth-of-aviation/

[16] International Civil Aviation Organization (ICAO). (2022). *Environmental report 2022: Article 7* https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2022/ENVReport2022_Art7.pdf

[17] Wang, B., Jia Ting, Z., and Zhao, M. (2024, December). Sustainable aviation fuels: Key opportunities and challenges in lowering carbon emissions for the aviation industry. *Carbon Capture Science and Technology, 100263*. https://doi.org/10.1016/j.ccst.2024.100263

[18]Dauvergne, P., and Neville, K. J. (2013). Forests, food, and fuel in the tropics: The uneven social and ecological consequences of the emerging political economy of biofuels. In *The politics of biofuels, land and agrarian change* (pp. 57–86). Routledge.https://utoronto.scholaris.ca/server/api/core/bitstreams/fa774b3d-bd4e-4b2c-90af-42fed368ee11/content

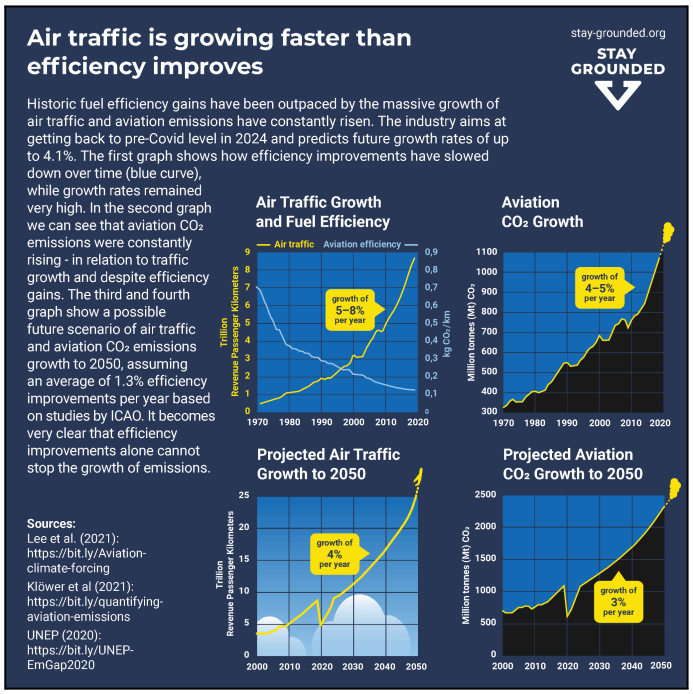

Fig. 3: Air Traffic Growth and Fuel Efficiency (Source: Stay Grounded, 2025)[19]

Another major concern associated with aviation is the colossal amount of land required to support airport operations. In India, aviation infrastructure has expanded rapidly over the past decade, with the number of operational airports growing from 74 in 2014[20] to 159 in 2025[21]. According to industry specialists, India is expected to become the world's third most significant civil aviation market by the year 2030, potentially surpassing China and the United States[22]. Schemes such as Ude Desh ka Aam Naagrik (UDAN) aim to improve connectivity to remote and underserved regions. Furthermore, the Ministry of Civil Aviation has detailed strategies for the industry's growth over the next twenty years to accommodate the anticipated surge in passenger numbers. Two significant plans have been developed: 'Vision 2040'[23], released in 2019, and a second plan titled 'Connecting India to the world in Amrit Kaal: Setting the stage for Indian Civil Aviation @ 2047'[24], released in 2024. The first plan forecasts a sixfold increase in the volume of air travellers, reaching 1.1 billion by 2040. Air cargo movement is expected to increase fourfold to 17 million tonnes by 2040. The number of airports across India is projected to expand to approximately 200 with an estimated 150,000[25] acres of land to be allocated for airport

[19] Stay Grounded. (2024a, October 21). *Greenwashing Fact Sheet Series — Stay grounded*. https://stay-grounded.org/greenwashing/

[20] Ministry of Civil Aviation. Press Information Bureau. (2024, September 5). *Press release*. https://pib.gov.in/PressNoteDetails.aspx?NoteId=152143andModuleId=3andreg=3andlang=1

[21] India, Ministry of Civil Aviation. (2025, February 10). Number of operational airports in the country (Rajya Sabha Starred Question No. 62). Sansad. https://sansad.in/getFile/annex/267/AS62.pdf?source=rajyasabha

[22] *Indian aviation industry, Aviation Companies in India - IBEF*. India Brand Equity Foundation. (n.d.). https://www.ibef.org/industry/indian-aviation

[23] Ministry of Civil Aviation, Government of India. (2019, January). *Vision 2040 for the Civil Aviation Industry in India*. https://static.investindia.gov.in/s3fs-public/2020-02/VISION-2040-FOR-THE-CIVIL-AVIATION-INDUSTRY-IN-INDIA.pdf

[24] Federation of Indian Chambers of Commerce and Industry (FICCI). (2024, January 20). *Connecting India to the World in Amrit Kaal: Setting the Stage for Indian Civil Aviation @2047*. https://ficci.in/api/pdf1/EMP?fileID=23873andfileName=5DZJHgTW5tvaL36TFjosiiVVUWKMYli67P8jl5XF.pdf

[25] Ministry of Civil Aviation, Government of India. (2019, January). *Vision 2040 for the Civil Aviation Industry in India*. https://static.investindia.gov.in/s3fs-public/2020-02/VISION-2040-FOR-THE-CIVIL-AVIATION-INDUSTRY-IN-INDIA.pdf

developments. The recent plan estimates that passenger volume will range between 1.1 billion and 1.3 billion by 2047. Approximately 250 new airports will be necessary, with around 30 cities that already have airports requiring additional airports.[26] In total, 350-400 airports may be needed by 2047[27], with 2000 to 5000 acres required for each new airport–totaling 500,000-1,25,0000 acres of land. Additionally, further land and resources will be required to connect airports with metro networks, railways, and high-speed highways from major cities to ensure seamless connectivity within key catchment areas. Land is a limited resource and therefore its injudicious use comes at the cost of disrupting lives of both humans and other life forms, who are often socio-economically and linguistically disadvantaged from an anthropocentric perspective. There is, therefore, an urgent need to understand the 'true cost' of aviation–a cost that goes beyond monetary considerations.

This report therefore aims to highlight the socio-economic, ecological and climatic impacts of aviation, unpack airport construction processes, and explore alternatives to flying, particularly for IT industry members.

Large non-manufacturing corporations in India such as Infosys, Wipro, TCS, and Bajaj Finance—have demonstrated leadership and are undertaking diverse actions toward climate impact mitigation. They highlight demonstrable steps to reduce their climate impacts; for example, some IT companies have established 'green' criteria for vendors and suppliers, some have set internal targets to switch to climate friendly recycled reports, and the replacement of conventional lighting systems with LED technology is among other mainstream operational shifts that reduce environmental harm. However, these progressive measures do not extend equally to business travel, even though air travel is the single largest hotspot of climate pollution arising from their operations. During 2019-2020, flights taken by a typical Indian IT Company with 200,000 employees emitted 110,000 tonnes of climate pollution—equivalent to the climate impact of chopping down 0.5 million trees[28]. This concern is heightened by the Global Business Travel Association(GBTA) travel outlook poll report (2025), which highlights that nearly half (48%) of respondents expect their company will take more business trips in 2025 than it did last year, while only 12% expect their company will take fewer trips[29].

This investigative field and desk research-based aviation impact insight report, developed as part of the FairTravel program (see Box [1]), is a climatic, socio-economic, and ecological injustice combating discourse shaping and advocacy effort. It primarily speaks to IT companies that have not initiated work towards adhering to their Scope 3 business travel reduction goals, as well as other industry domain corporations. The report clarifies the multifaceted impacts of aviation so that its consequences on society are not approached from a uni-dimensional lens. It intends to sensitize and mobilize strategic collective action by members of the industry towards minimizing their aviation impact to ensure their active contribution and accountability in mitigating aviation-induced injustices.

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[26] Federation of Indian Chambers of Commerce and Industry (FICCI). (2024, January 20). *Connecting India to the World in Amrit Kaal: Setting the Stage for Indian Civil Aviation @2047*. https://ficci.in/api/pdf1/EMP?fileID=23873andfileName=5DZJHgTW5tvaL36TFjosiiVVUWKMYli67P8jl5XF.pdf

[27] Press Information Bureau. (n.d.-d). PM announces passing of Delhi Declaration on civil aviation. *Press Information Bureau*.https://pib.gov.in/PressReleasePage.aspx?PRID=2054314

[28] cBalance Solutions, Fair Travel Team. (2020). *Internal research on climate pollution from business air travel in Indian IT companies (2019–2020)*. Retrieved May 13, 2025, from http://cbalance.in/ecosystem-services/

[29] Global Business Travel Association. (2025, February). *GBTA Business Travel Industry Outlook Poll*. https://www.gbta.org/wp-content/uploads/Business-Travel-Outlook-Poll-February-2025-vFinal.pdf

Box 1: The FairTravel Program

The 'FairTravel' program seeks to minimize the aviation impact of non-manufacturing companies by not merely transforming individual companies through top-down travel policy change but by addressing it at the sectoral level through evidence based policy advocacy with an apex body such as NASSCOM, a confederation of more than 3,200 IT companies in India. The program is working with pioneering IT and BPO/Finance companies in India through a participatory method, successfully employed in global enterprises, called 'carbon reduction action groups' (CRAGs). CRAGs are mixed groups consisting of anywhere from 10 to 40 employees across the corporate management structure. They work together, in a facilitated environment, to set their own carbon footprint reduction targets, including climate impacts from business-related air travel. The groups co-create their roadmap to achieve these reduction targets alongside FairTravel, which will handhold them through the entire process and provide all necessary training and support to achieve these targets. FairTravel provides carbon footprinting and other decision support, along with communications support, for Corporate Sustainability teams of participating companies to amplify these pioneering efforts. Upon completion of one-year-long pilots, their CRAGs reductions will be benchmarked compared to average employees who are not engaged through these cohorts (i.e., 'control' groups). Findings and insights from this project will be used to influence NASSCOM through its platforms (roundtable events) to amplify the discourse and to include all significant member companies, who can be supported through Regional Chapter-level CRAGs operated within the umbrella of the association's other membership services. The current cohort members of the program comprise two pioneering IT companies (names confidential).

In addition to working with IT companies to minimize their air-travel-based emission impacts, the Fair Travel program also works on discourse shaping related to socio-ecological justice issues emerging from airport infrastructure development.

The report is structured as follows:

- Chapter-I, 'An overview of Aviation Emissions and the IT Industry: Sustainable Development Goals, Emission Mitigation Progress and Possibilities, ' comprises two sections :

A. The first section, 'Sustainable Development Goals, Aviation and the IT Industry', provides an overview of SDGs associated with aviation, an analysis of India's progress towards its emission-related goals and the need for the IT Industry to contribute, given its aviation emissions.
B. The second section, 'Emission Mitigation Commitments, Reduction Mechanisms and Aviation Emission Mitigation Possibilities: Case studies of Eight Indian IT organizations', presents case studies of eight pioneering IT companies, highlighting their emission mitigation commitments, progress towards emission reduction, details of reduction mechanisms adopted, and aviation emission reduction possibilities.

- Chapter-II, 'Unpacking Aviation Beyond Flying Emissions: The Airport Land Acquisition Landscape and the Unviability of Indian Airline and Airport Growth Models,' comprises three sections:

A. The first section, titled 'The Socio-Economic and Other Impacts of Airport Construction on Ecosystem', provides an overview of the impacts of airport construction on human and other living systems inhabiting spaces identified for airport construction.

B. The second section, 'An Evaluation of Land Acquisition and Compensation Processes for Airport Construction', provides an overview of protocols followed by the government to acquire land from communities, details community responses, and the government's reaction.
C. The third subsection, 'A Critical Evaluation of Airline and Airport Growth Models in India', evaluates the viability of aviation's projected growth trajectory and strategies planned to meet these projections by evaluating the state of airlines and the airport development models in India, unpacking monetary and non-monetary costs of this growth model while highlighting who is advantaged and disadvantaged by it.

- Chapter-III, 'Exploring a Socio-Economically, Ecologically and Climatically Viable Domestic Travel Alternative: A Comparative Analysis of Rail and Air travel,' presents a comparative analysis between airways and railways to enable travelers to make informed decisions on their mode of transport. It also presents a comparative analysis of government budget allocation and expenditure on railways and airways to highlight the type of transport infrastructure that should be prioritized for the well being of all members of our common home.

The sub-sections analyze railways and aviation based on the following themes :

1. Rail and air travel service offerings;
2. Environmental impact;
3. Employment generation, nature of employment, job security, and working conditions;
4. Travellers served, budgetary allocation and expenditure.

- Chapter-IV, 'Recommendations,' shares actionable pathways for diverse stakeholders. The subsections comprise:
    A. Recommendations for IT organizations;
    B. Recommendations for policy making and administration service entities;
    C. Recommendations for members of civil society.

I. An Overview of Aviations Impacts and the IT Industry: Sustainable Development Goals, Emission Mitigation Progress and Possibilities

I.A. Sustainable Development Goals, Aviation and the IT Industry

In 2015, nations around the world united to address global challenges such as poverty, education deficits, gender inequality, and the climate crisis. This collaborative effort led to the adoption of the Sustainable Development Goals[30], a commitment to achieve prosperity and peace for both people and the planet we inhabit. These 17 Goals collectively offer a framework for member countries to achieve equitable development, balancing profit with its impact on the planet and people, thereby supporting action towards making the 2030 Global Agenda a reality. They address a wide range of issues, including poverty, hunger, health, education, gender equality, clean water, affordable and clean energy, economic growth, reduced inequalities, sustainable cities, responsible consumption and production, climate action, life below water, life on land, peace and justice, and partnerships for the goals. The interdependence of these goals highlights that achieving a sustainable balance requires targeting and tracking them collectively rather than individually. However, the COVID-19 pandemic, an increase in conflicts, geopolitical and trade tensions, and the worsening impacts of climate chaos have contributed to hampering progress towards the SDGs. This is enunciated by the fact that, as of 2024, only 16% of the SDG goals were achieved globally, leaving an 86% gap, largely attributed to member countries prioritising individual interests over the collective good.[31]

A critical analysis of SDGs from an aviation perspective reveals the following :

SDG 13 (Climate Action) focuses on taking urgent action to combat climate change and its impacts. Progress towards meeting this goal, however, seems bleak given that the last time CO_2 was consistently higher than in 2024 (about 426 parts per million -ppm)[32] was about 14 million years ago[33]. Of all sectors adding to atmospheric CO_2 concentration, transport is the second most polluting sector after industries, contributing about 8% of total CO_2, with road transport emissions accounting for most of it and aviation accounting for a smaller portion.[34] However, research by a

[30] United Nations. (2015). Sustainable development goals. https://sdgs.un.org/goals
[31] United Nations. (2024). *The Sustainable Development Goals Report 2024*. https://unstats.un.org/sdgs/report/2024/The-Sustainable-Development-Goals-Report-2024.pdf
[32] **Parts per million** (**ppm**) is the number of units of mass of a contaminant per million units of total mass. (Source:U.S. Geological Survey (USGS). (n.d.). *Water Science School: Water properties: Water quality: What is ppm and mg/L*? Retrieved from https://www.usgs.gov/special-topics/water-science-school/science/ppm-and-mgl)
[33] Milman, O. (2024, May 9). Record-breaking increase in CO_2 levels in world's atmosphere. *The Guardian*. https://www.theguardian.com/environment/article/2024/may/09/carbon-dioxide-atmosphere-record
[34] Würth, K. (2023, November 14). *State of climate action 2023*. World Resources Institute https://www.wri.org/research/state-climate-action-2023

group of 21 scientists reveals that aviation's total climate impact to date (i.e., including short-lived non-carbon dioxide effects; from oxides of nitrogen, contrail cirrus, water vapour, soot and sulphates) is 3 times that of all accumulated carbon dioxide alone. Thus, even though aviation's share of global carbon emissions was approximately 2.5 % in 2020, it is responsible for 7.2 % of humankind's annual climate pollution impact[35].

Apart from emissions, the aviation sector also poses other challenges to meeting the SDG goals. For example, the expansion of airport areas and airport construction activities has detrimental impacts on terrestrial and freshwater ecosystems, hampering progress toward SDG 15 (Life on Land), which aims to ensure the conservation, restoration, and sustainable use of these ecosystems. Aviation also contradicts the goals of SDG 11 (Sustainable cities and transport) because a typical short haul flight contributes to climate emissions equivalent to cutting down approximately 285 trees[36]. Additionally, noise and contrails from aircraft have detrimental health impacts on communities near airports situated in urban areas.mAnother significant yet often overlooked impact of aviation is felt by socio-economically marginalized communities. The unjust displacement of these members of society during airport expansions contradicts the aims of SDG 10, which focuses on peace and justice. These concerns are elaborated on and validated in section II of this report.

India's SDG Commitments and the IT Sector's Responsibility towards Aviation Impact Mitigation

Since 2015, India has championed the 'Viksit Bharat'[37] initiative to fulfill the 2030 Agenda for Sustainable Development. For SDG 13 the country is actively addressing three key aspects of climate change: increasing non-fossil fuel-based energy to 50% by 2030, reducing emission intensity by 35% compared to 2005 levels by 2030, and expanding forest cover nationwide. According to the SDG Index Report (2024)[38], the country has made notable progress in achieving these targets, reaching an overall index of 67 as of 2024. However, the country remains heavily reliant on coal, which constitutes 71.4% of emissions in the energy sector.[39] At COP26, India endorsed a halt in coal production—but not a complete phase-out.[40] Halting coal-use is crucial and will require India to implement more stringent emission reduction targets and potentially accelerate its transition away from coal to achieve climate goals.

Additionally, India's focus on reducing emission intensity (emissions per unit of GDP) rather than absolute emissions means that overall emissions will still rise as GDP grows, contributing to accelerating climate catastrophes. Another key insight from the Index report is the selective reporting of target aspects rather than addressing all components of a goal. For instance, under Goal 11, the report monitors sustainable transport by focusing on improvements in public

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[35]Lee, D. S., Fahey, D. W., Skowron, A., Allen, M. R., Burkhardt, U., Chen, Q., Doherty, S. J., Freeman, S., Forster, P. M., Fuglestvedt, J., Gettelman, A., De León, R. R., Lim, L. L., Lund, M. T., Millar, R. J., Owen, B., Penner, J. E., Pitari, G., Prather, M. J., Sausen, R., and Wilcox, L. J. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric Environment, 244*, 117834. https://doi.org/10.1016/j.atmosenv.2020.117834

[36]Our World in Data. (2023). *Which form of travel has the lowest carbon footprint?* https://ourworldindata.org/travel-carbon-footprint

[37] NITI Aayog. (2024). *SDG India Index 2023–24.* Government of India. https://www.niti.gov.in/sites/default/files/2024-07/SDG_India_Index_2023-24.pdf

[38] NITI Aayog. (2024). *SDG India Index 2023-24: Baseline report on sustainable development goals*. Government of India. https://www.niti.gov.in/sites/default/files/2024-07/SDG_India_Index_2023-24.pdf

[39] International Energy Agency. (n.d.). *India - Countries and regions: CO2 emissions from energy*. IEA. Retrieved April 24, 2025, from https://www.iea.org/countries/india/emissions

[40] Gütschow, J., Bhattacharya, J., Mitra, S., and Pai, M. (2022). *INDIA*. https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-India-Web.pdf

transportation and the reduction of road accidents, while other aspects of national travel, such as aviation and railways, are not discussed.

Among the various stakeholders responsible for realizing India's SDG targets, service and non-service industries play a critical role through implementing their ESG (Environmental, Social, and Governance) strategies. The National Association of Software and Service Companies (NASSCOM), apex body serving over 3,200 IT companies, in its Sustainability playbook (2024)[41] suggests the following: according to its study of 40 technology companies, Scope 3 emissions account for 60% of technology companies' total GHG emissions, with business travel as the second highest contributing factor. It also states that business travel (along with other key Scope 3 categories) is at a scale requiring systemic GHG reduction intervention. NASSCOM also emphasises executing a multi-phase transformation program requiring leadership commitment, operational rigor, measurement to assess impact, and communication to engage and influence climate mitigation.

Currently, as part of transport emission mitigation measures, IT corporations focus on road transport by investing in electric vehicles but overlook GHG emissions from aviation. This is despite the widespread awareness amongst sustainability officials in these companies that air travel is the single largest hotspot of climate pollution emerging from their operations. Though many companies inventory air travel, there have been no major strides in reduction through ambitious business travel reduction targets or via holistic behavioural change approaches recommended by NASSCOM.

India's transportation sector stands at a critical juncture, with ambitions for relentless economic growth contradicting the urgent emissions reduction needs. Addressing Scope 3 emissions—the indirect emissions from both national and international travel—is paramount for corporate and national strategies. IT corporations and businesses heavily reliant on air travel must act immediately, integrating aggressive sustainability measures into their operations to curb the environmental impact and align fully with climate imperatives. Immediate comprehensive measures are essential to meet global climate targets and propel socio-ecological and climatic responsibility.

Given the intention and context of this report, the next section will focus on analysing the IT organizations' progress towards emission reduction and potential to enhance actions.

[41]NASSCOM Community. (n.d.). *Sustainability playbook for the tech industry*. https://community.nasscom.in/communities/esg-sustainability/sustainability-playbook-tech-industry-practical-guide-advancing

I.B. Emission Mitigation Goals, Reduction Mechanisms and Aviation Emission Mitigation Possibilities: Case studies of Eight Indian IT Organizations

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Given the high dependence of the IT sector on flying and aviation's perturbing climate impacts (as described in the previous section), this section aims at :

a) *Assessing the IT industry's progress toward mitigating business travel and specifically aviation emissions*
b) *Gauging the need for enhanced aviation emission reduction actions by the IT industry*
c) *Providing insights to support determining actionable pathways for aviation emission mitigation*

These objectives are addressed through secondary research-based case studies of eight leading IT service companies, namely, Infosys, Wipro Technologies, HCLTech, Tata Consultancy Services (TCS), Tech Mahindra, Accenture, Cognizant and Thoughtworks. The IT companies were selected based on the following criteria :

a) Workforce exceeding 10,000 employees
b) Extensive global market reach and strong international recognition
c) Consistent public disclosure of year-on-year emissions data, including Business Travel as part of Scope 3 emissions.
d) Monitoring and ranking as part of the 'Travel Smart campaign' (see Box [3]) [42]

Company Profiles:

- **Headquartered in India:** TCS, Infosys, Wipro Technologies, HCLTech and Tech Mahindra operate in over 50 countries, serving industries including, finance, healthcare, telecommunications, manufacturing and enterprise solutions.
- **Headquartered outside India:** Accenture, Cognizant and Thoughtworks are internationally registered MNCs. Cognizant has strong North American market focus and operates globally, offering IT services, digital transformation solutions, and business process outsourcing. Accenture, headquartered in Dublin, is among the world's largest consulting and professional services companies across domains such as telecommunications, chemicals, energy, health and finance with presence in more than 120 countries. Thoughtworks is an American software consultancy, specializing in digital innovation, agile transformation, and custom software development.

Case Study Insights and Recommendations:

- **Scope 1, 2 and 3 Emissions Overview:** This subsection provides an overview of each company's Scope 1,2 and 3 emissions[43], including graphs and highlights. It encapsulates

[42] Transport and Environment. (n.d.). *About - Travel Smart Campaign*. Retrieved May 13, 2025, from https://travelsmartcampaign.org/about/
[43] Innovation Center for U.S. Dairy. (2018). *Scope 1 and 2 GHG Inventory Guidance* https://ghgprotocol.org/sites/default/files/Guidance_Handbook_2019_FINAL.pdf

the companies' Scope 3 emission performance based on Science Based Targets initiative (SBTi)[44] recommended near-term targets (see Box [2])

Box 2: Science Based Targets initiative (SBTi)

The Science Based Targets initiative (SBTi) is a corporate climate action organization that enables companies and financial institutions worldwide to play their part in combating the climate crisis. SBTi assists companies by providing standards, tools and guidance for setting greenhouse gas (GHG) emissions reduction targets aligned with keeping global heating below catastrophic levels and achieving net-zero by 2050. SBTi provides two target-setting options: i) Near-term science-based targets ii) Targets aligned with the Corporate Net-Zero Standard.

SBTi recommends the following Scope 3 emission mitigation pathway : companies must set near-term science-based targets to roughly halve emissions before 2030. These targets must cover at least 95% of company-wide Scope 1 and 2 emissions. When Scope 3 emissions constitute 40% or more of total emissions (Scope 1, 2, and 3), companies must set one or more emission reduction targets and/or supplier or customer engagement targets that covering at least 67% of total scope 3 emissions, considering the minimum boundary of each category per the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard. The Corporate Net Zero standards also recommend setting the near-term science-based targets.

- **Business Travel Emissions Overview :** Although SBTi does not recommend specific reduction percentages for business travel emissions (a key component of Scope 3 and an emission hotspot for IT companies as established in section I.A.), this subsection highlights business travel emissions. Comparative analogies between business travel emissions and an annual road footprint of an average Indian are provided to highlight the magnitude of business travel emissions. The datapoints considered include: i) India's per capita carbon dioxide (CO_2) emissions at 2.07 metric tons per person in 2023[45] ii) road transport constituting 9% of the average Indian's footprint[46] or is 0.18 tonnes of CO_2e annually. Business travel emission highlights also include company rankings as per the TravelSmart[47] campaign (see Box [3]).

Box 3: Travel Smart Ranking Campaign by Transport and Environment

The TravelSmart campaign aims to reduce corporate air travel emissions, recognized as the most effective way to significantly mitigate aviation's climate impacts in the present decade. It monitors businesses across the world on their commitments to reduce and report corporate air travel emissions. The campaign is organized by Transport and

[44] Science Based Targets Initiative. (n.d.). *The Net-Zero Standard*. https://sciencebasedtargets.org/net-zero

[45] Statista. (2025, February 5). Per capita CO_2 emissions in India 1970-2023. https://www.statista.com/statistics/606019/co2-emissions-india/

[46] Third Biennial update Report to the United Nations Framework Convention on Climate Change. (2021). UNFCCC. Retrieved May 23, 2025, from https://unfccc.int/sites/default/files/resource/INDIA_%20BUR-3_20.02.2021_High.pdf

[47] Travel Smart. (2025c, April 12). Travel Smart Ranking - Travel Smart. https://travelsmartcampaign.org/ranking/

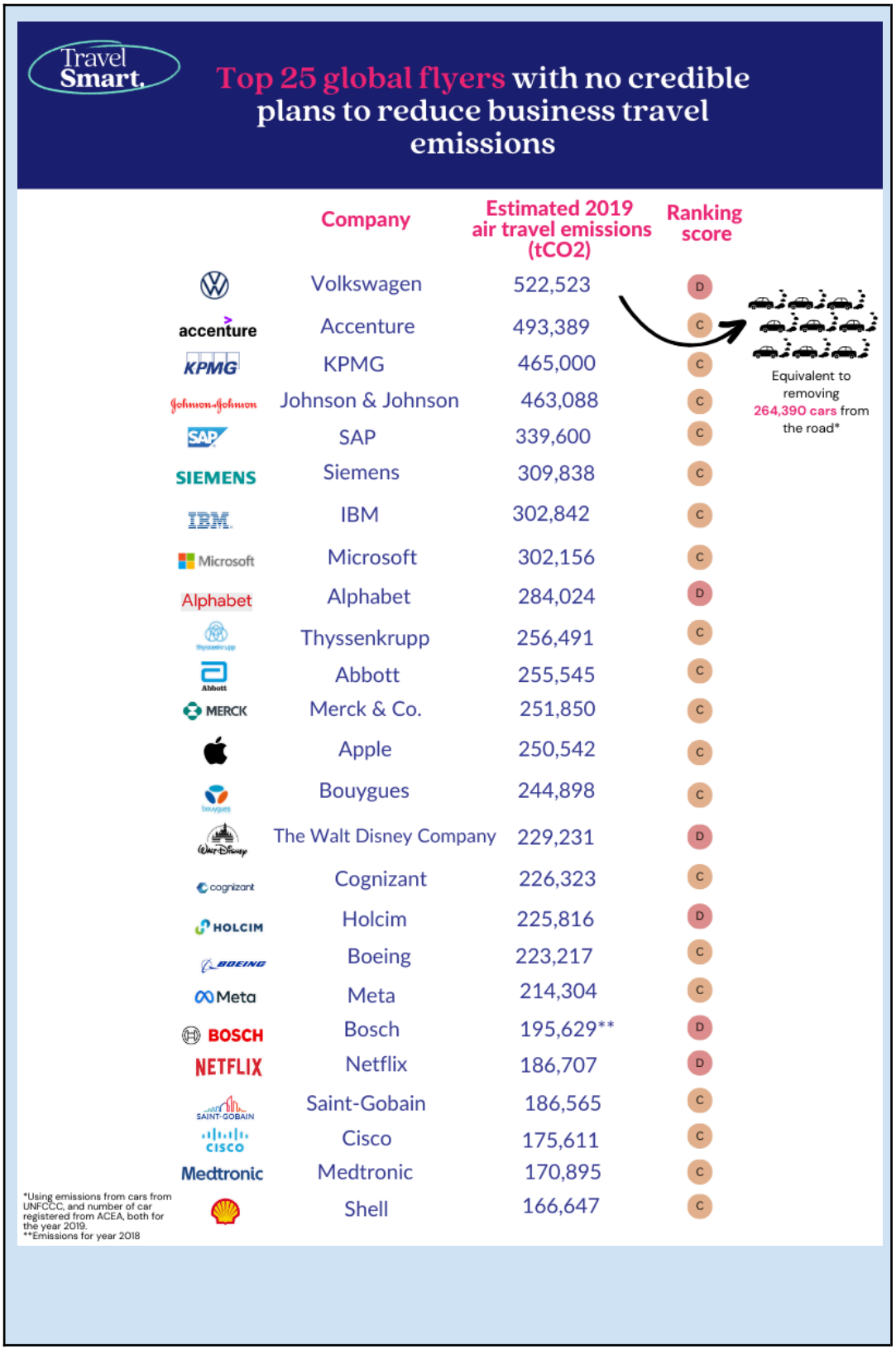
Environment, a European organization engaged in advocacy for clean transport and energy.

This campaign ranks more than 300 businesses annually. Companies are scored based on the following eleven indicators: target commitment; target adoption year; absolute or intensity reduction targets; percent reduction commitments; target timelines; reporting specificity; public disclosure of emissions; air travel and business travel emissions reporting; years of reporting; non CO2 reporting; and emissions tracking.

The indicators are broken down into varying levels of success, which gives a company a specific amount of points, indicating its placement in one of four ranking categories—Category A, Category B, Category C, or Category D. The top-scoring businesses are given a Category A ranking while the low-scoring businesses are ranked as Category D. To understand more about the scoring and ranking please refer to the FAQs[48]. In addition to the Category ranks, companies are also assessed for their rail travel policy.

Top 25 corporate flyers list as ranked by the Travel Smart Campaign is as below.

[48] Travel Smart. (2025d, April 12). Travel Smart Ranking - Travel Smart. https://travelsmartcampaign.org/ranking/#QandA



- **Emission Mitigation Goals, Progress and Reduction Measures :** This subsection reviews each company's short-, medium-, and long-term emission mitigation goals and progress. It also highlights reduction measures for Scope 1, 2 and 3 emissions. Given the focus on business travel emissions, there is a detailed analysis of Scope 3 emission goals and progress, wherein business travel emissions are evaluated against two other Scope 3

emission components—namely, capital goods and employee commute—due to their higher footprint among all fifteen Scope 3 emission sub-components.

- **Business Travel Emission Intensity Analysis and Recommendation for 5-Year Reduction Goals** : This subsection presents 'Business travel emission intensity' —business travel emissions produced per rupee (INR) revenue earned. This data can provide insights into how efficiently a business can minimise its GHG emission impact while generating revenue as defined by its growth roadmap. Details of business travel emission intensity for each company are therefore plotted on a graph against information on revenue and business travel growth (actuals and projected), as available. This information has been used to suggest emission reduction targets for each company.

  It must be noted that revenue growth details have been based on the 12.03% Compound Annual Growth Rate(CAGR) projections for the period 2026-30. Additionally, business travel emission reduction recommendations for this period for all companies mention a year-on-year reduction target of 5% between FYs 2026-2030.

  The rationale for the projection and recommendation are as follows :

  a) Rationale for 12.03% CAGR - The revenue growth as projected by industry studies conducted by TechsciResearch[49] have been considered in the absence of publicly available company-specific projections for all companies evaluated under this section. Additionally, it must be noted that even though a few companies chosen for this study are headquartered in the United States and Europe, India's CAGR projections are considered for these companies thereby plotting a hypothetical scenario for each of these companies' performances under the actual and projected revenue and business travel emissions scenarios .
  b) Rationale for the 5% year-on-year business travel emission reduction recommendation: The Science Based Targets initiative (SBTi)[50] recommends that companies set near-term targets to reduce their Scope 3 emissions by approximately 50% by 2030, aligning with the pathway to limit global temperatures to well-below 2°C . For the eight companies studied, business travel emissions range from 15% to 32 % of the total Scope 1,2 and 3, emissions and from 9% to 31% of Scope 3 emissions. The average of Scope 3 emission short-term goals across the eight companies is close to 30% (refer to 'Climate Goals - Short Term and Medium Term' tables under all case studies). Given this information, it will be ideal to set a target of 30% reduction over 6 years (2025-2030) which approximates the maximum percentage of this emission component across the eight companies.

Information for all case studies was derived by reviewing company annual reports and Environmental, Social and Governance (ESG) reports accessed from the respective company or Carbon Disclosure Project (CDP) websites. [51] The research was conducted between April 2024 - Dec 2024 therefore the company reports available until this period have been referred to for the analysis.

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[49] TechsciResearch pvt ltd. (n.d.). *India IT Services Market by Size, Share and Forecast 2030F | TechSCI Research*. TechsciResearch Pvt Ltd. https://www.techsciresearch.com/report/india-it-services-market/15425.html

[50] Science Based Targets initiative. (March, 2024). *SBTi Corporate Net-Zero Standard* (Version 1.2). https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf

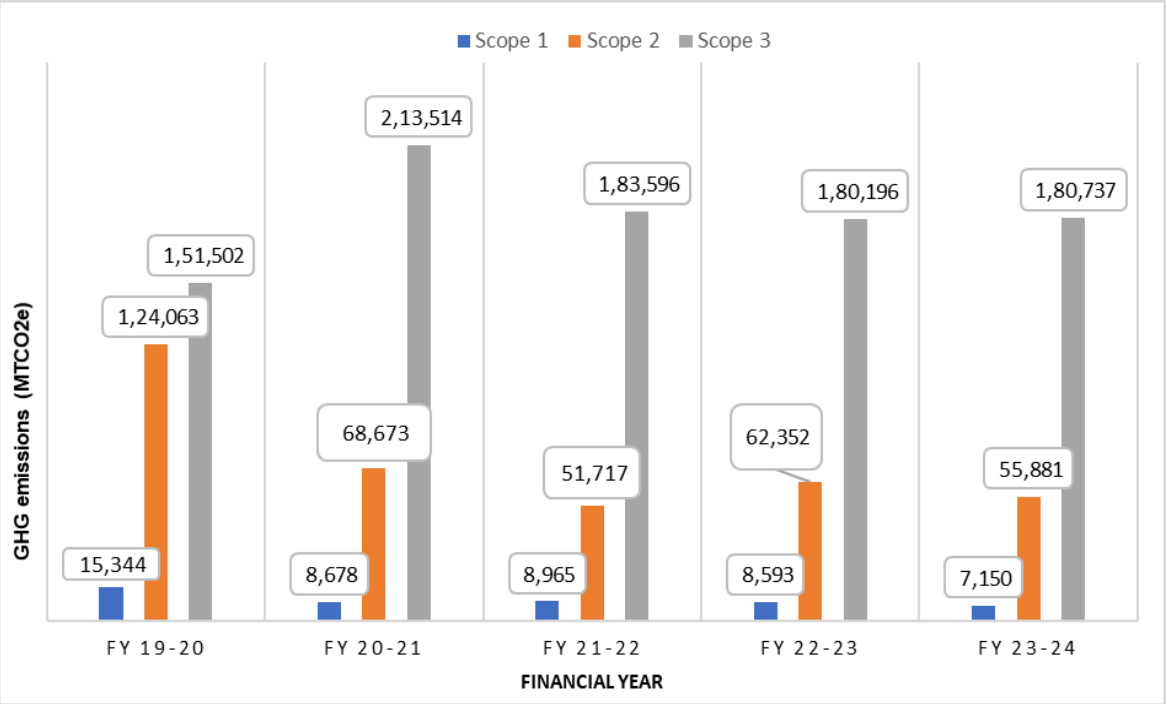
[51] *CDP: Turning transparency to action*. (n.d.). CDP. https://www.cdp.net/en

Case Studies

1. Infosys

GHG Emissions Profile: Insights and Recommendations

1.1. Scope 1, 2 and 3 Emissions Overview



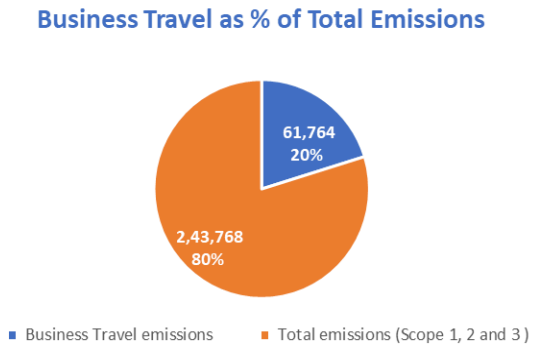
Graph 1: Scope 1,2,3 Emissions - Infosys

Box 4: Infosys - Scope 1, 2 and 3 Emission Highlights

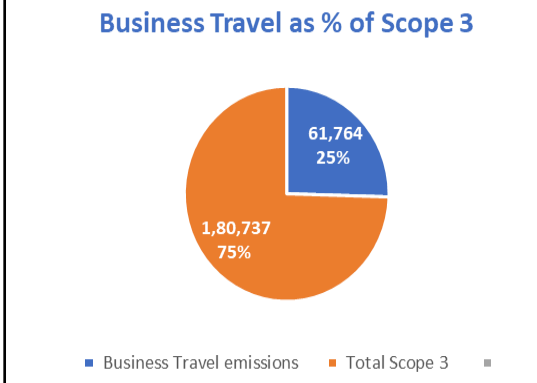
As per details in Graph [1]:

- *Scope 1 emissions have declined substantially between FY 2019-20 and FY 2023-24.*
- *Scope 2 emissions have been fluctuating year on year across FY 2019-24.*
- *Scope 3 emissions increased between FY 2019-20 and FY 2020-21. They shot up drastically during the COVID-19 pandemic period (FY 2020-21 and FY 2021-22). While emissions stabilised after FY 2020-21, they were significantly higher than Scope 1 and 2 emissions.*
- *Scope 3 emissions, as assessed against SBTi target-setting criteria, were found to be more than 40% of total Scope 1,2,3 emissions in FY 23-24.*

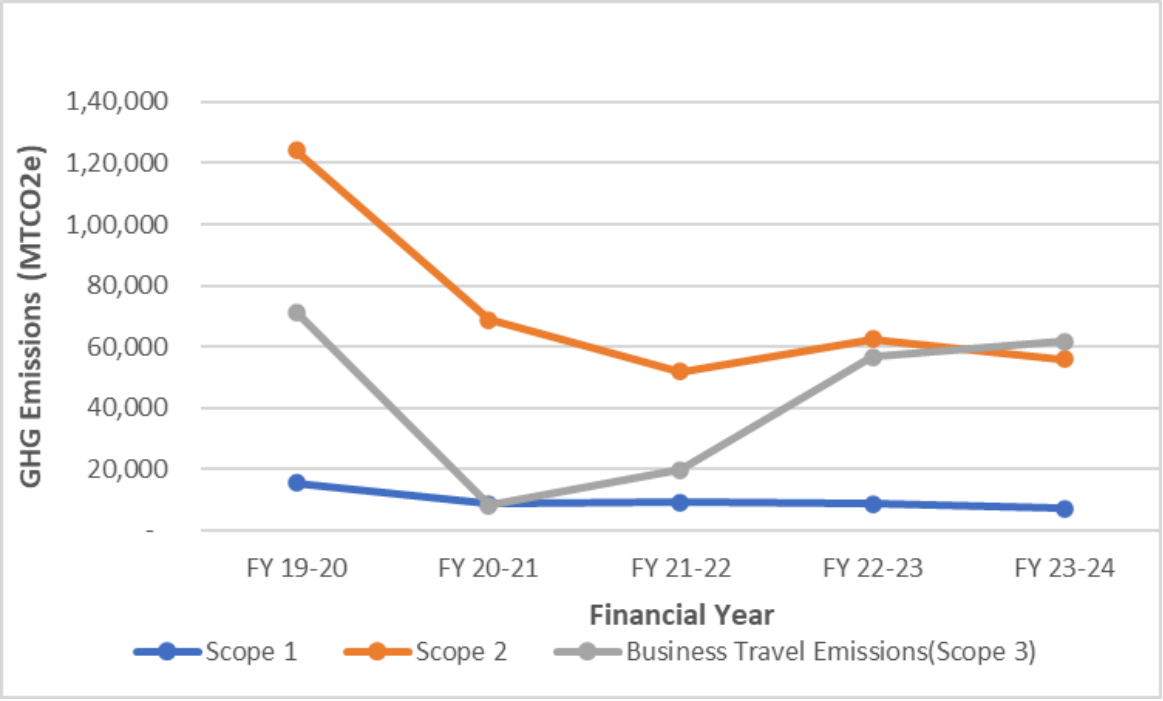
1.2. Business Travel Emissions Overview



Graph 2: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – Infosys



Graph 3: Contribution of Business Travel Emissions to Scope 3 emissions in FY 2023-24 – Infosys



Graph 4: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Box 5: Infosys - Business Travel Emission Data Highlights

- *Business travel emissions are 20% of total scope 1,2,3 emissions (see Graph [2]).*
- *Business travel emissions are 25% of scope 3 emissions (see Graph [3]).*
- *Business Travel Emissions for FY 2023-24 equal the annual road transport footprint of 3,43,133 average Indians*[52]
- *Business travel emissions have increased since FY 2020-21, while Scope 1 emissions have been consistently decreasing. Scope 2 emissions show a largely downward trend except in FY 2022-23 (see Graph [4]).*
- *According to the 'Travel Smart Ranking' Infosys falls under Category C.*[53]

1.3. Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

Infosys has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2040 (see Table [1]).

Table 1: Infosys Climate Goals - Short-Term and Medium-Term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year 2019-20 emissions*	**Medium-Term Goals (by 2040)**
Scope 1	75%	Net Zero
Scope 2	75%	Net Zero
Scope 3	30%	Net Zero

Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

Infosys has significantly reduced its Scope 1 emissions year-on-year during the last five financial years (FY 2019-20 to FY 2023-24), marking a 53% reduction. Scope 2 emissions have also seen considerable progress with a 55% reduction over the same period. The company has undertaken various measures to tackle Scope 1 and Scope 2 emissions, including-

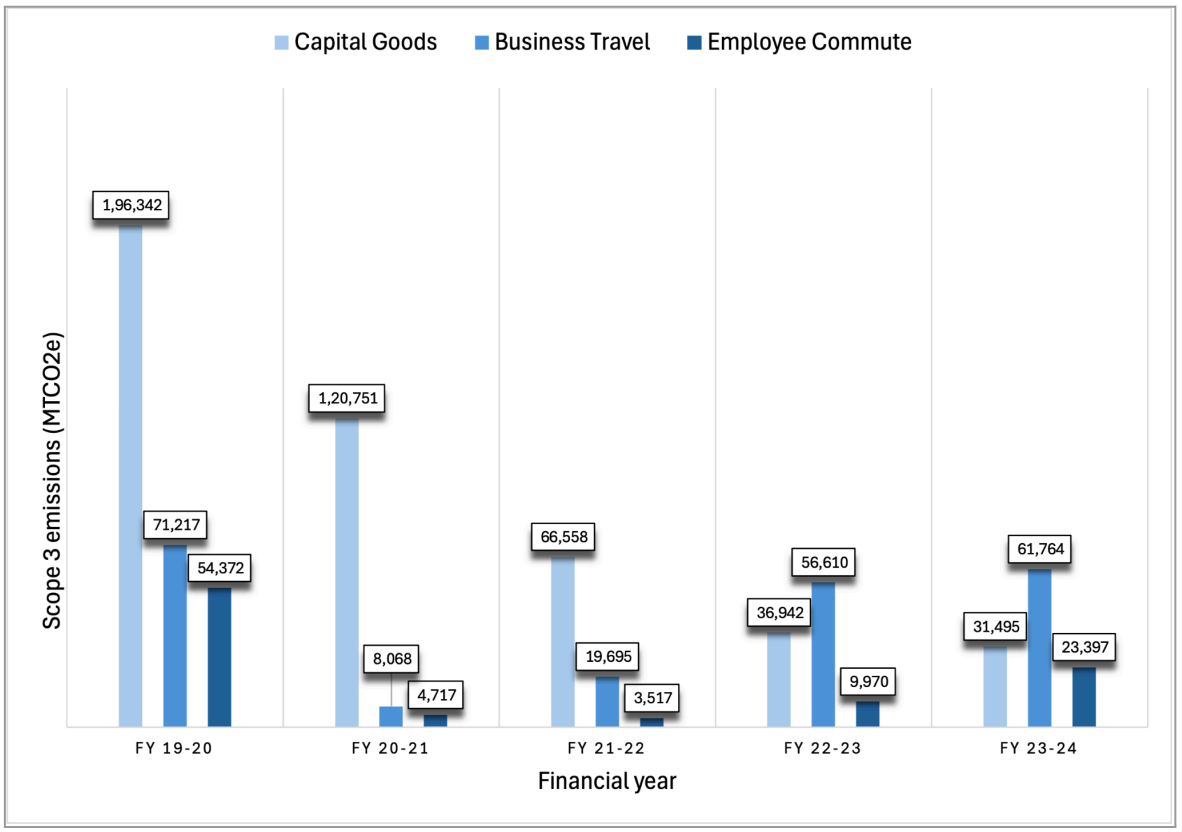
[52] 2 tonnes of CO2e is the average Indian footprint.Road Transport is 9% of India's average footprint which is 0.18 tonnes of CO2e per year or 1/5th of a tonne.
[53] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

- Optimizing diesel generator (DG) sets
- Better management of HVAC emissions
- Transitioning to electric vehicles (EVs)
- Energy-efficient building designs
- Retrofitting older structures
- Expanding renewable energy usage, including a 60 MW solar capacity

Scope 3

Scope 3 emissions (see Graph [5]) have been growing compared to Scopes 1 and 2. The contribution of capital good emissions has declined over the years, while business travel and employee commute emissions have been fluctuating.

Business travel emissions dropped drastically during the COVID-19 pandemic from 71,217 metric tonnes in FY 2019-20 to 8,068 metric tonnes in FY 2020-21— but rebounded significantly in FY 2023-24 as travel restrictions eased. Employee commuting emissions followed a similar trend. While Infosys has seen reductions in some Scope 3 components, particularly during the pandemic, the gradual rise in emissions from business travel and employee commuting between FY 2020-21 and FY 2023-24, warrants attention. Efforts to lock in the emission savings made during the pandemic, especially in these categories, will be critical moving forward.



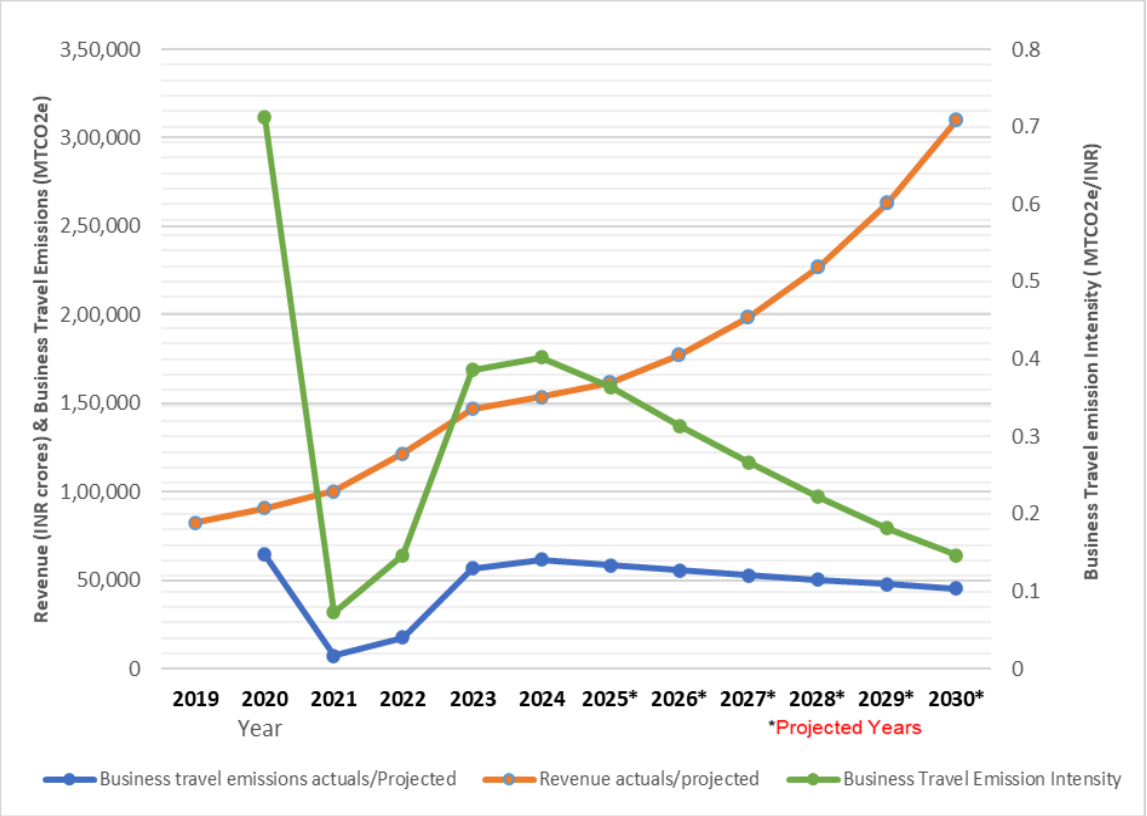
Graph 5: Infosys - Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Promoting video conferencing to reduce business travel
- Using carbon alerts during travel bookings

- Adopting EV cabs
- Encouraging mass transport and carpooling
- Increasing EV usage with charging infrastructure
- Conducting ESG assessments of key suppliers and increasing renewable energy share to reduce transmission and distribution losses

1.4. Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



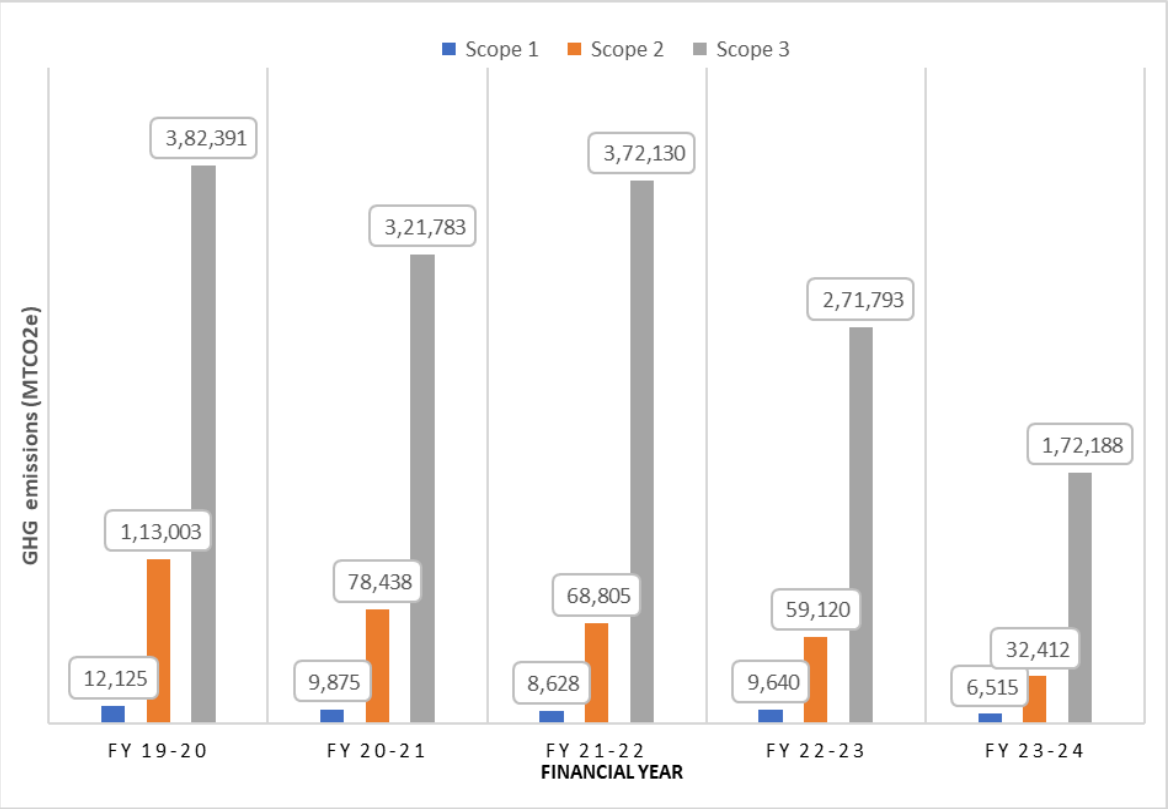
Graph 6: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected.

Graph 6 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance amid projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [1]).

2. Wipro

GHG Emissions Profile: Insights and Recommendations

2.1. Scope 1, 2 and 3 Emissions Overview



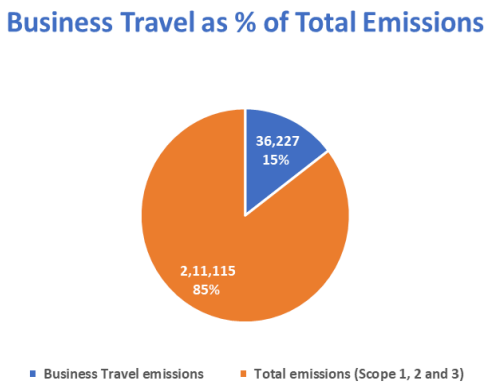
Graph 7: Scope 1, 2, 3 Emissions – Wipro

Box 6: Wipro - Scope 1, 2 and 3 Emission Highlights

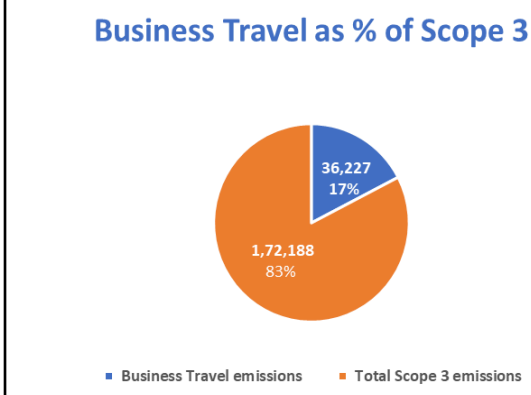
<u>As per details in Graph [7]:</u>

- *Scope 1,2 emissions have been decreasing over the last five financial years. Scope 3 emissions have been fluctuating and on a reducing path in the last two financial years (2022-23, 2023-24).*
- *Scope 3 emissions, as assessed against SBTi target-setting criteria, are found to be more than 40% of total Scope 1,2, and 3 emissions in FY 2023-24.*

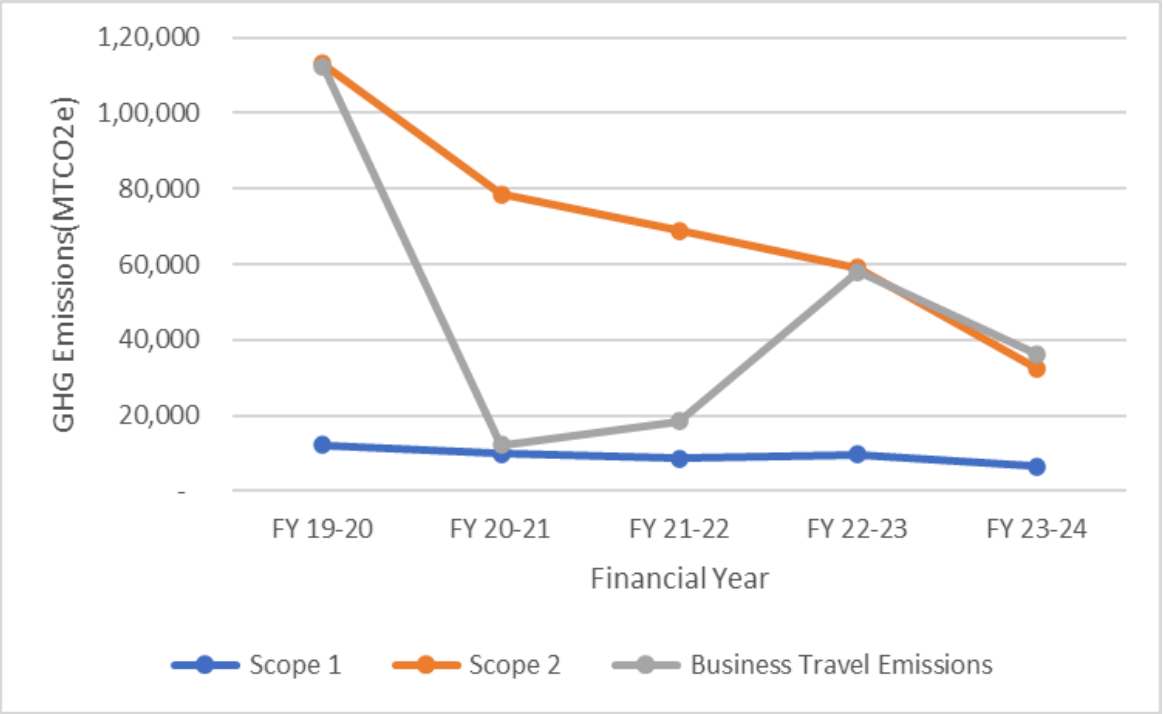
2.2. Business Travel Emissions Overview



Graph 8: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – Wipro



Graph 9: Contribution of Business Travel Emissions to Scope 3 emissions in FY 2023-24 – Wipro



Graph 10: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Box 7: Wipro - Business Travel Emission Highlights

- *Business travel emissions are 15% of total Scope 1,2, and 3 emissions.*
- *Business travel emissions are 17% of Scope 3 emissions.*
- *Business travel emissions for FY 2023-24 equal the annual road transport footprint of 2,01,261 average Indians.*[54]
- *Business travel emissions have shown a downward trend year-on-year since FY 2019-20; except in FY 2021-22. Similarly, Scope 1 emissions have shown a downward trend except in the FY 2022-23, while Scope 2 has consistently decreased. (see Graph [10]).*
- *Travel Smart Ranking campaign ranks Wipro as a Category A company, with additional recognition for its rail travel policy.*[55]

2.3. Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

Wipro has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2040 (see Table [2]).

Table 2: Wipro Climate Goals - Short-term and Medium-term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year 2019-20 emissions*	**Medium-Term Goals (by 2040)**
Scope 1	59%	Net Zero
Scope 2	59%	Net Zero
Scope 3	55%	Net Zero

[54] 2 tonnes of CO2e is the average Indian travel footprint. Road Transport is 9% of India's average footprint which is 0.18 tonnes of CO2e per year or 1/5th of a tonne.

[55] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

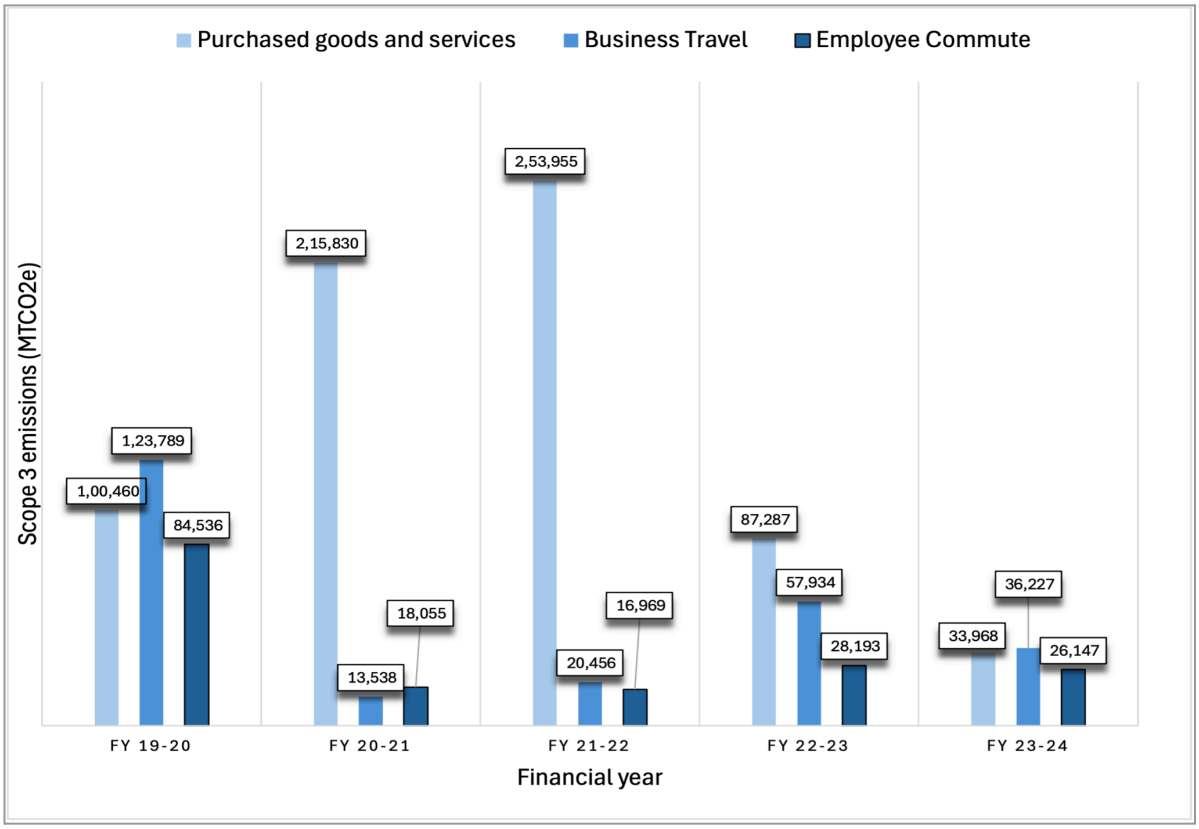
Wipro has achieved considerable reductions in Scope 1 and Scope 2 emissions year-on-year across FY 2019-20 to 2023-24, reflecting the effectiveness of its strategies, except for a negative trend in FY 2021-22 and FY 2022-23, respectively.

Scope 1 and 2 emission reduction measures:

- Robust monitoring of diesel generator (DG) operations
- Ambient air quality checks
- Energy-efficient infrastructure
- IoT-enabled systems
- Large-scale renewable energy

Scope 3

Wipro's Scope 3 emissions reveal an overall reduction of more than 55% from FY 2019-20 to FY 2023-24. Business travel emissions were significantly reduced during the pandemic (13,538 metric tonnes in FY 2020-21); however, they rose to 36,227 metric tonnes in FY 2023-24 but remained lower than pre-pandemic levels (see Graph [11]).

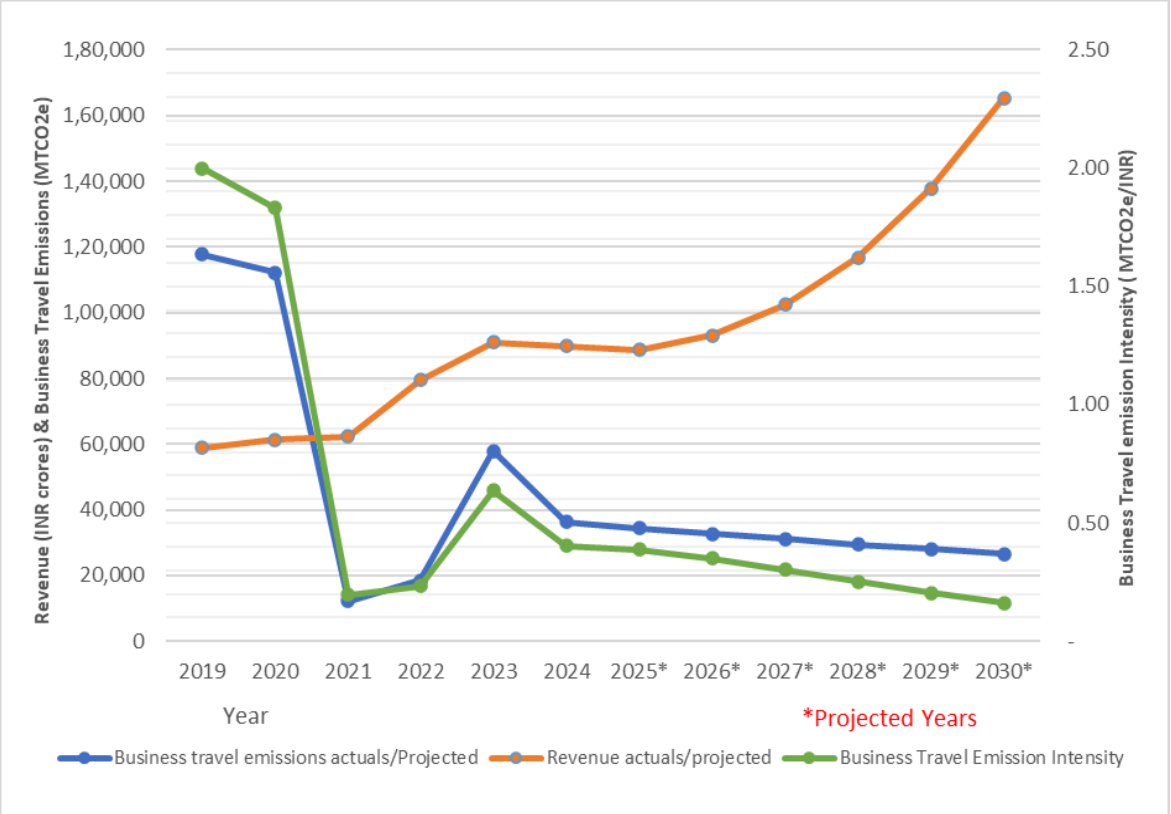


Graph 11: Wipro – Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Promoting sustainable employee commuting options including electric vehicles (EVs), carpooling, and CNG buses
- Promoting video conferencing
- Alternative low-carbon travel options, and train policy
- Engage suppliers and shifting to renewable energy to reduce transmission and distribution losses

2.4. Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



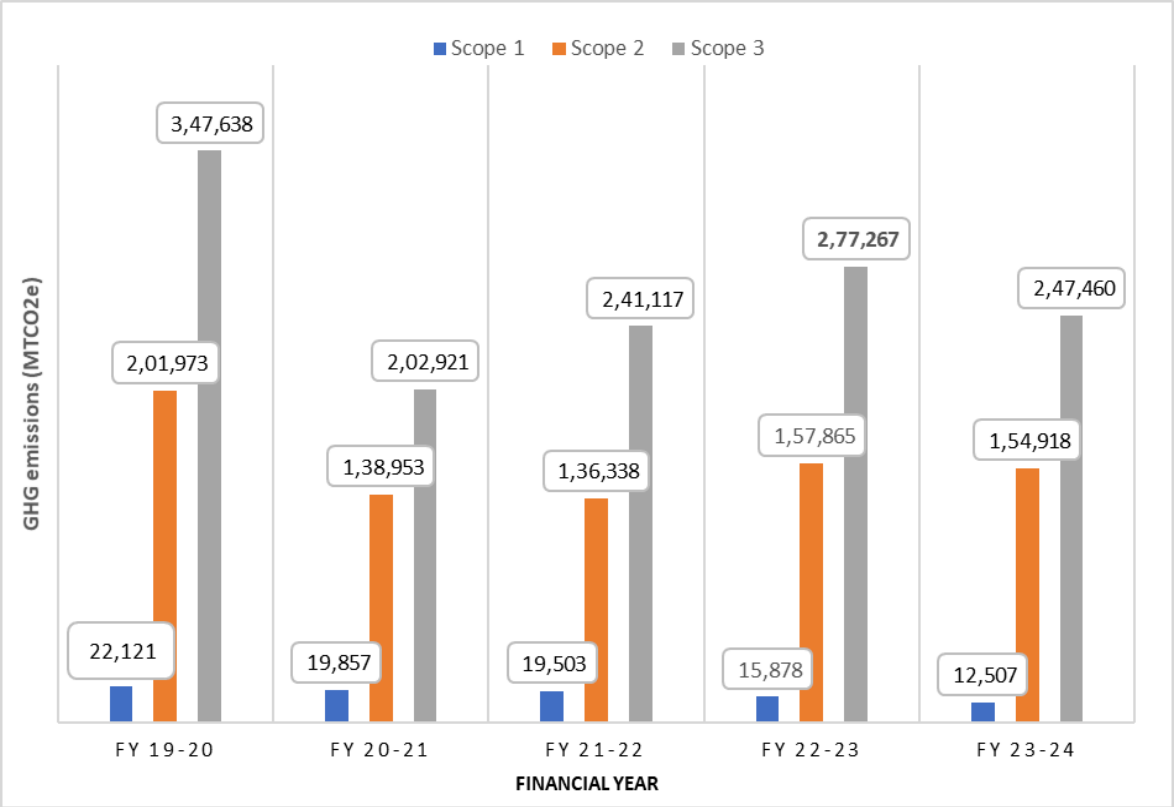
Graph 12: Business Travel Emissions, Revenue, and Business Travel Emission Intensity - Performance Actuals and Projected

Graph [12] indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [2]) .

3. HCLTech

GHG Emissions Profile: Insights and Recommendations

3.1. Scope 1, 2 and 3 Emissions Overview



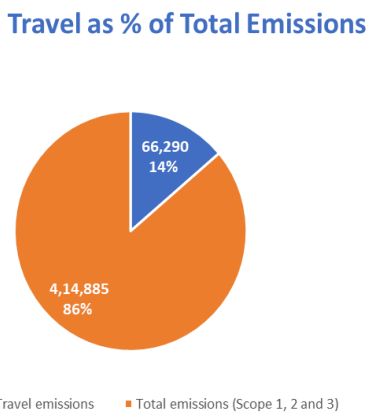
Graph 13: Scope 1, 2, 3 emissions – HCLTech

Box 8: HCLTech- Scope 1, 2 and 3 Emission Highlights

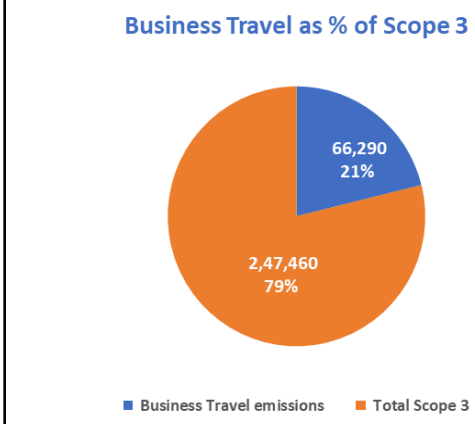
As per details in Graph [13]:

- *Scope 1 emissions have been decreasing over the last five financial years from FY 2019-20 to FY 2023-24. Scope 2 and Scope 3 emissions have fluctuated over the last few years since 2019-20 and have shown a decreasing trend in FY 2023-24. These inconsistent pathways suggest current measures are insufficient to deliver sustained reductions.*
- *Scope 3 emissions accounted for more than 40% of total Scope 1,2 and 3 emissions in FY 23-24, exceeding SBTi thresholds for significant coverage.*

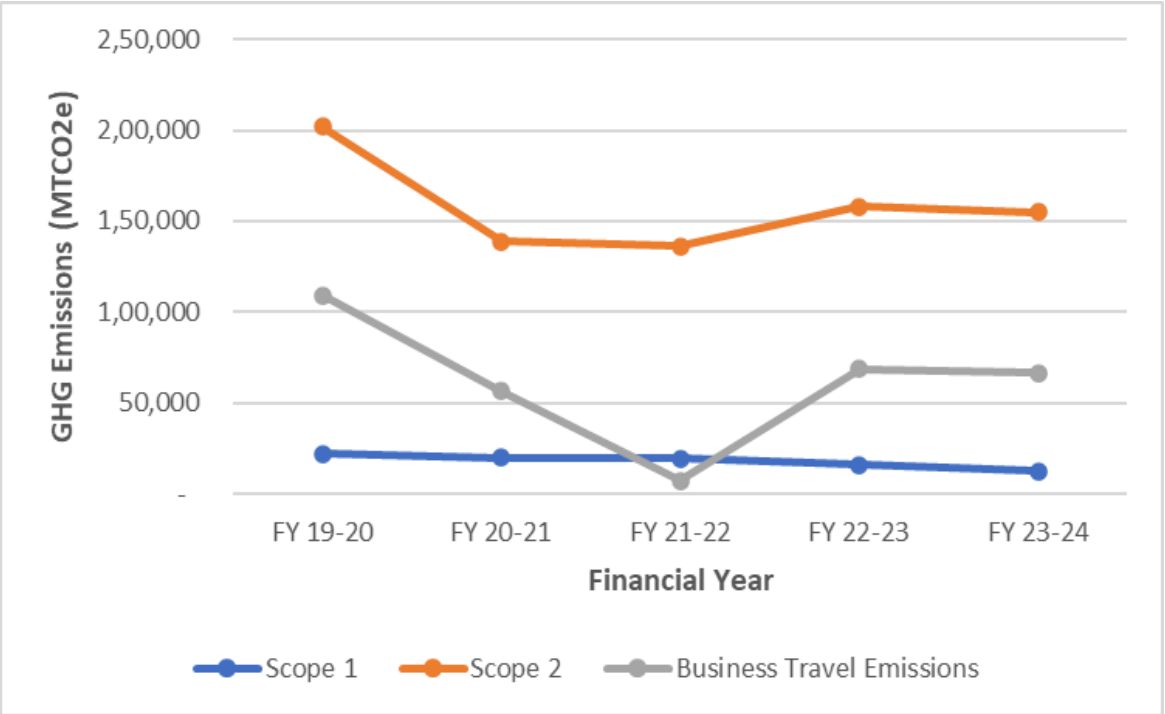
3.2. Business Travel Emissions Overview



Graph 14: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – HCLTech



Graph 15: Contribution of Business Travel Emissions to Scope 3 Emissions in FY 2023-24 – HCLTech



Graph 16: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance.

Box 9: HCLTech - Business Travel Emission Highlights

- *Business Travel Emissions is 14% of total scope 1,2,3 emissions.(see Graph [14])*
- *Business Travel Emissions are 21% of scope 3 emissions.(see Graph [15])*
- *Business Travel Emissions for the FY 2023-24 is equivalent to the annual road travel footprint of 3,68,278 average Indians*[56]
- *Business Travel Emissions has shown an upward trend since FY 2021-22; Similarly, Scope 1 emissions have shown a downward trend except in the FY 2021-22 while Scope 2 has consistently fluctuated indicating current measures are not sufficient to reduce consistently. (see Graph [16])*
- *According to the 'Travel Smart Ranking' HCLTech falls under Category C.*[57]

3.3. Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

HCLTech has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2040 (see Table [3]):

Table 3: HCLTech Climate Goals - Short-Term and Medium-Term

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year (2019-20) emissions*	**Medium-Term Goals (by 2040)**
Scope 1	50%	Net Zero
Scope 2	50%	Net Zero
Scope 3	42%	Net Zero

[56] 2 tonnes of CO2e is the average Indian travel footprint. Road Transport is 9% of India's average footprint which is 0.18 tonnes of CO2e per year or 1/5th of a tonne.

[57] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

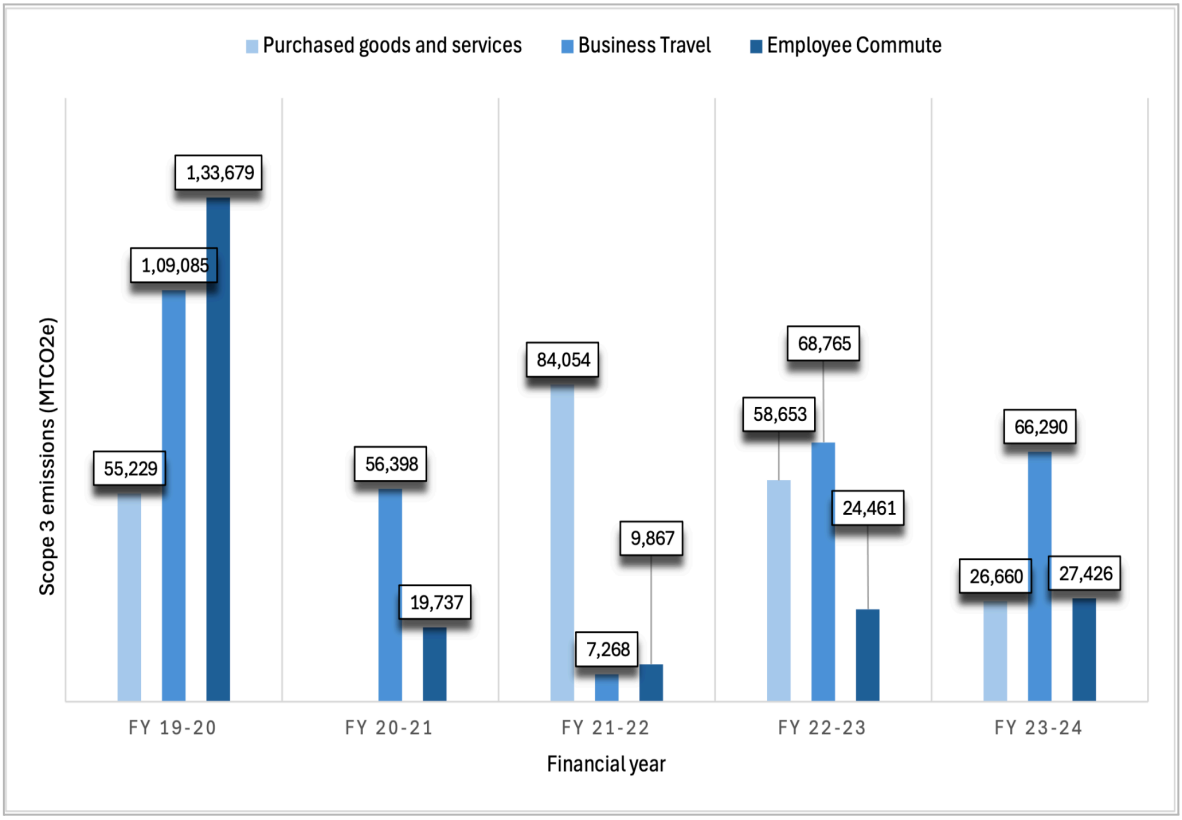
HCLTech has made notable progress in reducing Scope 1 and Scope 2 emissions over the years. Scope 1 emissions decreased from FY 2019-20 to FY 2022-23 and further reduced to 12,507 metric tonnes in FY 2023-24 which reflects a 44% reduction. Scope 2 emissions have reduced by 23% from the base year 2019-20, though it has shown an inconsistent trend year-on-year from FY 2019-20 to 2023-24. This increase in Scope 2 emissions in recent years is notable and points to a possible challenge in maintaining reduced emissions.

Scope 1 and 2 emission reduction measures:

- LED lighting upgrades
- Integration of smart energy metres
- Technology optimization for energy-efficient lighting solutions
- UPS system optimization
- HVAC enhancements
- Building management systems
- Chiller Performance

Scope 3

Scope 3 emissions of HCLTech reflect varied progress across different components. Total Scope 3 emissions were reduced from FY 2019-20 to FY 2020-21, followed by an increase in FY 2022-23. Notably, business travel emissions saw a sharp drop during the pandemic, falling from 109,085 metric tonnes in FY 2019-20 to just 7,268 metric tonnes in FY 2021-22. However, this decline was temporary as emissions rose in FY 2022-23 with the resumption of travel and showed more or less similar trends during 2023-24. Employee commute emissions also followed a similar trend, decreasing sharply during the pandemic, before rising again to 24,461 metric tonnes in FY 2022-23. They exhibited a similar scale during 2023-24 (see Graph [17]). HCLTech may need to intensify their actions to meet their short term reduction goals of 42% for Scope 3 emissions including setting specific business travel emission targets.

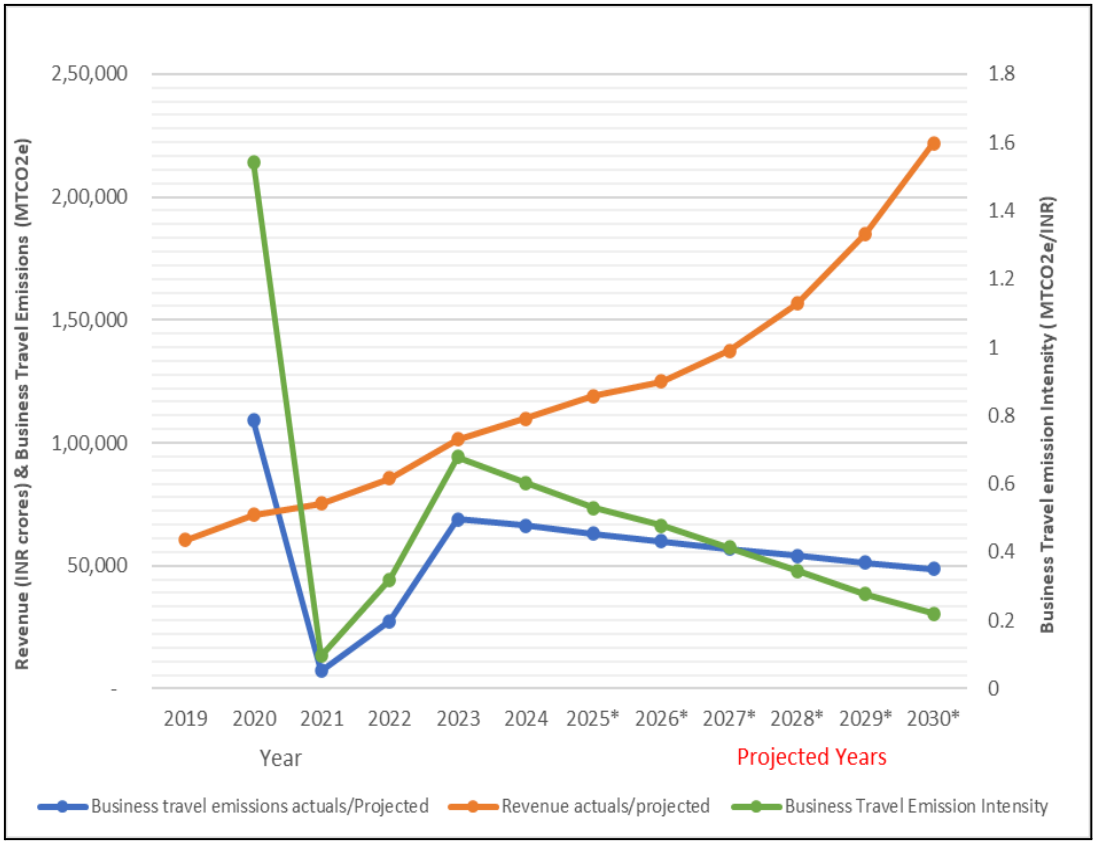


Graph 17: HCLTech- Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Promoting sustainable travel practices
- Transitioning to electric vehicles (EVs)
- Encouraging teleconferencing to replace business travel

3.4. Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



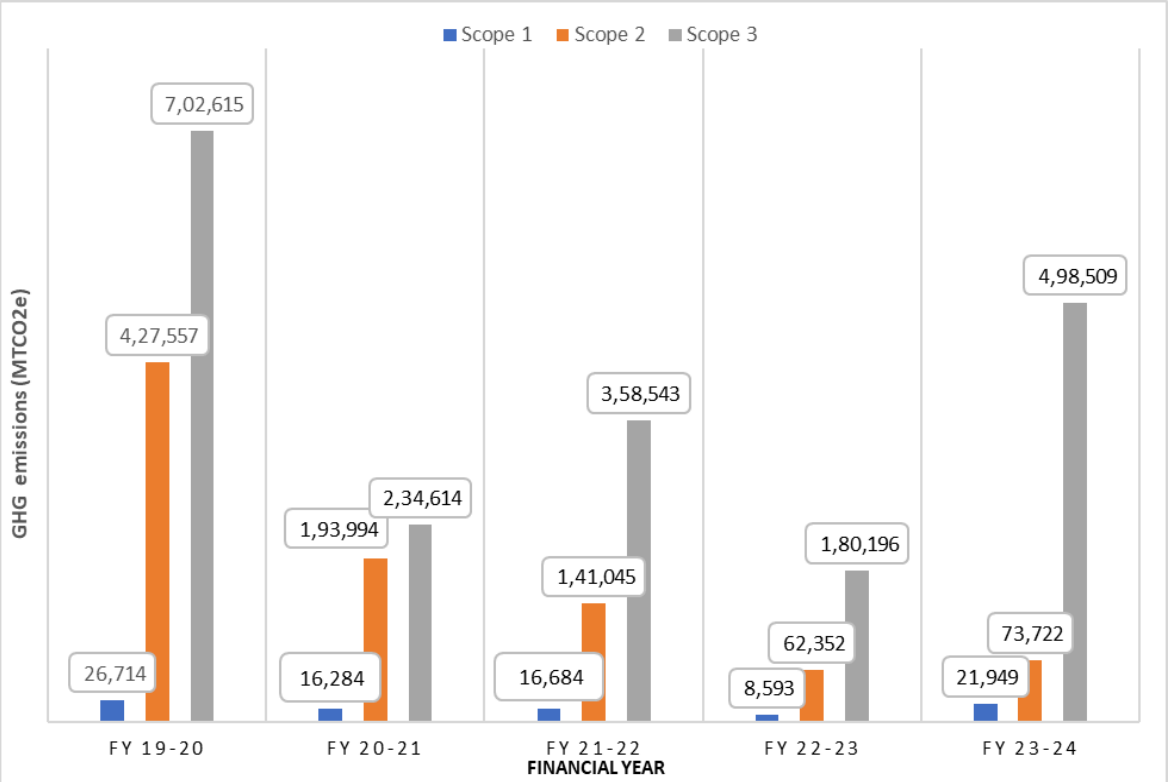
Graph 18: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected.

Graph 18 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [3]).

4. TATA Consultancy Services (TCS)

GHG Emissions Profile: Insights and Recommendations

4.1.Scope 1, 2 and 3 Emissions Overview



Graph 19: Scope 1, 2, 3 emissions – TCS

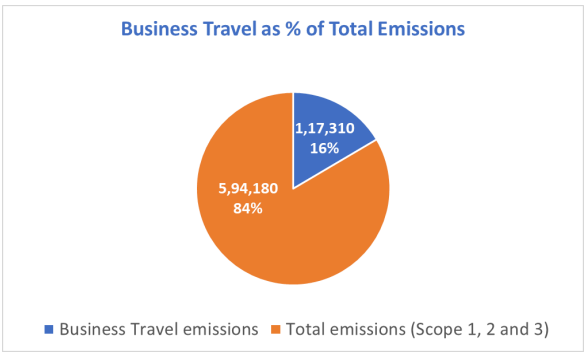
Box 10: TCS - Scope 1, 2 and 3 Emission Highlights

As per details in Graph [19]:

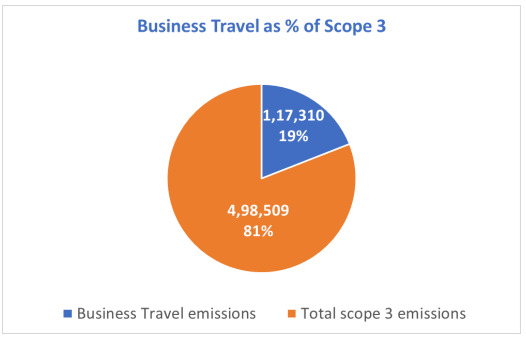
- Scope 1,2,3 emissions have been fluctuating over the last five financial years from FY 2019-20 to FY 2023-24 with business travel peaking at an all time high in FY 23-24. These inconsistent pathways indicate that current measures are insufficient.
- *Scope 3 emissions, as assessed against SBTi target-setting criteria, are found to be 87% of total Scope 1,2,3 emissions in FY 23-24.* [58]

[58] Science Based Targets initiative. (2024, March 13). *SBTi Corporate Net-Zero Standard* (Version 1.2) https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf

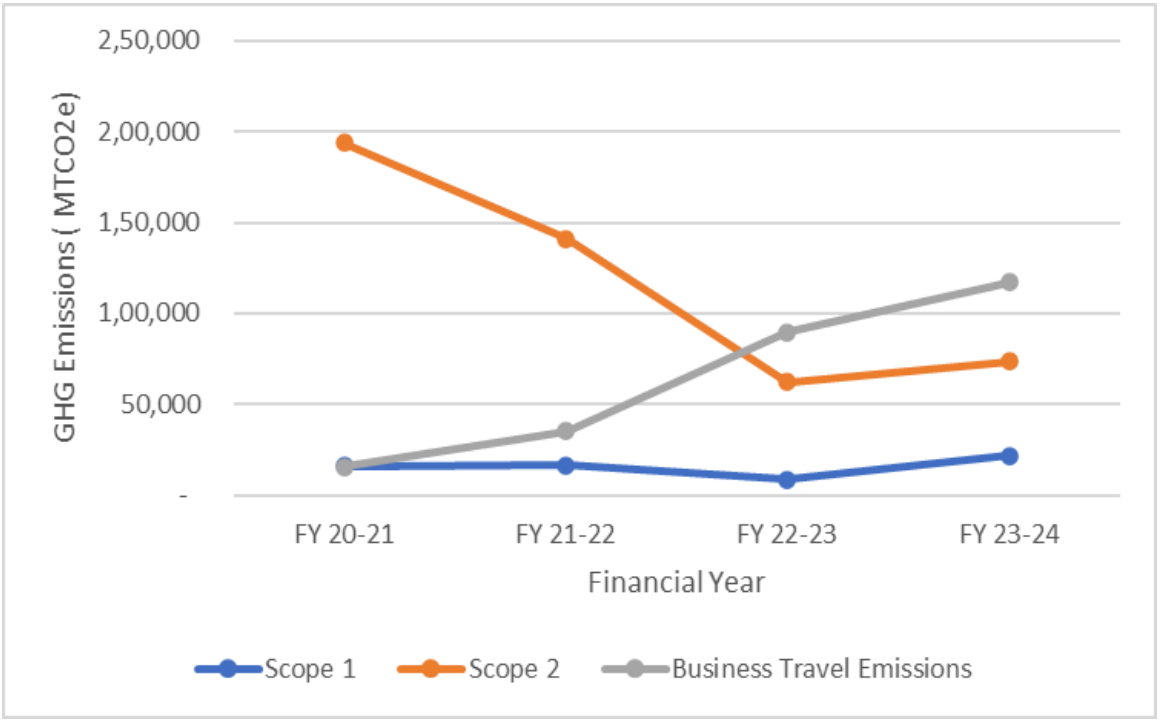
4.2. Business Travel Emissions Overview



Graph 20: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – TCS



Graph 21: Contribution of Business Travel Emissions to Scope 3 Emissions in FY 2023-24 – TCS



Graph 22: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Box 11: TCS- Business Travel Emission Highlights

- *Business Travel Emissions is 16% of total Scope 1,2,3 emissions (see Graph [20]).*
- *Business Travel Emissions is 19% of Scope 3 emissions (see Graph [21]).*
- *Business Travel Emissions for FY 2023-24 equals the annual road transport footprint of 6,51,722 average Indians.*
- *Business Travel Emissions have consistently grown since FY 2020-21. However, Scope 1 and 2 emissions have shown a downward trend except in FY 2023-24 (see Graph [22]).*
- *According to the 'Travel Smart Ranking' TCS falls under Category C.*[59]

4. 3. Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

TCS has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2 emissions however not declared any target reductions against Scope 3 emissions by 2040 as mentioned in Table [4]:

Table 4: TCS Climate Goals - Short-Term and Medium-Term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year 2016 emissions*	**Medium-Term Goals (by 2040)**
Scope 1	70%	Net Zero
Scope 2	70%	Net Zero
Scope 3	Not declared	Net Zero

Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

TCS has demonstrated considerable progress in reducing its Scope 1 and Scope 2 emissions over the last five years. Scope 1 emissions have decreased by 18% from FY 2019-20 to FY 2023-24.

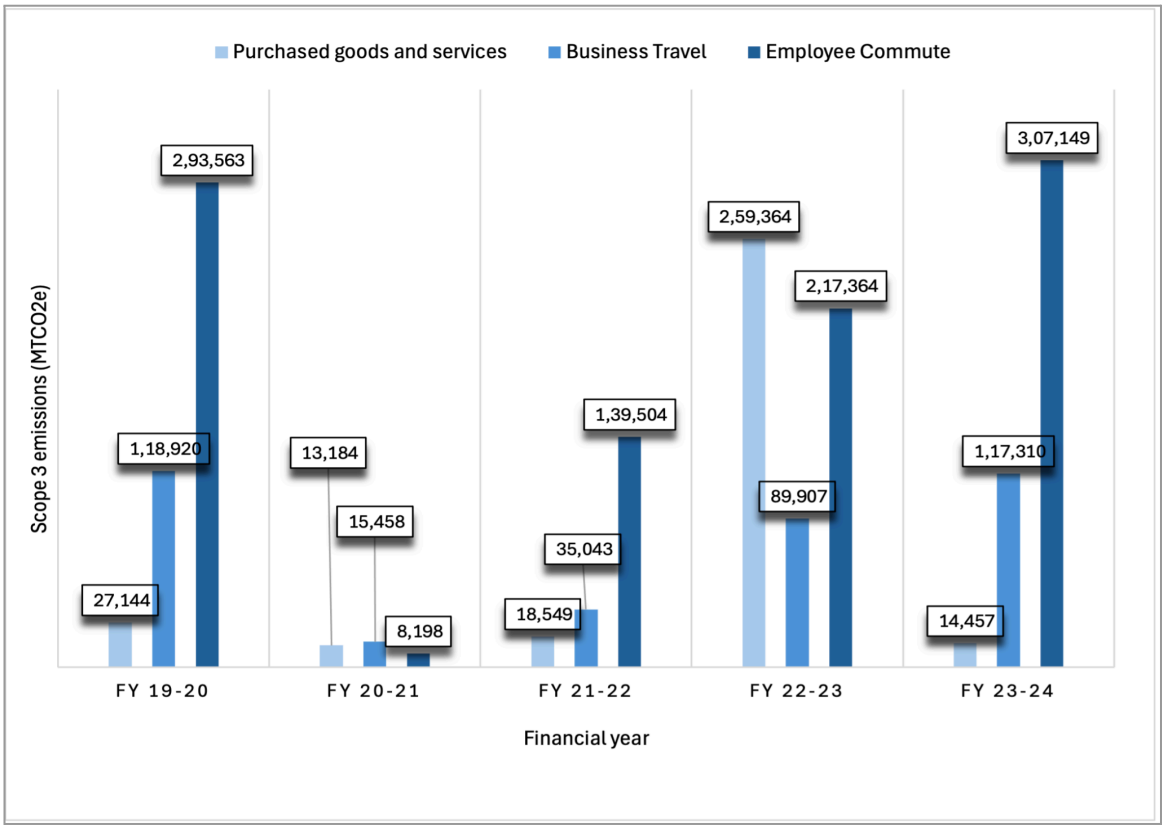
Scope 1 and 2 emission reduction measures:

[59] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

- Optimization of HVAC systems
- Increased use of electric vehicles (EVs) for employee transportation
- Energy-efficient upgrades to existing infrastructure
- Use of LED lighting
- Smart energy metres
- Green energy procurement through renewable energy sources such as solar power

Scope 3

Scope 3 emissions (see Graph [23]) dropped sharply from 7,02,615 metric tonnes in FY 2019-20 to 2,34,614 metric tonnes in FY 2020-21 due to pandemic-related restrictions. They have since rebounded, reaching 4,98,509 metric tonnes in FY 2023-24. Business travel emissions fell significantly during the pandemic, from 1,18,920 metric tonnes in FY 2019-20 to just 15,458 metric tonnes in FY 2020-21. However, with the easing of travel restrictions, these emissions have surged to 1,17,310 metric tonnes in FY 2023-24. Similar trends were shown by employee commute emissions which dropped to significant low during pandemic and rebounded post pandemic Despite the overall reduction in Scope 3 emissions compared to pre-pandemic levels, the recent uptick in business travel and employee commuting poses a challenge.



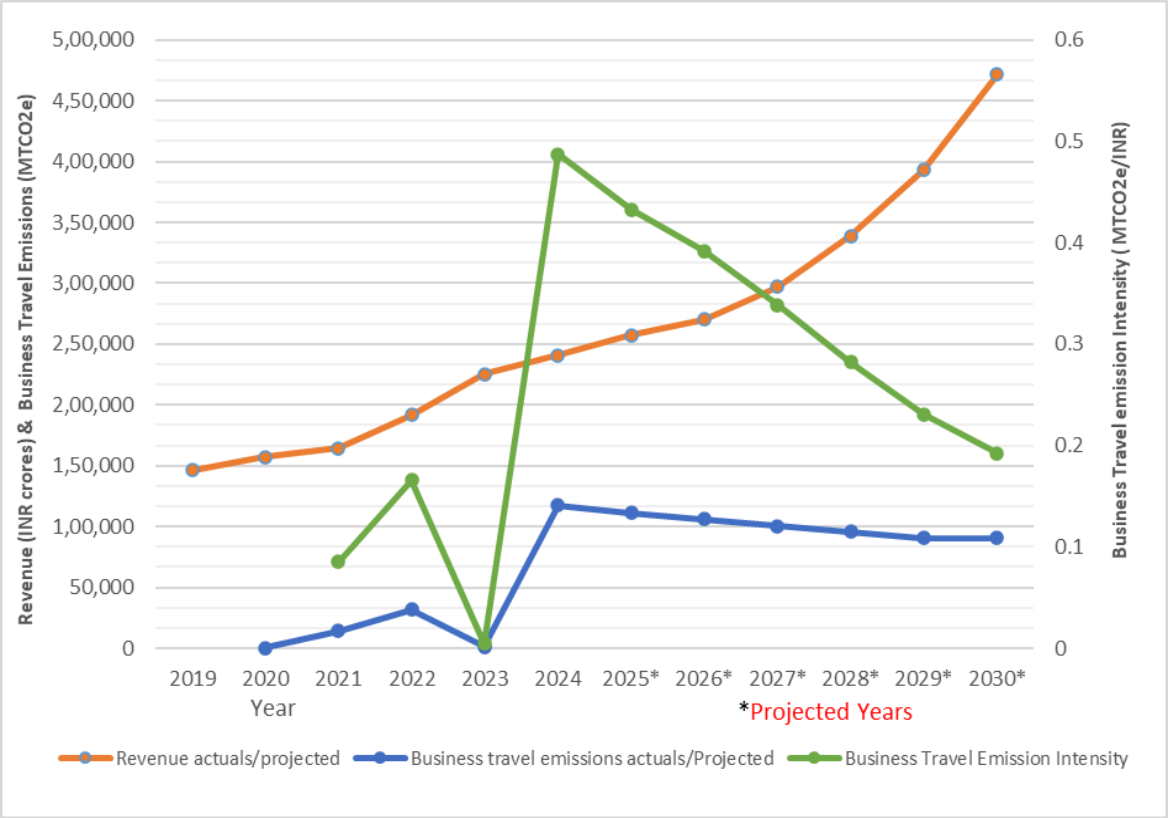
Graph 23: TCS - Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Promoting telecommuting
- Investing in EV infrastructure
- Leveraging digital collaboration tools

However, TCS has not committed to Scope 3 reduction targets for 2030 unlike other companies and this could lead to an internal unmonitored ecosystem paving the way towards negative emission reduction trends.

4.4. Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



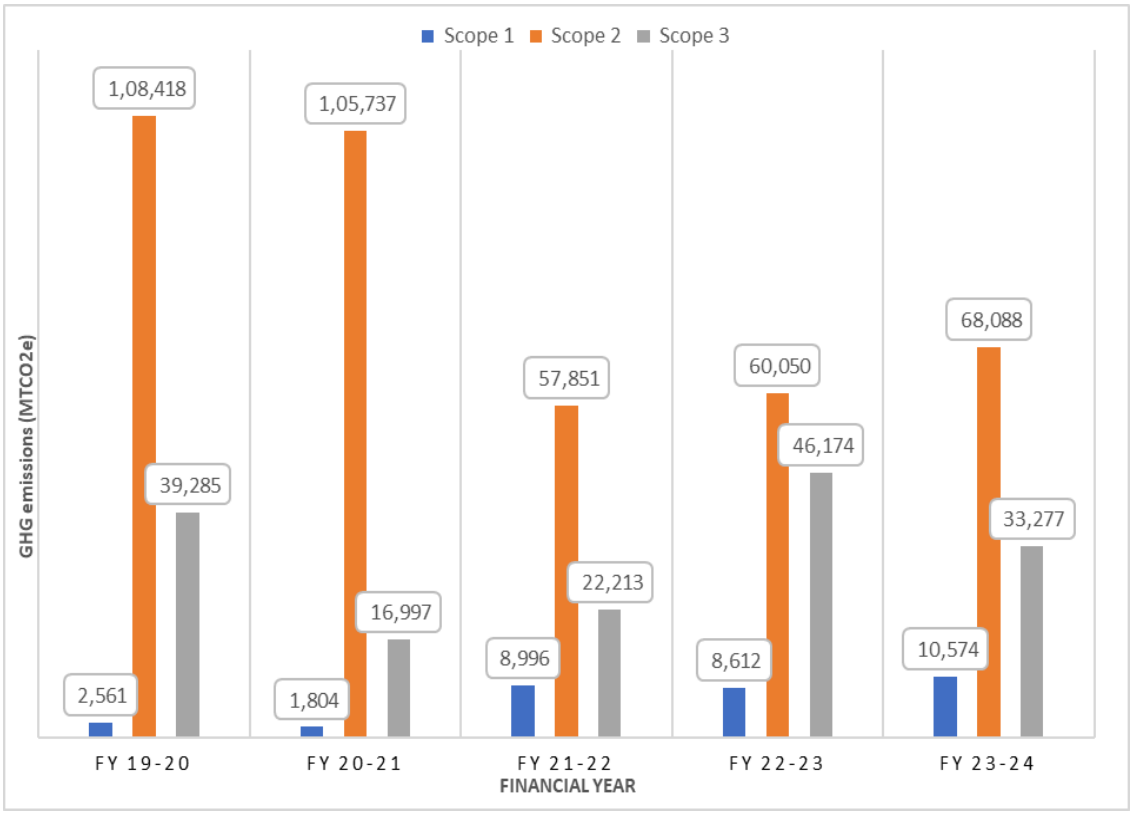
Graph 24: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected

Graph 24 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. Considering that Scope 1,2 and 3 have exhibited inconsistent reduction pathways, setting 2030 targets as per the SBTi standards is necessary.

5. Tech Mahindra

GHG Emissions Profile: Insights and Recommendations

5.1. Scope 1, 2 and 3 Emissions Overview



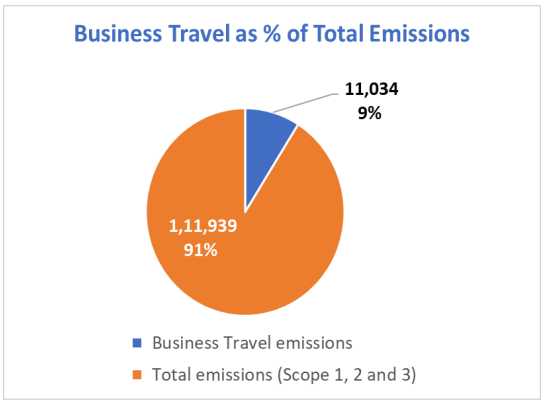
Graph 25: Scope 1, 2, 3 Emissions - TechMahindra Technologies

Box 12: TechMahindra - Scope 1, 2 and 3 Emission Highlights

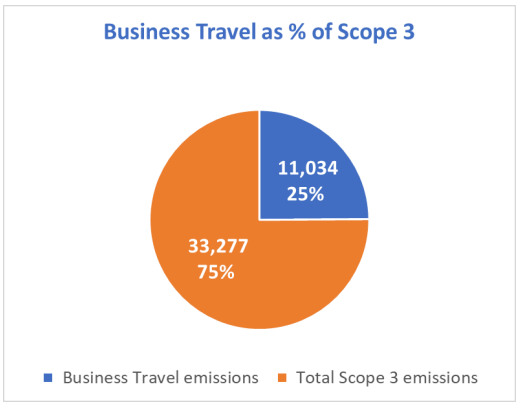
As per details in Graph [25]:

- *Scope 1,2,3 emissions have been fluctuating over the last 5 FY's from FY2019-20 to FY 2023-24 with Scope 3 emissions peaking at an all time high in FY 22-23. These inconsistencies indicate the company's measures are insufficient.*
- *Scope 3 emissions, as assessed against SBTi target-setting criteria are found to be at 30% of total Scope 1,2,3 emissions in FY 23-24.*

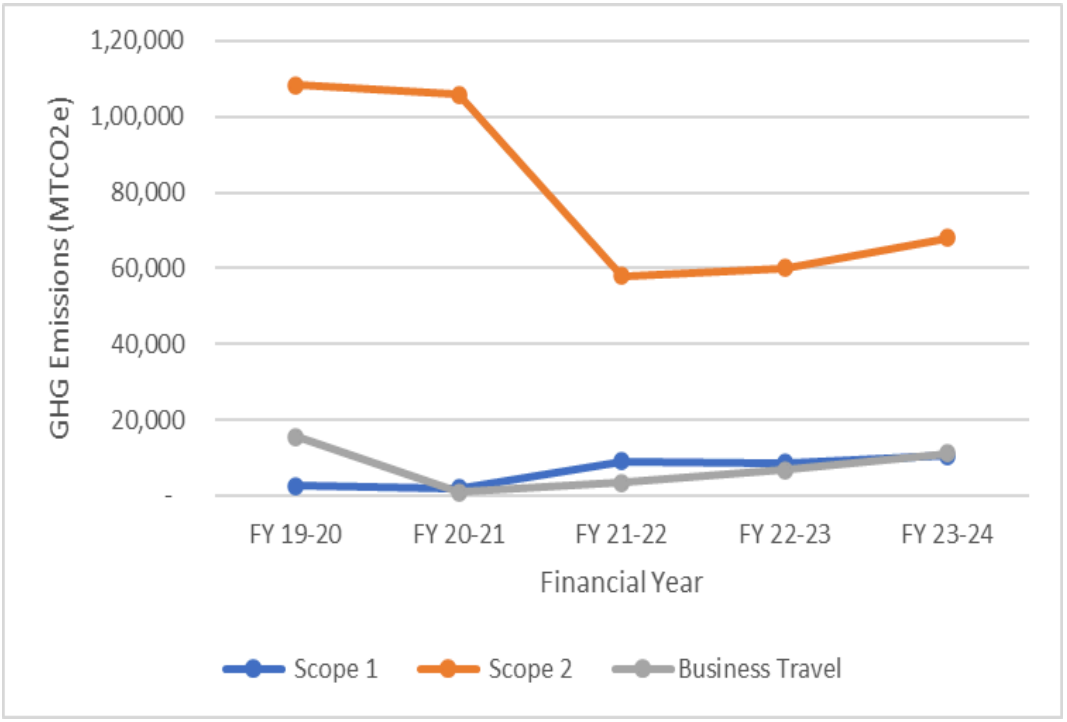
5.2. Business Travel Emissions Overview



Graph 26: Contribution of Business Travel Emissions to Scope 3 emissions in FY 2023-24 – TechMahindra



Graph 27: Contribution of Business Travel Emissions to total emissions in FY 2023-24 – TechMahindra



Graph 28: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Box 13: TechMahindra - Business Travel Emission Highlights

- *Business Travel Emissions are 9% of total Scope 1,2 and 3 emissions (see Graph [26]).*
- *Business Travel Emissions are 25% of Scope 3 emissions (see Graph [27]).*
- *Business Travel Emissions for FY 2023-24 equals the annual road transport footprint of 61,300 average Indians.*
- *Business Travel Emissions have consistently grown since FY 2020-21. However, Scope 1 and 2 emissions have been inconsistent indicating that all Scope emissions need to pay attention to the targets set (see Graph [28]).*
- *According to the Travel Smart Ranking campaign TechMahindra falls under Category C.*[60]

5.3.Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

TechMahindra has set short-term goals to reduce its Scope 1, Scope 2, Scope 3 emissions by 2030 and medium term goals for Scope 3 emissions as mentioned in Table [5].

Considering TechMahindra has achieved carbon neutrality in the year 2023 against Scope 1 and 2 emissions it has been observed that no specific medium term goals were set for Scope 1 and 2.

Table 5: Tech Mahindra Climate Goals - Short-Term and Medium-Term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year FY 2015-16 emissions*	**Medium-Term Goals (by 2040)**
Scope 1	22%	Not declared
Scope 2	22%	Not declared
Scope 3	20% (by 2025)	90 % (by 2035)

[60] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

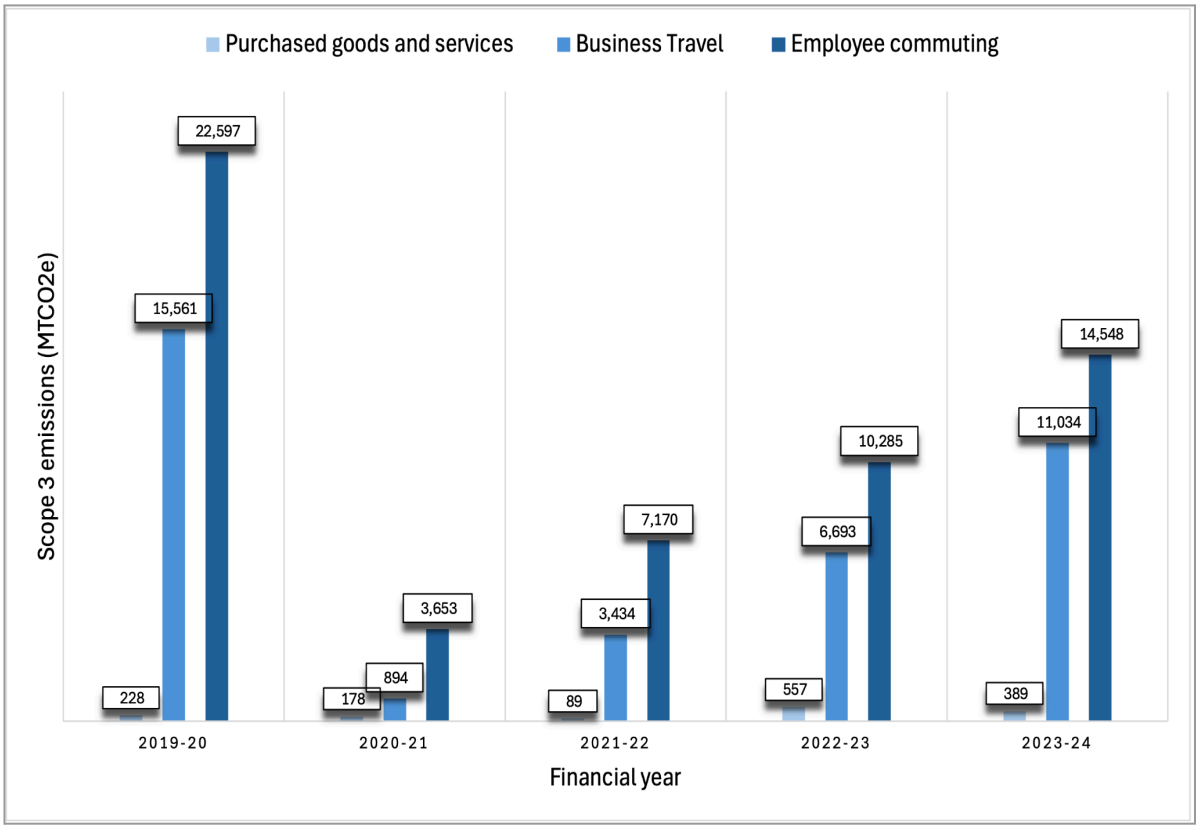
In FY 2023, TechMahindra achieved a 40% reduction in its Scope 1 and 2 emissions. By 2023, Tech Mahindra had achieved carbon neutrality for Scope 1 and 2 emissions. As part of its strategy, the company has committed to increasing its renewable energy usage to 90% by 2030. In 2021, renewable energy accounted for 17.6% of total electricity consumption, and this has been a key driver in lowering emissions. These initiatives are part of Tech Mahindra's larger commitment to addressing climate change and transitioning to a more sustainable operational model.

Scope 1 and 2 reduction measures:

- Increasing the use of renewable energy
- Achieving certifications like the Indian Green Building Council (IGBC)
- Leadership in Energy and Environmental Design (LEED) for some of its campuses.

Scope 3

TechMahindra has made notable progress in reducing its Scope 3 emissions from 2019 to 2024 (see Graph [29]). Its commitment is reflected through its target of reducing 90% of Scope 3 emissions by FY 2034-35, with an interim goal of reducing 20% by FY 2025-26 from a baseline of 39,285 MTCO2e in FY 2019-20. By FY 2023-24, Tech Mahindra achieved a reduction in Scope 3 emissions (33,277 MTCO2e), surpassing its target of 34,047 MTCO2e for that year. These reductions demonstrate Tech Mahindra's commitment to sustainability through the Science Based Targets initiative (SBTi) and strategic investments in green technologies. While TechMahindra’s goals are aligned to SBTi near-term targets and taking measures for necessary interventions, the growth in business travel emissions from 2020 to 2024 warrants attention. There is a need for measures such as setting specific targets for the business travel emissions and envisioning policy level changes.

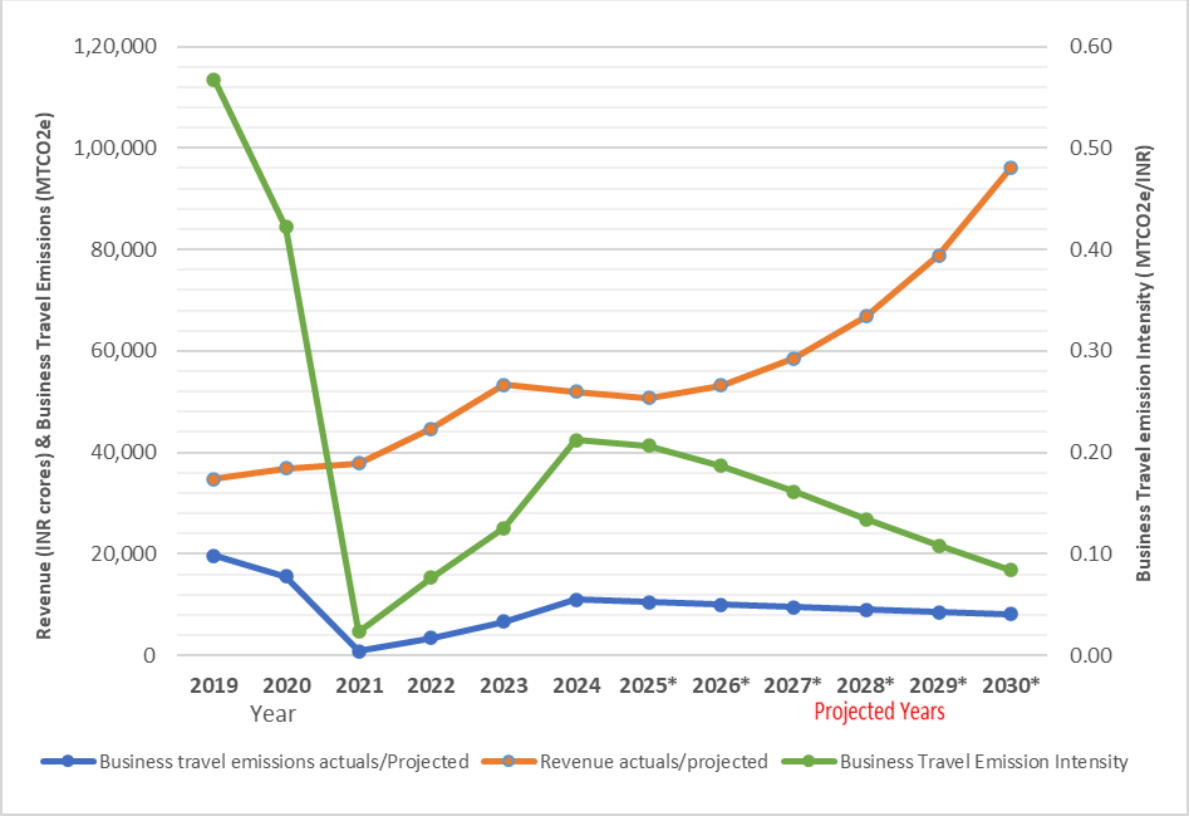


Graph 29: TechMahindra - Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Engaging suppliers in sustainable practices.
- Adopting circular economy solutions.
- Sustainable procurement.
- Green commute and logistics.
- Flexible remote working policies.
- Utilizing virtual meeting platforms.

5.4 Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



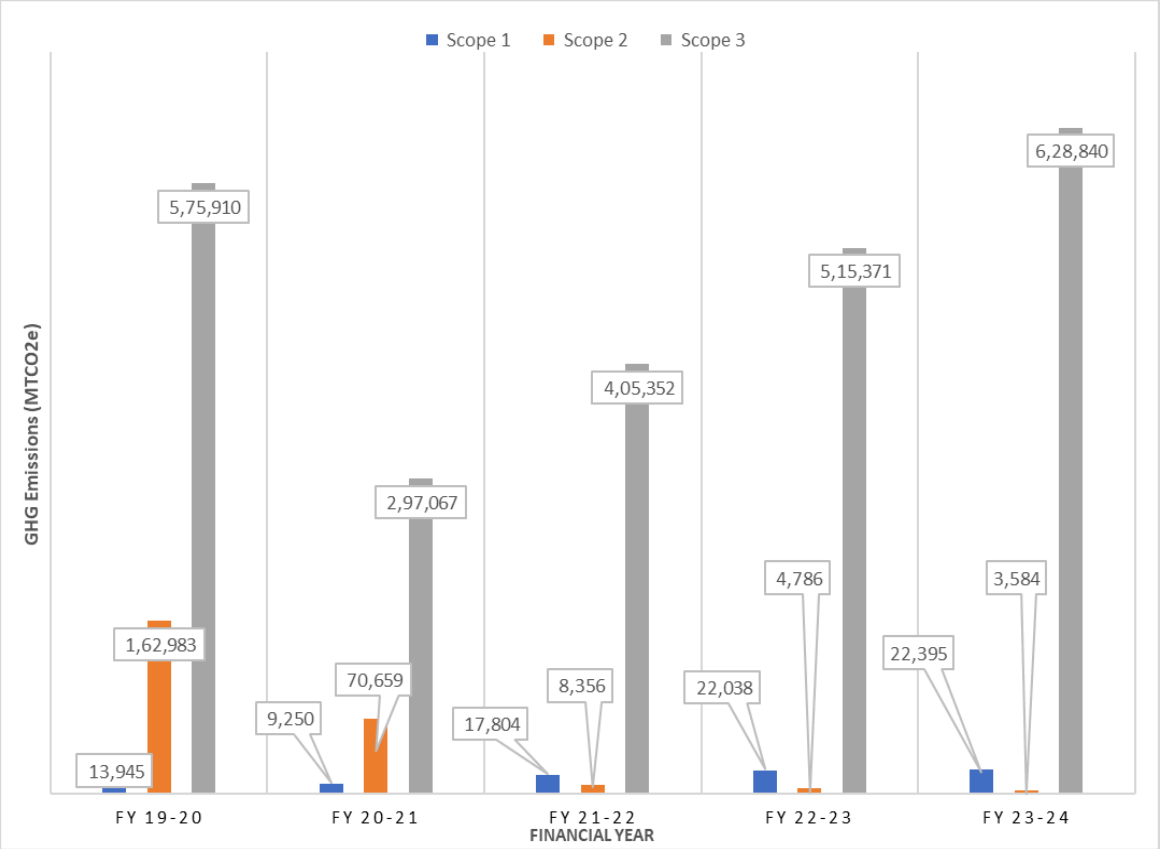
Graph 30: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected

Graph 30 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [5]).

6. Accenture

A. GHG Emissions Profile: Insights and Recommendations

6.1. Scope 1, 2 and 3 Emissions Overview



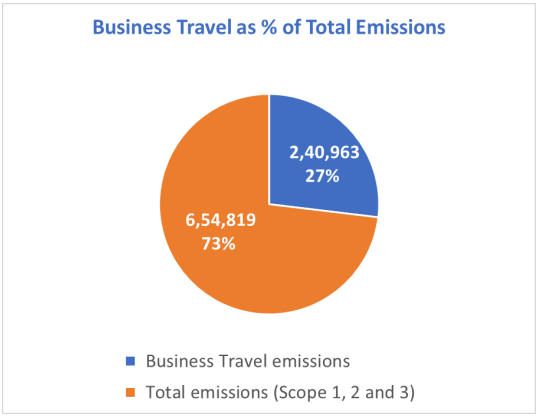
Graph 31: Scope 1, 2, 3 Emissions – Accenture

Box 14: Accenture - Scope 1, 2 and 3 Emission Highlights

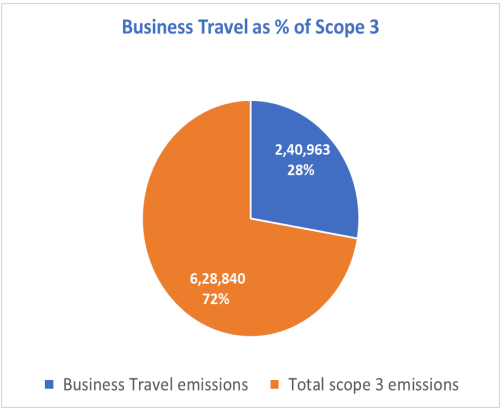
As per details in Graph [31]:

- *Scope 1 emissions have been increasing over the last three financial years from FY 2021-22 to FY 2023-24 while Scope 2 emissions have been decreasing. Scope 3 emissions in the FY 2023-24 have exceeded beyond FY 2019-20 emissions. Accenture is an exception among all the eight companies in this aspect having exceeded its FY 2019-20 Scope 3 emissions.*
- *Scope 3 emissions as assessed against SBTi target setting criteria are found to be 96% of total Scope 1,2,3 emissions in FY 23-24.*

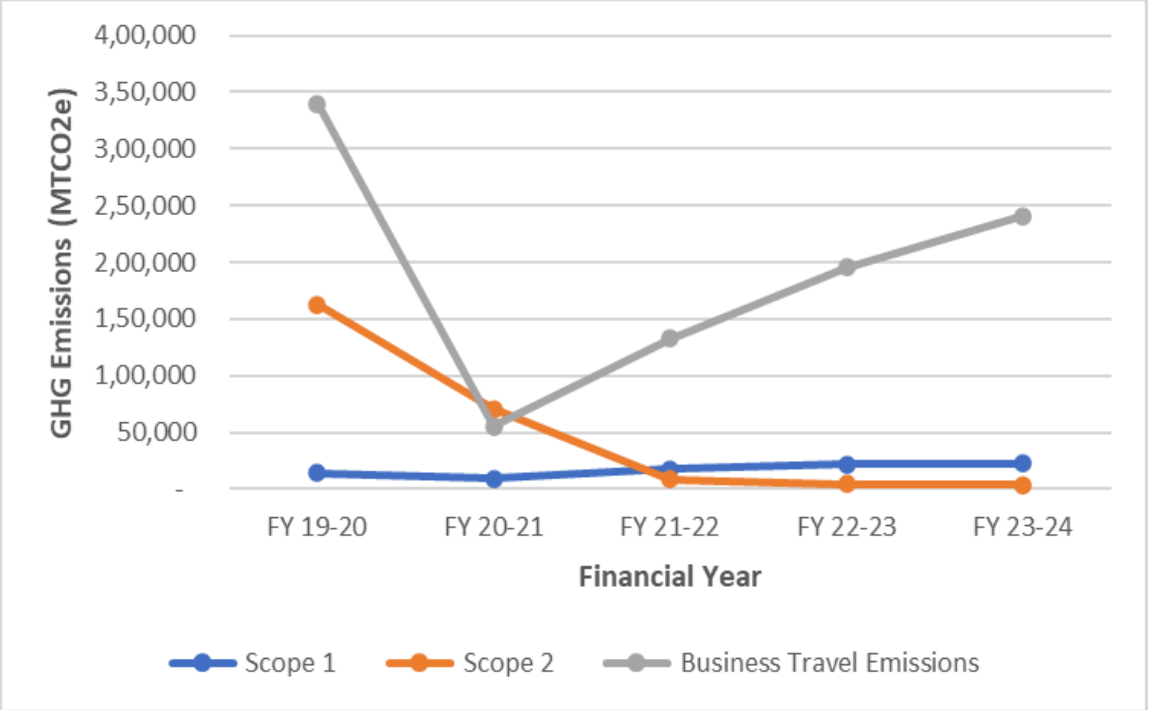
6.2. Business Travel Emissions Overview:



Graph 32: Contribution of Business Travel Emissions to total Emissions in FY 2023-24 – Accenture



Graph 33: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – Accenture



Graph 34: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Accenture - Business Travel Emission Highlights:

- *Business Travel Emissions are 28% of total Scope 1,2,3 emissions (see Graph [32]).*
- *Business Travel Emissions are 27% of Scope 3 emissions (see Graph [33]).*
- *Business Travel Emissions for FY 2023-24 equal the annual road transport footprint of 13,38,683 average Indians.*
- *Business Travel Emissions have shown an upward trend since FY 2020-21; Similarly, Scope 1 emissions have shown a slightly upward trend since FY 2021-22 while Scope 2 emissions have consistently decreased since FY 21-22 (see Graph [34]).*
- *According to the 'Travel Smart Ranking' Accenture falls under Category C.*[61]

6.3.Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

Accenture has set ambitious short-term and medium term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2040 (see Table [6])

Table 6: Accenture Climate Goals - Short-Term and Medium-Term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year 2015-16 emissions*	**Medium-Term Goals (by 2040)**
Scope 1	80% absolute reduction	90% absolute reduction
Scope 2	80% absolute reduction	90% absolute reduction
Scope 3	55% reduction per unit revenue	90% absolute reduction

Accenture is continuing to work toward its goal of reducing carbon emissions. It has set near-term goals after approval and guidance from SBTi for the reduction of Scope 1, Scope 2, and Scope 3 emissions. According to Transport and Environment, Accenture is yet to set specific targets to reduce its business travel despite being one of the topmost companies that flies.[62]

[61] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

[62] Transport and Environment. (2024, March 12). *KPMG and Accenture, GSK failing to keep up with industry leaders in cutting corporate travel emissions*. https://www.transportenvironment.org/articles/kpmg-accenture-gsk-failing-to-keep-up-with-industry-leaders-in-cutting-corporate-travel-emissions

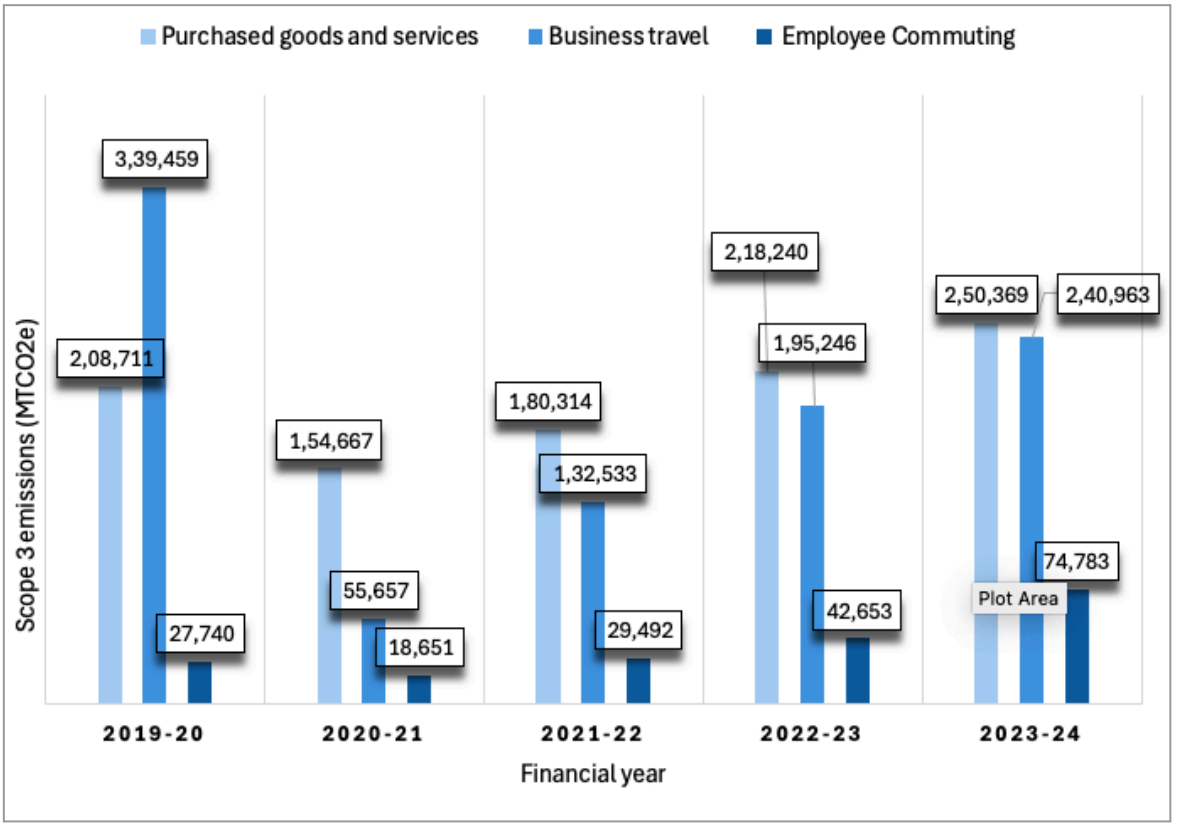
Emission Mitigation Progress and Reduction Measures

Scope 1 and Scope 2

There was a gradual increase in mobile combustion emissions within Scope 1 from 2021 to 2023 post COVID-19 even though there have been investments in electric vehicles. There is a significant decrease in Scope 2 emissions as most employees have been working from home rather than office, thereby,reducing electricity use in office post-pandemic. In addition to this, Accenture also invested in renewable electricity bringing down its Scope 2 emissions.

Scope 3

Accenture's Scope 3 emissions (see Graph [35]) were 628,840 MTCO2e in 2024 which exceeded pre-COVID level (575,910 MTCO2e) emissions. Employee commute emissions also indicate an increasing trend from 2019 to 2024. Business Travel Emissions comprised 28% of total emissions and 27% of Scope 3 emissions in the year 2023-24, indicating that targets were missed.

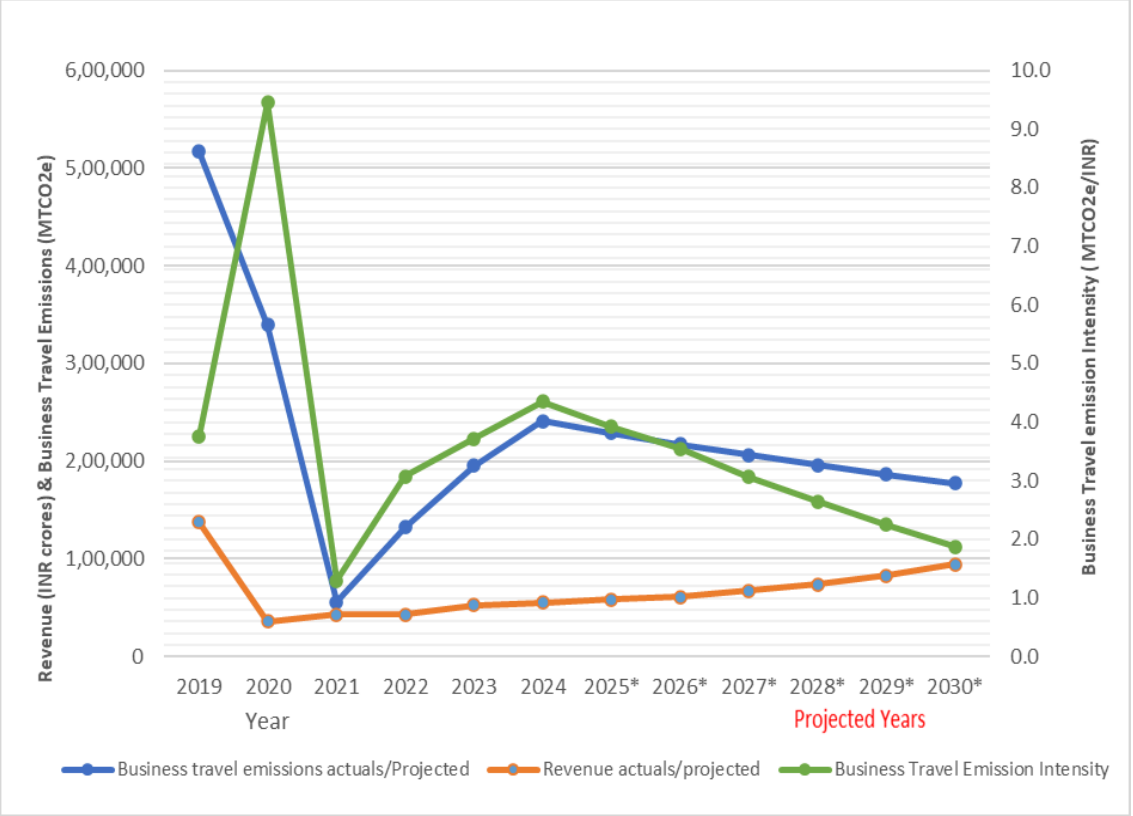


Graph 35: Accenture - Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Analytics and Reporting has helped employees identify opportunities to reduce travel or to use less carbon-intensive modes of travel.
- Encouraged the use of more carbon-efficient alternatives, such as rail.
- An aviation carbon calculator has been developed that highlights actual emissions differences between flights to support informed booking decisions.
- Accenture has set a goal of making 90% of its key suppliers disclose their environmental targets and actions to reduce emissions by 2025.

6.4 Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



Graph 35 : Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected

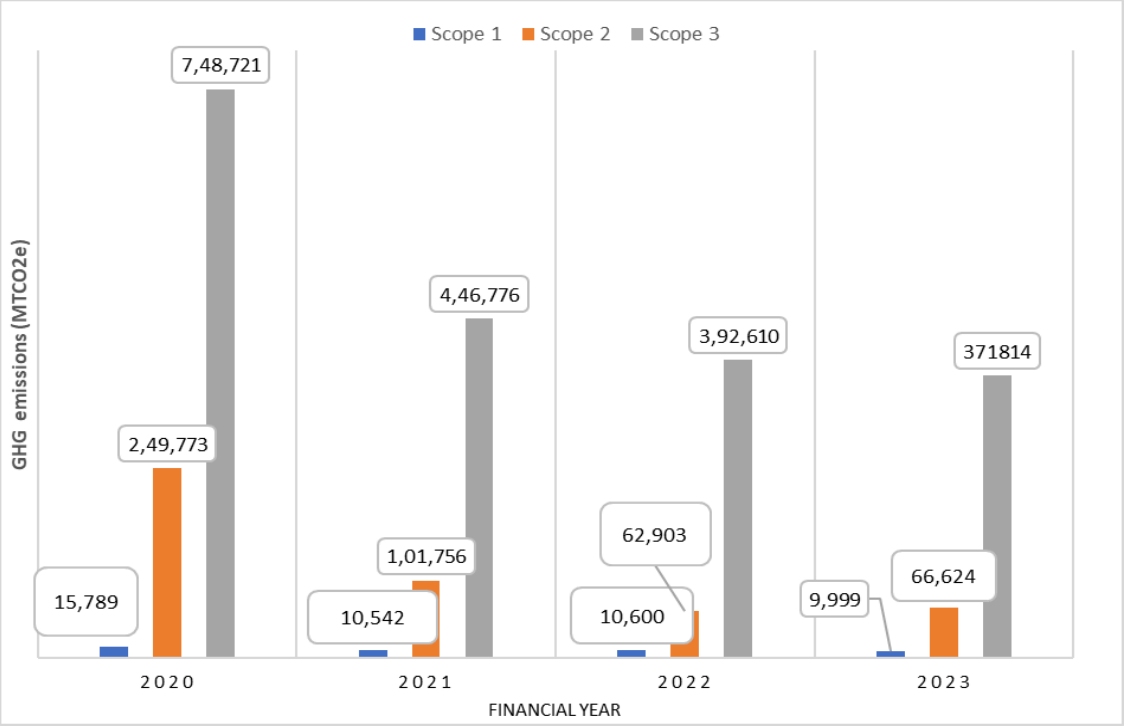
Graph 35 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [6]).

7. Cognizant

GHG Emissions Profile: Insights and Recommendations

7.1.Scope 1, 2 and 3 Emissions Overview

Note: Cognizant reports their emissions on a calendar-year basis i.e. if it is for year 2023, the time period considered is Jan 2023 – Dec 2023. Data for the calendar year 2024 is unavailable in Cognizant's official reports as yet.



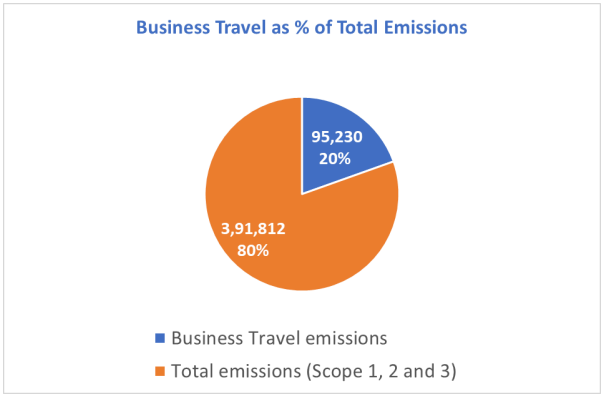
Graph 36: Scope 1, 2, 3 Emissions – Cognizant

Box 15: Cognizant - Scope 1, 2 and 3 Emission Highlights

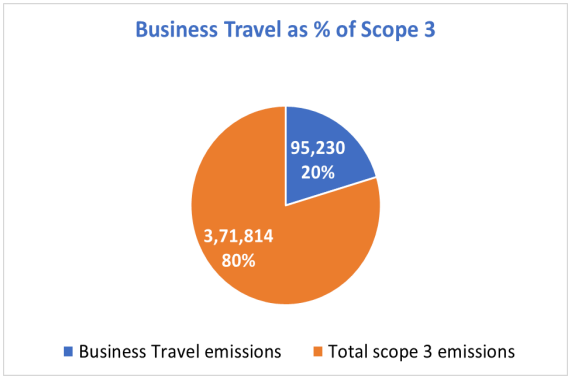
As per details in Graph [36]:

- *Scope 1 emissions have been decreasing over the last four financial years from FY 2020 to FY 2023. Scope 2 emissions, though fluctuating, have shown a decreasing trend over the same period. Although Scope 3 emissions have shown a decreasing trend between FY 2020-22, they increased in FY 2023. These inconsistencies indicate that the company's measures are insufficient.*
- *Scope 3 emissions, as assessed against SBTi target-setting criteria, were found to be 86% of total Scope 1,2,3 emissions in FY 2023.*

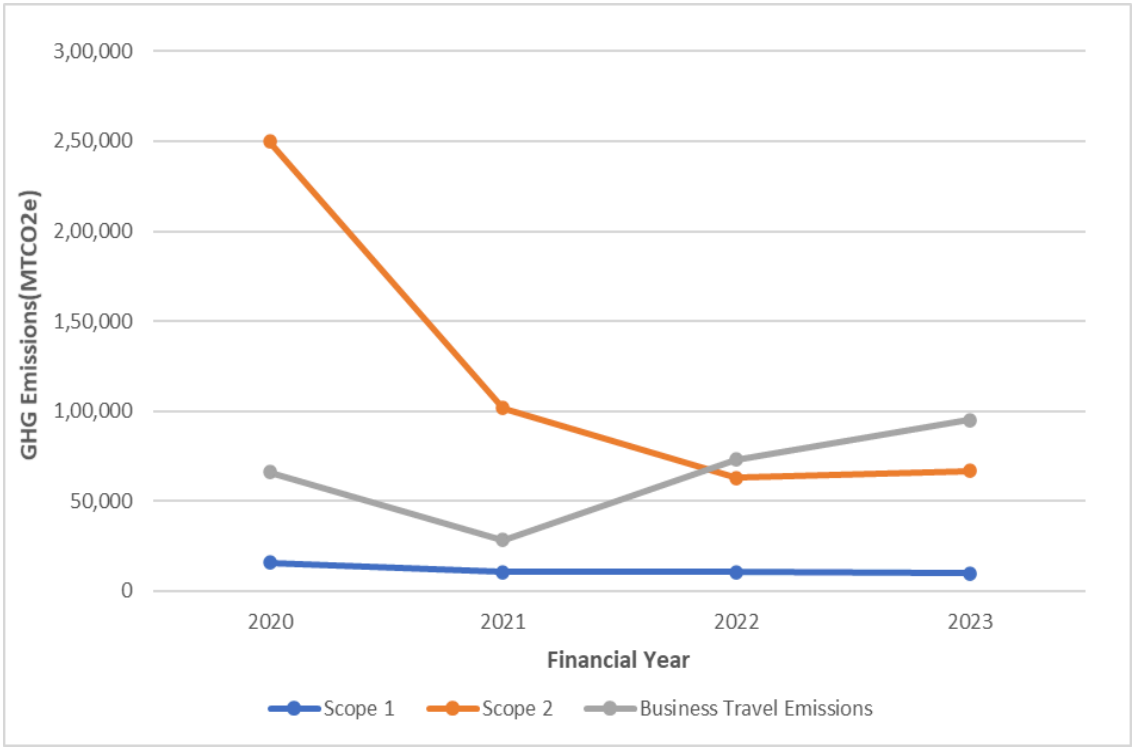
7.2. Business Travel Emissions Overview



Graph 37: Contribution of Business Travel Emissions to Total Emissions in FY 2022-23 - Cognizant



Graph 38: Contribution of Business Travel Emissions to Scope 3 emissions in FY 2022-23 - Cognizant



Graph 39: Business Travel Emissions Performance Against Scope 1 and 2 Emission Performance

Box 16: Cognizant - Business Travel Emission Highlights

- *Business Travel Emissions are 14% of total Scope 1,2,3 emissions.(see Graph [37])*
- *Business Travel Emissions are 21% of Scope 3 emissions.(see Graph [38])*
- *Business Travel Emissions for FY 2023 equal the annual road transport footprint of 3,68,278 average Indians.*
- *Business Travel Emissions have shown an upward trend since FY 2021. Similarly, Scope 1 and Scope 2 emissions have shown a downward trend since FY 2020 to FY 2023. (see Graph [39])*
- *According to the 'Travel Smart Ranking' Cognizant falls under Category C and is recognized as a Top Flyer.*[63]

7.3.Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

Cognizant has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2040 (see Table [7]):

Table 7: Cognizant Climate Goals - Short-Term and Medium-Term

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year 2019-20 emissions*	**Medium-Term Goals (by 2040)** *Reduction Percentage against base year 2019-20 emissions*
Scope 1	50%	90%
Scope 2	50%	90%
Scope 3	Net Zero	Not declared

Emission Mitigation Progress and Reduction Measures:

Scope 1 and Scope 2

In the year 2021, Cognizant took key actions such as adopting renewable energy sources and upgrading energy efficiency measures across offices and IT infrastructure. By 2022, Cognizant had achieved a significant reduction in emissions. Scope 1 emissions were reported at 9,999 metric tons, while Scope 2 emissions were 101,402 metric tons (location-based) and 66,624 metric tons

[63] Travel Smart. (2025b, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/#QandA

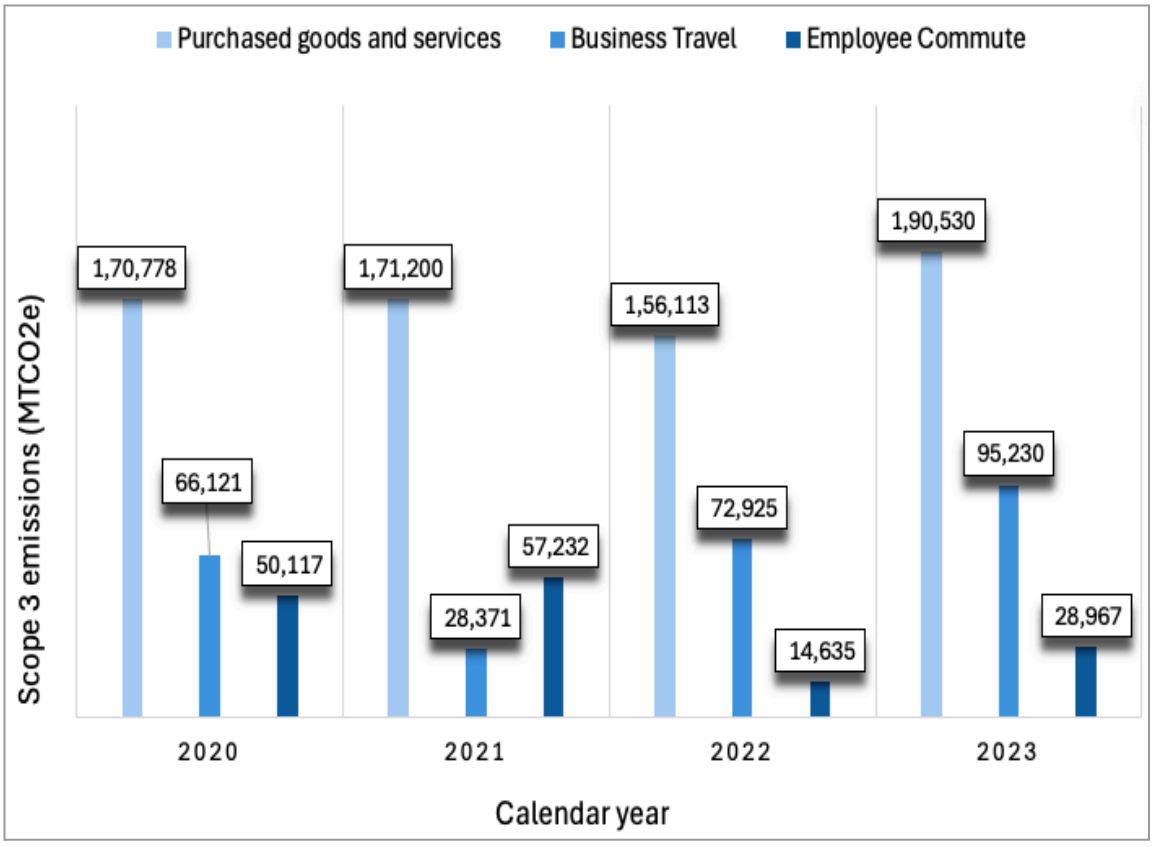
(market-based). By 2023, Cognizant achieved a 61% reduction in electricity consumption compared to the 2019 baseline and a 66% reduction in energy intensity.

Scope 1 and 2 emission reduction measures:

- Sourcing renewable electricity for properties, particularly through Power Purchase Agreements (PPAs) for solar and wind power. India-specific projects played a major role in these reductions, wherein 44% of electricity consumed was renewable in 2022.
- Upgraded HVAC systems
- Shifted to LED lighting
- Improved energy performance in data centres
- Over 80% of their apps were hosted in the cloud, which reduced the energy required to manage data
- Focused on both technology upgrades and operational improvements

Scope 3

Cognizant has made significant strides in reducing its Scope 3 emissions over recent years (see Graph [40]). In its 2022 ESG report, Cognizant highlighted that it had reduced emissions linked to its IT infrastructure by 60% since 2020. Cognizant is working to reduce emissions across its entire supply chain by 90% by 2040. The company is focusing on monitoring emissions from purchased goods and services and collaborating with its largest suppliers to improve emissions transparency and reductions.

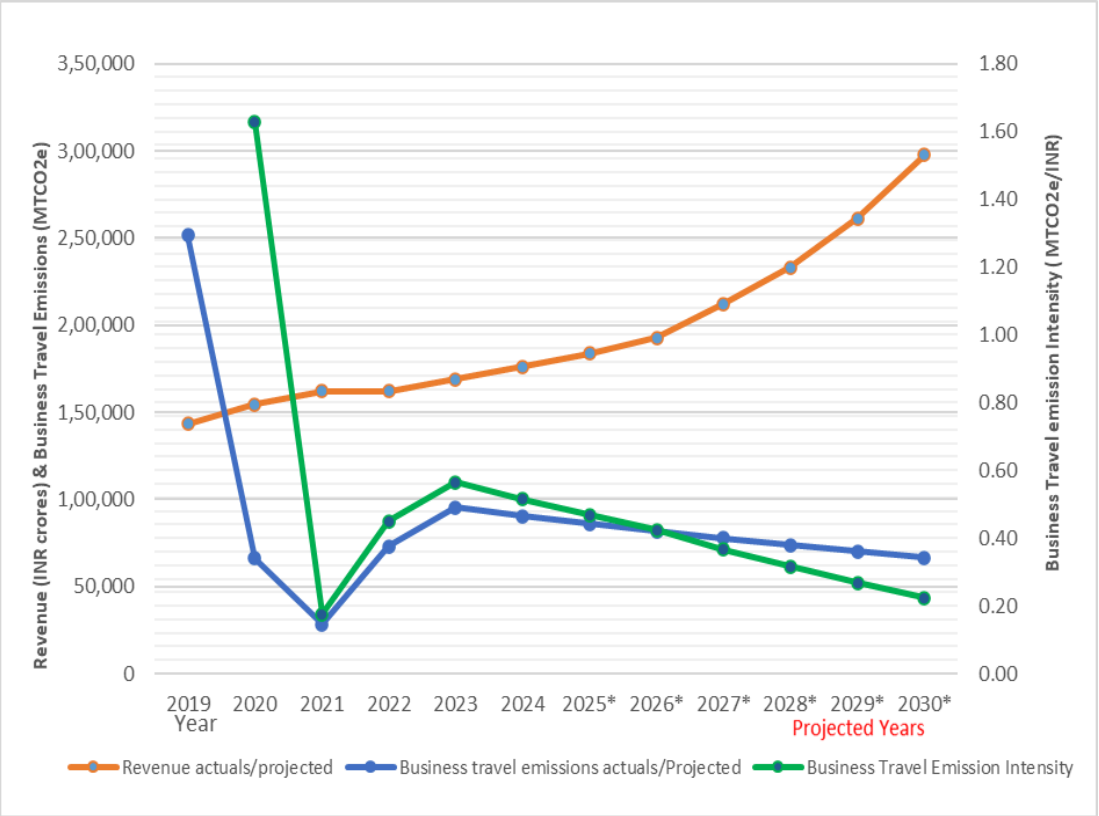


Graph 40: Cognizant- Emissions by Top 3 Scope 3 Components

Scope 3 emission reduction measures:

- Engaged with the top 150 suppliers to encourage them to set net zero targets.
- Setting limits on travel expenses.
- Pre-travel approval process .
- Delivering information and insights to associates on their travel carbon footprint.
- Drawing insights from reports to optimize and regulate travel.
- Videoconferencing to better support continued remote working.

7.4 Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



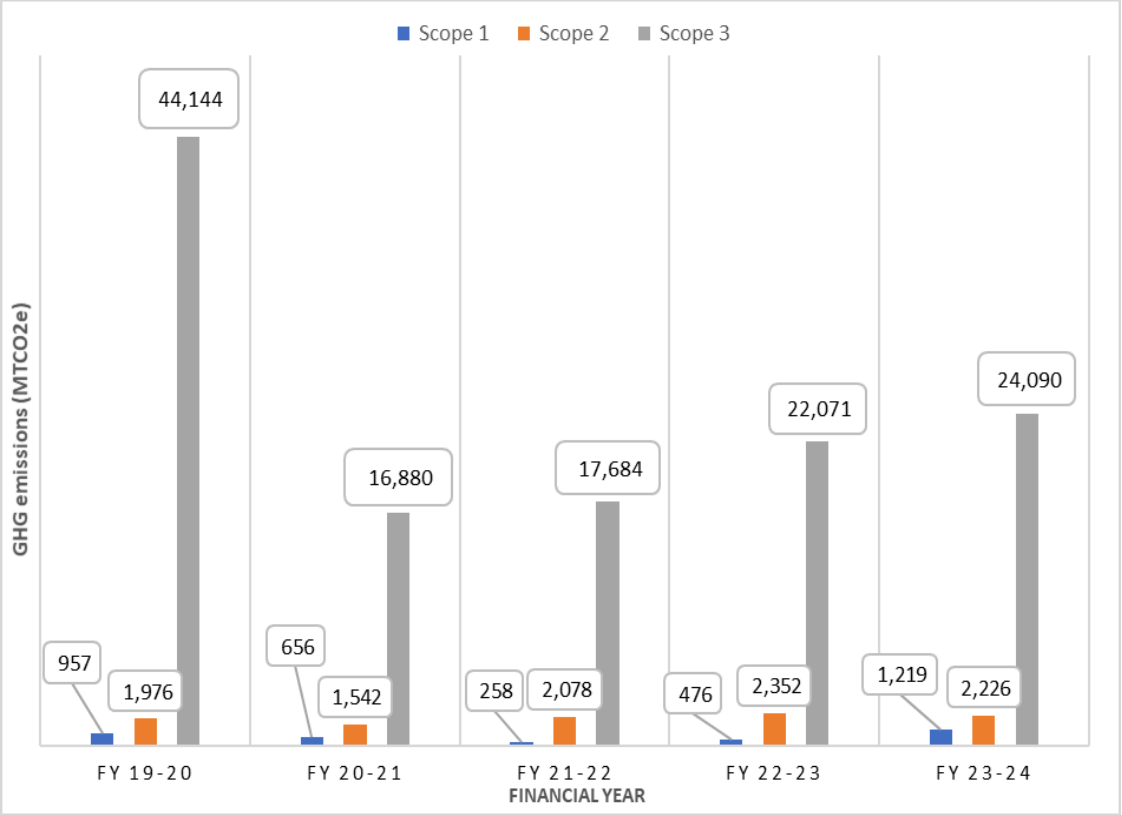
Graph 41: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected.

Graph [41] indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short-term climate commitment goals (see Table [7]) .

8. Thoughtworks

GHG Emissions Profile: Insights and Recommendations

8.1. Scope 1, 2 and 3 Emissions Overview



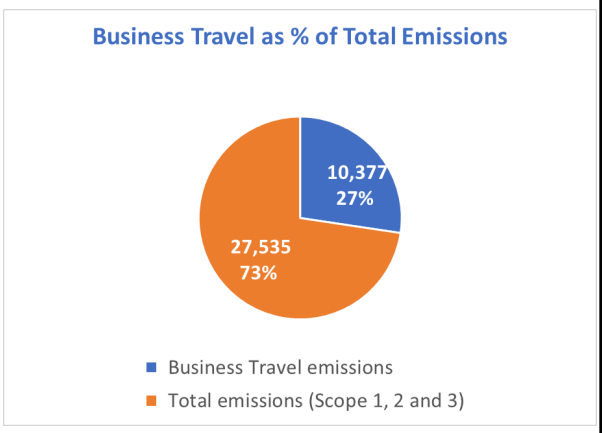
Graph 42: Scope 1, 2, 3 Emissions - Thoughtworks

Box 17: Thoughtworks - Scope 1, 2 and 3 Emission Highlights

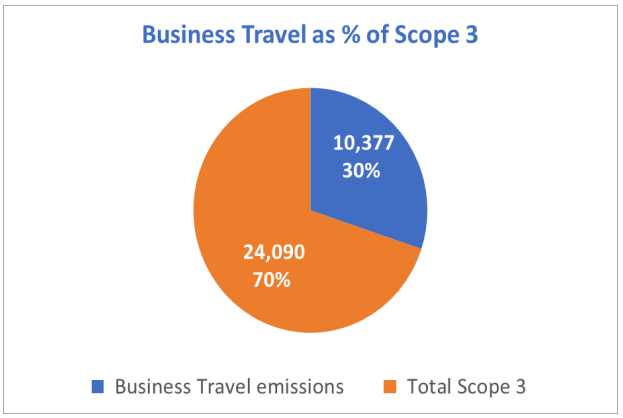
As per details in Graph [42]:

- *Scope 1 emissions have been decreasing over the four financial years from FY 2019-20 to FY 2022-23 with a slight increase in FY 2023-24. Scope 2 emissions have fluctuated between FY 2019-20 to FY 2023-24. Scope 3 emissions have shown a growing trend since FY 2020-21, although they have not returned to the pre-COVID levels observed in FY 2019-20.*
- *Scope 3 emissions, as assessed against SBTi target-setting criteria are found to be more than 40% of total Scope 1,2,3 emissions in FY 23-24.*

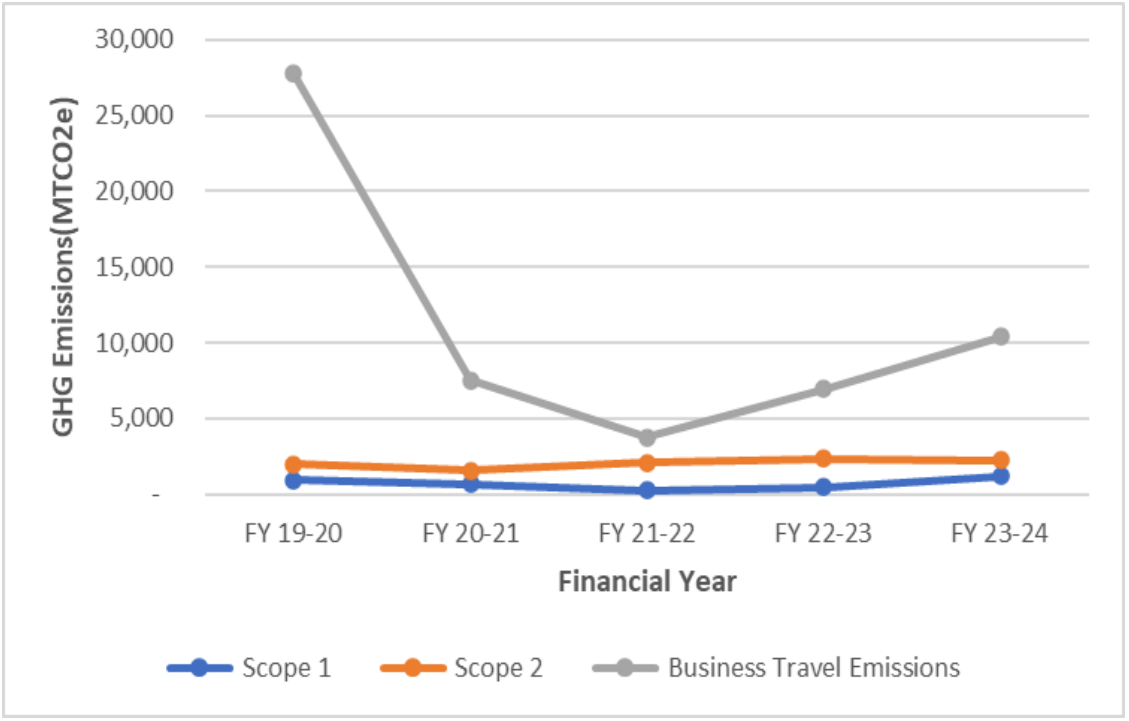
8.2. Business Travel Emissions Overview:



Graph 43: Contribution of Business Travel Emissions to Total Emissions in FY 2023-24 – Thoughtworks



Graph 44: Contribution of Business Travel Emissions to Scope 3 Emissions in FY 2023-24 – Thoughtworks



Graph 45: Business Travel Emissions Performance Against Scope 1,2 Emission Performance

Box 18: Thoughtworks - Business Travel Emission Highlights

- *Business Travel Emissions are 30% of total Scope 1,2,3 emissions (see Graph [43]).*
- *Business Travel Emissions are 27% of Scope 3 emissions (see Graph [44]).*
- *Business Travel Emissions for FY 2023-24 equal the annual road travel footprint of 57,650 average Indians.*
- *Business Travel Emissions have shown an upward trend since FY 2021-22, however, they have not reached pre-COVID emission levels recorded in 2019-20. Scope 1 and 2 emissions have been fluctuating negligibly between FY 2019-20 to 2023-24 (see Graph [45]).*

8.3.Emission Mitigation Goals, Progress and Reduction Measures

Emission Mitigation Goals

Thoughtworks has set ambitious short-term and medium-term goals to reduce its Scope 1, Scope 2, and Scope 3 emissions by 2035 (see Table [8]).

Table 8: Thoughtworks Climate Goals - Short-Term and Medium-Term.

Emission Type	**Short-Term Goals (by 2030)** *Reduction Percentage against base year FY 2019-20 emissions*	**Medium-term Goals (by 2035)** *Reduction Percentage against base year FY 2019-20 emissions*
Scope 1	50%	Net zero
Scope 2	50%	Net zero
Scope 3	87%	Net zero

Emission Mitigation Progress and Reduction Measures

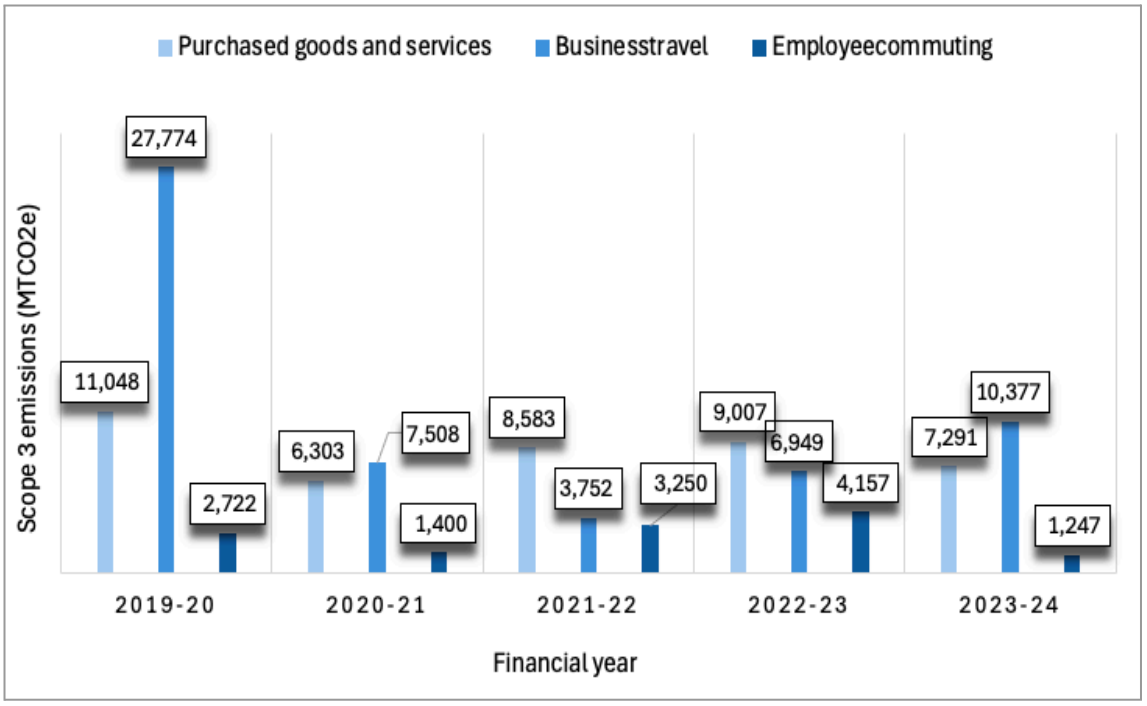
Scope 1 and Scope 2

Between 2019 and 2024, Thoughtworks implemented several measures to reduce its Scope 1 and Scope 2 emissions as part of its commitment to achieving net-zero emissions by 2035.

It began by shifting to 100% renewable energy sources for electricity, significantly reducing Scope 2 market-based emissions to zero by 2022. To further manage Scope 1 emissions, which include gas heating and refrigerant use, it introduced more efficient energy systems and began collaborating with landlords for better control and reporting of building emissions. It also optimised equipment usage to extend the lifespan of devices.

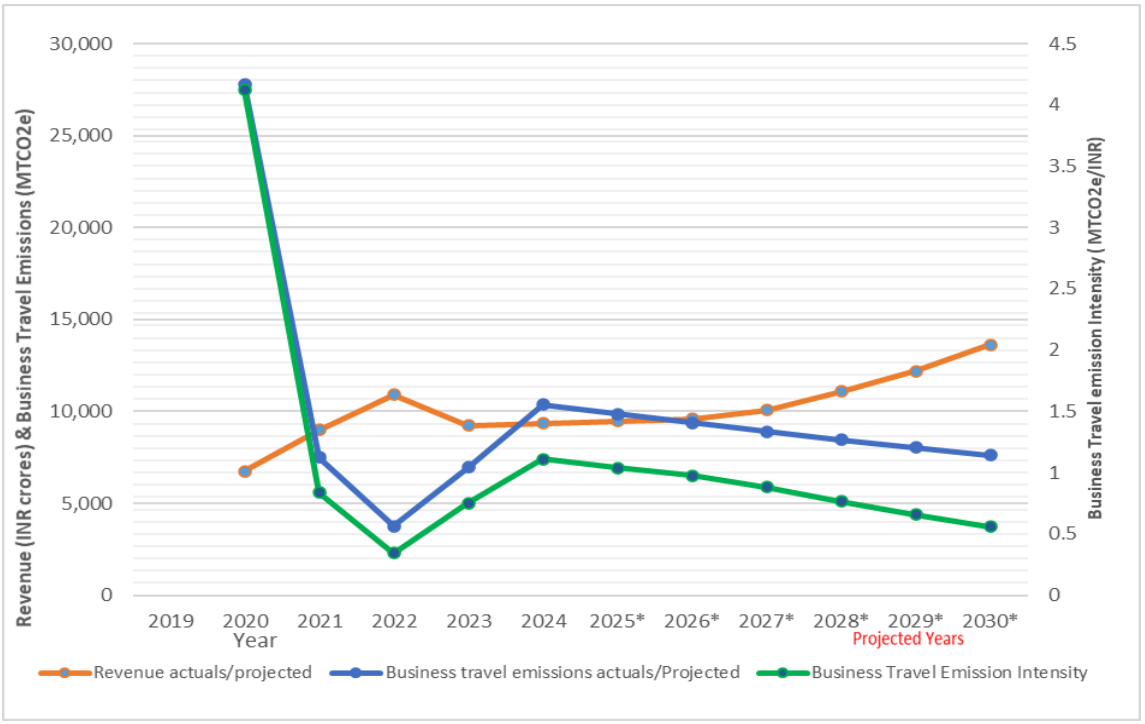
Scope 3

Thoughtworks has made substantial strides in reducing their Scope 3 emissions, 2019 onwards (see Graph [46]). In 2019, their global Scope 3 emissions totaled 1,919.68 tons CO2e, with business travel being the largest contributor (1,722.15 tons CO2e). The pandemic significantly altered these figures and thereafter Thoughtworks adopted a hybrid work model, drastically reducing travel and commuting. It introduced measures like limiting business travel expenditure to 30% of 2019 levels, encouraging greener commuting through making cycle storage facilities available, and to encourage employees to explore sustainable travel options. Their long-term goal is to reduce Scope 3 emissions by 85% per employee by 2030, and they are progressing steadily toward this target. However there have been increasing trends noticed in business travel emissions since FY 2023. Thoughtworks realized that technological innovations alone cannot lead to a substantial aviation emission reduction.



Graph 46: Thoughtworks - Emissions by Top 3 Scope 3 Components

8.4 Business Travel Emission Intensity Analysis and Recommendation for Five-Year Emission Reduction Goals



Graph 47: Business Travel Emissions, Revenue and Business Travel Emission Intensity - Performance Actuals and Projected.

Graph 47 indicates that setting a year-on-year target to reduce business travel emissions by 5% can keep the company's emission intensity regulated and improve its environmental performance for a projected revenue growth of 12% CAGR by 2030. This will also ensure that the company meets its short term climate commitment goals (see Table [8]).

Key Insights

Of the eight companies assessed, Wipro Technologies has proven to be a pioneer in business travel emission reduction since 2015. It has set a Scope 3 target of 55% reduction compared to 2019 emissions, to be achieved by 2030. It has reduced business travel emissions by 71% to the base FY 2019-20. Given the FairTravel team's engagement with the company it is known that its travel policy is inclusive of train travel, which is noteworthy. Thoughtworks is another pioneer company making efforts in the direction of experimenting with behavioural change and sustainable travel policy co-creation with employees. It has successfully adhered to its Scope 3 emission reduction targets for the last two financial years, 2022-23 and 2023-24 reducing its business travel emissions by 63% compared to FY 2019-20. HCLTech has also reduced its business travel emissions compared to its base year by 39% and has not exhibited growing trends since FY 2022-23. However, HCLTech can perform better by setting specific business travel reduction targets. LTIMindtree[64] although not assessed as part of these case studies[65], is among the

[64] Travel Smart. (2025, April 12). *Travel Smart Ranking - Travel Smart*. https://travelsmartcampaign.org/ranking/
[65] Historical travel data wasn't available due to the merger of Mindtree with LandT in May 2022.

companies evaluated by the Travel Smart Campaign showcasing exemplary performance. It has set specific targets for business travel emissions and has exceeded in meeting the reduced targets.

Infosys, TechMahindra and Accenture have managed to keep business travel emissions below pre-COVID-19 levels; however, their recorded emissions for FY 2023-24 represent substantial growth, indicating that specific reduction targets are necessary to cap business travel emission growth.

Cognizant witnessed a 30% increase in business travel emissions in FY 2022, exceeding its pre-COVID emission levels despite interventions reported in its 2023 ESG report.

TCS has exhibited an increase in business travel emissions, nearly equaling pre-COVID levels. It has also not set short-term Scope 3 emissions, which has impacted its progress towards meeting climate goals.

The climate gains possible by replicating best practices without revolutionary changes are presented in recommendations provided in the Section IV.A. of this report.

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-The impacts of aviation go beyond emissions, affecting our planet and its inhabitants, as briefly mentioned in Section I.A. The next chapter of this report attempts to unpack some of these impacts to present a more comprehensive and critical picture of the impacts and viability of aviation.

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II. The Airport Land Acquisition Landscape and the Unviability of Indian Airline and Airport Growth Models

Aviation's impacts are not limited to flying emissions alone. It has larger implications on human society and the ecosystem we are intertwined with– drawing on vast natural and financial resources for airport and aircraft construction, day-to-day operations, and the expansion of urban infrastructure necessary to sustain the aviation sector. Gauging a holistic perspective of these impacts of aviation is a crucial step for all stakeholders–businesses, governments, and civil society– to make informed decisions on the mode of transport to be prioritized for travel. It is also crucial to understand the broader implications of aviation development to inform action in the direction of transport infrastructure development aligned towards meeting the needs of the present and future generations of the planet.

In this context, this chapter of the report seeks to unpack a few critical but often overlooked aspects of aviation's impact, specifically :

A. The socio-economic and and other than human consequences of airport construction.
B. The land-acquisition and compensation processes, and their implications for equity and justice.
C. A critical evaluation of aviation development models in India, including the airports and airlines growth.

II.A. The Socio-Economic and Other Impacts Of Airport Construction on Ecosystem

II.A.1. Introduction

Airport projects are land-intensive given that they require space for runways, terminals, parking, and associated land uses for cargo, fuel, maintenance, offices, the entry and exit thoroughfares, in addition to open spaces to create buffers to reduce noise endured by inhabitants in the surrounding area.[66] In addition to this, land is also required to build the infrastructure that brings air travel traffic into the airports. Suburban rail networks, metro rail, expressways, roads, gas stations, bridges, overpasses, and more that connect cities to their airports are other associated land-intensive projects.

Given that land is a limited resource, airport infrastructure comes at a considerable cost of displacing and dispossessing local communities of their native ways of being. Airport projects

[66] International Civil Aviation Organization. (2023). *Airport Planning Manual, Part 1: Master Planning* (Doc 9184, 3rd ed.) https://www.icao.int/publications/Pages/publication.aspx?docnum=9184

across the country are acquiring land by dodging legal processes and under-pricing assets and are far from being transparent, participatory, humane, and fair to local communities. In the Rajya Sabha, questions raised on displacement and compensation remained unanswered[67].

Airport projects are no different from other mega infrastructure projects such as dam building, power plants, ports, highways, railways, mineral extraction, and more. Studies largely miss to indicate exact numbers of internally displaced people by such mega projects. Protests and resistance by local people to part with the land are frequently encountered by employing the rules of eminent domain and ignoring fundamental human rights[68]. An atmosphere of fear is instilled in these regions to silence dissenting voices in the resolve to complete proposed projects.

What happens to the local people inhabiting places allocated for airport construction? Do they ever get access to land elsewhere? Do they still practice agriculture or other native livelihoods as a way of life? What about the other life forms local to that area? Are airport development plans considerate of their needs? As promised by those who implement/advocate for airport construction projects - How many of those who parted with their land managed to get jobs at the airport constructed on their land? Do their children complete their education once displaced? Do they have access to food, healthcare and mobility? These and more questions often need to be answered.

Very few studies exist to understand airport infrastructure's socio-economic and other impacts on biodiversity. This section of the report therefore aims at highlighting varied socio-economic and ecological impacts borne by human communities and other lifeforms who are located in spaces allocated for airport construction. The methodology adopted to gather the information on these impacts is described in the section below.

Research Methodology and Limitations

This section of the report delves into the diverse socio-ecological and economic impacts of airport construction by substantiating each impact with supporting examples from :

a. A proposed airport in Parandur which is situated in Kanchipuram District of TamilNadu.
b. The Bengaluru International Airport Ltd. (BIAL) also known as The Kempegowda International Airport situated in Karnataka, India.

These examples have been selected from the perspective of documenting learnings from on-ground observations and interviews with communities most vulnerable to airport construction, in addition to harnessing learnings from the case of a completed airport through both primary and secondary research, respectively.

The proposed Parandur Airport: The proposed Parandur airport is in its formation (pre-construction) stage[69]. Therefore this study is limited to information available in the public domain with respect to site selection and clearances, and a pre-feasibility report worked on by

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[67] *SabrangIndia. (2023, December 6). Displacement due to airport expansions? Union response in Rajya Sabha leaves questions unanswered.* *https://sabrangindia.in/displacement-due-to-airport-expansions-union-response-in-rajya-sabha-leaves-questions-unanswered/*

[68] Sharma, S., Ittner, I., Khambule, I., Mingorría, S., and Geschewski, H. (2025). Chapter 1: Contested airport lands in the Global South. In I. Ittner, S. Sharma, I. Khambule, and H. Geschewski (Eds.), *Contested Airport Land: Social-Spatial Transformation and Environmental Injustice in Asia and Africa* (pp. 1–21). Routledge. https://library.oapen.org/handle/20.500.12657/92908

[69] As of 2024

Louis Berger International[70]. Primary research was conducted through site visits and conducting interviews and focus group discussions (FGDs) with community members to understand their concerns. During on-ground interactions with members from the community, it was revealed that a climate of fear prevailed in the region. It was extremely difficult to engage with concerned authorities and those who engaged with the research team did not want to be quoted. Therefore, names of respondents have been changed for the sake of privacy. Since the findings are similar to most airport constructions in the world, the analysis and findings of the study takes into consideration learnings from broader studies with almost similar contexts. Desk research further supplemented field observations. Relevant documents were analysed and journal studies on similar issues were reviewed.

Bengaluru International Airport Ltd. (BIAL , Kempegowda International Airport) : The study of BIAL is limited to sitework conducted for a study by the Environment Support Group in 2014-15, which is currently unpublished. Learnings shared from on-site observations and direct engagement with local stakeholders are therefore sourced from the sitework conducted for the study. Additionally, published literature on the socio-economic and ecological impacts of the airport construction has been reviewed. The literature review revealed that information published on the socio-economic and ecosystem impacts of the BIAL is limited, too. These factors have limited the overall comprehensiveness of the findings.

Background of Bengaluru International Airport Ltd (BIAL) and the proposed Parandur airport

Bengaluru International Airport Ltd. (Kempegowda International Airport)

Bengaluru International Airport Ltd. (BIAL) located in Devanahalli, north of Bengaluru was inaugurated in 2008. It was constructed to accommodate the rapidly growing air traffic in Bengaluru, driven by the city's booming IT industry and its reputation as India's Silicon Valley[71] [72]. Spread over 4,000 acres, the airport was designed to handle both domestic and international flights with modern infrastructure and facilities, including two runways and several terminals for passenger and cargo operations. The airport was developed by Bangalore International Airport Ltd (BIAL), through a public-private partnership arrangement. The project aimed to improve connectivity for the city and was seen as essential for Bengaluru's economic growth. The construction of the airport, however, came at a cost to the local communities in the area; thousands of people were displaced, primarily from agricultural and rural areas surrounding Devanahalli. Approximately 4,000 acres of land were acquired, displacing numerous families and causing disruption to local agricultural activities. The residents who were displaced faced issues like inadequate compensation, loss of livelihoods, and limited opportunities for resettlement[73]. While two villages were completely displaced, many others saw partial displacement. As the

[70]Louis Berger International. (2024, March). *Pre-feasibility report for ToR1: Development of Chennai Greenfield Airport at Parandur*. Tamil Nadu Industrial Development Corporation. https://data.opencity.in/dataset/ec181dea-9f26-4c02-959b-e512a0d5fbc7

[71]Gupta, A. (2013). *Greenfield Airport Development in India: A Case Study of Bangalore International Airport. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2311993.*

[72] Pande, P. (2020, July 19). *The history and rise of Bangalore International Airport*. Simple Flying. https://simpleflying.com/bengaluru-airport-history/

[73]News Karnataka. (2025, April 17). *Promises uprooted as Bengaluru's airport expansion displaces rural lives*. https://newskarnataka.com/karnataka/bengaluru/promises-uprooted-as-bengalurus-airport-expansion-displaces-rural-lives/17042025/

villages were predominantly agrarian, the loss of agricultural lands and commons such as grazing pastures and lakes resulted in significant socio-economic and cultural challenges, which are elaborated in the latter parts of this report section.

Since the development of the Bengaluru International airport in 2008, the region has transformed from a largely agrarian economy to an emerging industrial and commercial-hub. The proximity to the city of Bengaluru has been a catalyst for attracting both domestic and international investments for logistics, warehousing, and other non-manufacturing industrial sectors. The government of Karnataka has promoted the development of the Aerospace Park and the Information Technology Investment Region (ITIR). It has also initiated a special economic zone, the aerospace SEZ, which is a cluster of aerospace companies, including aircraft component manufacturing and aviation-related research and development firms. There is also the hardware park and logistics park that is being looked at as a major industrial center in the region. However, the region is a rich agricultural belt supporting a variety of agriculture, horticulture, sericulture, and animal rearing livelihoods. The region is also very famous for the blue grapes and a wide variety of fruits and vegetables. Over the last two years farmers have been protesting against the forceful acquisition of prime agricultural land in the airport region for industrial development.[74]

The Parandur Airport

The proposal for a new airport near Chennai was initiated with the expectation of significantly amplifying connectivity and reinforcing the economic growth of the city and its surrounding regions. The new airport is anticipated to decongest the existing Chennai International Airport and serve the growing passenger and cargo traffic, placing Chennai as a major aviation hub in South Asia[75]. Efforts towards establishing a new airport at Parandur was initiated by the Government of Tamil Nadu in 2022. After a pre-feasibility study conducted by the Airports Authority of India (AAI), Parandur emerged as the most suitable option among a few others for several reasons, including fewer human-made obstacles, better land availability, and lower land acquisition costs compared to Pannur, another potential site for the airport. The pre-feasibility report outlines several reasons why Parandur was considered more suitable than Pannur[76] for the development of the Greenfield International Airport. These reasons include:

1. **Fewer human-made obstacles:** Parandur has fewer existing infrastructural developments, making it less challenging for airport construction. In contrast, Pannur is surrounded by multiple industries and Extra High Tension (EHT) power lines, which pose significant obstacles to aircraft operations. These human-made structures would require extensive modifications or relocations, increasing the complexity and cost of the project.

[74]HS, S. (2024, May 3)**.** *Why does KIADB want to build industrial area on fertile land?* The Hindu. https://www.thehindu.com/news/national/karnataka/why-does-kiadb-want-to-build-industrial-area-on-fertile-land/article66900000.ece

[75]ANI News. (2023, December 30). *Will the Parandur airport create a new industrial hub in South India*. https://www.aninews.in/news/business/business/will-the-parandur-airport-create-a-new-industrial-hub-in-south-india20231230134123/

[76] It would be ideal to present data for Pannur, as well, however, despite reviewing the same sources that provided data for Parandur, the researchers have found that the data for Pannur is missing. It is therefore vital for readers to note that this report will refrain from drawing any premature conclusions given the lack of data available on Pannur.

Additionally, in Pannur, the presence of industries within and near the site would require careful planning to avoid disruptions to the local economy and industrial activities.

2. **Better land availability:** The land at Parandur is largely undeveloped, meaning fewer structures, habitations, or industries exist in the area. This allows for easier acquisition of land and greater flexibility in planning and designing the airport. Pannur, on the other hand, has significant industrial development and residential structures, which would require additional land acquisition, particularly on the east and south-east sides of the site, to accommodate essential navigational aids. This would complicate the land acquisition process and potentially delay the project.
3. **Lower land acquisition costs:** The cost of land acquisition at Parandur is substantially lower than at Pannur. This is due to the more undeveloped nature of the Parandur site, which makes land acquisition less expensive. Whereas, in Pannur, the presence of industries and developed land increases the cost of acquisition significantly. The land in and around Pannur is relatively developed, which inflates the land prices, making the acquisition process costlier.
4. **Additional factors favoring Parandur:** Parandur has better connectivity with upcoming infrastructure projects, such as the Chennai-Bangalore Expressway, which would provide easier access to the airport. Fewer families are displaced in Parandur compared to Pannur, which simplifies the rehabilitation and resettlement (RandR) process.

These combined factors—fewer obstacles, better land availability, and lower costs—made Parandur the preferred site for the airport's development. The pre-feasibility report concludes with detailed financial arrangements for compensation, acquisition, and staff costs, ensuring that the funds will be provided by Tamil Nadu Industrial Development Corporation (TIDCO). The reasoning in the report for selecting Parandur as the site for the Greenfield Airport raises serious concerns that seem to be overlooked in favor of lower displacement costs, which encapsulate the neglect of wetlands and hydrology and disregard for local livelihoods such as agriculture (these factors are elaborated on in sections II.A.2 and II.A.3. of this report**).**

The pre-feasibility report also gives the impression that the government's priority is to reduce land acquisition costs and displacement expenses rather than to create a sustainable and socially equitable development project.

By focusing on Parandur because of lower compensation requirements (due to fewer human-made obstacles and lesser development), the government is choosing a path that will increase the historical marginalisation faced by the marginalized castes i.e. the Vanniyar community. The majority of the people in Parandur are from the Vanniyar community, which is classified as a Most Backward Class (MBC) in Tamil Nadu (see Table [9]).

Table 9: Block Wise - Land, Caste and Literacy Details of Parandhur (Source: Block Census 2011)

Data source -

Block wise - Land details ,caste and literacy details									
	Village Name	Area (Ha)	To be accquired (Ha)	Total population	SC population	ST population	MBC (Vaniyar)	Literates	Illiterates
Walajabad Block									
1	Parandur (A&B)	1,328.11	291.00	2,556	152	6	2098	1,505	1,051
2	Thandalam	433.42	117	649	506	-	143	419	230
3	Nelvoy	392.65	223	496	179	40	277	339	157
4	Podavur	405.65	43	479	332	-	147	288	191
5	Thodur	324.73	4	550	188	30	362	330	220
6	Valathur	923.01	173	1,218	637	-	581	750	468
7	Madapuram	118.06	50	(not inhabitated)					
Sriperumbudur Block									
8	Gunakarambakkam	173.75	19	1,056	389	11	647	693	363
9	Edayarpakkam	503.73	65	1,497	1,014	14	469	1,163	334
10	Akkamapuram	208.14	67	412	-	24	388	270	142
11	Ekanapuram	367.77	181	1,435	624	-	811	964	471
12	Mahadevimangalam	405.83	218	514	-	19	495	335	179
13	Singilipadi	153.08	0.67	418	-	-	418	265	153
	total		1452						

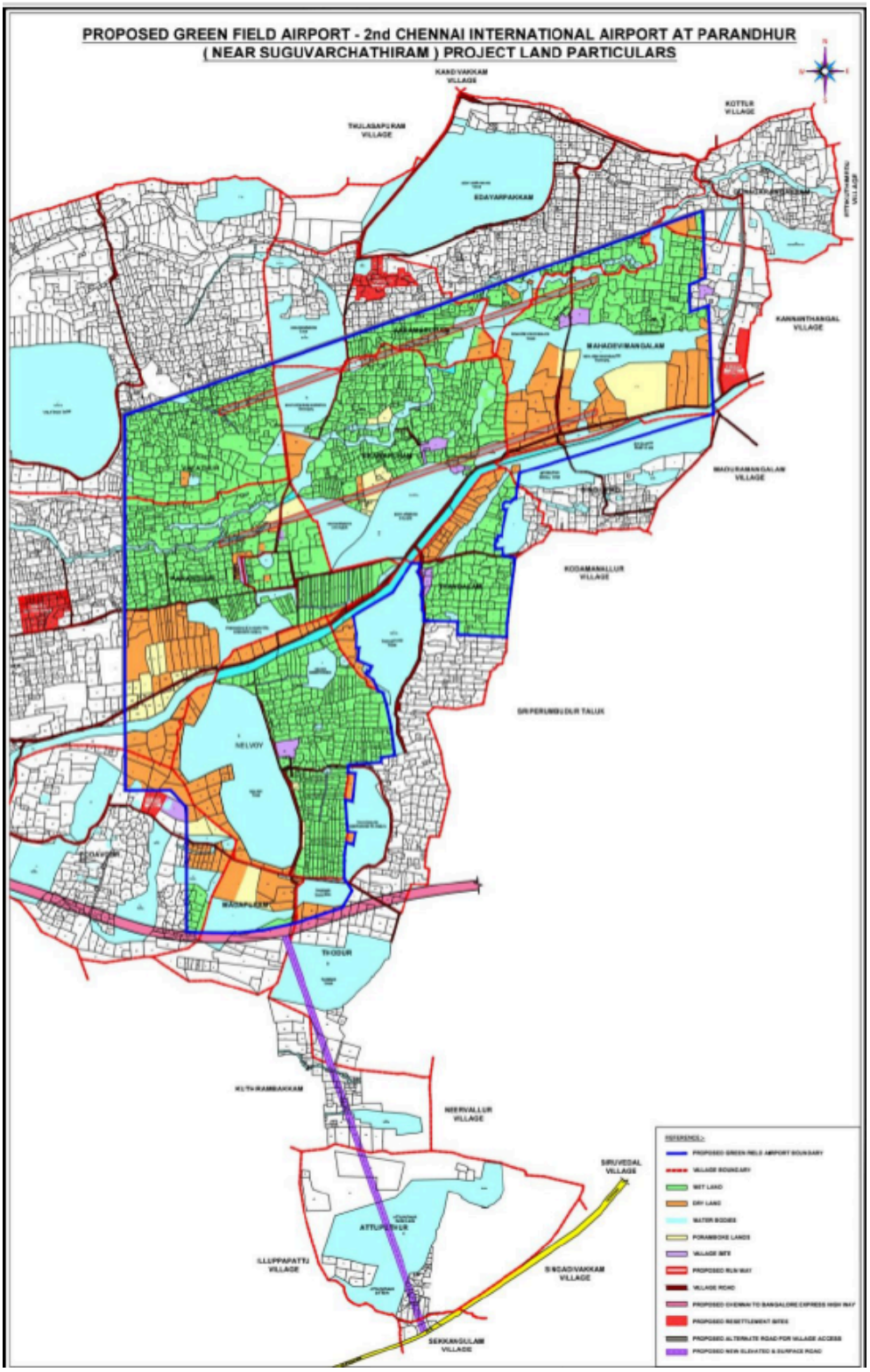
Historically, the Vanniyars have faced marginalization and economic deprivation despite being a populous caste in the state. The Vanniyars have historically been involved in agriculture and manual labourers, often owning small pieces of land or working as agricultural labourers. They have faced systematic neglect in terms of access to education, healthcare, and economic opportunities, despite their numerical strength. As a Most Backward Class (MBC), they have struggled to gain political and economic influence relative to more powerful caste groups. The destruction of livelihoods in this area disproportionately affects this marginalized group. This decision essentially places a lower value on the lives and livelihoods of the Vanniyars, treating them as expendable in the name of development. The report's simplistic reasoning of choosing Parandur based on cheaper displacement costs, therefore, reveals a larger discriminatory practice that neglects the cost of development on marginalized communities. The predominant presence of the Most Backward Class (MBC) community in these villages highlights systemic inequalities and raises important questions about social justice in the context of infrastructure projects.

It is also vital to understand the nature of the land that will be impacted by the airport construction (see Table [10])

Table 10: Breakup of the Land Usage at the Proposed Airport Site (Source: Pre-feasibility report)

Type	Ha	% of Affected Coverage
Agriculture land (Irrigated)	1031.21	47.46%
Agriculture land (Dry Land)	355.22	16.35%
Built-Up Area (Road)	29.60	1.36%
Govt/Poramboke Land	173.00	7.96%
Water Bodies (Irrigation Tanks)	576.74	26.54%
Built-Up Area (Village)	6.96	0.32%
Total	**2172.73**	**100.00%**

The land, currently used for agriculture, includes wetlands and interconnected lakes (see Fig. 5) vital for irrigation and water management. This land will be converted into runways, terminals, and other airport infrastructure. The report focuses on the economic benefits of acquiring this land but lacks adequate discussion on the impacts of this activity on the lives of farming communities and other living systems.



Picture showing both the runways on lakes

Fig. 4: Water Bodies Inside the Airport Boundary (Source : Skyscraper City Forum)

Based on information in the pre-feasibility report, the project will acquire a total of 5746.18 acres (2325.44 hectares) of land, which includes both patta lands (3774.01 acres) and government lands (1972.17 acres). As per the Louis Berger pre-feasibility report, the proposed greenfield airport at Parandur will require a total land acquisition of 5,369 acres (approximately 2,172.73 hectares) for Phase 1. The report does not provide a detailed breakdown of this land into patta (private) and government lands. However, a Government Order (G.O. issued in November 2023) states that a total of 5,746.18 acres will be acquired for the project, comprising approximately 3,500 acres of patta land and 1,917.17 acres of government/common land. Thus, the land requirement mentioned in the G.O. exceeds the figure given in the Louis Berger report by around 377 acres and includes a specific breakdown between patta and government land, which the report itself does not detail.

The total estimated compensation for the project is Rs. 15,492.43 crore (this number changes across portals and documents). The total administrative cost for the land acquisition and staff for the same is estimated at Rs. 192.49 crore for the first year. The land will be acquired under the Tamil Nadu Acquisition of Lands for Industrial Purposes Act, 1997, or through private negotiation. Compensation for the acquired lands will be determined as per the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013. A detailed table outlines the tentative land values, compensation structure (including land, structures, trees), and solatium (compensation for emotional distress).

Displacement is a profound and often traumatic experience that can drastically alter the lives of local communities. Displacement and resettlement induced distresses are elaborated under this section of the report. Under the RFCTLARR Act, 2013 displacement is legally defined as the physical and/or economic relocation of individuals or communities due to land acquisition for public purposes or large-scale development projects. According to Section 5 of the Act, prior to the acquisition of land, the concerned authorities are required to conduct a social impact assessment (SIA) and hold public hearings in the affected areas. These hearings should be organised to allow residents to express their concerns and suggestions regarding the proposed acquisition. The government must also publish the findings of the SIA, making it accessible to the public, and consider their feedback before proceeding with land acquisition. This process aims to uphold transparency and engage local populations in the development projects that directly impact their lives and livelihoods. The government's approach to land acquisition for new airport projects, however, is known to employ heavy-handed tactics that overlook the rights and voices of local communities, undermining the market-driven ideals of negotiation and consent. Following are known problems associated with displacement and resettlement due to infrastructure projects in India[77]:

1. **Inadequate compensation**: Often, compensation does not reflect the true value of the land or properties lost, leaving displaced individuals unable to rebuild their livelihoods[78]. Many families receive monetary compensation without considering the non-monetary value of their land, such as cultural and emotional attachments[79].
2. **Lack of proper rehabilitation**: Resettlement processes are frequently poorly managed, with insufficient planning for housing, livelihood opportunities, and community

[77]Kumar, P., and Mishra, A. (2023). *Resettlement and Rehabilitation in India: Issues, Methodologies, and Lessons Learned*. International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), 3(5), 52–55. https://ijarsct.co.in/Paper11611.pdf

[78]Samata. (2024, February 8). *NGO India - Samata Judgement | Adivasi Tribal Forest Right Support*. Retrieved from https://www.samataindia.org.in/samata-judgement/

[79] Mathur, H. M. (2013)**.** *Displacement and Resettlement in India: The Human Cost of Development* (1st ed.). Routledge. https://doi.org/10.4324/9780203491799

infrastructure, often resulting in individuals moving to less favourable areas with limited access to resources and services.

3. **Loss of livelihoods**: Displacement often affects individuals who rely on agriculture or small businesses, leading to the loss of their primary source of income. The transition to new livelihoods is challenging, particularly if new locations do not provide the same economic opportunities.
4. **Cultural disruption**: Resettlement can disrupt social structures and cultural ties within communities. Displaced individuals also face challenges in adapting to new environments, leading to social fragmentation and loss of community identity.
5. **Limited participation in decision-making**: Affected communities are often excluded from the planning and decision-making processes related to resettlement. This lack of participation leads to grievances and resistance from displaced populations.
6. **Implementation gaps**: There can be significant delays in the implementation of resettlement plans and compensation disbursement, leading to prolonged hardship for affected communities.
7. **Vulnerability of marginalised groups**: Scheduled Castes, Scheduled Tribes, and mother marginalised communities often face greater challenges during displacement due to existing socio-economic vulnerabilities. They are also known to receive less support and protection during resettlement processes[80].
8. **Environmental concerns**: Infrastructure projects lead to environmental degradation, affecting the resources that displaced communities rely on. This exacerbates their struggles and hinder their ability to adapt to new circumstances.
9. **Risk of landlessness:** In projects that involve acquiring large amounts of land, many displaced people become landless, with no real possibility of returning to agricultural livelihoods. The one-time grant offered as compensation is often not enough to buy new land elsewhere, and without proper reskilling, individuals often face long-term unemployment or underemployment.
10. **Lack of long-term support:** Many resettlement policies focus on short-term compensation but fail to provide long-term support, such as skill development or sustained employment opportunities. Displaced individuals therefore struggle to rebuild their lives without ongoing institutional support to help them adapt to their new environment.

The sections on 'Socio-economic impact on local communities' and 'Impact on living systems' unpack the above mentioned impacts of airport construction through highlighting examples of the same based on learnings from the BIAL airport in Karnataka and proposed Parandur airport in Tamil Nadu.

Each of the sub-sections under socio-economic and ecosystem impacts are structured as follows:

- A brief overview of the identified impact.
- Insights on the identified impact based on learnings from the proposed Parandur airport titled 'Parandur airport study learnings' . Each Parandur airport study sub-section is further divided into two sections - a) Pre-feasibility report learnings and b) Learnings from field study.
- Insights on the identified impact based on learnings from the BIAL study titled 'BIAL study learnings'.
- Each of the above mentioned sections comprise 'Case Studies' which are highlighted in boxes, as available and applicable.

[80]Debasree, D. (2014). *Development-induced displacement: Impact on adivasi women of Odisha*. Community Development Journal, 50(3), 448–462. https://doi.org/10.1093/cdj/bsu053

II.A.2. Socio-Economic Impact on Local Communities

Land-related conflicts in the country due to airport projects have been many and a large number of projects are being challenged in various courts. Based on Land Conflict Watch[81], an organization that monitors land conflicts reports there are about 20 ongoing conflicts related to airports affecting 1,30,839 people (as of 19th September, 2024) .

A case study from the proposed Parandur airport region (see Box [19]) underscores the significant value of land to families, who will be impacted by airport construction.

Box 19: The Story of Bhaskaran, Ekanapuram (Part 1)

Bhaskaran who lives in Ekanapuram narrated what the land means to him and his community , *"I built the house by myself, taking a loan. If I lose this land, I will have to rebuild the house. My workload is very inconsistent, some months are good, some months there is no work at all.. I will never be able to build a house again. For each cent they have told us that they will give us Rs 9000 (guidance value), but just outside the airport areas the prices have skyrocketed and the asking price is about Rs 40,000 per cent. Is that fair in any way? We will lose lands, and then they will pay us peanuts for the land. It is a double whammy. If the airport is confirmed, then the prices in the surrounding areas will double further. Even in Kanchipuram the land prices will go up. We will be in no position to buy land in a decent place for the money we get. This is for land, for the house they will not give anything. I had built the house 15 years ago. I have not even thought about what I will do if the airport comes. All the pucca houses you see in our village were built in the last 5 years or so.. that is because the children have all grown up and found jobs outside the village, they took loans to build their houses. All the houses will have some loans on them. We are scared; after living in a pucca house, we cannot go and stay in a kutcha house. The villagers are deciding to move to Andhra, and in that case I will also go. I cannot go against the villagers or do something different. Everybody in the village is related to one another. All my relatives are here and alternative lands have not been allotted. There is a rumour that there is a land between Kaandur and Maduramangalam, and that it will be allotted to us. People from that village have already sent a letter opposing the decision. They will not let go of their lands.*

Some villages on the outskirts have received notices for resettlement in other small villages. It is only in our village, because we are protesting, that we have not allowed any government officials to come here and measure land. The moment we protest, the police have a blanket order to arrest us, and they come in a van and send us to jail for a day. All of us have gone to jail and come back in the evening. Only the earlier collector stood by us. She was the one who created awareness amongst a lot of MP's and MLAs. But they transferred her and now the new collector ignores us. We go for the meeting and when it is about our village, she does not comment."

[81] *Advanced Search.* Www.landconflictwatch.org.

This subsection of the report highlights the impacts of airport-construction induced displacement on:

- Livelihoods.
- Essential services.
- Health and well-being.
- Culture and social relations.

2.A.2.1. Impact on livelihoods

Mega infrastructure projects such as airports are known to disrupt the ways of being of people located in spaces identified for the implementation of these projects. People are forced to transition from livelihoods they are skilled in. Such transitions more often than not come at the cost of people's livelihood autonomy and dignified working conditions. Many times people are deprived of a source of livelihood altogether. These impacts of airport construction on livelihoods of communities located in spaces allocated to airport construction are presented through learnings from the Parandur airport study and BIAL airport study, mentioned below.

Parandur airport study learnings

Learnings from pre-feasibility report

The report emphasises the importance of compensating and rehabilitating individuals affected by displacement due to the greenfield airport project. It provides various measures to address the impact on local livelihoods, particularly for those whose traditional occupations, such as agriculture and small trading, are disrupted. The measures comprise:

1. **Compensation for loss of livelihood:** Individuals who lose their primary source of income, such as farming or businesses, will receive financial compensation. Titleholders, for example, are entitled to a one-time livelihood grant of Rs. 500,000. This initiative aims to support the transition from traditional occupations to alternative forms of livelihood following displacement.
2. **Support for artisans and small traders:** Special provisions are in place for small traders and artisans who rely on their craft for sustenance. They are eligible for grants under the resettlement and rehabilitation (RandR) framework. This helps address the disruption of local businesses that were part of the traditional economy.
3. **Employment opportunities:** The project acknowledges the importance of providing new employment opportunities for displaced individuals. Project-affected persons (PAPs) are given priority for work related to the construction and operation of the airport. This includes both temporary and permanent employment, depending on availability and interest. This opportunity is particularly important for individuals moving away from their traditional occupations, as it allows them to integrate into the project workforce.
4. **Subsistence allowance:** To mitigate the immediate effects of displacement, affected individuals will receive a subsistence allowance during the transition period. This allowance is intended to cover the gap between losing their traditional sources of income and securing new employment or livelihood options. The goal is to ensure that displaced individuals do not face economic hardship while adjusting to their new circumstances.

Overall, while traditional occupations such as agriculture and local trading may be lost due to displacement, the report outlines efforts to facilitate the transition of affected individuals to new forms of employment, whether through direct financial support, re-skilling, or employment in the project itself. While the pre-feasibility report outlines provisions to compensate and provide new employment opportunities for those displaced, there are several potential disadvantages based on:

a) **Loss of traditional livelihoods:** For instance, many displaced individuals depend on agriculture and moving to an urban or peri-urban area may make it difficult for them to continue farming. Shifting from an agrarian lifestyle to wage labour, especially in construction or other industries, may not be feasible for everyone due to a lack of transferable skills or a mismatch with their existing way of life. Additionally, traditional occupations are often tied to cultural and social identities. Displacement not only disrupts livelihoods but can also break the social fabric of communities. Shifting to new jobs or urban lifestyles can lead to cultural erosion and psychological distress.

b) **Temporary nature of employment**: While the project promises employment opportunities for displaced persons (PAPs), such jobs are often temporary, such as during the construction phase. Once the project is completed, these opportunities may dry up, leaving displaced individuals once again without sustainable income sources. Additionally, most of the displaced population may not have the skills needed for construction or other industries that develop around infrastructure projects. This could result in a situation where only a small portion of the affected population benefits from these opportunities, leaving others unemployed.

Learnings from field study

The case studies below (see Box [20] and Box [21]) delve into the multifaceted pains of displacement, exploring the psychological toll it takes on affected individuals, the disruption of traditional ways of life, and the socio-economic repercussions that echo through the fabric of communities.

Box 20: The Story of Mohan Nayakar, Ekanapuram

Mohan Nayakar, a member of the Most Backward Caste (MBC), lives with his wife, their son Sanithar, his wife and their two daughters. The family was emotional and upset about the airport project, and they all spoke at once, sharing their concerns.

Mohan is approximately 85 years old. His family's land, 3 acres, was passed down from his grandfather, Andiyapar Nayakar, to his father, Muthu Nayakar, and then to him. Despite many hardships, Mohan had preserved the land and handed it over to his son, Soham, "*Now it's going to be taken from us*," he lamented. He described their modest beginnings, living in a hut made of palm leaves until they built their current house in 2011. "*Back then, masons charged Rs 500 per day. Now it's Rs 1,600, and bricks that cost Rs 2 are now Rs 20. Where will we go? How will we build another house?*" Rishi added that his son had recently built a toilet for the family at a cost of one lakh rupees.

The family grows rice and sometimes ragi, depending on the rains, harvesting two or three times a year. They typically get 20 bags of rice per acre per harvest, each weighing 100 kilograms. They keep 10 bags for themselves and sell the rest, making around Rs 50,000 per

harvest after expenses. Rishi mentioned they once had 38 goats, but after losing a few to an undiagnosed illness, they sold the rest for Rs 2 lakh, incurring losses.

Kiran (Mohan's wife) shared that she was married in 1964, and their village received electricity in the late 1960s. Water piped to the house is a more recent development. For healthcare, they visit hospitals in Kanchipuram or Maduramangalam, as the local Primary Health Centre mostly handles maternity and neonatal care.

Soham mentioned that he studied up to the 5th standard before dropping out, but he can still read and write. He has two daughters, Sadhana and Savitri. When asked about their future if displaced, Sadhana explained that her father had promised to build them a house with a tin roof on any land they might be given. "*But he only knows farming; he won't be able to find other work,*" she said. She also doubted they could afford a toilet and would likely have to use the fields again. Sadhana dreams of becoming a village officer, inspired by a relative who works in the role, while Savitri hopes to become a teacher. They both mentioned that their teachers have been preparing them to leave, and Savitri is worried about being accepted by people in the new village where they might be relocated.

The family has actively protested against the airport project for the last two years, participating in marches, demonstrations, and even threatening to move to Andhra Pradesh. Yet, officials and ministers remain indifferent. "*Now we are ready to lay down our lives*," Mohan said.

Box 21: The Story of Yellappan, a Shepherd from Ekanapuram

Yellappan shared his story with us. "We own a house but do not have fields of our own," he said. "We are grazers, so we keep goats and cows. We have 10 cows, and we sell milk. We will never let go of the village; we would give up our lives before leaving. My granddaughter and grandsons are studying in the school here."

He then listed all 13 villages marked for the airport project. "But in our village, no land has been surveyed yet. We have not allowed officials inside. We will kill ourselves before we let them take our land. How can we leave this place and go elsewhere?"

Yellappan explained that the village has no other forms of livelihood. "Everyone here only knows farming, either on their own land or on leased land. There are a few ponds that are contracted out for fishing, and the fish are sold to officers in Kanchipuram. We also buy fish from them whenever we want. Many people have gone to work in companies, but it's hard to explain exactly what kind of work they do there."

Concerns on the loss of local livelihood are often countered by promises of new job opportunities created by airport projects. However, this narrative warrants critical interrogation based on the fact that:

Building an airport requires a diverse range of skilled labor, including civil engineers, structural engineers, architects, electricians, plumbers, HVAC specialists, machine operators, and laborers skilled in concrete work, earthmoving, and finishing tasks. In addition to construction-related

roles, specialized skills are required for aviation-related infrastructure, such as those needed for runway construction, terminal design, air traffic control systems, and safety compliance. In India, skilled labor for airport projects is often sourced through contractors who maintain a pool of workers or hire subcontractors specializing in certain trades. These contractors may either rely on local skilled labor or, as often observed in Tamil Nadu, bring in workers from other states like Odisha and Bihar. Although many of these migrant workers possess basic construction skills, they may not always have the expertise needed for more specialized tasks, leading to on-site training or lower-quality work. The reliance on cheaper labor also means that highly skilled local workers are often sidelined in favour of those willing to work for less, which can further erode the quality of labor and lead to potential safety risks in such large-scale infrastructure projects. This practice creates a divide, where the truly skilled workforce either migrates to other regions or sectors, leaving a gap in the local labor market. Additionally, hiring practices for large infrastructure projects, such as airport construction, often involve the dominance of external hiring agents who take charge of labor recruitment. These intermediaries have strong ties to powerful contractors, which allows them to control the bulk of the labor market. Local contractors, who possess critical knowledge of the area and local contacts, are often sidelined, receiving only a small share of the profits. This is illustrated through the story of Bhaskaran, a resident of Eknapuram (see Box [22]) .

Box 22: The Story of Bhaskaran, Ekanapuram (Part 2)

Bhaskaran lives closer to the main road and occupies a small plot, built from end to end on 4 cents of land. On being asked about the history of his family, Bhaskaran was able to recollect his grandfather Chellan, his father Yellappan, Bhaskaran himself and his daughter.

He narrated the history of the village and the present as follows - *"The village had only 2 streets, and about 60 houses when I was growing up . The lakes have been around since my grandfather's time. Three lakes provide water for all our fields. None of the houses have borewells. There is a certain geographical setting, where one lake feeds a set of fields and likewise the other two lakes. When the lakes overflow, it will flow into a canal, and so there are no floods. There are times when children go out to swim in the canal after a rain, and when it is filled to its capacity close to 15ft high…. One child drowned last year also. The airport guys keep saying that they will save the canal, but how is it possible?"*

The main occupation of the people in this village is farming. He went on to share "*My father had lands, but he sold the lands for my sister's wedding. My older sister lives in the next lane and my younger sister lives in the next village. I studied till 8th in the local school. And then went to Maduramangalam for my 10th. I supply resources to all the* local *companies in this area. Some years back I provided sign boards for the entire Chennai airport. This was subcontracted to me by a friend who stays in Mumbai. I started working for him and then learnt the skill required for the work. I place young men who come from Bangalore, Orissa and Gujarat to work in these companies. I have contact with agents and they provide the details of skills required, and I send them a suitable person. It works well. Even if the airport comes here, I will not be able to supply labor directly. I can provide direct labor only to small companies. For big projects like the airport - I will have to provide labor to a contractor.. and they will take a cut…..Today also, all the people from our villages are working in these companies on contract. They can be told to leave anytime.. Only one or two persons are permanent employees. Everybody is paid from Rs 10,000 to 14,000 per month…Nobody is made permanent - There is one person from each family going to these companies and earning Rs 14,000, the older people in the family take care of the lands.. that is how we are able to make ends meet. The young will use their Sundays and holidays to do the tougher labor in their fields. The cash by itself is not*

enough for any family. Both my daughters go to private schools on a school bus. I have to pay their fees. My parents passed away. My wife has studied till 12th. She helps the children with their homework."

BIAL study learnings

The primary source of income for many of the displaced villages in the case of the Bangalore International Airport was agriculture. With the acquisition of their land, they lost their primary means of livelihood. Approximately 4,000 acres of land were acquired, displacing numerous families. The residents who were displaced faced issues like inadequate compensation, loss of livelihoods, and limited opportunities for resettlement. Many affected families reported receiving compensation that was insufficient to buy new land or start alternative livelihoods, leading to prolonged economic hardship.[82] There were also complaints about delays in compensation payments and a lack of proper rehabilitation programs for those displaced. Additionally, the environmental impact of the airport's construction, such as the alteration of local water bodies and ecological zones, added to the concerns of the displaced communities. Besides farmers and pastoralists, the airport affected a variety of other ancillary livelihoods such as blacksmiths, carpenters, artisans, shopkeepers and others who basically catered to the agricultural economy. Many of these communities were not literate and did not have the ability to access information about the airport project or negotiate for better compensation, resettlement and rehabilitation.

The Bengaluru International airport did promise job opportunities for the displaced community. Most of the jobs were in the construction phase and later in the service sector. Many of the local community members found that these promises of getting a job were not always easy and certainly did not match the skill sets they possessed. This also left many unemployed for a long time. Members of the displaced population who were able to secure jobs ended up in low-paying and unskilled labor positions such as watchpersons and cleaners, given that the jobs at the airport required very different skills, particularly in technical and service sectors. The local community did not have these skills, and automatically many of these jobs went to workers from outside the region who had the necessary skills and qualifications, leaving the locals in despair. A study titled 'District Wise skill Gap Study for Karnataka' published in 2013[83], a SWOT analysis of Bangalore Rural District where the Kempegowda International Airport is located, highlights the strengths and weaknesses of the region and provides recommendations for the much needed skill training. Highly skilled and talented incumbents are the need of the hour in such a rapidly developing region to meet global standards of quality. In such a situation, the study mentioned above helps understand the gaps in the skilled work force available in the region and the urgent need to establish the necessary skill training for the local community people. It is more than a decade now and the locals in the region continue to face the disconnect between their agro pastoral skills and the skills required in the rapidly changing economy.

Additionally, from a gender perspective, the airport and its related industries have created new employment opportunities for women, particularly in retail, hospitality, and administrative roles. While this shift may appear to be progressive, where women from traditionally patriarchal rural households have gained financial independence and contribute to household incomes, not all jobs

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[82] Yadav, U. (2016, November 10). Karnataka: *Villagers' plight continue as Airport lands on failed government promises*. The Economic Times https://economictimes.indiatimes.com/news/politics-and-nation/karnataka-villagers-plight-continue-as-airport-lands-on-failed-government-promises/articleshow/55348852.cms

[83] *District wise skill gap study for the State of Karnataka.*District-wise Skill Gap Study for the State of Karnataka (PDF)

come with security, good working conditions, and benefits. While more women are entering the workforce in and around the airport, the challenges of safety and security are a huge concern.[84]

2.A.2.2. Impact on essential services

Land Acquisition processes can have a significant and damaging impact on local communities. Once land is notified, most essential infrastructure related services will be cancelled or abandoned if started. The local panchayats in whose jurisdiction lands get notified for mega infrastructure projects, usually lose the budgets allocated for the improvement of the region or the local improvement plans will stand cancelled. From the point of notification to displacement, the local communities have to suffer the poor quality of roads, lack of street lights or lack of maintenance of public buildings such as the panchayat office, anganwadis, post office, Public Distribution System (PDS) shops, Public Health Centres (PHCs), schools etc. Most of the local state schemes get discontinued leaving the lives and livelihoods of the local communities disrupted. Learnings from the Parandur airport study and BIAL airport study are presented below.

2.4.2.1. Parandur airport study learnings

Learnings from pre-feasibility report

The prefeasibility report does not mention anything about access to services.

Field study learnings

Infrastructure delays in India have a history of stretching across decades, leading to a "slow kill" in several aspects. The Parandur project was announced in 2019 , at the time of this study in 2024, it had been 5 years and nothing has moved forward, which was obvious on the field wherein in the village of Ekanapuram the Panchayat building was in a ramshackled state with no one in the building.

[84]Yadav, U. R. (2019, August 24). *Night travel is still a nightmare for Bengaluru women*. Deccan Herald. https://www.deccanherald.com/india/karnataka/bengaluru/night-travel-is-still-a-nightmare-for-bengaluru-women-756550.html

The rundown panchayat office and the fair price shop at Ekanapuram

Fig. 5: The Rundown Panchayat Office and Fair Price Shop at Ekanapuram

Only the government school, PDS shop and anganwadi were functioning. The roads remained neglected. One of the roads that had received budget and material for its upgradation, was abandoned with piles of stone and gravel sitting at one end. Locals had to navigate through muddy roads and it was extremely difficult for an ambulance or a fire engine to navigate through the narrow roads and attend to any emergencies. Additionally, while many homes had recently completed building toilets, there were others who did not want to venture into it as the future was grim and they did not want to risk wasting the money.

Another impact on essential services was evident when women who were working under the MGNREGA scheme shared how many of the schemes had been discontinued in certain villages. They shared that local schemes such as street lights, rural building maintenance and renovation scheme, rural roads under NABARD, renovation of integrated sanitary complex for women and others had been discontinued in villages like Ekanapuram. Members of the local community stated that they had also lost their ability to take loans as they could no longer use the land as collateral as had been notified for the airport.

BIAL Study Learnings

The notification and eviction of local communities in the Kempegowda International airport area was a long drawn process. The villages of Arasinakunte and Gangamuthanahalli that were erased from the map in Devanahalli Taluk is a heart breaking story.[85] Post notification of land, while the local people were still grappling with the fact that they would be displaced, dealing with the paperwork and the procedures to receive the compensation amounts, the essential services soon began to go one by one. Roads were blocked, construction equipment arrived, sanitation was disconnected and eventually the electricity was cut off. Bulldozers came to demolish their homes and they had to pick up whatever they could and leave.

[85] Yadav, U. (2016, November 10). *Karnataka: Villagers' plight continue as Airport lands on failed government promises*. The Economic Times. https://economictimes.indiatimes.com/news/politics-and-nation/karnataka-villagers-plight-continue-as-airport-lands-on-failed-government-promises/articleshow/55348852.cms

2.A.2.3 Impact on health and well-being

Acquisition of land, displacement, resettlement and rehabilitation can have significant public health impacts on the communities. Most often local populations rely on public health centres for their immediate health care. Once they are displaced, it takes a long time for them to reorient themselves in the new area and the services that may or may not be available to them. This often leads to neglect of health issues until they get very complicated. Maternal and child health particularly suffers as the displacement leaves them disconnected to the continuous care that is provided by local health care workers such as asha workers, midwives and other traditional medicinal practitioners. Access to anganwadis becomes a challenge thereby posing a risk to pregnant women and children who receive a variety of benefits such as nutrition supplements and immunizations. This can have serious impacts on maternal mortality and infant mortality in the region. Additionally, the psychological trauma from displacement, including stress, depression, and anxiety, will have long-term public health repercussions. The displacement of local communities also results in the disruption of social networks and livelihoods which can have serious mental health concerns. Economic stress and uncertainty from the time the land is notified to the time of resettlement and rehabilitation leaves communities with little hope of their future and substance abuse could increase. This further contributes to social issues of domestic violence and community fragmentation. Additionally, airport construction activities themselves are a threat to the health of communities as they involve bringing in heavy earth moving machinery and heavy vehicular traffic which are health hazards, furthermore, the loss of water bodies which accompany such large scale projects can result in disturbance of aquatic species and make way for breeding grounds for mosquitoes that increase the risk of vector borne diseases such as malaria, dengue, chikungunya.

Learnings on health issues associated with the Parandur Airport Study and BIAL airport study are presented below.

Parandur airport study learnings

Findings of pre-feasibility report

The report outlines steps for continuous monitoring and adherence to pollution control norms for air, water, and noise to safeguard public health during both construction and operation.

To following measures are highlighted to mitigate pollution:

a. **Air Pollution:** The report highlights the protocol for monitoring of ambient air quality and emphasises compliance with air pollution control measures, especially during construction. This includes controlling dust, emissions from machinery, and vehicles by adhering to standards set by the Air (Prevention and Control of Pollution) Act.
b. **Water Pollution:** Water pollution prevention is to be managed through both monitoring and treatment systems. The Sequential Batch Reactor (SBR) wastewater treatment system will handle sewage and wastewater during operations. Additionally, water conservation measures such as rainwater harvesting and the use of treated wastewater for landscaping are proposed to reduce the burden on freshwater resources.
c. **Noise Pollution:** The report discusses noise level monitoring to assess vehicular and machinery noise and recommends protective measures to reduce exposure in surrounding areas.

d. **Wastewater Treatment:** A crucial public health safeguard involves the use of a Sequential Batch Reactor (SBR) system, designed to treat sewage generated at the airport. This system ensures that wastewater is treated to meet public health and environmental standards, mitigating risks of contamination. The SBR system, in particular, is critical for treating wastewater and ensuring that it does not contaminate local water bodies or the groundwater system. This system will be in place during the operational phase of the airport.

Findings from field study

There are no elaborate observations from the field study as the airport construction process hasn't been initiated yet. The local people shared that since the time of site selection, there has been a deterioration of the services provided from the local Panchayats. In the context of impacts on public health, renovation of integrated sanitary complexes for women had been discontinued in certain villages like Ekanapuram. Women shared the challenges of not having access to clean water and restrooms that are critical for health. Many shared their fears of not having access to restrooms in the resettlement area and feared they would not have money to build toilets for their homes.

BIAL Study Learnings

The displacement of villages for the construction of the Kempegowda International Airport (KIA) in Bangalore brought about significant public health challenges for the affected communities. These issues stem from a combination of forced relocation, loss of livelihoods, inadequate infrastructure in resettlement areas, and social dislocation. The villages of Arashinakunte and Gangamuthanahalli, suffered the worst. Some of the key public health Issues observed were[86]:

- **Water and Sanitation Problems:** In resettlement areas in Balepura, access to clean and reliable water sources were completely absent. The community that was resettled here had to walk long distances to nearby villages in search of wells to access water. Resettlement colonies lacked water infrastructure, leading to increased waterborne diseases. Displacement often results in poor sanitation facilities. The resettled areas had no provisions for public toilets or proper sewage systems. Waste disposal was an issue, too.
- **Loss of Healthcare Access:** The displaced communities relocated in Balepura were farther away from primary health centres and hospitals. The long distance to healthcare services usually results in delayed medical care, particularly in emergency situations, leading to poorer health outcomes. This particularly affected women, children and senior citizens. Routine immunisations, maternal and child health services, and disease prevention programs, were disrupted for these communities after displacement.
- **Mental Health and Stress-Related Disorders:** Displacement had caused fragmentation among the community networks. Social isolation in such situations often complicates mental health, particularly among the elderly and those with pre-existing mental health conditions. Much of this was not documented and very few reports or studies were conducted at that point of time in these villages.

[86]Rao, B., and Saldanha, L. (2014–2015). *Field notes on the socio-ecological impacts of the Bengaluru International Airport* [Unpublished field notes].

- **Environmental Health Hazards:** Communities living near the airport were exposed to constant noise from aeroplanes, which causes sleep disturbances, stress, and long-term hearing issues. Airport operations also use a large amount of water. It was only recently that the water challenges saw some relief. A sewage treatment plant of 2.5 (MLD) was set up and rainwater harvesting systems have been developed, both of which have reduced the dependence on municipal water.[87]
- **Occupational Health Hazards:** The region of airport construction was also a site of occupational hazard during the construction phase. Displaced populations often face unemployment or are forced into informal, unregulated jobs with poor working conditions. These jobs exposed workers to occupational hazards, including unsafe construction sites, lack of protective gear, and exposure to toxic substances.

2.A.2.4. Socio-cultural impacts

Airport construction projects often disrupt natural and cultural heritage sites located in the area chosen for the project. Besides this, displacement of communities impacts the socio-cultural fabric of communities, possibly altering community cohesion and the social structure as a whole. The socio-cultural impacts of airport construction on communities located on land allocated for the BIAL and Parandur airport are described below.

Impact on natural and cultural heritage sites and local identities

Parandur airport study learnings

Learnings from pre-feasibility report

The pre-feasibility report mentions that the Tamil Nadu region, where the project is situated, has a rich cultural heritage, with a deep tradition of literature, art, music, and monumental Hindu temples. However, as per the report, no specific cultural or archaeological sites are at risk from the project, and no clearance under the Ancient Monuments and Archaeological Sites and Remains Act, 1958, is required.

Learnings from field study

Kanchipuram is known as the "City of Temples" and is home to several ancient temples that hold religious and cultural significance for millions of people. From field observations, and visits to many of these sites it was evident that the villages, which celebrate numerous festivals and rituals, draw their identity from their land, history, and cultural practices. Temples like the Shaktivan Ellaman and Kalliamman bind the community spiritually, offering a sense of belonging. Displacement would erase these cultural landmarks, severing the connection between the people and their history. Generations-old temples and village offices, which serve as places of gathering and governance, would disappear, leaving the displaced with no sense of cultural continuity. Potential threats as shared by community members are shared in Box [23].

[87] *Express News Service. (2021, July 29). KIA puts in more water than it uses. The New Indian Express.* https://www.newindianexpress.com/cities/bengaluru/2021/Jul/29/kia-puts-in-more-water-than-it-uses-2337062.html

Box 23 - Narratives on the impacts of airport construction on religious and cultural heritage

A senior citizen Raman felt that the airport would disturb the temples by bringing in too much tourism and that would completely turn spirituality into a commercial entity. One of the interviewees shared that the waiting time for 'Darshan' would become more and one would have to spend more time just standing in queues.

The struggle is also deeply emotional for the local people, as the loss of land means the loss of graves, temples, and historical roots - three young men, Shiva, Velu and Mazaar in Ekanapuram, said they stay in the village because their parents' graves are there, expressing the deep emotional and cultural connection to the land. They were afraid that the proposed airport would erase the graves and that they would have nothing left in the village for them to stay.

In addition, the destruction of cultural and religious landmarks, like the temples where festivals are celebrated, is seen as a blow to their identity - Malar in Ekanapuram wondered if there would be a temple where her family could go for worship in the resettlement area and if her family would be welcomed there. Without these cultural markers, the community's sense of continuity is severed. It was evident that the temples not only serve as places of worship but as hubs for social life and communal solidarity. The movement is, therefore, not just political but also a fight to protect their spiritual and emotional ties to their land.

A young priest Balan shared a different view from the above mentioned people - he felt that with the airport the revenue generation of the temples would increase and perhaps all temples of the region could then be more well maintained. He even went on to share that pilgrims and tourists might visit not only the temples in Kanchipuram but also other historical sites in the vicinity and the region could become a good tourist spot.

BIAL Study Learnings

The Bengaluru International Airport that was constructed in 2008 is located in a region studded with many temples of the Chola Dynasty, the Vijayanagar Empire and other kingdoms that ruled the region. It is also the region where Tipu Sultan was born. Most of the temples and other historic sites in and around the airport region today remain in a dilapidated state. The Nallur Fort and the Nallur tamarind Grove are examples.[88]

The Nallur Tamarind Grove was the country's first biodiversity heritage site – declared so in 2007 – the signs of neglect are aplenty comprising piles of liquor bottles, garbage strewn around, the conversion of the site into a parking lot during village fairs, or weeds over-running its 53 acres, among a few. Situated just beyond the Kempegowda International Airport, it was once described

[88] *Das, R. N. (n.d.). Nallur Fort: Ruins amidst a biodiversity heritage site. Retrieved from https://www.talesofanomad.com/2021/12/nallur-fort-ruins-amidst-biodiversity.html*

by the National Biodiversity Authority as being a "spectacle of awesome wonder and a freakish site". Industrialisation and urbanisation now threaten its existence.[89]

Although the Bengaluru International Airport (Kempegowda International Airport) itself is located several kilometers away from the Nallur Tamarind Grove, the construction and subsequent development of the surrounding areas have had indirect effects on the grove:

- **Urbanization and Infrastructure Development**: The development of the airport spurred rapid urbanization and industrialization in the Devanahalli region. This expansion led to increased pressure on nearby land, altering the landscape surrounding the Nallur Tamarind Grove. New roads, residential areas, and commercial developments have been built, changing the local ecosystem and potentially disturbing the natural habitat around the grove.
- **Loss of vegetation**: Although the Nallur Tamarind Grove was officially protected, surrounding deforestation and land conversion for urban projects reduced the natural buffer zones that once surrounded the grove. This has affected local biodiversity and potentially increased the vulnerability of the grove to environmental changes.
- **Increased Human Activity**: With the airport serving as a major international gateway, human activity in the area has increased dramatically. This includes both tourists and local populations. While the Nallur Tamarind Grove is protected, increased human presence in the region has raised concerns about potential pollution, habitat disturbance, and informal encroachment.
- **Hydrological Changes**: The airport and associated urbanization have altered local hydrological patterns due to changes in drainage, surface runoff, and groundwater extraction. Although the grove itself is not directly impacted by the airport's construction, any changes in groundwater levels or water availability could indirectly affect the health of the tamarind trees, which depend on stable environmental conditions.

Very few studies exist to exactly pinpoint the reasons for the deterioration of the Nallur Tamarind grove.

- **Impacts on the social fabric in places of airport construction**

The establishment of an airport in a rural area brings significant changes to the social fabric of the surrounding society given that the construction and operation of airports often brings with it migrants from other regions of the country which impacts the social fabric. These are explored through the Parandur Airport and BIAL airport study learnings.

Parandur airport study learnings

Findings of pre-feasibility report

The pre-feasibility report does not mention social fabric or the influx of the new population

Findings from field study

While it is too nascent to share details of the impacts of the Parandur airport construction on social fabric, the collective struggle of the villagers against displacement highlights shifts in social, political, and cultural dynamics. The movement has strengthened social cohesion, uniting people across class, age, and gender, with movement leaders amplifying marginalized voices and

[89]Balila, V. (2022, April 23). *Tamarind trees of Nallur: Living relics of the past*. *Deccan Herald*. Retrieved from https://www.deccanherald.com/india/karnataka/tamarind-trees-of-nallur-living-relics-of-the-past-1103136.html

mobilizing the entire village, including women and youth. Cultural resilience has become central, as the protests express the deep connection between people, their land and identity, safeguarding agricultural traditions and cultural memory. They demonstrated innovative protest tactics—ranging from symbolic actions such as refusing to vote and blocking officials—demonstrate a radical shift in how they engage with political power, challenging the state's narratives of development. New forms of leadership have emerged, with local figures documenting the struggle and building social capital, reflecting how rural communities are now utilizing both traditional and modern means of mobilization in a digitally connected world. Cross-generational solidarity is another key aspect, with youth deeply involved in protecting the land they hope to inherit, while elders fight for their past livelihoods. Ultimately, the villagers are challenging institutional narratives, asserting their right to define development on their terms and resisting the erasure of their cultural and social identity in the name of infrastructure projects. This evolving social fabric showcases their resilience, unity, and determination to protect not just their land but their way of life.

BIAL Study Learnings

The construction of the airport and the resulting boom in industries in and around the Bengaluru International airport region attracted a large influx of people from other parts of Bengaluru, Karnataka, and even from other states. Migrant workers came to the area to work in construction, transportation, and airport-related industries. Professionals, including those in technology and logistics, also moved in, seeking new opportunities. The influx of migrants and the urban elite altered the demographic makeup of the area, introducing more diverse languages, cultures, and lifestyles. The rural, predominantly Kannada-speaking population had to learn to coexist with new residents who brought with them different customs and backgrounds, leading to both cultural blending and, at times, social tensions.[90]

Before the airport, villages in the region were typically organised around traditional, closely-knit communities, with long-established social hierarchies and relationships based on caste, kinship, and occupation of the trading town of Devanahalli.[91] The sudden wealth from land sales and the influx of new residents disrupted these structures. In some cases, the newer, wealthier landowners and urban migrants gained influence, while long-standing community leaders lost their traditional authority. As the area urbanised, communal spaces such as temples, village squares, and agricultural fields gave way to commercial developments, gated communities, and industrial zones.

In response to the rapid changes brought about by the airport, some communities have organised themselves into new social groups or cooperatives to address their collective needs. For example, some residents have formed associations to advocate for better compensation for land acquisition, access to public services, or environmental protection. Farmers have come together and are resisting the acquisition of land by the Karnataka Industrial Area Development Board (KIADB).[92]

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[90] *Rao, B., and Saldanha, L. (2014–2015). Field notes on the socio-ecological impacts of the Bengaluru International Airport [Unpublished field notes].*

[91] Purushothaman, S., and Kashyap, S. (2017). *A historical analysis of land ownership and agroecology in the erstwhile Mysore region of South India*. BRICS Initiative for Critical Agrarian Studies (BICAS) Working Paper Series No. 5-60. Retrieved from https://www.iss.nl/sites/corporate/files/2017-11/BICAS%20CP%205-60%20Purushothaman.pdf

[92] HS, S. (2024, May 3). *'Why does KIADB want to build industrial area on fertile land?' The Hindu*. Retrieved from https://www.thehindu.com/news/national/karnataka/why-does-kiadb-want-to-build-industrial-area-on-fertile-land/article66900000.ece

II.A.3. Impact on Living Systems

Airport projects, depending on where they are implemented, are known to disrupt land and water ecosystems leading to the loss of other life forms including plants, trees, insects, mammals and other beings due to the encroachment of their habitats for airport construction. Additionally, habitat fragmentation and pollution are other well known impacts of airport construction that are known to disrupt the lives of our animal and plant relatives on whom we (humans) depend for survival and are in relationship. This section highlights few of these impacts of airport construction on living systems through examples of the proposed Parandur airport and BIAL airport.

Parandur airport study learnings

Learnings from pre-feasibility report

The report claims that no ecologically sensitive areas exist within a 10 km radius of the project site, and thus no wildlife clearance or eco-sensitive zone permissions are required.

26.54% of the demarcated airport land (576.74 hectares) consists of water bodies that will be affected by the airport's construction. Two water channels and the large Nelvoy Eri water body in the southern part of the project area will be disturbed, potentially affecting local hydrology and nearby agricultural lands that rely on these resources. The report provides a detailed breakdown of water demand and sources. The project will require substantial amounts of water from potable and non-potable sources, with demand increasing from 0.85 MLD in Phase 1 to 4.7 MLD in Phase 4. The main sources of water determined for the airport include the Palar River (21 km away), Thenneri Lake (10 km), and Coovam Lake (5 km). This extraction could place stress on local water systems. Rainwater harvesting is proposed to mitigate demand on these external sources, particularly through the development of Nelvoy Tank near the site. The Parandur lake which is a human-made water body is in close proximity to the proposed airport site and will be impacted significantly.

The project will also lead to the removal of 36,635 trees, which will impact the humans and other living beings dependent on the trees to support their habitats, carbon sequestration, and erosion control. The report also notes significant waste generation, with 4 tons of solid waste per day during construction, and increasing to 48 tons of solid waste, 8 tons of hazardous waste, and 24 tons of aircraft waste daily in the final operational phase. Waste management will need to comply with environmental regulations to prevent soil and water contamination.

Learnings from field study

In environmental impact assessments (EIAs) and feasibility reports, a 10 km buffer zone is often defined to assess potential environmental impacts, with the assumption that the most significant effects will occur within this radius. However, this buffer may not always be adequate, especially for large-scale projects like airports, which have far-reaching consequences beyond this zone. For

instance, in Parandur, the proposed airport will directly affect 10 major water bodies and disturb 76 others, altering local hydrology, drainage, and ecosystems. These water bodies, crucial for groundwater recharge and biodiversity, could be impacted by pollution, water table shifts, and habitat loss. Wetlands and floodplains, vital for maintaining hydrological balance, could experience increased flooding, water scarcity, and deteriorated water quality. The region, despite not being officially designated as ecologically sensitive within the 10 km radius, hosts critical habitats for wildlife and supports agriculture dependent on these water sources.

The pre-feasibility reports' focus on water requirements for airport construction and operation, while neglecting the broader environmental and hydrological impacts, is a concerning oversight. By merely listing sources such as the Palar River, Thenneri Lake, and Coovam Lake, the report fails to address the critical upstream and downstream effects of diverting water from these sources. It also ignores the interconnected nature of water bodies in the region, especially the role they play in flood control, irrigation, and groundwater recharge. Most concerning is the failure to consider the impact on Chennai's drinking water supply, which depends on this delicate network of rivers, tanks, and lakes. The omission of these crucial details paints an incomplete and misleading picture, undermining the serious risks posed by the airport project to the region's water security and ecological balance, as substantiated below:

1. The wetlands of Tamil Nadu and the Paranudur airport construction site

As per the National Wetland Atlas of 2011, the total area under wetlands in Tamil Nadu is estimated to be 902534 ha which is 6.92 % of the geographic area of the state[93]. The state also has the highest number of Ramsar sites in the country with 18 sites being recognised under the Ramsar convention[94]. Even though the sites may appear isolated and disconnected from each other on the map, they aren't isolated ecosystems. The state also has one of the highest reductions[95] in water spread area of wetlands from post monsoon to pre monsoon at 55% reduction next to Madhya Pradesh and Rajasthan that have a 57% reduction[96]. This significant reduction shows how a lot of the freshwater in the state is collected in wetlands during monsoons and undergoes reduction over the seasons. Tanks are another highlight of the state's water landscape, they play a vital role in collecting surface runoffs during monsoons in the southern states of Andhra Pradesh, Karnataka and Tamil Nadu - wherein the largest concentration of irrigation tanks can be found in the country. Additionally, Tamil Nadu has 59% of wetland area under aquatic vegetation in the form of lakes and irrigation tanks.[115] Wetlands such as lakes, irrigation tanks, reservoirs and ponds serve multiple purposes such as supporting local aviana and aquatic life, providing irrigation for agriculture, and also providing income, nutrition and health by acting as a source of water for fisheries, fodder grass collection and brick making for poor households around wetlands.[115.]

In the context of the proposed airport site, a district wise view of the percentage of geographic area under wetlands and percentage of total wetland area shows that Kancheepuram district is leading in terms of total wetland area (% wetland area) among all the districts and is having 10.24% of its geographic area covered in wetlands - 7th largest district having % area covered

[93] Tamil Nadu Wetlands Mission. (2024) Www.tnswa.org.
[94] The Hindu Bureau. (2024, August 16). *Nanjarayan and Kaliveli bird sanctuaries get Ramsar site tag; T.N. tops list in the country*. *The Hindu*. Retrieved from https://www.thehindu.com/news/national/tamil-nadu/nanjarayan-and-kaliveli-bird-sanctuaries-get-ramsar-site-tag-tn-tops-list-in-the-country/article66900000.ece
[95] The water spread area of a wetland is the total area of open water in the wetland.
[96] Bassi, N., Kumar, M. D., Sharma, A., and Pardha-Saradhi, P. (2014). Status of wetlands in India: A review of extent, ecosystem benefits, threats and management strategies. *Journal of Hydrology: Regional Studies, 2*, 1–19. https://doi.org/10.1016/j.ejrh.2014.07.001

under wetlands in the state. While the proposed site of the airport has many observed wetlands (see Fig. 6), it is concerning that the Tamil Nadu wetland mission whose purpose is the ecological protection and restoration of 100 wetlands in the state, has not identified a single wetland in Kancheepuram district needing protection or restoration.[97] Details of risks to wetlands due to the airport construction are elaborated on in the sections below.

Fig. 6 : Proposed Site of the Airport Runway Showing Wetlands and Thick Aquatic Vegetation Close to Agricultural Farms.

2. Threats to water security and increased vulnerability to flooding

The proposed site of the airport in the Kancheepuram district has several surrounding lakes and tanks, some of which fall within the boundaries of the airport site. Fig. 7 shows the water bodies that fall inside and around the site of the airport, with the boundaries of the airport shown in red. There are 15 water bodies that fall within the site of the airport.

[97] *List of 100 Wetlands Identified Under Tamil Nadu Wetlands Mission.*
List of 100 Wetlands Identified Under Tamil Nadu Wetlands Mission (PDF)

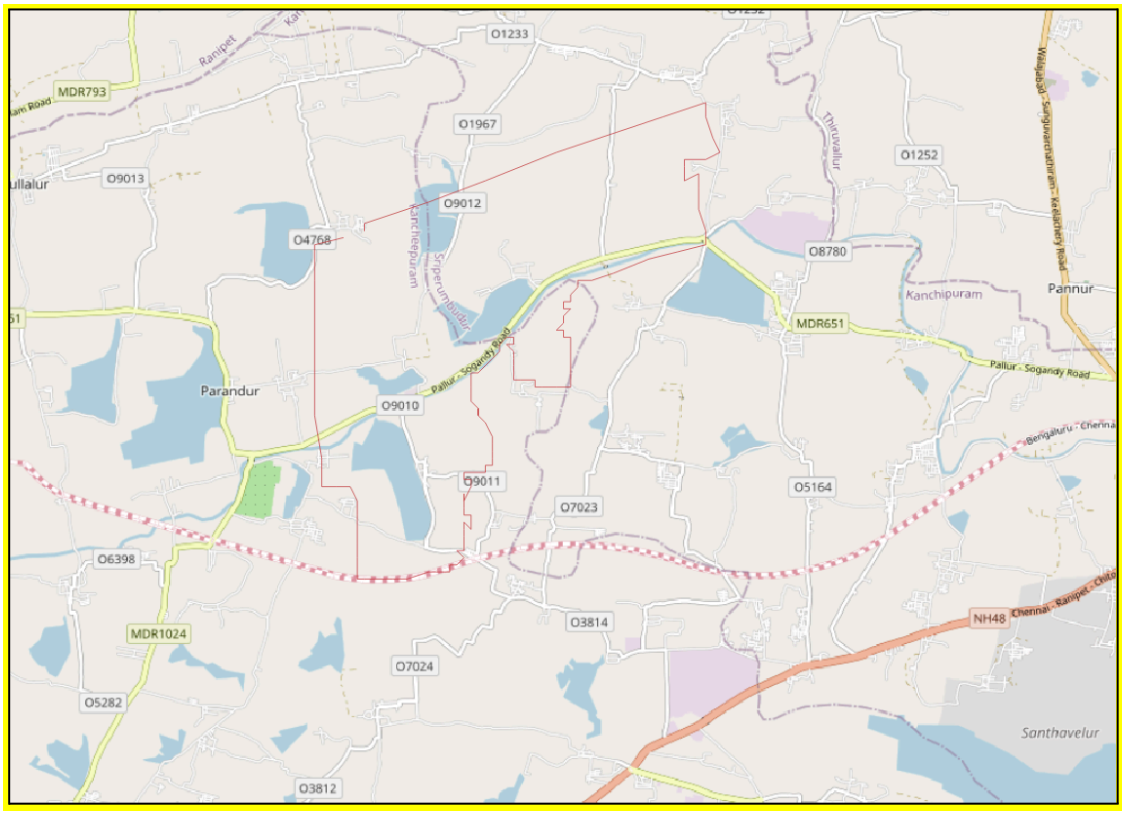

Fig. 7: Water Bodies that Fall Inside and Around the Site of the Proposed Parandur Airport. (Source : Proposed site of the Airport overlaid on Open Street Maps - Coordinates of the airport were obtained from the pre-feasibility study report).

The proposed site of the airport falls in the Palar-Anicut River basin. The Palar River basin is a major basin that flows from Karnataka, Andhra Pradesh and Tamil Nadu before it finally exits into the Bay of Bengal. The basin and its 50 tributaries fall in Vellore, Thiruvannamalai, Kancheepuram, Thiruvallur, Villupuram and Krishnagiri districts of Tamilnadu. The river basin is surrounded by other river basins such as the Chennai River basin to the north and the Pennaiyar and Varahanadhi basin to the south [98]. It is considered that the Palar River would once flow through the Chennai Region and that due to river piracy it was stolen by Vegavathi river, a tributary of the Cheyyar river. The present day Cooum, Kosathaliyaar and Adyar are considered to be remnants of the mighty Palar River.[99]

[98]National Water Mission. (n.d.). Palar Report. Ministry of Jal Shakti, Government of India. https://nwm.gov.in/sites/default/files/Palar_Report_updated.pdf

[99]Saju, M. T. (2018, November 12). 'Palar flowed in Chennai, river piracy changed its course'. The Times of India. https://timesofindia.indiatimes.com/city/chennai/palar-flowed-in-chennai-river-piracy-changed-its-course/articleshow/66587121.cms.

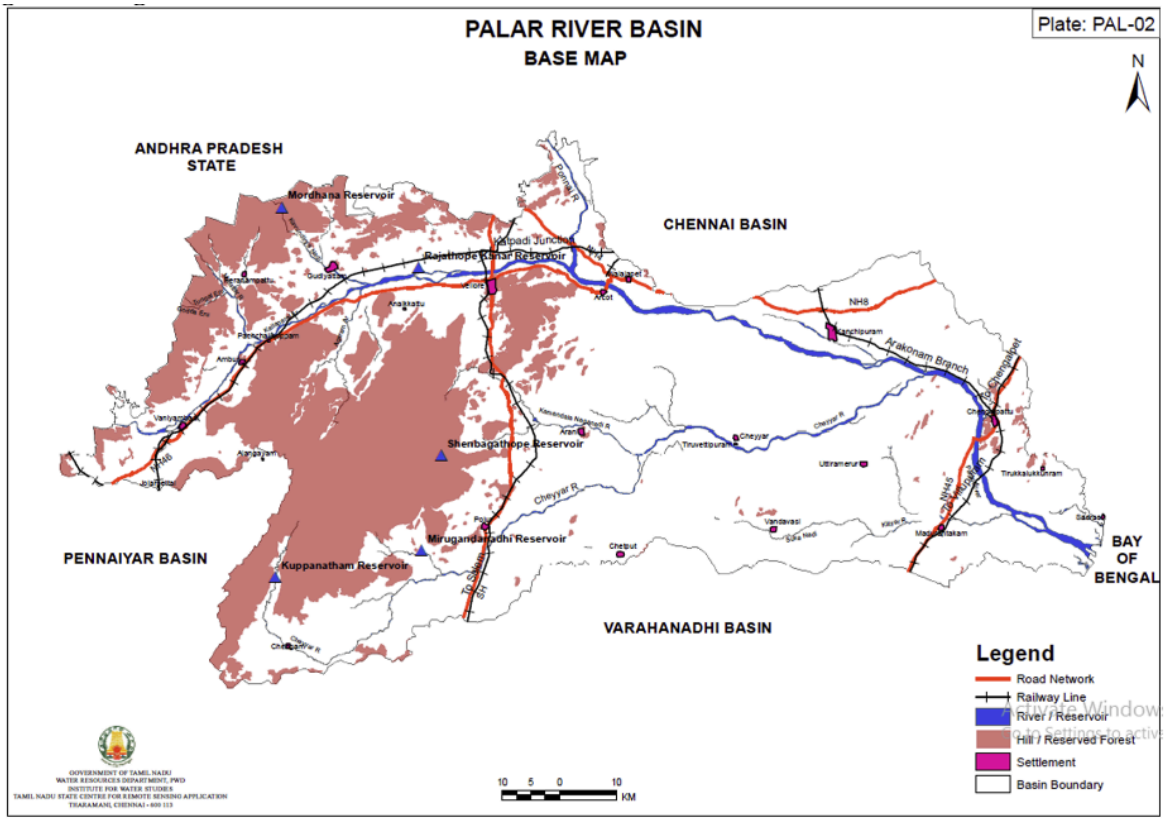

Fig. 8 : Palar River Basin (Source : Palar Report)

Cooum River is fed by Kosasthalaiyar river's surplus from the Kesavaram anicut in the Chennai basin and also fed by Palar River surplus from Palar anicut through the Govindavadi channel and the Kambakkal channel and the network of tanks that handle surplus rainwater during monsoons. Cooum River also supplies water to the Chembarambakkam lake in the Adyar Sub-basin - which is one of the two major water sources of drinking water for Chennai city (see Fig. 8).

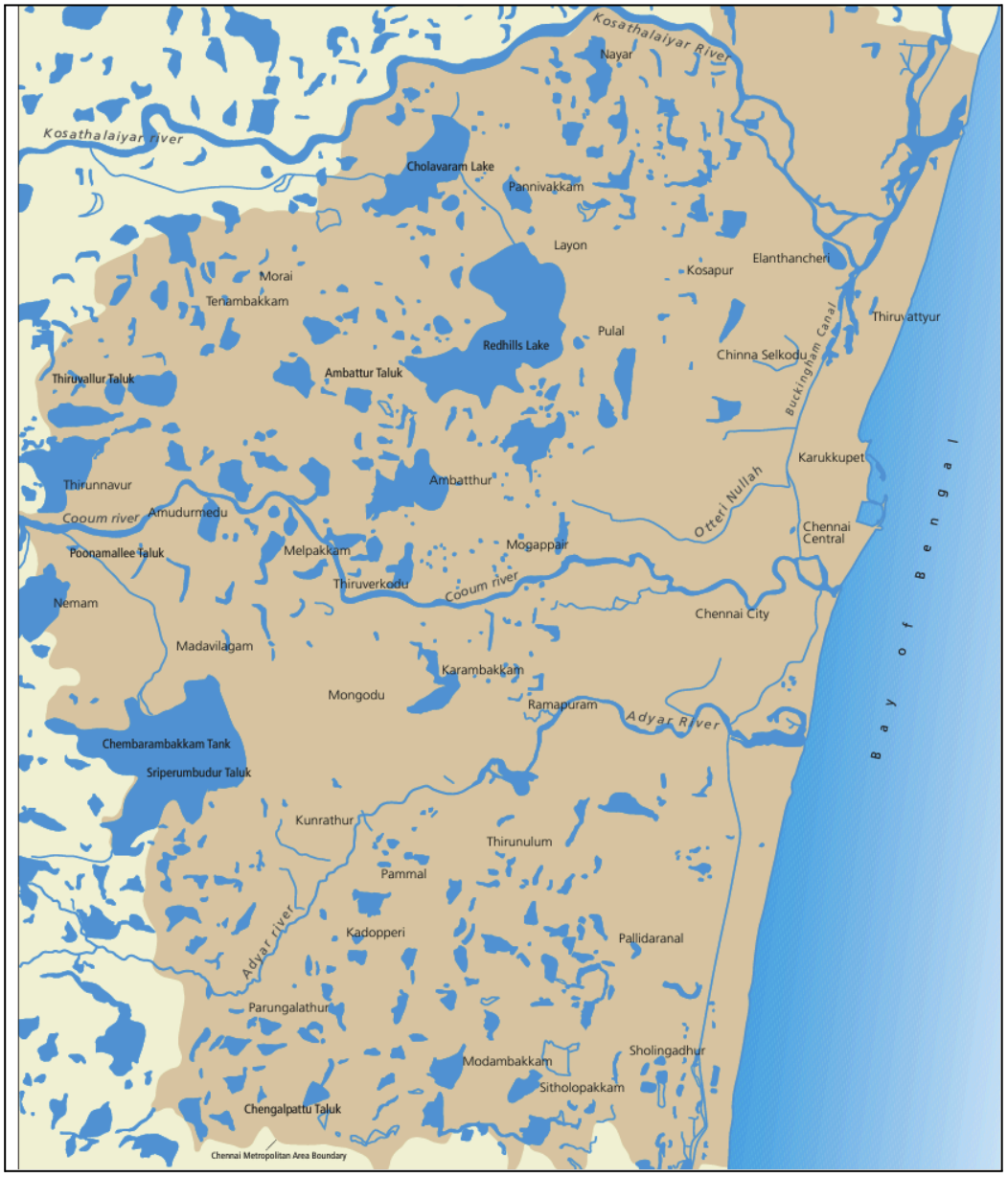

Fig. 9: Waterways in Chennai Metropolitan Region (Source: Anon 2006, Development Plan for Chennai Metropolitan Area, government of Tamil Nadu, Chennai., in Down To Earth, 2015)

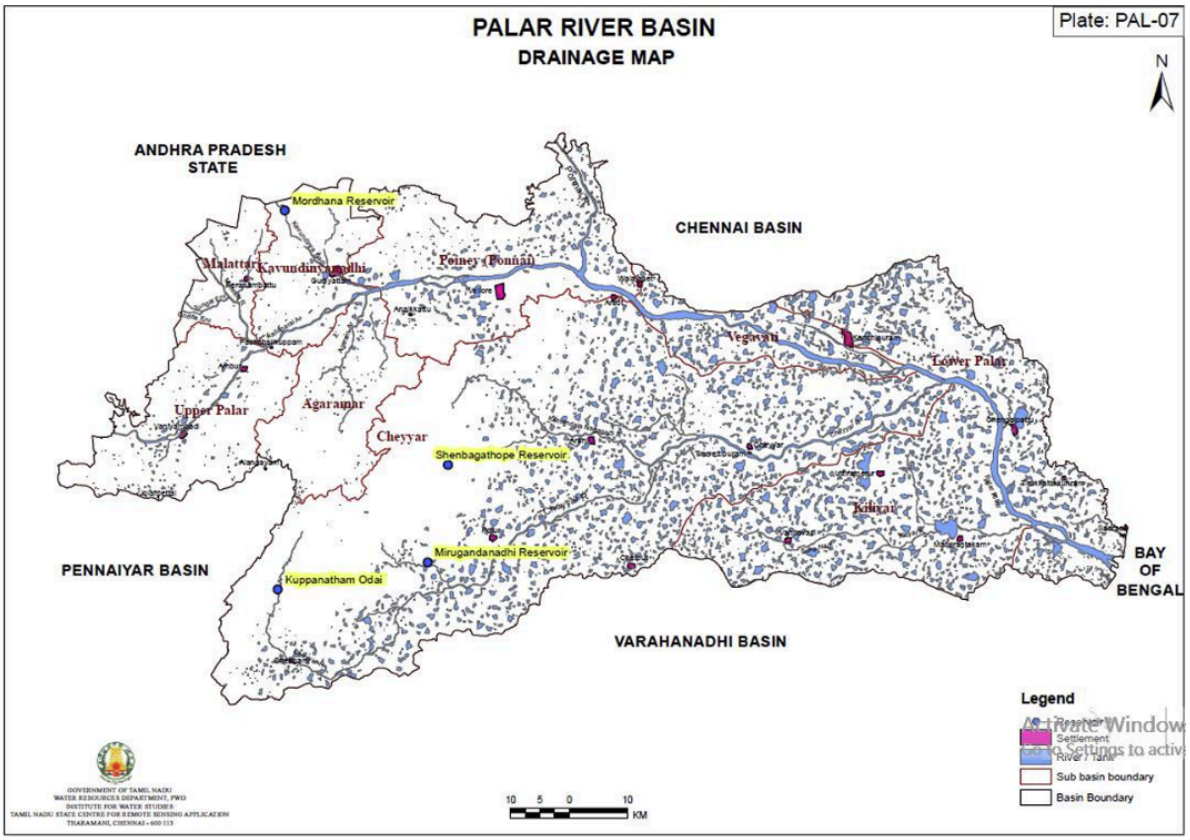

Fig. 10: Drainage Map of Palar River Basin Showing the Network of Lakes and Tanks that Connect and Feed into the River. (Source : Palar Report)

The sketch map of the Palar-Anicut basin showing the network of the lakes and tanks feeding into the river (see Fig. 11) was provided by a retired employee from the water works department. They highlighted that the map was made by British officials more than 100 years ago emphasizing that the intricate and interconnected knowledge of the river basin and its many irrigation tanks and lakes has existed for a long time. However, the origins of this intricate water network of the Palar River and the surrounding tanks itself, dates back to thousands of years from the time of the Pallava Kingdom [100].

The Palar River is the main source of drinking water for Chennai city. It is important to note that the river isn't perennial and maintains its flow because of seasonal monsoons and in the past has become dry and flooded depending on the monsoons [101, 102]. The river water diverted to the Poondi reservoir in the Chennai basin is one of the sources of Chennai city's drinking water and the second source is the Chembarambakkam lake which also receives water from Palar river via the Sriperumbudur tank and the Kambakal channel. The Palar River flows from the anicut to the

[100]Satish, L. (2023, February 16). Parandur airport site flooded. Poovulagin Nanbargal. Retrieved from https://poovulaginanbargal.org/2023/02/16/parandur-airport-site-flooded/

[101]Julie, M. (2021, November 25). *Tamil Nadu: When deluge came on the dry Palar*. *The Times of India*. https://timesofindia.indiatimes.com/city/chennai/tamil-nadu-when-deluge-came-on-the-dry-palar/articleshow/87902029.cms

[102]The Hindu Bureau. (2024, January 4). *Invasive plant threatens to dry Palar river bed in Vellore, nearby districts*. *The Hindu*. Retrieved from https://www.thehindu.com/news/national/tamil-nadu/invasive-plant-threatens-to-dry-palar-river-bed-in-vellore-nearby-districts/article67654321.ece

Sriperumbudur tank and along the way bifurcates into several channels and connects to many tanks and lakes that all collect rain water and feed into the river.

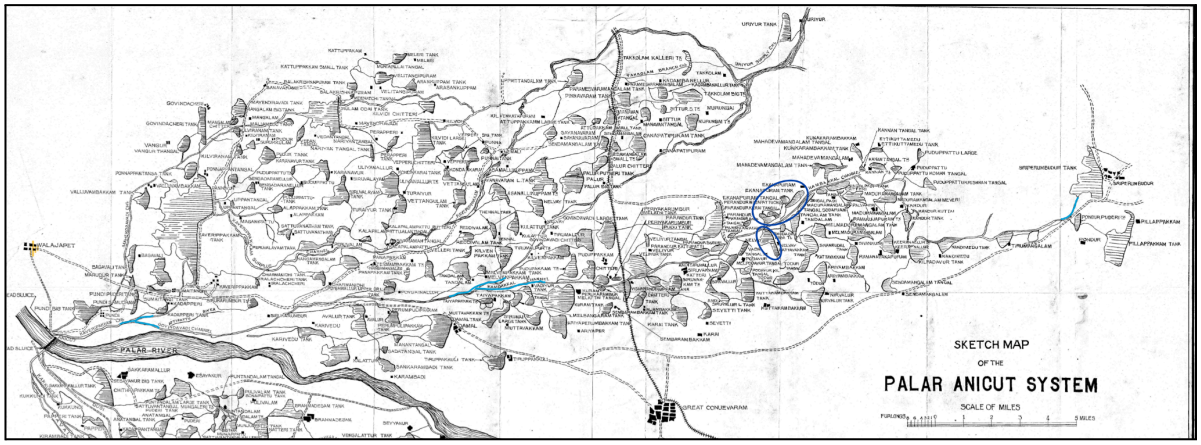

Fig. 11: Palar Anicut River Basin Sketch Map (Source : shared by the retired employee from the water works department)

The Kaveripakkam channel connects Palar river to the Kaveripakkam tank and also bifurcates into Govindavadi channel. The Kaveripakkam channel splits into Govindavadi channel along the way and continues up to the Govindavadi tank. The Govindavadi channel further bifurcates into the Kambakal channel also called Kamban canal. The Kambakkal channel then continues for 44km all the way to the Sriperumbudur tank which then continues to Chembarambakkam lake - which is one of the sources for Chennai's drinking water. The Kamban canal along the way connects a network of 85 lakes which store surplus water during monsoons[103]. The Kambakkal channel throughout its length forms a complex irrigation network of canals and tanks that not only manages surplus water from monsoons but also connects upstream and downstream water sources and ensures water flow in both directions[104].

[103]The Hindu Bureau. (2022, December 20). *Farmers, activists say proposed airport at Parandur poses serious threat to environment*. The Hindu. https://www.thehindu.com/news/cities/chennai/farmers-activists-say-proposed-airport-at-parandur-poses-serious-threat-to-environment/article66116080.ece

[104]Lakshmi, K. (2021, October 30). Tanks in Kancheepuram and nearby districts filling up. The Hindu. https://www.thehindu.com/news/national/tamil-nadu/tanks-in-kancheepuram-and-nearby-districts-filling-up/article37234567.ece

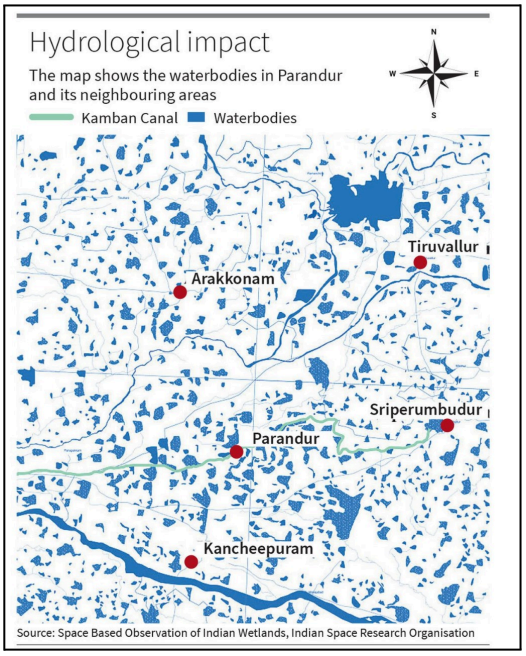

Fig. 12: A Map Showing Water Bodies in the Parandur Area. (Source: The Hindu,2022)

The Kamban canal flows right through the proposed site of the airport covering a 7 km stretch[26]. The canal remains dry unless seasonal monsoon water flows through it and during the years with heavy rainfall such as in December 2022, the canal and its surrounding agricultural lands have been flooded[26]. Another waterbody that will be directly impacted by the airport is the Nelwai or Nelvoy lake which is a 360 acres human made lake that falls in the site of the airport and much like other tanks in the region is connected to the Kamban canal. As the airport is constructed the government plans to deepen Nelvoy lake, route rainwater from the periphery of the airport and drain them into the lake. Any excess water from there would flow out into the eastern side of the airport, into expressway drains and also into neighboring water bodies and tanks [105]. The water in Nelvoy lake is planned to be used for the airport. However, preserving the Nelvoy lake alone and constructing an airport over the other water bodies will increase the risk of rainwater runoff from the airport area due to the concretization of the land in that area and cause flooding as per a member of Care Earth Trust NGO. While the government doesn't have clear plans on how the Kamban canal's flow is going to be maintained after the construction of the airport.[106,107] Farmers

[105]TOI Staff. (2024, March 4). *Most of Parandur airport planned over water bodies*. *The Times of India*. https://timesofindia.indiatimes.com/city/chennai/most-of-parandur-airport-planned-over-water-bodies-chennai/articleshow/108190102.cms

[106] *Sekar, S. (2023, October 14). Committee formed to study ecological impact of Parandur airport will submit report soon. The Hindu. https://www.thehindu.com/news/cities/chennai/committee-formed-to-study-ecological-impact-of-parandur-airport-will-submit-report-soon/article67420616.ece*

[107]Admin. (2024, September 10). Parantur Airport; TIDCO refuses to give Machendranathan committee report on water damage. Poovulagin Nanbargal. https://poovulaginanbargal.org/2024/09/10/parantur-airport-tidco-refuses-to-give-machendranathan-committee-report-on-water-damage/

at the airport site point to how the construction of the airport is going to bring in real estate developers to build housing, hotels and other airport related commercial infrastructure to the area. They also point to the irony of protecting Nelwai lake but not Kamban canal which supplies water to Nelwai lake, surrounding farmlands and water tanks in the catchment.

The construction of the airport will also enhance the region's vulnerability to flooding given that many of the water bodies around the site of the airport show episodic flooding emphasising the seasonal nature of water in the area. The map (see Fig. 13) shows areas that are flooded on an episodic basis (in orange) versus areas that are regularly inundated (in blue). It shows how frequently water returns from one year to another and is expressed in percentage. This was derived by studying the global surface water project's[108] interactive map to get an understanding of the seasonal nature of the water bodies in the region and the water recurrence map that captures inter-annual variability of water availability.

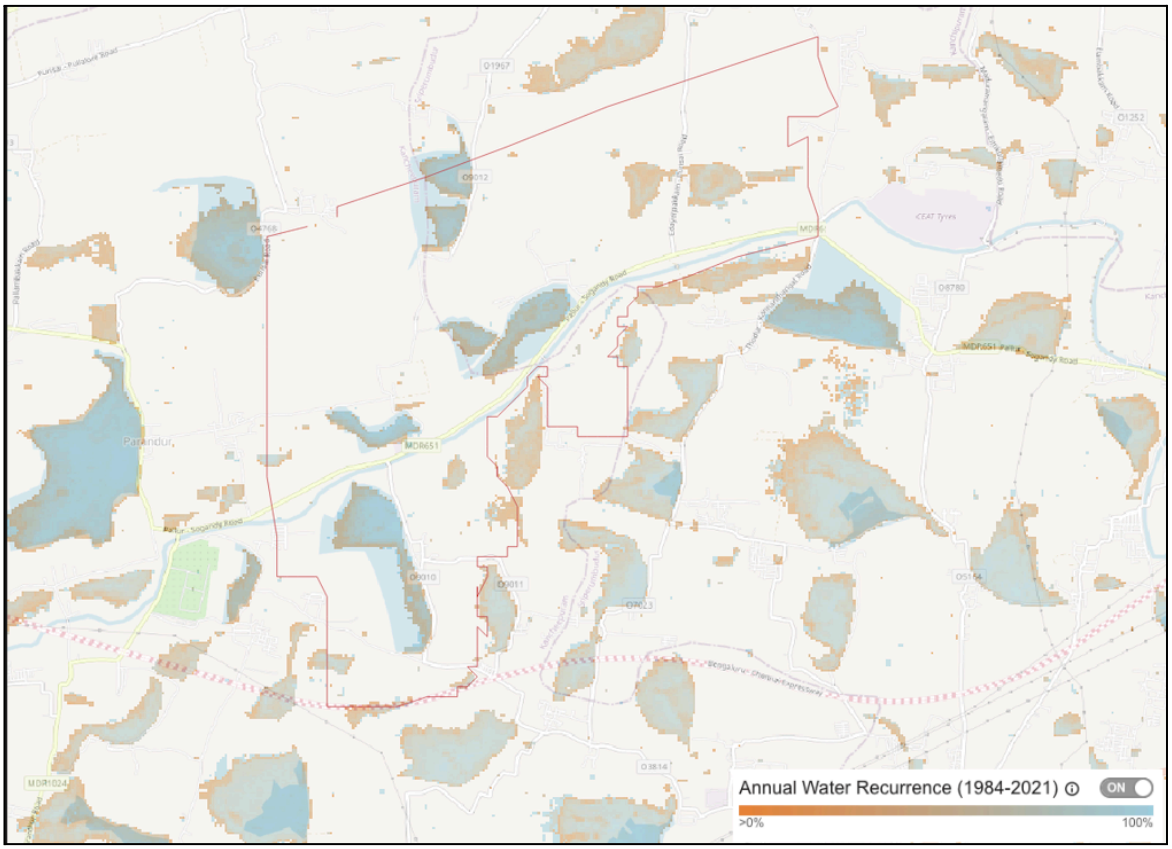

Fig. 13: Areas that are Flooded on an Episodic Basis (in orange) Versus Areas that are Regularly Inundated (in blue) (Source : Water recurrence map from the Global Surface Water Project overlaid on Open Street Map and highlighting the boundaries of the airport.)

Furthermore, the interactive map provided an annual and monthly view of water recurrence of the area where the runway of the airport is proposed to be built (see Fig. 13). A temporal profile of flooding at various coordinates in the region, proved the highly variable and seasonal nature of water in the area, enunciating its vulnerability to flooding.

[108]Pekel, J.-F., Cottam, A., Gorelick, N., and Belward, A. S. (2016). High-resolution mapping of global surface water and its long-term changes. Nature, 540(7633), 418–422. https://doi.org/10.1038/nature20584

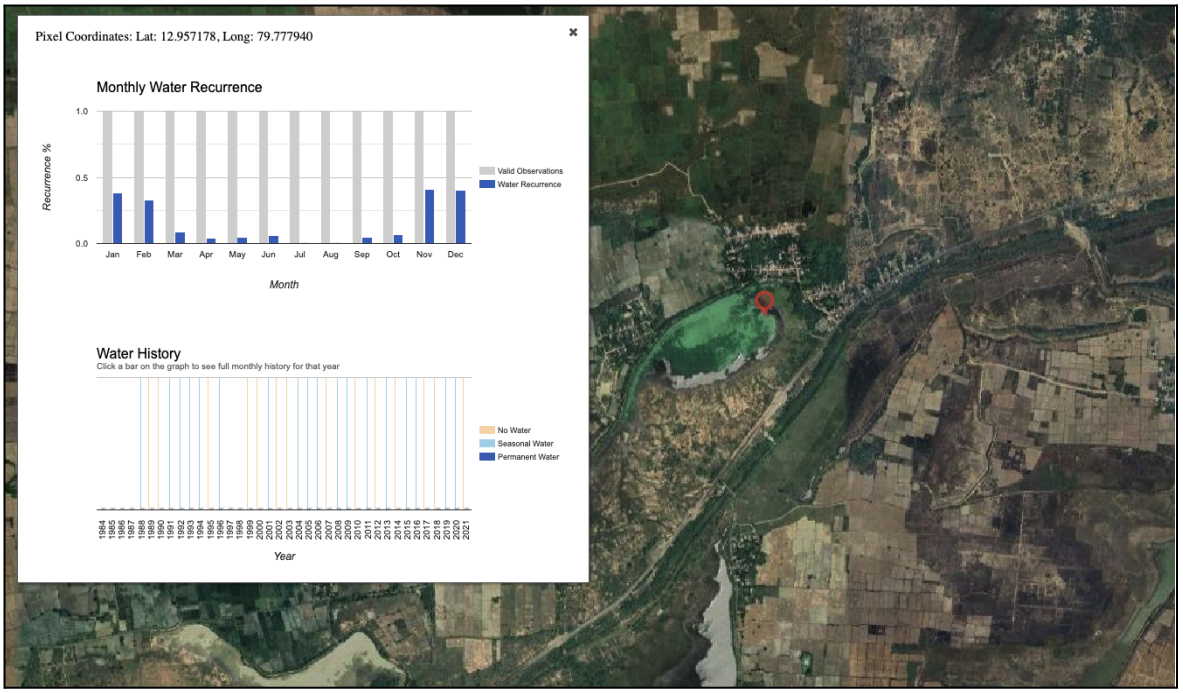

Fig.14: Seasonal Nature of Water Recurrence% for the Area of the Airport with Proposed Runway

Overarchingly, the interconnected network of rivers, channels, tanks and lakes provide water for irrigation and Chennai city's water supply by managing and storing excess rainwater during monsoon, also acting as a major floor carrier for the city[109]. The disruption of this network by the airport will threaten water security and increase the city's vulnerability to flooding while also impacting local living beings as described below.

3. Multi-faceted impacts of the Parandur airport construction on other life forms and dependent ecosystems:

With the previously stated context, the proposed Parandur airport in Kanchipuram district, Tamil Nadu, has raised significant concerns which are a threat to the life forms of the region.

Some of the threats include disturbance to the traditional water systems that could cause significant challenges to the water security of the region, and disturb habitats, particularly forests and Ramsar sites.

Impact on birdlife

The area around Kanchipuram District has numerous small wetlands, lakes (tanks), and water bodies as highlighted earlier in this section. These are crucial habitats for various species, mainly migratory and resident birds. The construction of the airport could lead to the destruction or alteration of these wetlands, affecting aquatic life, as well as the birds that rely on these ecosystems for feeding and breeding. The region is also home to important bird sanctuaries, including Pallikaranai, Vedanthangal and Karikili bird sanctuaries, located relatively close to the proposed airport site. These wetlands attract migratory bird species such as storks, pelicans,

[109] *Chennai River. (2021). Chennairivers.gov.in. https://booking.chennairivers.gov.in/cooum.php*

herons, and ibises. The airport's proximity could disrupt bird migration routes, increase collision risks with aeroplanes (bird strikes), and disturb the birds' breeding and feeding patterns due to noise and light pollution.

Birds play a crucial role as predators, pollinators, scavengers, seed dispersers and pests. They are an important link in the food chain and food web keeping a check on many pests that otherwise would lead to natural catastrophes. They help in nutrient cycling and are key ecosystem architects while also providing many other services that are economically significant.[110] Destruction of such critical bird habitats will have serious long-term implications, and only time will reveal the irreversible damage caused by such habitat loss. A bird survey of Tamil Nadu has indicated that the region has many vulnerable and threatened species[111]. Any further damage to the bird habitats will only push these birds to extinction. Bird researchers have reported research information that the bird species flying towards Tamil Nadu sanctuaries from the European continent are considering the Parandur area as their route. According to the State of India's Birds report, 130 species of birds have been reported from the Parandur region and nearby water bodies. Of these, 28 are migratory bird species, while two are in the 'vulnerable' list and five are in the 'near threatened' list.[112]

Pallikaranai, Karikili and Vedanthangal bird sanctuaries that are close to the proposed airport site already face several threats, mainly from human activities, environmental changes, and poor conservation efforts. These sanctuaries that also have the Ramsar status are crucial for bird conservation, especially for migratory species, but are increasingly under pressure from various sources. The Pallikaranai marshland which is a major migratory bird destination is threatened by pollution. The land over the years had become a dump yard with burning garbage that was a major threat to the birds. It is only recently that local citizen action has helped push some action in clearing the legacy waste and returning the landscape to its original pristine glory.[113] Vedanthangal relies heavily on the nearby lakes and tanks for its water supply, but over-extraction of water for agriculture, industries, and domestic use has led to water scarcity, affecting the wetland ecosystem and reducing bird habitat.[114] Agricultural runoff containing pesticides and chemical fertilizers from surrounding farms pollutes the water bodies, harming the bird populations and degrading the sanctuary's biodiversity.

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[110]Riches, M. (2021, September 30). Why we need birds (far more than they need us). BirdLife International. https://www.birdlife.org/news/2019/01/04/why-we-need-birds-far-more-than-they-need-us/

[111]Channel, W. (2022, February 15). Bird Survey in Tamil Nadu Finds Several Vulnerable and Nearly-Extinct Species; A Good Sign, Says TN Wildlife Department. The Weather Channel. https://weather.com/en-IN/india/biodiversity/news/2022-02-15-tamil-nadu-bird-survey-finds-vulnerable-and-nearly-extinct

[112] Ketkar, S. (2024, September 17). *Parandur Airport – A boon or bane for Chennai? Mathrubhumi*. https://english.mathrubhumi.com/news/money/new-parandur-airport-chennai-tamil-nadu-farmer-protest-against-land-acquisation-7a253789

[113]Balasubramanian**,** R. (2024, January 21). Pallikaranai Marshland: A crucial haven for migratory birds threatened by pollution. The South First. https://thesouthfirst.com/tamilnadu/pallikaranai-marshland-a-crucial-haven-for-migratory-birds-threatened-by-pollution/

[114]Kumar, B. A**.** (2021, November 8). Amid widespread flooding, Vedanthangal bird sanctuary has not enough water. The Hindu. https://www.thehindu.com/news/national/tamil-nadu/vedanthangal-bird-sanctuary-has-not-enough-water/article37415644.ece.

The negative impacts on aviation birdlife were enunciated through conversations with a birdwatcher and local forest guard (see Box [24])

Box 24: Impacts of Airport Construction on Birdlife

A renowned naturalist and avid bird watcher who did not want to be named shared with this team of researchers that the proposed airport region is also part of the Central Asian flyway.[115] He said this was the main reason the region had so many migratory birds, as they land here as a stopover in their long flight from the global north to the south. He was afraid that a project such as the proposed airport would seriously impact the migratory birds. In addition, he was also concerned about the birds that soar high using the thermal currents, such as vultures, eagles, kites, storks and pelicans. He insisted that only a detailed study by ornithologists and naturalists of the birds in the region's wetlands could help understand the detailed impacts on bird life. He urged that there must be alternatives as development in today's world is imperative. He also shared the challenges in environmental impact assessment reports that truly need more depth when discussing impacts on local biodiversity.

Kaumudi, a local forest guard at the Vedathangal Bird Sanctuary shared that the birds which are migratory may stop coming if the habitat is disturbed. He feared that the fragile ecosystem already had many threats from pollution, lack of water, and the growth of Cuscuta, a parasitic plant that had spread across the Vedanthangal sanctuary. He felt the pressures of an airport and its expanding activities in and around the region would certainly have its impacts on the bird sanctuary.

Impacts on agro-pastoralism dependent and supporting life

Wetlands, agriculture and pastoralism have coexisted in the global south for time immemorial, with local agro-pastoral communities playing an essential role in nurturing and benefiting from them. Loss of such habitats will severely impact agriculture and food security in the region, besides creating unemployment and loss of a variety of traditional livelihoods.

Agricultural lands that coexist with natural aquatic habitats support a variety of crops (food and cash crops) and native species of plants and animals. With the loss of such habitats, the region's agrobiodiversity will see a significant transformation, leading to the loss of many species. Various avian, mammal, reptile and insect species depend on these ecosystems for food and shelter. The airport project could lead to clearing of vegetation, particularly trees, shrubs, herbs, and grasslands that are home to such wildlife, disrupting the ecological balance. Tamil Nadu is home to 73 species of endemic plants, that are unique to the region could face habitat destruction, leading to population declines or potential local extinction[116].

[115]Wikipedia contributors. (2024, March 14). *Central Asian Flyway*. *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Central_Asian_Flyway

[116]Chacko, S., and Chacko, S*. (2022, April 28). Large share of India's threatened endemic species in Kerala, Tamil Nadu and Karnataka: Study. Down to Earth.*
https://www.downtoearth.org.in/wildlife-biodiversity/large-share-of-india-s-threatened-endemic-species-in-kerala-tamil-nadu-and-karnataka-study-82601

Runoff from the airport construction site, including chemicals, fuel, and construction debris, could contaminate nearby water bodies, affecting aquatic life and water quality for surrounding ecosystems. The construction and operation of the proposed airport could also lead to heavy groundwater extraction, adding great stress to the local water table, given that the region already faces severe water scarcity, and the additional demand for water by the airport could deplete the resources that are critical for both agriculture and local ecosystems[117].

Impacts of habitat fragmentation and pollution

The large area often required for such an airport could fragment local ecosystems, creating barriers to the natural movement of animals. This fragmentation can lead to isolated species populations, reducing genetic diversity and increasing the risk of inbreeding and population declines.[118] Construction and operation of the airport would also cause significant noise and light pollution in the region, which could disrupt nocturnal wildlife, including bats, owls, and other species that rely on darkness and quiet for their natural behaviours, such as hunting, breeding, and resting.[119] The noise and light may also disrupt migratory birds and their routes.[120] For other migratory species, the airport could act as a physical and behavioural barrier, forcing them to alter their traditional migration routes.

The airport will further bring increased and continuous air traffic, and associated activities from incoming and outgoing traffic will also contribute to higher levels of air pollution. Air pollution affects photosynthesis in plants, leading to reduced growth and vitality of regional vegetation, which impacts herbivores and other animals that depend on these plants. In the case of agriculture that may survive around the airport, the ecological stress will also result in increased use of fertilisers and pesticides, thereby adding to the local pollution levels in water and soil and higher doses of toxicity in the food.

BIAL study learnings

The construction of the Bengaluru International Airport has had a significant impact on the local water systems in the region. The lakes and wetlands around the airport in Devanahalli Taluk were home to a variety of plant and animal species, including birds, fish, amphibians, and reptiles. The destruction of these habitats has led to a decline in biodiversity. Wetlands which support a wide range of species, were particularly important for local wildlife. With their loss, migratory birds and other wildlife that once thrived in the area have been displaced.

Lakes and wetlands provide critical ecosystem services, including water filtration, flood control, and groundwater recharge. Their loss has disrupted these services, leaving the region more vulnerable to environmental stresses such as droughts and floods. Additionally, the loss of vegetation around these water bodies has led to soil erosion and land degradation in some areas.

Critics of the airport project and the unplanned urbanization of the city argue that there was a lack of foresight and planning regarding water management. The airport and surrounding

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[117] Jebaraj, P.(2019, March 29). Chengalpet and Kanchi parched. *Deccan Chronicle*. https://www.deccanchronicle.com/150528/nation-current-affairs/article/chengalpet-and-kanchi-parched

[118]Shankar, P. (2024, July 18). Habitat fragmentation and its impact on India's biodiversity hotspots. Mongabay-India. https://india.mongabay.com/2024/07/explainer-how-does-habitat-fragmentation-impact-indias-biodiversity-hotspots/

[119]Brisbane Flight Path Community Alliance (BFPCA). (n.d.). 60 Reasons to Protest: Reason #43 – Aircraft noise impacts on wildlife. https://bfpca.org.au/60reasons/

[120]Flack, A., Aikens, E. O., Kölzsch, A., Nourani, E., Snell, K. R. S., Fiedler, W., Linek, N., Bauer, H.-G., Thorup, K., Partecke, J., Wikelski, M., and Williams, H. J. (2022). New frontiers in bird migration research. Current Biology, 32(20), R1187–R1199. https://doi.org/10.1016/j.cub.2022.08.028.

developments were constructed without adequate consideration of the region's water needs or the impact of destroying natural water bodies. This lack of integrated water management has left the region vulnerable to water scarcity and ecological decline. One potential solution that has been proposed to mitigate the water crisis is the large-scale implementation of rainwater harvesting systems. By capturing and storing rainwater, the region could alleviate some of the pressure on groundwater resources. However, rainwater harvesting practices have not been widely adopted in the area, leaving untapped potential for water conservation.

The water needs of an airport are enormous and given the scarcity in the region the BIAL has managed to recharge the groundwater and lakes and take active steps in treating water for reuse.[121] The airport authority has taken active steps to rejuvenate the Bettakote lake which is adjacent to the first runway.[122] The Bettakote lake was once the lifeline of the Bettakote village as it ensured water for agriculture and domestic purposes. But with the establishment of the airport the lake had deteriorated. Collective action from local residents, academicians, water experts and naturalists has helped the airport authority in restoring this lake.

Moving forward, there is a critical need for more sustainable water management practices, including rainwater harvesting, lake rejuvenation, and better urban planning to mitigate the long-term consequences of airport construction in the area.

Airport construction comes with detrimental impacts to human and other life forms located in places allocated to airport construction. Habitats, livelihoods, health, culture and other dimensions of the lives of humans are impacted. This inadvertently raises questions on - How is it that even though there is immense discontent felt by local communities that airport projects are approved and implemented? And what are the processes followed to acquire land to make such projects happen?

The next section attempts to unpack the above-mentioned questions based on learnings from the experience of the proposed Parandur and BIAL airports.

[121]Kappan, R. (2021, July 29). *Kempegowda International Airport now water positive, replenishes more than it consumes*. *Deccan Herald*. https://www.deccanherald.com/india/karnataka/bengaluru/kempegowda-international-airport-now-water-positive-replenishes-more-than-it-consumes-1014069.html

[122] Yacoob, M. (2018, March 31). *This is how Bengaluru International Airport revived a 300-acre dead lake*. *Asianet News Network Pvt Ltd*. Retrieved from https://newsable.asianetnews.com/karnataka/this-is-how-bengaluru-international-airport-revived-a-300-acre-dead-lake

II.B. An Evaluation of Land Acquisition and Compensation Processes for Airport Construction

As highlighted in the previous section, airport construction processes have multifaceted impacts on communities in spaces identified for airport construction. It, therefore, becomes crucial to evaluate the protocol followed by the government to acquire land from local communities, given the perturbing impacts of airport construction on their lives. Furthermore, it is also crucial to unpack local people's reactions to these processes and the government's response to the same to assess how transparent, inclusive, and accountable land-acquisition processes are from the perspective of the airport construction landscape in India. This section of the report, similar to the previous one, uses the proposed Parandur airport and the BIAL airport, as examples to illustrate common practices of and reactions to land acquisition for airport construction in India. Each section begins by sharing the overarching policy framework that was/is relevant to facilitate the approval and implementation of these airport projects given the time period of their approval process.

Land-acquisition for the proposed Parandur airport study

The policy applicable for the approval of the Parandur airport is the Greenfield Airports (GFA) Policy of 2008[123], which was introduced by the Government of India to regulate the establishment of new, privately owned airports, distinct from the state-owned entities already in operation. The term "greenfield" refers to projects developed on unused land, as opposed to "brownfield" projects, which involve upgrading or expanding existing facilities.

The GFA policy[124] allows private players to develop, operate, and maintain airports while setting out a framework for their approval and establishment. Under the policy, entities wishing to build a greenfield airport must obtain approval from the Ministry of Civil Aviation after meeting certain requirements. Some key aspects of the policy include:

1. **Clearance Procedures:**The policy outlines the clearance procedures for setting up greenfield airports, including environmental clearances and compliance with aviation regulations.
2. **Public-Private Partnerships (PPP):** It promotes the involvement of private capital through PPP models, encouraging investments by private stakeholders in developing infrastructure.
3. **Regulatory Oversight:** The Airports Economic Regulatory Authority (AERA) is responsible for monitoring tariffs and service standards to ensure fair practices in privately operated airports.
4. **Land Acquisition and Compensation:** The policy discusses mechanisms for acquiring land and compensating affected parties, while also specifying the role of state governments in facilitating the development of airports through support such as land allocation.

[123] *Ministry of Civil Aviation. (2008). Greenfield Airports Policy. Government of India.* https://www.civilaviation.gov.in/sites/default/files/migration/moca_000939_0.pdf

[124] *Airports | Ministry of Civil Aviation. (2024, September 26). Civil Aviation.gov.in.*

The document "Guidelines for Setting Up of Greenfield Airports"[125] by the Ministry of Civil Aviation, provides a detailed framework for the approval, establishment, and monitoring of new Greenfield airports in India. A Steering Committee, constituted by the Central Government, coordinates and monitors the various clearances required for setting up Greenfield airports. The Ministry of Civil Aviation serves as the secretariat for this committee.

Learnings from pre-feasibility report

Policies like the Tamil Nadu Ground Water (Development and Management) Act, 2003, and the Tamil Nadu State Environment Policy, 2017, are mentioned in the report in the context of managing natural resources. These policies ensure that water resources are not overexploited and that environmental management is aligned with sustainable development goals. The report also mentions central and state-level guidelines for resettlement and rehabilitation .

The report. however, makes no mention of the Greenfield Airport Policy, which is integral to all the processes of the Parandur Airport. Neglecting the Greenfield Airport Policy in a feasibility study for the Parandur Airport is a critical oversight, as ignoring these guidelines risks undermining compliance with national standards and missing important assessments related to displacement, infrastructure alignment, and environmental safeguards. Additionally, it can lead to procedural delays, cost overruns, and community resistance, as well as legal challenges, jeopardizing the project's long-term viability. A comprehensive feasibility study must integrate such policies to ensure holistic and sustainable development.

Learnings from field study and desk research

While site clearance for the Parandur Greenfield Airport has been granted, there are notable dissonances between the 'Guidelines for Setting Up of Greenfield Airports (GFAs)'[126] and the actual procedures followed, as revealed through studying news reports and from field visits. A chronological list of events associated with the clearance process and dissonances in relation to the same (as applicable), are as follows :

Date	Details
August 2022	The Tamil Nadu Industrial Development Corporation (TIDCO) submitted an application to the Ministry of Civil Aviation (MoCA) for site clearance to develop a new Greenfield airport at Parandur, in Kancheepuram district. This was in line with the Greenfield Airports (GFA) Policy of 2008, which outlines the process and requirements for setting up new airports
	Following the submission, the proposal underwent a detailed examination by various agencies, including the Airports Authority of India (AAI), the Directorate General of Civil Aviation (DGCA), and the Ministry of Defence/Indian Air Force. This review was conducted to assess the technical feasibility, safety considerations, and potential impact on defence operations.

[125] *Ministry of Civil Aviation. (2016, December 23). Guidelines for setting up of Greenfield Airports. Government of India. https://www.civilaviation.gov.in/sites/default/files/migration/moca_000939_0.pdf*

[126] Shekhar, L. (2024, June 19). Chennai's new airport: On-ground realities differ from what's on paper. Citizen Matters. https://citizenmatters.in/chennais-new-airport-on-ground-realities-differ-from-whats-on-paper/

Date	Details
Dec 2022	In December 2022, the Tamil Nadu Industrial Development Corporation (TIDCO) issued a Request for Proposal (RFP) to hire a consultant for the project. Louis Berger, along with three other firms submitted bids, and their proposal was ultimately chosen for the task based on factors such as cost, technical expertise, and their approach to the feasibility study. There was no transparency in the process.
March 23rd 2024	The Pre-feasibility report was released on March 23rd 2024. Documents were released for public scrutiny (after RTIs were filed by several grassroot organizations). The following documents are available 1) Parandur boundary maps 2) Geographic coordinates of various sites. 3) Monitoring maps 4) Drainage maps 5) Pre-feasibility reports 6) Existing land use maps 7) Final CGA draft plan (ToR) made by TIDCO The link to these documents can be accessed here
July 9, 2024	After a comprehensive review, the proposal was presented to the Steering Committee on Greenfield Airports, a body responsible for coordinating and monitoring the necessary clearances for new airport projects. On July 9, 2024, the Steering Committee recommended granting[127] site clearance for the Parandur airport. The Union Civil Aviation Minister announced this clearance in the Rajya Sabha, stating that the proposal met the criteria set out by the GFA Policy. The clearance of the airport warrants scrutiny given that : 1. According to Annexure III of the guidelines for GFAs, no greenfield airport should be allowed within an aerial distance of 150 km of an existing civilian airport unless compelling reasons are presented, and the impact on the existing airport is thoroughly examined. This clause requires detailed scrutiny, especially as Parandur is within 150 km of the existing Chennai airport. However, the discussions or specifics on how this proximity issue was addressed in the Steering Committee's recommendation have not been disclosed publicly. 2. The GFA guidelines call for transparent examination of the impact on the existing airport. There is no publicly available information whether this analysis took place or what conclusions were drawn. 3. An Environmental Management Plan (EMP)[128] is typically required before site clearance as part of the broader Environmental Impact Assessment (EIA) process. The EMP ensures that all potential environmental impacts are addressed, and mitigation measures are in place before any major development can proceed. The discrepancy in the site clearance process for the Parandur airport project stems from the fact that it was granted without

[127] *SV Krishna Chaitanya. (2024, July 23). Centre gives nod for site clearance for new airport in Tamil Nadu's Parandur. The New Indian Express.*

[128] Online Desk. (2024, August 28). Ekanapuram land acquisition notice raises concern amidst local protests. Dtnext.in; dtnext.

Date	Details
	the EIA and EMP processes being completed. According to the guidelines under Annexure III for setting up Greenfield airports, the EMP forms a crucial part of the environmental clearance, which should ideally be secured before project-related approvals like site clearance are issued. However, for Parandur, the Terms of Reference (ToR) for conducting the EIA and preparing the EMP were only issued after the site clearance. 4. The law mandates that a comprehensive Social Impact Assessment (SIA) be conducted before land acquisition. There is no report on the same available. 5. Section 16 (Preparation of RandR Scheme): Under the LARR Act, any land acquisition should include a Resettlement and Rehabilitation (RandR) scheme for displaced families. The compensation package proposed for the villagers appears inadequate, as per the protestors' claims, and does not reflect the market value of agricultural lands and properties. Moreover, the cultural and environmental losses (e.g., destruction of water bodies and temples) have not been accounted for in any RandR scheme. 6. Section 19 (Publication of Declaration and RandR Scheme): There have been reports that the villagers and local communities did not receive formal notification about the declaration of land acquisition, violating Section 19, which mandates the publication of the RandR scheme and detailed information on the project's impact. 7. For PPP projects the law requires consent from 70% of the affected families. However, interviews with locals to understand if any government officials visited the airport revealed that the community is always in the know-how on who visits their village, and they are not aware of a steering committee visiting the site to seek consent.

Following the site clearance, TIDCO is expected to proceed with the detailed project report (DPR), land acquisition, and obtaining further necessary approvals, such as the "in-principle" approval from relevant ministries including Defence, Home Affairs, and Finance. This step also requires submission of the SIA (Social impact Assessment) and EIA (environmental Impact Assessment reports.The "in-principle" approval does not mean the project is fully approved or can commence immediately. It signifies a preliminary acknowledgment that the project is strategically viable but must meet all other statutory and regulatory conditions. The next stages will also involve applying for an Aerodrome Licence.

The story of site clearance in Parandur indicates a lack of transparency and justice in land acquisition processes for airport construction. There is a dire need for the government and companies to rectify their approach to land acquisition given that the people at the receiving end of these injustices are leaving no stone unturned to express their dissent towards these unjust processes as described below.

Peoples response to land acquisition in Parandur

While the site clearance has been granted, there has been significant opposition from the local communities, particularly from the residents of the 13 villages that would be affected by the airport's construction. The reasons for public protests in Parandur are centred on :

- **Agriculture vs. Development**: The protestors argue that the proposed airport project was not truly for public benefit but catered to corporate interests, specifically naming companies like Adani and Ambani. This framing positioned the project as a threat to the livelihood of farmers, who feared displacement and loss of agricultural land that had supported their communities for generations.
- **Environmental Concerns**: The protestors highlighted how the proposed airport would destroy crucial water bodies and agricultural land, increasing the risk of floods and ecological degradation. Environmental experts added weight to this argument by pointing to research on climate resilience and water security.
- **Democratic Deficit**: Protestors repeatedly stressed that the project lacked public consent and was imposed without adequate consultation or transparency. Despite meetings with ministers, the protestors felt ignored, as the government continued to push forward with the project without addressing their concerns.

In Tamil Nadu, citizens have the constitutional right to protest under Article 19, but this right is often curtailed when protests are perceived as a threat to law and order. In cases like Parandur, the state prioritises infrastructure development and uses legal tools like Section 144 and public safety laws to suppress dissent. The tactics of creating an atmosphere of fear, arresting organisers, and discouraging public rallies are consistent with similar repressive measures seen in other parts of India and globally. Despite this protests in Parandur have persisted .

Field visits revealed that the protest at Parandur was led by figures like Ekanapuram S.T. Kathiresan, who played a crucial role in mobilizing the affected communities and sustaining the protest over 800 days(as of Oct 7th,2024). He ensured that the protest gained media attention, which helped sustain momentum and attract support from political and environmental groups. Repeated resolutions were passed in village meetings rejecting the airport project. The protest committee included vice-presidents, secretaries, and other local leaders, showing a structured and organized resistance movement. Politicians like Velmurugan, MLA of Tamil Nadu Right to Life Party, and activists such as Medha Patkar and Thirumurugan Gandhi publicly supported the protest. They criticized the state's decision and highlighted the contradictions in its claims of promoting both agricultural and infrastructural development. Environmental groups like Friends of the Earth voiced strong opposition to the project due to its potential ecological harm, especially regarding the destruction of water bodies and migratory bird habitats. The destruction of Kamban Canal and risks of flooding were among the primary concerns.

In the case of Parandur, the pre-feasibility report makes a mention of the Tamil Nadu Panchayats Act, 1994, emphasising the role of local governance and the preparation and implementation of District Development Plans. Local bodies are responsible for developmental approvals, and the project appears to involve local community voices in ensuring proper land use and planning decisions. The evidence from the field study however highlighted a completely different story of how the local governance has ignored the voices of local communities in decision making on the mitigation and adaptation plans. Villagers receive abrupt notices and are given just 30 days to submit their decisions or objections. Despite many of them sending in formal objection letters, there has been no genuine effort to engage with them through official surveys or consultations. In fact, their voices have been systematically ignored at district-level meetings. Additionally, the police, acting in collusion with the State, are quick to suppress any attempts at organised protest, threatening arrests if residents talk about marches or processions. Local media occasionally covers the community's plight, but the major newspapers largely offer a skewed narrative, focusing only on the airport's progress while ignoring the struggles of the people. The case study (see Box [25]) highlights the communities resistance towards the airport and the climate of fear imposed on them

during their ongoing fight to protect their water resources and land from this unilateral development project.

Box 25: Case Study 5 : Mr Murugan Narrative, the Secretary of the Ekanapuram Farmers' Struggle Against the Parandur Airport

Mr. Murugan, the secretary of the Ekanapuram Farmers' struggle against the Parandur airport, met us with two of his close associates. It was clear from the way he spoke that he had told this story many times before and was well-versed in responding to questions. He eagerly shared all relevant documents, including government orders, pre-feasibility reports, and a document detailing the two-year history of their struggle. He also showed us a 15-point handout outlining why the airport should not be built at Parandur, along with a book titled “Stupid Reasons to Have an Airport on a Wetland”, which included pictures of the area.

Murugan explained that the first mention of an alternative airport for Chennai came in 2008, with Pannur as the suggested site. However, when the AIADMK, led by Jayalalitha, came to power in 2011, that idea was dropped. He remarked that new governments often abandon projects initiated by previous administrations. In 2019, out of nowhere, Parandur was proposed as the site for the new airport, and the villagers immediately retaliated.

Murugan contrasted Pannur and Parandur, noting that Pannur has fewer water bodies, more dry land, and is closer to Chennai, near SIPCOT, with a population largely consisting of traders, Naidu families from Telangana, and Christians. He speculated that large real estate interests, including G Square and certain political families, owned land in Pannur, making Parandur a more convenient target for the airport project.

He went on to describe the evolution of the government orders (GOs). The first mentioned 4,700 hectares, while the second expanded to 5,450 hectares, increasing the affected villages from 13 to 22. Initially, they sought help from Aarthi, a district officer, who was sympathetic and even set up meetings with ministers. But after showing support, she was transferred, and her replacement was uncooperative.

Murugan emphasized the historical and environmental significance of the land, stating that it had existed unchanged for 1,200 years, dating back to the Pallava dynasty. He spoke of the Kamban canal, which runs 45 kilometers from Kavaripakkam to Sriperumbudur, with seven kilometers passing through the proposed airport site. He highlighted the 86 lakes and water bodies within the airport’s boundaries, which feed into Chembarambakkam Lake, Chennai’s largest water source. The runway would also cut through major lakes like Kaileri, Vyleri, and Kadapayeri.

In his analogy, Murugan said, “When we need gold, we go to a gold mine; when we need oil, we go to where it’s found. Water is no different. You cannot build an airport where water naturally exists." He criticized the government for not considering alternatives and suggested dismantling the Meenambakkam Training Academy, built on 750 acres, to expand the current airport.

Murugan shared that the proposed airport would cover 2,500 acres of wetland, 1,100 acres of dry land, and 1,600 acres of lakes, ponds, and canals. He pointed out the rich birdlife that thrives in the area, giving Parandur its name, meaning "where birds fly above." He argued that

there was no need for a new airport when cities like Trichy, Coimbatore, Salem, and Madurai had expansion funds allocated.

When IAS officer S. Machendranath visited in 2023 to study the hydrology of the area, Murugan said the visit was brief and dismissive. Attempts to retrieve the officer's report through RTIs had been unsuccessful. No public consultations had been held, and in neighbouring villages, residents refused to surrender their land despite receiving denotification notices.

Murugan noted that local leaders, like Parandur's village president Ramabalan, were hesitant, voicing resistance in public but wavering in private. He criticized the government for selling off Tamil Nadu, citing widespread corruption, including a minister's recent comments trivialising a hooch tragedy.

Murugan also raised concerns about a nearby Indian Air Force base that had granted a No Objection Certificate (NOC) for the airport, though the conditions of the NOC were unknown. He shared fears about the impact on the rice economy, predicting that as more rice fields were destroyed, prices would rise. He also condemned a government attempt to downplay the water issue by using drone images taken during the dry season, which inaccurately depicted the water bodies as nearly empty.

He mocked the promise of 700 local jobs at the airport, asking, "To do what? Clean toilets and scrub floors after being our own masters?" He questioned the fate of the other 9,300 people who would lose their livelihoods. Murugan said that, unlike bus stops or hospitals, airports become private properties, benefitting few.

Murugan shared their tactics for protest, explaining how they refused to vote in elections and even threatened to move en masse to Telangana, where the government had offered land to the displaced villagers. He proudly spoke of their 100-year-old school, where children are now being taught to fight for their land. Caste, he said, was not an issue in their struggle, with the majority of the village being from the MBC (Vanniyar) caste, 10% from SC, and a small number from higher castes, who did not interfere.

As we spoke, Murugan received a call from the local police station about a procession they were planning to the District Collector's office. The next day, he and others were arrested before they could leave the village but were released by evening. Despite setbacks, Murugan remains committed to leading the village's fight, gathering villagers after dinner each night by the Vylari lake to update them on any developments.

The villagers' unity and Murugan's leadership have created a strong, informed resistance. Through interviews, we found that all the adults shared the same story, data, and perspectives on the struggle, underscoring their collective resolve.

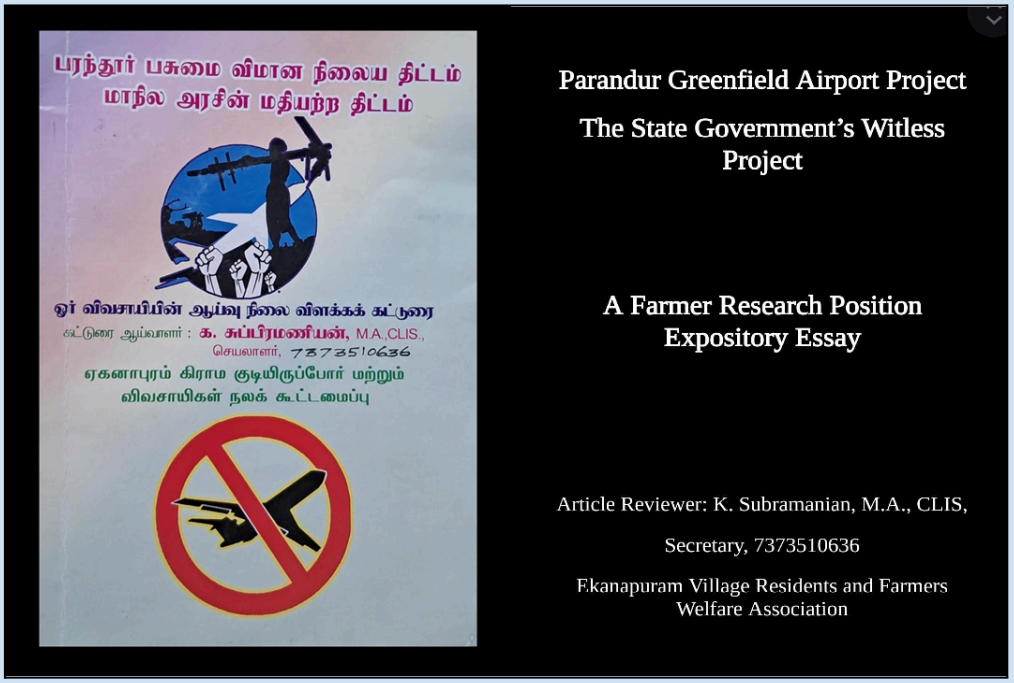

Fig. 15 : A Farmers Research Position Expository Essay

Villagers have employed innovative protest tactics that emphasize their cultural roots—organizing temple rituals, community gatherings, and invoking traditional songs and stories to mobilize resistance. These tactics serve not only as a form of protest but also as a way to reaffirm their cultural identity. The blending of cultural significance with activism transforms the protests into a deeper, symbolic struggle for the preservation of their way of life. The people of Ekanapuram have been protesting in unique ways. They shaved their heads, undertook a perumal tilak protest, Fire pot protest, held a begging bowl (thiruvodu , bowl made from the calbadh tree), daily night protests, stood knee deep in the river and lakes to show the wetlands, did not participate in polling[129] , went on a hunger strike, protested in front of the district collectors office, protested so as to speak to ministers, and withdrew their children from the school for almost a month. It was also brought to the notice of the researchers that during the first 200 days of protest, they had invited dalit leaders from across the state to come and speak on their behalf to the villagers and at public spaces. Then the inertia set in when the government did not respond at all. They felt ignored and then sought other structures of protest.

[129] SV Krishna Chaitanya, and SV Krishna Chaitanya. (2024, April 18). *TN keen on airport project, 1,600 voters in two villages decide to boycott election*. The New Indian Express. https://www.newindianexpress.com/states/tamil-nadu/2024/Apr/18/tn-keen-on-airport-project-1600-voters-in-two-villages-decide-to-boycott-election

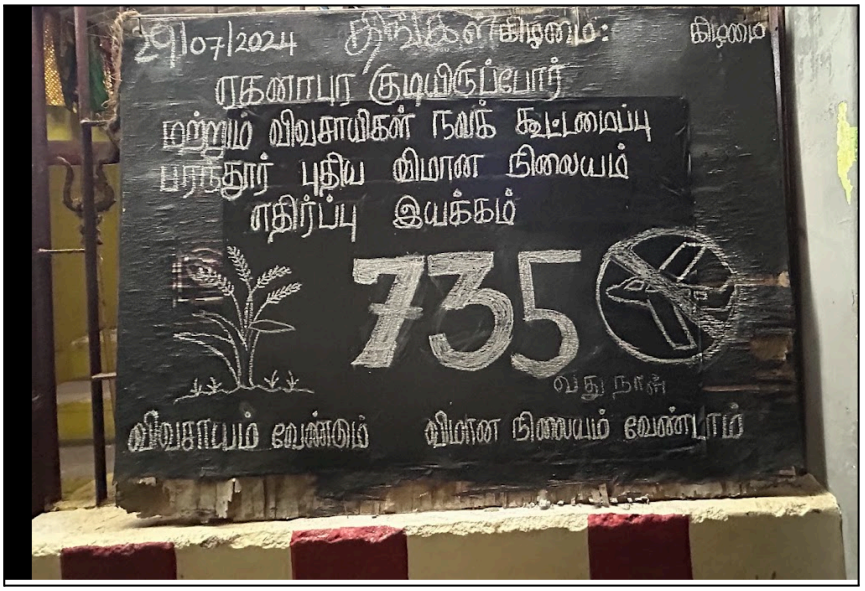

Fig. 16: Board in Front of the Place of Protest that is Updated on a Daily Basis Indicating the Days of Protest.

The situation in Parandur highlights a growing need for balancing development with the right to dissent, especially in democracies where public participation should be an integral part of decision-making.

Land acquisition and compensation process for BIAL

The construction of BIAL commenced in 2005[130] and the airport was inaugurated in 2008[131]. It comprised the acquisition of vast tracts of land and the displacement of local communities. The effectiveness of the land acquisition policies at that time and the adequacy of the compensation schemes have been subjects of criticism and debate. The construction of the airport was carried out as per the Land Acquisition Act of 1894 (replaced later by the Land Acquisition, Rehabilitation, and Resettlement Act of 2013). The airport was constructed on a BOOT model through a PPP by Siemens and LandT.[132] A BOOT model stands for Build, Own, Operate, and Transfer. It is a form of Public-Private Partnership (PPP) where a private entity is given the responsibility to build a facility, own and operate it for a set period (usually 20-30 years), and then transfer the ownership back to the government or public sector after the concession period ends. This model allows the private entity to recover its investment and earn profits during the operational phase before handing it over.

The airport was first conceived by the TATA led consortium in 1991, who walked out due to delay in clearance. Later the Airports Authority of India (AAI) and Karnataka State Industrial and Infrastructure Development Corporation (KSIIDC) signed an MOU. It was only in 2000 that bidders

[130] Vasundhara. (2023, June 6). Kempegowda International Airport, Bengaluru, India. *Airport Technology*. https://www.airport-technology.com/projects/kempegowda-international-airport-bangalore/
[131] India Today. (2008, May 24). New Bangalore airport opens to traffic sans fanfare. *India Today*. https://www.indiatoday.in/latest-headlines/story/new-bangalore-airport-opens-to-traffic-sans-fanfare-256033-2008-05-24
[132] Gupta, A., Agrawal, S., and PolicyAide Consultants India Pvt. Ltd. Greenfield Airport Development in India: A Case Study of Bangalore International Airport. In PolicyAide Consultants India Pvt. Ltd.

got invited to submit a Detailed Project Report. After much delays the final clearance came in December 2004 and the project commenced in 2005.

At the time, the act allowed the government to acquire land for public purposes, including infrastructure projects, but it had significant shortcomings in terms of compensation, resettlement, and community participation. The Karnataka government acquired approximately 4,000 acres of land for the airport project under this law, displacing numerous farmers and villagers. The land was acquired mostly from agricultural communities in villages such as Devanahalli, where many were dependent on farming for their livelihoods.

The process followed the traditional top-down approach, with absolutely no participation from the affected communities in decision-making.[133] This lack of engagement led to dissatisfaction among the displaced populations, who often felt they were not consulted or given adequate time to respond to the acquisition process. The land acquisition process was often criticised for lacking transparency. Many villagers were not fully informed of the implications of the land acquisition and the details of compensation. The non-transparent methods used to determine compensation led to dissatisfaction and mistrust of the authorities.

The compensation policies and rehabilitation schemes implemented during the airport's construction are often criticised for their inadequacy and failure to fully address the needs of the displaced communities. Many of the displaced farmers were offered cash compensation based on the government-determined value of their land. According to local villagers the compensation offered was about Rs.500,000/- per acre.[134] However, this value was based on outdated benchmarks that did not reflect the market value of the land at that point of time, especially with the real estate boom that followed in the airport region. As a result, many farmers found the compensation insufficient to buy equivalent land elsewhere or to sustain their livelihoods after displacement. Lack of proper land records[135] and clarity further led to delays and dissatisfaction over the entire process of acquisition too. There were significant delays in compensation payments in many cases, and some landowners had to go through lengthy legal battles to receive adequate compensation. This added to the economic strain on displaced families, who had limited financial support during the transition period.

For those who relied on farming or local businesses for their income, there was little to no provision of alternate employment or livelihood options. Displaced farmers were not given adequate support in transitioning to new occupations, such as training, job placement, or business assistance. In some cases, displaced individuals were offered small parcels of land in alternative locations, but these plots were often unsuitable for farming or lacked basic infrastructure, further exacerbating their financial difficulties.[136]

While the government promised resettlement programs for displaced families, the new settlements often lacked proper infrastructure like water supply, electricity, healthcare, and sanitation facilities. In some instances, resettlement areas were located far from the original

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[133] Goldman, M. (2011). Speculative urbanism and the making of the next world city. International Journal of Urban and Regional Research, 35(3), 555–581. https://doi.org/10.1111/j.1468-2427.2010.01001

[134] *Purushothaman, S., PhD, Vanjari, R. S., and Azim Premji University. (2022). One Part Farmers: Villages two decades after land acquisition for the Bengaluru International Airport.*

[135] *Mehu, S. A. (2002, April 17). Major fraud in airport land. The Times of India.*

[136] *Yadav, U. (2016, November 10). Karnataka: Villagers' plight continue as Airport lands on failed government promises. The Economic Times.*
https://economictimes.indiatimes.com/news/politics-and-nation/karnataka-villagers-plight-continue-as-airport-lands-on-failed-government-promises/articleshow/55348777.cms

villages, increasing social isolation and making it difficult for communities to access work opportunities or services.

While the airport brought large-scale development to the surrounding area, the benefits did not adequately reach many of the displaced individuals. Promises of jobs at the airport or infrastructure development in resettled areas were not fully realized for many displaced families. The economic upliftment of the region largely benefited real estate developers and corporations, while the displaced communities struggled to integrate into the new economic realities.

The failure to provide adequate compensation and rehabilitation resulted in significant socio-economic impacts. Many displaced families experienced a decline in their quality of life, increased poverty, and food insecurity as they lost access to their agricultural land. Furthermore, the social disruption caused by displacement often led to issues like mental health challenges, loss of community cohesion, and migration to urban areas in search of work, which further strained local resources.

Lessons learned from BIAL

Inadequate Compensation and Resettlement: One of the most significant criticisms was that the compensation provided did not account for the long-term loss of livelihood and the psychological and social impacts of displacement. While the monetary compensation was intended to offset the loss of land, it did not replace the generational wealth that agricultural communities had built.

Failure to Ensure Livelihood Restoration: Many of the displaced populations struggled to transition from agrarian lifestyles to urban or industrial work. The failure to provide adequate skills training, employment opportunities, or alternative sources of income exacerbated poverty in these communities.

Legal Reforms: In the aftermath of these issues, India saw the need for better land acquisition laws. Civil society groups across the country had been working to bring in the amendments to the draconian Land Acquisition Act of 1894. This culminated in the enactment of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act (RFCTLARR 2013) of 2013, which includes provisions for fairer compensation, rehabilitation, and resettlement, and ensures greater transparency and community involvement in land acquisition processes.

The policies and compensation schemes implemented during the construction of Bangalore International Airport in 2005, were inadequate in addressing the economic and social needs of the displaced communities. Compensation was insufficient, resettlement was poorly managed, and the failure to provide alternative livelihoods resulted in long-term economic hardship for many displaced families.

Lessons from both, Parandur and BIAL demonstrate that while there are processes in place to undertake land-acquisition in consultation with communities, these processes fail to translate to action. Current acquisition practices reflect a lack transparency and fairness, where community voices against unjust land-acquisition practices are either not heeded or threatened, indicating a dire need for the government to embody a spirit of ‘listening’ to local communities and honoring needs voiced by them given that local communities have been inhabitants and stewards of the land for generations. Additionally, in cases where communities consent to moving away from

their land, it is vital to have rehabilitation and resettlement policies and processes that are comprehensive and ensure that communities have dignified housing, livelihood opportunities and minimal disruption to their socio-cultural fabric. Additionally, efforts must be made to ensure minimal disruption to other life forms in consultation with communities, conservation practitioners and other stakeholders knowledgeable in the realm.

Why is it that despite so many issues with and resistances to airport construction that more airport projects are constantly being announced? Who do these projects truly benefit? What about airlines that are a crucial element of the aviation industry ?What is the growth model that they follow? How are the people employed by the industry, those seeking its services and the ones located around airport projects impacted? Is the industry's growth model sustainable for them? These are a few questions that warrant unpacking to analyse the driving forces of and the justifications for aviation growth.

The next section of the report attempts to unpack the above mentioned questions.

II.C. A Critical Evaluation of Airline and Airport Growth Models in India

According to aviation industry experts, India is on track to become the globe's third most significant civil aviation market by the year 2030, with expectations to surpass both China and the United States as the leading air passenger market in the forthcoming decade[137]. Movement in this direction is being boosted by initiatives by the Indian government such as the UDAN (Ude Desh ka Aam Naagrik), launched in 2016 that aims to make air travel affordable and widespread, promoting inclusive growth and connecting underserved and unserved airports across the country[138]. As mentioned in the introduction of this report, the Ministry of Civil Aviation has detailed strategies for the industry's growth over the next twenty years to cater to the anticipated surge in passenger numbers. Two significant plans developed in this context are - a) the 'Vision 2040'[139], released in 2019, which forecasts that the volume of air travelers will surge six times to reach 1.1 billion by the year 2040, necessitating 2,359 passenger planes. It expects the movement of air cargo to increase fourfold to 17 million tonnes by 2040 and the number of airports across India to expand to approximately 200. It estimates that an estimated 150,000[140] acres of land will need to be allocated for these airport developments. b) The 'Connecting India to the world in Amrit Kaal Setting the stage for Indian Civil Aviation @ 2047'[141] plan released in 2024, which estimates that the volume of passengers will range between 1.1 billion and 1.3 billion by 2047. It is anticipated that approximately 250 new airports will be necessary, with around 30 cities that already have airports needing another one[142]. This section of the report evaluates the viability of this anticipated growth trajectory by evaluating the state of airlines and the airport development model in India. It unpacks the monetary and non-monetary costs of this growth model while highlighting who is monetarily advantaged and disadvantaged by the same. Observations are substantiated by learnings from the development of the BIAL airport as available, given that this airport was studied for the previous section of this report.

II.C.1 The Airline Growth Model and its Impacts

Airline companies and airports are facing challenges in achieving profitability in recent fiscal years. A news report on airports' financial performance in 2017 highlighted that most of the airports in

[137] *India Brand Equity Foundation. (n.d.). Indian aviation industry, aviation companies in India.* https://www.ibef.org/industry/indian-aviation
[138] *Ministry of Civil Aviation* (2025, April). Connecting India, One Flight at a Time. PIB. https://pib.gov.in/PressReleasePage.aspx?PRID=2124459
[139] Invest India. (2019, January). Vision 2040 for the civil aviation industry in India [PDF]. https://static.investindia.gov.in/s3fs-public/2020-02/VISION-2040-FOR-THE-CIVIL-AVIATION-INDUSTRY-IN-INDIA.pdf
[140] Invest India. (2019, January). *Vision 2040 for the civil aviation industry in India* [Report]. https://static.investindia.gov.in/s3fs-public/2020-02/VISION-2040-FOR-THE-CIVIL-AVIATION-INDUSTRY-IN-INDIA.pdf

[141] Federation of Indian Chambers of Commerce and Industry (FICCI), and KPMG. (2023). *Connecting India to the world in Amrit Kaal: Setting the stage for Indian Civil Aviation @ 2047* [Report]. https://ficci.in/api/pdf1/EMP?fileID=23873andfileName=5DZJHgTW5tvaL36TFjosiiVVUWKMYli67P8jl5XF.pdf
[142]Federation of Indian Chambers of Commerce and Industry (FICCI), and KPMG. (2023). *Connecting India to the world in Amrit Kaal: Setting the stage for Indian Civil Aviation @ 2047* [Report]. https://ficci.in/api/pdf1/EMP?fileID=23873andfileName=5DZJHgTW5tvaL36TFjosiiVVUWKMYli67P8jl5XF.pdf

the country were running on loss and only 13 out of 125 were making profit[143]. This trend has continued given that as per recent report from the parliamentary panel for civil aviation, only 22 out of 148 airports were running on profit as of 2023[144]. Apart from Indigo airlines, a number of other carriers like Kingfisher airlines, Deccan Airways, Jet Airways have folded in the past few years, with Spicejet fighting for survival, and Go First being the latest airline to succumb to business pressures, currently undergoing insolvency proceedings[145]. Elevated operational expenses, particularly due to aviation turbine fuel (ATF) pricing, alongside fierce competition and governmental regulations, represent significant obstacles for companies[146]. The industry is therefore extremely vulnerable to price changes within the global financial markets, given that a substantial share of airline company's revenue is allocated towards expenditures on ATF, aircraft upkeep, and leasing. ATF represents 40-50% of operational costs, plus fluctuations in ATF pricing on the international stage will directly affect operational expenses. Additionally, leasing constitutes another cost factor for operations. In India, approximately 80% of the commercial fleet is leased, with airlines disbursing around INR 10,000 crores annually in lease payments to lessors, representing nearly 15% of the revenues for Indian airlines, excluding Air India[147]. Furthermore, aircraft companies allocate 12-15% of their revenue for maintenance, repair, and overhaul (MRO) expenses. Notably, many airlines in India tend to outsource a significant portion of their high-maintenance tasks to overseas firms. For instance, Indigo, a leading player in the industry, outsources 90% of its MRO to foreign companies[148]. In essence, while covering operational costs, a sizable amount of revenue from Indian airlines is flowing out of the country, primarily towards the EU and the US. Expenses on ATF, leasing, and MRO escalate further with the depreciation of the Indian rupee, and the current state of the Indian rupee aggravates the situation, as the rupee has fallen by 27.6% against the US dollar in last 10 years, dropping from Rs 60.34 to Rs 83.38[149]. Given this context, airline companies are increasing ticket prices to meet their operational costs[150]

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[143]NDTV. (2017, March 1). *With 13 of 125 airports making profit, here's what Government is planning.* https://www.ndtv.com/india-news/with-13-of-125-airports-making-profit-heres-what-government-is-planning-1665074

[144] Sekhar, Metla Sudha, Mukeri, Zafer, Elearnmarkets, Godin, Seth, Rai, Sachenkumar, Penny, Nigel, De, Tanusree, Moore, Pam, Somani, Shraddha, and Gupta, CA Rahul. (n.d.). *Only 22 out of 148 operational airports making profit: Parliamentary panel.* The Economic Times. Retrieved April 25, 2025, from https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/only-22-out-of-148-operational-airports-making-profit-parliamentary-panel/articleshow/102433352.cms

[145] Munjal, D. (2023, May 13). *Explained: The troubles of India's aviation industry.* The Hindu. https://www.thehindu.com/news/national/explained-the-troubles-of-indias-aviation-industry/article66836343.ece

[146] Shah, D. (2024, May 18). *Why Indian Airlines struggle to be successful*. Simple Flying. https://simpleflying.com/why-indian-airlines-struggle-to-be-successful/

[147] Munjal, D. (2023, May 13). *Explained: The troubles of India's aviation industry*. The Hindu. https://www.thehindu.com/news/national/explained-the-troubles-of-indias-aviation-industry/article66836343.ece

[148] Standard, B. (2023, October 5). *90% of our MRO expenses directed to foreign firms: Indigo to moca.* Business Standard. https://www.business-standard.com/industry/news/90-of-maintenance-repair-and-overhaul-expenses-directed-abroad-indigo-123100501332_1.html

[149] Damodaran, H. (2024, April 29). *How the rupee has "strengthened" under Modi government.* The Indian Express. https://indianexpress.com/article/explained/explained-economics/rupee-modi-government-9285946/

[150]Gupta, S. D. (2024, November 5). *India's domestic air tariff up 43% in 5 years, just behind Vietnam. www.business-standard.com.* https://www.business-standard.com/industry/news/india-s-domestic-air-tariff-up-43-in-5-years-just-behind-vietnam-124110501484_1.html

[151] [152] [153], and also are enacting stringent cost-cutting strategies that raise human rights issues e.g., a report released in May 2024 shares details of the fatalities of two on-duty pilots within three months alerting flight crews, aviation safety specialists, and the media concerning the stress and exhaustion faced by flight crews employed by Indian airlines on domestic routes[154].

An examination of the current realities on the ground therefore reveal that the industry which claims that it will boost the nation's economy and create improved living opportunities is failing to provide meaningful returns. This is further enunciated by the implications and progress of the UDAN Scheme. News reports highlight [155] [156] that while the UDAN scheme has had some success in improving regional connectivity (As per the 2025 budget speech, the scheme has connected 88 airports and operationalized 619 routes[157]. However, of the 619 routes, nearly 370 are currently active while the remaining have fallen into disuse), its heavy reliance on subsidies, challenges with route viability, lack of sufficient infrastructure, and limited airline participation raise questions about its long-term sustainability. Operational challenges, safety concerns, and environmental impacts further complicate its execution. UDAN also negatively impacts established airlines that are not benefiting from the same subsidy structure this is evident from the fact that at the time of the launch of the scheme, this Regional Connectivity Schemes (RCS) levy on non-UDAN flights was INR 5,000 at the time of initiation of the scheme which was gradually raised to INR 6,500 from April 1, 2023 to April 30, 2027. A government order released on October 21, 2022 raising the levy to INR 10,000, and subsequently INR 15,000, was opposed by airlines and later rescinded[158].

The issues detailed above are indicative of the need to evaluate the current airline development model and identify pathways to minimize issues experienced by passengers, airline companies and employees. While the government is making a few attempts to minimize issues experienced by passengers and airlines associated with the UDAN scheme[159], there is a need to devise strategies that are holistically healthy for all members associated with and impacted by airlines.

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[151] Hindustan Times. (2025, April 25). *IndiGo CEO addresses issue of rising airfare, says prices in India are 'most competitive globally'*. Hindustan Times. https://www.hindustantimes.com/trending/indigo-ceo-addresses-issue-of-rising-airfare-says-prices-in-india-are-most-competitive-globally-101745136919198.html

[152] The News Minute. (2015, March 6). *Survey finds Chennai airport is among the worst in Asia, because it stinks.* The News Minute. https://www.thenewsminute.com/tamil-nadu/survey-finds-chennai-airport-among-worst-asia-because-it-stinks-35337

[153] India Today. (2024, December 2). *Flight tickets and food deliveries to cost more this holiday season?* https://www.indiatoday.in/business/story/jet-fuel-commercial-lpg-price-increase-air-travel-flight-tickets-eating-dining-food-delivery-expensive-2643528-2024-12-02

[154] Bandyopadhyay, O. (2024, May 10). *India's airline pilots: Fatigue reports prompt safety worries*. British Safety Council India. https://www.britsafe.in/safety-management-news/2024/india-s-airline-pilots-fatigue-reports-prompt-safety-worries

[155] Financial Express. (2024, August 31). *UDAN scheme to be extended and revamped: How will it benefit airline operators and what are the challenges ahead.* https://www.financialexpress.com/business/airlines-aviation-udan-scheme-to-be-extended-and-revamped-how-will-it-benefit-airline-operators-and-what-are-the-challenges-ahead-3597573/

[156] The Hindu. (2025, February 1). *Modified UDAN scheme to connect 120 destinations to be launched:.* https://www.thehindu.com/business/budget/modified-udan-scheme-to-connect-120-destinations-to-be-launched-sitharaman/article69167493.ece

[157] Government of India, Ministry of Finance. (2025, February 1). Budget 2025-2026: Speech of Nirmala Sitharaman, Minister of Finance. https://www.indiabudget.gov.in/doc/budget_speech.pdf

[158] The Economic Times. (2025, February 1). Union Budget 2025: *Modified UDAN scheme to have 120 new destinations.* https://economictimes.com/industry/transportation/airlines-/-aviation/union-budget-2025-modified-udan-scheme-to-have-120-new-destinations/articleshow/117818862.cms

[159] India, Ministry of Civil Aviation. (2024, December 9). *Rising airfares and passenger rights* (Rajya Sabha Unstarred Question No. 1471). Sansad. https://sansad.in/getFile/annex/267/AU1471.pdf?source=rajyasabha

II.C.2. The Airport Infrastructure Growth Model and its Impacts

The National Infrastructure Pipeline (NIP) portal[160] is an initiative by the Government of India designed to offer a transparent, centralized platform for tracking and managing infrastructure projects across the country. The portal showcases a comprehensive list of around INR 15,000 odd projects, spanning various sectors such as energy, transportation, water, and social infrastructure. It serves as a critical tool for investors, providing information on investment opportunities, and facilitates better project monitoring by offering updates on progress. It emphasises public-private partnerships (PPPs), encouraging collaboration between the government and private sector to drive infrastructure development. [161] This initiative is a part of India's broader strategy to boost economic growth by investing INR 111 lakh crore (around USD 1.5 trillion) from 2020 to 2025 in infrastructure, aiming to meet the country's future urban and economic needs. The modes of implementation for infrastructure projects provide insight into how these projects are financed and executed.

As per the NIP there are currently 12,049 projects under the Engineering, Procurement, and Construction (EPC)[162] model, 1,813 under Public-Private Partnership (PPP)[163], 274 fully private projects, and 734 projects in the pipeline. These modes of implementation vary based on context, contracts, and available financial agreements, as well as factors like return on investment (ROI).

In the context of the aviation sector, various players provide distinct allied services that are crucial to the ecosystem of an airport. These players focus on different areas, ensuring that operations run smoothly and efficiently. The players comprise investors and service providers looking into aircraft maintenance, repair, and overhaul (MRO) , technology and digital infrastructure management, safety and security, cargo and logistics. This complex ecosystem requires collaboration between various stakeholders to ensure the efficient delivery of services, highlighting the multifaceted nature of airport operations. In this report, we will only focus on the construction and expansion ecosystem, which is the first stage of setting up an airport.

As per the NIP portal there are:

- PPP- 9 projects.
- EPC- 25 projects.
- Private -5 projects under aviation.

This reveals that the majority of core aviation construction is financed by the government. There is evidence of a growing demand for PPP given that industry experts highlight that the Ministry of

[160] National Portal of India. (n.d.). *Infrastructure*. https://www.india.gov.in/infrastructure
[161] Press Information Bureau. (2020, August 10). *Finance Minister launches an online dashboard for the National Infrastructure Pipeline*. https://pib.gov.in/PressReleasePage.aspx?PRID=1644785
[162] In an EPC project, a single contractor or consortium is responsible for the entire project, from detailed design through to procurement and construction, culminating in the handover of the completed asset to the client. Source: Wikipedia contributors. (2025, April 28). *Engineering, procurement, and construction*. In Wikipedia. https://en.wikipedia.org/wiki/Engineering,_procurement,_and_construction
[163] In a PPP, a government agency partners with a private company to finance, design, implement, and operate projects that traditionally fall under public sector management. Source: World Bank Group. (n.d.). *Public-private partnerships*. https://ppp.worldbank.org/public-private-partnership/overview/what-are-public-private-partnerships

Civil Aviation is developing Public-Private Partnership (PPP) modalities to privatise 25 airports under the National Monetization Pipeline.[164]

The major players in the aviation space today are Adani[165] and GMR. Adani controls almost eight airports in the country. The airports were built by AAI and given to Adani to manage and operate the airport. While each contract might be different and is not available to the public scrutiny, a part of the passenger service fee, 30 to 40% revenue from non-aeronautical sources like retail and real estate is shared with the government, the government also bears a portion of the maintenance cost.[166]

Given the massive scale and long-term nature of airport projects, the private sector's involvement is crucial, given that the government will not have any more employees on their roll, and that everything in this country will be contracted[167]. The PPP model has therefore become the preferred choice for airport development because it allows the government to leverage private sector expertise and financing, while sharing both the risks and rewards. In large infrastructure projects like airport construction, there is often a significant imbalance in how risks, resources, and benefits are distributed - the land used for such projects typically belongs to the local people, whether it is public land or acquired from local communities[168]. This land, which is often central to people's livelihoods and heritage, is handed over, sometimes through forced displacement, to serve the project's needs. Despite this, the revenue generated from the airport's operation usually flows into private hands, as private companies or consortiums manage and profit from the facility once it is built. Thus, public resources and risks are used to enable private profit, creating a system where the local community bears the costs but reaps few of the financial benefits.

Box [26] illustrates the PPP model adopted for Bangalore International Airport Limited (BIAL) and the impacts of the construction on the lives of local communities.

Box 26: Case of Bangalore International Airport Limited (BIAL)

In the case of the Bangalore International Airport (BIAL), the Concession Agreement, Shareholders' Agreement, and State Support Agreement collectively establish a framework that heavily favours private stakeholders at the expense of public interest and consumer welfare[169] - The Concession Agreement, Shareholders' Agreement, and State Support Agreement are critical legal documents that govern the operations, financial structure, and governmental support of major infrastructure projects. The Concession Agreement outlines the terms under which BIAL

[164] India Brand Equity Foundation.(n.d.). Indian Aviation Industry. https://www.ibef.org/industry/indian-aviation (last accessed: 24thApril, 2025)

[165] Economic Times. (2021). *Adani Group wins bid for six airports from AAI.* The Economic Times. https://economictimes.com/industry/transportation/airlines-/-aviation/adani-pays-2440-crore-to-aai-to-take-possession-of-6-airports/articleshow/87575511.cms

[166] Business Standard. (2020). Adani Airports' non-aero revenue share with govt at 30-40%: AAI chairman. https://www.business-standard.com/article/companies/adani-owned-mumbai-international-airport-begins-revenue-sharing-with-aai-122042600068_1.html

[167] Policy Circle. (2025). *India's workforce transformation: More contract workers, less security.* https://www.policycircle.org/policy/indias-workforce-transformation/

[168] Estache, A., and Saavedra, C. (2010). *Public-private partnerships: Lessons from the experiences of the World Bank and others.* World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/255351468134395315/public-private-partnerships-in-transport

[169] Ghosh, S. (2018). Infrastructure development and social justice: A study of India's PPP model. Economic and Political Weekly, 53(36), 60–68.

operates the airport, delineating responsibilities for development, operation, and maintenance until 2068, ensuring that all parties are aligned on the airport's long-term management. The Shareholders' Agreement details the equity structure and financial commitments from various stakeholders, including the Airports Authority of India (AAI), the Karnataka state government, and private investors, establishing the framework for investment and profit-sharing. Lastly, the State Support Agreement specifies the support provided by the Karnataka government, including land allocation and regulatory assistance, which is essential for the smooth implementation and functioning of the airport. Together, these documents create a comprehensive framework that facilitates collaboration among stakeholders while ensuring compliance with legal and regulatory requirements.

The Concession Agreement granting BIAL operational control until 2068 is fundamentally flawed in its lack of robust accountability mechanisms. This excessively long tenure enables private operators to prioritise profit over public service, with minimal fear of regulatory pushback. As a result, consumers are routinely subjected to inadequate services—ranging from frequent delays and inflated ticket prices to limited flight options—all symptoms of a system that privileges commercial gain over quality and access. Additionally, the agreement largely ignores the social and environmental obligations toward surrounding communities, entrenching a model of development that favours economic growth at the expense of equity and sustainability. Compounding this is the Shareholders' Agreement, which entrenches power in the hands of dominant private stakeholders. These actors wield disproportionate influence over strategic and operational decisions, sidelining public interest. The lack of transparency around financial flows and institutional responsibilities further weakens democratic oversight. This opaque, profit-driven governance model severely limits consumer recourse and obstructs meaningful scrutiny, leaving the public with little power to question or reform decisions that directly affect their mobility and rights.

The State Support Agreement exemplifies preferential treatment, where the Karnataka government provides extensive land allocation and regulatory support to private stakeholders, often sidelining local concerns[170]. The benefits of these arrangements disproportionately favour private investors, while local communities face displacement and adverse consequences, often without adequate compensation.

This is the case of many other airports that are planned, developed and implemented following the PPP model.

Impacts on the lives of local communities:

The BIAL project required a vast amount of land in and around Devanahalli, led to the displacement of several villages and the uprooting of agricultural communities. The primary issues revolved around inadequate compensation, poor resettlement planning, and the socio-economic impact on displaced families. While the government offered compensation under the Land Acquisition Act of 1894 , the compensation that was paid was much lower than the market value prevailing at those times between 1991-2007. Compensation was obtained through bank accounts and those who did not have bank accounts got cheated by brokers and others who offered to help them out. Additionally, the resettlement process itself was poorly planned and executed. There was no comprehensive rehabilitation plan in place to help displaced families adapt to their new situations. Many displaced villagers struggled to rebuild

[170] Khanna, R. (2019). *Public Interest vs. Private Gain: A Critical Analysis of Infrastructure Development in India*. Journal of Development Studies, 55(2), 145-159.

their lives due to the lack of adequate infrastructure, services, and support in resettlement areas. Resettlement colonies were promised to those displaced, but the infrastructure in these areas was often lacking. Basic facilities like water supply, sanitation, and electricity were either unavailable or poorly maintained in many of the relocation sites. In many cases, the resettlement colonies were located far from the villagers' original lands and places of livelihood. This physical displacement, combined with the absence of alternative livelihood opportunities, made it difficult for displaced families to adjust to their new environments.

The resettlement process not only displaced individuals but also disrupted long-standing community networks. Families that had lived together for generations were scattered, weakening social bonds and community support systems. This social dislocation was particularly challenging for older generations and women, who were more dependent on traditional social structures.For many displaced communities, their connection to the land and agricultural traditions was central to their cultural identity. The loss of their land and the shift to an urban or semi-urban environment caused significant cultural dislocation, leading to a loss of identity and traditional ways of life[171].

The case of resettlement in Arasinakunte and Gangamuthanahalli:

Two villages that were completely erased from the map were Arasinakunte and Gangamuthanahalli. The families from these villages were placed far from their villages in another village called Balepura. Many of the displaced families found themselves marginalized in the new urban environment, struggling to access basic services, secure stable employment, and integrate into the local economy. This created long-term socio-economic challenges for these populations.With no support to rebuild their homes, many settled for thatched roofs and tarpaulins , given that it was the rainy season. Essential services became a dream. The new area had no provision of water, sanitation, public health centre, PDS facility, schools or even burial grounds for the dead. More importantly, they had no access to grazing pasture or a place for their cattle, sheep, goats and hens. The plot sizes were way too small compared to the homes where they had managed animal rearing too. This also resulted in distress sale of the animals, thereby leaving them devoid of a possible livelihood too. They had to negotiate for every little service and it took many years for these families to even rebuild proper homes. Many children discontinued their schooling and many opted to get into the workforce to meet ends at the household level. It is these families who had to bear the burden of the airport for no cause of theirs. And it is these families who have been pushed into deep intergenerational poverty. Studies to capture their struggle are few.

Public land is also used as a means to 'cross-subsidize airport projects', wherein while an airport itself may incur operational losses, entities e.g. companies under the PPP offset these by utilising the additional land acquired for commercial ventures, such as hotels, resorts, shops, and residential developments[172]. This strategy not only enhances the financial viability of the airport project but also maximises revenue generation from non-aeronautical sources. Therefore, once an airport is sited and the construction begins, the land around it automatically integrates to shape residential, recreational, commercial, and industrial complexes strategically close to the airport. It builds all the economic, social, cultural and environmental activities around it, transforming it into a new city with diverse growth and services. The airport becomes the real

[171] Rao, Bhargavi and Saldanha, L (2014-15) *Field notes on the Socio-Ecological Impacts of the Bengaluru International Airport* [Unpublished field notes]
[172] *CAPA Centre for Aviation. (2019). The Role of Non-Aeronautical Revenue in Airport Financing*

estate developer, luring all non-airport-aviation activities around it.[173] This is the aerotropolis model that largely caters to the elite, with new urban centres, where the airport is at the core. This model is far from nurturing the lives and livelihoods of the region's original inhabitants, thereby excluding a large section of the local population. In this new model public parks, walkable streets, and other public spaces that otherwise enhance participatory governance will be completely absent. It is a place for private businesses, the state bureaucracy, transnational corporations, and high levels of security to operate, maintain, and manage the region. The region habitually soon integrates with Special Economic Zones that enjoy all the subsidies from the state governments, including tax holidays. Implementing smart city projects in these regions is another added asset. A study on Smart cities indicated how rich neighbourhoods were habitually selected for the implementation while poorer neighbourhoods suffered with lack of basic amenities across the country.[174] An example of a mushrooming aerotropolis is illustrated in Box [27].

Box 27: The BIAL Airport Aerotropolis

While the BIAL airport was being built, large tracts of land were amassed, foreseeing growth and expansion. An airport centric ecosystem came up immediately. While much of Bengaluru as a city is still grappling with the expansion created by the Information Technology and the Biotechnology sectors from the northeast to the southeast, the new airport located in the north of the city has set the trend for the emergence of an airport city.[175] Since it was launched in 2008, the area around the airport has got built up with land being earmarked to diverse sectors to create an Information Technology Investment Region (ITIR)[176]. An Aero Park and hub are being built to bring the companies closer to the airport for operational convenience. Hotels and resorts have sprung up enhancing the hospitality infrastructure of the region. Air cargo got a boost with a cargo complex, which includes warehousing, distribution, centres and other infrastructures to support cargo operations. Residential projects also have increased. It is a vibrant business district with a mix of office spaces, retail, hospitality and entertainment.

The same organization that took over airport operations created the ecosystem - Bangalore International Airport Property Developers Pvt. Ltd. (BIAAPA). BIAAPA is a parastatal. It is partly owned by the government, to carry out public services that the government deems important. Yet, they function independently to ensure operational efficiency. BIAPPA's role is to maximise the economic potential of the land around the airport, contributing to revenue streams beyond just airport operations. Recently Adani bought 74% stakes in BIAL.

Parastatals are often scrutinised for inefficiency or corruption because they straddle public and private. Parastatals often struggle because they are expected to serve two masters: public service and commercial viability.[177] These entities, while established to serve public interest, sometimes suffer from governance issues, excessive political interference, and a lack of transparency, leading to inefficiency or corruption.

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[173] Bridger, R. (2015, March). *What is an Aerotropolis, and why must these developments be stopped?*
[174] Dwivedi, G., and Gomezs, K. (2022). *7 Years of Smart Cities Mission, India - A Review*. www.cenfa.org.
[175] ACI Asia-Pacific and Middle East. (2024, May 24). *The future of business, hospitality and entertainment: Two million square feet business park and 775 keys hotel set to transform Bengaluru Airport City*. https://www.aci-asiapac.aero/page/detail/840
[176] Kumar, C. (2018, January 25). *Government plans to revive the much-delayed ITIR project.* The Times of India.
[177] McKinsey and Company. (2023). *The rise of hybrid governance.* https://www.mckinsey.com/industries/public-sector/our-insights/the-rise-of-hybrid-governance

Local governments silently support such mega infrastructure projects. To the city's local government it is the hope to enrich the city's economy. The power structures within the local governments, too, nurture the processes that impair democratic processes in decision-making. They undermine the constitutionally mandated governance through local governments, as per Constitutional amendments made in 1992, namely the 73rd and 74th Panchayat and Nagarpalika Acts. For Bengaluru, BIAAPA is not the first case; the Electronics City Industrial Township Authority (ELCITA), had already set an example where it had weakened the local government[178]. These undemocratic models will play a crucial role in shaping the cities of tomorrow.

One of the most direct impacts of urbanisation e.g., in spaces dominated by agriculture is the conversion of agricultural land into residential, commercial, and industrial spaces. As the airport becomes the centre around which the region begins to urbanise, fertile land is often consumed by urban sprawl, leading to a reduction in agricultural productivity. Infrastructure development such as roads, railways, and new townships fragment farmland, making it difficult for farmers to cultivate efficiently. This reduces yields and forces farmers to abandon agriculture. As urban expansion increases the demand for land, speculation often drives up the prices in hinterland areas. This often leads to the displacement of local farming communities and a shift from traditional agriculture to more lucrative urban-oriented activities like real estate. Airport construction also demands vast quantities of water which keeps augmenting as industrial and commercial activities mushroom. While cities often source their water from rivers, lakes, and groundwater located in hinterlands, such urbanisation contributes to water scarcity in rural areas, where access to clean water is already limited. Untreated sewage, industrial effluents, and solid waste from the expanding urban areas often end up in water bodies located in hinterlands. Polluted rivers and lakes make it unsuitable for agriculture, fisheries, or even human consumption in the rural areas. Many residents of rural areas move away from traditional agriculture to seek jobs in urban-centric industries, construction, or services. Small farmers and landless labourers are especially vulnerable to economic displacement, leading to increased inequality between urban and rural populations. These statements are validated by 86-year-old Krishnamurthy, who in a focus group discussion, raised critical questions regarding the Parandur airport project (as described in section II.A) , pointing out that the state stands to gain little while local communities face significant losses. He asked, "What is the state gaining from this project?" He outlined that the land, once belonging to the people, is being leased to private entities for a mere fraction of its worth, with the income generated shared with the government, which will receive only a small percentage. He highlighted that the state is likely to borrow funds from investors, particularly from the Middle East, to finance infrastructure projects, burdening the country's fiscal balance with high-interest repayments. The adverse effects on local communities, including the closure of schools and hospitals, family disruptions, and increased poverty, were also emphasized. Krishnamurthy argued that there isn't a pressing need for a new airport, as reports indicate low passenger turnout and cancelled flights. Additionally, he warned that the construction would disrupt natural water flow, exacerbate flooding, and negatively impact local biodiversity[179]. He expressed concern that the airport's development serves the interests of the wealthy, who already have access to existing infrastructure, while the community suffers the consequences.

[178] Idiculla, M. (2015, August 27-29). *Who Governs the City? The Powerlessness of City Governments and the Transformation of Governance in Bangalore.*

[179] *Online Desk. (2024, October 4). 10 flights cancelled at Chennai Airport due to low passenger turnout. Dtnext.in.*

The multi-faceted impacts of air travel on local communities, airline operators, airline employees, passengers, other living systems and other stakeholders discussed in the report highlight a dire need for governments, corporates and citizens to evaluate alternatives that can support meeting domestic travel needs in ways that are minimally invasive to the planet and the humans and other living systems in relationship with it.

The next chapter of this report shares a comparative analysis between a few facets of rail and air travel to support informed decision making when choosing one's mode of travel as a citizen/businessperson. The analysis can also inform policy makers and implementation entities working in the transport infrastructure development sector.

III. Understanding Air Travel as an Unviable Mode of Transport in Comparison to Rail Travel

Given that the current growth in air travel is driving the political-economic paradigm while proving calamitous for the biosphere, it is crucial to evaluate sustainable transportation alternatives that support domestic regional connectivity and are socio-ecologically and economically viable for both, the beings who depend on them and the ecosystems they affect. This section presents a comparative analysis between airways and railways to enable travelers to make informed decisions on the sustainable mode of transport. This section critically reviews the budgetary allocations for railways versus airways and the government's focus on infrastructure for the commons versus the infrastructure for the elite; inconsideration of.

This section delves into a comparative analysis of railways and aviation based on the following themes:

A. Rail and air travel service offerings.
B. Environmental impact.
C. Employment generation, nature of employment, job security and working conditions.
D. Travellers served, budgetary allocation and expenditure.

High-speed trains such as the Vande Bharat and Tejas Express—which support intercity travel—are specifically focused on for certain comparative analyses, as they are more viable for people engaged in business travel due to their time efficiency as compared to other long-distance trains. Although the railway infrastructure expansion projects have been found to cause negative socio-economic and ecological impacts similar to those of airways, this section evaluates these impacts and explains how railways could still be considered a sustainable mode of transport.

III.A **Rail and Air Travel Service Offerings**

Railways and airways offer a range of services to support travelers transportation needs ranging from seating arrangements, food arrangements, accessibility, affordability, baggage keeping facilities etc. Evaluating the characteristics of these offerings is one step in the direction of supporting informed decision making when privileged to choose between the two modes of travel.

This section comprises 2 tables: Table [11] provides a comparison of general rail and air travel experiences and offerings that are determined based on available literature and the report authors' observations from train travel , while Table [12] shares a comparison between both modes of travel with parameters that are specifically curated to highlight the difference in offerings between airlines and the Vande Bharat train due to its high-speed, which might make it

more preferable for business travelers. The Bengaluru-Chennai route has been chosen for this evaluation given that this report has highlighted the impacts of the BIAL and the proposed Parandur airport which are located in Benguluru and Chennai, respectively.

Table 11: Comparison of Rail and Air Travel Offerings

Criteria	Rail travel	Air travel
Travel time	- Longer journey as compared to air travel. - Allows for 'slow travel' with family and friends.	- Shorter travel time as compared to rail travel.
Seating	- Sleeper seats in Indian trains offer more leg-room and wider seats compared to economy class on most aircraft. - Chair Car (CC) seats in Indian trains have similar leg room compared to economy seats in planes. - Passengers can walk about the train if they feel the need for body movement.	- Most airlines operate with narrow economy class seats and limited legroom to maximize passenger capacity and reduce operating costs. - Business class seats have more leg space than economy class seats. - Passengers are largely confined to their seats and moving around is discouraged. The lack of flexibility to move about can feel particularly uncomfortable during long-distance flights.
Connectivity to city centres	- Railways are generally closer and have good connectivity to city-centres.	- Airports are often located far from city centers.
Affordability	- Multiple fare travel compartments to suit the paying capacity of people spanning most socio-economic classes.	- High base fares with additional hidden costs are therefore accessible to people from middle class and more affluent classes based on their social context.
Baggage policies	- No baggage limits.	- Strict baggage limits and high fees for excess baggage.
Food services	- Meals are available at prices affordable to most socio-economic classes of	- In-flight meals on domestic and short-haul international flights have

	travelers, with options to purchase from food cooked in the train pantry (when available) or food vendors passing through the train.	prices that are often marked up significantly compared to regular retail prices.
Infrastructure (Railway station and Airport)	- While the Ministry of Railways is planning the redevelopment of major stations in metro cities through Amrit Bharat station scheme[180],many mid-size and smaller stations warrant upgrades from the perspective of sanitation and hygiene, safety and lighting, and other basic facilities.	- While several major airports in India have undergone infrastructural changes, many still struggle with operational inefficiencies that impact passenger experience e.g. bottlenecks at security and immigration, limited terminal space, insufficient seating and waiting areas, manual check-in and baggage systems, etc.
Freight and cargo	- Supports bulk cargo at affordable costs per ton-km.	- Limited cargo space and high freight costs.
Hygiene and cleanliness	- Cleanliness varies across different travel compartments, with the AC compartments being relatively cleaner than non-AC ones. However, cleanliness also varies across different categories of AC classes, with the classes with more expensive tickets receiving more attention to clean bathrooms and compartments. - There are concerns over sanitation at stations and the need for better waste management.	- Cleanliness standards are similar across both economy and business class. - There are complaints about airport restroom maintenance.
Ticket booking services	- Considering a larger section of people rely on train travel,	- Air tickets offer last-minute flexible booking options and

[180] Press Information Bureau. (n.d.). *1275 railway stations have been identified under Amrit Bharat Station scheme*. https://pib.gov.in/PressReleseDetail.aspx?PRID=1911975

	booking train tickets requires sufficient pre-planning through online portals, authorized agencies, or the Tatkal services.	dynamic pricing models, which tends to be more expensive and thus more accessible to upper-class travelers.

Sources : a) Travel experience, connectivity, affordability, baggage policies, onboard services, infrastructure, freight and cargo - Pandey, S. (2020, February 26)[181] b) For Hygiene and Cleanliness in trains [182]- Das, A. K. (2019, c) For Hygiene and Cleanliness in flights - India, T. O. (2025, February 10)[183]

Table [12] shares a comparison of travel by air and rail (by Vande Bharat) on the Bengaluru-Chennai route.

Table 12: Comparison of Travel Efficiency on the Bengaluru–Chennai Route: Vande Bharat Express Versus Air Travel.

Factor	**Rail Travel (Vande Bharat)**	**Air Travel**
Ticket cost	- INR 400 – INR 800 (AC Chair Car), higher for Executive Class.	- INR 3,000 – INR 5,000 (Economy Class).
Accessibility to airport/ train station from city-centre	- Minimal travel time, as railway stations are centrally located.	- The airport is approx. 60 km from the city centre.
Duration of travel	- 5-6 hours	- 2 hours
Seating arrangements	- Seating arrangements are similar to aircraft with limited leg room, with Chair Car (CC) seats having less space than Executive Chair Car (EC) seats. - Passengers have the	- Limited leg room with Economy Class seats having lesser space than Business Class seats. - Passengers are largely confined to their seats, and moving around is discouraged, therefore

[181] Pandey, S. (2020, February 26). *India's Aviation Industry Has An Unlikely Competitor -The Railways*. India Infra Hub. https://indiainfrahub.com/main-featured/aviation-competitor-railways/

[182] Das, A. K. (2019, January 19). *Indian Railways: Passengers give thumbs down to toilet cleanliness on major trains - . The Wire.* https://thewire.in/government/toilet-cleanliness-indian-railways-survey

[183] India, T. O. (2025, February 10). *Airport pet peeve: Passengers raise a stink over dirty washrooms*. *The Times of India*. https://timesofindia.indiatimes.com/city/kolkata/airport-pet-peeve-passengers-raise-a-stink-over-dirty-washrooms/articleshow/118126330.cms

	flexibility of walking in the train during the journey if they feel the need for body movement.	giving passengers limited opportunities to pay attention to body movement needs.
Food cost	- Food prices are more affordable than flights but higher than other long-distance trains with pantries.	- Food costs are exorbitantly higher than regular food costs[184]

III.B. Environmental Impact

While railways and airways offer essential transportation services, they also pose environmental challenges that demand closer examination. Table 13 provides comparative insights into the environmental impacts of railways and airways across several dimensions – carbon emissions, land use, noise pollution, and their effect on other life forms. Similar to section II of the report, this section uses travel between Bengaluru and Chennai as the basis for comparison given that this report has focused on airport projects in both these cities. Special attention is given to the impacts of the Vande Bharat wherever applicable.

Table 13: The Environmental Impacts of Airlines and Railways

Category	Airlines	Railways
Carbon emissions	A single Airbus A320 aircraft with a capacity of 180 passengers emits approximately 80-90 $kgCO_2$ per passenger for a 560 km journey.[185]	The electrified Vande Bharat train, powered by a mix of conventional and renewable energy sources, emits only 6-8 $kgCO_2$ per passenger for the same distance, even at full capacity (1,000-1,200 passengers). This highlights a significant reduction in per-passenger emissions, with trains being nearly 10-15 times more carbon-efficient than flights.[186]

[184] Aravindh, S. (2024, January 9). *Fliers flag up to 15-Fold Higher MRP on food sold onboard flights. NDTV Profit*. https://www.ndtvprofit.com/nation/fliers-flag-up-to-15-fold-higher-mrp-on-food-sold-onboard-flights

[185] Carbon Independent. (2007). Aviation emissions. https://www.carbonindependent.org/22.html
[186] Housing News. (2024, April 24). Understanding the new Mysore-Bangalore-Chennai route. https://housing.com/news/mysore-bangalore-chennai-bullet-train-project-route-map/

Land use	The Kempegowda International Airport's Terminal 2 (T2) occupies a sprawling 255,661 m² and has an annual capacity of 25 million passengers. Its construction involved extensive land use and the transplantation of 7,900 plants, showcasing a notable environmental cost.[187]	The Vande Bharat train utilizes existing rail infrastructure, requiring no additional land use for its operations on this route. However, new projects like the Bengaluru-Chennai-Mysuru Bullet Train, sanctioned under the National Rail Plan 2019, involve minimal land disruption. 86% of the 935 km route is planned to be elevated, and 11% will pass through tunnels, minimizing changes to the existing landscape.[188]
Noise pollution	Flights generate around 85-120 dB during landing and takeoff, as measured in Environmental Impact Assessments (EIA) for airport terminals.[189]	Vande Bharat trains produce noise levels of 70-80 dB near the tracks while running. Electric trains like Vande Bharat generate less noise than standard diesel trains due to smoother mechanics and the absence of combustion engines, as confirmed in standard literature on electric train systems.[190]
Global transport emission contribution	According to the International Energy Agency (IEA), aviation accounts for 5% of global transport emissions. [191]	Rail transport accounts for less than 1% of global transport emissions.
Impact on ecosystems	Airport expansions often encroach on ecosystems, leading to habitat loss. The development of Bengaluru's Terminal 2 led to the displacement of local flora and fauna, with some species struggling to adapt to transplanted	Railways, especially those optimizing existing tracks, cause fewer disruptions than airports. There are also examples where railways have attempted to minimize disruption to wildlife eg. The Bengaluru-Chennai-Mysuru Bullet Train project has incorporated elevated tracks and tunnels to minimize habitat fragmentation and ensure migratory

[187] Airport Technology. (2023). Kempegowda International Airport, Bengaluru, India. https://www.airport-technology.com/projects/kempegowda-international-airport/

[188] Press Information Bureau, Government of India. (2025). Introduction of 50 new bullet train routes. https://www.pib.gov.in

[189] Encyclopedia MDPI. (2023). Aircraft noise. https://encyclopedia.pub/entry/30773

[190] Times of India. (2022, September 30). Noise inside Vande Bharat train 100x less than that in airplane: PM Modi. https://timesofindia.indiatimes.com/india/noise-inside-vande-bharat-train-100x-less-than-that-in-airplane-pm-modi/articleshow/94571563.cms

[191] International Energy Agency. (2025, January 16). Aviation. https://www.iea.org/energy-system/transport/aviation

	environments. (Ref to section II.A.3.)	pathways for wildlife remain intact. [192]

With significantly lower emissions, reduced land-use impacts, and minimal biodiversity disruption, railways align better with long-term environmental goals.

III.C. Employment Generation, Nature of Employment, Job Security and Working Conditions

Both railways and aviation apart from serving peoples transportation needs are sectors with the capacity to offer job opportunities. Given that employment generation is one among other commonly used justifications for infrastructure development projects, this section critically evaluates the scenario of employment generation, the types of employment opportunities offered, job security and working conditions in the aviation and railway sectors, respectively.

Employment generation

There is limited data on employment generation in both the railway and aviation sectors for the last decade.

Aviation: Preliminary research suggests that the airline industry has created more jobs compared to railways on a yearly basis. As of December 2022, India's aviation and aeronautical manufacturing sectors directly employed approximately 250,000 individuals, encompassing roles such as pilots, cabin crew, engineers, technicians, airport staff, ground handling, cargo, retail, security, administrative, and sales personnel.[193] Projections indicate that the aviation sector is poised to generate an additional 100,000 jobs over the next two years, reflecting the industry's rapid expansion and increasing demand for air travel. [194]

Railways: Total jobs in railways increased from 411 thousand (2004–2014) to 499 thousand (2014–2023) indicating a 21% rise. The annual average job creation also improved from 41,000 to 50,000 jobs per year. The Garib Kalyan Rozgar Abhiyan employed 979 thousand daily wage workers across six states by September 2020.[195] New track constructions generated 33,000 effort days of employment during 2023-24 and directly employed around 500 thousand individuals. Redevelopment of 508 stations is expected to create additional job opportunities as part of the Amrit Bharat Station Yojana. However, there is no comprehensive data on the number of informally employed individuals who earn their livelihood as porters, catering services, and contractual workers.

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[192] National High-Speed Rail Corporation Limited. (2025). Environmental impact assessment for Bengaluru-Chennai-Mysuru High-Speed Rail Corridor. https://www.nhsrcl.in

[193] Direct employment in the aviation and aeronautical manufacturing sector is around 2,50,000 employees. (n.d.). https://pib.gov.in/PressReleasePage.aspx?PRID=1885687andutm

[194] Online, E. (2022, August 8). India's aviation sector likely to employ 1 lakh more people in next two years. *The Economic Times*. https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/indias-aviation-sector-likely-to-employ-1-lakh-more-people-in-next-two-years/articleshow/93432356.cms

[195] Tiwari, S. (2023, November 9). *Indian Railways takes lead in job creation, directly and indirectly*. News Station, Latest News, Samachar, Indian Railways, News. https://newsstation.media/latest-news/indian-railways-takes-lead-in-job-creation-directly-and-indirectly/shilpa-tiwari/

Nature of employment

Aviation: The aviation industry caters to fewer but often high paying individuals emphasizes on specialized roles such as pilots, air traffic controllers, aircraft maintenance engineers, and cabin crew[196]. It is apparent that these positions generally demand advanced education, certifications, and language proficiency, favoring individuals from more privileged socio-economic backgrounds who have access to such training and resources. [197]

Railways: Railways as a mass transit system offer opportunities in technical roles like track maintenance and signaling, operational roles such as train driving and ticketing, and broader support functions including station management.[198] They also provide indirect jobs which include portering, catering services etc. These jobs often cater to a wider socio-economic demographic, requiring varied skill levels and offering significant employment to individuals in rural and semi-urban areas. [199]

Job security and working conditions

Railways: Railway jobs are typically government-backed and often provide stable employment with better adherence to labor laws compared to the aviation sector. Despite documented cases of contractual workers in Indian Railways facing issues such as underpayment and lack of benefits[200], the sector's large-scale employment opportunities and unionized structure often ensure more stable working conditions. For instance, in July 2020, multiple railway unions organized nationwide protests against policies perceived as detrimental to the interests of workers[201]. These protests highlighted the active role of the unions in opposing measures that could harm them and in upholding the dignity of labor.

Aviation: Private airlines have faced scrutiny for overworking staff and inadequate compliance with labor standards[202]. Additionally the aviation sector is also heavily influenced by market volatility, fuel prices, and economic conditions, which can lead to frequent layoffs, for instance, in January 2021, Lufthansa India laid off over 70% of its India-based cabin crew, affecting 103 out of 140 employees, as part of its restructuring efforts during the pandemic [203]. Job opportunities in

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[196] Barten, M. (2024, June 6). *Aviation Careers: An overview of different aviation positions*. Revfine.com. https://www.revfine.com/aviation-careers/

[197] Sharma, N. (2025, January 8). *Careers in the aviation industry: Scope, roles, and growth opportunities in 2025 - ET Edge Insights. ET Edge Insights*. https://etedge-insights.com/industry/aviation/careers-in-the-airport-industry-scope-roles-and-growth-opportunities-in-2025/

[198] *Merementor*. (n.d.). https://www.merementor.com/library/railways

[199] *International Research Journal of Commerce, Arts and Science. (2021). Indian Railways: Its evolution and role in the development of India. 12(11). iSaRa Solutions. http://www.casirj.com/article_pdf?id=18383.pdf*

[200] PPK NewsClick Studio Private Limited. (2019, January 26). *Contractual workers: A saga of neglect by Indian Railways*. NewsClick. Retrieved January 22, 2025, from https://www.newsclick.in/contractual-workers-saga-neglect-indian-railways

[201] TriContinental: Institute for Social Research. (2020, July 2). *Unions hold countrywide wide demonstrations against anti-people policies in India*. Peoples Dispatch. Retrieved January 22, 2025, from https://peoplesdispatch.org/2020/07/04/unions-hold-coutrywide-wide-demonstrations-against-anti-people-policies-in-india

[202] Ray, P. (2024, September 26). Pilots are dying of tiredness. tech can't save them. *WIRED*. https://www.wired.com/story/pilots-are-dying-of-tiredness-tech-cant-save-them

[203] People Matters. (n.d.). *Lufthansa lays off over 70% of India cabin crew*. People Matters. https://www.peoplematters.in/news/employee-relations/lufthansa-lays-off-over-70-of-india-cabin-crew-28438

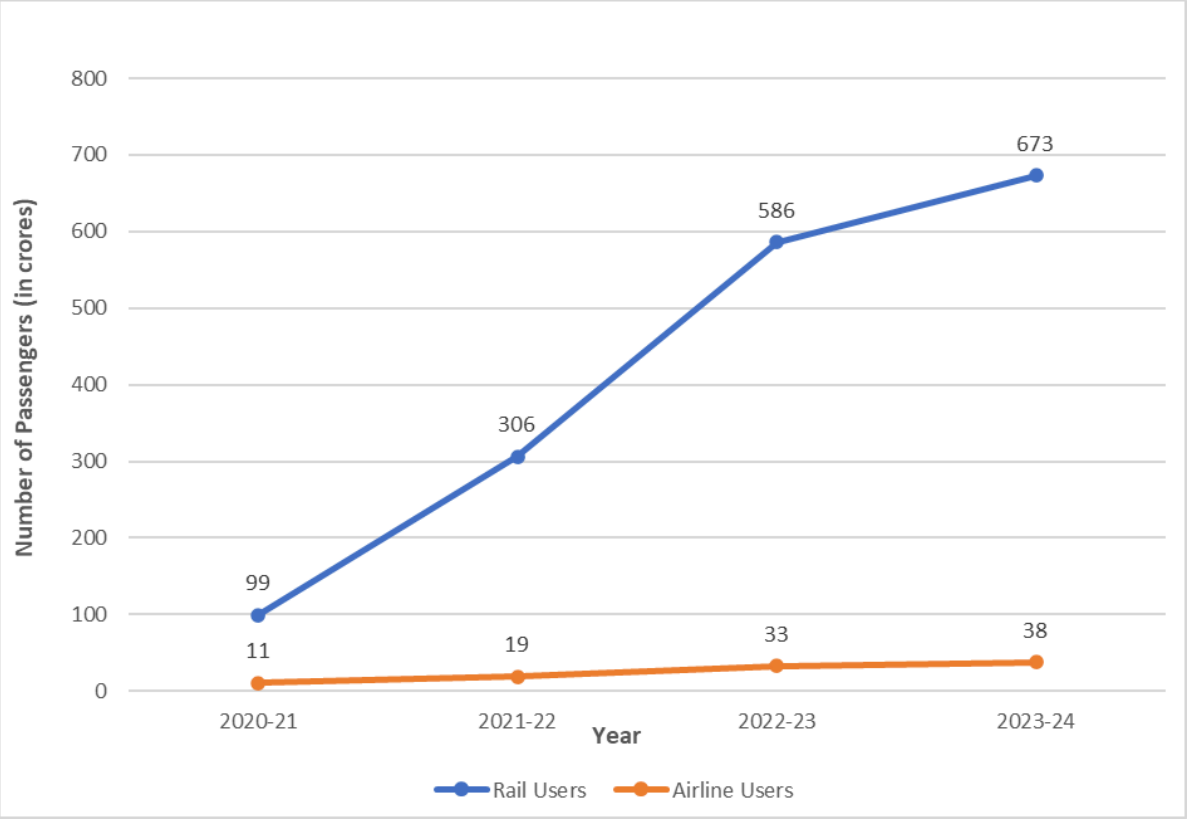
the aviation industry, while lucrative and specialized, are concentrated in urban centers and frequently subject to market volatility.

Regardless of the sector, ensuring dignity of labor remains essential. This includes advocating for fair wages, humane working hours, and safe working conditions. Whether it is a station porter in the railways or a cabin crew member in the airlines, every worker contributes significantly to the nation's transport infrastructure and deserves respect, equitable treatment, and justice for their labor.

III.D. Travellers Served, Budgetary Allocation and Expenditure

This section aims at unpacking the number of people served by railways and airways, the budgetary priorities of the government and expenditure per passenger, with the intention of evaluating the need for investments towards railway service enhancement.

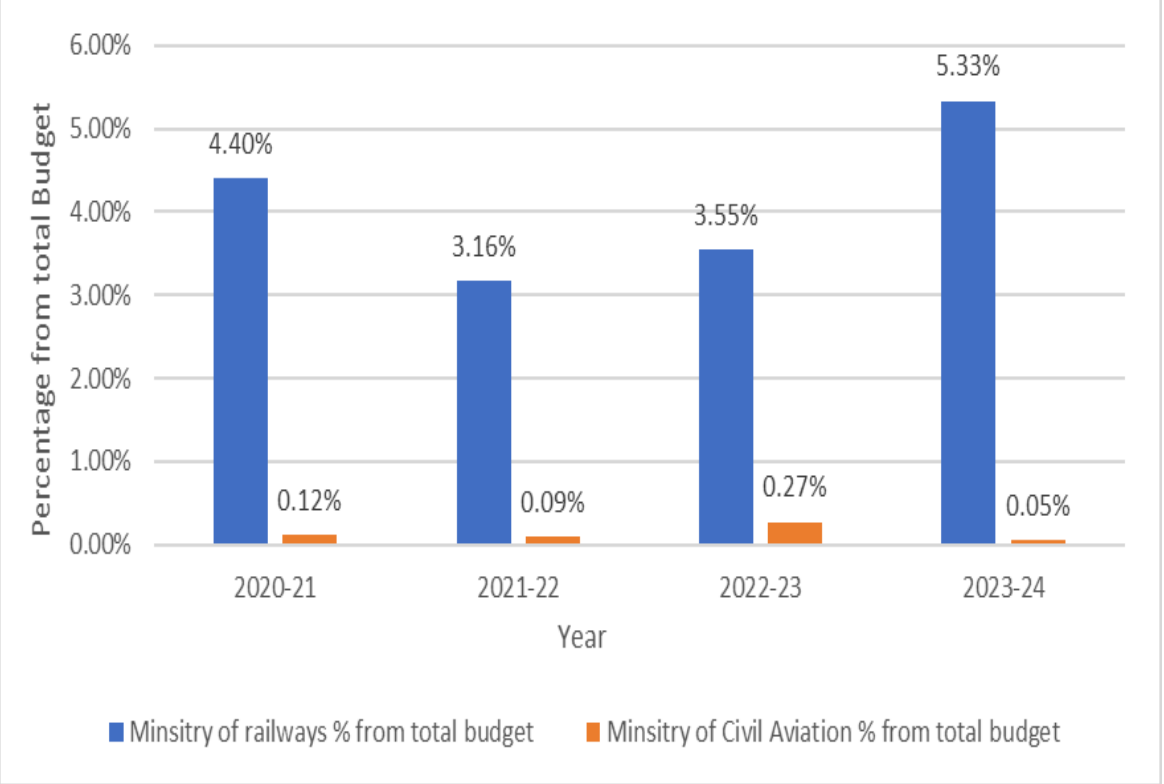
Travellers Served: The Ministry of Railways serves a vast population, with passenger numbers rising from 128 crore to 673 crore (2020-21 to 2023-24), catering to a larger demographic, while the Ministry of Civil Aviation caters to a smaller demographic, with its passenger base growing from 11 crore to 38 crore during the same time period. See graph 48.



Graph 48: Number of Passengers Served by Airlines and Railways.

(Source : Railway Passengers[204] , Airline Passengers[205])

Budgetary Allocation: In terms of budgetary allocation for both these models of transport, the railways consistently receive a larger share of the budget, whereas the Ministry of Civil Aviation receives comparatively less budgetary share when compared to railways (see Graph [49]) .



Graph 49: Budgetary Allocation for Ministry of Railways and Ministry of Civil Aviation. (Source : Budget for Ministry of Railways - 2020-21, 2021-22, 2022-23, 2023-24[206], Budget for Ministry of Civil Aviation - 2020-21[207], 2021-22[208], 2022-23[209], 2023-24[210])

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[204] Online, E. (2023, April 13). *Three years on, Indian Railways' passenger traffic remains below pre-pandemic numbers. Economic Times*.
https://m.economictimes.com/industry/transportation/railways/three-years-on-indian-railways-passenger-traffic-remains-below-pre-pandemic-numbers/amp_articleshow/99458137.cms

[205] World Travel and Tourism Council, Airport Authority of India, Ministry of Civil Aviation, MRO India, IATA, Crisil, FICCI, PWC, and DGCA. (2024). AVIATION. In *AVIATION* (p. 3) [Report].
https://www.ibef.org/download/1726049417_Aviation_August_2024.pdf

[206] The Hindu Bureau. (2023, February 1). *Budget 2023 | Highest-ever capital outlay of ₹2.4 lakh crore for Railways*. The Hindu.
https://www.thehindu.com/business/budget/budget-2023-highest-ever-capital-outlay-of-240-lakh-crore-for-railways/article66457616.ece?utm

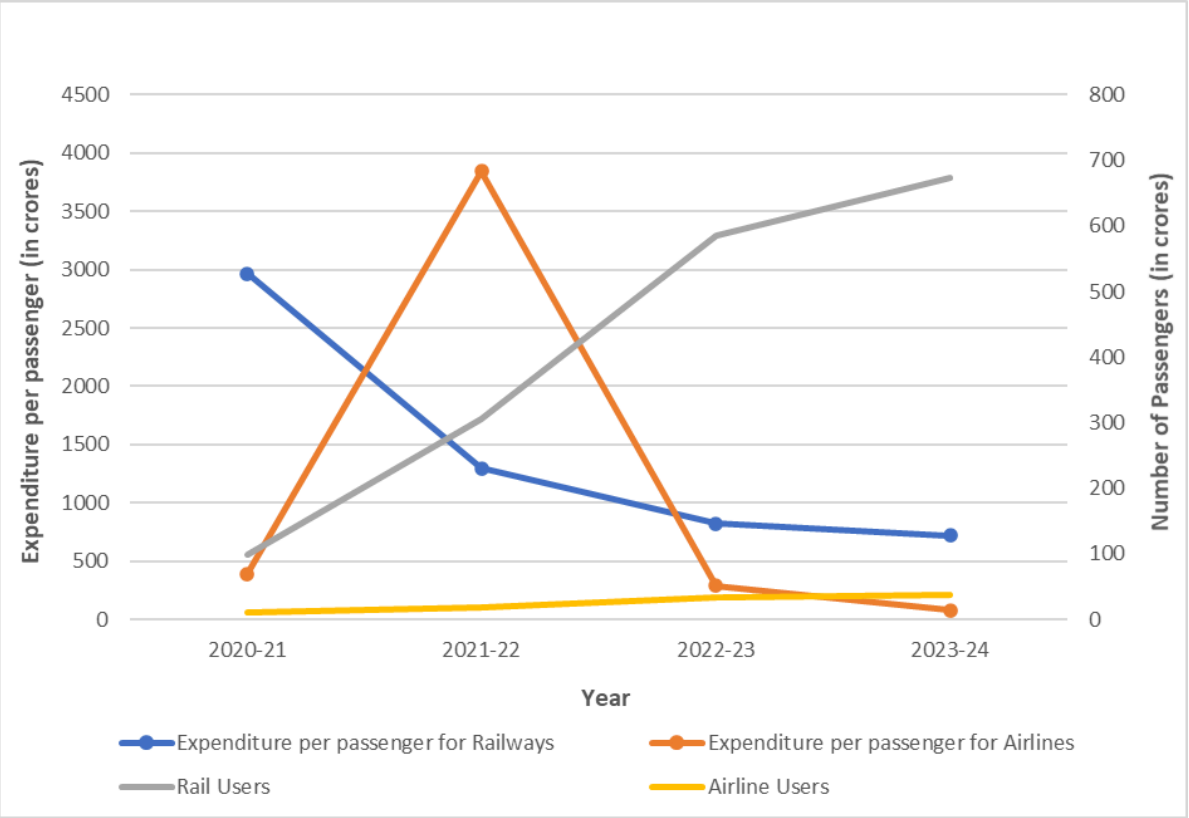
[207] Ministry of Civil Aviation. (2020). *Notes on demands for grants, 2020-2021* (No. 8).
https://www.indiabudget.gov.in/budget2020-21/doc/eb/sbe8.pdf

[208] Ministry of Civil Aviation. (2021). *Notes on demands for grants, 2021-2022* (No. 8).
https://www.indiabudget.gov.in/budget2021-22/doc/eb/sbe8.pdf

[209] PRS Legislative Research. (n.d.). *Demand for grants 2022-23 analysis: Civil aviation*.
https://prsindia.org/budgets/parliament/demand-for-grants-2022-23-analysis-civil-aviation

[210] Business Standard. (2024, July 21). *Civil Aviation Ministry gets Rs 2,357 cr budgetary allocation for 2024-25*.
https://www.business-standard.com/budget/news/civil-aviation-ministry-gets-rs-2-357-cr-budgetary-allocation-for-2024-25-124072300903_1.html

Expenditure per passenger: Although the budgetary allocation for railways is higher, its budgetary expenditure per passenger is lower than that for air travel (see Graph [50]) - The expenditure per passenger for railways reduced from INR 2292 crores in 2020–21 to INR 722 crores in 2023–24. For the aviation ministry, the spending increased to INR 3846 crores in 2021–22 from INR 389 crores the previous year, but then dropped to INR 286 crores in 2022–23 and INR 78 crores in 2023–24. The total expenditure of the Ministry of Civil Aviation for 2021-22, 2022-23, and 2023-24 is not published yet, therefore, the revised estimates of the respective years have been considered. Due to its niche user base and smaller passenger volume, the expenditure per passenger is significantly higher in aviation. Given that the railways ensure widespread connectivity at minimal costs, the lower investment per passenger raises concerns about long-term infrastructure development and service enhancement for railways.



Graph 50: Expenditure per Passenger by Railways and Airlines (Source : Aviation Statistics - 2020-21[211], 2021-22[212], 2022-23[213], 2023-24[214], Railways Statistics - 2020-21, 2021-22, 2022-23, 2023-24)

The comparison between railways and airways highlights that railways are more socio-economically and ecologically viable than airways. Information on the expenditure per passenger highlights the need for higher budgetary allocation to railways to enhance their services

[211] Ministry of Civil Aviation. (2020). *Notes on demands for grants, 2020-2021* (No. 8). https://www.indiabudget.gov.in/budget2020-21/doc/eb/sbe8.pdf
[212] Ministry of Civil Aviation. (2021). *Notes on demands for grants, 2021-2022* (No. 8). https://www.indiabudget.gov.in/budget2021-22/doc/eb/sbe8.pdf
[213] PRS Legislative Research. (n.d.). *Demand for grants 2022-23 analysis: Civil aviation*. https://prsindia.org/budgets/parliament/demand-for-grants-2022-23-analysis-civil-aviation
[214] Business Standard. (2024, July 21). *Civil Aviation Ministry gets Rs 2,357 cr budgetary allocation for 2024-25*. https://www.business-standard.com/budget/news/civil-aviation-ministry-gets-rs-2-357-cr-budgetary-allocation-for-2024-25-124072300903_1.html

given that they serve the mobility needs of the majority of the country's population rather than the few socio-economically privileged populations, who have the option of choosing air travel. Low-cost train ticket compartments must enhance their standards to ensure dignified travel conditions for all travelers irrespective of their socio-economic position. Additionally, from the perspective of enhancing the railway networks to improve surface travel connectivity wherever rail infrastructure expansion might be necessary, it is vital to recognise that, similar to airport expansion projects, there are socio-economic and ecological impacts that need to be assessed and accountably managed by the government and contractors to ensure that the expansion process is equitable and just. (Box [28] below presents an overview of the impacts of railway infrastructure expansion to draw attention to the need for responsible infrastructure expansion practices).

Box 28: The Socio-Economic and Other Impacts of Railway Infrastructure Expansion Projects on the Living Systems

While rail infrastructure provides substantial environmental benefits compared to road transport, its development in India poses challenges to humans and the ecosystem. The Bengaluru Suburban Rail Project (BSRP), expected to be operational by December 2027, aims to ease the city's traffic congestion and reduce emissions from private vehicles. The project's total estimated cost is approximately INR 7,279 crore.[215] It will span four corridors, connecting key urban and peri-urban areas, including Whitefield, Kengeri, Devanahalli, and Yeshwanthpur. However, land acquisition remains contentious, particularly in Benniganahalli and Jnanabharathi, where the section examines examples of railway projects in Karnataka to underscore the importance of responsible implementation of rail infrastructure expansion projects.

Rail Infrastructure Expansion in Karnataka: Balancing Growth, Ecology, and Equity

Rail projects in Karnataka are transforming transportation by reducing congestion and promoting sustainability and are by and large considered a more sustainable means of transport than road or air travel.[216] However, large-scale railway expansions, while enhancing connectivity, often disrupt the habitats, ecosystems and the traditional livelihoods of local communities. Understanding such impacts is crucial to achieving a balanced development approach.

Analysis of major railway projects in Karnataka

1. **Bengaluru Suburban Rail Project (BSRP)**

[215] DHNS, and DHNS. (2024, June 14). *Economic cost of cutting 32,572 trees for Bengaluru Suburban Railway Project is Rs 7,279 crore: Activists*. Deccan Herald. https://www.deccanherald.com/india/karnataka/bengaluru/economic-cost-of-cutting-32572-trees-for-bengaluru-suburban-railway-project-is-rs-7279-crore-activists-3067781

[216] Ministry of Railways. (2023). *Rail Infrastructure and Sustainable Development: Enhancing Connectivity and Reducing Carbon Footprint in India.* Government of India.

The displacement concerns of this project have sparked protests[217]. Additionally, as per the project's environmental impact assessment report, the 149-km project will require felling 32,572 trees. The compensatory plantation and environmental mitigation costs are estimated to be INR 8.07 crore.

2. Doubling of Bengaluru-Mysuru railway line

The project on the doubling of the Bengaluru-Mysuru railway line, aimed at reducing travel time and increasing capacity, was implemented in stages, with the final stretch (1.7 km at Srirangapatna) commissioned and the entire 138.3 km double line officially opened for traffic in November 2017.[218] The project itself began in 2003, with different sections completed over the years—Stage 1 (Bengaluru-Kengeri) in February 2007, Stage 2 (Kengeri-Ramanagaram) in October 2008, and the final stage (Ramanagaram-Mysuru) culminating in 2017. Electrification of the entire route was completed later, with full electrification officially inaugurated in 2024.[219] The project has improved rail efficiency between the two major cities.[220] However, its impact on local ecosystems is significant, especially in Mandya and Ramanagara districts. The expansion passes through elephant corridors, leading to habitat fragmentation and increased human-wildlife conflicts. Farmers in these regions have also expressed concerns over loss of fertile agricultural land due to track widening.[221]

3. Hubballi-Ankola Railway Line

The most controversial of Karnataka's rail projects, the Hubballi-Ankola line passes through the ecologically sensitive Western Ghats, a UNESCO-recognized biodiversity hotspot. The project, intended to improve connectivity for Uttara Kannada district, has faced stiff opposition from environmentalists and local communities.[222] Critics argue that it will be a threat to endangered species such as tigers, Malabar civets, and hornbills who live in the region. Moreover, forest-dependent human communities, particularly in Yellapur and Karwar divisions, fear losing access to traditional resources. The project is progressing through environmental clearance, detailed surveys, and planning stages with completion targeted by 2027. However, ecological

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[217] Express News Service. (2024, September 9). *December 2026 is fresh deadline for Bengaluru suburban rail's two corridors. The Indian Express*. https://indianexpress.com/article/cities/bangalore/december-deadline-bengaluru-suburban-rails-corridors-9558656/

[218] Author. (2017, November 22). Double track commissioned. Star of Mysore. https://starofmysore.com/double-track-commissioned/

[219] Author. (2017, November 22). Double track commissioned. Star of Mysore. https://starofmysore.com/double-track-commissioned/

[220] Dey, P. (n.d.). *Double railway line between Bengaluru-Mysuru opens for traffic.* Times of India Travel. https://timesofindia.indiatimes.com/travel/destinations/double-railway-line-between-bengaluru-mysuru-opens-for-traffic/articleshow/61780798.cms

[221] R.Sukumar, P., and T.G Sitharam, P. (2014). *Biodiversity and Environmental assessment of proposed doubling of railway track between Kulem and Castlerock in Goa-Karnataka.* In Rail Vikas Nigam Limited, Ministry of Railways, Government of India. Rail Vikas Nigam Limited, Ministry of Railways, Government of India. https://forestsclearance.nic.in/writereaddata/Addinfo/0_0_711112112131EIA_RVNL_Finalreport_Aug2017(1).pdf

[222] Shivnarayan Rajpurohit, and Shivnarayan Rajpurohit. (2023, January 30). *Red-flagged 11 times over green concerns, but Karnataka rail project proposal may get bigger*. Newslaundry. https://www.newslaundry.com/2023/01/30/red-flagged-11-times-over-green-concerns-but-karnataka-rail-project-proposal-may-get-bigger

concerns, legal scrutiny, and community opposition have delayed physical construction, and full environmental approvals remain pending.[223]

Table 13 below summarizes details of the predicted number of beneficiaries, estimated land required, displacement, few key considerations and the current status of the project.

Table 13: Railway Projects in Karnataka– Key Considerations and Project Status

Project	Predicted Number of Beneficiaries	Estimated Land Required (Hectares)	Displacement	Other Key Considerations
Bengaluru Suburban Rail Project (BSRP)	~5 million daily commuters (after completion)	~500-600 hectares (for stations, tracks, and infrastructure)Mostly urban land, includes green spaces and residential areas	~650 structures (residential and commercial) affected	Aims to ease traffic congestion in Bengaluru and reduce carbon emissions, but faces land acquisition and displacement issues.
Doubling of Bengaluru-Mysuru Railway Line	~1.5 million travelers annually	~300-400 hectares (for expanded tracks and station upgrades)Includes agricultural land, some forested areas, and barren land	Exact displacement statistics are not widely available, but concerns include impact on local settlements	Will reduce travel time but concerns over deforestation and impact on local wildlife

[223] DHNS, and DHNS. (2023, January 30). *Hubballi-Ankola railway line: Wildlife board for relook into proposal*. Deccan Herald.https://www.deccanherald.com/india/karnataka/hubballi-ankola-railway-line-wildlife-board-for-relook-into-proposal-1186176.html

			and farming communities	
Hubballi-Ankola Railway Line	~1 million (from better connectivity and regional development	~400-500 hectares (for railway tracks and related infrastructure Primarily forested and ecologically sensitive land in the Western Ghats	Displacement of forest-dependent communities and loss of biodiversity; specific numbers not confirmed	Important fo improving connectivity to remote areas, but is a threat to the lives of more than human inhabitants and the way of life o humans inhabiting the western ghats

These examples of Karnataka's rail projects highlight a common inequitable dimension of most infrastructure development projects - benefits tend to favor urban and industrialized areas, often bypassing rural regions and exacerbating regional disparities. For instance, projects like the Bengaluru-Mysuru track doubling risk neglecting smaller towns, leaving them underserved. Additionally, potential job losses due to privatisation,[224] and higher fares that may disproportionately affect low-income travelers [225] highlight the broader social and economic tensions surrounding rail infrastructure development.

Therefore, while train infrastructure development projects are relatively less invasive than airport expansion projects, socio-economically and ecologically responsible planning and

[224] Lahoti, P., and Wason, D. S. (2024). Why Railways aren't Privatised in India. International Journal of Social Science and Economic Research, 09(08), 2713–2728. https://doi.org/10.46609/ijsser.2024.v09i08.010

[225] Majumder, G., Ashra, S., and Tapasvi, S. (2025). *Does Indian Railways follow marginal cost pricing? A case study on its passenger business pricing through CES type cost functions.* Case Studies on Transport Policy, 101438. https://doi.org/10.1016/j.cstp.2025.101438

impact mitigation strategies should be mapped and implemented in consultation with the considerations of communities who will be most impacted by these projects.

Who makes infrastructure development decisions? Who benefits from these decisions? Who is disadvantaged by these decisions? How equitably are these decisions implemented? How can all stakeholders including governments, businesses and members of civil society make transportation related decisions that are in the interest of the people and the planet? These are a few critical aspects that warrant attention as we keep moving forward.

The next and final section shares transportation-related recommendations for IT businesses, policy makers and government agencies, and citizens rooted in the interest of our common home-the earth, and her present and future inhabitants.

IV. Recommendations

As evident from the previous sections of this report, aviation has multi-faceted impacts on the lives of people, ecosystems and the planet as a whole. Aviation's contribution to GHG emissions is ginormous (see Section I.A) and immediate measures are needed in terms of policy and action to mitigate the global heating it catalyzes to meet the Paris Agreements mission of confining temperatures to 1.5 degrees C. The growth trajectory of the industry as prevalent in the context of airlines and airports (see Section II.C) in India warrants scrutiny given its impact on local communities, people engaged in working with airlines/at airports and passengers availing these services too. There is a need to evaluate policies in favor of this expansion which disproportionately benefit large corporations. Additionally, prevailing land acquisition practices and the aerotropolis model of development contributes to multiple socio-economic distresses in the lives of humans especially those living in and around areas allocated to airports and the lives and habitats of other life forms (see Sections II.A and II.B) warranting urgent attention. Addressing these multi-faceted impacts of aviation are crucial to meeting India's Sustainable Development Goal commitments (see Section I.A) . Furthermore, the IT industry given its high dependence on aviation has a key role to play in mitigating these impacts (see Section I).

Given the high investment in commercial aviation and the fact that our planet and most of its inhabitants are at the receiving end of aviation-induced injustices, the urgency to reimagine and rethink mobility to enable 'fair travel' for planetary well-being, social equity and healthy ecosystems cannot be ignored. In this direction, Section III emphasizes the socio-economic and ecological viable mode of transport, advocating for re-evaluation of investment priorities between aviation and railways to better address the mobility needs of members of society spanning diverse socio-economic backgrounds. It also underscores the viability of train travel for domestic business trips.

The aspiration towards a fairer mobility ecosystem, therefore necessitates that multiple stakeholders reimagine and rethink the roadmaps leading towards this transition and exercise their agency to enable an equitable and sustainable travel system and practice. With this context, a few recommendations applicable for IT organizations, policy making and administration service entities and members of civil society have been listed below.

IV.A. Recommendations for IT Organizations

The assessment of business travel reduction targets and progress by companies described in section I.B. have informed the insights and recommendations shared in this section.

1. **Integrate diverse travel emission reduction strategies as part of business travel practice and policy**

   Few options to support efforts in direction of air travel emission reduction strategies that can be expanded/modified to suit the company's context are:

a) **Inventorying company specific air travel emissions:** Measuring air travel emissions and benchmarking emission intensity are initial steps in developing a targeted emission reduction pathway for air travel.

b) **Offering and mandating modal shift alternatives**: Modal shift refers to switching from one mode of transportation to other sustainable modes of transportation. In the context of air travel this means, switching to train or bus travel as they are more sustainable. To enable this, a company's travel policy can define a distance/time criteria for which the air travel can be switched to rail/bus travel. Eg. A possible way to define a modal switch travel policy can be - *For all origin-destination distances of less than 600kms or for any journey with less than 6 hours by train/bus, employees should choose to travel by train/bus as a first option, unless inhibited due to non-negotiable circumstances.* The travel booking system can support such a policy by integrating options that present alternative modes of travel available for a selected origin-destination pair chosen by an applicant.

c) **Mandating travel in best-in-class airlines:** In cases where a modal shift is not feasible, a policy mandating travel by best-in-class airlines (as available) thereby discouraging bookings with high-emission intensity airlines, can support emission reduction actions. Integrating a database of airlines emission factor ranking into travel booking systems to indicate efficient airlines to choose from as part of travel bookings can support the implementation of this policy.

d) **Mandating non-stop over multi-stop flight travel**: Multi-stop flights, particularly for long routes, are emission intensive due to multiple takeoffs and landings. Mandating the choice of nonstop flights (as available) over business-as-usual, stopover flights for key sectors can support air travel impact reduction. The travel booking system can create enabling conditions for this by providing choices and highlighting nonstop flights that are emission efficient based on diverse parameters (e.g., aircraft model, type of fuel used, etc.) that influence the efficiency.

e) **Mandating economy class travel over business class travel**: Air travel on a business/premium class ticket causes 2.7 times the emission caused by traveling in an economy class. The travel policy should mandate economy class flying for all employees irrespective of organizational hierarchies to ensure that everyone, including C-suite executives, contributes to business travel emission reduction.

f) **Enhancing digital connectivity**: Encourage virtual meetings and digital solutions to reduce the need for business travel. During the COVID-19 pandemic, the rise of remote work and virtual conferencing demonstrated that much business travel can be replaced with digital alternatives. Enhance technology and facilitation techniques so that the experience of virtual meetings is as effective as in-person meetings and fosters engagement, collaboration, and relation-building.

g) **Capping trips for superflyers**: Super-flyers in a company are those who have a higher frequency of air travel and account for a disproportionate share of air travel emissions. A business travel emission study of IT companies, conducted under the *Fair Travel* program, revealed inequitable flying patterns across employees belonging to different hierarchies. Implementing a policy to cap the number of flights that can be taken by super-flyers can help to meet business travel emission targets and ensure greater equity in travel practices.

h) **Enabling informed travel requests:** To support informed travel requests, the travel approval form should integrate key parameters such-as pre-planning details and surface travel options. Additionally, incorporating business unit and individual employees emission targets, along with Superflyer rankings, into the approval

workflow can enhance informed decision-making during the approval process by aligning travel behavior with the set targets.

i) **Implementing an intra-organizational emission trading system:** A micro-scale cap-and-trade mechanism can be applied within an organization wherein each business unit receives an emission cap in adherence to the organization's emission targets. Business units can buy credits, lend/borrow emissions from each other based on internally determined governance to ensure that the overall organization's travel emissions stay within the determined limit.

j) **Providing tool based support to enable informed decision making:** Two tools that can support informed decision making by employees while planning business trips developed as part of the *Fair Travel* program are as listed below:
   - **Travel Decision Tree**: This tool is a flowchart-based decision guide designed for integration into IT companies' travel approval processes. It includes a series of questions that guide the user to determine the necessity of a specific trip and to choose sustainable travel options. The tool is customizable and can be modified to add user-specific questions to support informed and responsible travel decisions.
   - **Travel-Decision Climate Impact Tool**: This tool provides a dashboard view of business travel emissions goals, comparing actual emissions by a business unit and individual employees against the company's reduction targets for a given financial year. Its features also provide insights into specific sustainable travel interventions–such as switching from premium to economy class, switching to long distance non-stop flights, and switching to virtual meetings instead of an in-person trip–can contribute to reducing emissions per trip.

k) **Offering incentives for behaviour change**: Employees can be encouraged to partake in emission reduction actions through economic incentives or other employee benefit programs. Some incentivization strategies can include:
   - Economic incentivization to employees traveling by train or bus.
   - Substituting additional travel days needed for surface travel with additional leave.
   - Sustainability bonus for employees and business units that adhere to their business travel emission targets.
   - A pre-planning travel bonus awarded to employees who consistently submit their travel requests within a timeframe that allows the travel team to plan a sustainable and efficient itinerary.

Companies should aim at working towards a sustainable travel policy to assess the feasibility of implementing the above mentioned measures and more in consultation with employees to enable widespread acceptance and motivation towards adhering to such a policy. A recommended approach to implementing and testing the feasibility of the above mentioned recommendations is to adopt a bottom-up, participatory model for co-creating the travel policy. This involves engaging employees across all levels of the organization. For instance, as part of the *Fair Travel* program, IT organizations are supported in developing sustainable travel policies through the formation of Carbon Reduction Action Groups (C.R.A.G.). These groups are employees from diverse roles and designations who collaboratively explore and propose various emission reduction strategies. Through a series of workshops, the C.R.A.G members are trained to co-hold the co-creation processes, to explore and suggest multiple emission reduction supporting pathways . The learnings derived through engagement with the

C.R.A.G. members provide workable evidence that can inform an organization's sustainable travel policy.

2. Adhere to the Science Based Target initiative's (SBTi) corporate Net Zero standard recommended reduction targets for near-term and long-term goals.

'Net Zero' refers to the amount of greenhouse gas (GHG) produced and removed from the atmosphere. The SBTi provides standards, guidance, criteria and recommendations for companies to set science-based net-zero targets that align with limiting global temperature to 1.5℃ above pre-industrial levels. The advisory is specifically for IT Companies to set SBTi targets to demonstrate their climate action leadership and their commitment to national climate goals. The guidance provided by the SBTi net zero standards are as mentioned below:

- **Near term Targets:** Companies must set near-term science-based targets to roughly halve emissions before 2030.
- **Long term targets:** Companies must cut all possible–usually more than 90%--of emissions before 2050.
- **Neutralize residual emissions:** After a company has achieved its long-term target and cut emissions by more than 90%, it must use permanent carbon removal and storage to counterbalance the final 10% or more of residual emissions that cannot be eliminated.
- **Beyond Value Chain Mitigation (BVCM):** Businesses should invest in actions to reduce and remove emissions outside of their value chains in addition to near-term and long-term science-based targets. This includes investment in climate projects, purchasing carbon credits from high-quality projects etc., as part of the company's broader effort towards the set targets.

3. Integrate sustainable travel goals with business goals.

Measures to curb business travel are known to be part of cost-cutting strategies by IT companies, particularly during periods of economic downturn. This approach is supported by data showing that business travel emissions tend to rise in proportion to an organization's economic growth. However, given the prevailing climate emergency, it is vital to rethink and reimagine this strategy – not just as a financial measure, but as an integral part of environmental responsibility . Graphs representing the business travel emission intensity in each case study (see Section I.B.) represent the possibility of envisioning reduced business travel emissions, while still meeting environmental performance targets along with the revenue growth of the company.

The following strategies can be adopted to integrate sustainable travel as part of business goals :

- The opportunity costs for each business trip should be inclusive of the emission impact converted to a carbon price. This can support informed decision making on business trips and encourage employees and teams to choose sustainable alternatives in situations where a trip is deemed as inevitable.
- Sustainable travel goals have to be estimated and integrated into the revenue projections instead of the business-as-usual approach of isolating the revenue projections from emission impacts.
- IT companies in India engage with clients across different geographic regions like the USA, Europe, and Canada. The demand for travel is often due to the need to nurture and build strong relationships with current and potential clients,

contributing to business travel emissions. The recommendation is for companies to engage with business clients to establish a common emissions reduction charter to manage demand-side travel. Collaboration between the Travel Department, Sustainability Department, and business units/account teams will be crucial to co-create emission reduction conversations with clients.

- Co-locating team members to project locations can reduce travel for project meetings and support travel reduction goals.

IV.B. Recommendations for Policy Making and Administration Service Entities

While there are certain policies and practices in place to reduce the negative impact of aviation on people and the ecosystem, there is a need to strengthen policies such as the Environment Impact Assessment (EIA). It is also crucial to explore pathways to enhance alternate transport options, and also implement strategies that can support optimizing already existing airport infrastructure, to reduce the prospects of new airport construction. Recommendations related to the same are shared under this section.

4.2.1 Reinforce and modify the EIA policy and its processes

The following are few recommendations for actions that should be undertaken to reinforce airport clearance processes associated with EIAs:

1. **Introduce multiple public consultations in the EIA workflow**
   The public hearing is the best way to understand the social and environmental issues due to proposed infrastructure projects, given that local communities are most knowledgeable of the impacts of projects on their lives and the land they inhabit. Based on the current EIA workflow, public hearings happen only once before project clearance. The workflow warrants reinforcement through the integration of multiple public hearings at different phases in the EIA workflow, to ensure broader public participation.

2. **Integrate adaptive measures to address climate impact mitigation goals as a core part of Environmental Impact Assessments (EIAs)**
   The EIA workflow should be revised to mandate Life Cycle Assessments (LCA) to measure direct and indirect emissions across the construction and operational phases of airports. This will ensure that airport project approvals incorporate carbon emission mitigation measures, aligning with India's commitments under the Paris agreement.

3. **Diversify expert committees for EIA through indigenous community member representation**
   While the Impact Assessment Agency (IAA) is supported by the Expert Appraisal Committee (EAC) for airport project clearance as part of the EIA workflow, the EACs are not inclusive of representation from indigenous communities. Indigenous communities have better knowledge about the multi-faceted threats to the ecosystem they are a part of, therefore their assessments of the impacts of an airport project are crucial.

4.2.2 Envision new aviation impact mitigation and alternative mobility enhancement policies

1. **Introduce policy to cap aviation emissions**

   A global limit on aviation emissions coupled with fair distribution of emissions among different countries based on parameters like national gross domestic product (GDP), economic development goals, historical emissions, population; can contribute to meeting the Paris agreement's goal of net-zero emissions by 2050. This can also help in assessing the need for airport expansion projects for each country, which are currently envisioned without factoring in their increasing contributions to the overall aviation sector emissions. The ownership of such policies can jointly be helmed by the United Nations specialised agency initiative - CORSIA[226] (The International Civil Aviation Organizations (ICAO)initiative) and its member states. While India has committed to participate in the mandatory phase of CORSIA starting in 2027, a proactive reduction pathway would be to envision policies that cap aviation emissions by implementing stringent regulations and policy changes that can include :

   - Limiting the number of flights.
   - Encouraging airlines to adopt more fuel-efficient technologies.
   - Limiting airport expansion projects through use of Advanced Traffic Management Systems (ATMS).
   - Identifying strategies to optimize air spaces for cities e.g. by supporting alternative transport infrastructure as opposed to constructing a second airport.

2. **Introduce a policy to levy carbon taxes on air travel**

   Introduce or raise carbon taxes on every flight trip taken by a traveler to reflect the true environmental cost of air travel. The carbon taxes can follow a dynamic taxing methodology that considers the category of the travel while determining the tax rate, e.g., imposing a higher tax for business and pleasure trips. In addition, the taxing methodology can also consider the feasibility of surface travel on these routes. The income from the tax-based benefits can be channeled towards creating high-quality climate projects.

   While coupling flying with carbon taxes can lead to entitlements for the privileged class who can afford the carbon taxes, it can reduce the overall demand on increasing the capacity for airports and the resources can be diverted towards development projects that serve the larger population rather than the elite. Carbon taxes based on "the polluter pays principle" can also serve as a resource for other climate mitigation projects.

3. **Incorporate policies that discourage airlines from operating short-haul flights**

   For a short-haul flight (typically less than 800km) energy consumption and CO2 emissions are significantly higher than they are for medium- or long-haul flights, as aircraft burn the maximum fuel at take offs[227] and landing, thereby, increasing the CO2 emissions per

[226] The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the first global market-based scheme that applies to a sector. It complements other aviation in-sector emissions reductions efforts such as technological innovations, operational improvements and sustainable aviation fuels to meet the ICAO aspirational goal of carbon neutral growth.

[227] Aviation and the Global Atmosphere. (n.d.). IPCC. https://archive.ipcc.ch/ipccreports/sres/aviation/126.htm

passenger per km. Rail, bus or other forms of surface transport are suggested replacements to short-haul flights. Policies such as those listed below can discourage short distance flying/short-haul flights :

- Short-haul flights should be carbon taxed at higher rates as compared to long-haul flights, given that short-haul flights are high polluters.
- Airlines operating short-haul flights should be discouraged by limiting the number of flights flying between a source-destination and distributing them among different airlines to avoid monopoly across most frequented routes.
- Policies that levy eco-taxes for noise and air pollution should be implemented for short-haul flights.
- Subsidies on flying should be reduced to promote other modes of travel for short-haul distances.

4. Incorporate policies integrated with Earth Law Principles

From an Earth law perspective, ecosystems, rivers, forests, and even the atmosphere should have inherent rights to exist and thrive. Building new airports often involves deforestation, destruction of wetlands, and disruption of wildlife habitats which results in carbon emissions due to construction plus operationalization of airports; along with the carbon sequestration capacity due to biodiversity loss. Recognizing beings and elements apart from humans as legal entities that deserve to be treated with justice could serve as a legal argument against airport construction that damages ecosystems, aligning with indigenous philosophies and ecological jurisprudence.

5. Introduce policies in favor of a 'Just Transition'

As per forecasts the availability of green aviation technologies is limited in at least the next decade. The climate emergency however demands a rapid transition towards climate-safe mobility. This demands envisioning 'just transition' by policy makers in consultation with other stakeholders; one that does not bring about devastating effects for people and communities trapped in a fossil fuel-based system. The policies should provide a direction for transitioning the fossil fuel based employment and livelihood loss to sustainable livelihoods rooted in climate justice. Policies should define the right use of recovery packages to finance just transitions. It should focus on living wages, social security, training programmes, job alternatives for the workers moving from high carbon emission industries to foster alternatives[228] to a flight centric ecosystem.

6. Invest in high-speed rail and enhancement of regional rail infrastructure

Instead of building new airports, focus on expanding high-speed rail networks, which are a low-carbon alternative for domestic and regional travel. Rail is also the most energy-efficient form of motorized passenger transportation, using twelve times less energy and emitting 7 to 11 times fewer GHGs per passenger-km than cars and aircraft[229]. Industry support for this is critical, combined with transport research from academia to plan and execute the rail networks effectively.

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[228] Dana Rausch and Mihkali Pennanen. (2022). DEGROWTH STRATEGY and how to bring about social-ecological transformation. In N. Barlow, L. Regen, N. Cadiou, E. Chertkovskaya, M. Hollweg, C. Plank, M. Schulken, and V. Wolf (Eds.), Mayfly Books.
https://www.degrowthstrategy.org/wp-content/uploads/2023/09/Degrowth-n-Strategy-2022.pdf

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As part of enhancing railway services, in addition to developing new train routes and introducing high speed trains on the existing routes, the Indian railways should invest in improving hygiene through initiatives like bio-toilets, maintenance of the coaches and cleanliness campaigns to foster a cleaner travel experience. Hygiene and cleanliness should be equally prioritized for passengers travelling in all coaches.

7. **Adopt non aviation-centric lenses for urban development**

   Rather than expanding air travel infrastructure, focus on sustainable urban development that reduces the need for long-distance travel. This includes enhancing public transport, supporting walkability, non-motorized mobility and fostering localized economies that minimize reliance on global trade and tourism. Redirecting resources that would have been used for airport construction toward people and planet centric infrastructure can help cities become more climate-resilient. This includes investments in roof top energy, agri-photovoltaics (APV) , public transit, and affordable and sustainable earth friendly housing, which collectively reduce the carbon footprint and promote climate adaptation, thereby catering to the larger population rather than the smaller percentage of the population that access air travel.

4.2.3. Optimize existing airport infrastructure to prevent new airport construction

Instead of constructing new airports in cities with already existing airports, the civil aviation ministry should focus on research, innovation and policy that improves existing airport infrastructure and operational efficiencies. A few suggestive ways to achieve these are as listed below :

a) Redesign airspace and optimize air traffic control.
b) Add surcharge for peak hour flights to distribute the flights traffic through non peak hours, improving terminal congestions.
c) Increase airport personnel to handle more flights and passengers.
d) Enhance efficiency in security, check-in procedures to reduce congestion at airports.

IV.C. Recommendations for Citizens

Similar to IT organizations, citizens who are socio-economically privileged to choose air travel, have a crucial role to play in mitigating the impacts of aviation. Few pathways through which citizens can contribute to minimizing aviations impacts are as follows :

1. Prioritize surface travel over air travel.
2. Avoid travelling for ‘leisure’ on routes that cannot be accessed by surface modes of transport (i.e. reserve air travel on such routes only for non-negotiable visits.)
3. In cases where air travel is non-negotiable adopt the following measures to minimise impact (refer to Section IV.A. - 1 for more details) :
   - Travel by economy class.
   - Choose best-in-class airlines.
   - Choose non-stop flights.

4. Participate in people's movements that resist airport construction projects to ensure that projects are implemented in a just manner.

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