ACCLIMATE

Accelerating Climate Action: Navigating towards a Low-Emissions, Climate-Resilient Future

D2.1- Nine (9) NDC Country Studies (Brazil, Côte d'Ivoire, European Union, India, Indonesia, Nigeria, Senegal, Sierra Leone, United States) including an Assessment of NDC Progress with a Focus on Adequacy, Feasibility and Fairness

WP2 – An Assessment of NDC Progress with a Focus on Adequacy, Feasibility and Fairness

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EC Summary Requirements

1. Changes with respect to the DoA

No changes with respect to the work described in the DoA.

2. Dissemination and uptake

As detailed in the DoA and the project's Communication, Dissemination and Exploitation Plan, the deliverable will be made available on the project website and advertised via the project's newsletter and social media channels.
The deliverable will be of use to different groups of stakeholders:

- Policymakers and societal stakeholders can draw on the analysis of fairness, feasibility and equity in current NDCs of ACCLIMATE country partners.
- The country analyses also make a significant contribution to academic debates on national climate change mitigation measures in the target countries.

3. Short summary of results

This report brings together assessments of the latest Nationally Determined Contributions (NDCs) of Brazil, Côte d'Ivoire, the European Union, India, Indonesia, Nigeria, Senegal, Sierra Leone, and the United States under ACCLIMATE Work Package 2. Using a common framework, the country teams assess NDCs against three criteria: fairness, feasibility, and adequacy. Fairness examines how the costs, benefits, and risks of climate action are distributed; feasibility considers the political, economic, social, institutional, and technological conditions affecting implementation; and adequacy assesses whether commitments and policies match the scale of transformation required for a net-zero pathway. The assessments combine documentation-based scoring with structured expert judgement, drawing mainly on official climate commitments, legislation, long-term strategies, and secondary sources. Across the cases, the report identifies recurring themes while also showing how these three criteria vary across different national political, economic, and institutional contexts.

4. Evidence of accomplishment

This report.

Preface

The overall objective of ACCLIMATE is to achieve enhanced integrated national and international strategies for climate-resilient, low-emission development. ACCLIMATE will contribute to improving the transparency, consistency, and clarity of GHG emission reduction commitments and create appropriate tools by developing an assessment framework for mitigation commitments. Working in a bottom-up manner with national experts within an international consortium comprising high-emitting countries from the Americas, Asia and Europe, as well as low-emitting countries from West Africa, ACCLIMATE will identify needs for improvements of NDCs and long-term strategies. A focus will be set on adequacy, fairness and feasibility, as well as on needs for improving current policies and measures to actually achieve NDCs and long-term objectives.

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Executive Summary

This report combines the country- and region-level narrative reports submitted by the national teams under the ACCLIMATE consortium's Work Package 2 (WP2), which assesses the latest Nationally Determined Contributions (NDCs) of nine jurisdictions against three criteria: fairness, feasibility, and adequacy.

The focus throughout is on what the country teams themselves detailed in the narrative report templates they were provided, drawing directly on the assessments they submitted rather than reworking or independently revising their substance. The nine jurisdictions were selected to span emission profiles, income levels, and political systems: Brazil, Côte d'Ivoire, the European Union, India, Indonesia, Nigeria, Senegal, Sierra Leone, and the United States. Together they account for roughly 31% of current global GHG emissions. The United States is treated as two parallel cases, the Biden administration (assessment cutoff January 2025) and the Trump administration (from January 2025).

Each criterion examines a different aspect of an NDC.

Fairness looks at how the costs, benefits, and risks of climate action are distributed across social groups, regions, and sectors, and how a country frames its responsibilities relative to others. It spans several dimensions: who bears the costs and who receives the benefits of climate action (distributive), whether decision-making processes were inclusive and transparent (procedural), whether marginalised and historically excluded groups are recognised (recognitional), whether past harms are acknowledged and addressed (restorative), and whether the interests of future generations are protected (intergenerational).

Feasibility looks at whether commitments can realistically be delivered, across five dimensions: political conditions such as legal frameworks and leadership endorsement; economic and financial conditions such as the cost of measures and access to climate finance; social conditions such as public and civil society support; institutional conditions such as coordinating bodies and monitoring systems; and technological conditions such as innovation capacity and the availability of low-carbon technologies. Throughout, it distinguishes between formal feasibility, whether policies and institutions are in place, and de facto feasibility, whether they function as intended.

Adequacy looks at whether commitments and policies match the scale of transformation a net-zero pathway requires, focusing not on headline emission targets alone but on the deeper sectoral changes that underpin them: reducing fossil fuel use across energy, transport, industry, and buildings; developing land-use systems that protect and expand carbon sinks; and reducing non-CO_2 emissions from agriculture.

Working from a common data collection instrument and narrative template, the country teams assessed their NDCs against these criteria by combining documentation-based scoring with structured expert judgement, drawing primarily on official sources such as the latest UNFCCC submissions, long-term strategies, and supporting national legislation, complemented by secondary data.

Spanning major and minor emitters, federal, unitary and supranational systems, fossil-fuel producers and importers, and countries at very different points on energy access, fiscal space, socioeconomic development, and institutional capacity, it allows themes common across very different national settings to be distinguished from those specific to particular contexts. The narrative reports surface a number of recurring themes across the three criteria.

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1. Brazil

This country study is designed to generate policy-relevant insights into how Brazilian climate commitments are being articulated and operationalised in practice. The objective is to assess existing commitments and implementation pathways using three core criteria: fairness, feasibility and adequacy, as defined by the ACCLIMATE project consortium. The methodological approach includes the analysis of official climate commitments and policy documents such as the most recent NDC and the Ecological Transformation Plan (launched at COP29 in November 2024), the national mitigation strategy and eight sectoral mitigation plans (published in March 2026), relevant legislation (the federal law creating a cap-and-trade system approved in December 2024), and publicly available data and secondary sources.

In Brazil, the historical GHG emissions pathway is explained by the implementation of development policies in different sectors and areas, with the corresponding implications for climate change. Efforts targeting the protection of the Amazon forest motivated by many other reasons have allowed to cut down its annual deforestation rates and country's total emissions from over 3.5 GtCO2e/y in 2004 to around 1.3 GtCO2e/y in 2012.As of 2022, Brazil was halfway in its energy transition, with renewables representing half of the overall energy mix and 88% of power generation coming from non-fossil sources. The significant decarbonization of the Brazilian economy achieved in the past was mainly a co-benefit of policies implemented since the seventies (hydropower and biomass development, recently complemented by wind and solar power) with broader objectives, such as economic and energy security concerns (La Rovere, 2025).

Very few policy tools have been implemented before 2024 with a specific focus on targeting climate change mitigation, such as the National Climate Change Fund created in 2010. Therefore, this study presents a mostly forward-looking expert assessment of the future deployment of recently launched climate policies, based upon the extensive modelling and scenario exercises developed by Centro Clima / COPPE / UFRJ in the last two decades. The time horizon of the assessment includes the near-term (2030), medium-term (2035), as per Brazilian NDC targets, and the long-term commitment to reach economy-wide net-zero GHG emissions by 2050. International factors are not incorporated into the analysis, which remains primarily focused on the Brazilian context.

The Introduction sets out the national context relevant to the assessment. The three following sections focus on fairness, feasibility and adequacy of national climate plans. The conclusion synthesises key findings and highlights implications for cross-country comparative analysis.

1.1 Introduction – The Brazilian Context and Political–Economic Setting

Brazil is a federation of 26 States organized under the 1988 Federal Constitution as a presidential political regime, like the U.S. system but with less autonomy for states. The President is elected for a four-year term and may be re-elected for one more term only. The Bolsonaro's presidency from 2019-2022 has discontinued most of federal climate policy initiatives, resumed under Lula's comeback since 2023. The next presidential election is scheduled for October 2026, and its result is key to the continuity (or not) of implementation of current climate policies. The main body in the governance of climate policy is the Interministerial Climate Change Committee (CIM). It is composed of 22 ministries under the presidency of the Civil House. It also includes other six members (with no right to vote), including representatives of chambers gathering members of the civil society (2), subnational governments (2) and the scientific community (2).

In the international arena, Brazil is an active member of the BRICS group and historically aligned with the G77 and China positions in international climate politics. It was the sole non-Annex I country to submit a proposal to the design of the Kyoto Protocol, including a Clean Development Fund based on the historical responsibility of all UNFCCC parties in the global temperature increase. It is a major emitter mainly due to its LULUCF emissions: the

country's historical CO2 emissions reach 119 GtCO2 in 1850-2022, behind USA, China, Europe and Russia (UNEP 2024). Brazil is a technology leader in first advanced biofuels and a large wind power component manufacturer, relying on China for solar PV cells, batteries, and electric vehicles. It is a finance recipient and a strong champion of initiatives to increase financial flows from the Global North to low-carbon and resilient projects in the Global South.

Total GHG emissions in 2025 are estimated to be around 1.6 GtCO2e. The profile of GHG emissions per source and per sector is quite different from the prevailing pattern across the world. In Brazil, as of the latest official data available for 2022, AFOLU accounts for 70% of the total 2.0 GtCO2e emissions: 39.5% from LULUCF and 30.5% from Agriculture, including methane from the enteric fermentation of livestock, which accounts for the bulk of agricultural GHG emissions. Energy-related emissions are 20.5% of the total GHGs only, thanks to the high share (50%) of renewables (hydropower, biomass, wind and solar energy) in its overall primary energy mix, including 88% of renewable power generation. Key "hot spots" of climate vulnerabilities include: small farmers in the semiarid Northeastern region; urban population in slums subject to floods and landslides; and natural ecosystems with high biodiversity as the Amazon tropical forest. The most recent NDC (announced at COP29) includes GHG emissions targets of 1.2 GtCO2e/y in 2030 and of 0.85-1.05 GtCO2e/y in 2035, besides the commitment of achieving net-zero GHG emissions by 2050. The Brazilian government has yet to deliver a Long-term Low Emissions Development Strategy (LT-LEDS) to the UNFCCC Secretariat.

Brazilian average annual economic growth rate was about2.48% in 1991-2025. The period 1994-2014 showed a higher growth, while the period 2014-2022 presented a lower-than-average growth rate. The new government term has shown an average of 3 % per year from 2023 to 2025. The increase of the internal debt reaching 90% of GDP in 2025 (according to the IMF criterion) has been imposing a severe constraint on public investments and a very high interest rate of 15% implemented by the Central Bank in recent years has jeopardized domestic private investment. The Brazilian economy remains vulnerable to external shocks of commodities prices , as its main hard currency earnings come from the exports of: oil products; iron ore; all kinds of meat; orange juice; coffee; sugar and bioethanol; pulp and paper; steel; etc.

1.1.1 Main domestic actors shaping climate policy include:

- the very powerful agribusiness sector, strongly represented in the Congress, resisting to the full implementation of the Forest Code (requiring restoration of deforested areas in private properties); many farmers are still supportive of expanding the agricultural frontier through deforestation, especially in the Amazon and savannah ("cerrado") regions, where they are supported by the Governors of States and mayors of municipalities.
- key ministries, such as Environment and Climate Change; Agriculture; Finance; Mines and Energy; Foreign Affairs; and the Civil House, responsible of their coordination.
- the state-owned oil company Petrobras, focusing on oil&gas only, planning to accelerate the extraction of Brazilian oil resources; the Brazilian President has been aligned to the official position of the Brazilian Minister of Energy that oil resources are necessary to fund the energy transition of the country.
- private lobbies pushing for: increase of oil production; subsidies to lifetime extension of coal mining and of coal-fired thermopower plants; and increasing the use of natural gas in industry and by thermopower plants; they are supported by the Congress (where the opposition retains a majority), state Governors and mayors of municipalities (trying to maximize short-term earnings from royalties and taxes on the production and use of fossil fuels).
- civil society organizations, including the scientific community and environmentalist NGOs, pushing for a just transition away from fossil fuels and for halting all deforestation of the country biomes before 2030.

The main recent turning points that have influenced the trajectory of climate policy in Brazil were the presidential elections of 2018 and 2022. The four years under Bolsonaro as President have witnessed a dismantling of

environmental policy and institutions. The expansion of agriculture, logging and mining in the Amazon has led to a strong increase in annual deforestation rates. The country's overall GHG emissions have jumped from around 1.5 GtCO2e/y in 2018 to 1.8 GtCO2e/y in 2022. The Lula's presidency has restored environmental and climate policies implementation, leading so far to a 35% reduction in annual deforested land: from 2.67 Mha/y (million hectares per year) in 2022 to 1.74 Mha/y in 2025. This has led to a corresponding decrease in the country's total GHG emissions from 1.8 GtCO2e/y in 2022 to an estimated figure of 1.5 GtCO2e/y in 2025, yet insufficient to meet the NDC target of 1.32 GtCO2e/y by 2025.

1.2 Fairness

1. Who bears the short-term costs of climate and energy policies and who captures the benefits?

The key issue in this field is the impact of the Brazilian Emissions Trading System (SBCE) on the inflation rate and its burden on different household income classes. This is the most important specific climate policy tool, created by a federal law of 2024, but due to a slow implementation schedule it will have a concrete impact on corporate costs from 2034 on. Depending on the market competition features, a share of the production cost increases caused by the acquisition of emission allowances will be transferred to consumers, with an impact on the general price index and potential reduction in sales. On the other hand, the final social effects of this carbon pricing policy will depend on the use of the governmental revenues obtained from the system. The Allocation Plan of these revenues is to be decided by the governmental body in charge of managing the SBCE. There is a potential risk of harming the purchasing power of low-income households. That is why the economic and social outcome of carbon pricing schemes may be improved by complementary public policies (Stiglitz, Stern et al, 2017). Model simulations in different exercises carried out by Centro Clima / COPPE / UFRJ (see for example Wills et al, 2021; Grottera et al, 2022) have identified some crucial requirements for avoiding the potential negative social impacts of SBCE implementation:

- ensuring the fiscal neutrality of the system: recycling the revenues back to the economy.
- use of the revenues to reduce the tax burden on employment generation (social charges), particularly in labor intensive sectors.
- allowing for an increase in labor revenues and consumption, compensating for the potential reduction of the economic activity induced by the production cost increases induced by SBCE.

Looking back on the historical record, energy policies have been producing significant distributional effects. In some cases, pricing policies have protected lower income households, particularly through subsidies to dieselprices (used in buses and trucks that transport most of freight in Brazil) and to LPG prices (used for cooking and water heating in areas not served by natural gas pipelines, which cover mainly high-income neighborhoods). On the other hand, significant subsidies granted to oil production and to gasoline prices have caused regressive effects as car ownership patterns are skewed in Brazil. Subsidies to fossil fuels (mostly to oil&gas, with less than 1% to coal) have reached an amount of USD 16.4 billion in 2023 (51% to production and 49% to consumption) while subsidies to renewable energy were of 3.6 USD billion in 2023, 4.5 times less than for fossil fuels (INESC, 2024).

Short-term costs of Brazilian power sector policy tend to have regressive effects, reflecting long-standing structural features of the electricity sector and broader socio-economic conditions. A significant component of these costs is associated with the Energy Development Account (CDE), a sectoral mechanism designed to finance multiple public policy objectives, including universal access, regional integration, and targeted subsidies. While these charges increase electricity tariffs—estimated at around 13% of the average bill—they also reflect policy choices aimed at expanding energy access and supporting vulnerable regions. As a result, although low-income households bear a relatively higher burden as a share of income, the system also incorporates redistributive elements.

The tariff structure further shapes the distribution of costs. The Social Electricity Tariff (TSEE) provides a strong discount to households with a consumption below 80 kWh/month. It benefits 16.4 million people living in

low-income consumers today. It is estimated that another 7.9 million people are eligible to benefit from this discount but are not automatically benefited due to discrepancies in data banks and are not able to make a formal claim for it through the appropriate channels. However, the effectiveness of this mechanism can be limited by structural factors such as household size, appliance efficiency, and consumption patterns, which may lead some households to exceed subsidized thresholds. In addition, the "tariff flags" system ("Bandeiras Tarifárias"), which reflects hydrological conditions, transfers the cost of increased thermal generation during periods of drought to consumers.

At the sectoral level, differences in scale, access to finance, and institutional support influence the distribution of transition costs and opportunities. Smallholder farmers face greater constraints in adopting low-carbon practices, including limited access to credit and technical assistance; moreover, despite the theoretically lower interest rates available to small and medium-sized producers, the lack of eligible collateral and the complexity of bureaucratic processes often tilt the system in favor of large-scale operations. At the same time, larger agricultural producers - supported by established financing instruments - are better positioned to incorporate sustainability criteria and access emerging market opportunities. Similar asymmetries are observed in the energy sector, where employment in fossil fuel-related activities - such as oil and gas extraction and refining - may face gradual adjustment pressures, while new opportunities are being created in renewable energy, particularly in wind and solar generation. However, these opportunities are not always geographically or skill-wise aligned with existing jobs, creating transitional challenges for specific groups of workers.

Regional disparities also play an important role in shaping the distributional impacts of the transition. In the North and parts of the Northeast, challenges are associated with limited infrastructure, reliance on isolated systems, and higher exposure to climate-related risks such as droughts and biomass burning. In contrast, the Southeast and South concentrate industrial activity, financial resources, and access to infrastructure, positioning these regions to capture a larger share of investment and economic benefits associated with the transition. At the same time, regions such as the Northeast have experienced significant expansion of renewable energy projects, particularly wind and solar, creating new economic opportunities but also raising local governance and land-use considerations.

The distribution of benefits from the transition is therefore uneven, with more immediate gains observed in capital-intensive sectors such as utility-scale renewable energy and export-oriented agricultural activities. However, these developments are also part of a broader process of structural transformation, in which new value chains, technologies, and markets are gradually being established. Over time, these changes may contribute to more diffuse economic benefits, although this process remains uneven across regions and social groups.

This imbalance is also reflected in public finance. Climate-specific instruments such as the Climate Fund (Fundo Clima), which recently mobilized around BRL 10 billion, have expanded in recent years, but remain smaller in scale compared to broader sectoral financing mechanisms, such as the Plano Safra, which exceeds BRL 400 billion. Even within the Plano Safra, programs specifically designed for low-carbon agriculture, such as the ABC+ Plan (around 5% only of Plano Safra), offer more attractive interest rates but still represent a limited share of total disbursements and face significant barriers regarding technical requirements and collateral. This difference reflects historical policy priorities related to food security, economic development, and sectoral support, rather than climate policy design alone.

Overall, while the current costs of the energy policy may be disproportionately borne by certain groups in the short term, it also includes mechanisms aimed at redistribution, access expansion, and gradual structural adjustment. The extent to which these mechanisms will effectively balance distributional impacts depends on continued policy coordination, targeted support measures, and the evolution of financing and regulatory instruments over time. Anyway the most urgent task is to reduce some expenses included in the electricity tariffs (through the CDE) that cause a higher burden on low-income households: subsidies to solar PV generation in high-income households;

subsidies to diesel oil for power generation in off-grid remote areas; and to avoid the undue interference of the Congress in the power sector planning, creating higher costs of the installation required by law of new power plants fired by natural gas to favour lobbies of private investors.

2. To what extent do policies address inequalities (income, geography, gender, energy access)?

Brazil's climate policy framework explicitly recognizes social inclusion and inequality reduction as core objectives. Official documents of the National Climate Plan, such as the Transversal Strategy for Climate Action, Just Transition and Climate Justice (MMA, MRE, CC/PR, 2026) link climate action to poverty reduction, regional development, and the integration of gender and vulnerable groups into the green economy, particularly in rural and forest areas.
In terms of energy access, the country has achieved near-universal electrification, but regional disparities persist, especially in remote Amazonian areas. Policies such as decentralized renewable systems aim to address these gaps.

However, affordability remains a major issue, as rising tariffs disproportionately affect low-income households. This is partly due to cross-subsidies in the power sector, where incentives for decentralized generation often shift grid peak load meeting costs to lower-income consumers who lack the capital to invest in their own renewable systems. Recent changes of Law 14.300/2022 (The Legal Framework for Distributed Generation in Brazil) have begun phasing out subsidies for Micro and Mini-Generation (MMGD) to reduce this transfer of financial resources to the higher-income households. However, due to "grandfathered" rights for older systems and a gradual implementation schedule, the cross-subsidy remains a persistent factor in the energy costs of lower-income households. The amount of these subsidies is not negligible, as of April 2025, 3.5 million rooftop PV systems (80% in the residential sector) with a total installed capacity of 39 GW were connected to the Brazilian grid.

Gender and other dimensions of inequality are acknowledged in policy frameworks, including references to vulnerable populations and the need for inclusive approaches. However, NGOs such as the Climate Observatory (Observatório do Clima - OC) argue that these considerations are not consistently translated into targeted policies, dedicated funding, or measurable outcomes. Similar concerns apply to indigenous peoples and traditional communities, who may face barriers to effective participation due to limited access to digital tools and institutional processes (see for example OC, 2024; "OC Proposal to Brazil' 2nd NDC within the Paris Agreement").

3. Are there compensatory measures / social protection / redistribution mechanisms?

The historical record is that the Brazilian government relies primarily on broader social and economic development policies rather than on climate-specific compensation mechanisms. Instruments such as the Social Electricity Tariff (TSEE) provide targeted support to low-income households by reducing electricity costs, protecting the lowest income household class (consumers of less than 80 kWh/month) of the impact of tariff-based cost recovery associated with subsidies to PV systems. Although this protection is partly financed through cross-subsidization within the tariff system, it plays an important role in mitigating affordability constraints for the most vulnerable consumers.

A significant recent development is that Law No. 15.042/2024, which establishes the Brazilian Emissions Trading System (SBCE), has ensured that Indigenous peoples, traditional communities, and agrarian reform settlers have the right to generate and commercialize verified emission reduction or removal certificates (CRVEs) and carbon credits from projects developed in their territories. This right is conditional on compliance with socio-environmental safeguards, including free, prior and informed consent (FPIC), in line with ILO Convention 169, with consultation processes funded by project developers. The legislation also requires fair and equitable benefit-sharing arrangements, guaranteeing a minimum share of revenues or credits to these communities (at least 50% for removal projects and 70% for REDD+ market-based projects), as well as participatory governance of benefits. Additional provisions include support for sustainable livelihoods, social protection, cultural preservation, and compensation for potential damages arising from project implementation. The law also includes provisions for the potential use of revenues to support industrial decarbonization and promote social inclusion within the transition. However, its role

as a compensatory mechanism will depend on forthcoming regulation, particularly regarding how resources are allocated and whether they effectively reach groups most affected by structural changes.

More broadly, concessional finance and rural credit programs—such as the ABC+ Plan—provide important support for the adoption of low-carbon practices in agriculture. While these instruments are not explicitly designed as social protection mechanisms, they contribute indirectly by facilitating access to technology, supporting productivity improvements, and enhancing small farmers' income. The concept of a "just transition" is increasingly reflected in strategic documents and policy narratives. However, its operationalization remains at an early stage. There is currently no fully articulated national framework for large-scale reskilling or targeted redistribution for workers potentially affected by the transition, suggesting that further development of dedicated instruments may be needed to strengthen the social dimension of climate policy. The elaboration of the national Roadmap to Transitioning Away from Fossil Fuels - TAFF already demanded by President Lula and the future preparation of a LT-LEDS may help towards this end.

4. How are fairness considerations framed politically?

Fairness considerations in Brazil's climate policy are generally framed within a broader narrative of development, inclusion, and national sovereignty. The government presents climate action as part of a strategy of "Ecological Transformation," linking mitigation to economic modernization, job creation, and new industrial opportunities. This framing emphasizes the potential for "green growth," supported by Brazil's relatively low-carbon energy mix and natural resource base.

Public debate on climate policy has historically been less conflict-driven than in some other countries, in part because mitigation efforts have been concentrated in land-use change (LULUCF), with more limited direct impacts on household consumption. However, as climate policies increasingly extend to the energy, transport, and industrial sectors, fairness considerations are becoming more visible in political and public discussions. Recent legislative debates in Congress on carbon pricing and the Brazilian Emissions Trading System (SBCE), as well as discussions on fuel taxation and energy tariffs, have reflected concerns about potential impacts on competitiveness, energy prices, and inflation. These debates illustrate how fairness considerations are often framed in terms of economic impacts, cost distribution, and sectoral competitiveness.

At the same time, civil society organizations and research institutions have highlighted the importance of ensuring that climate policies are implemented in a socially inclusive manner. Issues such as access to finance, participation of vulnerable groups, and the regional distribution of benefits (and costs) of the transition have been raised in public consultations, technical reports, and media discussions. In some cases, local tensions have emerged around the siting of large-scale renewable energy projects, particularly in regions experiencing rapid expansion of wind and solar generation, where land-use conflicts and distribution of benefits have been debated.

Overall, fairness considerations are present in both official narratives and public discourse, although their translation into concrete policy design and implementation continues to evolve. Political framing tends to emphasize opportunities and development benefits, while discussions in Congress, academia, and civil society increasingly bring attention to distributional aspects and implementation challenges.

5. Do fairness concerns shape policy design or are they rhetorical?

Fairness considerations are explicitly incorporated into the high-level design of Brazil's climate strategy, particularly through the framing of a "Just Transition" within the Ecological Transformation Plan, the updated NDC, and sectoral plans. These frameworks link mitigation objectives to broader development goals, including job creation, technological development, regional inclusion, industrial opportunities, and the promotion of sustainable economic activities.

At the level of policy design, several instruments incorporate elements that can contribute to more inclusive outcomes. Examples include targeted support mechanisms such as the Social Electricity Tariff (TSEE), the integration of social criteria into rural credit and agricultural programs (e.g., ABC+), and provisions within the Brazilian Emissions Trading System (SBCE) that allow for the use of revenues to support decarbonization and social inclusion. In addition, participatory processes and stakeholder engagement mechanisms are increasingly present in the formulation of climate-related policies.

At the same time, the degree to which fairness considerations shape implementation varies across sectors and instruments. Many policies are primarily designed to achieve emissions reductions and economic efficiency, with distributional outcomes addressed through complementary measures rather than as core design features. In practice, factors such as access to finance, technical capacity, and institutional support influence who can benefit from mitigation opportunities, which may result in differentiated outcomes across social groups and regions.

Overall, fairness functions as an important guiding principle in policy frameworks and is increasingly reflected in program design and institutional arrangements. However, its operationalization continues to evolve, particularly regarding the development of more targeted mechanisms that can systematically address distributional impacts and support vulnerable groups throughout the transition.

6. How does the country frame its climate responsibility internationally?

Brazil frames its climate commitments within the principle of Common but Differentiated Responsibilities and respective capabilities (CBDR-RC) of UNFCCC, emphasizing historical responsibility, national circumstances, and the need for international support. Its NDC is presented as an unconditional national contribution, while enhanced ambition is associated with access to climate finance, technology transfer, and capacity building.

In international fora such as the UNFCCC and the G20, Brazil advocates for reforms in the global financial architecture, including expanded access to concessional finance and stronger support for developing countries. Climate action is consistently linked to broader development objectives, with an emphasis on addressing global inequality alongside environmental goals. The country also highlights its mitigation contribution through land-use and forest-related actions, as well as its clean energy mix and green electricity. Brazil's positioning is broadly aligned with that of other major emerging economies, such as China and India, which similarly emphasize equity, development priorities, and differentiated responsibilities of developing countries.

Although Brazil has an ambitious NDC if compared with most countries, external assessments (see for example https://climateactiontracker.org/countries/brazil/ 30 June 2026) have raised questions regarding the alignment of Brazil's targets with a 1.5°C pathway, particularly given the continued reliance on land-use mitigation and the challenges associated with scaling mitigation across energy, transport, and industrial sectors and transitioning away from fossil fuels. While intrinsically subjective, climate-centric, highly controversial and disputable, these views create a degree of tension between the country's equity-based narrative and expectations regarding its overall mitigation contribution.

Brazil's international leadership, reinforced by its role in hosting COP30, has increasingly focused on acting as a bridge between developing and developed countries. This includes support for the global objective of transitioning away from fossil fuels, while emphasizing that such a transition must be implemented in a manner consistent with development needs and supported by adequate international cooperation.

The fairness of the transition depends on aligning high-level climate goals with practical instruments. Ultimately, Brazil's ability to deliver on its long-term climate objectives will depend on its capacity to translate strategic narratives into operational measures—ensuring that the financial and social costs of decarbonization are managed

in a balanced manner and that the economic opportunities of the green transition are broadly accessible across sectors, regions and social groups.

1.3 Feasibility

The key question about the feasibility of meeting the NDC emission targets in 2030 and 2035 is whether the Government will be able to cut AFOLU emissions that represent 70% of the country's total. As emissions from Agriculture (about 30%) are hard to abate in the short and medium term, the essential challenge is to curb down the annual deforestation rate in the country, given the high (nearly 40%) share ofBrazil's GHG emissions coming from LULUCF.

A mix of command-and-control and economic instruments to fight deforestation has achieved a remarkably sharp decline of Brazilian GHG emissions (by more than 1 GtCO2e/y) in the period 2005-2012. Despite the recent success in reducing it by 40% in the last three years in the Amazon region, achieving the official goal of zero deforestation by 2030 looks particularly challenging in view of the uprise in illegal small-scale gold mining and drug dealing activities. Therefore, the task is considerably more complex than in the period 2005-2012 and the enforcement of laws and regulations is even more pressing.

Brazilian new Forest Code approved by a federal law in 2012 requires the restoration of natural vegetal cover in medium and large-size private rural properties (80% of the original cover in the Amazon and 20% elsewhere). Around 20 million hectares of private land should be restored by farmers, allowing for a substantial increase of carbon removals. The initial deadline for compliance across the country was 2032. However, there were delays in the registry of rural properties and the deadline was suspended (cancelled) by the Bolsonaro government in 2019. Still today the enforcement of this law is very slow. This hampers a key feature of a net-zero transition in Brazil: the increase of carbon sinks by forestry.

The main explanation for this blockage is once again the power of the agricultural lobby, particularly strong in the Northern region where state governors are generally supportive of farmers' interests. Farmers and ranchers simply don't want to pay for the restoration of the missing share of forest cover required to ensure compliance with the Forest Code in their properties.

Halt the deforestation of non-destinated public land is also important. There are around 50 million hectares of public forests in the Amazon with no use defined yet. They were not transformed into Conservation Units and not regularly transferred to private operators yet. The illegal occupation by farmers of this public land is one of the main emission drivers in the Amazon. The main challenge to reduce it is the enforcement of environmental laws and regulations in faraway remote access territories, especially in the Amazon. It is very hard for the Federal Government to control all these vast territories and in many cases states' governors and local land ownership registry offices tolerate illegal practices by powerful vested interests of big producers.Command-and-control instruments to reduce deforestation of public land include joint operations of the Federal Environmental Agency (IBAMA) with the Federal Policy and the Federal Road Police. The collaboration with the States' authorities and with the Justice institutions is key to ensure its effectiveness, seizing cattle and equipment in the illegally occupied land. New norms created by the new Federal Government in 2023 and 2024 are an effort to accelerate the destination of public forests, including partnerships with private capital to restore the original forest cover. Only in 2025 the National Development Bank has started a program targeting the reforestation and afforestation of public land in the borders of the Amazon region (the "deforestation arch"), through tenders to private operators. This is a promising initiative, as it is estimated that the amount of public degraded land in the Amazon exceeds 60 million hectares, but still at a very incipient stage. Its main challenge is the difficult logistics and the lack of infrastructure for planting and forestry activities in general, under Amazonian conditions.

Given the short time available, it is unlikely that the political commitment of achieving zero deforestation by 2030 will be met. However, if the result of the presidential elections in October 2026 allows for the continuity and acceleration of current mitigation policies being implemented since 2023, the resulting emissions pathway can still meet the NDC target of 1.2 GtCO2e established for 2030, given the recent record of 2.0 GtCO2e in 2022 and the estimate of 1.6 GtCO2e in 2025. The same applies to the 2035 NDC target of a 0.85-1.05 GtCO2e range. In case of the continuation of a Congress dominated by anti-environmental regulations and/or the return of a president anti-climate policies, the achievement of NDC targets would be jeopardized as there are no safeguards ensuring the enforcement of mitigation policies.

Prospects of meeting the main Brazilian commitment to the Paris Agreement, reaching net zero GHG emissions by 2050, seems doable, under the assumption of political continuity and acceleration of current mitigation policies: the country is already halfway in its energy transition (50% of renewables in its overall energy mix mostly though biomass and hydro), and has experienced periods of success in curbing down annual deforestation rates.Long-term analyses of GHG emission pathways are available from the studies developed by Centro Clima within the DDP initiative in the last ten years. From its main findings, a long-term decarbonization strategy emerges, including: a key role of stopping deforestation and increasing forest sinks; and progressively moderating the use of fossil fuels and increasing renewables in the energy mix, through enhanced use of solar and wind energy, biofuels, electrical transportation, transmission lines and storage in batteries.

The Federal Government has been building its institutional capacity to mainstream climate policies in the different sectoral ministries. The Interministerial Climate Change Committee - CIM ensures the coordination across the ministries (see section on Context). It published in March 2026 the National Climate Plan, which includes 16 Sectoral and Thematic Adaptation Plans and 8 Sectoral Mitigation Plans, and 5 Cross-cutting Strategies of Climate Action, after an extensive public consultation process. The governmental capacity to design and coordinate climate policies is now reasonably established. The enforcement of climate policies must face strong vested interests. These include:

- farmers whodon’t want to pay for the restoration of around 20 million hectares of private land required to ensure compliance with the Forest Code in their properties. The New Forest Code (2012) requires the restoration of natural vegetal cover in medium and large-size private rural properties (80% of the original cover in the Amazon and 20% elsewhere), allowing for a substantial increase of carbon removals.
- ranchers and beef producers who remain opposed to tracking and reducing GHG emissions (both methane from enteric fermentation and CO2 from induced illegal deforestation) that is needed along the whole supply chain through the adoption of good practices.
- private lobbies pushing for fossil fuels, successfully obtaining from the Congress the continuity of subsidies to coal mining and use in thermopower generation; increase of thermopower generation from natural gas (large associated production available from oil fields), inflicting severe economic losses to existing wind farms, subject to curtailment of their power sales to the grid.
- local governments, State Governors and Congress representatives, most often from parties in the opposition to the federal government (that currently retains the majority of both Congress houses, the Chamber of Deputies and the Senate), who support farmers and ranchers in the denial of compliance to federal laws, and push for the expansion of oil and gas production to increase short-term benefits from the payment of royalties due to municipalities and states, and from regional economic growth.
- Petrobras, the powerful state-owned oil and gas company, who has stopped the incipient diversification of its activities towards energy transition and in practice is focusing on oil and gas only, planning to accelerate the extraction of Brazilian oil resources as fast as possible; as the government is favorable to expand oil production (its exports allow for hard currency earnings crucial for the equilibrium of the country’s trade balance), criticism of this decision has come from environmentalists only; moreover, even if Brazilian government has a golden share of its capital, nominates its board of directors and has an influence on the oil products pricing policy, Petrobras is mostly owned by private investors who privilege the highest profit in its quarterly balance sheets.

The very limited fiscal space, due to an internal debt reaching 90% of GDP in 2025, is another barrier to the enforcement of climate policies. The main allocation of public funds to the transition is made through the National Economic and Social Development Bank – BNDES, a powerful institution of the size comparable to the World Bank. It has also been issuing green bonds and operating the resources of the National Climate Fund (with a budget of USD 5.5 billion in 2026). Brazil also benefits from international grants of USD 0.7-0.8 billion to the Amazon Fund. Going beyond grants, Brazil has launched in COP 28 the proposal of a USD 25 billion Tropical Forests Fund Forever – TFFF that has so far obtained commitment from international parties of around USD 6 billion. However, the amount of international capital flows is so far insufficient to complement domestic sources and fund the huge potential of economically viable investment opportunities in low-carbon and resilient projects in Brazil. Brazilian Ministry of Finance has already made an effort to de-risk these projects to increase the mobilization of private capital and to reduce the cost of capital in Brazil, still higher today than in other emergent economies: it launched an Ecological Transformation Plan at COP 29 in November 2024, including policy tools as the creation of the Brazilian Investment Platform (BIP) that identified a portfolio of USD 25.2 billion in potential investment projects and mainly of Eco Invest that has experienced a big success and already mobilized USD 25.4 billion (USD11.2 billion from foreign investment) of capital through public-private partnerships (blended finance arrangements). Other tools in the same direction are the Brazilian Sustainable Taxonomy (to define criteria for green investments labelling) and a Green Tax Reform (still underway), aiming at a tax increase on products harmful to the environment while supplying fiscal incentives to biofuels, low-carbon hydrogen, materials recycling and reuse.

Carbon pricing is another key policy tool that will be introduced in Brazil thanks to the approval on 11 December 2024 of a cap-and-trade system applicable to companies emitting more than 25 ktCO2e/y (excepted in the agricultural sector). Its full implementation is expected after a transition period consisting of several phases: - Phase 1: one to two years for edition of the law regulations; - Phase 2: one year for implementing the operational tool of emissions reporting; - Phase 3: two years when the companies will be only required to report emissions and removals, and to present a monitoring plan; Phase 4: implementation of the first emissions allowances allocation plan (with duration to be defined) with distribution for free (grandfathering) and start of the emissions trading system; - Phase 5: full implementation of the cap-and-trade system, after the end of the first emissions allowances allocation plan. It is expected that its full implementation happens in 2034 only, but in the long run, it will be a key tool to put the economy on track to the net-zero transition.

Given its endowment of natural resources, including renewables that already supply 50% of the overall energy mix, Brazil sees the transition to a net zero economy as an opportunity to meet its broader development priorities, such as growth, employment, energy security, industrial development, and social stability. The Ecological Transformation Plan has presented a long-term vision for Brazilian development based on a green economy. It is axed in six priority dimensions: sustainable finance; enhanced technological innovation and productivity; bioeconomy and food production systems; energy transition; circular economy; and green infrastructure and adaptation. The global transition also supplies opportunities for Brazil tapping its competitive advantages in some promising industrial sectors: critical minerals; batteries and its components; hybrid (bioethanol&electrical) and plug-inelectrical vehicles; sustainable aviation fuels (SAF); wind power generators; low-carbon steel; and green fertilizers (Guerra et al, 2025).

The main challenge to reach net-zero GHG emissions in Brazil is to overcome the conflict between short-term quick gains from exploiting non-renewable resources and the short, medium and long-term benefits of building a green economy based upon the vast potential of renewable resources of the country. The transition towards net-zero will demand the building of a new Brazilian economy, based on new low-carbon and sustainable activities. It is essential to build not only a vision of this long-term sustainable economy but also elaborate its roadmap to enlighten the required short and medium-term policies and the benefits of following this pathway from today. The ETP can be further detailed and periodically updated, guiding the adoption of a similar approach in sectorial planning. This process can help to give concreteness to the benefits provided by the Brazilian competitiveness within a global transition to net-zero and progressively increase the political support to a low emissions development strategy.

1.4 Adequacy

Brazil's NDC (Second Commitment to the UNFCCC) - Institutionally, the NDC is anchored in the Climate Plan (Plano Clima) and overseen by the Interministerial Committee on Climate Change (CIM). This governance structure involves coordinated action across federal, state, and municipal levels, highlighted by the Pact for Ecological Transformation, which unites the executive, legislative, and judicial branches in a long-term state commitment. The National Mitigation Strategy (ENM), as the core of the Plano Clima, translates these national targets into sector-specific emission limits. It articulates eight sectoral mitigation plans (covering land use, agriculture, energy, industry, transport, cities, and waste) supported by cross-cutting strategies for innovation, monitoring, and a just transition.

Table 1.1. 2030 and 2035 Targets by Mitigation Sectoral Plan Source: The National Mitigation Strategy – National Climate Plan (Brazil, 2026)

Sectoral Plan	2022	2030 Target	Percentage Change 2030/2022	2035 Target		Percentage Change 2035/2022	
	(MtCO2e)	(MtCO2e)	%	Lower Bound (MtCO2e)	Upper Bound (MtCO2e)	Lower Bound (%)	Upper Bound (%)
LUC Public Areas	448	-181	-140%	-250	-248	-156%	-155%
LUC Private Areas	352	106	-70%	-34	-30	-110%	-109%
Agriculture	643	649	1%	599	653	-7%	2%
Industry	179	198	11%	203	240	13%	34%
Energy	80	106	33%	81	115	1%	44%
Transport	116	126	9%	107	134	-8%	16%
Cities	136	121	-11%	75	111	-45%	-18%
Waste	85	75	-12%	69	75	-19%	-12%
Total	2039	1200	-41%	850	1050	-58%	-49%

As shown in the table, the bulk of avoided emissions required to meet the NDC targets in 2030 and 2035 are allocated to Land Use Change, first in public areas and secondly in private areas. This distinction was key to overcome the resistance of farmers who didn't want to be blamed for high emissions nor be responsible tof meeting a very strict target: after months of political negotiations, the creation of two sectoral mitigation plans splitting public and private areas was key to unblock the stalemate and obtain the approval of the National Climate Plan. Then come Cities, andWaste, that must reduce the absolute emissions level in 2035 even in the upper bound of the target, and Transport and Agriculture, in decreasing order of mitigation efforts. Energy supply would be entitled to at least keep the same 2022 level of emissions in 2035, if the lower bound of the target is met. Finally, Industry is entitled to increase its emissions in 2035 compared with 2022, even in the case of reaching the lower bound target.

To support implementation, the NDC leverages a mix of established and newly created instruments. It revitalizes existing mechanisms, such as the Climate Fund, which now serves as the primary financial engine for the Ecological Transformation Plan (PTE). Central to this plan are new initiatives, including the issuance of Sovereign Green Bonds, the Eco Invest Brasil program for currency risk mitigation, and the Brazilian Climate Investment Platform (BIP). These are complemented by the legal framework for the National Carbon Market, tax reforms with environmental incentives, and updated innovation policies. Together, these structural measures aim to mobilize large-scale capital and drive a deep transformation of the Brazilian economy.

The main financial and regulatory instruments show a significant strengthening of Brazil's climate policy implementation. The Climate Fund (Fundo Clima), managed by BNDES, has scaled up its operations, reaching approximately USD 1.9 billion in approved loans in 2025, with strong growth in disbursements and a focus on transport electrification, green industry and forest conservation. The legal framework for carbon pricing has also been established through Law No. 15,042/2024, which created the Brazilian Emissions Trading System (SBCE), although its implementation is expected to begin in 2030. In parallel, the Ecological Transformation Plan (PTE) has advanced through initiatives such as Eco Invest Brasil and the Brazilian Climate Investment Platform (BIP), aimed at mobilizing private capital and attracting international investment for green projects.

Finally, the NDC places significant emphasis on transparency, data, and monitoring systems. The Braziliangovernment highlights ongoing improvements in greenhouse gas inventories, climate data platforms, satellite-based monitoring systems, and modelling tools. These systems are intended to support evidence-based policymaking, strengthen transparency, and ensure alignment with the reporting requirements of the Paris Agreement. Overall, Brazil's NDC combines ambitious economy-wide targets with a broad, system-oriented policy framework that integrates mitigation, adaptation, and socio-economic development, supported by an expanding set of governance and financing instruments.

1.5 Linking Targets with Policy Instruments

The National Mitigation Strategy is supported by a combination of regulatory, economic, and planning instruments distributed across sectors, reflecting the diversity of mitigation pathways in the Brazilian context. In the land-use sector, instruments are centered on command-and-control measures, land governance, environmental regularization, and incentives for conservation and restoration, including mechanisms linked to the Forest Code and monitoring systems. In agriculture, the strategy relies primarily on the promotion of low-carbon practices through rural credit, technical assistance, and programs supporting sustainable intensification. In the energy sector, instruments focus on expanding renewable generation, promoting electrification and biofuels, and enabling new technologies, supported by planning tools and sectoral policies. Industry and transport combine regulatory measures, efficiency standards, and incentives for fuel switching and technological adoption, while urban policies emphasize land-use planning and improvements in public and freight transport systems. In the waste sector, instruments target methane reduction through improved waste management, landfill gas capture, and recovery. Across sectors, these instruments are complemented by cross-cutting measures, including climate finance mechanisms, carbon market development, innovation policies, clean technology transfer, capacity building, and governance arrangements aimed at coordination and monitoring. Overall, the strategy relies on a diversified but largely sector-specific set of instruments, combining existing policy tools with emerging mechanisms to support the transition.

The big challenge to the adequacy of the NDC implementation remains the enforcement of all these policy tools and regulations, which will require a firm political will from the presidency and the concerned ministries, as well as a strong monitoring from governmental auditing bodies, regulatory agencies and the civil society, in order to overcome the resistance from vested interests of private lobbies and Congress representatives (that will most probably continue as only a share of the congressists changes in the elections).

2 Côte d'Ivoire

2.1 Introduction -- Country Context and Political–Economic Setting

Political system, governance structures, and climate policy framework

Côte d'Ivoire is a presidential republic characterized by a strong executive branch and a relatively centralized governance structure, although ongoing decentralization efforts aim to strengthen the role of local authorities. Since the resolution of the political crisis in 2011, the country has experienced sustained political stabilization and institutional consolidation, which have facilitated economic recovery and enabled the development of long-term public policies, including those related to climate change and the energy transition. Climate governance in Côte d'Ivoire is primarily coordinated by the Ministry of Environment, Sustainable Development and Ecological Transition, which oversees the formulation, implementation, and monitoring of national climate strategies, including the ≪Contribution Déterminée au niveau National (NDC 3.0)≫. The development of Nationally Determined Contributions (NDC 1.0) in 2015, the ratification of the Paris Agreement in 2016, the updating of NDC 2.0 in 2022 and 2025 (NDC 3.0), and the COP15 Abidjan Declaration on land degradation neutrality demonstrate Côte d'Ivoire's strong commitment to combating climate change in accordance with the Paris Agreement. To meet its commitments, the government has strengthened the institutional framework by creating the National Climate Change Programme (PNCC), the Directorate for International Cooperation and Financing Mobilization (DCIMF), the National Commission for Combating Climate Change (CNLCC), and the Carbon Market Office (BMC). These structures were created to strengthen the work of the Ministry of Environment, Sustainable Development, and Ecological Transition. In terms of planning, the government requires climate action to be integrated into regional and municipal planning policies, particularly measures to address and adapt to climate change. These plans are generally referred to as 'climate plans' or 'green plans'. The institutional framework is inherently cross-sectoral, requiring coordination among key ministries such as energy, agriculture, infrastructure, finance, and planning, reflecting the multidimensional nature of climate action.

The NDC 3.0 emphasizes a whole-of-government and multi-stakeholder approach, involving public institutions, private sector actors, civil society organizations, and local communities. Institutional strengthening in recent years has included the development of a national climate transparency system, improvements in measurement, reporting, and verification mechanisms, and the establishment of a national carbon market framework. These efforts demonstrate a progressive alignment with international climate governance standards. The preparation of the NDC 3.0 was itself based on extensive consultations involving a range of stakeholders. These included (i) national stakeholders, such as the public sector, the private sector, local authorities and civil society organisations; and (ii) development partners (UNDP, GIZ, FAO, etc.). This mobilisation demonstrates a growing commitment to participatory governance. Furthermore, the concept of ≪territorialization≫ of climate policy has gained prominence, aiming to translate national climate objectives into local action plans and decentralized implementation mechanisms. Despite these advances, challenges remain in ensuring effective inter-institutional coordination, strengthening technical capacities at subnational levels, and fully operationalizing monitoring and accountability systems.

2.1.1 Position in international climate politics and global political economy

Côte d'Ivoire occupies a dual and strategically important position within international climate politics and the global political economy. As a developing country highly vulnerable to climate change, it aligns with the principles of the Paris Agreement, particularly that of common but differentiated responsibilities, while at the same time positioning itself as an emerging economic leader in West Africa. The country is best characterized as a net recipient of climate finance, a technology importer in the field of renewable energy and low-carbon systems, and an increasingly active participant in international carbon markets. The NDC 3.0 explicitly recognizes that achieving national climate

objectives depends significantly on access to international financial resources, technology transfer, and capacity-building support, highlighting the structural dependence of climate ambition on external partnerships.

Côte d'Ivoire's integration into global commodity markets, particularly through exports of cocoa, coffee, rubber, and palm oil, further shapes its climate policy orientation. This integration creates a complex dynamic in which international sustainability standards and zero-deforestation commitments can act as drivers of environmental reform, while at the same time exposing the country to price volatility and external economic shocks. The country's climate strategy, therefore, reflects a balancing act between maintaining competitiveness in global markets and transitioning toward more sustainable production systems. In recent years, Côte d'Ivoire has increasingly sought to position itself as a proactive climate actor within the African region, demonstrating relatively ambitious mitigation targets and engaging with emerging global mechanisms such as carbon markets. However, the extent to which these ambitions can be realized remains closely tied to global economic conditions and the availability of international support.

2.1.2 Macroeconomic context and implications for climate policy

Côte d'Ivoire has been one of the fastest-growing economies in Sub-Saharan Africa over the past decade, supported by strong performance in agriculture, infrastructure development, and a growing services sector. The country's demographic profile, characterized by a young and rapidly expanding population (estimated at 26.8 million people in 2020 and 32.8 million people in 2025), offers significant opportunities for economic transformation but also generates considerable pressure on employment, urban infrastructure, and natural resources. Despite these positive growth dynamics, the macroeconomic environment presents important constraints for the implementation of ambitious climate policies.

The country is highly exposed to climate risks, particularly in sectors that are central to its economy. Agriculture, which remains largely rain-fed, is highly sensitive to changes in precipitation patterns and temperature variability. Water resources are increasingly affected by both droughts and flooding, while coastal zones face rising threats from sea-level rise and erosion, especially in economically strategic areas such as Abidjan. These climate impacts have the potential to significantly affect economic performance and exacerbate poverty, thereby reducing the fiscal space available for climate investments. To reverse this trend, the NDC 3.0 sets an ambitious target of reducing emissions by 33.07 per cent by 2035 compared with the business-as-usual (BAU) scenario, by mobilising a portfolio of differentiated sectoral measures designed to strengthen the resilience of vulnerable sectors. The financial requirements associated with the implementation of the NDC 3.0 are substantial, estimated at approximately USD 58.8 billion, a large share of which is conditional on international support. This underscores the country's reliance on external financing sources, including multilateral institutions, bilateral partners, private investors, and emerging carbon market mechanisms. At the same time, the structure of the Ivorian economy, which remains dependent on natural resources and partially reliant on fossil fuels, particularly natural gas for electricity generation, creates structural challenges for decarbonization. Efforts are underway to promote a transition toward a low-carbon and climate-resilient economy, but these must be managed carefully to avoid undermining economic growth and energy security.

In addition, Côte d'Ivoire is exposed to external economic shocks, including fluctuations in global commodity prices, volatility in international energy markets, and changing financial conditions. These factors can directly influence government revenues and investment capacity, thereby affecting the pace and scope of climate policy implementation.

2.1.3 Emissions profile, energy mix, climate vulnerability, and commitments

Côte d'Ivoire's greenhouse gas emissions profile is dominated by the Agriculture, Forestry and Other Land Use sector, primarily due to deforestation driven by agricultural expansion, particularly in cocoa production. The energy sector constitutes the second-largest and fastest-growing source of emissions, reflecting increasing demand associated with economic growth, urbanization, rising standards of living, and industrialization. The country's energy mix is relatively diversified, with electricity generation largely based on natural gas-fired thermal plants, complemented by hydropower and a gradually increasing contribution from renewable energy sources such as solar and biomass. While this diversification provides a degree of resilience, the continued reliance on fossil fuels presents a challenge for long-term decarbonization.

Côte d'Ivoire is highly vulnerable to climate change impacts across multiple sectors, including agriculture, water resources, coastal zones, and ecosystems. These vulnerabilities reinforce the need for integrated mitigation and adaptation strategies, as emphasized in the NDC 3.0. Under this framework, the country has committed to reducing its greenhouse gas emissions by 33.07 % by 2035 relative to a business-as-usual scenario, with part of this target conditional on international support. The NDC outlines sectoral transformation pathways and promotes the development of carbon market mechanisms and national transparency systems, reflecting a comprehensive approach to climate governance.

2.1.4 Main domestic actors shaping climate policy

Climate policy in Côte d'Ivoire is shaped by a diverse range of actors operating at different levels of governance. Political leadership at the highest level plays a central role in setting strategic priorities and integrating climate objectives into national development plans. Key ministries, particularly those responsible for environment, energy, and agriculture, are instrumental in designing and implementing sectoral policies that contribute to climate goals. State-owned enterprises in the energy sector play a crucial role in shaping the electricity mix and infrastructure development, thereby influencing the trajectory of the energy transition.

The private sector is increasingly important, particularly in areas such as renewable energy investment and sustainable agricultural value chains, often driven by international market requirements and sustainability standards. Civil society organizations contribute to stakeholder engagement, advocacy, and monitoring of environmental and social impacts, although their influence varies across sectors. Local authorities are gaining importance through the decentralization of climate policy, although their capacity to implement climate actions remains uneven.

2.1.5 Recent reforms, crises, and turning points

The trajectory of climate and energy policy in Côte d'Ivoire has been shaped by several key reforms and turning points over the past decade. The post-2011 period of political stabilization enabled the development of long-term policy frameworks and increased investment in infrastructure and institutional capacity. The evolution of Côte d'Ivoire's NDCs, from the initial submission in 2015 to NDC 3.0 in 2025, reflects a marked increase in climate ambition. This evolution is characterized by stronger economy-wide emission reduction targets (33.07% unconditional and up to 74.29% conditional by 2035), expanded coverage of all major emitting sectors, more ambitious quantified sectoral targets (including 46.3% renewable electricity, restoration of 1.5 million hectares of forest, and a 50–70% reduction in HFC consumption), and stronger integration of adaptation, climate finance, gender, and implementation mechanisms. .

Reforms in the energy sector have focused on expanding generation capacity, improving access to electricity, and integrating renewable energy sources, while maintaining reliance on natural gas for energy security. The establishment of a national carbon market framework in 2024 represents a significant institutional innovation, positioning Côte d'Ivoire within emerging global carbon finance systems. At the same time, recurrent climate-related events such as floods, droughts, and coastal erosion have heightened awareness of climate risks and reinforced the

urgency of policy action. Global economic and geopolitical dynamics, including energy price volatility and supply chain disruptions, have further influenced national strategies by emphasizing the importance of resilience and energy security. In terms of emissions, Côte d'Ivoire was a net carbon sink thanks to its abundant forests. However, it has now become a net emitter, with 110,345.58 Gg CO_2eq recorded in 2022, representing a 1,531 per cent increase compared with 1990. This change is mainly due to deforestation and the decline in the absorption capacity of the Land Use, Land-Use Change and Forestry (LULUCF) sector, which is now the main source of emissions. In response to this trend, in 2018 the government revised its conservation policy, focusing on reforestation and agroforestry, with the aim of restoring up to 4.0 million hectares, thereby restoring the sector's role as a carbon sink. This policy is underpinned by projects to restore degraded land developed under the REDD+ mechanisms. The downward trend is significant with the implementation of Phase 2 and the launch in 2025 of reforestation projects as part of the Forestry Strategy for 2030. Notable projects in this context include the ProForêt project, the Cocoa-based Food Systems, Land Use and Restoration project in Côte d'Ivoire (SCOLUR-CI), and the project to promote deforestation-free cocoa production to reduce emissions in Côte d'Ivoire (PROMIRE).

2.2 Fairness

This section assesses how climate and energy policies in Côte d'Ivoire distribute costs, benefits, and risks across social groups, regions, and economic sectors. The analysis is based exclusively on the 'Nationally Determined Contribution (NDC 3.0)' and a review of existing documents. The assessment takes into account both the current situation and the expected outcomes following the implementation of the NDC, with a time horizon extending mainly up to 2035, which corresponds to the main target year of NDC 3.0.

2.2.1 Distribution of costs and benefits of climate policies

The NDC 3.0 of Côte d'Ivoire explicitly recognizes that the transition toward a low-carbon economy will generate both significant socio-economic benefits and unevenly distributed costs across society. It adopts a "just transition" framework, aiming to maximize socio-economic gains while mitigating the negative impacts on vulnerable groups, including workers, communities, and enterprises. In the current situation, the distribution of costs and benefits is not uniform across social groups or regions. Households, particularly low-income and rural populations, may bear short-term costs and energy affordability concerns associated with energy transition policies, such as changes in energy pricing, adoption of clean cooking technologies, or limited access to modern energy infrastructure. The transition from traditional biomass to cleaner energy sources, for example, may require upfront investments that are not equally affordable across income groups.

Similarly, workers in sectors indirectly linked to fossil fuels or unsustainable land-use practices may face adjustment costs, including job insecurity or the need for reskilling or upskilling. However, the available evidence in the NDC indicates that these impacts are acknowledged but not quantified in detail, and no comprehensive national mechanism for workforce transition is explicitly defined. At the same time, the NDC highlights the potential for long-term socio-economic benefits, including job creation in renewable energy, sustainable agriculture, forestry, and circular economy sectors. The transition is expected to generate new economic opportunities, improve productivity, and enhance resilience across the economy.

After implementation of the NDC, the distribution of benefits is expected to improve, particularly through increased access to clean energy, development of green jobs, and improved environmental conditions. However, these benefits may still be unevenly distributed, especially if structural inequalities are not fully addressed.

2.2.2 Fairness across income groups and energy affordability

The fairness assessment highlights that income-based inequalities remain a critical issue in Côte d'Ivoire's energy transition. In the current situation, the affordability of energy services is not uniform, and vulnerable households may face a higher relative burden when energy costs increase or when new, more expensive low-carbon technologies are introduced. The NDC 3.0 includes measures aimed at improving energy access and affordability, such as the promotion of clean cooking solutions and the continuation of subsidy programs for liquefied petroleum gas (LPG). For example, the NDC targets a 70% penetration rate of LPG in households by 2035?, supported by national subsidy programs. These measures are intended to reduce energy poverty and improve living conditions, particularly for low-income households.

Despite these efforts, analysis of the data collected shows that access to affordable energy remains unequal, with rural and low-income populations facing greater financial constraints. The transition to cleaner energy could, initially, lead to higher costs and raise concerns about affordability, particularly due to the necessary investments in low-carbon infrastructure and technologies. In the medium to long term, the transition to renewable energy is expected to contribute to greater price stability and, potentially, a reduction in energy costs, which could improve affordability. However, the absence of explicit redistribution mechanisms or targeted social protection measures in the CND limits the certainty of these outcomes.

2.2.3 Regional and geographic inequalities

Geographic disparities are a central dimension of fairness in Côte d'Ivoire. The current situation is characterized by unequal access to electricity and energy infrastructure, with rural areas generally less well-served than urban centers. The NDC 3.0 recognizes the need to expand access to energy services and improve infrastructure, which is expected to reduce regional disparities over time. However, the Excel assessment indicates that the regional development benefits from the energy transition are not yet evenly distributed, and disparities in infrastructure investment and economic opportunities persist. Furthermore, climate vulnerability itself is spatially differentiated. Rural regions, particularly those dependent on agriculture, are more exposed to climate risks such as droughts and floods. These regions may therefore bear disproportionate adaptation costs, while also facing structural barriers to accessing the benefits of climate investments. After NDC implementation, improvements in infrastructure and access are expected to reduce some regional inequalities, but full convergence across regions is unlikely without targeted territorial policies and stronger decentralization mechanisms.

2.2.4 Gender equality and social inclusion

Gender and social inclusion are explicitly integrated into the NDC 3.0 as cross-cutting priorities. The document adopts a transformative gender approach, aiming to reduce inequalities between men and women and strengthen the resilience of vulnerable groups, including women, youth, children, persons with disabilities, and the elderly. In the current situation, however, gender inequalities persist, particularly in access to economic opportunities, participation in decision-making, and access to energy services. Women, especially in rural areas, are disproportionately affected by energy poverty and environmental degradation. The NDC includes targeted measures to promote women's economic empowerment, including support for entrepreneurship in green sectors and a target of at least 100,000 young women employed or leading businesses in green and renewable energy sectors by 2035. Despite these commitments, the Excel assessment indicates that gender equality in the energy transition is still partial, particularly in terms of actual participation in decision-making processes and equitable distribution of benefits. After implementation, gender inclusion is expected to improve due to targeted programs and increased attention to gender-responsive policies. However, the absence of binding mechanisms or quantified participation targets in governance structures suggests that progress may remain uneven.

2.2.5 Employment impacts and just transition

Employment effects are a critical dimension of fairness in the energy transition. The NDC 3.0 acknowledges that the transition will have significant impacts on employment, both positive and negative. On the one hand, the development of renewable energy, circular economy, and sustainable land-use systems is expected to create new jobs and economic opportunities, particularly for youth and women. On the other hand, the transition may lead to job displacement in certain sectors especially those with high carbon-intensity, although this risk is less pronounced in Côte d'Ivoire due to the relatively limited size of fossil fuel extraction activities.

The NDC explicitly refers to the need to mitigate negative impacts on workers and communities as part of a just transition. However, the Excel assessment highlights that specific mechanisms for retraining, reskilling, and worker protection are not clearly defined in the NDC. As a result, while employment benefits are expected to increase over time, the distribution of these benefits across social groups is likely to remain uneven, particularly in the absence of structured labor transition policies.

2.2.6 Procedural fairness and participation

Procedural fairness refers to the inclusiveness and transparency of decision-making processes. The NDC 3.0 emphasizes a participatory approach, involving government institutions, private sector actors, civil society organizations, and local communities. The preparation of the NDC included consultations with a wide range of stakeholders, including youth organizations and gender-focused groups. This reflects a commitment to inclusive governance and stakeholder engagement.

However, the Excel-based assessment indicates that participation is not yet fully inclusive or institutionalized. Certain groups, particularly rural populations, women, and informal sector actors, may have limited influence over decision-making processes. Similarly, while transparency mechanisms such as monitoring and reporting systems are being developed, comprehensive frameworks for auditing energy and climate projects are not clearly detailed in the NDC. After implementation, procedural fairness is expected to improve through enhanced stakeholder engagement and governance reforms. Nevertheless, without formalized participation mechanisms and accountability frameworks, these improvements may remain partial.

2.2.7 Social Protection, Redistribution, and Just Transition Mechanisms

The NDC 3.0 acknowledges the importance of social protection and redistribution mechanisms as part of a just transition. It highlights the need for measures to support vulnerable groups, including socio-economic support programs, reskilling activities, and capacity-building initiatives. However, the Excel assessment indicates that specific and operational just-in-transition policies are not yet fully developed. There is no comprehensive national just transition plan that clearly defines:

- compensation mechanisms for affected workers or communities,
- targeted financial support for vulnerable households,
- or structured redistribution frameworks.

As a result, while the principle of fairness is recognized at the policy level, its implementation remains uncertain.

Political framing of fairness, policy credibility, and international equity positioning

Fairness considerations in Côte d'Ivoire's climate and energy transition are explicitly framed within the broader narrative of a "just, inclusive, and sustainable transition", as reflected in the NDC 3.0. The political discourse emphasizes the need to balance climate ambition with socio-economic development priorities, particularly poverty reduction, employment creation, and improved access to essential services such as energy. Within this framing, fairness is closely linked to the concept of inclusive growth, rather than being treated as a purely redistributive or compensatory policy objective.

At the national level, the NDC presents climate action as an opportunity for economic transformation and social progress, highlighting co-benefits such as job creation, improved health outcomes, and increased resilience of vulnerable populations. This narrative contributes to building social legitimacy for climate policies by framing them not as constraints, but as drivers of development. However, based on the Excel assessment, there is limited explicit evidence of strong public contestation or protest dynamics specifically related to climate or energy transition policies. This may reflect both the relatively early stage of structural transformation and the fact that major transition-related costs, particularly in the energy sector, have not yet been fully internalized by households and firms. Nevertheless, underlying distributional tensions remain implicit. These include disparities between urban and rural areas in access to energy infrastructure, differences in capacity to absorb rising energy costs, and unequal access to economic opportunities created by the transition. These structural inequalities suggest that while fairness is positively framed in political discourse, potential sources of social conflict could emerge over time, particularly if policy implementation leads to increased costs for vulnerable groups without adequate compensation mechanisms.

From a policy design perspective, fairness considerations are partially embedded but not fully operationalized. The NDC 3.0 integrates key principles of fairness, including gender inclusion, support for vulnerable groups, and stakeholder participation. It also recognizes the need to mitigate the negative socio-economic impacts of the transition and to promote equitable access to emerging opportunities. However, as reflected in the Excel-based assessment, these principles are not systematically translated into concrete, enforceable policy instruments. For instance, while the NDC highlights the importance of supporting workers and communities affected by the transition, it does not define detailed mechanisms for compensation, retraining, or income support. Similarly, although energy affordability and access are recognized as priorities, the document does not establish comprehensive redistribution frameworks or targeted subsidy systems beyond specific measures such as LPG promotion. This suggests that fairness considerations currently function more as guiding principles than as binding policy commitments, which may limit their effectiveness in practice. The credibility of fairness outcomes, therefore, depends heavily on implementation capacity, institutional coordination, and the development of complementary policies beyond the NDC framework. Without these, there is a risk that fairness remains primarily rhetorical, rather than fully embedded in the operational design of climate policies.

At the international level, Côte d'Ivoire frames its climate responsibilities within the principles of the Paris Agreement, particularly emphasizing equity, capability, and conditionality. The NDC clearly states that a significant portion of its mitigation and adaptation commitments is conditional on international support, including financial resources, technology transfer, and capacity building. This reflects the country's position as a developing economy with limited historical responsibility for global emissions and constrained domestic resources. This framing is consistent with a broader political economy perspective in which Côte d'Ivoire seeks to balance its national development objectives with its international climate commitments. By emphasizing conditionality, the country positions itself as a responsible but constrained actor, willing to increase its level of ambition provided that adequate support is mobilized. This approach also reflects concerns about the potential trade-offs between climate action and economic growth, particularly in a context where energy demand is rapidly increasing and structural transformation is ongoing. Furthermore, Côte d'Ivoire's integration into global markets, particularly through agricultural exports, reinforces its sensitivity to international standards and external pressures, including sustainability requirements and climate-related trade policies. This creates both opportunities and constraints: while international partnerships can support the transition, they may also introduce new forms of inequality or dependency, particularly if access to finance and technology remains uneven. From a political economy perspective, the sustainability of climate policies in Côte d'Ivoire will depend on their ability to maintain social legitimacy over time. This requires that the distribution of costs and benefits be perceived as fair by key constituencies, including households, workers, and regional actors.

At present, the relatively moderate level of immediate costs and the strong development-oriented narrative contribute to policy acceptability. However, as the transition deepens and more structural changes are

implemented, the risk of distributional conflict may increase, particularly in the absence of robust social protection and redistribution mechanisms.

In summary, fairness in Côte d'Ivoire's climate transition is politically acknowledged and positively framed, but remains partially operationalized. The NDC 3.0 provides a clear narrative foundation for a just transition, aligned with international principles of equity and conditionality. However, the translation of these principles into concrete policy instruments remains limited, raising important questions about the long-term equity, social acceptance, and sustainability of the transition pathway.

2.3 Feasibility

The credibility and feasibility of Côte d'Ivoire's climate commitments are contingent upon sustained political and institutional stability, a secure environment, robust socio-economic progress, and continued advancements in the legal and institutional framework governing climate action since 2015.

Politically, notwithstanding election periods, which are often marked by tensions among political actors, Côte d'Ivoire has regained political, institutional, and security stability, thereby providing a solid foundation for its socio-economic development. This stability is evidenced by the continuity of public action over nearly two decades without interruption. Despite a fragile security context along its northern borders and the persistent threat of terrorism in the Sahel region, Côte d'Ivoire remains a relatively stable country, enabling the continued strengthening of its legal and institutional framework for climate change.

Côte d'Ivoire's political commitment to addressing climate change is further reflected in the systematic integration of climate considerations into planning policies at both national and local levels. Climate action is fully embedded in key strategic frameworks, including the National Prospective Study Côte d'Ivoire 2040 and the National Development Plan (PND 2026–2030). In addition, several sectoral plans incorporating climate change mitigation and adaptation measures have been developed. These include the National Agricultural Investment Program (PNIA II), the national REDD+ strategy, the Forestry Investment Program (FIP), the National Adaptation Plan (PNA), the National Strategy for Contribution to Reforestation in the Coffee and Cocoa Sector (2025–2035), the Gender Equality and Climate Change Strategy, also referred to as the National Gender Equality Policy (2024–2030), the National Disaster Risk Reduction Strategy (2019–2030), and the National Energy Pact, which is aligned with both the National Development Plan and the Sustainable Development Goals (SDG 7). At the local level, regions and municipalities are progressively developing green or climate plans aimed at defining and guiding local climate action. However, significant challenges remain, particularly about the effective implementation of these plans on the ground.

At the legal and institutional level, Côte d'Ivoire has strengthened its climate governance and legal framework with Law No. 2025-528 of June 25, 2025, on combating climate change. This law reinforces climate governance, regulates the carbon market, and contributes to the global response to the threat of climate change as outlined in international agreements ratified by Côte d'Ivoire. It also defines the main emitting sectors, the principles of international cooperation, the stakeholders involved in combating climate change, and the State's obligations regarding climate action. The current legal framework in Côte d'Ivoire requires local authorities to implement national strategic policies and plans related to combating climate change at the local level. Climate action is now integrated into the three-year programs and strategic development plans of local authorities. In the private sector, the new climate law mandates that companies adopt low-GHG emission development and investment projects. The role of companies is also structured by the law, specifically articles 23, 24, and 25 of section 4.

At the legal and institutional level, Côte d'Ivoire has significantly strengthened its climate governance and regulatory framework through the adoption of Law No. 2025-528 of 25 June 2025 on combating climate change. This

legislation reinforces climate governance, establishes a regulatory framework for the carbon market, and contributes to the global response to climate change in line with the international agreements ratified by Côte d'Ivoire. It further delineates key greenhouse gas (GHG)-emitting sectors, outlines the principles of international cooperation, identifies the stakeholders involved in climate action, and specifies the obligations of the State in this domain.

The current legal framework mandates local authorities to implement national strategic policies and plans related to climate change at the territorial level. Accordingly, climate action is now systematically integrated into the three-year programs and strategic development plans of local governments.Within the private sector, the new climate law requires companies to adopt low-GHG emission development and investment strategies. The role and responsibilities of private actors are further structured under Articles 23, 24, and 25 of Section IV of the law.

Beyond the adoption of climate legislation, governance arrangements in Côte d'Ivoire are being further strengthened to ensure the effective implementation of the country's climate commitments including its NDC3.0. In particular, a Carbon Market Office has been established as a one-stop shop for carbon market mechanisms, in alignment with Article 6 of the Paris Agreement and the framework for international cooperation and climate finance mobilization. This entity is tasked with mobilizing climate finance to support the implementation of climate action through the development of carbon credit projects. These specialized institutional arrangements have been established to complement the role of the National Climate Change Commission, which is responsible for coordinating actions across sectoral ministries. All these climate governance structures operate under the oversight of the Ministry of the Environment and Sustainable Development (MEDD). With regard to climate finance, the total cost of implementing Côte d'Ivoire's NDC 3.0 is estimated at USD 62.06 billion, including USD 34.85 billion allocated to adaptation and USD 27.22 billion to mitigation by 2035.

To achieve the objectives set out in NDC 3.0, two categories of measures are envisaged. The first category comprises unconditional measures that the State commits to implementing without external support, relying primarily on the mobilization of domestic financial resources. The estimated cost of these measures amounts to USD 10,622,108,004. The second category consists of conditional measures, whose implementation is contingent upon the provision of international financial and technical support. These measures are expected to enable a reduction in greenhouse gas emissions of up to 74.29%. The total cost of these conditional measures is estimated at USD 48,173,099,679. To implement unconditional measures, the State has developed climate finance strategies encompassing both traditional and innovative mechanisms. Traditional financing mechanisms rely primarily on public funds and international financial support. In addition, the State has introduced innovative instruments, including the establishment of the Carbon Market Office to enable the monetization of carbon credits, the creation of Village Associations for Community Mutual Aid to finance local climate initiatives, and the implementation of a local environmental tax based on the polluter-pays principle at the territorial level.

Beyond these sources of climate finance, dedicated budget lines have also been integrated into the three-year programs of local authorities to support the financing of local climate action. However, several challenges persist in financing climate action, thereby affecting the effective and efficient implementation of Côte d'Ivoire's climate commitments. These challenges include the low level of private sector participation in climate project financing, largely due to risk aversion; the complexity of eligibility criteria for carbon credit projects; and the lengthy and often cumbersome procedures for accessing climate finance. In addition, there are significant capacity constraints at the national level, particularly in the development of bankable projects, the mobilization of climate finance, and the understanding and operationalization of carbon credit payment mechanisms for local communities. Furthermore, there is a lack of robust mechanisms to ensure the sustainability of benefits generated by financed climate projects for local populations. With regard to the interaction between climate policy and Côte d'Ivoire's development priorities, it is important to note that climate action is now fully integrated into the country's key development sectors through national planning frameworks and Nationally Determined Contributions (NDCs). Indeed, the vision

of the Côte d'Ivoire 2040 National Development Plan (NDP) is articulated as follows: 'Côte d'Ivoire, an industrial powerhouse, united in its cultural diversity, democratic and open to the world.' This vision is operationalized through National Development Plans structured around six pillars, which define the country's core development priorities.

Pillar 1 focuses on accelerating the structural transformation of the economy through industrialization and cluster development, supported by sustained public investment and strengthened partnerships with the private sector. This approach is expected to increase investment in key growth sectors while generating employment and decent incomes. Within this pillar, climate policy seeks to promote the development of the circular economy as a strategic and cross-cutting response, aimed at transforming production and consumption patterns while fostering green growth, sustainable job creation, and economic resilience. The integration of the circular economy into productive sectors is intended to strengthen Côte d'Ivoire's climate resilience. It further entails the promotion of sustainable agriculture and the enhancement of energy efficiency in the industrial sector, to reduce energy intensity by 30% by 2035. This policy framework also encourages the development of low-emission projects by private sector actors.

Pillar 2 focuses on developing human capital and promoting employment, notably by ensuring equitable access to quality education for all Ivorians, with particular emphasis on young people. This is intended to better equip them to absorb modern (and green) technologies, contribute to economic growth and job creation, and thereby improve income levels and living conditions. It also entails the preservation of human capital to ensure its sustainability over time through strengthened health and social protection policies. At the social level, climate policy prioritizes adaptation measures targeting the most vulnerable groups, while ensuring equity and the mainstreaming of gender considerations in climate action. It further seeks to strengthen the capacities of youth and women in innovative technologies and to promote the development of climate-related projects for the benefit of local populations. The overarching objective is to protect human well-being from the adverse impacts of climate change by enhancing the skills of young people and strengthening their resilience.

Pillar 3 focuses on developing the private sector and promoting investment in order to enhance the overall competitiveness of the economy. It encompasses strategies and programs aimed at strengthening private sector development and private investment, expanding access to finance and infrastructure, improving the business climate, and broadening domestic, regional, and international markets to boost trade and investment. Within this framework, climate policy requires private sector actors to adopt low-emission development and investment approaches, comply with national and regional climate change mitigation plans, and actively contribute to greenhouse gas emission reduction initiatives. It also calls for the mobilization of climate finance and relevant technologies, the implementation of climate action measures, and the integration of corporate social responsibility principles into business practices.

Pillar 4 focuses on strengthening inclusion, national solidarity, and social action by promoting the participation of all social groups in economic development and improving equitable access to essential economic and social services. Particular attention is given to the most vulnerable populations, including women, youth, persons with disabilities, and the elderly. In this regard, Côte d'Ivoire places women, youth, social inclusion, and vulnerable groups at the core of its climate policy, as outlined in NDC 3.0, with a specific focus on strengthening their resilience to climate extremes.

Pillar 5 focuses on promoting balanced regional development, environmental preservation, and climate change mitigation through optimal land-use planning and the economic valorization of regional potential, while ensuring a balanced relationship between rural and urban areas. This pillar also emphasizes environmental protection, the safeguarding of natural heritage, and the sustainable use of natural resources, to respect ecological systems, addressing global warming, and ensuring sustainable development. Environmental conservation, identified as a key development priority for Côte d'Ivoire in the context of climate change, focuses on the preservation of existing

natural heritage, the restoration of degraded forest areas through reforestation and agroforestry initiatives, and the promotion of green jobs and the green economy.

Pillar 6 focuses on strengthening governance, modernizing the State, and promoting cultural transformation to consolidate peace and ensure security, justice, and social cohesion. It emphasizes the need for a more proactive role of the State in the delivery of economic and social public services, as well as the reinforcement of planning, programming, budgeting, implementation, and monitoring systems for development policies and programs. The Plan further seeks to transform institutional cultures and practices within public administration and the private sector to foster values and behaviors that are conducive to development. This objective involves enhancing national and social awareness through a comprehensive cultural transformation embedded in the education system, public administration, workplaces, places of worship, community associations, and non-governmental organizations. In terms of governance, climate policy is closely linked to territorial development planning through the systematic integration of climate action into all development planning instruments, as well as the progressive establishment of green or climate plans at the regional level across the country.

Favorable factors for the implementation of Côte d'Ivoire's climate commitments include the mobilization and strong engagement of all stakeholders, namely the State, sectoral ministries, the private sector, Technical and Financial Partners (TFPs), civil society, local authorities, and local populations. The roles of these actors are clearly defined in NDC 3.0 and in national planning frameworks. The second key factor is the mobilization of climate finance through the establishment of dedicated financing mechanisms for climate action. These include State subsidies, bilateral and multilateral funding, the valorization of carbon credits managed by the Carbon Market Office, the creation of budget lines within local government development programs, the promotion of private sector investment in low-GHG emission projects, and the establishment of Local Development Groups (LDGs) to support the financing of local climate initiatives.

However, several challenges remain, including stringent conditions for accessing climate finance; the complexity, length, and demanding eligibility criteria associated with carbon credit projects; and persistent concerns regarding the risks involved in the development of climate-related initiatives. Additional constraints include insufficient technical expertise in designing bankable projects eligible for climate finance, as well as the limited availability of climate funds, partly due to the reluctance of some developed countries to provide adequate financial support to developing countries. Furthermore, strengthening national capacities remains a key challenge, particularly in the areas of gender and climate change integration, sustainable agricultural practices, and the development of renewable energy systems.

2.4 Adequacy

Key national long-term system transformations

The assessment of Côte d'Ivoire's adequacy in addressing long-term climate objectives shows a mixed but progressively evolving alignment with net-zero transformation pathways. The country's climate strategy, as reflected in its national planning documents and NDC 3.0, incorporates several structural transformations across energy, transport, land use, and agriculture. However, the degree of integration varies significantly across sectors, with some transformations strongly operationalized while others remain either partially addressed or absent.

Transformations aimed at facilitating a gradual transition away from fossil fuel consumption

Transformations towards carbon neutrality in the energy sector focus on several key areas. These include energy efficiency improvements through the transition to LED lighting, intending to achieve a 100% LED penetration rate and reduce energy intensity by at least 30% by 2035. They also involve expanding access to clean cooking solutions for households by increasing the use of liquefied petroleum gas (LPG) and promoting the adoption of improved biomass cook stoves, to reach a long-term LPG usage rate of 70% and an improved cook stove adoption rate of 25%

by 2035. In addition, these transformations encompass the electrification of transport and the development of renewable energy sources, intending to achieve a 46.3% share of renewables in the national energy mix by 2035.

Transformations aimed at developing a land-use system that maximizes carbon sinks Before 1990, Côte d'Ivoire functioned as a carbon sink. However, greenhouse gas (GHG) emissions from the country increased from -18,522.29 $GgCO_2eq$ in 1990 to 53,643.11 $GgCO_2eq$ in 2022. Emissions from the forestry and land-use sector could reach 44,000 $GgCO_2eq$ by 2035. This upward trend is primarily driven by significant deforestation dynamics, with forest cover declining from approximately 16 million hectares at the beginning of the twentieth century to about 2.97 million hectares in 2021 (INFF, 2021), thereby transforming Côte d'Ivoire into a net GHG-emitting country. Several factors contribute to deforestation in Côte d'Ivoire, but the main factor remains agriculture, which accounts for approximately 62%. Future emission trajectories in this sector will depend on several key drivers, including (i) the expansion of agricultural land, (ii) urbanization dynamics, (iii) changes in logging practices, (iv) the evolution of illegal gold mining activities, (v) bushfire incidence, and (vi) population growth. Current forest cover consists of 92,340 hectares of reforested areas, 2,880,490 hectares of natural forests, 558,030 hectares of natural forests within classified forests, 674,500 hectares of protected areas, and 1,740,300 hectares of rural forests. The forestry and land-use sector plays a crucial role as a carbon sink in climate change mitigation. The main pillars for decarbonizing the sector towards long-term carbon neutrality include: (i) increasing national reforestation areas; (ii) expanding agroforestry systems; (iii) strengthening the conservation status of protected areas and classified forests; (iv) scaling up financing for carbon credit projects; (v) effectively promoting zero-deforestation agricultural practices; and (vi) controlling urban expansion and illegal gold mining activities.

These conservation, reforestation, and agroforestry measures are expected to reduce forest cover loss and enhance carbon dioxide (CO_2) sequestration capacity. Since the adoption of the National REDD+ Strategy in 2017, Côte d'Ivoire has strengthened forest governance through the implementation of the 2019 Forest Code, the operationalization of results-based payment mechanisms under the Forest Carbon Partnership Facility (FCPF), improved forest monitoring systems, and the expansion of agroforestry and forest restoration programmes. While these efforts have contributed to a gradual slowdown in deforestation, forest loss remains a major challenge, driven primarily by agricultural expansion, particularly cocoa production, illegal logging, and demographic pressure. Achieving the country's forest restoration objectives will therefore require sustained implementation and stronger enforcement. Under the NDC 3.0, these measures are expected to: (i) limit forest loss to 550,000 hectares by 2035 through biodiversity protection, zero-deforestation agricultural policies, the implementation of the REDD+ strategy, strengthened forest governance, and the sustainable management of forest resources; (ii) increase forest cover by 1.5 million hectares through a differentiated reforestation approach adapted to national needs by 2035; and (iii) convert 2,500,000 hectares of agricultural land in key value chains (cocoa, cashew, oil palm, and rubber) into sustainable agroforestry systems by 2035. . Furthermore, the decarbonization of the AFOLU sector will depend on the financing and effective implementation of carbon credit projects under the REDD+ strategy, aimed at restoring forest cover and promoting sustainable agricultural practices.

<u>Transformations aimed at reducing agricultural emissions other than CO_2</u>

The agricultural sector is one of the main sources of greenhouse gas (GHG) emissions in Côte d'Ivoire. Its emissions increased from 5,975.11 GgCO2eq in 1990 to 8,230.68 $GgCO_2eq$ in 2022. According to the climate scenarios outlined in NDC 3.0, agricultural emissions (CH_4 and N_2O) could potentially double by 2035.

Three main factors contribute to GHG emissions in the agricultural sector. The first is enteric fermentation (CH_4) and livestock manure management (CH_4 and N_2O) associated with animal production systems. The second is the burning of savannas and forests linked to pasture renewal for perennial crops (cocoa, rubber, cotton, cashew, among others), as well as bushfires and hunting practices. The third is the excessive use of soil fertilizers, including mineral and organic fertilizers, animal manure, compost, and crop residues. However, the agricultural sector in Côte d'Ivoire remains highly vulnerable to extreme weather events, as more than 95% of cultivated land is rain-fed, compared

with only 0.02% under irrigation. This heavy dependence exposes the sector to significant risks of drought and declining yields in both cereal crops (maize, rice, millet, sorghum, etc.) and cash crops (cocoa, coffee, cotton, etc.). This vulnerability is expected to further increase farmers' exposure to climate risks between 2030 and 2050.
Moreover, cocoa production of Côte d'Ivoire's main export crop could decline by 17% to 23% by 2050, thereby threatening the livelihoods of millions of producers and potentially affecting the national trade balance. In this context, the priority levers for the long-term decarbonization of the agricultural sector include sustainable livestock farming, climate-smart rice cultivation, improved fertilizer management, and the prohibition of crop residue burning, while savanna and forest ecosystems play a role in stabilizing or reducing sectoral emissions.

Key transformation targets for the sector by 2035 and 2050 include: (i) achieving 70% adoption of climate-smart techniques among livestock farmers; (ii) ensuring that 75% of rice-growing areas implement climate-smart practices; (iii) reaching 70% adoption of good agricultural practices aimed at reducing open burning, with a target of reducing the area affected by such practices by 90%; and (iv) ensuring that 100% of regulated agricultural areas are covered by sustainable management plans. The overarching objective is to increase the share of vulnerable farmers by adopting climate-smart practices and to strengthen the resilience and sustainability of agricultural production systems. These strategies are implemented by the relevant ministries, in this case the Ministry of Agriculture, Rural Development and Food Crops, through the National Agricultural Investment Plan

Côte d'Ivoire's current regulatory framework on climate change is defined by Law No. 2025-528 of 25 June 2025 on the fight against climate change, the Nationally Determined Contributions (NDC 3.0), and national and regional development planning policies integrating climate action. The transitions towards carbon neutrality under this regulatory framework are structured around key greenhouse gas (GHG) emission sectors. These include: (i) transformations towards carbon neutrality in the energy sector. These focus on energy efficiency improvements through the transition to LED lighting, with the objective of achieving a 100% LED penetration rate and reducing energy intensity by at least 30% by 2035; expanding access to clean cooking solutions for households by increasing the use of liquefied petroleum gas (LPG) and promoting the adoption of improved biomass cookstoves, with the aim of reaching a long-term LPG usage rate of 70% and an improved cookstove adoption rate of 25% by 2035; as well as the electrification of transport and the development of renewable energy sources, with the objective of achieving a 46.3% share of renewables in the national energy mix by 2035 ; (ii) Transformations towards carbon neutrality in the agricultural sector focus on sustainable livestock farming, the adoption of climate-smart rice cultivation practices, the responsible management of fertilizers, and the prohibition of crop residue burning. These measures also aim to promote the widespread adoption of zero-deforestation agricultural practices ; (iii) In the land-use and forestry sector, transformations towards carbon neutrality and the strengthening of long-term carbon sinks involve restoring national forest cover by 20% by 2030 through the conservation of existing forest areas, as well as the restoration of 4.0 million hectares via reforestation and agroforestry systems ; (iv) In the waste sector, transformations are centered on waste sorting and recovery, the promotion of the circular economy, and methane (CH_4) management through methanization processes et (v) In the industrial processes and product use sector, transformations towards carbon neutrality focus on strengthening the control and progressive reduction of hydrofluorocarbons (HFCs) used in air conditioning and refrigeration equipment, with the objective of achieving a 70% reduction in consumption by 2035.

However, several challenges remain, including stringent conditions for accessing climate finance; the complexity, length, and demanding eligibility requirements of carbon credit projects; and persistent concerns regarding the risks associated with the development of climate-related initiatives. Additional constraints include insufficient technical expertise in designing projects eligible for climate finance, as well as the limited availability of climate funds, partly due to the reluctance of some developed countries to provide adequate financial support to developing countries. Furthermore, strengthening national capacities remains a key challenge, particularly in the areas of gender and climate change integration, sustainable agricultural practices, and renewable energy development.

2.5 Key national policies

The adequacy of Côte d'Ivoire's climate strategy also depends on the extent to which current policies address structural inertias, accelerate the diffusion of low-carbon solutions, and manage socio-economic impacts.

In addressing structural inertias, the analysis reveals that most policy efforts are classified as "existing but insufficient," indicating partial alignment with long-term transformation needs. In the residential energy sector, behavioral inertia remains significant, as many households continue to rely on firewood and butane gas for cooking. Although awareness campaigns and clean energy promotion exist, they are not sufficient to drive large-scale behavioral change. Similarly, in the industrial and commercial sectors, technological inertia persists due to limited technology transfer and insufficient technical capacity. This constraint is particularly critical for renewable energy deployment and energy efficiency improvements.
In the agriculture sector, technological and governance challenges limit the adoption of sustainable practices. Efforts to promote climate-smart agriculture and sustainable livestock farming are ongoing, but require stronger institutional support, training, and professionalization. In the forestry sector, governance structures are relatively well developed, supported by the 2019 Forestry Code, yet enforcement remains weak, allowing continued deforestation and degradation.

Infrastructure-related inertia is particularly evident in the transport sector. While major projects such as the Abidjan metro and BRT systems are underway, the overall transport system still faces challenges in scaling up electric mobility and integrating multimodal transport systems. The development of Intelligent Transport Systems (ITS) represents a promising step, but it remains insufficient to fully overcome existing infrastructural constraints. Regarding the acceleration of low-carbon solutions, Côte d'Ivoire employs a combination of economic and non-economic instruments. Economic instruments include state subsidies, local budget allocations, environmental taxation based on the polluter-pays principle, and international climate finance mechanisms such as the Green Climate Fund, Adaptation Fund, and Global Environment Facility. However, these instruments are consistently assessed as not sufficiently impactful. A key limitation is the low level of private sector investment, driven by perceived risks associated with climate-related projects.

Non-economic instruments, on the other hand, appear more robust. The integration of climate considerations into national and regional planning frameworks, as well as the adoption of a new climate law, provides a strong institutional foundation. Governance structures are being strengthened across major emitting sectors, supporting policy coherence and coordination. Nevertheless, the effectiveness of these instruments depends on implementation capacity and enforcement, which remain uneven. Across all five key transformations, namely, renewable energy deployment, public transport expansion, electric vehicle adoption, forest conservation, and agroforestry, the same pattern emerges: economic instruments are insufficient to drive the required investment in mitigation options, while governance frameworks are relatively well developed but require stronger operationalization. This indicates a structural imbalance between financial and institutional dimensions of climate policy.

Finally, the socio-economic dimension of the transition reveals important gaps. Côte d'Ivoire's strategy emphasizes the circular economy as a central pillar for green growth, sustainable job creation, and economic resilience. However, there is limited clarity on whether existing policies are sufficient to drive industrial transformation and economic diversification toward a net-zero economy. The absence of explicit redistributive mechanisms further highlights a gap in addressing equity concerns.Vulnerability assessments identify urban populations, particularly those living in flood-prone informal settlements, as highly exposed to climate risks. However, the integration of these vulnerabilities into policy design remains limited. This raises concerns about the social sustainability of the transition, particularly in the context of potential increases in energy and transport costs.

In summary, Côte d'Ivoire's climate strategy demonstrates a moderate level of adequacy. The country has established a solid foundation through ambitious targets, infrastructure investments, and institutional reforms. However, significant gaps remain in addressing structural inertias, mobilizing sufficient financial resources, and integrating socio-economic considerations. The overall trajectory suggests a transition that is technically and institutionally initiated, but not yet fully aligned with the depth and speed required for a comprehensive net-zero pathway.

3 European Union

3.1 Introduction -- Country Context and Political–Economic Setting

The European Union (EU) is a supranational political and economic union of 27 member states. In certain policy areas (such as trade, competition, environment) the member states have conferred competences to the supranational, i.e. the Union, level. In areas of Union competences, EU policies and laws are decided within the Union's legislative procedures. The EU and its member states are liberal representative democracies.

The European Council (heads of state/government) sets out the overall political direction and general priorities of the Union. It plays a key role in the setting of EU climate targets at the political level (but is not formally involved in the legislative process). EU policies (including for the environment and climate change) are adopted under the EU's Ordinary Legislative Procedure (OLP, or co-decision procedure). Under this procedure, the European Commission (the EU's executive body) proposes legislation, which is then negotiated and adopted by the Council of the EU (national ministers) and the European Parliament. Depending on the type of legislation, the Commission and/or the member states are responsible for implementing EU policies.

In terms of governance EU is characterised by a multi-level governance system with shared policymaking competences between the EU and its Member States in the field of environment and climate. EU climate targets are legally binding under EU law and implemented through legislation at EU and Member State level respectively. The EU sets decadal climate targets at EU-level that are binding on the EU and its Member States. The European Climate Law enshrines the EU's climate targets for 2030, 2040 and 2050 into EU law. The EU NDC is decided by the European Council (heads of state/government) in line with the EU's decadal climate targets (for 2030, 2040, 2050).

The EU's current climate targets are:

- A domestic reduction of net GHG emissions by at least 55% by 2030 compared to 1990 (2030 NDC).
- An indicative domestic reduction of net GHG emissions of between 66.25%-72.5% by 2025 compared to 1990
- A domestic reduction of net GHG emissions by at least 90% by 2040 compared to 1990. High-quality international credits may contribute up to 5% to achieving this target.
- Union-wide climate neutrality (net-zero emissions) by 2050.

To ensure coordination of Member State measures, the Governance Regulation (Regulation (EU) 2018/1999) sets common rules for policy planning, reporting and monitoring for national climate action. This includes an enhanced governance system related to integrated planning, reporting and monitoring in climate and energy policy fields, including with respect to climate and energy targets, policies, measures and projections, inventories and provisions for multi-level public participation as well as public consultations to be held by Member States. This is captured by periodically updated (every 5 years) National Energy and Climate Plans (NECPs) to ensure member state measures are aligned with EU-wide target

3.2 Fairness

3.2.1 Short-term costs of climate and energy policies

Experiences vary significantly across regions in Europe, with some benefiting from new green developments, and others struggling at the moment, but not necessarily because of the energy transition. Opportunities, benefits and burdens also differ significantly across European regions. Urban centres are likely to benefit most from the clean transition including through better employment opportunities, lowered pollution levels from planned transport-related emission reductions, etc. (European Commission, 2025 EU Agenda for Cities: Factsheet) . Regions

with good access to renewable energy might benefit from increased manufacturing and deployment of clean energy projects. In contrast, regions dependent on fossil-fuel based industries (e.g. coal mining) might face job losses without targeted countermeasures. While measures are foreseen, future employment opportunities depend on local conditions that differ across EU regions.

Currently, energy poverty impacts more than 46 million Europeans with electricity almost three times more expensive than gas in many European countries. Volatility and high supply costs due to the dependence on imported fossil fuels result in high energy prices across Europe. An extensive analysis of energy poverty indicators reveals that approximately 8% (using consensual indicators) to 16% (using expenditure-based indicators) of the EU population face energy poverty, while most of the energy poor are not income poor.[1] The EU NDC highlights that "women are disproportionately affected by energy poverty and transport poverty, in particular single mothers, who represent 85% of single parent families, as well as single women, women with disabilities, and elderly women living alone".[2] Addressing access to affordable energy (both for private and commercial users) is a key priority for EU policymakers. Ambitious plans to address the underlying causes are under discussion or being implemented at EU-wide and Member State-level. Recent studies show that modelled climate policies, and specifically increases in transport fuel prices, affect man-headed households more, reflecting gender patterns and inequality in car ownership and use, as well as rural communities that bear higher costs due to limited alternatives to private vehicle use.[3]

With respect to climate risks and adaptive capacities, the impacts are borne differently by people depending on a range of socio-economic factors such as income, gender, age, disability, health, and social exclusion (particularly affecting migrants, ethnic minorities, and Indigenous Peoples). Extreme weather has higher health impacts particularly on vulnerable groups with the elderly, children and people with poor health severely impacted by instances of heatwaves and other climate extremes. Regions in central and northern Europe are increasingly affected by coinciding events of prolonged droughts and heatwaves. Forest fires also caused severe damages in Southern Europe. Towards this, specific climate adaptation measures are being taken to reduce specific vulnerabilities including expansion of insurance coverage and nature-based solutions, etc.[4]

3.2.2 Fairness principles shaping EU Climate Policy

EU Internal Effort Sharing

The EU has established an internal effort sharing system to distribute EU-wide emission reduction targets across member states and sections. The EU Effort Sharing Regulation (ESR) establishes national emission reduction targets for 2030 covering domestic transport (excluding aviation), buildings, agriculture, small industry and waste.[5] , Under the current ESR (adopted in 2023) the Member States are obliged to reduce GHG emissions by 40% by 2030 compared to 2005 levels. The national targets are based on the recognition that different Member States have different capacities to - . Hence, to share the decarbonisation burden in a fair way, national decarbonisation targets for ESR differ in terms of ambition, ranging from 10-50% by 2030 (compared to 2005), based on GDP per capita.[6] Along with national targets, the ESR defines annual emission limits for 2021-2030. Member States are provided with emission allocations corresponding to a tonne of CO_2 equivalent with allocations decreasing each year within the

[1] Maier, S., & Dreoni, I. (2024). Who is "energy poor" in the EU. European Commission, Joint Research Centre. https://publications.jrc.ec.europa.eu/repository/handle/JRC138418

[2] European Union. (2025). The nationally determined contribution of the European Union and its Member States. Accessed at https://unfccc.int/sites/default/files/2025-11/DK-2025-11-05%20EU%20NDC.pdf

[3] Alonso-Epelde, E., Garcia-Muros, X., Sampedro, J., Rodés-Bachs, C., Frilingou, N., & Van de Ven, D.-J. (2026). An across and within country analysis of who bears the costs of EU decarbonisation. npj Climate Action.

[4] EEA. (2024). European Climate Risk Assessment. EEA Report 01/2024.

[5] Regulation (EU) 2018/842.

[6] European Commission. (n.d.). Effort sharing 2021-2030: targets and flexibilities. https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en

time period. This the challenges faced by lower income Member States and to a certain degree provides flexibility for them to access allowances from the EU ETS1.

Emissions outside the ESR are mainly covered by the EU Emission Trading System (ETS) for power generation, large industry, aviation, and maritime transport (ETS1). Under the ETS emission rights are auctioned by the member states and the EU. While the majority of member states auction shares is based on historical ETS emissions, a small share (10%) is allocated to certain member states to support economic growth (solidarity mechanism, similar to ESR). A separate ETS2 will apply from 2028 to fuel combustion in buildings, road transport, and some small industry sectors. ETS2 complements the ESR by adding an EU-wide carbon price in sectors that remain central to Member States' ESR obligations.

The EU NDC takes into consideration cross-cutting priorities including the commitment to create and maximise synergies between the social, environmental, and economic dimensions of sustainable development. The dimensions of human rights and gender equality by Member States are integrated into their national plans, strategies under the EU Energy and Climate Governance Regulation, the European Pact on Gender Equality and the EU's support for adoption of the United Nations Declaration on the Rights of Indigenous Peoples. Given that the effects of climate change and environmental degradation are felt most acutely by women and girls, as well as other segments of the population who contribute the least to them, the EU promotes a human rights-based and gender, youth and children's transformative approaches to climate action. It promotes social justice, fairness and inclusiveness in the global transition towards climate neutrality with full, equal and meaningful participation and engagement of women, youth and children in climate-related decision-making recognising differential needs in diverse contexts while ensuring human rights obligations for climate action.

Gender considerations

Currently, in the EU, women are disproportionately affected by energy and climate poverty. Moreover, climate risks are also acutely felt by vulnerable populations on the cross-sections of various socio-economic factors including income, gender, age, disability, health, and social exclusion (particularly affecting migrants, ethnic minorities, and Indigenous Peoples). Gender is often an exacerbator of existing vulnerabilities deepening faultlines along the various socio-economic factors mentioned (Anjum & Aziz, 2025). Therefore, the Member States are required to take these aspects into consideration while developing their Social Climate Plans (SCPs) with effective and inclusive participation by a range of relevant actors in wider stakeholder consultations. Moreover, gender mainstreaming is essential across EU policies and to access most EU funding programmes, including the National and Regional Partnership Plans.

3.2.3 Social Protection and Redistribution Schemes in the EU

Social policy in the EU falls predominantly on member state competences but is supported by key EU level policies. The European Green Deal put social fairness and solidarity at its centre and laid out the objective to leave no person and no place behind. This has been implemented through the just transition mechanism and the Social Climate Fund.

Social Climate Fund

To contribute to the transition towards a climate-neutral economy in a fair way, leaving no one behind, the EU established the Social Climate Fund (SCF). It aims to make the green transition fair and inclusive by supporting vulnerable people and small businesses most impacted by rising energy and transport costs due to the imposition of carbon prices in the transition to climate neutrality in the EU. The SCF supports vulnerable households, micro-enterprises and transport users in coping with the price impacts of the new EU ETS2 for buildings and road transport fuels. It cushions the impact of the ETS2 policy prior to its postponed initiation in 2028. Overall, the aim is to address challenges linked to energy poverty for vulnerable households and micro-enterprises and support

vulnerable transport users. It ensures that support is available for EU countries with lower incomes (i.e., Member States whose gross domestic product (GDP) per capita is below 75% of the EU average for the years 2016 to 2018) and more widespread energy or transport poverty. In principle a maximum amount of EUR 65 billion should be made available for the period 2026-2032. To finance these measures and investments in support of the most vulnerable groups, the SCF will pool revenues from the auctioning of allowances from the EU ETS2, which will commence as planned in 2027, as well as 50 million allowances from the existing EU ETS1. Member States are required to submit Social Climate Plans (SCPs) with planned measures to support the most vulnerable sections of society for green transition between 2026-2032. The Social Climate Plans are essential to access funding under the Social Climate Fund.[7]

Just Transition Mechanism

The Just Transition Mechanism aims to alleviate and support the most affected regions from the negative socio-economic impacts of transition. It does so through three main pillars: the Just Transition Fund, the Invest EU scheme and a public sector loan facility to mobilise public investment.

- The Just Transition Fund (JTF) mobilises EUR 19.2 billion of EU investments to help the people and places that suffer the most from the transition to climate neutrality (especially fossil-intensive regions).
- The Fund leverages public and private finance for the 4 pillars of EU priority policy areas. This includes Sustainable infrastructure; Research, innovation and digitisation; small and medium-sized businesses; and social investment and skills. Under the Sustainable infrastructure pillar, investment covers transport, energy, supply and processing of raw materials, oceans, water, nature and infrastructure supporting environmental climate resilience, etc.
- The public sector loan facility is a blending instrument combining grants from the EU budget with loans from the European Investment Bank to mobilise greater public investment. It supports regions, sectors and communities that are heavily reliant on carbon-intensive projects to address socio-economic and environmental challenges arising from the transition.
- The Just Transition Platform brings together EU countries and regions to a single access point for technical and advisory support on just transition. It provides support for authorities and beneficiaries on funding opportunities, regulatory updates, sector specific initiatives, best practices, etc.

Just transition of the Workforce

The EU recognises climate education and training as a strategic enabler for the green transition, essential for fostering an informed understanding of the climate crisis, building resilience to disinformation and creating a sustainability-skilled workforce to meet the growing demands of the growing green-tech labour market. Existing EU initiatives, such as the “Education for Climate Coalition”, the “GreenComp” European sustainability competence framework and the Council Recommendation on Learning for green transition and sustainable development, support Member States in embedding climate education across formal education, vocational training and lifelong learning systems.

Overall, Europe has a highly skilled and experienced technical workforce across a wide range of sectors. Regional variation does exist. Targeted re-training programs are available in several Member States to enable a just transition for the European workforce. This is supported by several EU measures, including the Just Transition Fund, the Skills

[7] See European Commission. (n.d.). Social Climate Fund. https://employment-social-affairs.ec.europa.eu/policies-and-activities/funding/social-climate-fund_en

Guarantee scheme of the European Commission (supports workers and businesses and tackles labour shortages in strategic and growing sectors), the Skills Guarantee (will reinforce strategic sectors in line with the future European Competitiveness Fund to enable workers to transition into strategic industries, secure new jobs, and develop additional skills).[8]

3.2.4 Public Discourse on climate fairness

Even in the face of heightened geopolitical tensions climate change remains among the top three concerns of Europeans. 85% of EU citizens believe climate change is a serious problem. 81% support the EU's goal of becoming climate neutral by 2050. Over three quarters (77%) agree that the cost of damage caused by climate change outweighs the cost of transitioning to a climate-neutral economy, while 88% support greater investment in renewables and energy efficiency by the EU. More than eight in ten Europeans (84%) agree more support should be given to European companies to compete in the global market for clean technologies, demonstrating public backing for the Clean Industrial Deal.[9] Socio-demographic, economic, and behavioural factors, as well as perceptions of fairness are significant determinants together with policy preferences and green engagement. A recent Fair Transition Working Paper found that age, gender, education, tenant status, type of residential area, and difficulties paying bills have a significant impact on the support for different climate-related measures and green engagement.[10]

Climate protests and Greenlash

The EU has witnessed several pro and anti-climate protests over the past decades. These were particularly strong around 2020 (e.g. Fridays for Future). Fridays for Future was a youth-led and organised movement that began in August 2018, after 15-year-old Greta Thunberg and other young activists sat in front of the Swedish parliament every school day for three weeks, to protest the lack of action on the climate crisis. However, more recently climate protests seem to be less strong. Pro-climate protests recently include those against the deregulation wave which are viewed to be diluting sustainability goals and social rights with the ruse of competitiveness.

Greenlash in the EU includes protests demanding the rollback of environmental protection regulations that threaten traditional livelihoods and lifestyles. Farmers are one of the most prominent and unified groups mobilizing against the European Green Deal, and they tend to cite concerns not only about the energy transition's affordability but also more broadly about globalism and elitism. Their concerns include cheap imports of agricultural products, rising production costs, and falling prices for food sales which are seen as exacerbated by European Green Deal policies. The Yellow Vests protests in France grew out of opposition to raising carbon taxes on fuel and included a range of people from across the country, who took to the streets to protest the costs of living and French state policies more broadly. There have also been intensified local activism against windfarms, for instance, in Spain and Italy. In 2023, Germany witnessed protests against the Green Party's "heating ideology," when proposals for climate friendly heating systems were put forth. Places like Portugal, Spain, and Serbia have also witnessed local community organizations and individuals mobilizing against the mining projects for green transition.[11]

[8]European Commission (2025, Nov 7). Commission launches Skills Guarantee to support workers in transition learning new skills for strategic sectors. https://ec.europa.eu/commission/presscorner/detail/en/ip_25_2828
[9]European Commission (2025). Eurobarometer survey on Citizen support for climate change.
[10] European Commission (2025). Perceptions of fairness and climate action in the EU – What drives citizens' support for the green transition? Directorate-General for Employment, Social Affairs and Inclusion. https://data.europa.eu/doi/10.2767/1292775
[11] Kriwak, H. (2025, September 24). Activists lead three-day march on Brussels against EU's "deregulation wave". EUobserver. https://euobserver.com/27059/activists-lead-three-day-march-on-brussels-against-eus-deregulation-wave/.; Carnegie Endowment for International Peace. (2025, September). Climate backlash in Europe: Green transition and farmers' protests. https://carnegieendowment.org/russia-eurasia/research/2025/09/climate-backlash-europe-green-transition-farmers-protests

3.2.5 Framing of EU Climate Policy with respect to International Climate Policy

The EU and its Member States have steadily decreased their GHG emissions since 1990. So far, the EU met its emission reduction commitments for 2028-2012 and 2020 under the Kyoto Protocol.

Domestically, the EU's climate policy is somewhat ambiguous. On the one hand, the EU wants to 'lead by example' through strong domestic climate action and clean technology leadership. On the other hand, the EU does not want to hurt its domestic economy by being overly ambitious, especially compared to other major emitters (this is strongly iterated in the current political narratives focused on competitiveness and security). Fairness is strongly articulated internally through burden sharing among Member States, but the external fairness dimension is less explicit and is expressed more indirectly through support for developing countries, just transition partnerships, and climate-finance commitments.

A dominant narrative within Europe is that the EU cannot solve the climate crisis on its own. Accordingly, international cooperation remains at the heart of the EU's contribution to global climate action, and the EU will continue to call on the countries with the largest share of emissions to commit to the highest possible ambition. Beyond its own mitigation performance, the EU frames its international climate role through multilateral diplomacy, climate finance, transparency, capacity building, and rule-shaping under the UNFCCC and Paris Agreement.

3.3 Feasibility

3.3.1 Credibility of political commitments for climate action in the EU

EU targets are legally binding under EU law. They are implemented through policies and measures at the EU and member state levels. So far, the EU has achieved its climate targets for 2020 and has reduced its GHG emissions by 40 % over 1990-2025 (EEA, 2026). Overall, the EU institutional framework is generally in place with challenges pertaining more to the political dimension. Historically there has been strong support for EU climate action across the main political families at European level (as well as across the main EU institutions, i.e. Commission, European Council, Council of the EU, Parliament). Support for ambitious climate action at European level has been relatively stable over election cycles, as manifested in continuous adoption (and revision) of more stringent climate targets and implementing legislation.

However, recently this strong cross partisan support has come under pressure, as climate action is increasingly seen by many political actors as compromising economic development and in particular industrial competitiveness. This has started in the 2nd half of the first term of the von der Leyen Commission (2019-2024) and well continued into the current term (2025-2029). In the 2024 European Parliament elections parties that are more sceptical towards climate action significantly increased their share of overall seats. Despite recently shifting political priorities (towards economic growth, security, competitiveness, and simplification) and a shift of Parliament majorities, the EU adopted an ambitious 2040 target, and corresponding 2035 NDC, in 2025. A revision of the European Climate Law, enshrining the EU 2040 into Union law, was adopted by the co-legislators in 2026.

3.3.2 Institutional Capacity for EU Climate Action

The EU has a well-developed institutional framework for climate action. Accordingly, over the years it has developed institutional capacity to design, coordinate, implement and enforce climate action. The European Commission, the EU's executive branch, is responsible for proposing and implementing EU legislation. It has specific capacity for developing and implementing climate policy:

- The Directorate-General for Climate Action (DG CLIMA) leads the Commission's work on climate policy. It functions as a policy-making DG, preparing policy proposals and participates in their negotiation

under the EU's legislative process. It also supports and monitors the application of EU climate legislation, both by the Commission (EU ETS) and in the Member States. representatives.

- Other DGs with competences relevant to climate include DG ENER (Energy Policy), DG GROW (Internal Market), DG ENVI (Environment), DG COMP (Competition Policy), DG AGRI (Agricultural Policy).
- The Presidential Cabinet plays a key role in coordinating EU climate policy across DGs and policy areas.

The Council of the EU (representation of the member states) and the European Parliament (EP) negotiate agreement on proposed legislation. Both have specific configurations/committees focusing on climate policy issues:

- Environment Council (encompassing environment ministers from the EU27), and its subsidiary bodies (COREPER I, Working Party on the Environment) – representing the institutional capacity and expertise of the member states.
- EP Committee on Environment, Public Health and Food Safety (ENVI).

Several EU institutions and agencies support and monitor EU climate policy design and implementation:

- European Scientific Advisory Board on Climate Change (ESABCC) is an independent body providing the EU with scientific knowledge, expertise, and advice relating to climate change. The Advisory Board evaluates policies and identifies actions and opportunities to successfully achieve the EU's climate targets. Several member states have national advisory bodies.
- The European Environment Agency (EEA) monitors the state of the environment in Europe. Member states have national environment agencies.
- The European Court of Auditors is the EU's external auditor made up of the individual Members assigned by each Member State, has a section on Energy, environment and climate action projects and programmes.

3.3.3 National Energy and Climate Plans (NECPs)

Member states are responsible for implementing common EU rules and can adopt and implement additional measures in line with EU law. The Governance Regulation sets mandatory rules for planning, reporting, and monitoring of EU countries. Under the Governance Regulation, EU Member States are required to develop ten-year integrated National Energy and Climate Plans (NECPs). These plans detail how each Member State intends to achieve its energy and climate objectives, targets and contributions over the relevant period. Member States must submit draft NECPs, which the European Commission reviews at both the EU and national levels. Based on the Commission's recommendations, Member States are required to update their draft plans.

Monitoring, Reporting and Verification System (MRV)

A robust MRV system is in place. All EU countries are required to monitor their emissions under the EU's Climate Monitoring Mechanism, which sets the EU's own internal reporting rules based on internationally agreed obligations. The Governance Regulation establishes procedures to help track progress of compliance with the obligations on the levels of greenhouse gas emissions and removals established in EU legislation, such as the Effort Sharing Regulation and the LULUCF Regulation. It also lays down a monitoring mechanism for greenhouse gas emissions and other climate information as regards adaptation to climate change and support to developing countries, so that the EU will be able to comply with its reporting obligations under the UNFCCC and Paris Agreement.

The Commission is responsible to monitor the implementation of and compliance with EU law by Member States. In case of non-compliance the Commission can open infringement procedures under EU law. Laws targeting individual actors (e.g. ETS) have specific compliance mechanisms.

3.3.4 Fiscal Space for Climate Action in the EU

Climate action in the EU is financed both through the EU and member states budgets.

EU Climate Budget: The Commission estimates that under the current EU Multiannual financial Framework (MFF) for 2021-2027, i.e. the EU's budget, and the NextGenerationEU (Covid19 recovery instrument) climate finance will amount to €658 billion. This constitutes over 34% of the total EU budget, exceeding the 30% climate spending target. Climate-related expenditure is mainstreamed in all major spending areas including the Recovery and Resilience Facility, Cohesion Policy, the Common Agricultural Policy, the Connecting Europe Facility and the EU's research programme Horizon Europe.[12]

Additional EU level funding for climate action is available through several programs:

- At least 30% of the InvestEU programme's target of EUR 372 billion for mobilising additional investment over the period 2021-27 is expected to contribute to meet the EU climate objectives.
- A specific share of emission allowances (i.e. CO2 emissions rights) is allocated for EU level funds, including the Innovation and Modernisation Fund. In 2023, EUR 7.4 billion was raised for both funds. Additional allowances from the inclusion of maritime non-emissions (methane and N_2O) will also be auctioned and added to the Innovation Fund.
- The EU's Sustainable Finance Framework is mobilising significant private investment for sustainable activities, with green bond issuance in the EU reaching a record EUR 314 billion in 2024.
- On 16 July 2025, the European Commission presented a proposal for an MFF covering the 2028-2034 period amounting to almost €2 trillion. The Commission proposed that 35% of this amount (over €700 billion) should be spent on climate and environment measures.

Member State Climate Finance: Fiscal space for member states depends very much on specific national contexts and hence cannot be assessed here. However, there are key EU level policies/measures that support national climate finance provision (in addition to what is allocated under national budgets):

- NextGenerationEU is a temporary recovery instrument to support Europe's economic recovery from the coronavirus pandemic and build a greener, more digital and more resilient future. Based on Member State requests for funding under the Recovery and Resilience Facility and the funding needs of other EU programmes supported by NextGenerationEU, the EU expects to raise up to €712 billion (out of a maximum programme envelope of €806.9 billion) by 2026.
- In addition, in 2023 and 2024, Member States complemented their recovery and resilience plans with new chapters on REPowerEU in response to the energy crisis, through new or scaled-up reforms and investments to help phase out the EU's dependency on Russian fossil fuels and accelerate the clean energy transition.
- Carbon revenues from the EU ETS are to a large part collected by member states (with an allocated but small share of allowances finance EU level Fund, including the EU Innovation Fund, Modernisation Fund, and Social Climate Fund). In principle, member states are expected to use ETS revenues to fund climate action at national level, but practice varies. In 2023, EUR 7.4 billion was raised for the Modernisation and Innovation fund, and EUR 36.2 billion was distributed through Member States' budgets.[13]

3.3.5 Historical Climate Expenditure

Since the EU does not receive international climate finance, we assess climate spending instead.

According to the European Court of Auditors (ECA), the European Commission fell short of its self-imposed target to spend 20% of the EU budget for 2014-2020 on climate action. ECA reported that the Commission's estimated spending was not always effectively relevant to climate action. The report highlights that the Commission overstated

[12] European Commission. (2025). Climate Action Progress Report 2025.
[13] European Commission. (2024). Climate Action Progress Report 2024.

climate finance by more than €72 billion. This in turn would mean that only 13% of the EU budget (2014-2020) has actually been dedicated to climate action.[14]

3.3.6 Climate Finance Projections

To limit climate change and meet the EU's 2030 climate and energy targets, investment in the EU's energy system must increase significantly to reach around EUR 565 billion a year between 2021 and 2030, up from the EUR 250 billion invested per year in the previous decade. It does not include investments to decarbonise the transport sector. The residential sector has the highest absolute needs, with an estimated needs of EUR 215 billion a year to renovate buildings and replace heating systems and appliances. This is nearly twice the average investment made in 2011-2020.[15]

Bankability of clean technology projects and technology transfer partnerships vary depending on the national context. While transition technologies are readily available, challenges relate mainly to economic, social, and political dimensions.

3.3.7 Role of Fossil Fuel Interests

The EU is a net-importer of energy and does not have a significant production of fossil fuels compared to overall economic output. At the same time, exposure is heterogeneous across Member States and regions (e.g., coal-dependent regions and countries with legacy oil/gas extraction), where employment, local revenues, and political economy can be more significant.

Fossil fuel subsidies remained stable, at between EUR 57-62 billion (2023 prices), from 2015 to 2021. A growth of EUR 4 billion occurred during 2015-2018, caused by increases in transport and industry sector subsidies. Followed by a decrease of EUR 5 billion from 2018-2021, mostly due to reductions in the energy sector and subsidies for coal and lignite. The sudden significant growth in 2022 fossil fuel subsidies can be attributed to the energy price crisis, intensified by Russia's invasion of Ukraine. The strong support continued in 2023, although at a lower level (EUR 111bn), as many crisis measures were prolonged despite the large decrease of fossil energy prices. In 2023, 43% (EUR 47.7bn) of total fossil fuel subsidies have a planned end-date before 2025, while a further 9% (EUR 10.1bn) have an end-date by 2030. There is no end-date provided for 48% (EUR 53.1bn) of fossil fuel subsidies.[16]

Continuously high energy prices and inflationary pressures in the aftermath of the energy crisis have shifted the political focus towards energy affordability, security of supply, and the economic and social costs of climate action. The EU also increased LNG imports and expanded regasification capacity (including FSRUs) as a security response to the disruption of Russian pipeline gas.

3.3.8 Interaction of Climate Policy with other development priorities

In 2019, the EU launched the European Green Deal as its growth strategy consisting of a package of policy initiatives, setting the EU on the path to a green transition, with the goal of reaching climate neutrality by 2050, putting social fairness and solidarity at its heart, leaving no person and no place behind. Under the European Green Deal all policy areas are meant to contribute to fighting climate change and support measures across economic sectors covering energy, transport, industry, buildings, environment, agriculture, sustainable finance, circular economy, health and more.[17]

In addition to the European Green Deal, several sectoral strategies were published that outline policy objectives and priorities for key sectors (e.g. Circular Economy Action Plan, 2030 Biodiversity Strategy, Farm to Fork, etc.).

[14] European Court of Auditors (2022). Special Report on Climate spending in the 2014-2020 EU budget.
[15] European Commission (2025). Climate Action Progress Report 2025.
[16] EEA. (2025, Jan 25). Fossil fuel subsidies in Europe. https://www.eea.europa.eu/en/analysis/indicators/fossil-fuel-subsidies
[17] European Union. (2025). The nationally determined contribution of the European Union and its Member States. p.1, para 3.

Furthermore, transition pathways for industrial ecosystems are being co-developed with industrial actors. The sectoral strategies generally build on and specify the general transition objectives outlined in the European Green Deal. All contribute to climate neutrality.

3.4 Adequacy

3.4.1 Key national long-term system transformations

Transformations to support a relentless decrease in fossil fuels

The reduction of fossil fuel use and transitioning towards a renewable low-emission energy system is at the core of the EU's transition towards climate neutrality. This should be achieved through a transformation of both the power sector (supply-side) towards renewable energy and low carbon energy and the end-use sectors (demand-side) through direct and indirect electrification. This transformation is supported through a comprehensive policy framework at EU and member state level (see below).

The decarbonisation of the power sector and energy supply is key for achieving the EU's climate neutrality objective. This is to be achieved through increasing clean energy supply (renewables (solar, wind) and nuclear) and developing a more interconnected and agile European electricity grid combined with large-scale investment in storage capacities. Whereas the composition of the energy mix remains member state competences, EU policies provide a comprehensive policy framework for the energy transition (see below). The use of natural gas for electricity production is seen as a transitional measure in several member states.

On the energy demand side, the EU's approach includes both cross-cutting and sector specific solutions. At cross-cutting level, an emphasis has been put on increasing energy efficiency (i.e. delivering the same output with less energy input) as implemented in the Energy Efficiency Directive, which sets objectives and obligations for increasing energy efficiency in the EU. During the 2022 energy crisis following the Russia invasion of Ukraine, energy efficiency and energy demand reduction was emphasised as a key strategy to reduce reliance on imported fossil fuels.

Additionally, end-use sectors are foreseen to reduce their reliance on fossil fuels.

- For the buildings sector, the Energy Performance of Buildings Directive (EPBD) sets out the objective to achieve a fully decarbonised buildings stock by 2050. This is to be achieved by upgrading the buildings stock to reduce energy needs for heating and cooling (an emphasis is put on renovating the worst-performing buildings). Remaining energy needs for heating and cooling needs are to be met by low-emission alternatives (such as heat pumps or district heating), depending on local context.
- For the transport sector a 90% emission reduction by 2050 is foreseen (compared to 1990). This is to be achieved through shifting towards sustainable transport modes (e.g. public transport, railways), decarbonising road passenger and freight transport (e.g. EVs, low-emission fuels like advanced biofuels and hydrogen), and internalising external costs (i.e. polluter pays).[18] This will be achieved by a range of measures at EU and member state level (see below).
- For aviation and maritime transport, decarbonisation will mainly be achieved through the shift towards sustainable fuels, especially advanced biofuels and clean synthetic e-fuels. The transformation will be achieved through pricing emissions (aviation and maritime emissions are partially covered under ETS1 and policy support to ramp-up the supply of sustainable fuels (see below).
- Industry emissions are largely covered under ETS1, which foresees a decarbonisation of covered sectors by 2040 (but this might be postponed). Decarbonisation will be achieved through a mix of direct electrification (where possible), indirect electrification through hydrogen (with natural gas as

[18] European Commission. (2020). Sustainable and Smart Mobility Strategy. P. 2.

transitional fuels), bio-based fuels and feedstocks, as well as carbon capture and storage (CCS) in hard-to-decarbonise processes. The key policy to foster industrial decarbonisation is the ETS1, complemented by technology requirements, innovation and investment support (EU and member state policies), and circular economy measures (see below).

As a cross-cutting transformation enabler the EU has put emphasis on increasing the circularity of the European economy. The Circular Economy Action Plan contains the ambition to enhance the circularity across the economy, including end-use products. This ambition has been implemented in the Ecodesign for Sustainable Products Regulation (ESPR) and technology specific rules such as the Batteries Regulation, which contains detailed rules for the repair, reuse and recycling of batteries (including car and EV batteries).

As outlined below, the EU has a comprehensive framework in place to reduce the use of fossil fuels in power production and energy-use sectors. However, key inertia exists that currently hinder the adoption of alternatives and result in the EU being off track when it comes to decarbonising the buildings and transport sector. First, electricity prices remain high across Europe (both compared to other energy carriers and internationally), despite a significant increase in clean energy supply. This disincentivises the adoption of clean alternatives (especially in industry) and limits the international competitiveness of European industry. Second, high upfront investment costs for low-emission alternatives are a key barrier, especially in the transport and building sectors. Third, infrastructure bottlenecks both increase electricity prices and limit access to clean energy sources (especially in the transport and industry sector)

Transformations to develop a land use system maximising carbon sinks

As of 2030 the EU's climate targets are 'net-emission' reduction targets and hence account for removals from carbon sinks. Accordingly, increasing carbon sinks is a key aspect of the EU's climate neutrality strategy. The LULUCF Regulation[19] governs the emissions from the land use sector. It sets:

- a 2030 Union target for net GHG removals in the LULUCF sector, as well as
- commitments of Member States for LULUCF sector that contribute to achieving the objectives of the Paris Agreement and meeting the greenhouse gas emission reduction target of the Union for the period from 2021 to 2025;
- accounting of GHG and removals from the LULUCF sector and checking the compliance of Member States with the national commitments for the period from 2021 to 2025;
- targets for net GHG removals in the LULUCF sector for Member States for the period from 2026 to 2030.

Transformations to reduce non-CO2 agriculture emissions

As part of the European Green Deal, the Farm to Fork strategy set out objectives to "reduce the environmental and climate footprint of the EU food system and strengthen its resilience, ensure food security in the face of climate change and biodiversity loss and lead a global transition towards competitive sustainability from farm to fork and tapping into new opportunities".[20] However, contrary to other objectives of the EGD, the farm to fork objectives were never fully implemented and key provisions of the CAP were rolled back in 2024.

[19] Regulation (EU) 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework.

[20] European Commission. (2020). Farm to Fork Strategy. https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

3.4.2 Key national policies

Tackling key structural inertias

Technology: Technological solutions to phase out fossil fuels are generally readily available for passenger and freight transport, buildings, small industry and energy production. Here the main inertia is that cost barriers as alternative solutions often require high upfront costs. A variety of measures exist at EU and member state level to address these cost related barriers and make low-emission alternatives economically competitive, including positive (e.g. subsidies, tax breaks) and negative (e.g. carbon pricing) economic incentives. For energy-intensive industries, aviation and maritime transport technology availability remains a bit more of a challenge: while technologies exist in principle, their deployment is constrained by limited access to enabling infrastructure and high investment and operational costs. Policies exist to support the further development and uptake of these technologies (e.g. ETS, subsidies, fuel requirements), but it will take time until alternative fuels and feedstocks are available at scale needed.

Infrastructure: The availability of key enabling infrastructures remains a core challenge across all sectors. This includes clean energy production capacity and electricity grids as (for both energy production and use sectors), railways and charging infrastructure (transport), as well as the production and transport infrastructure for alternative energy carriers and feedstocks, such as hydrogen and biomass, and the transport and storage of CO2 (industry, aviation and maritime). The EU and its member states have ambitious objectives and plans for infrastructure development. However, the development of infrastructure takes time and can be constrained by lengthy regulatory procedures and public resources.

Governance: Inertia exists at both structural and sector-specific level. At the structural level, the EU's multi-level governance framework can create inconsistencies across policies and member states. At sector specific levels inertia relate to ownership issues (e.g. buildings: tenants vs. landlords), coordination challenges (e.g. industry: availability of infrastructure and feedstocks to decarbonise; energy: grid connections). Addressing governance challenges has been highlighted as a political priority, but improvements have been slow due to EU-MS legal competences and different political priorities across member states and political parties.

Behaviours: In particular, the transformation of the buildings and transport sector depends on consumer choices and behaviour. A number of positive (e.g. subsidies, tax breaks) and negative (e.g. carbon pricing) economic incentives and other measures has been put in place at EU and member states level. However, behaviour seems to be sticky.

Targeting the accelerated diffusion of existing energy-efficient and low-carbon solutions

Power sector: Accelerating the penetration of renewable production assets in the power market

- The Renewable Energy Directive sets a binding EU-level target to achieve at least a 42.5% share of renewables in the energy mix by 2030. It includes specific targets for use of renewable fuels of non-biological origin in industry and in transport. The build-out of renewable energy is implemented by the member states, for example through subsidies, feed in tariffs, etc.
- ETS1 sets an overall emissions limit and carbon price for power production (and industry), increasing the cost-competitiveness of low-emission energy production. It has been a key policy in supporting the build-out of low-emission energy capacity and since 2005 ETS1 emissions have reduced by almost 50%.
- The Trans-European Networks for Energy (TEN-E) policy sets out a framework for planning cross-border energy infrastructure to strengthen interconnectedness of energy systems. Additionally,

the EU has set an interconnection target of at least 15% by 2030 to encourage EU countries to interconnect their installed electricity production capacity.[21]

Transport: shifting towards sustainable modes of transport

The European Green Deal foresees a 90% reduction of transport emissions to achieve the 2050 climate neutrality target. Transport emissions (except aviation and maritime) are covered under the Effort Sharing Regulation and therefore it is mainly the responsibility of the member states to put in place implementing measures. Nevertheless, several EU policies exist to steer and support the transformation of transport.

- CO2 price for transport fuels: ETS2, as of 2028, will set a price for the emissions from transport fuels, incentivising the uptake of alternative transport modes. CO2 prices for transport fuels exist already in some member states (e.g. Germany).
- Adoption of electric vehicles (passengers): The CO2 for Cars and vans Regulation requires that from 2035 all vehicles sold in the EU must be emissions free (however, currently negotiations are underway to reduce this target and allow for a limited sale of ICE-cars after 2035). Additional measures exist to promote the uptake of EV focusing on charging infrastructure and alternative fuels (Alternative Fuels Infrastructure Regulation). Most member states have adopted additional measures to encourage EV uptake (e.g. subsidies, tax breaks, corporate fleet requirements).
- Adoption of electric vehicles (freight): Regulation (EU) 2019/1242 sets increasingly strict CO2 emission performance standards for new heavy-duty vehicles (i.e. lorries, buses and coaches). Additional EU measures exist to promote the uptake of charging infrastructure and alternative fuels (Alternative Fuels Infrastructure Regulation). Additional measures exist across the member states.
- The 2020 Sustainable and Smart Mobility Strategy outlines the objectives to support rail and inland waterways and coastal (IWWC) freight transport, multimodal transport, collective transport and strengthening local and regional supply chains. The main responsibility to implement these objectives lies with the member states. Within its competences the EU has adopted supporting measures.
- The Circular Economy Action Plan contains the ambition to enhance the circularity of end-use products, including cars. This ambition has been implemented in the Ecodesign for Sustainable Products Regulation (ESPR) which sets product standards for consumer goods.

Aviation & maritime transport: shifting towards low emission fuels:

- ETS1 (partially) covers maritime and aviation emissions, supporting the sectors' transition to sustainable fuels (mostly advanced biofuels and e-fuels) by aircraft and ships.
- The FuelEU maritime Regulation sets maximum limits for the yearly average GHG intensity of the energy used by ships above 5,000 gross tonnage calling at European ports, regardless of their flag. Targets will ensure that the GHG intensity of fuels used in the sector will gradually decrease over time, starting with a 2% decrease by 2025 and reaching up to an 80% reduction by 2050.
- The ReFuelEU Aviation regulation promotes the increased use of sustainable aviation fuels (SAF). It sets requirements for aviation fuel suppliers to gradually increase the share of SAF blended into the conventional aviation fuel supplied at EU airports to 2% from 2025 and 70% from 2050.

Buildings: fully decarbonised buildings stocks

The Energy Performance of Buildings Directive (EPBD)[22] sets out the objective to achieve a fully decarbonised buildings stock by 2050. The responsibility of implementing this objective lies mainly with the member states, supported by several key EU level policies.

- Upgrading the building stock: the EPBD sets gradually increasing requirements for energy efficiency and GHG emissions for new and existing buildings in the EU. In doing so, it promotes the uptake of

[21] https://energy.ec.europa.eu/topics/infrastructure/electricity-interconnection-targets_en
[22] Directive (EU) 2024/1275 on the energy performance of buildings

low-emission heating and cooling systems and more efficient insulation. A specific emphasis is placed on renovating the worst-performing buildings.

- CO2 price for heating fuels: ETS2, as of 2028, will set a price for the emissions from heating fuels, incentivising the uptake of low-emission alternatives. CO2 prices for heating fuels exist already in some member states (e.g. Germany).
- Adoption of energy-efficient consumption appliances': The Ecodesign for Sustainable Products Regulation (ESPR) sets eco-design requirements for a range of end-user products, including household appliances. It also mandates energy efficiency labels to help consumers make more informed choices.

Industry

Industry emissions are largely covered under ETS1, which foresees a decarbonisation of covered sectors by 2040 (will be revised in 2026). Key policies to implement this objective include the carbon price under ETS1, emission requirements, innovation and investment support (EU and member state policies), and circular economy measures.

- Carbon price: ETS1 creates an important financial incentive for the industry to decarbonise, which resulted in almost -50% GHG emissions in the industry sector between 2005 and 2023.[23] However, so far sectors at risk of carbon leakage such as steel, aluminium or chemicals have received a large part of their allowances for free, lowering the economic incentive for investing in decarbonisation. With the introduction of CBAM, free allowances for cement, aluminium, fertilisers, iron and steel, hydrogen and electricity will be phased out until 2034.
- Use of sustainable fuels: Renewable Energy Directive introduces a binding target of renewable fuels of non-biological origin (RFNBO) used for final energy and non-energy purposes in the industry sector. At least 42% of the hydrogen used for final energy and non-energy purposes in industry by 2030 should come from renewable sources, and 60% by 2035. The Directive also sets an indicative target to increase the average share of renewable sources in the amount of energy sources used for final energy and non-energy purposes in the industry sector by 1.6 percentage points.
- Emission requirements: the industrial emissions directive Prevents and controls emissions from large industrial and livestock installations across the EU. Including for the light industry not covered under ETS1.
- Innovation and investment support: Horizon Europe (research & innovation), Innovation Fund (funding for innovative technology), Modernisation Fund (support for energy efficiency in some member states) support industrial decarbonisation.
- Circular economy: The Ecodesign for Sustainable Products Regulation (ESPR) established a framework for the setting of eco-design requirements for intermediate and end user products. Energy intensive good, such as steel and cement will be among the first new product groups for which eco-design recruitments will be adopted (expected in 2026). Additionally, the EU is implementing product-specific regulations for batteries and packaging & packaging waste, that will help significantly improve the sustainability of these product chains. Additionally, the Commission is expected to adopt a Circular Economy Act in 2026, which will accelerate the circular transition, building on our single market. The Act will enable the free movement of circular products, secondary raw materials and waste, foster a higher supply of high quality recyclates and stimulate demand for secondary materials and circular products while bringing down feedstock costs.[24]

Forests: Accelerating the adoption of practices that protect and increase carbon absorption in existing forests, and that a-/reforests.

LULUCF Regulation sets binding national targets for removals and emissions from LULUCF for 2030. The current rules will apply until 2025, under which EU countries will have to ensure that emissions in the LULUCF sector do not

[23] European Union. (2025). The nationally determined contribution of the European Union and its Member States. P. 7, para 34.
[24] European Commission (2025). The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation (COM(2025) 85 Final).

exceed the amount that has been removed. From 2026, EU countries will have a four-year budget for 2026-2029 instead of binding annual targets.

National targets are implemented through measures at national level. Several EU policies support the development of carbon and forest sinks.

- The Nature Restoration Law requires the restoration of degraded ecosystems by member states, which contributes to the management and development of carbon sinks.
- Through the Regulation on Deforestation-free Products the EU is supporting global efforts to halting and reversing deforestation and forest degradation. The regulation requires that certain imported commodities (e.g. cattle, wood, cocoa, soy, palm oil, coffee, rubber) cannot originate from deforested land or have contributed to forest degradation.

Crop-and grasslands: Accelerating the penetration of agro-ecological and agro-forestry practices in farming practices

The Common Agricultural Policy (CAP) provides the European Framework for agricultural practices. The 2023-2027 CAP supports measures to make farming more sustainable. This includes subsidy schemes to reduce GHG emissions from the agricultural sector through measures such as eco-schemes, agri–environment–climate commitments and (non)-productive investment schemes. However, after 2024 reform environmental schemes are voluntary. Member states are responsible for implementing the CAP and may set different priorities and implementing measures in the National Strategic Plans.

Additional EU measures reduce non-CO2 agriculture emissions include:

- The Industrial and Livestock Rearing Emissions Directive is the main EU instrument to reduce these emissions into air, water and land, and to prevent waste generation from intensive livestock farms (pig and poultry).
- The EU Soil Health Directive looks at all aspects of soil degradation, from erosion and compaction to loss of organic soil carbon and soil biodiversity, as well as contamination and soil sealing. It applies to all soils: in forests, agricultural land, urban areas, and others, providing a legal framework to help achieve healthy soils by 2050. It will do so by: a) Requiring Member States to monitor and assess soil health; b) Supporting farmers and soil managers to help improve soil health and resilience c) Putting in place a solution to the long-standing issue of contaminated sites in the EU; d) Improving knowledge about soil health and improving its resilience, contributing to the EU's climate and biodiversity goals, as well as competitiveness and food security.

3.4.3 Addressing the socio-economic effects of the ecological transition

Social policy is a member state competence. Accordingly, the socio-economic efforts of the ecological transition are mostly addressed through measures at national and sub-national level. While measures vary significantly across the member states, they commonly include general social protection (under the social-welfare state), retraining and reskilling, as well as more targeted just transition or economic restructuring measures.

Member states policies and measures are supported through several EU level initiatives. These generally provide funding for measures implemented at national level (see also above).

- The Just Transition Mechanism (JTM) provides targeted EU support to help mobilise around €55 billion over the period 2021-2027 in the most affected regions, to alleviate the socio-economic impact of the transition. It encompasses a Just Transition Fund of EUR 19bn (with additional national co-financing), an InvestEU "Just Transition" scheme to mobilise expected EUR 10-15 bn in private sector investment, and a new Public Sector Loan Facility.
- The Social Climate Fund (SCF) provides funding for 'vulnerable people and small businesses who are most affected by rising energy and transport costs' as the EU starts implementing ETS2 for transport

and heating fuels. The SCF is funded through the revenues generated through the ETS2 and implemented at national level, through Social Climate Plans.

- The Modernisation Fund supports the modernisation of energy systems and the improvement of energy efficiency in 13 lower-income EU Member States for the 2021-2030 period. The total revenues of the fund amount to €57 billion from 2021 to 2030, financed through the ETS1.

4 India

4.1 Political Economy and International Cooperation

India has a domestic political economy that focuses on the right to develop without distinguishing the aspirations of the economy and the environment. The question of climate change is not a significant issue during the elections but is rather presented through the prism of energy security and economic opportunity. This framing enables the government to have ambitious renewable energy targets as a way of decreasing the reliance on energy imports rather than a replacement for domestic fossil fuel use. This is one reason why there is a continued significant share of coal in the electricity mix amongst others India's domestic aspirations to provide economic opportunity while also addressing climate issues shapes its stance at the global stage.

In order to achieve its goals, India has voiced its climate finance requirements and continues to do so, while representing the Global South. India stands as the frontrunner in the Global South to implement decarbonisation policies, with much to offer as lessons for other countries to learn from. Although India has progressed on its climate commitments, it treads the path of sustainability while developing new and maintaining old ties. As a result of global trade rules such as the Carbon Border Adjustment Mechanism (CBAM) and other Free Trade Agreements (FTAs) impacting India's domestic markets, Indian industries are compelled to engage voluntarily in carbon reduction in order to remain competitive in the market. Therefore, the participation of India in global collaboration is taking a new turn as a technology partner and in supply chain resilience, as in the case of the US-India TRUST program and green hydrogen alliances with the EU.

In a nutshell, India's climate commitments prove to be achievable and ambitious, while simultaneously incorporating many aspects of fairness, feasibility and adequacy that we have analysed. There remains scope for improvement in terms of representation of a wider group of stakeholders in the policymaking process, developing a national MRV framework for monitoring progress towards climate commitments, enhancing commitments to have sectoral targets and developing targeted policies that assist in transforming social structures that currently rely on incentive-driven policies to self-reliance. Doing so, India will be able to devise more comprehensive NDCs and long-term targets to ensure a just transition that balances aggressive decarbonization with socio-economic resilience.

India's climate policies and commitments reveal that it is currently undergoing a major transition and is standing at a complex intersection of growing economically and achieving decarbonisation while working towards net-zero. Despite being a global major emitter, India has low per-capita emissions and it further intends to decouple economic growth from greenhouse gas emissions. However, India stands at 9th position in the most climate-vulnerable regions in the world with nearly 80 per cent of the population residing in extremely vulnerable to hydro-meteorological disasters. This vulnerability is further exacerbated by the critical pressure on the existing natural resources, including a sharp decline in per capita water availability and climate-induced heatwaves. Heatwaves impact not only agricultural productivity and food security , it is emerging as a serious public health concern. Moreover, heatwaves increase mortality and morbidity, and reduce labour productivity for outside activities such as construction and agriculture. Additionally, cooling demand increases significantly putting additional stress on the electricity systems. The impact varies across different socio-economic groups, eventually amplifying the existing inequalities present in the economy. Groups with adaptive capacity are faring well, however, the rest are impacted severely Additionally, India maintains its commitment to the principles of equity and Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) of the Paris Agreement. While India recognises that addressing climate change will require collective actions, the climate action has to be aligned with the national capabilities, historical responsibility and developmental priorities. The Updated NDC (2022) reflects this interpretation of CBDR-RC and specifically mentions that implementation of targets will require climate finance, technology transfer and capacity building from the developed nations. Beyond NDCs, India's Long-Term Emission

Development Strategy (LT-LEDS) has been prepared within India's right to an equitable and fair share of the global carbon budget, representing India's call for "climate justice". This will ensure that India achieves its vision of rapid economic growth while conserving the environment.

Economically, India's transition is being undertaken within a tight fiscal space. The current central government fiscal deficit stands at 4.8 per cent of GDP and a massive debt service burden that consumes over 36 per cent of net revenue receipts. The significant fiscal deficit and debt servicing obligation constrains the range of government finances for large-scale investments required for mitigation and adaptation actions. This encourages private investment mobilisation and use of regulatory instruments like Renewable Purchase Obligations (RPOs) to support the transition process. At the same time, with India's heavy dependence on fossil-fuel imports, there exists a strong push towards transitioning to domestic renewable energy, energy efficiency and electrification in the end-use sectors. This is indicative of a decarbonisation strategy going beyond the climate objective of reducing greenhouse gas emission, reducing fossil fuel import dependency and improving energy security. Consequently, despite a limited fiscal space, it was observed that India is progressing towards decoupling economic growth from emissions through a combination of industrial energy efficiency, renewable energy deployment and expansion of low-carbon technologies at scale.. As of December 2025, non-fossil sources account for 52.5 per cent of its total power capacity, and the country has already halved its GHG intensity relative to GDP compared to 2005 levels. This development is supported by a strong evolution of governance, through the replacement of centralized Five-Year Plans by the consultative system of NITI Aayog Niti Aayog operates as a policy think tank, unlike the planning commission promoting cooperation and facilitating consultations between State Governments, Central Government, civil societies and industry stakeholders. This approach strengthens the implementation and provides greater flexibility to all the stakeholders in coordinating, communicating the implementation of cross-sectoral plans such as the National Action Plan on Climate Change, India's updated NDC and LT-LEDS.This study's evaluation of fairness, feasibility, and adequacy underscores both the ambitious nature of India's national targets and the significant structural hurdles that remain in operationalizing these goals on the ground.

4.2 Fairness

The principle of fairness within India's climate policy framework is not just a technical mandate, it also acts as a bridge between fair economic aspiration and environmental obligations. This is evaluated for India's climate policy with respect to five dimensions: distributive, recognitional, procedural, restorative and intergenerational equity. These dimensions are used to assess the benefits and costs of climate policies across different households, workers and regions. The analysis not only examines whether the climate policies are able to achieve their environmental outcomes, but also looks at which groups or individuals are considered within the policy framework, who bears the costs, benefits and who participates in the decision-making process.

Another crucial aspect of this assessment is looking at India's position within the international climate equity context. The country emphasises on the Common but Differentiated Responsibilities and Respective Capabilities in negotiations globally indicating the importance of international equity. India contributes to only around 8% of global emission but holds nearly 18% of world population between 1850 and 2019, while per capita emissions were 2.46 tCO2 eq, compared to the global average of 4.79 tCO2 eq reflecting low contribution of India in global emissions level. Therefore, the growing role of India in global mitigation should take into consideration its historical responsibility, developmental needs and capacity to act. This is one of the key reasons why climate policies in India are framed around the equity and CBDR-RC guidelines.

In India, these fairness perspectives are tested against imbalance where an unplanned transition can further impact the vulnerable populations. While both national and state level policy implementation are planned strategically, however, planning alone cannot ensure that the policies are fair on ground, therefore, outcomes like energy access and employment are used to determine the fairness of the relevant policies.

Distributional fairness is examined through the lenses of energy access and reliability across households, employment status across gender, sectors and region. Access to clean reliable energy, employment are basic developmental needs linked to the transition process and are therefore considered critical entry points in the assessment. India has made strides in energy access with having electrified all of India, but electricity reliability remains a concern. India currently has many schemes and policies in place to improve electricity supply through feeder separation and network upgradation. The robust deployment of smart meters has also allowed for improved billing, bill collection and real time tracking of electricity consumption, overall improving electricity reliability in many areas through better monitoring. Access to clean cooking in the form of LPG has been a crucial objective that the Indian government has been progressing on through its Pradhan Mantri Ujjwala Yojana (PMUY) scheme and has supported around 100 million people. This scheme was launched in 2016 with the target to replace 80 million biomass and coal-based cooking with LPG deposit-free connection. This target has already been achieved in 2019 cutting household level emissions and now more than 103 million connections are present. Although LPG is not clean, still was considered over electric cookstoves since it requires less new grid infrastructure and mainly because rural areas have uneven electricity reliability making LPG a suitable cooking alternative with lower emissions where both rural and urban areas can grow at scale.

Moving further, there remains scope for improvement in fairness across India's inequality and gender equity aspects. Women employment in the renewable energy force is lower than global average, partial protection is provided to tribal communities from the perspective of community consent for power plant related projects, and no domestic legal framework requires new energy related (renewable & non-renewable) projects to assess the impacts on cultural heritage. Employment and regional development considerations in India's climate commitments also face challenges. However, gender and social equity in the transition process goes beyond just employment, for instance, tribal and forest communities dependent on the forests and common land for their livelihoods often are affected when decisions such as renewable projects, mining, building transmission/grid infrastructure involving land usage are taken without taking their perspective into account. This suggests that participation of these vulnerable groups into the decision-making process is crucial to safeguard the livelihoods of these communities.

On the one hand, the renewable sector supports more than 1 million jobs in India, and on the other hand, a transition away from fossil fuels will cause a decline in revenues, especially for the coal rich eastern states like Odisha, Jharkhand and Bihar. There are national instruments such as the District Mineral Foundation which protects these regions from extreme revenue losses by redirecting revenues earned in mining activities back to these affected regions. Some states even have established Just Transition Task Force to ensure that the transition is equitable and just, however, a formally funded Just Transition mechanism is not yet present at the national level, thus, limiting the extent to which fairness can be achieved in the transition process. Although there is progress in reskilling the current workforce for the ever-growing renewable sectors, lack of job targets and geographically uneven job distribution limits the extent of regional development. This is not only limited to the renewables sector. Even in the industry sector, fuel-switching and energy efficiency gains play a crucial role, and will reshape the employment structure between sectors and decarbonising technology, however, granular sectoral data is still very limited and needs to be comprehensively monitored on-ground.

India's climate commitments are devised with a framework where development will not risk the welfare of future generations. This is not only limited to the issue of natural resources depletion in the long-run such as ground water and forest cover. This also extends to the issue of fiscal burden on mitigation and adaptation spending for the future decarbonisation budgets and the impact on health. India's NDC commits to enhance the investments in health as a climate-vulnerable sector. Policy Instruments are present in India such as stateand city Heat Action Plans and National Programmes on Climate Change and Human Health which work towards operationalising climate-health issues, focused on monitoring diseases and early warning systems to heat and vector borne illness. These schemes provide direct connection between the social sector and climate action in India's policy architecture.The social co-benefits of the NDCs, however, have unresolved gaps that remain on land use and biodiversity. Biodiversity impacts of energy projects in India are not consistently or comprehensively calculated. In order to improve

restorative fairness in India's environmental framework, it must integrate standards like IFC Performance Standard 6. Beyond biodiversity in restorative fairness, India has policy instruments and frameworks like Compensatory Afforestration Funds (CAMPA) and Resettlement & Rehabilitation (R&R) for communities affected due to mining or energy infrastructural activities compensating the losses faced due to the transition process, cushioning the impact at the same time. . Examining Indian environmental policies through the aspect of transparency in planning, reveals that gaps exist in the procedural fairness of climate practices. India has made the provision of Right to Information (RTI) to ensure transparency and accountability. Power imbalances and poor enforcement continue to exclude true beneficiaries or the people who need substantial incentives. To better include the affected communities, formal channels exist like the mandatory public hearings under the Environmental Impact Assessment which ensures that these groups are included in the decision making and transition process. However, the process for procedural fairness is not followed throughout with limited outreach, limited hearing on the concerns raised and short periods of hearing. Contrarily, NTPC has demonstrated institutional transparency by disclosing performances and vigilant monitoring, consistent auditing, evaluation and robust stakeholder engagement can ameliorate just transition process without impeding inclusivity or due process.

India specific policy examples across the five verticals have been used to provide a comprehensive measure of fairness and not treating each policy as a single development outcome.

4.3 Feasibility

To assess the feasibility of India's NDCs and climate commitments, we have utilised five aspects; political, economic & financial, social, institutional, and technological.

The Indian political spectrum has a strong will to address climate change issues and work on mitigation and adaptation impacts. This not only stems from the central government driven net-zero announcement, but also because of the fact that India is very prone to climate extreme events. India has consistently improved its NDCs and has been able to achieve some of them before the deadline through the broad spectrum of domestic policies that support decarbonisation and afforestation.For instance, India has already achieved its NDC target of 50% renewable capacity in the electricity mix by 2030. This showcases that the climate policies where the targeted sector such as the renewable sector is aligned with the pre-existing economy-wide priorities of reducing emissions have progressed significantly while coal-phase down is considered to be a politically contested area. Another reason for the effectiveness of these policies might also be that it serves two purposes, energy security and higher domestic manufacturing capacities. The reason why political feasibility appears the strongest in these policies.

Provided that India is a developing country and has many competing developmental priorities, fiscal space for expenditure on climate mitigation and adaptation is limited. India provides substantial support in the form of subsidies for LPG and fertilisers, suggesting that vulnerable households need to be protected. While subsidies are crucial, a gradual rationalisation of inefficient or poorly constructed subsidies could help create fiscal space for other decarbonisation activities. This will help India reduce its dependency on international climate finance by redirecting funds within the domestic market to support other decarbonisation actions. Since 2017, India has received ~1.2 Billion USD from the Green Climate Fund (GCF) in the form of grants, concessional loans, and equity. In comparison, the Government of India estimates that around USD 2.5 trillion (at 2014-15 prices) will be required to achieve the NDC targets by 2030. This highlights the scale of GCF in comparison to the large scale required to actually achieve the short-term goals, not even considering the overarching goal of net-zero. As of now,these funds have been used for financing projects in multiple sectors such as e-mobility, enhancing climate resilience, ground water recharge by using solar micro irrigation, and other sustainability initiatives.

The local awareness on climate change is limited in India; although the impacts of climate change are personally experienced by 89 per cent of people and therefore there is social support to improve the livelihoods of the most climate vulnerable communities in India. However, social feasibility goes beyond just public support and awareness,

it also considers whether benefits outweigh the cost of transition for the vulnerable group. Indian policies like UJALA were implemented with the objective of reducing the cost of energy-efficient lighting by switching to LEDs or PMUY for expanding LPG usage among low-income households are examples that show how climate actions like these benefit the household reducing cost of transition and as a result, strengthen social acceptability. On the other hand, policies which require transition to renewables can affect employment and local economies in coal-dependent regions, while increasing the upfront clean technology adoption cost for households and firms This indicates that social feasibility also depends on employment opportunities, access to affordable clean energy and reduced transition cost.

Institutionally, India has created strong and independent authorities that are able to communicate clearly with the Secretary of MoEFCC to oversee the progress of the implementation of India's NDCs and track progress towards meeting the Paris Agreement goals. Niti Aayog is responsible for cross-sectoral coordination, while the State Climate Change Cell is responsible for implementing State Action Plans on Climate Change. Additionally, the respective sectoral ministries and agencies work towards implementing plans within their respective areas, ensuring transparent communication between the central and state. The challenge here remains of establishing an integrated national MRV system to track the economy-wide progress against the NDC and net zero targets that currently does not exist . Currently, India has sector-specific mechanisms to monitor greenhouse-gas inventories, renewable energy and specific energy consumption (SEC) within the Perform, Achieve and Trade (PAT) scheme, a regulatory instrument with the objective of targeted monitoring and reduction of SEC using efficiency improvements for specific energy intensive industries. However, these mechanisms do not provide a holistic picture of the economy as a whole and therefore, it's crucial to have an integrated mechanism to strengthen the MRV system. The final aspect that we explored was that of technological feasibility.

Technologically, India has progressed significantly, especially considering the absorption capacity of industry to improve energy efficiency and adopt newer and cleaner technologies. By utilising multiple policies and market driven signals, India has been able to attract investments in Green Hydrogen, renewable energy, off-shore wind, and battery storage and is progressing towards technological feasibility for its climate commitments, but there is scope for improvement. Free trade agreements and bilateral country level carbon market Article 6 partnerships are also some of the key steps that India has taken to become technologically advanced.

4.4 Adequacy

The adequacy of the India climate framework is gauged by the compatibility between national policy and long-term changes in the system needed to achieve net-zero emissions by 2070. The evaluation is about the shift to non-fossil demand sectors, the strengthening of carbon sinks, and the reduction of non-CO2 agricultural emissions.

In the transport sector, India’s approach is a mixture of modernizing the infrastructure and a vigorous drive towards electrification. The PM Gati Shakti and Sagarmala initiatives seek to transfer freight to more efficient and electrified railways and inland waterways. These policies are implemented to reduce emissions from freight transfer by shifting the mode of transport from road to railways and waterways. Since 2014, under PM Gati Shakti, roughly 2672 million tonnes of freight movement have been transferred from road to rail reducing over143 million tonnes of CO2. Similarly, around 180 out of 232 target ports have been modernised under the Sagarmala initiative reducing logistics related emissions. Furthermore, the passenger transport segment is driven by the PM E-DRIVE scheme, where electric two-wheelers, three-wheelers, and trucks receive large subsidies, essentially providing support to the end-use consumers by reducing the upfront cost of vehicles With the implementation of this scheme, the economy saw a significant rise in electric 2W and 3W, while electric buses and other heavy vehicles observed a limited rise due to its dependence on public procurement and the presence of a charging infrastructure. The subsidy within the scheme was reduced from INR 5000 to INR 2500 pre kWH indicating a rational reduction in fiscal incentives to

reduce dependence on subsidies. An adequacy gap though is critical in the sense of urban planning with no policies for developing compact, walkable cities to moderate the demand of travel in the country. For the building sector, mandatory labeling of high use appliances is managed by the Bureau of Energy Efficiency (BEE) and the LiFE (Lifestyle for Environment) program formally incorporates behavioral changes into national policy. Although schemes like PMUY have boosted clean cooking, the high prices of other new technologies such as heat pumps are still a challenge towards complete residential electrification. The industrial sector focuses on hard-to-abate sectors such as steel and cement. This change is based on improving industrial efficiencies and incentivising fuel switching. The PAT scheme is one of the critical policy instruments in the industry sector implemented to reduce fuel consumption while improving efficiency and providing mandatory specific energy consumption targets for specific energy intensive industries. It was observed that the first two cycles combined within the PAT scheme saved 8.67 Mtoe in the first cycle and 14.08 Mtoe in the second cycle million tonnes of CO2 while issuing several million tradeable energy-saving certificates. Nevertheless, even with these measures, there is a high lock-in in heavy industry, and Carbon Capture Utilization and Storage (CCUS) technologies are still in the early research phases.

The land-use system in India aims at optimizing carbon sequestration by restoring forests and agroforestry. India based on the NDC targets aims to create an additional carbon sink of 2.5-3 billion tonnes of CO2 equivalent through forest and tree cover by 2030, relative to 2005. These carbon sinks will be utlised to offset the residual emissions from the hard-to-abate sectors. India is on track to meet this target and already has created 2.44 billion tonnes of CO2 eq carbon sink between 2005 and 2022. But fragmented governance and lack of special policies to safeguard peatlands or to regulate artificialization of soil undermines adequacy. Non-CO2 emission mitigation in agriculture is aimed at minimizing methane and nitrous oxide. The National Livestock Mission propagates the scientific feeding models to maximize production and minimize emissions. In the case of croplands, the government promotes Direct-Seeded Rice (DSR) to minimize nurseries that use a lot of water and PM-PRANAM scheme to encourage states that decrease the use of synthetic fertilizers. There are still gaps in food waste management and shifts to plant-based protein promotion.

However, the critical analysis unveils a gap in the drivers of policy: the excessive dependence on economic motivation (the carrot) such as the Production Linked Incentive scheme (PLI) and Faster Adoption and Manufacturing and Electric Vehicles scheme (FAME) respectively. PLI supports the domestic manufacture of solar panels, batteries, automobiles and other goods by encouraging investment and creating domestic capacities for these technologies. Similarly, the FAME scheme provided subsidies to the consumers to increase the uptake of EVs in the economy. On the other hand, regulatory requirements (the stick) have a flaw of inconsistent implementations and stringencies. For instance, in India within either the Perform, Achieve and Trade (PAT) scheme for the industrial sector or Renewable Purchase Obligations at the state level, enforcement of the mandated targets are weak and non-compliance penalties have diluted over the years. Moreover, the power sector is still locked in by coal infrastructure and there are no specified decommissioning plans yet. Based on this, it points to a problem that sequencing is missing, and that economic incentives and regulatory requirements are implemented separately at different points of time which reduces the combined decarbonisation effect in India.

There is another trade-off between long-term adequacy and feasibility. The current use of fiscal incentives in India is only viable in the prevailing political environment, but it might not be sufficient to deal with the economy-wide decarbonisation. . Decarbonisation will require complementary policies including fiscal incentives to reduce upfront cost, market measures to create demand for the clean technologies and regulatory measures to keep the climate action on track with the targets and strengthening the decarbonisation effort. Over time, India will need to ultimately move away from a subsidy-based model and adopt a strong regulatory framework that will require comprehensive decarbonization of all demand sectors.

Parallely, India has a number of innovative models that can be of lessons to other developing countries. The examples of UJALA and PMUY schemes demonstrate that climate-related objectives can be met by focusing on immediate socio-economic benefits such as health and energy savings to low-income households. The Perform,

Achieve and Trade (PAT) scheme has been effective in the creation of incentives to encourage low-carbon technologies by energy-intensive industries. Building on this scheme, the forthcoming Carbon Credit Trading Scheme (CCTS) aims to reduce greenhouse gas emissions across selected firms within industries by setting emission intensity targets. The firms reducing intensity beyond the target will be issued a carbon credit certificate while those falling short may buy these certificates to meet the target. .Moreover, the LiFE (Lifestyle for Environment) program is an official part of the national policy that focuses on behavioral changes, particularly through moderation of resource consumption patterns. The objective is to reduce emissions by reducing consumption through behavioural nudges. One good example is the BEE Standard and Labelling (S&L) scheme where the electricity consumption is mentioned in the body of every appliance manufactured which led to some consumers purchasing high rated ACs or Refrigerators which utilises lower electricity and overall reduces emissions from the households.

Assessment of these climate policies are to examine whether they are adequate enough to deliver NDCs and Net-Zero targets. However, going beyond just policies, it's crucial that for these policies to work, formal and inclusive stakeholder architecture is present to facilitate the implementation process. NDC in India was prepared with consultations across central, state ministries, industries, civil societies and domain experts and later approved by the Union Cabinet. Even with the process in place, the level of consultation lacked depth as third-tier/local governments were not fully included suggesting that the consultation process needs a wider range of stakeholders to have targets more aligned with the realities.

5 Indonesia

5.1 Fairness as a Condition for Legitimate Climate Action

Indonesia's most recent data portray a power system that is relatively stable but still facing structural and social challenges. Grid reliability in 2025 shows moderate performance, with customers experiencing on average 8.5 hours of outages annually (SAIDI), about 3.2 interruptions per year (SAIFI), and an average restoration time of 2.6 hours (CAIDI), according to national utility statistics. Electricity access has reached near-universal levels at 99.8% of the population, reflecting substantial infrastructure expansion over the past decade (National Statistics, 2026). However, disparities remain in energy use quality: while 88.59% of households use clean cooking fuels such as LPG or piped gas, this access is heavily dependent on subsidies, which support roughly 92% of users. Energy affordability continues to be a concern, as households allocate approximately 22.5% to 25% of their income to energy-related expenses (National Statistics, 2026). At the same time, income inequality remains moderate with a Gini coefficient of 0.363. Indonesia's energy subsidies and compensation packages generally range between 1% to 3% of GDP depending on global crude oil prices, domestic consumption, and currency exchange rates. Recent allocations in the state budget (APBN) earmark over IDR 300 trillion to IDR 381 trillion for energy support. The energy provided focuses more on fossil fuels — e.g., electricity which heavily supplied from coal, household LPGs, and gas for specific industries, and petrol and diesel fuels — rather than renewables development. Employment trends show positive growth in the renewable energy sector, which supports approximately 3.45 million jobs (Bappenas, 2025), and there have been no officially reported job losses in fossil fuel industries, suggesting a gradual rather than disruptive transition.

From a social and environmental safeguards perspective, Indonesia has formally recognized principles of Free, Prior, and Informed Consent (FPIC), an internationally recognize safeguard that ensures indigenous people and local communities are consulted in advance, provided with sufficient information, and able to freely approve or reject projects that may affect their customary lands, resources, and livelihood. Nevertheless, implementation on the ground remains inconsistent, particularly in forestry and plantation activities where land tenure and community rights are often contested (Elfitra et al., 2019; Jasim et al., 2025). Gender inclusion in the energy transition shows partial progress, although there is no policy and regulation in place specifying on gender inclusion, with women accounting for around 32% of the renewable energy workforce — noting that this figure is based on slightly dated international estimates (IRENA, 2019). Environmentally, the country has yet to achieve an absolute reduction in greenhouse gas emissions relative to 1990 levels, indicating that emissions growth has accompanied economic expansion (Raihan et al., 2022). Air quality also remains a significant issue, with average PM2.5 concentrations around 30 $\mu g/m^3$ in 2025 (Abidin et al., 2025), well above recommended health thresholds. On the regulatory side, biodiversity considerations are increasingly incorporated, as demonstrated by the application of international standards such as the IFC Performance Standard 6 in recent projects.

In terms of governance and planning, Indonesia has begun to embed just transition principles within its long-term and medium-term development frameworks, including integration into the 2025–2045 national development vision (RPJPN) and the 2025–2029 medium-term plan (RPJMN). Mechanisms to enhance transparency and accountability are being strengthened, including independent audits of transition-related funds and increased public disclosure of renewable energy project information. Environmental and Social Impact Assessments are now routinely published, reflecting commitments aligned with international transparency norms such as those associated with the Aarhus Convention (Romianingsih et al., 2023). Cultural considerations are also formally addressed, with project developers required to comply with standards equivalent to IFC Performance Standard 8, ensuring that cultural heritage is identified and protected through impact assessments prior to project implementation. Together, these developments indicate a transition framework that is increasingly structured and transparent, though still facing challenges in enforcement, inclusivity, and environmental effectiveness.

5.1.1 Assessment of Fairness based on the NDC and Associated Documents

Indonesia's Nationally Determined Contributions (NDC) and related policy documents — such as National energy Policy (Government Regulation No. 40/2025), National Electricity Plan (RUKN), Electricity Supply Business Plan (RUPTL), and Just Energy Transition Partnership (JETP) — present a nuanced yet evolving approach to fairness in the context of climate and energy transitions. These documents emphasize the importance of distributing the costs, benefits, and risks of climate action equitably across social groups, regions, and economic sectors. A clear intention is articulated to ensure an inclusive transition, particularly recognizing the roles and rights of vulnerable populations such as women, indigenous "adat" communities, local populations, and economically disadvantaged groups. This commitment is reflected in the emphasis on participatory processes and stakeholder engagement, spanning civil society, the private sector, and financial institutions.

However, although the NDC acknowledges that climate policies may impose short-term costs—especially on workers and regions dependent on carbon-intensive industries—it offers limited concrete details on how these costs will be distributed or mitigated through explicit compensation mechanisms. The documents engage with structural inequalities unevenly: gender equity is identified as a cross-cutting priority, committing to integrate gender-responsive approaches into climate and energy policies, but other dimensions such as energy affordability receive less detailed treatment. While 99% national electricity access is noted as an achievement, affordable access and localized and multidimensional energy insufficiency remain insufficiently addressed with specific targets or policy instruments.

Land use is highlighted as a critical fairness domain, given its central role in Indonesia's mitigation strategy. The policy documents emphasize protecting land rights, promoting restoration, and avoiding conflicts, especially for indigenous and rural communities. Mechanisms like community consultations and multi-stakeholder dialogues aim to enhance participation and reduce disparities, although their effectiveness depends heavily on implementation.

Regarding compensatory measures and just transition tools, Indonesia's NDC and related frameworks indicate an emerging but still underdeveloped architecture. References to safeguarding community rights and establishing just transition funds or regional development initiatives show awareness of the need to support those adversely affected by the energy and economic transition. However, these measures currently lack clear quantitative targets, detailed operational frameworks, and robust social protection systems. Consequently, their credibility and effectiveness—in addressing the needs of workers, households, and regions disproportionately burdened by the transition—remain uncertain.

At present, no formal compensatory measures, social protection schemes, or redistribution mechanisms have been implemented. The government is exploring targeted incentives such as subsidies and tax benefits for electric vehicles (EVs). It is important to note that the climate mitigation potential of EVs depends on the carbon intensity of the electricity supply; if the electricity is low- or zero-carbon, EV adoption reduces emissions, whereas otherwise it mainly improves local air quality without significantly addressing climate challenges. Besides financial incentives, EVs enjoy non-monetary benefits, including preferential parking and exemptions from traffic restrictions, which further encourage uptake. These initiatives represent initial efforts to embed fairness and just transition principles within Indonesia's climate policy but highlight considerable scope for strengthening and operationalizing mechanisms to equitably support vulnerable groups throughout the transition.

Fairness is also deeply embedded in Indonesia's political climate agenda. Policy narratives emphasize inclusiveness, transparency, accountability, and the principle that "no one is left behind." This framing aligns with global climate justice discourses and enhances the social and political legitimacy of climate action. Nevertheless, a gap exists between this normative commitment and policy specifics. Often, fairness appears more aspirational than enforceable, lacking measurable targets, binding requirements, or systematic monitoring to ensure equitable outcomes.

Internationally, Indonesia frames fairness primarily through national capability and conditional support. Its Enhanced NDC (2022) commits to emission reductions of 31.89% below business-as-usual through domestic efforts, increasing to 43.20% with international assistance in finance, technology transfer, and capacity building. While this implicitly acknowledges differentiated responsibilities, explicit references to historical emissions or strong equity-based global burden-sharing claims are limited. The forthcoming Second NDC (2025) adopts absolute emission limits, projecting a peak by 2030 and a cap of 1.34–1.49 $GtCO_2e$, alongside targets for 2031–2035. These steps signal ambition growth but do not substantially deepen international equity principles.

From a political economy perspective, fairness considerations reflect efforts to navigate distributional tensions in transitioning a large, resource-dependent economy. Inclusion of multiple stakeholders and focus on vulnerable groups aim to build broad support and ensure policy sustainability. However, lack of detailed compensation mechanisms for those losing out—workers, communities, or regions—remains a significant challenge, potentially undermining social acceptance and complicating implementation where economic interests and institutional constraints collide. Coal isn't just an energy source in Indonesia — it's a fiscal base for producing regions (Kalimantan, South Sumatra) and a source of jobs and local royalties. Any acceleration of coal phase-out runs into resistance from actors who benefit from the status quo, which is part of why coal retains policy protections like price caps even as renewables become cost-competitive on paper. Fairness here isn't abstract — it's about who absorbs the fiscal shock when a coal region's revenue base shrinks. The energy transition policy frameworks formally commits to supporting workers, communities, and vulnerable groups affected by the transition, aiming to generate low-carbon jobs and cushion socio-economic losses, but critics argue this is thin in practice. Safeguards for how transition benefits actually get distributed across society remain underdeveloped even as green finance flows in. Broader regional analysis frames the underlying principle as requiring distributional justice — equitable distribution of the benefits and burdens tied to energy production and consumption, not just aggregate decarbonization – moving from investor centric to whole community focus.

Assessing fairness across dimensions reveals a complex landscape. Distributive fairness covers grid reliability, electricity accessibility, affordability, employment impacts, gender equity, health and environmental exposure, land use impacts, and regional development. Most Indonesians experience similar grid reliability and 99% national electrification ratio, maintained through programs like Rural Electrification. In some remote and isolated areas, community initiatives such as micro hydro power plants development also contribute to rural electrification. Energy affordability benefits from government subsidies targeting low-income communities, though explicit affordability improvement strategies lack in the NDC. Employment impacts from the energy transition are unclear due to limited data.

Gender equity currently scores low on distributive fairness; women represent only about 5% of decision-makers in the energy sector. While the NDC commits to gender-responsive policies with specific metrics and pilot programs, nationwide implementation faces challenges. Health and environmental fairness is low due to uneven pollution exposure influenced by local industry and seasonality. Land use fairness is also low, with resource-rich islands like Sulawesi and Maluku bearing greater ecological and social burdens from “green” mining, while regions like Java face renewable infrastructure impacts. Regional economic development fairness rates medium, with mixed outcomes.

Restorative fairness involves support for those affected by transition. Retraining programs for displaced workers and communities are uncertain; PLN focuses staff training on greenhouse gas emission calculation with limited support to affected communities. Land-use decisions are actively being revisited to restore social, cultural, and ecological well-being, though progress is uneven. National programs for equity and ecological restoration sometimes conflict with large projects like National Strategic Projects (PSN) and the Food Estate program.

Procedural fairness concerns inclusivity and transparency in decision-making. Rights safeguarding around energy projects is uncertain due to limited information and early implementation stages. Land-use decisions mandate

transparency and stakeholder involvement but remain a source of tension among government, corporations, and communities. Biodiversity impacts are managed through Environmental Impact Assessments (AMDAL), Biodiversity Management Plans, and Social and Biodiversity Impact Assessments (SBIA), guided by the Strategic Biodiversity Strategy 2025–2045. Stakeholder participation rates medium fairness—mandated policies exist, but actual influence varies. Transparent auditing is in place but shows gaps, especially in power purchase contracts. Benefit allocation to disadvantaged communities has historically been low, focusing on technocratic and economic goals; however, recent policy shifts aim to direct climate finance and benefits to vulnerable groups through gender and social inclusion grants.

Recognitional fairness, particularly on gender, currently scores low but is improving alongside procedural fairness and policy participation, showing growing but incomplete acknowledgment of gender concerns.

Intergenerational fairness is reflected in emission targets and cultural heritage protection. Targets exhibit low ambition in sufficiently protecting future generations from environmental and economic strain, despite NDC net-zero goals supported by international cooperation, which suffers from insufficient global commitment. Cultural heritage protection has historically been low-priority, treated more as compliance. However, it is becoming central during energy project evaluations, evolving into a mandatory “no-go” criterion in NDC implementation. Compliance with IFC Performance Standard 8 ensures projects screen and protect tangible and intangible cultural heritage and promote equitable benefit sharing.

In summary, Indonesia’s energy transition fairness profile shows strengths in grid reliability and electricity access but significant challenges remain, including gender equity, environmental burden distribution, participation, benefit sharing, and safeguarding rights and heritage. The evolving policy landscape under the NDC and national regulations aims to address these gaps, but success depends on effective enforcement, capacity building, and broad stakeholder engagement.

5.1.2 Assessment of fairness based on expert judgment

Indonesia’s NDC and its associated policy documents emphasize the equitable distribution of costs, benefits, and risks across social groups, regions, and economic sectors, with particular recognition of vulnerable populations such as women, indigenous “adat” communities, local populations, and economically disadvantaged groups. This commitment to inclusiveness is supported by participatory processes and broad stakeholder engagement involving civil society, the private sector, and financial institutions.

Although the NDC acknowledges that climate policies may impose short-term costs—especially on workers and regions reliant on carbon-intensive activities—it offers limited concrete details on how these costs will be distributed or mitigated through explicit compensation or social protection mechanisms. In practice, all parties that consume energy and emit greenhouse gases—households, workers, and firms—bear the short-term costs associated with climate and energy policies, as such policies generally lead to higher energy prices. Meanwhile, energy suppliers potentially capture short-term benefits by producing and selling energy at prices deemed affordable. The overall climate benefits are expected to materialize predominantly in the longer term.

In terms of distributive outcomes, Indonesia performs relatively well in expanding access to electricity and maintaining grid reliability, with near-universal coverage and stable service provision. This suggests a baseline level of fairness in the provision of essential energy services. However, beyond access, equity becomes less clear. Energy affordability continues to rely heavily on government subsidies, indicating that the burden of energy costs remains significant for many households. At the same time, the employment implications of the energy transition are uncertain. Although the renewable energy sector is growing, there is limited clarity on how job creation offsets potential losses in fossil fuel-dependent sectors, and whether these shifts are equitably distributed across regions and skill groups.

Geographical disparities are particularly pronounced. Resource-rich regions such as Sulawesi and Maluku are bearing a disproportionate share of the environmental and social costs associated with the transition, including deforestation, land degradation, and ecological impacts linked to mining activities for critical minerals used in clean technologies. In contrast, more developed regions like Java tend to experience fewer direct environmental burdens. This uneven spatial distribution highlights a structural imbalance in how the benefits and costs of climate policies are allocated. Moreover, historically disadvantaged communities have not consistently benefited from climate and energy investments. Although recent policy developments, including those under the Second NDC, aim to shift toward more inclusive benefit-sharing—such as through grants and programs targeting gender equality and social inclusion—the real-world effectiveness and reach of these initiatives remain uncertain.

Existing inequalities further shape these outcomes. While the NDC formally promotes gender equity and introduces gender-responsive approaches, implementation remains limited. Women's participation in decision-making processes is still low, and many gender-focused initiatives remain confined to pilot projects supported by external partners rather than being systematically embedded in national policy. Broader socio-economic and geographic inequalities also persist, particularly in exposure to environmental risks such as air pollution, which varies significantly across regions depending on industrial activity. Land-use governance remains a critical area of concern, with frequent tensions between government authorities, private sector actors, and local communities. Limited transparency and uneven stakeholder engagement weaken procedural fairness, while efforts to address past injustices through restoration or corrective measures are often inconsistent and constrained by competing economic priorities.

Compensatory measures and social protection mechanisms remain underdeveloped. Existing initiatives, such as retraining programs for workers, are limited in scope and tend to focus on specific institutions rather than encompassing the broader workforce and affected communities. While the NDC includes elements of capacity building, particularly related to emissions monitoring, it does not yet provide a comprehensive framework for managing the social impacts of the transition. As a result, mechanisms to compensate those adversely affected or to redistribute benefits more equitably are still emerging and lack the scale and credibility needed to ensure a genuinely just transition.

From a political and institutional perspective, fairness in Indonesia's energy and climate transformation is increasingly acknowledged in public discourse but remains constrained in practical realization. Although there has been a noticeable shift from purely rhetorical commitments toward more substantive considerations of equity—such as electrification of all communities in provision of clean and affordable energy, energy subsidies for the poor, and in particularly, concerning gender (both local communities and workforces) and vulnerable groups (e.g., vulnerable households, remote communities, and informal-sector)—significant gaps persist in transparency, accountability, and meaningful public participation. Decision-making processes largely remain dominated by central authorities and economic elites, limiting effective engagement by affected communities. While civil society organizations actively raise concerns related to transparency, land rights, and equitable benefit-sharing, these issues are not consistently or systematically addressed, thereby contributing to ongoing social tensions and calling into question the legitimacy of policy actions.

Fairness considerations in Indonesia are politically framed around questions of who should take the lead on climate action and who should bear the associated mitigation costs. For example, proposals to shut down coal-fired power plants—ostensibly to access international funds for cleaner alternatives—raise critical fairness-related concerns about how and by whom the resulting unemployment of workers in coal plants and mines should be managed. Since such coal plant closures have not yet occurred, Indonesia has not experienced protest dynamics tied to these transitions, but the potential for social conflict remains.

Despite these challenges, fairness issues have meaningfully influenced policy design beyond mere rhetoric. This is especially apparent for climate mitigation actions and programs that involve high investment and operational costs.

A prevailing view among Indonesians is that developed, high-emission countries should bear a greater share of responsibility for climate action. Reflecting this, Indonesia's climate policies are often designed to minimize the domestic economic burden and avoid imposing disproportionate costs on its own population. While fairness is progressively integrated into the political and institutional arena, practical implementation requires stronger mechanisms to ensure transparency, inclusive participation, and equitable sharing of costs and benefits. Addressing these political economy dimensions is crucial to enhancing the social legitimacy and effectiveness of Indonesia's just transition and energy transformation efforts.

In the international context, Indonesia's approach to fairness reflects its position as a developing country with conditional mitigation commitments. The NDC acknowledges the need for international support to achieve higher levels of ambition and highlights the gap between current global efforts and what is required to meet climate goals. While this framing signals awareness of equity in terms of capability and intergenerational responsibility, it also points to limitations in current ambition and the challenges of aligning national pathways with long-term global climate objectives.

These dynamics are deeply embedded in Indonesia's broader political economy. The uneven distribution of transition-related costs—particularly the concentration of environmental and social burdens in resource-rich but often marginalized regions—combined with limited inclusion in decision-making processes, creates ongoing distributional conflicts. The sustainability of climate policies will depend on how effectively these tensions are managed. Without stronger procedural fairness, greater transparency, and credible systems of social protection and compensation, there is a risk that climate policies may face resistance or lose public support over time.

Overall, Indonesia's NDC implementation reflects a growing recognition of fairness as a critical dimension of climate policy, encompassing gender equality, regional disparities, and inclusive participation. However, significant gaps persist between stated commitments and actual outcomes. While distributive fairness has improved in terms of access to energy, it remains weak in areas such as affordability, employment transitions, environmental quality, and land-use impacts. Procedural fairness is constrained by limited transparency and participation, and compensatory mechanisms remain partial and underdeveloped. Although political discourse increasingly embraces equity, its translation into practice is uneven and shaped by entrenched institutional dynamics.

These findings highlight the need to strengthen just transition frameworks, expand gender-responsive policies beyond pilot initiatives, ensure more inclusive and transparent decision-making, and develop credible compensatory mechanisms. Addressing these challenges will be essential to enhance the social sustainability, political legitimacy, and overall effectiveness of Indonesia's climate and energy policies as the country progresses toward its net zero goals.

5.2 Feasibility: Political Economy of Climate Policy Implementation

5.2.1 Assessment of Feasibility based on the NDC and Associated Documents

Indonesia's Nationally Determined Contribution (NDC) demonstrates a generally strong level of feasibility when assessed across political, social, institutional, economic, and technological dimensions, although important risks and constraints remain. Politically, the NDC is well anchored within national development priorities. Climate objectives are not treated as standalone commitments but are embedded within medium- and long-term development plans, aligning mitigation efforts with broader economic transformation goals. Meanwhile, Indonesia Long Term Strategy for Low Carbon Climate Resilience (LTS-LCCR) outlines the strategy to peak emissions by 2030, with net-zero GHG emissions targeted for 2060 or sooner — making Indonesia the second major emerging economy after China to make a significant net-zero pledge. It also targets a net sink in the forestry and land-use sector as part of reaching that peak, and was framed explicitly around balancing emission reduction, economic growth, justice, and climate resilience — with reference to Indonesia's constitutional obligation (Article 28H) to guarantee a healthy

environment for all citizens. BAPPENAS modelling of Indonesia LTS-LCCR suggests a more ambitious net-zero pathway could generate stronger economic growth and produce higher-quality, more resilient jobs over the long run — supporting a "green growth" narrative where decarbonization helps Indonesia escape the middle-income trap by 2045 rather than trading off against development.

Key institutions, particularly central planning agencies, play a leading role in integrating climate targets into national budgeting and development strategies, reflecting high-level political endorsement. Climate action is framed not only as an environmental necessity but also as a matter of economic opportunity and national resilience. This alignment strengthens political feasibility, although continuity may still be tested by electoral cycles and shifting political coalitions. While long-term planning frameworks provide some stability, informal power dynamics—particularly the influence of fossil fuel interests and state-owned enterprises—remain an underlying challenge that could affect the consistency of implementation.

From a social perspective, the NDC benefits from a relatively high degree of procedural legitimacy. Its formulation process incorporates participatory mechanisms, supported by legal provisions that encourage stakeholder engagement across government, civil society, and the private sector. Climate policies are explicitly linked to social co-benefits such as poverty reduction, equity, and improved livelihoods, which helps position climate action as supportive of broader societal goals rather than as a competing priority. In addition, efforts to institutionalize climate education and awareness contribute to building long-term public support and capacity. These factors enhance social feasibility, although the depth and effectiveness of participation may vary across regions and social groups.

Institutionally, Indonesia has established a relatively comprehensive governance framework to support NDC implementation. A centralized coordinating structure, supported by interministerial collaboration and formalized through legislation and presidential regulations-supplemented by operational guidance such as national strategies and sector-specific roadmaps, provides a clear hierarchy for policy coordination. The existence of a legally mandated Measurement, Reporting, and Verification (MRV) system strengthens accountability and transparency. Roles and responsibilities are generally well defined through a “lead–sectoral–support” structure that maps implementation across ministries. At the same time, Indonesia’s decentralized governance system elevates the importance of sub-national authorities. Provincial governments serve as a dual institutional function: acting as the direct extension of central authority in coordinating local implementation, while aligning regional climate strategies with national targets. Although Indonesia does not officially assign legally binding, quantified greenhouse gas reduction quotas to individual provinces within its national NDC, provincial governments actively contribute through local climate action plans (Rencana Aksi Daerah) and sub-national reporting framework. Some pioneering provinces have even initiated localized province-level NDC translations to streamline regional target tracking.

However, despite these formal mandates, provincial involvement in the actual design phase of the overarching NDC was historically limited. To bridge these gaps, the national government-primarily through the Ministry of Environment- now actively facilitates provincial governments in developing sub-national NDC roadmaps. These roadmaps serve as the critical mechanism translating national NDC targets into actionable, region-specific strategies. This reflects a governance model that continues to evolve toward stronger vertical alignment, though effective inter-level coordination remains essential. As with the political dimension, informal institutional dynamics—such as patronage networks or elite bargaining—are not always visible in formal frameworks but may influence outcomes in practice.

Economic and fiscal feasibility presents a more mixed picture. Indonesia has developed a range of domestic financing instruments, including fiscal incentives, green bonds, and emerging carbon pricing mechanisms, all embedded within a broader national climate finance strategy. These are complemented by access to international sources such as multilateral climate funds. However, a substantial share of the financing required to meet NDC targets remains conditional on external support, creating a degree of uncertainty and potential vulnerability. For instance, The JETP's $20 billion commitment is structured mostly as loans rather than grants, which raises real

questions about long-term debt sustainability and equity — one analysis argues this risks reinforcing energy dependency rather than genuine national ownership of the transition, given how little of the financing so far has translated into deployed renewable capacity relative to the fiscal burden it creates. That's a distributional tension between international climate finance framed as partnership versus its practical effect of shifting risk onto Indonesian public finances. While the integration of climate objectives into national development planning increases the likelihood of sustained budgetary allocation, fiscal space is still constrained by competing priorities and macroeconomic pressures, including debt servicing. The policy mix of incentives ("carrots") and regulatory or pricing mechanisms ("sticks") reflects an effort to encourage low-carbon investment while discouraging continued reliance on fossil fuels, but entrenched economic interests may complicate this transition.

Technologically, Indonesia's NDC is supported by relatively clear sectoral pathways. Priority technologies for mitigation and adaptation are identified across key sectors such as energy, transport, and waste, and are guided by national strategies and roadmaps (e.g., National Energy Policy, National Energy Plan, Provincial Energy Plan, National Electricity Plan, Electricity Supply Business Plan, Transport Sector Decarbonization Roadmap, Industrial Decarbonization Roadmap). The Second NDC further strengthens this dimension by incorporating an explicit focus on innovation, research, and development, with the aim of reducing dependence on imported technologies and fostering domestic capabilities. A combination of fiscal and non-fiscal incentives is in place to accelerate technology adoption, supported by plans for enabling infrastructure that can scale up implementation. These elements contribute positively to feasibility by linking technological transformation with institutional and financial frameworks. Nonetheless, challenges remain in closing technological capacity gaps, ensuring sufficient investment in innovation, and managing resistance from established fossil fuel-based systems.

A key strength of Indonesia's approach lies in the integration of climate policy within broader development objectives. Climate action is framed as contributing to economic growth, job creation, energy security, and social stability, which helps align it with core national priorities. This integrated framing enhances policy coherence and reduces the likelihood of conflict between climate goals and development agendas, thereby supporting long-term feasibility.

At the same time, several enabling factors and constraints shape the overall outlook. On the enabling side, Indonesia benefits from a strong legal and policy foundation, clearly defined institutional roles, established MRV systems, and high-level political support. Participatory processes and the integration of climate goals into development planning further reinforce feasibility. On the constraint side, dependence on external finance introduces delivery risks, while subnational capacity and involvement remain uneven. Informal political economy factors, including vested interests in fossil fuel sectors, also pose potential barriers. Although the embedding of climate targets in long-term plans enhances continuity, effectively managing these underlying dynamics will be critical.

Indonesia's NDC is politically and institutionally well grounded, socially supported, and underpinned by a growing set of financial and technological instruments. These factors provide a credible basis for implementation. However, risks related to financing gaps, uneven governance capacity, and entrenched economic interests remain significant. The technological dimension strengthens overall feasibility by offering clear pathways for transformation, but its success will depend on sustained investment, innovation, and policy consistency. Ensuring that these elements are effectively coordinated and that key constraints are addressed will be essential for translating Indonesia's climate commitments into tangible outcomes. Moreover, Indonesia's LTS-LCCR, while encouraging, is insufficient on its own to actually drive the shift away from fossil fuels — because Indonesia has built its economy on fossil fuel exports for decades, and turning away from coal, oil, and gas is not easy in political-economy terms, even when the growth modeling favors it. This is the crux: the strategy's macro logic is sound, but macro logic doesn't automatically move ministries, state utility incentives, or regional fiscal dependence on coal. The LTS-LCCR is feasible as an economic and technical exercise — the growth modeling holds up, and Indonesia has genuine comparative advantages (solar potential, critical minerals, forestry governance levers). It's much less feasible as a political trajectory in its current form, because the document's targets assume a pace of coal phase-down, subsidy reform, and institutional alignment that current governance capacity hasn't yet demonstrated it can deliver — the near-term coal and finance

dynamics we've been discussing are the load-bearing constraint on whether the 2050/2060 endpoint is real or aspirational. One assessment frames it directly: the success of implementing this strategy in this decade will be the litmus test for whether Indonesia's stated leadership on climate is substantive.

5.2.2 Assessment of Feasibility based on Expert Opinion

Expert assessment of the feasibility of Indonesia's Nationally Determined Contribution (NDC) points to a moderately feasible pathway under current conditions, but one shaped by significant trade-offs, institutional constraints, and political economy dynamics. Rather than a straightforward trajectory, implementation reflects a balancing act between long-term climate commitments and immediate development priorities, with varying degrees of readiness across political, institutional, economic, social, and technological dimensions.

Politically, Indonesia benefits from a relatively stable and institutionalized consensus on climate action. Climate policy is not deeply polarized along partisan lines; instead, it is broadly embedded within national development narratives and supported across governing coalitions. This continuity has been maintained across leadership transitions, including the shift from President Joko Widodo to President Prabowo Subianto, suggesting a degree of resilience in high-level commitment. However, this commitment is not without tension. There is a noticeable gap between formal climate targets and actual policy directions on the ground. For instance, while long-term ambitions emphasize renewable energy expansion, national electricity planning continues to include substantial additions of fossil fuel capacity. This reflects a persistent trade-off between decarbonization goals and concerns over energy security, industrial development, and economic growth. As a result, political feasibility is best characterized as pragmatic and incremental rather than transformative, with climate objectives advancing in tandem with, rather than overriding, other national priorities. The level of commitment among key stakeholders—including political elites, business actors, and the broader public—also varies, often depending on how climate policies intersect with economic interests.

Institutionally, Indonesia has built a relatively strong formal framework to support NDC implementation, particularly at the central government level. Key ministries and the executive branch play a dominant role in coordinating climate policy, and recent regulatory efforts have improved inter-ministerial alignment. Systems for monitoring and reporting emissions are in place and functioning, especially in sectors such as forestry and carbon markets. However, this strength at the center contrasts with weaker capacity at subnational levels. Local governments, while formally mandated to contribute to climate action, often face budgetary constraints, limited technical expertise, and competing development pressures. Although capacity building programs have been carried out at provincial level, comprehensive analysis and effective management of decarbonization initiatives are still lacking. This creates a "competency gap" between national ambition and local implementation. Coordination challenges persist both vertically, between national and local levels, and horizontally, across sectors with differing priorities. In practice, informal power dynamics—such as local political interests, patronage networks, and sectoral lobbying—can influence outcomes as much as formal institutional arrangements. Although enforcement mechanisms have improved in some areas, their effectiveness remains uneven.

Economic and fiscal considerations present one of the most significant constraints on feasibility. Indonesia maintains moderate fiscal stability, but its capacity to finance the transition is constrained by competing demands on public resources. The Indonesian government spent an average of Rp73.5 trillion annually on climate-related programs between 2018 and 2024 — around 3 percent of the state budget — while Bappenas estimates Indonesia actually needs between Rp794–800 trillion annually to meet its climate goals. That's roughly a 10x gap between current spend and estimated need. Climate-related spending remains relatively limited compared to overall needs, and a substantial portion of required investment depends on external financing. At the same time, entrenched fuel subsidies continue to absorb fiscal space, reflecting the government's priority to maintain social stability and protect households from price volatility. While new instruments such as carbon pricing, green bonds, and fiscal incentives have been introduced, their impact is still evolving and often moderated by broader economic considerations. Private sector investment is expected to play a major role in financing the transition, yet current flows remain insufficient and concentrated in lower-risk areas. Structural barriers—such as perceived investment risks, regulatory

uncertainty, and the continued influence of fossil fuel incumbents—limit the scale and speed of private capital mobilization. These dynamics contribute to a form of "fossil lock-in," where existing energy systems and economic interests slow the pace of change.

Socially, the feasibility of the NDC is supported by relatively high levels of public awareness and growing engagement with climate issues. Climate change is increasingly understood not only as an environmental concern but as a direct threat to livelihoods, health, and economic stability. Civil society is active, and public discourse increasingly links climate action with issues of justice, inequality, and national resilience. Frequent climate-related disasters, such as floods and droughts, reinforce the urgency of action and generate political pressure. However, this pressure often prioritizes immediate adaptation and crisis response over long-term mitigation. Climate policy must also compete with other pressing societal concerns, including job creation, energy affordability, and economic growth — which also include food (and energy) sovereignty targets. In response, the government has sought to frame climate action in terms of "climate sovereignty," emphasizing initiatives that deliver near-term economic or security benefits, such as biofuels, electric vehicle development, and food resilience. More politically sensitive measures—such as reducing fossil fuel subsidies or accelerating coal phase-out—tend to be delayed or implemented cautiously, particularly during periods of economic uncertainty. In addition, reforestation programs are initiated — starting with 500,000 hectares and reaching a total of 6.5 million hectares in forest areas — to mitigate the food and energy estates build out.

Technological feasibility adds another layer of complexity. Indonesia has made progress in developing strategic plans and roadmaps for low-carbon technologies, and it benefits from a relatively strong and growing technical workforce, supported by broader digital transformation efforts. However, domestic manufacturing capacity for key renewable energy technologies remains limited, leaving the country dependent on imports. Efforts to promote technology transfer through foreign investment and partnerships have had mixed results, often constrained by weak enforcement and limited knowledge spillovers. Financial barriers further complicate technology deployment, as many clean energy projects are perceived as high risk by domestic financial institutions, leading to restrictive lending conditions. Infrastructure constraints are also significant, particularly in the electricity grid, where capacity limitations—especially in high-demand regions—pose challenges for integrating renewable energy and supporting electrification. While initiatives such as national grid expansion strategies signal recognition of these issues, implementation will require substantial investment and coordination. At the same time, policies promoting domestic innovation, local content requirements, and technological self-reliance indicate a strategic shift toward building long-term capacity, albeit at a gradual pace.

Taken together, these dimensions highlight a feasibility landscape shaped by both strong enabling conditions and persistent constraints. Indonesia benefits from a supportive policy framework, institutionalized political commitment, growing public awareness, and emerging financial and technological instruments. At the same time, implementation is challenged by gaps between ambition and practice, limited local capacity, fiscal constraints, and entrenched economic interests. Informal political economy factors—such as elite bargaining, patronage networks, and sectoral veto players—further complicate the picture, influencing how policies are applied in practice.

Ultimately, the feasibility of Indonesia's NDC will depend on its ability to navigate these interconnected dynamics. Delivering on climate commitments requires not only maintaining political and institutional alignment, but also strengthening subnational capacity, mobilizing sufficient and predictable finance, accelerating technological development, and managing the distributional and economic implications of the transition. The pathway forward is therefore not constrained by a lack of vision or policy frameworks, but by the challenge of reconciling long-term climate objectives with immediate economic and social imperatives in a complex and evolving political economy.

5.2.3 Final Evaluation of the Feasibility

A final assessment of the feasibility of Indonesia's climate action plans across key dimensions suggests a generally credible pathway, but one that is constrained by structural, political, and capacity-related challenges. While policy

ambition and strategic direction are clearly articulated—particularly through the Second NDC (SNDC) and the National Adaptation Plan (NAP 2026–2030)—the ability to translate these commitments into consistent and large-scale implementation remains uneven.

From a political standpoint, feasibility is present but significantly constrained. High-level commitment to climate action is evident, and climate objectives are formally embedded within national development priorities. However, these commitments operate within a political economy where powerful incumbent interests—particularly in the coal sector—continue to exert strong influence. Coal remains strategically framed as a "sovereign asset" tied to energy security and economic stability, which creates a structural tension with decarbonization goals. This dynamic contributes to what can be described as a partial misalignment between stated climate ambitions and actual policy choices, where progress tends to be incremental and negotiated rather than transformative. As a result, political feasibility depends not only on formal commitments but also on the ability to gradually shift entrenched interests without destabilizing broader economic and political priorities.

Economically, Indonesia's climate agenda appears moderately feasible. The country benefits from relatively strong economic growth and has begun to establish key instruments to support the transition, including carbon market mechanisms such as the Indonesia Carbon Exchange. These developments signal increasing sophistication in aligning economic policy with climate objectives. However, a substantial financing gap persists, particularly for large-scale energy transition investments. While both public and private financing mechanisms are being developed, current flows remain insufficient relative to the scale of investment required. This gap represents one of the most critical constraints on feasibility, as the success of climate policies ultimately depends on the availability of sustained and predictable funding.

On the social dimension, feasibility is again evident but accompanied by major challenges. Public awareness of climate change is rising, and there is growing recognition of its impacts on livelihoods, health, and economic security. This creates a supportive environment for climate action. At the same time, climate risks and transition impacts are unevenly distributed, with poorer and more vulnerable populations facing disproportionate exposure to environmental hazards and economic disruption. Although policy frameworks increasingly reference the concept of a "just transition," practical mechanisms to protect livelihoods, ensure fair benefit-sharing, and manage social risks are still underdeveloped. This gap raises concerns about the inclusiveness and long-term social sustainability of the transition, particularly if affected groups do not perceive tangible benefits or adequate protection.

Institutionally, Indonesia has established a comprehensive governance framework, but its effectiveness is constrained by fragmentation and capacity limitations. Responsibilities for climate action are distributed across multiple agencies, often with overlapping mandates and differing priorities, which can lead to coordination challenges. Institutional inertia, combined with gaps in technical expertise and staffing, further slows implementation. In addition, budgetary systems tend to prioritize procedural compliance over performance outcomes, limiting flexibility and responsiveness. While the legal and organizational structures for climate governance are largely in place, their operational effectiveness depends on improving coordination, strengthening human resources, and aligning incentives across institutions.

Technological feasibility is assessed as moderate, reflecting both strong potential and significant constraints. Indonesia possesses abundant renewable energy resources, particularly in solar and geothermal energy, and has incorporated many relevant technologies into its national planning frameworks. However, the deployment of these technologies is constrained by structural limitations in energy infrastructure. The electricity grid remains fragmented and, in some regions, insufficiently robust to support large-scale integration of renewable energy. In addition, limited domestic capacity for energy storage and clean technology manufacturing restricts the pace of transition and maintains dependence on external technologies. Addressing these infrastructure and capacity gaps will be critical to unlocking Indonesia's full technological potential.

In overall terms, Indonesia's climate action plans demonstrate a solid foundation, supported by policy commitment, economic potential, and growing public awareness. However, feasibility is not uniform across dimensions. Political

and institutional constraints, social equity challenges, and technological and financial limitations all interact to shape a transition that is gradual and negotiated rather than rapid. While the economic dimension shows moderate strength, it remains highly contingent on closing financing gaps. Taken together, these factors suggest that Indonesia's climate agenda is achievable, but only if key structural constraints are addressed and greater alignment is achieved between ambition, resources, and implementation capacity.

5.3 Adequacy: Alignment with Climate Goals

5.3.1 Adequacy of Long-Term Transformation

Indonesia's long-term transformation pathways toward net-zero emissions highlights a broad and relatively comprehensive policy vision, but one that is implemented unevenly across sectors. The analysis focuses on three major system transitions: reducing dependence on fossil fuels, strengthening land-based carbon sinks, and lowering non-CO_2 emissions from agriculture. Across these areas, Indonesia has articulated many of the necessary strategies, but the adequacy of these varies across sectors and yet the gap between policy design and implementation remains a defining feature.

In the transport sector for passenger mobility, Indonesia has considered and adopted strategies focused on creating mixed land-use and compact urban areas to combat urban sprawl, reduce traffic congestion, and improve the quality of life, especially in rapidly growing metropolitan regions such as Jakarta and Bandung. This is realized through policies promoting Transit-Oriented Development (TOD), vertical housing, mixed-use buildings, and zoning reforms. Additionally, Indonesia prioritizes creating integrated and transit-oriented mobility infrastructures supporting collective and non-motorized transport, with TOD serving as a primary tool to reduce urban sprawl and facilitate non-motorized transport modes. However, the country has not considered incentivizing the adoption of collective transport that is safer, time-efficient, and cost-competitive, nor has it considered developing a circular economy related to transport freight such as reducing, repairing, reusing, or recycling freight materials. Similarly, incentives to promote local/regional supply chains and adoption of rail, inland waterways, and coastal freight transport remain unaddressed in national policy.

Indonesia is proactively driving the adoption of electric vehicles (EVs) as part of its long-term transformation toward net-zero emissions. The government has implemented a comprehensive suite of incentives combining fiscal policies, tax exemptions, and infrastructure development to reduce dependence on fossil fuels, lower greenhouse gas emissions, and cultivate a domestic EV ecosystem. Central to these efforts are significant Value Added Tax (VAT) reductions and luxury tax exemptions. Specifically, under the VAT Reduction policy (PPN DTP), qualified four-wheeled electric vehicles and electric buses that meet a minimum 40% local content requirement (TKDN) benefit from a VAT rate lowered drastically from 11% to just 1%. Complementing this, a full exemption from the Luxury Goods Sales Tax (PPnBM) is granted for Battery-Based Electric Motorized Vehicles (KBLBB), effectively reducing their purchase costs and encouraging consumer uptake.

To further expand EV access, the government provides a subsidy of IDR 7 million for purchasing new electric motorcycles as well as for converting conventional motorcycles to electric powertrains. Additionally, import duty exemptions are in place through 2025 for imported completely built-up (CBU) or completely knocked-down (CKD) electric vehicles, with the government bearing the VAT or duties to help increase vehicle availability. At the regional level, multiple local governments contribute to this supportive environment by reducing or waiving Motor Vehicle Tax (PKB) and Motor Vehicle Ownership Transfer Fee (BBNKB) for electric vehicles. On the financing front, financial institutions, including banks, are encouraged to offer special lower interest rates to facilitate EV purchases. Collectively, these policies demonstrate Indonesia's active and multifaceted approach to incentivizing electric vehicle adoption as a key long-term system transformation aimed at achieving net-zero goals.

In the buildings sector, concerning both residential and commercial buildings, Indonesia has taken significant steps. It has actively considered the development of bioclimatic and energy-efficient building envelopes and structures. The Ministry of Public Works and Housing (PUPR) mandates energy efficiency standards for new and existing commercial buildings through Green Building Regulations and Codes. Indonesia also incentivizes the adoption of energy-efficient appliances for lighting, cooking, heating, and cooling in industrial contexts. Under Government Regulation No. 70/2009 and its update PP 33/2023, industrial companies consuming over 6,000 tonnes of oil equivalent per year are obligated to appoint energy managers, conduct energy audits, and regularly report efficiency via the Pelaporan Online Manajemen Energi (POME) platform; this policy has been implemented. For commercial buildings, the Ministry of Energy and Mineral Resources (MEMR) enforces Minimum Energy Performance Standards (SKEM/MEPS), including appliance labeling from one to five stars, to ensure high energy efficiency. Nonetheless, Indonesia does not provide incentives for the adoption of low-energy lifestyles within buildings nor for the electrification of appliances such as heat pumps or renewable-based cooking and heating devices.

Within industrial sectors, Indonesia acknowledges the importance of a circular economy, particularly in high-emission, energy-intensive industries. The National Roadmap & Action Plan: Circular Economy Indonesia 2025–2045 mainstreams circular economy principles aiming for transformative, sustainable change and sectoral decarbonization by promoting industrial decarbonization, energy efficiency, waste utilization, waste-to-energy projects, and industrial symbiosis.

In energy-intensive industries such as cement, iron and steel, and aluminium, the country does not currently prioritize incentivizing the electrification and use of renewable energy for industrial processes as well as incentivizing the adoption of energy-efficient processes and appliances in these industries. Likewise, options to reduce process emissions through new methods or carbon capture and storage (CCS) technologies are not considered within national policy frameworks for these sectors. Similarly, in light industries including manufacturing, there is no formal consideration to incentivize the shift toward electrification or renewable energy usage in industrial operations.

Conversely, the power production sector is a clear focus area for renewable energy adoption. Indonesia has actively committed to incentivizing the transition from coal to renewable power production systems. Key policy objectives are embedded in Presidential Regulation No. 112/2022, which establishes various fiscal and non-fiscal incentives designed to accelerate renewable energy deployment. These incentives include corporate income tax deductions of up to 30%, accelerated depreciation allowances, exemptions from import duties and VAT on equipment, as well as relief on land and property taxes. Specialized financing options also support this transition, facilitating investments in renewable energy infrastructure and projects. This regulatory framework reflects significant progress in supporting the power sector's low-carbon transformation.

In the realm of other energy production and transformation industries, Indonesia is making promising strides by incentivizing the development of biomass-based refineries and green hydrogen technologies—including derivatives such as ammonia and methanol. The Ministry of Energy and Mineral Resources (MEMR) is actively preparing regulations under the Energy-Based Energy Transitions (EBET) Bill to offer fiscal incentives such as tax holidays, tax allowances, and mechanisms for carbon trading to encourage investment and growth in green hydrogen projects. Additionally, the government has mandated a B50 biodiesel blend, composed of 50% palm-based biodiesel, to be implemented by July 2026, anticipated to stimulate biomass refinery development and reduce foreign exchange expenditure. Indonesia is also promoting investment opportunities by marketing 17 potential sites for green hydrogen production at the upcoming Global Hydrogen Ecosystem Summit (GHES) 2026, aiming to attract $25 billion in investment. To enhance the competitiveness of green hydrogen against the currently subsidized fossil gas market (priced around USD 6/MMBTU), the government is reviewing carbon pricing schemes and considering direct subsidies to bridge cost gaps.

In light manufacturing industries, Indonesia also supports circular economy practices through regulatory frameworks focusing on extended producer responsibility (EPR), encouraging reduce, reuse, and recycle (3R) practices, though implementation remains limited. Yet, similar to energy-intensive sectors, incentives for energy-efficient processes and electrification using renewable energy are not considered.

These combined policies and initiatives underscore Indonesia's selective but strategic approach to industrial decarbonization, with robust support for renewable power production and emerging energy technologies but limited focus on electrification and process emission reduction in heavy and light industries.

Overall, while Indonesia has embedded many crucial long-term systemic and sectoral transformations toward net-zero in its national policies—particularly in urban passenger transport planning, energy-efficient building construction, and circular economy adoption in key industries—important gaps remain. These include lacking policies for incentivizing collective transport adoption, freight transport optimization, electrification in buildings and industry, and widespread implementation of circular and energy efficiency measures in freight and manufacturing sectors. Therefore, the adequacy of Indonesia's long-term net-zero transformations is mixed, with strong consideration and partial implementation in several domains but notable policy omissions and implementation barriers in others.

In contrast, the transformation of land use systems to maximize carbon sinks represents one of Indonesia's stronger areas of implementation. Forest management is central to this effort, with policies aimed at halting deforestation, promoting reforestation, and improving governance through mechanisms such as community-based forest management and timber legality systems. These initiatives are anchored by the ambitious forestry and land-use sector (FOLU) Net Sink 2030 operational plan, which targets a net carbon absorption of -140 MtCO2e from the sector by 2030. Under this target, the FOLU sector is expected to account for roughly 60% of Indonesia's total national emission reduction goals. However, fully achieving these ambitious target-particularly for conditional goal and large-scale peatland and mangrove restoration-, critically depends on adequate international support, including climate finance, technology support and capacity building. The involvement of local communities, alongside international backing and the aligned policies across national and subnational levels, remains essential to delivering tangible progress in this domain.

Beyond forests, agricultural land management is also being leveraged to enhance carbon sequestration. Programs promoting sustainable agricultural practices, the use of organic fertilizers, and the integration of trees into farming systems through agroforestry are being implemented with support from subsidies, technical guidelines, and climate finance. Peatland protection is another critical component, given its importance for both emissions reduction and disaster risk management. Restoration efforts, fire prevention policies, and water management measures have yielded measurable improvements, although challenges remain in maintaining long-term effectiveness.

Urban land use, however, presents a more difficult challenge. While policies recognize the need to limit land conversion and soil sealing, rapid urbanization, weak enforcement, and limited monitoring capacity have hindered effective implementation. Overall, the land-use sector benefits from strong regulatory frameworks, financial incentives, and community engagement mechanisms, but continues to face pressures from competing land uses, local governance constraints, and infrastructural limitations.

The third transformation—reducing non-CO_2 emissions from agriculture—illustrates both policy innovation and practical constraints. Indonesia has identified multiple pathways to address emissions from food systems, including reducing food loss and waste, promoting more balanced and diverse diets, improving livestock management, enhancing crop practices, and reforming fertilizer use. National campaigns and roadmaps aim to reduce food waste and improve efficiency across supply chains, while dietary policies are linked to broader goals of nutrition and food security. In the livestock sector, programs to improve productivity through better breeding, feed, and animal health are intended to lower emissions intensity.

In crop production, efforts focus particularly on rice cultivation, a major source of methane emissions. Climate-smart agriculture initiatives promote improved water management, the use of organic inputs, and diversification into less emission-intensive crops. Fertilizer policies also aim to reduce overuse of synthetic inputs by encouraging balanced and organic alternatives. Despite these efforts, implementation faces significant barriers. Traditional farming practices, limited irrigation infrastructure, and economic considerations—such as labor costs and market incentives—slow the adoption of new techniques. Similarly, reducing food waste and shifting dietary patterns encounter cultural and behavioral resistance, while logistical challenges affect the distribution and uptake of organic fertilizers.

Across all three transformation areas, a common pattern emerges. Indonesia has developed a broad and largely comprehensive policy framework that recognizes the key elements required for a transition to net zero. In some areas—notably forest management, peatland protection, and passenger transport electrification—this framework has translated into tangible progress, supported by regulatory clarity and financial incentives. In other areas, particularly heavy industry, freight transport, urban land management, and certain aspects of agricultural transformation, implementation remains limited or uneven.

These gaps point to the importance of strengthening enabling conditions. Greater investment in infrastructure, improved coordination across sectors and levels of government, enhanced institutional capacity, and accelerated technology deployment will be essential to move from policy ambition to effective action. Without addressing these underlying constraints, the pace and scale of transformation may fall short of what is required to achieve Indonesia's long-term net-zero goals.

5.3.2 Structural Inertia Factors for Long-Term Structural Change

Achieving long-term structural change toward Indonesia's climate and net-zero goals is constrained by deep-rooted forms of structural inertia that cut across sectors. These inertia factors are not simply technical barriers, but reflect entrenched patterns in infrastructure, governance systems, financing structures, technologies, and social behavior. While policies exist in most areas, they are generally not yet strong or coordinated enough to overcome these systemic constraints, which slows the pace of transformation.

In the transport sector, both passenger and freight systems are shaped by significant infrastructure and governance inertia. The development of low-carbon mobility—such as mass transit systems, rail networks, and integrated logistics—requires very high upfront capital investments with long payback periods. This makes it difficult to attract private financing, especially in a context where projects are fragmented across jurisdictions and sectors. In addition, effective transformation depends on coordination between multiple actors, including transport authorities, urban planners, and financial institutions, which remains complex and often weakly aligned. As a result, although policies promoting public transport and electrification exist, they are not yet sufficient to drive systemic change. Overcoming this inertia will require stronger financial mechanisms, including blended finance and risk-sharing instruments, as well as more integrated transport planning that prioritizes low-emission modes and aligns infrastructure development with climate objectives.

In the buildings sector, both residential and commercial, inertia is driven primarily by capital constraints and behavioural factors. Retrofitting existing buildings or investing in energy-efficient technologies involves significant upfront costs, while access to affordable financing remains limited. At the same time, building owners and developers often lack strong incentives to prioritize energy performance, and awareness of long-term efficiency benefits is uneven. In commercial buildings, risk aversion and misaligned incentives—such as the split between owners and tenants—further slow adoption. Current policies, including building standards and efficiency programs, provide a foundation but are not yet strong enough to transform the market. Accelerating change will require expanded financial support, such as subsidies and concessional loans, alongside regulatory measures like mandatory energy performance standards and stronger market signals that link building efficiency to asset value.

The transition of Indonesia's energy-intensive industries toward net-zero emissions by 2060 faces formidable structural inertia rooted in physical, economic, institutional, and behavioural factors that sustain high-carbon pathways. These challenges are particularly pronounced in hard-to-abate sectors such as iron and steel, cement, and chemical production, where the demand for high-grade heat makes switching from coal or gas to renewable energy technically complex and financially burdensome.

One major source of inertia is the deep fossil lock-in, especially the heavy reliance on coal. Many manufacturing facilities depend on captive coal-fired power plants that are relatively young (under 15 years) and designed for decades of operation, creating a physical and financial reluctance to retire these assets early. Overcoming this requires a strategic shift from business-as-usual to forced early retirement of coal plants, significant investment in renewable energy sources like solar, geothermal, and hydro, and strict prohibitions on new captive coal power development.

Financial and technological barriers also play critical roles. The high upfront capital costs of advanced low-carbon technologies—such as carbon capture, utilization, and storage (CCUS) or green hydrogen—discourage adoption, especially when competing against cheaper, high-emission alternatives. Current investment priorities focus on short-term economic growth rather than long-term sustainability, exacerbating the challenge. Addressing this requires policies mandating green certifications, expanding access to affordable, long-term financing for retrofitting and technology integration, and embedding CCUS costs within industrial accounting frameworks.

Policy misalignment and regulatory fragmentation further entrench inertia. Despite the existence of an industry decarbonization roadmap, inconsistent, short-term policy signals persist, with some regulations still permitting new coal use. Mandates are often voluntary or fragmented across ministries, causing delays and uncertainty. A unified, mandatory decarbonization plan, enforceable sectoral emission targets within the Industry Development Master Plan (RIPIN), strict energy efficiency standards, and harmonized policies between the Ministry of Industry and Ministry of Energy are essential prerequisites for progress.

Technological constraints present another hurdle. The industry's reliance on carbon-intensive processes like blast furnaces, combined with limited local expertise and infrastructure to deploy emerging technologies such as hydrogen-based steelmaking and advanced electric heating, slows transition efforts. Targeted investments in technology upgrades, material substitution, and research and development to localize these technologies are critical.

Institutionally, a prevailing "wait-and-see" culture hinders advancement. Small and medium enterprises (SMEs) often lack resources to invest in low-carbon technologies, while larger firms postpone actions pending clearer government support or technological maturity. Establishing a robust regulatory framework that mandates early decarbonization actions, stimulates market demand through public procurement of green products (such as cement and steel), and strengthens emissions reporting systems can counteract this inertia.

The outlook to 2060 envisions significant acceleration in electrification, energy efficiency, and renewable fuel substitution, propelled by the Industry Decarbonization Roadmap jointly prepared by the Ministry of Industry, IESR, and WRI Indonesia. This roadmap emphasizes retiring coal-based captive power plants, scaling renewable energy deployment, and adopting green hydrogen despite high current costs. However, a "business as usual" trajectory compounded by ongoing fossil fuel investments threatens to perpetuate structural obstacles and delay transition.

In the broader energy sector, inertia is closely tied to capital requirements and infrastructure dependencies. Expanding renewable energy capacity and improving energy efficiency require not only investment in generation technologies, but also significant upgrades to transmission and distribution systems. Regulatory uncertainty and financing constraints continue to limit the pace of this transition. While policies supporting renewable energy exist, they need to be reinforced with greater regulatory clarity, long-term investment frameworks, and targeted incentives that can accelerate deployment and reduce reliance on fossil fuels.

The land use sector presents a more complex form of inertia, spanning technological, infrastructural, governance, and behavioral dimensions. On the technological side, existing systems are often locked into conventional practices, such as the widespread use of synthetic fertilizers, which are supported by established supply chains and knowledge systems. Transitioning to more sustainable alternatives—such as bio-fertilizers or precision agriculture—requires new infrastructure, better data, and significant investment in research and innovation. Infrastructural inertia is also evident in agricultural systems designed for traditional practices, such as irrigation systems that support continuous flooding in rice cultivation. Shifting to more sustainable approaches, such as water-saving techniques or peatland restoration, involves costly retrofitting and long-time horizons.

Governance challenges further complicate land-use transformation. Overlapping mandates across ministries and levels of government, combined with unclear land tenure arrangements, create legal and administrative barriers. In addition, the relatively short time horizons of political and planning cycles are often misaligned with the long-term nature of land restoration and ecosystem management, which can take decades to yield results. Behavioral factors also play a critical role. Cultural preferences, such as the central role of rice in national diets, limit the adoption of alternative crops, while smallholder farmers—who dominate the sector—are often risk-averse due to economic vulnerability. Sustainable practices are frequently perceived as risky, particularly when they involve potential short-term yield reductions or require unfamiliar techniques.

Addressing these multiple layers of inertia requires a comprehensive and coordinated policy response. Financial mechanisms must be significantly strengthened to reduce investment risks and mobilize both public and private capital, particularly in sectors with high upfront costs. Governance reforms are needed to improve coordination across institutions, clarify roles and responsibilities, and align policy timeframes with long-term climate objectives. Technological innovation must be supported through sustained investment in research, infrastructure, and data systems, enabling the adoption of new practices and technologies at scale. At the same time, behavioral barriers must be addressed through education, capacity building, and risk mitigation tools such as insurance schemes and transitional support for affected communities.

Ultimately, the persistence of structural inertia highlights that Indonesia's transition is not constrained by a lack of policy intent, but by the depth of systemic change required. Existing policies provide an important foundation, but they need to be strengthened, better coordinated, and more effectively implemented to overcome entrenched patterns in infrastructure, institutions, and behavior. Without addressing these underlying constraints, progress toward long-term climate targets will remain gradual and uneven, underscoring the importance of sustained and integrated efforts across all sectors.

5.4 Expert Views on Regulatory Framework Enabling Sectoral Transformation

Expert assessment of Indonesia's current regulatory framework for enabling key sectoral transformations toward net-zero emissions reveals a system that is broadly in place but not yet sufficiently strong, coherent, or scaled to drive rapid change. Across the power sector, transport systems, forestry, and agricultural landscapes, a combination of economic and non-economic instruments has been introduced. However, these instruments tend to operate below the level of intensity required to overcome structural barriers, resulting in incremental rather than transformative progress.

In the power sector, the government has introduced a comprehensive set of economic incentives aimed at promoting renewable energy power generation. These incentives include income tax allowances, extension of loss periods for tax purposes, accelerated asset depreciation, reductions in import duties and dividend income tax for foreign investors, land and building tax reductions, as well as financing incentives such as interest rate subsidies and credit facilities. On the non-economic side, support mechanisms include offering more attractive feed-in tariffs, facilitation for easing renewable energy project permitting, allowing direct appointments for RE projects bypassing

tendering processes, provision for renewable power projects to obtain carbon credits, and tax incentives for special projects like waste-to-energy. Despite this array of policies, the penetration of renewable electricity generation remains relatively low—only around 15% of installed capacity—indicating that these instruments are currently insufficiently impactful. Specifically, there is a lack of targeted investment credit specifically for RE power plants, and while assistance in planning is provided as a non-economic instrument, it falls short of accelerating transformation at the desired scale and speed. Hence, both enhanced economic instruments such as dedicated investment credits and strengthened non-economic supports like more robust planning assistance are needed to expedite renewable energy development.

Indonesia's passenger transport sector is currently dominated by personal vehicles, including private cars and motorcycles, which poses a challenge for emission reduction. Increasing the share of public transport depends heavily on the availability of affordable and convenient options. Public transport infrastructure in Indonesia is typically a public-private partnership, with private investment in small to medium assets like buses, and government investment in large strategic projects such as rail and rapid bus transit. However, existing incentives to stimulate private investment in public transport infrastructure are limited. There is a need to explore diverse financing schemes, including accessing foreign capital, to boost development in this area. Additionally, structural urban planning interventions such as TOD combined with road management policies are necessary to encourage non-motorized transport modes like cycling. However, cultural and economic factors present barriers to cycling adoption; for example, the affordability of motorcycles and gasoline, as well as climatic conditions, make cycling less attractive for many Indonesians. Without significant petrol price adjustments or effective promotional campaigns, shifting public behavior toward cycling will remain a challenge.

The transition to EVs is still at an introductory stage in Indonesia and faces limited economic incentives. Currently, these include value-added tax discounts for cars, subsidies for electric motorcycles, and import duty exemptions. Non-economic incentives provide better privileges such as preferred parking and eased restrictions on accessing congested roads. To further accelerate EV uptake, particularly in public transport sectors like buses and light rail, expansion of economic incentives is essential. Additionally, promoting domestic manufacturing of electric batteries through both economic and non-economic incentives can bolster the EV industry locally. Increased public campaigns to raise awareness and acceptance of EVs are also necessary to foster adoption.

In the forestry sector, Indonesia's regulatory framework is comparatively more comprehensive, reflecting the central role of land use in the country's climate strategy. A mix of economic instruments—such as carbon pricing initiatives, ecological fiscal transfers, subsidies, and results-based payments—has been introduced alongside non-economic measures, including social forestry programs, certification systems, and community-based management approaches. These combined efforts contribute to a more durable and inclusive model of forest governance, with potential co-benefits for livelihoods and biodiversity. However, implementation challenges remain. Carbon pricing mechanisms are not yet fully developed or applied across sectors, and financing for nature-based solutions is often delayed due to results-based payment structures that only disburse funds after outcomes are achieved. Experts emphasize that shifting toward more upfront financing mechanisms and expanding carbon pricing coverage could significantly enhance the effectiveness and scalability of forest-based mitigation efforts.

In agricultural landscapes, particularly in crop and grassland systems, the regulatory framework supports a transition toward agro-ecological and agroforestry practices, but progress remains limited by structural and economic constraints. A range of economic instruments—including subsidies, credit schemes, and emerging carbon-related incentives—are in place, complemented by non-economic measures such as technical assistance, governance reforms, and digital tools. These efforts signal a growing recognition of the importance of sustainable land management. However, the current approach is still largely driven by policy "push" rather than strong market incentives, which limits scalability. Farmers often face risks associated with transitioning to new practices, including potential short-term yield losses, and lack sufficient financial protection or guaranteed returns. Experts point to the need for more innovative mechanisms, such as outcome-based payments linked to ecosystem services, risk-sharing

instruments, and the development of value chains that reward sustainable production. Strengthening these elements could make agroforestry and sustainable agriculture more economically attractive and widely adopted.

Across all sectors, a common pattern emerges: Indonesia has established a diverse set of regulatory tools that combine financial incentives, policy frameworks, and institutional support. However, these tools are often fragmented, limited in scale, or insufficiently aligned with market dynamics. Economic instruments such as tax incentives and carbon pricing exist but lack the breadth and enforcement needed to drive systemic change. Non-economic instruments, including planning support and governance reforms, provide an important foundation but require stronger coordination and integration to be effective.

Looking forward, experts emphasize the importance of a more ambitious and coherent regulatory approach. This includes expanding carbon pricing mechanisms across sectors, strengthening both upfront and performance-based financing instruments, and enhancing regulatory certainty to attract long-term investment. Equally important is improving governance capacity, aligning policies across sectors and levels of government, and building institutional and technical capabilities. Finally, fostering market-based mechanisms that reward low-carbon and sustainable practices will be critical to complement policy-driven approaches. By addressing these gaps, Indonesia can move from a framework that enables gradual progress to one that actively accelerates the structural transformations needed for a low-carbon and climate-resilient future.

5.5 Key National Policies Addressing the Socio-Economic Effect of the Transition

Indonesia addresses the socio-economic implications of its ecological transition through a combination of fiscal policies, social protection programs, and targeted support measures designed to shield vulnerable groups while maintaining broader economic stability. These policies reflect an effort to balance climate ambition with social equity, recognizing that the transition to a low-carbon economy can impose uneven burdens across different segments of society.

A central component of this approach lies in the use of progressive taxation and targeted tax incentives. The personal income tax system incorporates non-taxable income thresholds that increase with family size and number of dependents, thereby reducing the tax burden on lower-income households. This structure is complemented by temporary fiscal measures such as the government-borne income tax (PPh 21 DTP), which exempts workers in selected labor-intensive sectors earning up to IDR 10 million per month from paying income tax in 2026. In addition, micro, small, and medium enterprises (MSMEs)—which form the backbone of Indonesia's economy—benefit from a reduced final income tax rate of 0.5 percent, extended through 2029. Together, these measures aim to preserve purchasing power, sustain employment, and support inclusive economic participation during the transition.

Alongside fiscal instruments, Indonesia relies heavily on direct social assistance programs to protect households most at risk. Initiatives such as the Village Cash Transfer (BLT Dana Desa) provide regular financial support to households living in extreme poverty, while larger national programs like the Family Hope Program (PKH) and the Basic Food Card (Sembako) deliver conditional cash transfers and food assistance to millions of beneficiaries. These programs play a critical role in cushioning the immediate impacts of economic adjustment, including potential price increases or income disruptions linked to climate and energy policies.

Energy subsidies remain another key pillar of Indonesia's social protection strategy, particularly in the context of rising energy costs associated with the transition. Electricity subsidies are targeted toward low-voltage users, who are predominantly lower-income households, helping to maintain affordability of basic energy services. Similarly, subsidized 3-kilogram LPG cylinders are reserved for households and small-scale enterprises with limited financial capacity. While such subsidies can complicate efforts to reduce fossil fuel consumption, they are maintained as a short- to medium-term mechanism to prevent disproportionate impacts on vulnerable populations.

Importantly, Indonesia's climate and development strategies explicitly identify and prioritize vulnerable groups in the transition process. Policy frameworks such as the Second Nationally Determined Contribution, the Long-Term Strategy for Low Carbon and Climate Resilience 2050, and the Low Carbon Development Indonesia initiative recognize a wide range of at-risk populations, including smallholder farmers, indigenous communities, women, children, the elderly, persons with disabilities, urban poor populations, and communities exposed to displacement. These frameworks acknowledge that climate policies can affect livelihoods, health outcomes, and access to infrastructure, and they seek to integrate risk mitigation measures into planning and implementation.

Taken together, these policy instruments illustrate a deliberate effort to ensure that Indonesia's ecological transition proceeds in an inclusive and equitable manner. By combining tax relief, direct transfers, energy subsidies, and targeted support for vulnerable groups, the government aims to reduce the socio-economic risks associated with climate action. At the same time, the effectiveness of this approach will depend on how well these measures are coordinated, targeted, and adapted over time, particularly as the transition deepens and new distributional challenges emerge.

6 Nigeria

6.1 Fairness

This section provides the narrative on the assessment of the distributional, procedural, recognitional, intergenerational, and restorative dimensions of Nigeria's climate commitments, grounded in factual indicators, NDC extraction, and expert judgement.

6.1.1 Key Fairness-relevant Conditions and Indicators

The indicators provided in the framework present a consistent fairness story for Nigeria, as many households still face acute modern energy access problems, and even for those on the national grid, service quality and affordability constraints remain significant. The electricity access was estimated at 61% of the population, while access to clean cooking was only 26%, as of 2023, which shows that a large share of households still depend on crude and polluting fuels, e.g. firewood and charcoal, with attributed well-known health and time burdens that disproportionately affect women and children, especially in the rural and peri-urban communities.

On reliability, a typical case from the Nigerian Electricity Regulatory Commission (NERC) for Ikeja Electricity Distribution Company (Ikeja DisCo) suggests that the system average interruption duration index (SAIDI) for January-May 2023 is reported at roughly 676 minutes per customer, with monthly range of 605-791 minutes, while the system average interruption frequency index (SAIFI) over the same period was about 0.89 sustained interruptions per customer, with monthly range of 0.88-0.90. The average restoration time, based on the customer average interruption duration index (CAIDI), is about 758 minutes per interruption, with a monthly range of 679-879 minutes. The implication on a cumulative basis is that the figures suggest about 3,380 minutes (about 56 hours) of sustained interruption and about 4.5 interruptions per customer over the five-month period. However, data from NERC suggest that the 2023 service-band distribution shows a relative improvement in nominal availability over 2019, due to the introduction of band-based electricity billing in November 2020 (NERC, 2023). The service-band allocation and SAIDI/SAIFI measure different aspects of reliability and are not directly comparable. The figures suggest that reliability challenges are prevalent, which disproportionately hurt low-income households and small businesses with limited ability to provide self-diesel/petrol electricity generators or storage. Specifically, higher-income households and larger businesses (mainly in urban communities) may maintain electricity services through petrol/diesel generators, batteries, inverters or rooftop solar systems. By contrast, low-income households and micro and small enterprises (mainly in rural communities) may have to suspend productive activities due to limited access to backup technologies, which manifests as lost income or sales, spoilage of temperature-sensitive goods (especially agrofoods), or disproportionately high expenditure on small-scale fuel-based generation. Contextually, similar interruption rates can produce substantially different welfare and economic outcomes across income groups. In this context, reliability is evaluated through both the distribution of electricity interruptions and the distribution of consumers' capacity to cope with them.

There are strong concerns about affordability, as the Nigeria Residential Energy Demand-Side Survey 2024 estimated that the average monthly household electricity expenditure was around ₦4,155.8 for households earning ₦30,000-₦65,000 per month [19], implying that about 6-14% of households' income is spent on the electricity bill. This observation is sufficiently apparent to necessitate difficult trade-offs among food, transport, education, and health spending. These distributional pressures are magnified by underlying inequality (Gini coefficient of 33.9 in 2022), indicating that poorer households receive a greater destabilising burden of the same tariff or price shock.

Given the obvious fairness challenges, the official climate submissions (the LT-LEDS and NDC) omit data on fairness-relevant indicators, thereby weakening accountability for who gains and who loses in the transition. For example, Nigeria's Energy Transition Plan positions high-level job creation aspirations (hundreds of thousands of

jobs by 2030 and more by 2060). However, there is no official document estimating potential job losses in the fossil-fuel value chains that currently drive the country's economy. In addition, key labour-transition metrics commonly presented in climate planning, such as the percentage of displaced workers re-employed within 12 months or the upskilling/reskilling coverage of affected workers, are apparently missing. This signals strong justification for the country to develop a robust just transition guideline and action plan to reinforce the justice dimension of the official climate submissions.

Furthermore, critical social safeguards and concerns about recognitional equity are often absent or under-specified. The Free, Prior, and Informed Consent (FPIC) is not clearly enshrined in national documents as a standalone national requirement (though public consultation is embedded in Environmental Impact Assessment (EIA) processes). In this context, FPIC assesses the procedural dimension of justice to ascertain whether communities that may bear the concentrated environmental, social, and livelihood costs of climate mitigation projects have meaningful influence over the decisions that produce those impacts. Fairness requires more than distributing compensation after a decision has been made; it also concerns whether affected rights-holders receive adequate information, have sufficient time and institutional space to deliberate, and participate in decision-making before project commitments become difficult to reverse. Therefore, the lack of explicit expression of FPIC in the NDC may cause communities to experience land acquisition, displacement, restrictions on access to customary resources, livelihood disruption, or impacts on culturally significant places, even where the wider economic and energy benefits of the project accrue predominantly to the government, developers, or geographically distant consumers - the situation oil and gas producing communities are currently facing in Nigeria (Amnesty International, 2026). While FPIC provides a strong indication of fairness, its absence does not necessarily mean that every project is unfair; rather, it indicates a weaker procedural safeguard in cases where projects may impose substantial or irreversible local impacts.

The share of the renewable-energy workforce for women is not systematically reported, and several environmental and health indicators (e.g., PM2.5 exposure, biodiversity safeguard standards, independent audits of transition funds, cultural heritage safeguards) are not consistently tracked in either the NDC or the LT-LEDS. On governance, Nigeria has an important enabling architecture, most notably the Climate Change Act (2021), which establishes the National Council on Climate Change (NCCC), but without routine, disaggregated reporting on distributional outcomes, it stands a chance of testing whether transition finance and policies are delivering fairness in practice rather than in intent presented in the documents.

6.1.2 Fairness Features Extracted from the NDC

Nigeria's NDC 3.0 framing is to expand modern energy access, protect affordability, strengthen resilience, deliver health co-benefits, and prioritise stakeholder engagement in the implementation. In fairness terms, the NCD 3.0 framing is appropriate because it positions development outcomes and social legitimacy as integral to climate action. However, the analysis suggests that the framing pillars are only occasionally translated into measurable equity commitments. In many areas, the NDC presents intentions and principles without specifying equity targets, implementation metrics, or clearly defined support measures for groups that would otherwise bear disproportionate transition burdens, e.g., women and oil & gas-producing host communities, primarily located in the Niger Delta region.

On the whole, the analysis indicates that fairness outcomes in Nigeria are currently constrained by profound demographic and spatial inequalities (between women and men, across states, and along the urban–rural divide), persistent energy poverty, and uneven enforcement of rules and safeguards across institutions and projects. Even if Nigeria implements its NDC measures, distributional risks will remain unless the transition is deliberately designed around affordability protections, targeted delivery to lagging locations and vulnerable groups, and stronger enforcement and accountability. It implies that the NDC implementation should deliberately protect low-income households from higher energy and transport costs, direct climate finance and infrastructure towards underserved regions, provide credible livelihood alternatives for affected workers, and monitor how benefits and burdens are

distributed by income, gender, occupation and location. The central fairness challenge is the need to translate the NDC commitments into measurable, adequately financed and enforceable outcomes across federal, state and local levels.

6.1.3 Grid Reliability

The NDC's direction is generally positive because it positions the improvement in the electricity generation and supply, and reliability as an expected outcome of transition measures, but the explicit plan for indicators or targets that would allow progress to be tracked in concrete reliability terms (for example, using outage duration (SAIDI)/frequency (SAIFI) indicators) is lacking or best insufficient. This omission is grievous from a fairness perspective because reliability failures tend to penalise lower-income households and small enterprises, mainly in rural and peri-urban areas. However, it is noted that the NDC implicitly recognises income vulnerability, but a more Nigeria-nuance equity lens would consider location-based vulnerability, notably the uneven service quality between urban areas and peri-urban/rural and underserved communities, and oil & gas-bearing communities.

The fairness aspiration would be that the same level of electricity service quality is provided to all customers in the federation. However, the current reliability remains low, and it may remain so after the NDC 3.0 implementation, reflecting that reliability is shaped by differential investment, governance capacity, and network conditions across states and customers. In other words, the reliability of supply stands as an enabler of the transition because, without explicit reliability standards and enforcement, reliability gaps can persist and widen, with a disproportionate burden on poorer households and small firms that cannot afford alternatives.

By contrast, electricity access is one of the clearest areas where the NDC 3.0 goes beyond general statements, anchoring in the ambition for 100% electricity access by 2030 (as referenced in the "Mission 300" compact in NDC 3.0). The fairness logic is straightforward because expanding access is itself an equity goal. The NDC 3.0 also encourages support measures to rapidly drive access, providing a concrete push rather than being wholly aspirational. However, there are limitations because the NDC 3.0 does not adequately balance income-related vulnerability and location-based disparities, without which universal access will be achieved heterogeneously across groups.

The expert judgment rated electricity accessibility fairness as low because of disparities in access across the country (as seen in the South-North access disparity), and suggests that access may remain low post-implementation, even as national targets become more ambitious. The implication is not that progress is impossible, but that achieving national access goals does not automatically resolve the "last mile" equity problem unless implementation is explicitly pro-poor and spatially targeted.

6.1.4 Affordability

The NDC 3.0 strongly frames the transition around affordable energy and improved access, and marks it as a planned area of action. However, there is a gap, as it does not specifically provide affordability targets or indicators, limiting clarity on what affordability will be measured against and tracked (e.g., energy-burden thresholds, lifeline tariffs, targeted subsidies, or service-quality-adjusted affordability). This gap weakens transparency and accountability because affordability is usually a strong pillar, and climate and energy-sector reforms become effective only when protections are explicit. Again, the vulnerability framing of the NDC is mostly income-based, while Nigeria's everyday affordability challenges also have a pronounced geographic dimension (where higher costs and lower service quality often coincide). For example, the Northern part of the country is significantly more burdened by both energy costs and limited access than the Southern region.

The analysis reflects the view that affordability is a strong constraint in Nigeria's transition corridor, and it manifests in tariff reforms, fuel price dynamics, and cost-recovery pressures that can disproportionately affect low-income households unless deliberate mitigation measures are scaled. In practice, an "affordable transition" requires more

than stating affordability as a principle; it requires measurable affordability metrics, credible and targeted support, and enforcement to prevent the amplification of energy cost burdens, especially for vulnerable groups.

6.1.5 Employment

The NDC 3.0 discusses job creation, particularly in off-grid solar and clean cooking value chains, and presents employment as a transition co-benefit. Employment is recorded as a planned thematic area, but there are no specific, quantified national targets for just-transition employment. This creates a fairness risk because it prioritises job creation over managing job displacement. The NDC's vulnerability lens here is more occupation-based, recognising that some livelihoods will be more exposed (especially fossil-based employment), but it stressed that impacts will also vary sharply by location, given the spatial concentration of oil and gas activities in the Niger Delta region, refining and logistics corridors, and regional labour market differences.

Distributive fairness is important in the area of employment, meaning that the benefits and burdens of transition jobs and job losses are evenly shared across society. The current situation is rated low based on the developed NDC assessment framework (please refer to the assessment scorecard), and it may remain so after implementation, because employment impacts are expected to be uneven across sectors and states, and because retraining and social protection systems are not yet comprehensive at the required scale. In addition, restorative fairness, which pertains to retraining programmes for affected workers and communities, is taken into account in employment decisions. The analysis suggests that elements of reskilling, upskilling, and transition support are present in policy narratives and programmes, but the post-implementation rating may be low, highlighting concerns that delivery capacity, funding, and coverage may not match the scale of disruption, particularly in regions and income groups that are already disadvantaged.

6.1.6 Regional Development

The NDC 3.0 intends balanced growth through resilient infrastructure and sectoral investments, but explicit regional equity targets are limited. The vulnerability emphasis of the NDC is location-based, which requires an appropriate definition of "balanced growth" in measurable terms, especially in a federation where subnational delivery capacity, infrastructure deficits, and exposure to climate hazards differ widely. It is also noted that income should be treated as a co-determinant of regional disadvantage, because poor households in economically disadvantaged states often experience compounded vulnerabilities.

Distributive fairness would mean that regions benefit similarly from transition-driven economic opportunities. The distributive fairness is currently rated low according to the developed NDC assessment framework and will potentially be low post-implementation, according to expert judgment, reflecting the expectation that benefits and burdens will remain uneven, for example, transition and legacy impacts in the Niger Delta will be high compared to other regions, and uneven infrastructure-driven opportunities elsewhere. Without explicit regional equity objectives, Nigeria risks a transition that creates some positive climate-aligned new growth while leaving historically disadvantaged areas behind.

6.1.7 Rights and Safeguards

The NDC 3.0 includes commitments around safeguards and stakeholder engagement, suggesting an intent to manage social risk. However, there are indications that the NDC does not explicitly include many rights-based targets or metrics to clarify standards of protection and accountability. It identifies project-affected communities as an explicitly recognised group, while highlighting the need to systematically consider physical conditions (e.g., people with disabilities, the elderly, or those with health vulnerabilities), since these conditions can be subject to heightened harm from displacement, pollution burdens, or service disruptions.

The rating for procedural fairness, i.e., whether individuals affected by energy projects have their rights safeguarded, is currently rated medium and may remain the same after implementation. This reflects the presence of safeguards

in principle (such as FPIC, EIA processes, and stakeholder engagement expectations), while recognising persistent variability in enforcement and the effectiveness of grievance mechanisms across projects. Broadly, the analysis suggests that Nigeria has building blocks to safeguard rights, but its fairness will depend on consistent application, independent oversight, and remedy when harm occurs.

6.1.8 Gender Equity

The NDC 3.0 treats gender as a cross-cutting issue and reflects gender-responsive considerations, but it provides no concrete targets. Gender is explicitly recognised as a vulnerability category, but it did not provide guidance on operationalising gender mainstreaming, such as defining what equitable participation and benefit-sharing look like (for example, women's access to clean cooking solutions, finance, training, or jobs in decentralised energy value chains). The analysis also indicated that income intersects with gender vulnerability in Nigeria and should be treated through a combined equity lens rather than as a separate approach (FGN, 2025).

The current gender equity ratings are generally medium, according to expert judgement, indicating that gender is acknowledged and there are opportunities for participation and benefit-sharing. However, post-implementation ratings indicate low, reflecting concern that gender commitments are not yet consistently translated into measurable outcomes, meaningful participation, and enforceable provisions across the federation, especially given the intersection of gender with income poverty and regional inequality.

6.1.9 Climate Alignment

The NDC 3.0 is comparatively strong on quantification because it sets economy-wide absolute emission reduction targets (29% by 2030 and 32% by 2035 relative to 2018) and situates these within a net-zero 2060 pathway aligned with the country's LT-LEDS. The vulnerable group framing here is more intergenerational and economy-wide, reflecting long-term equity reasoning. Be that as it may, the analysis shows that the distributional question, who pays, who benefits, and who is protected during transition shocks, remains elusive, which requires clearer specification, and income vulnerability remains a critical lens for translating national targets into socially durable policy.

In terms of climate alignment and intergenerational fairness, the assessment is more stable, with medium rates now and after implementation. Experts recognise that Nigeria's NDC 3.0 has clearer targets and a net-zero 2060 direction, which improves intergenerational signalling. However, the medium rating implies room for improvement because adequacy and fairness for future generations hinge on whether implementation is fully financed and delivered, and whether near-term burdens are managed in a way that does not transmit to compound medium-term and long-term burdens to maintain social legitimacy.

6.1.10 Health and Environment

The NDC 3.0 links climate action to health co-benefits and resilience, including targets for reliable access to clean energy in health facilities (such as primary, secondary, and tertiary care). The NDC provides records of both a plan and targets, and also points to support measures. The framing of health vulnerability centres on physical condition, with particular attention to the sensitivity of children, pregnant women, the elderly, and people with chronic illnesses to pollution and service disruptions. The framing is appropriate because health vulnerability is location-based in Nigeria, since hazard exposure, service deficits, and pollution loads vary across places. For example, air pollution exposure hazard from oil & gas exploration is dominant in the Niger Delta region of the country.

Distributive fairness in health and environmental exposure would imply equal exposure to pollution across the country. However, according to expert judgement, this is currently rated low and it is expected to remain low post-implementation, reflecting persistent spatial and socio-economic exposure differences (e.g., urban/industrial hotspots versus rural areas), and the expectation that while climate and energy actions could reduce overall

exposure, disparities are likely to remain due to shift in industry focus (e.g. oil & gas mining to critical mineral mining) unless policies explicitly target pollution burdens in the most affected communities.

6.1.11 Land Use, Rights and Restoration

The NDC 3.0 includes quantified AFOLU actions, such as reducing deforestation rates and scaling restoration/afforestation, which provide strong, planned, and targeted outcomes. Vulnerability is largely location-based, reflecting the spatial nature of forests, grazing lands, and land conflicts. At the same time, there are red flags for occupation because farmers, herdsmen, forest-adjacent communities, and informal natural-resource livelihoods can be directly affected by restoration rules, access restrictions, and land governance reforms.

The expert judgements on land use, rights and restoration are particularly cautionary. While current ratings are considered medium (suggesting that policy intent and institutional arrangements exist), post-implementation ratings move to low across distributive, procedural, and restorative fairness. This reflects concern that land governance challenges, land tenure system complexity, enforcement gaps, corruption (contested decision-making), and uneven subnational capacity may undermine both equity and effectiveness. In practice, restoration and land-use transitions can deliver strong benefits, but only if decision processes are legitimate, information is accessible, and remedies are balanced against social and cultural harms.

6.1.12 Biodiversity Safeguards

The NDC 3.0 captures biodiversity and ecosystems, but there are indications that specific safeguard targets are limited. The vulnerability emphasis remains location-based, which fits Nigeria's ecological diversity and hotspot pressures, but the analysis suggests that other vulnerable categories, such as indigenous/local knowledge holders, livelihoods dependent on ecosystem services, or communities exposed to conservation-development trade-offs, may need clearer recognition.

Procedural fairness for biodiversity safeguards, i.e. whether biodiversity impacts are evaluated, is rated medium both now and after implementation, according to expert judgement. This again reflects that processes exist (such as EIA requirements), but depth and enforcement vary by project and institution. The same "medium–medium" pattern appears for planning and policy participation and for participation in policymaking, suggesting that stakeholder engagement is recognised and participatory intent is present, but consistent inclusivity, transparency, and influence of disadvantaged groups could be strengthened.

6.1.13 Participation in Policy Making

It was acknowledged that stakeholder consultations and commitments to multi-stakeholder implementation are present in NDC 3.0, but have no quantified participation indicators. Stakeholders such as CSOs, private sector actors, and subnational entities are recognised, but without metrics, participation risks being treated as process compliance rather than a clearly measurable equity outcome (who participates, from where, how often, and with what influence). The analysis also highlights the importance of adding a gender lens to participation, given persistent barriers to meaningful representation.

6.1.14 Transparency and Oversight

The NDC 3.0 addresses transparency and MRV systems, yet explicit transparency key performance indicators (KPIs) are not detailed. Accountability systems are recognised as the relevant vulnerable category in this area, but transparency gaps often have distributional consequences, including when information is weak, it is harder for poorer and less powerful groups to contest exclusion, elite capture, or uneven project impacts. The recommendation is to also consider income as a practical equity lens for oversight.

The analysis flags persistent weaknesses in transparency and oversight as a fairness issue. Procedural fairness here is rated as medium now and after implementation, based on expert judgement. It points to improvements in reporting

and MRV systems, but risks remain, including corruption, uneven tracking of benefit allocation, and limited visibility into whether disadvantaged communities actually receive a fair share of transition benefits. This connects directly with the analysis's overarching warning that, without measurable equity metrics, targeted delivery, and enforceable oversight, fairness remains vulnerable to implementation gaps, arising from potential hijack by elites and powerful individuals in the country.

6.1.15 Synthesis of the NDC's Fairness

The fairness analysis of Nigeria's NDC 3.0 shows that the country's transition challenge is not only about emissions reduction but also about whether energy and climate reforms improve living conditions for ordinary households, e.g., by improving income and standards of living. The evidence points to persistent inequality in access to electricity, grid reliability, clean cooking, and affordability. Long outages, low access to clean cooking, and a high electricity cost burden for lower-income households all indicate that the poorest groups remain the most exposed to energy insecurity, as currently being experienced by the escalated energy prices caused by the US-Israeli war on Iran. At the same time, the NDC still do not consistently track fairness indicators such as labour displacement, upskilling and reskilling outcomes, women's participation, pollution exposure, biodiversity safeguards, cultural heritage protection, or the distributional effects of reforms. This means that while policy intent is increasingly justice-sensitive, accountability for who benefits and who bears the cost remains broadly weak.

The analysis indicates that NDC contains several positive fairness features, including support for universal electricity access, affordable energy, health co-benefits, land restoration, stakeholder engagement, and gender-responsive implementation, while also setting quantified emissions targets and aligning with the 2060 net-zero pathway provided by the LT-LEDS [14]. However, across most thematic areas, these commitments are not yet translated into measurable equity targets, explicit safeguards, or clearly defined support measures for vulnerable groups. In this regard, the NDC is stronger in stating fairness principles than in operationalising them. The main conclusion, reinforced by expert judgement, is that Nigeria's climate transition framework is directionally aligned with fairness principles in its narrative, but fragile in its distributional delivery, suggesting that the country's climate transition would be more credible and socially durable if it adopted clearer metrics for affordability, state/regional equity, worker transition, rights protection, participation, and transparency, backed by regular disaggregated reporting.

Table 2. Mapping of Fairness Key FindingsFeasibility

Thematic area	Main fairness finding	Key gap identified	Vulnerability lens most relevant
Reliability	Grid unreliability imposes real hardship on low-income households and small businesses	No explicit NDC reliability indicators, such as outage duration (SAIDI)/frequency (SAIFI)	Income, location
Electricity access	Universal access is clearly framed as an equity goal	Need stronger targeting of last-served and underserved communities	Income, location
Clean cooking	Very low access shows continued dependence on polluting fuels	Limited operational equity focuses on who benefits first	Gender, income
Affordability	Energy costs are burdensome for poorer households and small businesses	No specific affordability thresholds, palliative tariffs, or measurable protections	Income, location

Employment	Transition is framed as job-creating	No robust accounting for fossil-fuel job losses, re-employment, or upskilling/reskilling outcomes	Occupation, location
Regional development	NDC supports balanced development in principle	No clear regional equity targets or measurable definitions of "balanced" growth	Location, income
Rights and safeguards	Stakeholder engagement and safeguards are acknowledged	Weak rights-based targets and limited accountability standards	Project-affected groups, physical condition
Gender equity	Gender is recognised as cross-cutting	Few concrete targets for women's participation, finance, training, or benefit-sharing	Gender, income
Climate alignment	Strong on national emissions targets and net-zero alignment	Distributional fairness remains weakly specified	Intergenerational, income
Health and environment	NDC links climate action to health co-benefits	Need stronger place-based tracking of exposure and service inequality	Physical condition, location
Land use and restoration	AFOLU actions are among the better quantified areas	Limited clarity on how reforms affect land-based livelihoods	Location, occupation
Biodiversity safeguards	Ecosystems are recognised	Specific biodiversity safeguard targets remain limited	Location, ecosystem-dependent communities
Participation	Stakeholder consultation is acknowledged	No metrics on who participates, how often, or with what influence	Gender, subnational actors
Transparency and oversight	MRV and transparency are referenced	No detailed fairness KPIs or routine distributional reporting	Income, accountability systems

This section presents the narrative on whether Nigeria's climate commitments appear implementable under current political, fiscal, institutional, social, and technological conditions, using document-based evidence and expert judgement anchored in a developed assessment framework for feasibility, adequacy and fairness.

6.1.16 Feasibility Evidence Narrative

Nigeria's feasibility profile is broadly positive on political commitment and institutional architecture, with more mixed signals on financial depth, delivery capability, and policy execution consistency. Overall, the evidence suggests that Nigeria's NDC 3.0 is not presented as a standalone climate document, but as a development-facing transition plan that is increasingly embedded in national priorities, sector strategies, and governance systems, while still relying heavily on external finance and uneven implementation capacity.

The expert judgements present Nigeria's feasibility picture as a balance of credible national direction and persistent delivery constraints. Across the assessment themes, political, economic/financial, social, institutional, and technological dimensions, the ratings cluster around "moderate", signalling that enabling conditions exist and are

improving, but with several "weak" ratings concentrated in fiscal space, debt/FX constraints, and deep technological capability. In practical terms, the judgment is that Nigeria's NDC 3.0 and LT-LEDS are implementable in parts and directionally sound, but the pace and scale of delivery will depend on how the country manages affordability politics, macroeconomic shocks, financing gaps, technology sovereignty, and uneven institutional development.

6.1.17 Political Feasibility

The analysis finds clear alignment between NDC 3.0 and Nigeria's national development direction, as it is anchored in several national plans and documents, e.g., the PIA, ETP, LT-LEDS, Agenda 2050 and the Climate Act 2021. Nigeria has broad policy support for climate action and a strengthening governance narrative, but climate politics must compete with the immediate pressures of energy affordability, security, and macroeconomic stability. NDC 3.0 frames climate action as a pathway to deliver core development priorities, especially energy access, jobs, and resilience, and ties this logic to national planning instruments such as Agenda 2050 and the National Development Plan. This alignment reduces the risk that climate action is treated as an external agenda and instead positions it as a domestic strategy for prosperity and resilience [14] [12]. "Bipartisan support" is viewed as real but not unconditional, especially when reforms affect rents and prices (e.g., subsidies, tariffs, regulation), which can trigger backlash and heighten perceived electoral risks. In this sense, climate ambition is politically viable to the extent that it is framed and experienced as improving living standards, reliability, jobs, health, and food security, rather than increasing household costs.

It is obvious that Nigeria has a formal legal basis and coordinating institution to support implementation. The Climate Change Act (2021) provides the overarching governance framework [11], and the National Council on Climate Change (NCCC) serves as the operational coordinating body, well-positioned in the LT-LEDS [14]. This combination strengthens political feasibility by institutionalising coordination beyond electoral cycles and providing a platform for whole-of-government implementation. Stability across election cycles is also judged moderate, according to expert judgement. Commitments have strengthened through the net-zero pledge and the institutionalisation of coordination through the NCCC, but sustainability still depends on sustained reforms and reliable financing sources, particularly when administrations face fiscal tightening or competing crises. Leadership commitment is considered credible beyond rhetoric, but delivery risk remains material because implementation depends on constrained public budgets, uneven execution capacity, and the extent to which climate priorities survive budget cycles rather than remaining high-level commitments.

Climate salience is rated as moderate by expert judgment because it is most politically visible through everyday impacts of flooding, heat, food and livelihood stress, and through energy access and reliability concerns, but it is generally less salient as a standalone voting issue than the economy and security. Along the same lines, elite, business, and civil society buy-in is also moderate, as engagement is growing and private investment interest is emerging; nevertheless, oil-and-gas incumbency interests can slow reforms and shape the sequencing of implementation. Broadly, the expert view is that ambition is likely to persist through shocks, but may be moderated when inflation, food crises, or affordability pressures intensify unless policies are paired with visible protections for households and firms.

Nigeria's NDC 3.0 and LT-LEDS set out mitigation and adaptation measures across key sectors, including power, buildings and residential energy use, transport, oil and gas, agriculture, forestry and other land use, industry and waste, together with supporting implementation frameworks [14], [12]. Their delivery is further supported by sector-specific anchor documents, notably the Energy Transition Plan [13], the National Renewable Energy and Energy Efficiency Policy [23], the revised National Energy Policy [24], the Upstream Petroleum Decarbonisation Template [25] and the Electricity Act [26]. In addition, the Climate Change Act 2021, the National Council on Climate Change, the Carbon Market Activation Plan and alignment with broader national development plans provide legal, institutional, financial and sectoral mechanisms for implementation. These instruments strengthen the feasibility of

Nigeria's climate commitments by providing multiple and complementary policy levers, although their level of maturity, implementation quality and enforceability varies across sectors.

However, there is partial integration of climate priorities into sectoral plans. While integration is improving, especially around the energy transition narrative, methane and flaring, and nature-based solutions, execution varies across sectors and levels of government. This implies that feasibility is not mainly about the absence of plans, but about uneven translation of plans into implementable actions, funded programmes, enforceable regulations, and consistent delivery at the federal and state levels.

The review indicates visible endorsement through official policy signals in the leadership and framing perspectives; the net-zero 2060 pledge is reiterated. The NDC 3.0 strengthens the credibility of national intent by setting absolute targets and outlining an implementation framework advanced through national processes [12]. The NDC also frames climate action as both a national survival/resilience issue and an economic opportunity, linking it to energy access, jobs, health, and broader development, while situating Nigeria's actions within international commitments under the Paris Agreement.

6.1.18 Economic and Financial Feasibility

The analysis shows that NDC 3.0 explicitly identifies overall finance needs and discusses domestic versus international sourcing [12]. Nevertheless, it also highlights a major feasibility constraint, as ambition remains highly conditional on external finance, with the NDC indicating a mitigation ambition structure of 20% unconditional and 80% conditional components. This approach is feasible in principle, but it raises practical risks around timing, predictability, and absorptive capacity if external flows lag or come with constraints.

Domestic climate finance instruments are assessed as partial and evolving, especially from the domestic carbon market. The NDC asserts readiness for carbon market/carbon pricing approaches, as well as public finance reforms, but the pipeline is not yet presented as a mature, consolidated financing architecture. It therefore points to complementary domestic signals beyond the NDC/LT-LEDS, such as Nigeria's sovereign green bond framework and sustainable banking principles that guide environmental and social risk management, alongside ongoing carbon-market policy development [27] [28] [29].

Along the same line, the formal national climate finance strategy is rated as only partially effective. While mobilisation, budget alignment, and investment planning are acknowledged, details remain dispersed rather than consolidated into a single, clearly sequenced national strategy. National enabling instruments exist, including the DMO's green bond programme and sustainable banking principles [28], alongside broader policy guidance like the National Climate Change Policy 2021-2030 [15], but the overall architecture still reads as fragmented rather than fully integrated.

Feasibility is clearer for international finance because international support mechanisms are explicitly acknowledged as necessary enablers, and NDC 3.0 notes historical climate finance received while emphasising the need to scale access and absorptive capacity. This framing signals both demand (what is needed) and the realism of implementation (what capacity constraints exist).

The expert judgement rates Nigeria as weak in its freedom from austerity-style constraints. Even without a single label, Nigeria faces market-driven and debt-driven fiscal tightening pressures, with FX constraints and debt burdens limiting policy space. In this regard, the expert rates fiscal space under current debt conditions as weak, noting that debt service, subsidy legacies, and competing priorities (security, food, social services) constrain capital spending and reduce room for domestically financed transition investment. The share of revenue used for debt servicing is also assessed as weak, not because a single number is provided here, but because the structural implications are

clear, since debt service crowds out capital budgets, making concessional and external support central to scaling climate action.

The expert view is that reform progress has been made, but subsidy politics remains highly sensitive, especially where energy affordability and cost recovery are contested, and legacy effects persist in expectations and political bargaining. In this regard, domestic revenue mobilisation for climate is rated moderate, as reforms and market instruments can improve mobilisation, but the scale remains insufficient relative to the NDC's financing needs. Similarly, absorptive capacity is assessed as moderate because pipeline quality, project preparation, bankability, safeguards, and MRV are improving, but remain constraints on turning finance promises into implemented projects.

The expert judged the competing national budget priorities as moderate, security, inflation, jobs, health, and infrastructure dominate fiscal decisions, meaning climate measures must be framed as enabling these priorities to secure sustained allocations. The scale gap becomes most explicit when comparing NDC finance needs to national capital budgets. The judgement is weak, emphasising that public budgets alone cannot carry the transition; private and external finance are essential. On historical inflows versus projections, the rating is low because past inflows are far below projected needs, so scaling depends on stronger investment frameworks and de-risking approaches that attract private capital at scale.

Finally, the expert assesses dependence on fossil rents as moderate. Oil and gas remain economically important, creating transition risks and political sensitivities, but also offering near-term mitigation opportunities (e.g., methane abatement and flaring reductions) that can align environmental gains with operational improvements. Private investment in climate finance is also moderate, as investor interest exists (off-grid, renewables, gas-to-power transition options), but FX risk, policy uncertainty, and offtaker risk continue to hinder scale.

6.1.19 Social Feasibility

The analysis suggests that Nigeria's NDC and LT-LEDS social feasibility repeatedly emphasise social co-benefits, energy access, jobs, health outcomes, cleaner air, resilience, and livelihoods. These co-benefits are expressed through concrete examples such as renewable/off-grid electrification, clean cooking, transport measures, methane reductions, and nature-based solutions that generate jobs and health gains. In addition, the NDC 3.0 recognises stakeholder engagement by describing stakeholder consultations and validation processes in its preparation and commits to inclusive participation in implementation, including recognition of vulnerable groups and social safeguards. However, the social feasibility is not without friction. A national climate education/awareness programme is assessed as partial; capacity building and awareness actions are acknowledged, but a detailed, single, standalone national climate education programme is not available. Furthermore, while participation is supported by governance structures, legally enforceable participation mechanisms vary by sector and state, leading to uneven inclusivity in practice.

Social feasibility is shaped by a paradox because climate impacts are strongly socially experienced, yet political mobilisation is not consistently "climate-labelled." The expert judgement rates climate impacts as strong, with flooding, heat stress, and agriculture/livelihood impacts being everyday realities, while public awareness is moderate and rising, particularly after major extreme events, though it varies by region and education. Many people perceive impacts as real and immediate, but the connection with climate change can vary, so awareness is growing, but not always translated into sustained political pressure for climate policy as a discrete agenda.

Civil society mobilisation is judged moderate by the expert, with uneven reach and capacity. Media visibility is also moderate because coverage spikes only during disasters, while sustained discourse competes with security and economic news. Disaster response politics is rated moderate; responses are visible but often reactive, while policy framing increasingly links resilience to planning. Extreme events create political pressure indirectly, through food prices, displacement, and infrastructure damage, rather than through explicit climate protest movements.

The expert judgement indicates that explicitly climate-connected protests are weak because large-scale protests are more often tied to fuel prices and economic hardship. As a result, protest dynamics are rated as moderate in orientation; they tend to be equity- and affordability-driven, and climate policy becomes contested when it is perceived as raising costs. This underscores a central lesson in feasibility for Nigeria that the durability of climate policy is highly sensitive to whether it improves or worsens household affordability and livelihood security.

6.1.20 Institutional Feasibility

The review shows a presence of strong institutional fundamentals, the NCCC functions as the national coordinating body; the Climate Change Act provides the governance/legal framework [16]; and MRV and transparency arrangements are referenced alongside progress on reporting and strengthening MRV. However, subnational engagement and role clarity are assessed as only partially met. Subnational actors, including local government authorities, are recognised as implementers and referenced in whole-of-government approaches, but capacity is uneven, and operational role clarity and resourcing gaps can limit delivery.

Institutionally, the expert judgement remains mostly moderate, indicating real progress but persistent constraints. Actual authority for climate action is strengthened by coordination structures, but enforcement authority and resourcing constraints persist across MDAs, limiting consistent execution. Inter-ministerial coordination is improving but still fragmented, with overlapping mandates remaining a challenge. Technical competence exists in fragments, but gaps remain in modelling, MRV, project preparation, and state-level delivery, keeping the rating at moderate [14] [12].

MRV is judged moderate in practice by the expert, as processes are progressing (including reporting improvements), but data quality, institutionalisation, and sector coverage still require strengthening. Subnational implementation power is also considered moderate, as states have roles, but fiscal capacity and technical staffing vary widely, which shapes uneven delivery outcomes. This is reinforced by the judgment that mandates often exceed staffing and budgets; delivery depends on targeted capacity support and sustained financing [14]. Rule enforcement capacity is rated moderate but uneven because regulatory power and sanction capability vary by sector, and enforcement can be weak where monitoring and incentives are limited. Policy learning systems are also moderate, reporting and policy updates exist, but feedback loops into budgets and project design are still maturing.

6.1.21 Technological Feasibility

The analysis indicates that priority mitigation and adaptation technologies are clearly specified in NDC 3.0 and the LT-LEDS, covering renewables, grid and off-grid expansion, clean cooking, transport options (including electrification/CNG), efficiency, methane abatement, forestry restoration, and waste management. Enabling infrastructure needs are also explicitly recognised (power system investments, transport systems, MRV/data systems). Still, feasibility is rated as partial on innovation/R&D and incentives, including domestic innovation and manufacturing capacity-building, but scaling them remains constrained, and incentives/standards/financial levers exist but vary in coverage and enforcement.

Technological feasibility presents the clearest split between ambition and domestic capability. Domestic manufacturing depth for clean technologies is judged weak, reflecting limited industrial depth and continued import dependence. The technical workforce is assessed as moderate, reflecting gradual capacity growth but continuing shortages in power systems, EV value chains, and MRV/data capabilities. Technology transfer partnerships are also rated as moderate, indicating they exist, but localisation outcomes are uneven.

Project bankability is rated moderate, reflecting improvements in segments such as off-grid and renewables, but FX risk, tariffs, and offtaker risk constrain scale. Importantly, the review flags a contextual nuance: "bankability" is often defined through external (Western development-finance) logics that may not fully reflect the realities of developing economies, thereby shaping which projects get financed and on what terms. Electric vehicle (EV) [16] ambitions

relative to grid capacity are judged weak, reflecting that grid constraints and gaps in charging infrastructure mean progress remains at the infant stage. Renewable targets, compared to transmission investment, are rated moderate, which indicates that major transmission and distribution (T&D) upgrades are required, progress is ongoing, but it is currently insufficient relative to the scale of ambition.

On innovation climate systems, the expert judgement is moderate, indicating that innovation efforts exist, but that a scaled national green innovation system is still emerging. The shift from technology import to technology sovereignty is judged weak, highlighting that capability-building remains nascent and will require deliberate green industrial policy and finance.

6.1.22 Synthesis of the Feasibility

Across dimensions, the framework points to improving governance architecture (the Climate Change Act; the NCCC; strengthened MRV), clearer targets in NDC 3.0, and a maturing transition narrative. At the same time, feasibility remains tightly coupled to (i) fiscal/FX constraints and the scale of conditional finance; (ii) power-sector bankability, tariffs, losses, and network constraints; (iii) political economy of subsidy reforms and fossil incumbency; and (iv) uneven subnational delivery capacity and enforcement. Table 2 presents the key mapping and outcome of the feasibility narrative.

Table 3. Mapping of Nigeria's Feasibility Assessment Across Five Core Dimensions of Climate Implementation

Dimension	Evidence	Strength	Constraint
Political feasibility	Climate action is aligned with Agenda 2050, the National Development Plan, and the Energy Transition Plan, and is supported by the Climate Change Act and the NCCC.	Strong policy alignment, visible leadership commitment, and an established governance framework improve continuity across political cycles.	Affordability pressures, subsidy and tariff politics, and competing priorities such as inflation, security, and jobs may weaken momentum for implementation.
Economic and financial feasibility	NDC 3.0 identifies financing needs and recognises both domestic and international funding sources, supported by green bonds and sustainable finance initiatives.	Emerging climate finance instruments and reform efforts provide a foundation for mobilisation.	Heavy reliance on external finance, weak fiscal space, debt and FX pressures, and limited absorptive capacity constrain delivery at scale.
Social feasibility	The NDC and LT-LEDS emphasise jobs, energy access, health co-benefits, resilience, and stakeholder engagement.	Climate action is framed around tangible development gains that can strengthen public legitimacy and acceptance.	Public awareness, participation, and climate-labelled mobilisation remain uneven, while affordability concerns can trigger resistance to reforms.
Institutional feasibility	Nigeria has a formal legal and institutional architecture, including the Climate Change Act, the NCCC, MRV systems, and implementation roles	Strong institutional foundations and improved coordination provide a basis for implementation.	Role clarity, inter-ministerial coordination, subnational capacity, staffing, and enforcement remain uneven across sectors and states.

	across MDAs and subnational actors.		
Technological feasibility	NDC 3.0 and the LT-LEDS clearly identify priority technologies across energy, transport, methane abatement, AFOLU, and waste, along with enabling infrastructure needs.	Clear technology pathways exist, and capacity is gradually improving in selected areas, such as off-grid and renewable energy.	Domestic manufacturing depth is weak, technical skill gaps persist, and grid, charging, finance, and innovation systems remain insufficient for large-scale transition.

6.2 Adequacy

Adequacy narrative is based on the assessment of the extent to which Nigeria's climate plans and current policies collectively drive the system and sector transformations required for a development-compatible pathway toward net-zero by 2060, beyond headline emission targets.

6.2.1 Coverage of Long-Term Transformations in National Plans

Nigeria's NDC 3.0 and LT-LEDS cover many of the core transformations needed across energy and land-use systems, but readiness remains uneven. In several areas, the commitments remain strategic or under-specified, particularly where delivery depends on large, coordinated infrastructure investments, deep institutional enforcement, or industrial options that require pilots and enabling ecosystems.

6.2.2 Transport Sector

In passenger transport, there is a relatively clear policy intent to promote integrated, transit-oriented mobility and a modal shift toward mass transit, including BRT and metro-type systems, to reduce passenger transport emissions. The policy intent is in the right direction if cities can deliver reliable, affordable mass transit, emissions and congestion can fall, while equity improves. However, the delivery strategy is heavily dependent on city-level financing and execution capacity, which makes the implementation pathway uncertain across different urban centres in the country. Closely linked to this, Nigeria also intends to incentivise collective transport by improving mass transit services; again, the direction is explicit, but the main risks are scale-up, service quality, and sustaining operations beyond pilot corridors.

There is a mixed picture for freight, as Nigeria includes circular economy ideas as a cross-cutting theme to improve material flows and logistics efficiency, but implementation remains at an infant stage and fragmented, suggesting a gap between concept and systems-level execution. More importantly, there are two striking omissions in the NDC/LT-LEDS [14] [12], namely, a non-explicit mention of local and regional supply chains development as a mitigation transformation, and neither is a clear freight modal shift toward rail and inland waterways/coastal transport framed as an NDC mitigation action. These are important missed opportunities because supply chain localisation and freight modal shift can reduce emissions, strengthen domestic industry, and lower logistics costs, but they are not articulated as core transformations within the NDC and the LT-LEDS.

Furthermore, transport electrification is clearly present in the NDC for both passenger and freight segments. However, it is still largely partial/early-stage, as targets are stated, but adoption will depend on vehicle affordability, the rollout of charging infrastructure, and improvements in electricity reliability and distribution capacity. In the same manner, cleaner fuels like biofuels for hard-to-abate segments (aviation and maritime) are mentioned, but the operational pathway is thin, as there is limited detail on production scale, supply chains, standards, and blending mandates that would make this actionable at scale.

Generally, the transport sector has a strong intent on transformative passenger mobility. However, there are gaps in freight modal shift and supply chain transformation.

6.2.3 Building Sector

In the buildings sector, Nigeria's NDC 3.0 is comparatively comprehensive in listing transformations. It includes bioclimatic and energy-efficient building envelopes, as well as efforts to improve overall building energy performance. The key challenge in the building sector is not whether the intent exists, but whether the country can consistently enforce building codes, standards, and inspection systems, and mobilise retrofit finance, particularly in commercial buildings.

The NDC supports energy-efficient appliances and equipment, lighting, cooking, heating, and cooling across residential and commercial contexts. The practicality of the ambition hinges on standards, labelling, compliance mechanisms, and market incentives that shift consumer and supplier behaviour, otherwise appliance efficiency will remain policy text rather than market transformation. The NDC and LT-LEDS emphasised low-energy lifestyles and behavioural change through awareness and capacity building, but the reality suggests that scalable, institutionalised programmes are limited, particularly for commercial buildings, where ambition appears aspirational rather than strategic.

On electrification in buildings, there is strong policy direction, as electrifying appliances, clean cooking transitions, and renewable-based appliances (including efficient electric options and renewable-based solutions) are clearly present in both the NDC and the LT-LEDS. However, the implementation is still partial or in its early stages, with affordability and supply chains as binding constraints, especially in residential clean cooking, where the transition is sensitive to upfront costs, fuel availability, and last-mile distribution.

6.2.4 Industry Sector

In industry, energy-intensive sectors are addressed through efficiency and fuel-switching measures, as well as through circular-economy approaches, namely material substitution and process efficiency. These can be considered as the "near-term feasible" levers, as they can be implemented incrementally and deliver emissions reductions even under constrained infrastructure. However, there are indications that implementation remains partial and in an early stage, and is tightly dependent on industrial investment conditions and energy reliability, which remain constraints.

The decarbonisation of industry is associated with adequacy risks, with the greatest adequacy risk in the truly deep decarbonisation options for heavy industry, new processes, and CCS, as well as longer-term electrification or advanced options such as renewable hydrogen pathways. Although these appear in the documents (mainly in the LT-LEDS), they remain mostly strategic and longer-term, with limited evidence of pilots, enabling infrastructure, or industrial policy mechanisms needed to move from intention to deployment. It can be positioned that the documents cover the transformation of the industry to a low emissions pathway, but readiness is not yet fully developed.

For light industries, a similar pattern exists, with policy intent focused on efficiency and electrification, including renewable power and cleaner self-captive generation targets, but evidence of scaled implementation remains limited in the documents, and delivery depends on SME finance, standards, and reliable power supply.

6.2.5 AFOLU and Land-use Sector

Nigeria's NDC and LT-LEDS include a broad set of measures, which include improved forest management and restoration, climate-smart agriculture practices to enhance soil carbon, and agroforestry/integrated land management approaches. Across these, the implementation reality is frequently partial or in the early-stage, as pilots exist, but scaling requires extension services, land governance clarity, incentives, and predictable funding. This underlines that AFOLU success is less about policy listing and more about the everyday institutional machinery, namely land tenure systems, enforcement, extension, and monitoring.

The NDC and LT-LEDS submissions have clear gaps for certain land categories. For example, peatland protection is not explicitly detailed as a mitigation action, and neither is limiting the conversion of natural or agricultural land into built-up urban areas framed as an explicit mitigation target. Given Nigeria's rapid urbanisation pressures, this is a meaningful omission because land conversion patterns can lock in emissions and reduce future adaptation capacity.

On agriculture and livestock, many measures are included, such as livestock methane management and breeding/practice improvements, rice variety shifts and management practices, and fertiliser optimisation and sustainable fertilisation practices. However, implementation evidence is frequently limited, and scaling would require farmer support systems, irrigation and water management, input market reforms, extension services, and stronger measurement/MRV, conditions that are not trivial to establish nationwide.

6.2.6 Overall Adequacy Observation

Putting these pieces together, the overall observation is that Nigeria's NDC 3.0 and LT-LEDS provide broad transformation coverage, especially in passenger transport, building efficiency, clean cooking, methane/flaring, forest management, and climate-smart agriculture. However, the most difficult transformations, freight modal shift, supply-chain restructuring, deep industrial decarbonisation, urban land-use control, and scaled behavioural programmes, are either missing, not framed as core transformations, or remain strategic with limited operational detail (see Table 3 for the adequacy mapping). This is why adequacy for Nigeria will ultimately depend less on the completeness of the list and more on whether the country can build the delivery systems, finance, enforcement, infrastructure, and institutional coordination that convert commitments into measurable outcomes.

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7 Senegal

7.1 Fairness

7.1.1 Introduction: Distributional Dimensions of Climate and Energy Transitions

Climate and energy policies in Senegal generate significant distributional consequences across households, regions, sectors, and social groups. While these policies are increasingly framed as essential for sustainable development, energy security, and climate resilience, they also produce winners and losers in both the short and long term. The political economy of climate action is therefore deeply shaped by questions of fairness, affordability, and social legitimacy (World Bank, 2023; Sénégal CDN, 2020).

In Senegal, where poverty levels remain significant, and many households' face income instability, inflationary pressures, and rising food and energy costs, the distribution of transition costs is politically sensitive (ANSD, Statistical Data and Reports, 2023; IMF, 2024). Energy affordability in particular has become a recurring source of social concern, especially in urban areas such as Dakar, Pikine, and Guédiawaye, where electricity consumption is structurally higher due to urban lifestyles and economic concentration.

At the same time, climate and energy transitions are expected to generate long-term benefits, including improved energy access, reduced dependence on imported fuels, and expanded renewable energy capacity (IRENA, 2023). However, these benefits are not evenly distributed across regions or social groups, raising important concerns about equity and inclusion.

7.1.2 Distribution of Costs and Benefits of the Energy Transition

Short-term costs and social sensitivity

The short-term costs of climate and energy reforms are often borne by low- and middle-income households, transport users, and small enterprises. Electricity tariffs, fuel prices, and transport costs remain highly sensitive political variables (MONETARY FUND, 2024; World Bank, 2023).

For example, any adjustment in fuel prices directly affects informal transport operators (e.g., "car rapide" and taxi sectors), which employ thousands of workers in urban areas. Similarly, electricity tariff adjustments disproportionately affect households already facing budget constraints due to inflation in food and basic goods.

In response to such pressures, the government has periodically relied on mitigation measures such as subsidies and targeted tariff adjustments. For instance, in January 2026, Senegal introduced a 10% reduction on the first electricity tariff block, benefiting over 2.6 million customers, including both prepaid (Woyofal) and postpaid consumers (Senelec, 2026). This measure reflects the political sensitivity of energy affordability and the need to maintain social stability while pursuing energy reforms.

Uneven distribution of benefits

While climate investments are expanding, their benefits are unevenly distributed. Urban populations, industrial actors, and formal enterprises are often the primary beneficiaries of improved electricity infrastructure and renewable energy investments.

Projects such as the Taiba N'Diaye wind farm and large-scale solar plants (e.g., Bokhol, Malicounda, Kahone) have strengthened national generation capacity, but the immediate benefits are concentrated in grid-connected urban and peri-urban zones. Rural electrification is progressing but remains uneven in coverage and reliability (ASER, 2024).

In contrast, rural communities—particularly in regions such as Matam, Kolda, and Tambacounda—often experience slower infrastructure project implementation and weaker institutional presence. This spatial inequality reinforces existing development gaps between Dakar and the rest of the country.

Renewable Energy and Structural Inequalities

Renewable energy development in Senegal offers important long-term benefits, including lower electricity generation costs, improved energy security, and expanded access to electricity. Projects such as the Taïba Ndiaye Wind Farm and several solar power plants have strengthened the national electricity system and supported the country's energy transition.

However, the benefits of these investments are not distributed equally. In the short term, renewable energy projects mainly benefit:

- international investors and development finance institutions,
- foreign or national engineering and infrastructure companies,
- urban, industrial, and commercial consumers already connected to the grid (AfDB, 2022; World Bank, 2023).

Many rural and low-income populations still face limited electricity access due to inadequate transmission infrastructure, high connection costs, and affordability constraints (ASER, 2024; World Bank, 2023). Regions such as Kédougou, Tambacounda, and parts of Casamance continue to experience energy poverty despite national progress in renewable energy generation. As a result, renewable energy expansion may improve national indicators while reproducing existing territorial and socio-economic inequalities.

Structural inequalities also appear in terms of employment and economic participation. Most high-value activities related to renewable energy projects—such as equipment manufacturing, advanced engineering, and project financing—are often carried out by foreign actors, while local employment is largely limited to temporary construction jobs (IRENA, 2023). In addition, large-scale renewable energy projects can create tensions around land use and community participation if local populations are not adequately consulted or compensated.

A fair industrial decarbonization pathway in Senegal must go beyond reducing greenhouse gas emissions and explicitly address the distribution of costs, benefits, and opportunities associated with the transition. As the country pursues industrialization through renewable energy and low-carbon technologies, policies should ensure that no social group or economic sector is disproportionately burdened. This requires integrating equity considerations into industrial and energy planning by promoting local value creation, decent employment, skills development, and broad access to affordable clean energy.

In this context, public policies should support rural electrification, decentralized renewable energy systems, targeted subsidies for low-income households, local content requirements, vocational training for technicians and engineers, and participatory decision-making processes involving affected communities. Such measures can strengthen domestic industrial capabilities while ensuring that the benefits of decarbonization are shared across society.

Initiatives implemented by the Senegalese Rural Electrification Agency (ASER) demonstrate how expanding access to renewable energy can contribute to reducing territorial and socio-economic disparities. More broadly, Senegal's experience highlights that industrial decarbonization is not inherently equitable. Achieving a truly just transition requires coherent governance frameworks that align climate objectives with industrial development, social inclusion, and regional equity, thereby avoiding the reproduction or exacerbation of existing inequalities.

7.1.3 Inequalities and Social Vulnerability

Regional inequalities

Senegal exhibits persistent territorial disparities. Dakar concentrates a disproportionate share of economic activity, infrastructure, and public investment, while peripheral regions face structural deficits in services and employment opportunities.

Climate impacts further amplify these disparities. Rural regions are more exposed to droughts, floods, and agricultural variability, while having lower adaptive capacity due to limited infrastructure and weaker state presence (IPCC, 2022; Senegal, 2022).

Rural vulnerability and agricultural dependence

Rural populations remain particularly vulnerable because of their dependence on rain-fed agriculture. Climate shocks—such as droughts in the Sahelian zone or flooding along river basins—have direct impacts on livelihoods, food security, and rural incomes (FAO F. a., 2023; Senegal CSE, 2022).

For example, in riverine zones, flooding events can destroy entire agricultural seasons, while droughts reduce yields and livestock productivity. These shocks disproportionately affect poor households that lack savings, insurance, or access to credit.

Gender Dimensions of Climate Vulnerability

Gender inequalities strongly influence climate vulnerability in Senegal, particularly because women are highly involved in climate-sensitive activities such as small-scale agriculture, food processing, informal trade, household energy management, and local market systems (UN Women, 2022; FAO F. a., 2023). As a result, women are disproportionately affected by droughts, irregular rainfall, environmental degradation, and energy insecurity.

In rural areas, women often depend on rain-fed agriculture and natural resources for household livelihoods. Climate change reduces agricultural productivity and increases food insecurity, especially in vulnerable regions such as the Groundnut Basin, Casamance, and the Senegal River Valley. Women are also heavily impacted by fuelwood scarcity, as they are primarily responsible for collecting biomass for cooking. Deforestation and environmental degradation force them to travel longer distances, increasing physical burdens and reducing time available for education or income-generating activities.

Women engaged in informal trade and food processing are additionally affected by flooding, heatwaves, coastal erosion, and disruptions in agricultural and fisheries value chains. However, despite their key role in household and community resilience, women often face limited access to land ownership, financial services, modern technologies, and decision-making processes, which constrains their adaptive capacity (UN Women, 2022; UNDP U. N., 2022).

To reduce gender-related climate vulnerability, Senegal is beginning to implement inclusive policies that improve women's access to land, finance, clean energy technologies, climate change adaptation programs, and governance. Supporting women-led initiatives in renewable energy and climate resilience can significantly contribute to social equity and sustainable development.

Youth unemployment and social pressure

Youth unemployment remains one of the most politically sensitive issues in Senegal. The labour market struggles to absorb a rapidly growing youth population, particularly in urban areas (ILO, 2024).

Climate policies that do not generate visible employment opportunities risk undermining social acceptance. Conversely, green economy initiatives—such as solar installation, energy efficiency programmes, and climate-smart agriculture—are increasingly seen as potential job creation avenues, though still limited in scale (IRENA, 2023).

7.1.4 Social Protection and Compensation Mechanisms

Existing policy instruments

The Senegalese government has implemented a range of social and resilience-oriented programmes, including:

- rural electrification initiatives (ASER-led programmes),
- agricultural input subsidies and climate-resilient farming support,
- cash transfer programmes for vulnerable households,
- adaptation projects funded by international partners,
- energy access expansion through grid extension and off-grid solutions.

These interventions aim to reduce vulnerability and improve access to essential services.

Absence of a structured "just transition" framework

Despite these initiatives, Senegal does not yet have a fully institutionalised just transition framework comparable to those in some OECD countries (OECD O. f.-o., 2023). Compensation mechanisms are often fragmented, project-based, and dependent on donor financing.

This limits their ability to systematically address distributional losses arising from energy pricing reforms or structural shifts away from fossil fuels.

Role and limitations of subsidies

Historically, fuel and electricity subsidies have functioned as indirect social protection instruments. They help stabilise consumer prices but also create fiscal pressure and inefficiencies.

Moreover, subsidies tend to disproportionately benefit higher-income urban households, which consume more electricity and fuel. This raises concerns about regressive distributional effects.

7.1.5 Political Narratives Around Fairness

Fairness is central to political discourse on climate and energy in Senegal. Government narratives consistently frame climate action as part of:

- poverty reduction strategies,
- energy access expansion,
- national resilience building,
- sustainable development planning (Sénégal CDN, 2020).

Public discourse also strongly emphasises the notion of low historical responsibility for greenhouse gas emissions. Senegal, like many African countries, positions itself as a climate-vulnerable nation with minimal contribution to global emissions.

Civil society and political elites frequently argue that:

- industrialised countries bear primary responsibility for mitigation,
- international climate finance should be predictable and scaled up,
- technology transfer is essential for low-carbon development pathways.

At the domestic level, fairness debates are strongly linked to:

- electricity affordability,
- transport costs,
- food prices,
- regional inequality,
- employment creation.

Public acceptance of climate policies tends to increase when tangible development benefits are visible (e.g., electrification, infrastructure, jobs).

7.1.6 Procedural and Participatory Dimensions

Formal inclusion mechanisms

Senegal has made progress in integrating participatory approaches into climate governance. Consultations are often conducted in:

- national adaptation planning processes,
- donor-funded climate programmes,
- sectoral policy development,
- NDC and long-term strategies development,
- environmental impact assessments.

Civil society organisations and technical partners are frequently involved.

Persistent limitations in practice

However, participation remains uneven. Key challenges include:

- centralised decision-making structures,
- limited voice for informal workers and rural communities,
- technical complexity of climate policy processes,
- weak decentralisation capacity.

Local governments often lack financial and human resources to effectively implement climate policies.

7.1.7 International Fairness Framing

Senegal's climate diplomacy is strongly rooted in the principles of equity and climate justice, with the country consistently emphasizing its very low historical contribution to global greenhouse gas emissions despite its high vulnerability to climate change impacts such as droughts, coastal erosion, flooding, and food insecurity. In international climate negotiations, Senegal advocates for greater access to climate finance, technology transfer, and capacity building in order to support adaptation and low-carbon development pathways while preserving national development priorities. Within this framework, the country's mitigation and adaptation commitments are frequently presented as conditional upon adequate international support, reflecting the broader political economy reality that ambitious climate action in Senegal largely depends on external financing, concessional resources, and international partnerships (UNFCCC U. N., 2023; IPCC, 2022).

7.2 Feasibility

Senegal's climate commitments are embedded within a broader national development framework that seeks to reconcile economic growth, industrialisation, energy access, social stability, and climate resilience. The revised Nationally Determined Contribution (NDC) is closely aligned with the country's long-term development agenda under the National Transformation Agenda – Vision Sénégal 2050, as well as with sectoral strategies related to energy, agriculture, water management, infrastructure, and industrial development (Sénégal CDN, 2020). In this context, climate action is increasingly framed not only as an environmental necessity but also as an opportunity to strengthen energy security, modernise the economy, create employment, and enhance resilience to climate shocks (Bank, 2022; IEA, 2023). This integration of climate objectives into national development planning significantly enhances the political feasibility of Senegal's climate agenda.

From a political perspective, Senegal has consistently demonstrated support for international climate cooperation and multilateral environmental governance. Successive governments have reaffirmed their commitment to the Paris Agreement, climate adaptation, and low-carbon development pathways through official policy documents, active participation in international climate negotiations, and engagement in initiatives such as the Just Energy Transition Partnership (JETP) (UNFCCC, 2021; IEA, 2023). Climate issues are increasingly presented in official discourse as matters of economic competitiveness, national resilience, and energy sovereignty rather than solely environmental

concerns. This framing contributes to strengthening political legitimacy and public acceptance of climate policies (IEA, 2023).

However, the long-term credibility and sustainability of Senegal's climate commitments remain conditioned by broader political and socio-economic dynamics. The country continues to face persistent challenges related to youth unemployment, inflationary pressures, poverty reduction, and social inequalities, all of which compete for political attention and fiscal resources (World Bank, 2023). Electoral cycles and political transitions may also influence the pace and prioritisation of climate reforms. During periods of economic or social stress, authorities may prioritise short-term affordability and social stability over long-term decarbonisation objectives, particularly when climate measures involve subsidy reforms, taxation adjustments, or increases in energy prices (IMF, 2024).

Institutionally, Senegal possesses one of the most structured climate governance systems in West Africa, reflecting more than two decades of engagement in international climate diplomacy and environmental policy reform (UNDP U. N., 2022). The Ministry of Environment and Ecological Transition (METE) plays the central coordinating role in climate policy formulation, NDC implementation, and international climate negotiations. The ministry oversees national climate strategies, environmental regulation, and coordination with international frameworks under the United Nations Framework Convention on Climate Change (UNFCCC). In parallel, several sectoral ministries contribute directly to mitigation and adaptation implementation, including ministries responsible for energy, transport, agriculture, water resources, urban planning, finance, and territorial governance.

Climate governance is further reinforced by institutional coordination mechanisms such as the National Climate Change Committee (COMNACC), which serves as a multi-stakeholder platform bringing together public institutions, civil society organisations, universities, research centres, private sector actors, and technical and financial partners. This mechanism has contributed to strengthening dialogue on climate adaptation, mitigation priorities, and climate finance mobilisation. Senegal has also established sectoral and territorial climate focal points aimed at mainstreaming climate considerations across ministries and local governments. In addition, national research institutions and specialised agencies working on meteorology, agriculture, and energy planning increasingly support evidence-based policymaking through vulnerability assessments, emissions inventories, and climate modelling exercises.

Senegal's institutional architecture has also been strengthened through the adoption of several major policy frameworks, including the National Adaptation Plan (NAP), the National Climate Change Strategy, and the Long-Term Low-Emission and Climate-Resilient Development Strategy (LT-LEDS), developed in alignment with the Paris Agreement and national development priorities (UNDP, 2026; Platform, 2023). Climate considerations have progressively been integrated into broader national planning frameworks such as Vision Sénégal 2050 and the Stratégie Nationale de Développement 2025–2029, which emphasize sustainable industrialization, renewable energy expansion, territorial resilience, and inclusive economic transformation (Senegal 2050, 2024a; SND, 2024b). Furthermore, partnerships with international institutions such as the Green Climate Fund (GCF), the World Bank, the African Development Bank, FAO, and UNDP have strengthened technical capacities and supported the implementation of renewable energy, adaptation, and resilience-building programmes across key sectors including agriculture, energy, and water management (FAO., 2025; UNDP., 2021; World Bank., 2022a).

Despite these advances, important institutional capacity constraints continue to limit implementation effectiveness. Coordination among ministries and public agencies remains fragmented, with overlapping mandates, administrative silos, and insufficient inter-sectoral integration (OECD, 2022). Climate objectives are not always fully aligned with investment priorities, particularly in sectors associated with industrialisation, urbanisation, transport expansion, and fossil fuel exploitation. While strategic frameworks are relatively well developed at the national level, the translation of climate commitments into operational programmes remains uneven across sectors and territories. Some

ministries benefit from stronger technical capacities and donor support, whereas others continue to face staffing shortages, insufficient training, and limited budget allocations for climate-related activities (UNDP U. N., 2022).

Monitoring, Reporting and Verification (MRV) systems also remain underdeveloped. Data collection mechanisms are fragmented across institutions, and sectoral emissions data are often incomplete or outdated, complicating the monitoring of implementation progress and compliance with international reporting obligations under the Paris Agreement (UNEP, 2023). These limitations are particularly acute in sectors such as agriculture, forestry, waste management, and informal urban transport, where weak statistical systems and the predominance of informal economic activities reduce data reliability. The absence of harmonised climate indicators and integrated digital monitoring systems further constrains evidence-based decision-making and long-term planning.

At the subnational level, local governments are expected to play an increasingly important role in adaptation planning and resilience-building, especially given Senegal's exposure to coastal erosion, flooding, droughts, desertification, and water stress (World Bank, 2021). However, decentralisation processes have not always been accompanied by adequate financial transfers or institutional strengthening. Many municipalities lack the technical expertise, planning tools, engineering capacities, and financial resources necessary to operationalise adaptation measures effectively. This challenge is particularly evident in vulnerable rural areas where local authorities face difficulties implementing climate-resilient agriculture, water management, and disaster risk reduction programmes without sustained external support (UNDP U. N., 2022). Major urban centres such as Dakar and Touba also face increasing governance pressures linked to rapid urbanisation, informal settlements, infrastructure deficits, and flooding risks, all of which complicate climate adaptation planning.

Beyond formal institutions, informal political and economic dynamics also shape climate and energy policy outcomes in Senegal. Decision-making processes in strategic sectors such as hydrocarbons, mining, and infrastructure development are often influenced by political bargaining, elite networks, and relationships between state institutions, politically connected business groups, and international. The recent development of offshore oil and gas projects, including the Greater Tortue Ahmeyim (GTA) and Sangomar fields, has increased the strategic importance of the extractive sector within national development planning (IEA, 2023). Although these projects are presented as opportunities for economic transformation and energy sovereignty, they also create tensions between climate commitments, industrialisation ambitions, and short-term fiscal priorities.

These governance dynamics may slow reforms, reinforce policy inconsistencies, and create implementation gaps between official climate commitments and actual outcomes. Although Senegal demonstrates relatively strong institutional ambition and international engagement compared with several regional peers, the effectiveness of climate governance ultimately depends on improved coordination, stronger local implementation capacities, enhanced transparency and accountability mechanisms, and the systematic integration of climate objectives into broader economic decision-making processes (OECD, 2022).

Economic and financial feasibility remains one of the main constraints affecting the implementation of Senegal's climate commitments. The revised NDC explicitly distinguishes between unconditional targets financed through domestic resources and more ambitious conditional targets dependent on external financial assistance (UNFCCC, 2021). This distinction reflects the structural limitations of Senegal's fiscal capacity and the high costs associated with climate adaptation, renewable energy deployment, resilient infrastructure, coastal protection, sustainable agriculture, and water resource management (World Bank., 2022a).

Over the past decade, Senegal has pursued an ambitious public investment strategy aimed at accelerating structural transformation through large-scale infrastructure projects implemented under successive national development plans. Under the previous administration, this strategy was mainly guided by the Emerging Senegal Plan (PSE), which

prioritised transport infrastructure, urban modernisation, energy expansion, industrial zones, and hydrocarbon development as key drivers of economic growth and competitiveness.

Under the current government, this orientation is being redefined through the National Transformation Agenda – Vision Sénégal 2050, which seeks to strengthen economic sovereignty, improve fiscal discipline, promote local value addition, and address structural imbalances in previous development models (Senegal 2050, 2024a). While infrastructure development remains central, the new agenda places greater emphasis on domestic resource mobilisation, public financial governance, and more selective investment prioritisation. In principle, this policy shift aims to better align economic transformation with fiscal sustainability, social inclusion, and long-term climate resilience objectives.

Nevertheless, Senegal continues to face substantial fiscal constraints linked to the cumulative effects of past investment cycles. Large-scale infrastructure and energy projects have contributed to rising public debt levels and growing debt servicing obligations, thereby reducing fiscal space for climate investments and social spending (IMF, 2024). These pressures have been compounded by recent concerns regarding debt transparency and public financial management, which have increased scrutiny from international financial institutions and investors.

The controversy surrounding Senegal's public debt reporting, often referred to as the "hidden debt" issue, has further complicated the financing environment following the political transition of 2024 (IMF, 2024). Audits reportedly revealed discrepancies in the reporting of public liabilities and budget deficits, raising concerns among development partners and financial institutions. Such uncertainties may weaken investor confidence, increase borrowing costs, and potentially delay access to concessional financing required for climate adaptation and energy transition projects.

At the same time, Senegal faces mounting expenditure pressures related to food insecurity, rising living costs, youth unemployment, social protection needs, and vulnerability to climate shocks such as droughts, floods, and coastal erosion (World Bank, 2023). These overlapping pressures create difficult trade-offs between short-term socio-economic stabilisation and long-term climate objectives. In practice, climate investments often compete with urgent public spending priorities in sectors such as energy subsidies, healthcare, transport, and education.

Although Senegal has established several domestic financing mechanisms for climate-related sectors, available resources remain insufficient relative to estimated investment needs. Climate-sensitive sectors therefore continue to depend heavily on international grants, concessional loans, and donor-supported programmes (UNEP, 2023). Furthermore, access to international climate finance remains institutionally demanding due to complex administrative procedures, project preparation requirements, and limited technical capacities within public institutions.

Despite these constraints, Senegal continues to position itself as a proactive actor in international climate diplomacy and green investment promotion. The country has successfully attracted support from institutions such as the Green Climate Fund, the World Bank, the African Development Bank, and bilateral development partners for renewable energy, adaptation, and resilience-building initiatives (GCF, 2023). The rapid expansion of solar and wind infrastructure demonstrates Senegal's ability to mobilise external investment under favourable conditions. However, sustaining and scaling up these efforts will largely depend on restoring macroeconomic credibility, strengthening fiscal transparency, improving debt governance, and maintaining investor confidence.

The Just Energy Transition Partnership (JETP) also represents an important opportunity to mobilise large-scale financial and technical support for Senegal's energy transition (IEA, 2023). However, the effectiveness of such initiatives will depend on the country's ability to prepare bankable projects, strengthen institutional transparency,

improve procurement systems, and ensure efficient project implementation. Delays, governance weaknesses, or administrative bottlenecks could reduce donor confidence and limit future access to climate finance.

Finally, vested economic interests continue to shape the feasibility of Senegal's climate transition. Recent offshore oil and gas discoveries have strengthened expectations regarding economic growth, industrialisation, export revenues, and energy sovereignty. The government presents natural gas as a transition fuel capable of supporting electricity generation and industrial development while gradually expanding renewable energy production (IEA, 2023). However, this strategy also illustrates the inherent tension between Senegal's decarbonisation commitments and its broader development and industrialisation ambitions.

7.3 Adequacy

Senegal's climate policy framework has progressively evolved over the past decade through successive updates of its Nationally Determined Contributions (NDCs), the development of sectoral climate strategies, renewable energy roadmaps, and adaptation policies. The country situated climate action within a broader sustainable development agenda that prioritises poverty reduction, expanded energy access, economic diversification, food security, and enhanced territorial resilience. As a lower-middle-income country highly vulnerable to climate change, Senegal seeks to reconcile decarbonisation ambitions with pressing socio-economic development imperatives.

The analysis below draws on the underlying analytical framework used in the assessment tool to examine the extent to which Senegal's national climate framework integrates the structural transformations required for a long-term transition toward net-zero emissions. It further assesses whether current national policies sufficiently address entrenched structural constraints, accelerate the deployment of low-carbon solutions, and effectively manage the socio-economic implications associated with the ecological transition.

Overall, Senegal's climate framework reflects a growing acknowledgement of the need for deep structural transformation across the energy, land-use, and agricultural sectors. However, implementation remains uneven and is constrained by limited access to finance, institutional capacity gaps, infrastructure deficits, technological dependence, and competing development priorities, notably in relation to the expansion of fossil gas.

7.3.1 Key National Long-Term System Transformations

Transformations Supporting a Progressive Reduction in Fossil Fuel Dependence

Senegal's long-term climate and development strategies increasingly acknowledge the need for a structural transformation of the national energy system in order to reduce vulnerability to imported fossil fuels, strengthen energy security, and align economic development with climate objectives. This orientation is reflected in the updated Nationally Determined Contribution (NDC), the Long-Term Low-Carbon and Climate-Resilient Development Strategy (LT-LEDS), the Plan Sénégal Émergent and the Agenda National de Transformation Sénégal 2050, all of which emphasize renewable energy deployment, electricity access expansion, energy efficiency, and infrastructure modernization (Senegal 2050, 2024a; Sénégal CDN, 2020).

The electricity sector constitutes the most advanced dimension of this transition. Over the last decade, Senegal has significantly accelerated the deployment of utility-scale renewable energy infrastructure, particularly through solar photovoltaic projects and the Taïba N'Diaye wind farm, which remains one of the largest wind power projects in West Africa. Solar plants located in Bokhol, Malicounda, Kahone, Sakal, and other regions have progressively diversified the national electricity mix and reduced dependence on imported heavy fuel oil and diesel generation (IRENA, 2023; IEA, 2023). Renewable energy capacity now represents more than 30% of installed electricity generation capacity, while renewable generation contributes approximately 20–25% of electricity production during

favourable operating periods (Senelec, 2022). These investments have improved grid diversification, reduced exposure to international oil price volatility, and strengthened medium-term electricity supply security.
The government has simultaneously expanded transmission infrastructure and regional electricity interconnections in order to improve grid stability and facilitate the integration of variable renewable energy. Regional interconnection projects developed within the framework of the West African Power Pool (WAPP) are expected to strengthen electricity trade and improve regional system flexibility (ECREEE, 2022; World Bank., 2022a). Rural electrification programmes, including decentralized solar systems and mini-grid solutions, have significantly contributed to improving energy access in underserved rural areas (World Bank, 2023; IEA, 2023). National electricity access rates now exceed approximately 84%, reflecting substantial progress compared to previous decades, although important territorial inequalities persist between urban and rural areas, where access remains considerably lower.

Despite these advances, Senegal's energy transition remains partial and structurally constrained. Fossil fuels continue to dominate final energy consumption across most sectors of the economy, reflecting the persistence of carbon-intensive infrastructures, technological lock-ins, and the limited availability of scalable low-carbon alternatives outside the power sector (IEA, 2023).

In the transport sector, fossil fuels account for nearly all final energy consumption due to the overwhelming reliance on gasoline and diesel-powered vehicles, combined with the very limited penetration of alternative mobility technologies such as electric or hybrid vehicles (IEA, 2023).

In industry, fossil fuels still represent approximately 60–80% of energy use, particularly in cement production, manufacturing, and extractive activities, where heavy fuel oil, diesel, and increasingly natural gas remain central for industrial heat and power generation (AfDB, 2022). Energy-intensive industries, such as cement, mining, and extractive activities, rely mainly on heavy fuel oil, diesel, petroleum coke, and increasingly natural gas for process heat and power generation. Meanwhile, light industries, including agro-processing and small manufacturing, present greater opportunities for electrification, renewable energy integration, and efficiency improvements.

Industrial decarbonization pathways rely mainly on two transformations: improving energy efficiency through the adoption of efficient equipment, optimized processes, and energy management practices; and developing circular economy approaches based on reducing, reusing, repairing, and recycling resources. While these approaches are increasingly recognised in national strategies, their implementation remains at an early stage due to financial constraints, limited technical capacity, and regulatory gaps. Large industrial facilities are expected to lead adoption, whereas SMEs may experience slower progress. These realities are considered in the modelling assumptions to ensure that industrial transition scenarios reflect domestic capacities, stakeholder perceptions, and the progressive nature of technological transformation.

Household energy consumption exhibits a more heterogeneous structure, combining liquefied petroleum gas (LPG), kerosene, electricity, and traditional biomass such as firewood and charcoal. Despite gradual improvements in access to cleaner cooking solutions, biomass remains a significant component of cooking energy demand, particularly in rural and peri-urban areas, reflecting persistent affordability constraints and uneven access to modern energy services (IEA, 2023; World Bank., 2022).

The electricity sector itself also remains heavily dependent on thermal generation. Although renewable energy deployment has accelerated, approximately 70–75% of electricity generation still originates from fossil-fuel-based thermal plants powered by diesel, heavy fuel oil, and increasingly natural gas (IEA, 2023). Consequently, Senegal's current trajectory reflects an ongoing diversification of the electricity mix rather than a full decarbonisation pathway.

This tension has become more pronounced following the development of offshore oil and gas resources, particularly the Greater Tortue Ahmeyim (GTA) gas project and the Sangomar oil field. The government increasingly presents domestic natural gas as a strategic lever for industrialisation, electricity generation, export revenues, macroeconomic stabilization, and national energy sovereignty (Senegal 2050, 2024a). From a national development perspective, gas exploitation is framed as a transitional solution capable of replacing more carbon-intensive liquid fuels while supporting economic competitiveness and expanding electricity access.

However, this strategy also creates significant long-term transition risks. Large-scale investments in gas infrastructure — including gas-fired power plants, pipelines, processing facilities, and associated industrial infrastructure — may generate long-term carbon lock-in effects that could delay deeper decarbonisation pathways (IPCC, 2022). Once established, these infrastructures create strong institutional, financial, and political incentives to maintain fossil fuel utilization over several decades in order to recover investment costs. As a result, Senegal's current transition pathway reflects a dual strategy characterized by simultaneous renewable energy expansion and fossil gas development, creating potential inconsistencies with long-term net-zero trajectories compatible with ambitious global climate stabilization objectives (Climate Action Tracker, 2023; UNEP U. N., 2023).
Beyond the energy sector, transport transformation remains comparatively limited despite growing recognition of its importance within national climate policy. Rapid urbanisation, increasing motorisation, and expanding freight demand are generating rising energy consumption and urban congestion, particularly in the Dakar metropolitan area. Senegal has initiated important urban transport reforms through the Regional Express Train (TER) and the Bus Rapid Transit (BRT) system in Dakar. These projects aim to modernize urban mobility, reduce congestion, improve accessibility, and lower emissions associated with inefficient transport systems (CETUD, 2023). They also represent important investments in mass public transport infrastructure and urban modernization.
Nevertheless, broader structural transformation of the transport sector remains insufficiently developed. Informal transport systems continue to dominate urban mobility patterns, while private vehicle ownership is increasing steadily due to demographic growth and urban expansion. Policies supporting compact urban planning, integrated land-use systems, cycling infrastructure, pedestrian mobility, and transit-oriented urban development remain relatively weak. Similarly, freight transport continues to rely predominantly on road transport, while rail freight modernization and regional logistics integration remain limited (World Bank, 2025).
Electrification of transport is also still at an early stage. Although Senegal has expressed growing interest in electric mobility and cleaner transport technologies, large-scale deployment remains constrained by high vehicle acquisition costs, weak charging infrastructure, dependence on imported technologies, and limited domestic industrial capacity (IEA, 2023; UNEP U. N., 2023). Consequently, current transport policies primarily focus on selected urban infrastructure modernization projects rather than a comprehensive transformation toward low-carbon mobility systems.

Energy efficiency and industrial transformation also remain relatively fragmented. National policy documents increasingly recognize the importance of reducing transmission losses, promoting efficient lighting, supporting cleaner industrial processes, and improving appliance efficiency (ECREEE, 2022). Some programmes additionally promote improved cookstoves and cleaner cooking technologies in order to reduce pressure on biomass resources and improve household energy efficiency (World Bank., 2022).
However, deeper structural transformations in buildings, industrial systems, and material use remain limited. Bioclimatic construction standards, mandatory energy-efficient building codes, and large-scale building retrofitting programmes are not yet systematically implemented (UNEP, 2023). Industrial decarbonisation strategies — including electrification of industrial heat, renewable energy integration into industrial production, low-carbon manufacturing processes, and green hydrogen development — remain at an early stage due to financial, technological, and institutional constraints (AfDB, 2022; IRENA, 2023).

Similarly, circular economy approaches remain weakly institutionalized despite their growing importance in long-term transition frameworks. Waste reduction systems, industrial recycling, material recovery, and resource

efficiency strategies are still limited in scale and coordination (World Bank., 2022). This limits Senegal's capacity to reduce material intensity, lower industrial emissions, and create integrated low-carbon production systems.
Overall, Senegal's long-term transformation pathway can therefore be characterized as a gradual diversification and modernization process rather than a rapid structural phase-out of fossil fuels. The country has achieved substantial progress in renewable electricity deployment, electricity access expansion, and selected urban transport modernization projects. Nevertheless, fossil fuels remain deeply embedded across transport, industry, and thermal electricity generation, while emerging gas exploitation strategies risk reinforcing long-term carbon dependence. The current policy framework reflects an attempt to reconcile climate objectives with immediate development priorities, energy security concerns, industrialisation ambitions, and macroeconomic constraints. As a result, Senegal's transition trajectory remains hybrid in nature: it combines important elements of low-carbon transformation with continued reliance on fossil-fuel-based development pathways, particularly through the strategic expansion of natural gas within the national economy (IPCC, 2022; Climate Action Tracker, 2023; UNEP U. N., 2023).

Transformations Supporting Carbon Sinks and Sustainable Land-Use Systems

Forest restoration and reforestation policies
Land-use management and ecosystem protection constitute a central pillar of Senegal's climate strategy because the country faces severe environmental pressures associated with desertification, deforestation, soil degradation, salinization, and coastal erosion. These vulnerabilities are particularly acute in the Sahelian and coastal zones, where climate change increasingly affects agricultural productivity, biodiversity, and rural livelihoods. According to the Food and Agriculture Organization (FAO), Senegal lost significant portions of its natural forest cover during previous decades due to agricultural expansion, fuelwood extraction, overgrazing, and urban growth (FAO F. a., 2023). Forest ecosystems nevertheless remain essential for carbon sequestration, water regulation, biodiversity conservation, and local energy supply.

Senegal's updated Nationally Determined Contribution (NDC) and related environmental strategies therefore place strong emphasis on ecosystem restoration, reforestation, sustainable forest management, and mangrove rehabilitation as core mitigation and adaptation priorities (Sénégal CDN, 2020). The country has committed to restoring degraded ecosystems while simultaneously strengthening rural resilience and supporting sustainable livelihoods. These interventions are expected to contribute both to greenhouse gas mitigation and to climate adaptation objectives.

Forest and land-use measures represent one of the few sectors in Senegal where mitigation and adaptation co-benefits are strongly integrated. The forestry and land-use sector is expected to contribute significantly to national carbon sequestration efforts through afforestation, assisted natural regeneration, agroforestry expansion, and restoration of degraded lands. Senegal has already implemented several large-scale restoration initiatives with support from international partners such as the World Bank, the Green Climate Fund (GCF), the Global Environment Facility (GEF), and the African Development Bank.

A major regional initiative in which Senegal plays an active role is the Great Green Wall initiative, which aims to restore degraded Sahelian ecosystems across more than 8,000 km from West Africa to the Horn of Africa. Within Senegal, the Great Green Wall program targets large-scale land restoration, reforestation, sustainable pastoralism, and water conservation in northern regions highly exposed to desertification. According to the United Nations Convention to Combat Desertification (UNCCD), millions of hectares of degraded land across the Sahel are expected to be restored under this initiative, with Senegal identified as one of the leading participating countries (UNCCD, 2022).

Mangrove restoration has become particularly strategic in coastal and estuarine areas such as the Sine-Saloum Delta and Casamance region because mangroves provide exceptionally high carbon sequestration potential while also

protecting coastal populations against erosion and saltwater intrusion. Senegal has implemented major mangrove rehabilitation campaigns involving local communities, NGOs, and international development partners. According to the International Union for Conservation of Nature (IUCN), Senegal restored tens of thousands of hectares of mangroves over the last two decades, contributing significantly to biodiversity preservation, fisheries productivity, and blue carbon storage (IUCN, 2021). Mangrove ecosystems are particularly valuable because they can sequester carbon at rates several times higher than terrestrial forests while simultaneously supporting fisheries that sustain rural coastal economies.

Sustainable agricultural land management

The analytical framework also identifies several key transformations related to agricultural soils and climate-resilient farming systems, including agroforestry, crop diversification, soil restoration, water conservation, and agroecological practices. In Senegal, agriculture employs approximately 30–35% of the labour force and remains highly dependent on rainfall variability, making climate-resilient land management critically important for both food security and rural stability (World Bank, 2023)

Senegal's agricultural and climate policies increasingly recognize that sustainable land management is necessary to address declining soil fertility, land degradation, recurrent droughts, and increasing climate variability. National adaptation and agricultural strategies therefore promote:

- agroforestry systems integrating trees into farming landscapes;
- sustainable irrigation practices;
- soil and water conservation techniques;
- restoration of degraded agricultural lands;
- crop diversification and climate-resilient seeds;
- integrated watershed management.

Programs supporting agroforestry and farmer-managed natural regeneration have shown positive impacts in several rural areas, particularly in the Groundnut Basin and semi-arid northern regions. These interventions contribute to improved soil fertility, reduced erosion, increased water retention, and enhanced carbon storage capacity. Agroforestry systems also help diversify household income sources while reducing pressure on natural forests for fuelwood and charcoal production.

Senegal has additionally invested in irrigation modernization and water harvesting systems to strengthen agricultural resilience. The country's irrigated agriculture potential remains concentrated in the Senegal River Valley and Anambé Basin, where investments in water infrastructure seek to reduce vulnerability to rainfall shocks. However, irrigated land still represents only a limited share of total cultivated land, constraining broader climate resilience in the agricultural sector.

Despite these advances, implementation remains highly uneven and constrained by multiple structural barriers. Financial limitations continue to restrict large-scale deployment of sustainable land management practices, particularly among smallholder farmers with limited investment capacity. Public agricultural extension services often lack sufficient staffing, technical resources, and logistical capacity to support climate-smart agriculture nationwide. According to international development assessments, rural producers frequently face inadequate access to improved seeds, irrigation technologies, mechanization, and climate information services.

Additional constraints include:

- rapid demographic growth and rising pressure on arable land;
- persistent rural poverty;
- insecure land tenure arrangements in some areas;
- dependence on biomass energy;
- overexploitation of forests and soils;
- expansion of informal settlements and infrastructure.

Biomass remains a dominant source of household energy in Senegal, particularly in rural areas where fuelwood and charcoal account for a large share of cooking energy consumption. According to the International Energy Agency (IEA), traditional biomass still supplies a substantial proportion of household energy demand despite ongoing

electrification and clean cooking initiatives (IEA, 2023). This dependence contributes to continued pressure on forest ecosystems and limits the effectiveness of conservation and reforestation policies.

Governance and land-use management challenges

Governance fragmentation constitutes another major challenge for long-term land-use transformation. Responsibilities for forestry, agriculture, water resources, land administration, urban planning, and environmental protection are distributed across multiple ministries and agencies, often with insufficient coordination mechanisms. This institutional fragmentation complicates integrated land-use planning and weakens implementation coherence across sectors.

The analytical framework also highlights the importance of limiting artificialization of soils and protecting ecosystems from uncontrolled urban expansion. In Senegal, rapid urbanisation—particularly around Dakar and secondary urban centres—continues to generate strong pressure on agricultural land, wetlands, and coastal ecosystems. Urban population growth, infrastructure development, and informal settlements increasingly compete with conservation objectives and agricultural land preservation.

Coastal zones are especially vulnerable because urban expansion intersects with rising sea levels, erosion, and ecosystem degradation. Several studies estimate that coastal erosion already threatens critical infrastructure, fisheries, tourism assets, and residential areas along Senegal's coastline (Group, 2021). Mangrove degradation and wetland loss further increase vulnerability to flooding and storm surges.

Enforcement of environmental regulations also remains uneven due to:

- limited institutional capacity;
- weak monitoring systems;
- insufficient environmental data;
- budgetary constraints;
- limited local enforcement mechanisms.

Illegal logging, charcoal production, and unsustainable land-use practices continue in some regions despite existing regulatory frameworks. Monitoring and verification systems for forest conservation and carbon sequestration remain relatively underdeveloped compared with the scale of the country's climate ambitions.

Overall assessment of land-use transformations

Overall, Senegal's climate framework demonstrates relatively strong integration of ecosystem restoration and sustainable land management priorities compared with several other transformation areas. National climate and environmental strategies clearly identify the importance of:

- reforestation and afforestation;
- mangrove restoration;
- sustainable forest management;
- agroforestry expansion;
- climate-resilient agriculture;
- soil restoration and water conservation.

These measures are increasingly embedded within the country's broader adaptation and low-carbon development agenda. Compared with sectors such as transport or industrial decarbonization, land-use and ecosystem restoration policies benefit from stronger alignment with rural development objectives, food security priorities, and international climate finance opportunities.

Nevertheless, implementation gaps remain substantial because of persistent structural constraints including:

- insufficient climate finance mobilisation;

- demographic and land-use pressures;
- institutional fragmentation;
- limited technical and monitoring capacities;
- rural poverty and energy dependence on biomass;
- weak enforcement of environmental regulations.

As a result, Senegal's land-use transformation agenda remains ambitious at the policy level but only partially operational at the scale required to maximize long-term carbon sinks and ecosystem resilience. Achieving the country's restoration and sequestration objectives will require significantly stronger institutional coordination, expanded climate finance, improved land governance systems, broader rural energy transitions, and sustained investment in climate-resilient agriculture and ecosystem management (Sénégal CDN, 2020; World Bank, 2023; UNDP., 2021).

Transformations Reducing Non-CO2 Agricultural Emissions

Agriculture, livestock, and non-CO2 emissions in Senegal

Agriculture remains one of the most strategic sectors of Senegal's economy because it supports food security, rural employment, poverty reduction, and social stability. The sector contributes significantly to national GDP and employs a large share of the active population, particularly in rural areas. However, agriculture is also an important source of non-CO2 greenhouse gas emissions, especially methane (CH_4) and nitrous oxide (N_2O), which possess much higher global warming potentials than carbon dioxide over a 100-year period.

In Senegal, non-CO2 agricultural emissions mainly originate from:

- enteric fermentation from livestock;
- manure management systems;
- rice cultivation in flooded conditions;
- inefficient fertilizer application;
- land degradation and soil nutrient losses;
- open burning of agricultural residues.

Livestock is particularly important within Senegal's rural economy and pastoral systems. Cattle, sheep, goats, and poultry contribute substantially to household income, food supply, and resilience in semi-arid regions. According to the Food and Agriculture Organization (FAO), livestock production constitutes one of the main agricultural emission sources in West African countries because methane emissions from enteric fermentation remain structurally high in extensive pastoral systems (FAO, 2021)

Rice cultivation also contributes to methane emissions, particularly in irrigated areas such as the Senegal River Valley, where flooded rice systems generate anaerobic decomposition processes that release methane. Although Senegal's rice production remains lower than in major Asian producers, national strategies aimed at increasing domestic rice self-sufficiency may increase future methane emissions if low-emission agricultural practices are not integrated into irrigation expansion policies.

Nitrous oxide emissions remain comparatively lower than methane emissions in Senegal; however, they are expected to increase progressively as agricultural intensification accelerates, particularly through the expansion of fertilizer use and irrigation systems. In this context, Senegal's agricultural modernization policies create a dual challenge consisting of simultaneously enhancing agricultural productivity and strengthening food security while limiting the long-term growth of agricultural greenhouse gas emissions associated with intensified farming practices.

Climate policy objectives and current regulatory orientation

Senegal's climate framework increasingly recognizes the importance of climate-resilient agriculture and sustainable land management. The country's updated Nationally Determined Contribution (NDC) identifies agriculture, livestock, forestry, and land use as priority sectors for both mitigation and adaptation interventions (Sénégal CDN, 2020).

Current national policy objectives primarily focus on:

- strengthening food security;
- improving agricultural productivity;
- enhancing resilience to droughts and climate shocks;
- modernizing irrigation systems;
- restoring degraded soils;
- promoting sustainable land management;
- improving water-use efficiency.

Several sectoral programs indirectly contribute to reducing non-CO2 emissions, even when mitigation is not always presented as the primary objective. Existing measures include:

- improved livestock feeding practices;
- better animal health management;
- development of fodder systems;
- sustainable grazing management;
- rehabilitation of pastoral ecosystems;
- improved irrigation efficiency;
- agroecological farming practices;
- reduction of post-harvest losses;
- sustainable soil fertility management.

For example, improved livestock productivity can reduce methane emissions intensity by increasing output per animal while limiting herd expansion pressures. Similarly, more efficient irrigation systems and improved water management can reduce methane emissions associated with continuously flooded rice systems.

Senegal has also adopted several strategic frameworks related to climate-smart agriculture, resilience building, and sustainable rural development. Programs supported by international institutions such as the World Bank, IFAD, FAO, and the Green Climate Fund increasingly integrate adaptation and mitigation co-benefits within agricultural projects.

Nevertheless, the current regulatory framework remains largely adaptation-oriented rather than explicitly focused on deep decarbonization of agricultural systems. Agricultural policies continue to prioritize production growth, food sovereignty, and rural economic stabilization, often without clearly quantified targets for methane or nitrous oxide reduction.

Limited structural transformation of food systems

The analytical framework highlights several deeper transformations that are necessary for achieving long-term carbon neutrality but that remain only partially integrated into Senegal's current policy and regulatory framework. Although Senegal has made progress in promoting climate-resilient agriculture and sustainable land management, the transition toward low-emission food systems remains relatively limited and largely indirect.

One major limitation is the absence of a comprehensive national strategy specifically dedicated to reducing methane emissions from agriculture. Unlike some countries that have adopted explicit methane reduction roadmaps aligned with international initiatives such as the Global Methane Pledge, Senegal currently addresses methane mitigation mainly through broader agricultural modernization and adaptation programs rather than through targeted emission-reduction policies. Existing interventions therefore tend to focus primarily on improving productivity,

strengthening food security, and enhancing resilience to climate variability rather than directly reducing agricultural greenhouse gas emissions.

In addition, structural transformations related to food consumption patterns remain largely absent from national policy discussions. Measures aimed at encouraging dietary transitions, reducing excessive animal protein consumption, or promoting alternative and lower-carbon protein sources are still politically and socially sensitive issues. Livestock products occupy an important place within Senegalese diets, rural economies, pastoral livelihoods, and cultural traditions. As a result, public policies generally continue to support livestock sector development in order to respond to growing domestic demand driven by rapid demographic growth, urbanisation, and changing consumption patterns.

Technological options capable of significantly reducing methane emissions in the livestock sector also remain insufficiently developed. Advanced mitigation solutions such as methane-reducing feed additives, anaerobic digesters, biogas recovery systems, improved manure management technologies, precision livestock systems, and large-scale methane monitoring infrastructures are still only marginally deployed across the country. In its NDC 2.0, Senegal planned to install 27,000 biodigesters by 2030 (Sénégal CDN, 2020); however, without corrective action, its realization will likely remain difficult, as persistent funding constraints and policy gaps could continue to hinder progress. Their expansion is constrained by high investment costs, limited technical expertise, weak research and innovation systems, and insufficient access to long-term financing mechanisms for rural producers.

Similarly, low-emission rice cultivation practices have not yet been integrated at large scale into national agricultural planning. Techniques such as alternate wetting and drying irrigation systems, climate-smart rice intensification, and methane-sensitive water management remain limited to pilot projects or localized initiatives despite their recognized mitigation potential. This represents an important challenge because Senegal's objective of increasing domestic rice production and strengthening food sovereignty could progressively increase methane emissions if irrigation expansion is not accompanied by low-emission production practices.

The analytical framework also emphasizes that transforming food systems requires going beyond agricultural production alone. It involves reducing food losses and waste, improving supply chain efficiency, promoting more sustainable consumption patterns, and integrating circular economy approaches into agricultural value chains. In Senegal, however, these dimensions remain insufficiently developed due to persistent structural weaknesses affecting the agri-food sector. Storage infrastructure remains inadequate in many rural areas, cold-chain systems are limited, transport and logistics networks remain inefficient, and post-harvest losses continue to be substantial across cereals, fruits, vegetables, and fisheries. According to international assessments, these losses significantly reduce resource efficiency while increasing indirect environmental pressures and economic vulnerability (World Bank, 2023).

Reality of implementation: facilitating factors and existing progress

Despite these limitations, several important enabling factors are already contributing to the gradual transformation of Senegal's agricultural systems. Climate-smart agriculture has progressively become more visible within national agricultural and climate planning. Numerous programs supported by international development partners increasingly integrate drought-resistant crops, water-efficient irrigation systems, agroforestry practices, soil restoration techniques, sustainable pastoralism, and integrated watershed management approaches. These interventions are primarily designed to strengthen resilience to climate variability, but they also indirectly contribute to reducing greenhouse gas emissions through improved efficiency and reduced land degradation.

International climate finance and donor support also play a central role in facilitating implementation efforts. Senegal benefits from substantial technical and financial assistance from organizations such as the Food and Agriculture Organization, the World Bank, the International Fund for Agricultural Development, and the Green

Climate Fund. These institutions support projects related to sustainable agriculture, irrigation modernization, resilience building, ecosystem restoration, and climate adaptation. International support therefore partially compensates for Senegal's limited domestic financial capacity and creates opportunities for experimentation with climate-resilient and lower-emission agricultural practices.

At the same time, growing awareness of climate vulnerability is progressively strengthening political and institutional recognition of the need for more sustainable agricultural systems. Recurrent droughts, irregular rainfall patterns, land degradation, and declining soil fertility increasingly threaten agricultural productivity and rural livelihoods across the country. Since Senegal's agricultural sector remains highly dependent on rainfed production systems, climate variability creates strong incentives for both policymakers and local communities to adopt more sustainable land and water management practices.

Missing elements and structural obstacles

Nevertheless, major structural obstacles continue to limit the scale and speed of transformation. Financial constraints remain one of the most important barriers. Agricultural modernization and low-emission transitions require major investments in irrigation infrastructure, climate information systems, rural transport networks, research and innovation, livestock productivity improvements, sustainable fertilizers, and methane-reduction technologies. However, Senegal's fiscal space remains limited, and many agricultural initiatives continue to depend heavily on external donor financing. This dependence raises concerns regarding the long-term sustainability and scalability of current programs.

Institutional and technical capacities also remain insufficient in several areas. Agricultural extension services often lack the human, financial, and logistical resources necessary to disseminate climate-smart agricultural techniques at national scale. Many smallholder farmers still face limited access to technical training, climate information services, veterinary care, improved seeds, irrigation technologies, and agricultural credit. As a result, adoption rates for sustainable agricultural practices remain relatively uneven, particularly in remote rural regions.

Demographic growth and food security pressures further complicate the transition. Senegal's rapidly expanding population continues to generate increasing demand for cereals, livestock products, and agricultural land. Under these conditions, policymakers frequently prioritize short-term production growth and food availability over long-term emission reduction objectives. Environmental sustainability goals may therefore become secondary when confronted with urgent food security and rural employment concerns.

Another important challenge concerns the weak development of monitoring, reporting, and verification systems for agricultural emissions. Agricultural production systems remain highly fragmented and largely informal, making it difficult to obtain reliable data on livestock emissions, fertilizer use, methane sources, and land-use practices. Consequently, Senegal still faces important limitations in its capacity to monitor non-CO2 agricultural emissions in a systematic and transparent manner.

Finally, livestock systems remain deeply embedded within Senegal's socio-economic and cultural structures. Pastoralism and livestock production are essential sources of income, food security, and social stability for many rural communities. Any policy perceived as restricting livestock production could therefore face strong social and political resistance. For this reason, most existing reforms tend to focus on improving productivity and resilience rather than fundamentally transforming livestock consumption patterns or reducing herd sizes.

7.3.2 Key national policies

Tackling key structural inertias (Q2.1 of the framework)

Senegal's climate and energy policies explicitly attempt to address several deep structural inertias that have historically constrained the country's transition toward a low-carbon development pathway. These inertias are particularly pronounced in the energy sector and are mainly associated with high dependence on imported fossil fuels, limited domestic industrial capacity, insufficient infrastructure, and persistent financing constraints.

Current policy frameworks aim to progressively reduce fossil fuel dependence through the expansion of renewable energy capacity and the improvement of national electricity access. These objectives are closely aligned with broader development priorities, including electrification, economic competitiveness, and territorial equity, particularly between urban and rural areas.

However, significant structural barriers continue to shape the trajectory of the energy system. The economy remains highly dependent on imported petroleum products, exposing it to global price volatility and external supply risks. In addition, transmission and distribution infrastructure is not yet fully adapted to accommodate high shares of variable renewable energy, limiting system flexibility and integration capacity.

A particularly important emerging dynamic concerns the development of natural gas as a "transition fuel." While the government positions gas as a strategic option to support industrialization, improve energy security, and facilitate the gradual replacement of oil-based generation, this strategy may also reinforce new forms of carbon lock-in. Investments in gas infrastructure could extend the lifespan of fossil-based assets and potentially slow down deeper decarbonization efforts if not carefully managed within a long-term neutrality framework (MEPM, 2020 - 2023).

Overall, Senegal's policies partially address structural inertias but remain characterized by a dual logic: a transition toward renewables on the one hand, and a continued reliance on fossil-based energy security strategies on the other.

Targeting the accelerated diffusion of existing energy-efficient and low-carbon solutions (Q2.2 of the framework)

Senegal has made substantial progress in accelerating the deployment of low-carbon technologies, particularly in the electricity sector. Over the past decade, the country has significantly expanded its renewable energy capacity through large-scale solar and wind projects. Notable examples include the Taïba Ndiaye wind farm and solar installations in Bokhol and Kahone, which have helped increase the share of renewables in the national energy mix.

Transformation 1 – Power sector: Senegal has established a favorable framework through renewable energy policies, long-term planning and concessional financing, enabling the rapid deployment of solar and wind power. However, limited grid flexibility, continued reliance on thermal generation and regulatory uncertainties remain key barriers. Grid modernization, regional electricity trade and energy storage offer important opportunities to further accelerate renewable integration.

Transformation 2 – Passenger transport (Sustainable): Investments in the Bus Rapid Transit (BRT) and the Regional Express Train (TER) support the shift towards public transport. However, incentives for public transport, walking and cycling remain limited, while rapid urbanization and increasing private vehicle ownership continue to challenge sustainable mobility.

Transformation 3 – Passenger transport (Electric vehicles): Senegal is at an early stage of electric mobility. Although pilot initiatives exist, comprehensive regulations, fiscal incentives and charging infrastructure are still lacking. Expanding renewable electricity generation offers favorable conditions for future electrification, provided adequate investment and supportive policies are introduced.

Transformation 4 – Forestlands: Existing forestry legislation and community-based forest management provide a solid foundation for forest conservation. Nevertheless, weak enforcement, illegal logging and land degradation

continue to limit progress. Strengthening governance, monitoring systems and incentives for ecosystem restoration would enhance carbon sequestration.

Transformation 5 – Crop- and grasslands: National strategies increasingly promote climate-smart agriculture and agroforestry through extension services and development projects. However, limited financial incentives, insufficient technical capacity and climate vulnerability continue to constrain large-scale adoption.

Overall, Senegal has established an increasingly supportive policy environment for low-carbon transitions, but stronger regulatory coherence, improved implementation, enhanced economic incentives and greater investment will be required to achieve systemic transformation across all sectors.

Addressing the socio-economic effects of the ecological transition (Q2.3 of the framework)

Senegal's climate policies explicitly recognize the socio-economic dimensions of the ecological transition, with particular attention to poverty reduction, employment creation, and territorial equity. The overarching objective is to ensure that the transition contributes to inclusive development and does not exacerbate existing social inequalities.

National priorities include universal access to modern energy services, rural development, food security, and job creation, particularly through green economy initiatives. Renewable energy investments are often framed as drivers of local development, generating employment opportunities during construction phases and supporting the emergence of new technical skills in installation, maintenance, and system operation.

For example, large-scale renewable energy projects in Senegal have generated significant employment opportunities during both construction and operation phases. The Taiba N'Diaye Wind Farm, the largest wind farm in West Africa, created approximately 650 jobs during its development phase, including around 450 positions filled by local workers. In parallel, decentralized rural electrification initiatives such as the ASER300 mini-grid programme have contributed to local capacity building by training hundreds of Senegalese technicians in photovoltaic installation and maintenance, including 247 young professionals specifically trained for solar mini-grid deployment. Beyond direct employment, rural electrification programmes have supported the emergence of new income-generating activities in agriculture, commerce, refrigeration, and small rural enterprises by improving access to reliable electricity services (European Union, 2020 - 2023; DFC Corporation, 2021).

However, dedicated social protection mechanisms for managing the impacts of the ecological transition remain limited. There is no fully structured national framework for compensating potentially affected groups or for systematically supporting workers transitioning from carbon-intensive or informal sectors. Similarly, professional retraining and reskilling programs linked specifically to the energy transition remain fragmented and underdeveloped.

Existing social and economic support measures are therefore dispersed across multiple sectoral policies, without a unified "just transition" framework capable of ensuring coherent and targeted support for vulnerable groups.

Overall assessment of national climate policies

Overall, Senegal's climate policy framework reflects a gradual and pragmatic transition toward a more resilient and lower-carbon development pathway. Significant progress has been achieved in renewable energy deployment, electricity access expansion, and the integration of climate considerations into sectoral policies.

However, three key limitations emerge from the analysis.

First, structural inertias in the energy system are only partially addressed. While renewable energy expansion is progressing, continued fossil fuel dependence and the strategic development of natural gas introduce potential risks of long-term carbon lock-in.

Second, although low-carbon technologies are being deployed at scale, their diffusion remains insufficient to transform the energy system fundamentally. Constraints related to infrastructure, financing, and institutional capacity continue to slow down system-wide change.

Third, the social dimensions of the transition remain weakly institutionalized. Mechanisms for compensation, retraining, and targeted support for vulnerable populations are still fragmented and not yet embedded in a comprehensive just transition framework.

In conclusion, Senegal's climate strategy demonstrates a coherent but incremental transformation process, strongly supported by international partners, yet still insufficient to achieve a rapid and fully systemic shift toward deep decarbonization consistent with the most ambitious global climate objectives (Sénégal CDN, 2020; World Bank, 2023; AfDB, African Development Bank, 2022).

8 Sierra Leone

8.1 Fairness

This section assesses how climate and energy policies distribute costs, benefits, and risks across social groups, regions, and economic sectors in Sierra Leone. The analysis applies five dimensions of fairness distributive, procedural, recognitional, restorative, and intergenerational examining both current conditions and projected post-NDC implementation trajectories. The analysis reveals that while procedural fairness is improving, distributive fairness remains the weakest dimension, characterised by stark inequalities and a significant "Just Transition" gap.

8.1.1 Fairness Assessment Summary

The following table summarizes fairness assessments across key sectors and dimensions, providing a structured overview of current conditions and projected post-NDC improvements:

Table 2. Fairness Assessment Across Sectors and Dimensions

Sector/Topic	Fairness Dimension	Current Rating	Post-NDC Projection	Key Constraints
Grid reliability	Distributive	Low	Medium	Urban-rural infrastructure disparities, financing gaps
Electricity accessibility	Distributive	Low	Medium	Affordability barriers, connection costs, rural reach
Energy affordability	Distributive	Unclear	Medium	Data gaps, subsidy sustainability, tariff reform risks
Employment transitions	Distributive	Low	Medium	Skills mismatches, geographic concentration, limited retraining
Employment transitions	Restorative	Low	Medium	Absence of systematic retraining programs, coordination gaps
Regional development	Distributive	Low	Medium	Coastal-urban concentration, rural investment gaps
Rights and safeguards	Procedural	Medium	Medium	Weak enforcement, superficial consultation, compensation delays
Gender equity	Distributive	Low	Medium	Underrepresentation in leadership, intra-household inequality
Gender equity	Procedural	Medium	Medium	Improving representation, limited technical influence
Gender equity	Recognitional	Medium	High	Mandatory assessments, dedicated units, mainstreaming requirements
Emission targets	Intergenerational	Medium	High	Conditional ambition, LNG lock-in risks, finance dependence
Health and environment	Distributive	Low	Medium	Pollution burden on poor settlements, indoor air quality
Land use and restoration	Distributive	Low	Medium	Tenure conflicts, benefit-sharing gaps, enforcement weakness

Land use and restoration	Procedural	Medium	Medium	Late-stage consultation, information asymmetries
Land use and restoration	Restorative	Low	Medium	No systematic harm correction, ad hoc restoration
Biodiversity safeguards	Procedural	Medium	High	Variable EIA quality, strengthening under NDC
Planning and policy	Procedural	Medium	High	Top-down tradition, improving participatory mandates
Transparency and oversight	Procedural	Low	Medium	Limited audit specificity, improving disclosure rules
Cultural heritage	Intergenerational	Medium	High	Inconsistent implementation, strengthening protocols

Rating scale: Low = significant fairness deficits; Medium = partial fairness achievement; High = strong fairness performance; Unclear = insufficient data for assessment

This summary reveals systematic patterns; current fairness performance is weakest in distributive dimensions (equitable distribution of costs and benefits) and strongest in emerging recognitional and procedural commitments that are not yet fully implemented. Post-NDC projections show potential for medium-to-high performance across most dimensions, but this improvement is contingent on finance access, capacity building, and sustained political commitment. The prevalence of "Medium" post-NDC ratings suggests incremental rather than transformational improvement, with significant residual fairness deficits likely to persist.

8.1.2 Distributive Fairness

Energy Access and Grid Reliability

Sierra Leone exhibits profound distributional inequities in energy access. While approximately 36% of the population has access to electricity nationally, access in Freetown and other major urban centres exceeds 70%, whereas electrification rates in many rural areas remain below 10%. This pronounced urban–rural disparity reflects historical patterns of infrastructure investment, the concentration of economic activity in the Western Area, and the high cost of extending the national grid to dispersed rural communities.

Successive governments have made significant efforts to expand electricity access through grid rehabilitation, transmission and distribution upgrades, and rural electrification programmes. Major interventions have included the rehabilitation and expansion of the Bumbuna Hydroelectric Project, construction of the 225 kV CLSG (Côte d'Ivoire–Liberia–Sierra Leone–Guinea) regional interconnection, expansion of transmission and distribution networks by the Electricity Distribution and Supply Authority (EDSA) and the Electricity Generation and Transmission Company (EGTC), donor-funded urban grid reinforcement programmes, and the deployment of mini-grids and stand-alone solar systems through the Rural Renewable Energy Project (RREP) and other initiatives supported by the World Bank, the African Development Bank, the European Union and development partners.

Despite these investments, the expected improvements in electricity access and service reliability have been constrained by several structural challenges. First, electricity generation capacity has not kept pace with rapid population growth, urbanisation and rising demand, resulting in persistent supply deficits. Second, transmission and distribution networks remain underdeveloped and suffer from ageing infrastructure, high technical and commercial losses (estimated at over 35–40%), inadequate maintenance and limited network redundancy. Third, chronic

financial constraints within the power sector, including low revenue collection, electricity theft, tariff-cost recovery gaps and dependence on government subsidies, have reduced utilities' ability to invest in network expansion and maintenance. Institutional reforms have also faced implementation challenges, including limited technical capacity, fragmented sector governance and delays in project execution.

Furthermore, many rural communities are located far from existing transmission corridors, making conventional grid extension economically challenging because of low population densities and relatively low electricity demand. Consequently, although grid expansion has increased access in urban centres, it has not substantially reduced the urban–rural electrification gap. These constraints have shifted national policy towards a more integrated electrification strategy that combines grid expansion with decentralised renewable energy systems, including solar mini-grids and stand-alone solar home systems, as outlined in the Energy Transition and Green Growth Plan (2023–2040) and the Medium-Term National Development Plan (2024–2030).

The quality and reliability of electricity supply also remain major challenges. Grid reliability indicators reveal persistent service disruptions. The System Average Interruption Duration Index (SAIDI) indicates average outage durations of approximately 150–500 hours per month, while the System Average Interruption Frequency Index (SAIFI) averages around 155 sustained interruptions per customer per year. The Customer Average Interruption Duration Index (CAIDI) is approximately 0.97 hours per interruption, indicating that although individual outages are relatively short, they occur with very high frequency. These reliability challenges reduce industrial productivity, increase operating costs for businesses, discourage private investment, and limit the socioeconomic benefits of electrification. Addressing these issues will require continued investment in generation capacity, transmission and distribution infrastructure, smart grid technologies, utility financial sustainability and decentralised renewable energy systems to ensure reliable, affordable and equitable electricity access across Sierra Leone.

However, these national aggregates obscure critical disparities: urban centres with priority infrastructure experience fewer outages with faster restoration, while rural networks suffer frequent, prolonged blackouts. Low-income households in peri-urban areas may have grid connection but experience effectively unreliable service, forcing continued dependence on polluting backup generators.

NDC 3.0 targets universal electricity access by 2030 through decentralized renewable systems, mini-grids, and off-grid solar, with specific commitments including deployment of over 500 solar mini-grids and 150,000 solar home systems. This decentralized approach potentially addresses spatial inequities by bypassing grid extension constraints. However, affordability barriers may persist for poorest households without targeted subsidies, creating risk of "energy access for the poor, quality energy access for the wealthy" patterns.

Affordability and Energy Burden

Energy affordability presents acute distributive challenges. The average household energy burden is already 15% of annual income. As the government pushes for a transition to cleaner energy, there is an inherent risk of “green-inflation.” While renewable technologies offer lower long-term operational costs, their high upfront capital requirements act as a barrier to entry. For the informal labourer, the shift from a subsidised or informal energy source to a formal, regulated green grid represents a potential shock to disposable income. Without targeted subsidies, there is a risk of creating “energy access for the poor, quality energy access for the wealthy” patterns.

Employment and Just Transition

The employment implications of energy transition present significant distributive concerns. Job losses are concentrated in traditional energy sectors; approximately 1,200 workers face displacement from thermal plant transitions according to SEforALL Energy Transition Plan documentation, while new renewable job creation remains limited and geographically concentrated. The SEforALL assessment identifies this displacement risk specifically in thermal power generation, with workers in Bumbuna and other conventional generation facilities facing uncertain futures.

New employment in clean energy is growing but insufficient to offset losses. Off-grid solar deployment through companies like Easy Solar has created more than 500 jobs (IRENA/SEforALL, 2023), but national disaggregated data is unavailable, suggesting monitoring gaps. The renewable energy workforce exhibits gender dimensions: women constitute 32% of the renewable energy workforce, but this aggregate masks concentration in specific roles with limited leadership representation.

Geographic and skills mismatches create distributive inequities. New renewable jobs require technical competencies often lacking in affected communities, creating risk that transition benefits flow to urban, educated populations while costs fall on rural, less-educated workers. Youth unemployment, already severe nationally, may be exacerbated if transition job creation fails to target this demographic.

NDC 3.0 includes just transition frameworks targeting 5,000 - 10,000 jobs in solar and hydro sectors, with regional renewable energy hubs and local content requirements intended to redistribute opportunities. Targets include "% of women/youth employed or in leadership in manufacturing/industrial processes." However, systematic re-training programs for displaced workers are virtually non-existent currently and rated low for restorative fairness, with only ad hoc NGO and donor initiatives lacking scale, coordination, and sustainable funding.

Regional Development and Spatial Equity

Regional disparities in energy infrastructure create self-reinforcing patterns of advantage and deprivation. The Western Area (Freetown Peninsula) captures disproportionate climate project attention due to population density and existing infrastructure. Rural districts, despite hosting significant renewable resources, face persistent underinvestment. NDC 3.0 explicitly targets regional equity through decentralised renewable deployment, with the goal that “all district councils adopt climate/GESI budget tagging” by 2035, aiming to mainstream climate and gender equity considerations across all administrative regions.

8.1.3 Procedural Fairness

Procedural fairness is the dimension showing the most improvement. The 2022 EPA Act represents a significant reform, securing the public’s right to access environmental information and participate in decision-making, providing a legal vent for distributional conflicts. However, participation is often hampered by an awareness gap. If rural communities lack the technical capacity to engage with Environmental Impact Assessments (EIAs), procedural fairness remains a tool for the elite and organised CSOs. The Seli Hydropower Project (2019) demonstrates that international safeguard standards like Free, Prior, and Informed Consent (FPIC) can be operationalised, but this appears exceptional rather than normative practice. NDC 3.0 strengthens procedural commitments through mandatory FPIC for renewable projects and targets for stakeholder consultations including vulnerable groups, but implementation capacity building is required.

8.1.4 Recognitional Fairness

Gender inequality is a defining feature of Sierra Leone’s energy landscape. The clean cooking access crisis disproportionately affects women and children, who mainly bear the time poverty of fuel collection and health impacts of indoor air pollution. Women currently hold less than 20% of jobs in the formal energy economy.
NDC 3.0 marks a turning point by shifting the gender fairness rating from “Low” to “Medium/High.” For the first time, policy design includes gender-responsive budgeting and targets women as entrepreneurial agents in the clean cooking value chain. However, this remains a conditional ambition; without specific external funding for gendered energy programs, the structural exclusion of women from the formal energy economy will persist.

Other social identities receive variable recognition. Youth are explicitly targeted for green job creation, and persons with disabilities are mentioned in participation targets. Coastal populations and smallholder farmers are recognised in vulnerability assessments but differentiated policy responses remain underdeveloped.

8.1.5 Restorative and Intergenerational Fairness

Restorative fairness correcting past environmental and social harms remains largely unaddressed in current policy frameworks. No systematic mechanism exists to review past harmful land use decisions from mining, plantation agriculture, or infrastructure development. Historical grievances from pre-conflict and post-conflict resource concessions remain unaddressed, with affected communities lacking avenues for redress. Ecological restoration of degraded lands is ad hoc, driven by project requirements rather than systematic assessment of restoration needs.

NDC 3.0 establishes foundations for improved restorative fairness through commitments to restorative justice frameworks, land remediation funds, and community-driven restoration initiatives. Traditional dispute resolution is integrated with formal mechanisms for cultural appropriateness. Climate-linked land restoration initiatives may improve corrective measures, but implementation remains pending.

Intergenerational fairness regarding emission targets is rated medium currently, the conditional 35% reduction target by 2030 is insufficient for 1.5°C pathway alignment and with implementation risks of locking in fossil fuel infrastructure (LNG import dependence) that creates stranded asset risks and future economic burden. However, the updated NDC 3.0 with enhanced ambition, clear decarbonization pathway, and explicit avoidance of fossil fuel lock-in could achieve high intergenerational fairness if international finance commitments are fulfilled.

8.2 Feasibility

This section evaluates whether Sierra Leone's climate commitments are realistically implementable under current conditions. It reveals a pattern of moderate political will and policy ambition that is significantly constrained by structural limitations, particularly in the economic, institutional, and technological domains.

8.2.1 Feasibility Assessment Matrix

The following table provides a structured assessment of feasibility across five dimensions, capturing expert judgments on current conditions and key constraints: -

Table 3. Feasibility Assessment Matrix

Dimension	Assessment Area	Expert Judgment	Key Constraints	Key Enablers
Political	Bipartisan support	Strong	Historical polarization, electoral uncertainty	Cross-party climate finance engagement
	Stability across cycles	Moderate	2023 election tensions, APC-SLPP rivalry	NDC institutionalization, green growth framing
	Leadership credibility	Strong	Resource gaps, implementation lags	High-level commitments, international partnerships
	Political salience	Moderate	Competing economic priorities, low awareness	Disaster experience, survival/opportunity framing
	Elite/business/CSO buy-in	Moderate	Military limited involvement, civic space constraints	EPA-SL leadership, PPP engagement, CSO advocacy
Economic	IMF austerity constraints	Weak	ECF conditionalities, fiscal tightening	Program stability, macroeconomic recovery
	Fiscal space	Weak	129% debt service/revenue, limited reserves	Revenue mobilization reforms, debt relief

	Fuel subsidy reform	Moderate	Social sensitivities, import dependence	2024 pricing formula, gradual adjustment
	Domestic revenue for climate	Moderate	9-10% revenue/GDP, debt pressures	IMF-supported reforms, NDC-identified instruments
	Climate finance absorption	Moderate	Coordination gaps, human resource limits	GCF/GEF readiness programs, CCS leadership
	Private investment	Moderate	High risk perceptions, early-stage markets	De-risking mechanisms, green instruments
Social	Public awareness	Moderate	36% awareness, rural gaps	Curriculum integration, targeted campaigns
	Personal experience/perception	Moderate	Low overall awareness	Direct impact experience, farmer concern
	Civil society mobilization	Moderate	Resource constraints, polarization	CRWIP, creative advocacy, NDC participation
	Media visibility	Moderate	Competition with economic news	Flood coverage, government events, social media
	Social experience of impacts	Strong	Disproportionate vulnerability	Documentation, NAP integration, community voice
Institutional	Authority and coordination	Moderate	Resource constraints, pending Climate Change Act	EPA Act 2022, CCS establishment
	Inter-ministerial coordination	Moderate	Historical silos, sectoral fragmentation	CCS facilitation, MRV system
	Technical competence	Moderate	Data analysis gaps, specialized skills	GCF/UNDP programs, BUR training
	MRV operationalization	Moderate	Data quality, verification needs	ETF framework, improving reporting
	Subnational implementation	Moderate	Limited budgets, weak authority	Consultation engagement, capacity building plans
	Rule enforcement	Moderate	Resource limits, corruption risks	EPA-SL legal authority, reform efforts
Technological	Domestic manufacturing	Weak	Heavy import reliance, limited industrial base	SOGREA local assembly, capacity building
	Technical workforce	Moderate	R&D gaps, education infrastructure	TNA/ETGGP training, STEM investments
	Technology transfer	Moderate	Scaling dependence on international support	GCF/GEF/UNDP partnerships, TNA frameworks
	Project bankability	Moderate	High perceived risks, limited local expertise	Climate Finance Roadmap, de-risking tools
	Infrastructure readiness	Weak	Grid capacity limits, charging gaps	SOGREA, transmission upgrades (slow)

Judgment scale: Strong = favorable conditions for implementation; Moderate = partial enabling conditions with significant constraints; Weak = major barriers to implementation

This matrix reveals systematic feasibility challenges: economic and technological dimensions show the weakest conditions (predominantly "Weak" to "Moderate" ratings), while political and social dimensions demonstrate moderate strength with notable enabling factors. The prevalence of "Moderate" ratings across most areas suggests that implementation is possible but will require sustained effort to overcome constraints, with high risk of implementation gaps if external support or political attention falters.

8.2.2 Political Feasibility

Political commitment demonstrates strong credibility through concrete high-level actions. The NDC 3.0 submission in December 2025, the CRET 2025 launch by President Bio, and the November 2024 energy sector retreat establishing zero-tariff policies demonstrate sustained executive attention. Bipartisan support is moderate to strong, with parliamentarians from both SLPP and APC reaffirming commitment to climate action, suggesting climate change may be becoming institutionalised as a governance issue less subject to partisan reversal.

The political elite have successfully framed the energy transition as a matter of “National Survival.” By linking climate action to the Feed Salone strategy and food security, the government has built a narrative of co-benefits, where a solar-powered irrigation system is framed as a tool for rural justice and poverty alleviation. This framing aligns climate with core development priorities, enhancing political durability.

8.2.3 Economic and Financial Feasibility

The economic dimension is the most constrained aspect of the transition, rated as feasible with major constraints. The single most binding constraint is the lack of fiscal space. NDC 3.0 estimates total implementation costs at USD 2.974 billion for 2025–2035. Critically, 79–80% of these needs are conditional on external finance. This creates a strategic vulnerability: if international climate finance does not materialise at scale, the roadmap is effectively unimplementable.

The IMF ECF program imposes fiscal tightening that severely limits fiscal flexibility for climate investments. Domestic contributions are identified at around USD 304 million, but actual mobilisation is hampered by extreme debt pressures. Fuel subsidies remain politically entrenched as inflation mitigation measures, straining budgets and complicating clean energy transitions.

The role of State-Owned Enterprises (SOEs), particularly EDSA and EGTC, is central to feasibility. These entities are financially fragile, and vested interests in the current system including those who profit from the procurement of heavy fuel oil (HFO) represent a structural inertia. Moving away from thermal generation requires dismantling the HFO dependency that has characterised the power sector for decades.

8.2.4 Social, Institutional and Technological Feasibility

Social feasibility is moderately feasible. While there is a strong experiential basis for action (people feel the impacts of floods and droughts), there is a significant awareness and mobilisation gap. Climate change is often perceived as an elite or NGO issue. Without broad-based social mobilisation, the government may find it difficult to implement policies requiring behavioural changes or those that might lead to short-term price increases.

Institutional feasibility shows moderate capacity with implementation gaps. While formal arrangements exist on paper, inter-ministerial coordination remains challenging, and the technical competence of staff, though improving, has significant gaps. Enforcement capacity is particularly weak; while the EPA Act 2022 grants sanctioning powers, resource shortages and occasional corruption risks reduce the ability to ensure compliance. Informal power relations, including patronage networks and traditional authorities (paramount chiefs), can act as informal veto players, stalling implementation if they do not see direct benefit.

Technological feasibility faces major constraints. The national grid is not yet capable of absorbing high levels of intermittent solar power without significant investment in battery storage and smart-grid technology items that Sierra Leone must import at high cost. The transition to e-mobility is limited by inadequate public charging infrastructure. Domestic manufacturing capacity is near-zero, leaving the country in a state of "technology import to technology sovereignty" transition.

8.3 Adequacy

This section assesses whether Sierra Leone's national climate plans address long-term system and sectoral transformations toward net-zero. Overall, Sierra Leone demonstrates moderate adequacy. Many key transformations are conceptually considered, particularly in renewable power, passenger transport electrification, forest restoration, and climate-smart agriculture. However, implementation depth remains shallow, critical structural inertia's are only partially tackled, and socio-economic safeguards are insufficient.

8.3.1 System Transformation Coverage

The following table summarizes coverage of the 39 identified sub-transformations across three macro-categories: fossil fuel reduction, land use and carbon sinks, and non-CO2 agricultural emissions:

Table 4. System Transformation Coverage in NDC 3.0 and Related Policies

Macro-Transformation	Sub-Transformation	Sector	Status	Implementation Level	Critical Barriers
A. Decrease fossil fuel use					
	1. Mixed land-use, compact cities	Transport-Passenger	Not considered	N/A	No urban planning framework for energy moderation
	2. Transit-oriented mobility infrastructure	Transport-Passenger	Considered/Partial	E-mobility pilots (e-buses, e-kekehs)	Grid capacity, charging infrastructure
	3. Collective transport adoption	Transport-Passenger	Considered/Partial	E-Mobility Strategy, pilots, incentives	Charging gaps, vehicle costs, kekeh competition
	4. Circular economy for freight	Transport-Freight	Not considered	N/A	Limited freight sector focus
	5. Local/regional supply chains	Transport-Freight	Not considered	N/A	Agro-processing infrastructure gaps
	6. Rail/IWWC freight	Transport-Freight	Not considered	N/A	Defunct infrastructure, rehabilitation costs
	7. Bioclimatic building envelopes	Buildings-Residential/Commercial	Not considered	N/A	No updated building codes,

					high material costs
	8. Energy-efficient appliances	Buildings-Residential /Commercial	Considered/Partial	Cookstoves, LPG/biogas, MEPS	Upfront costs, supply chains, cultural preferences
	9. Low-energy lifestyles	Buildings-Residential /Commercial	Not considered	N/A	No behavioral change programs
	10-12. Commercial building efficiency	Buildings-Commercial	Not considered	N/A	No commercial-specific regulations
	13. Circular economy for energy-intensive industry	Industry-Energy-intensive	Not considered	N/A	Limited industrial policy integration
	14. Energy-efficient processes	Industry-Energy-intensive	Considered/Partial	Captive solar PV in mining	Capital costs, technical expertise, grid issues
	15-16. Light industry efficiency	Industry-Light	Not considered	N/A	Limited incentives for small-scale
	17. Electric passenger vehicles	Transport-Passenger	Considered/Partial	E-kekehs, e-buses, battery-swapping	Grid capacity, vehicle costs, maintenance
	18. Electric freight vehicles	Transport-Freight	Not considered	N/A	Policy focus on passenger only
	19. Biofuels for aviation/maritime	Transport	Not considered	N/A	No sector focus, high costs
	20-21. Building electrification/renewable appliances	Buildings-Residential /Commercial	Considered/Partial	Solar water heaters, biogas, SHS	Upfront costs, grid reliability, supply chains
	22-24. Industrial electrification/renewables	Industry-Energy-intensive/Light	Considered/Partial	Captive solar PV, BESS	Capital costs, technical expertise, grid issues
	25. Renewable power production	Power	Considered/Significant	SOGREA, 500+ mini-grids, 150,000 SHS	Transmission constraints, financing, scaling
	26. Bioenergy refineries/green hydrogen	Other energy	Not considered	N/A	No advanced bioenergy

					policy, R&D gaps
B. Land use and carbon sinks					
	27. Forest surface increase	Forestlands	Considered/Partial	REDD+ readiness, 120,000 ha target	Funding, tenure disputes, enforcement
	28. Improved forest management	Forestlands	Considered/Partial	ANR, community forestry, Gola Forest	MRV scaling, international support
	29. Soil carbon agricultural practices	Crop/grasslands	Considered/Implemented	Feed Salone Pillar 5, CSAIP	Extension services, input access, financing
	30. Agroforestry practices	Crop/grasslands	Considered/Implemented	Agroecology, cocoa/cashew integration	Knowledge gaps, transition costs
	31. Peatlands protection	Peatlands	Not feasible	N/A	Not significant in Sierra Leone
	32. Control soil artificialization	Urban areas	Not considered	N/A	No policy targets, limited resources
C. Reduce non-CO2 agriculture					
	33. Agricultural waste reduction	Animal farming/Rice/Fertilizer	Not considered	N/A	No dedicated agricultural waste policy
	34. Animal protein substitution	Animal farming	Not considered	N/A	Cultural/economic reliance on livestock
	35. Livestock breeding improvements	Animal farming	Not considered	N/A	No research/extension on low-methane
	36. Rice diet substitution	Rice	Not considered	N/A	Rice as dietary staple, no alternatives
	37. Improved rice management	Rice	Not considered	N/A	Water access issues, no methane focus

	38. Fertilizer reduction	Land fertilization	Considered/Implemented	Organic manures, compost, agroecology	Farmer reliance on synthetics, access gaps
	39. Agroecological practices	Land fertilization	Considered/Implemented	Crop rotation, reduced tillage, cover crops	Extension gaps, economic incentives

Status categories - Not considered = no policy recognition; Considered/Partial = policy recognition with limited implementation; Considered/Significant = policy recognition with substantial implementation; Not feasible = not applicable to context; Considered/Implemented = policy recognition with active implementation.

This table reveals significant adequacy gaps; only 38% of sub-transformations show active implementation, with 44% not considered. Coverage is strongest in power production and passenger transport electrification, while critical gaps cluster in freight transport, building efficiency, and non-CO_2 agricultural emissions.

9 United States

9.1 Fairness

The United States is the most significant contributor to cumulative historical CO2 emissions since 1850, generating about 20% of the total in that period. As of 2024, cumulative U.S. emissions since 1850 are two-thirds higher than China's and three-quarters above the EU27. Today, the U.S. is the second highest greenhouse gas-emitting country, after China. Yet, low-income, lower-emitting countries bear the greatest burden of climate impacts, particularly developing economies and small island nations. This dynamic creates global environmental inequity that the U.S. has taken responsibility for in previous administrations through means including international climate finance, humanitarian aid, and climate research collaborations.,

Domestically, the intertwined nature of political and economic equality is an obstacle in achieving equitable climate policy and a just transition. Economic inequality in the United States has been growing for many decades. The U.S.Gini coefficient was 0.465 in 2024 (based on equivalence-adjusted income, which accounts for the number of people per household), one of the highest coefficients amongst developed countries., Economic inequality is visible in the political system, where less than 2% of state lawmakers come from working class backgrounds (defined by whether or not the lawmaker currently or previously worked in manual labor, the service industry, clerical, or labor union jobs), compared to half of American workers.

More than half of Congresspeople are millionaires, and the median net worth in the Senate is almost $4.4 million, more than 70 times median U.S. household net worth., The disproportionate economic status of legislators is compounded by their disproportionate racial and gender breakdown: only 28% of Congresspeople are women (33.6% of all state legislators), and 26% of Congresspeople identify as a race or ethnicity besides non-Hispanic White compared to 42.5% of the general population.,,, Relatedly, voter turnout patterns are misrepresentative of the diversity of the American population: people without college degrees and lower-income individuals vote at lower rates than the rest of the populace. In sum, individuals who have more limited social and economic resources to manage climate impacts are less well represented politically, which can curtail equitable participation in decision-making and thus allocation of mitigation and adaptation resources. For example, the Federal Emergency Management Agency's (FEMA) key disaster preparedness grant program, Building Resilient Infrastructure and Communities (BRIC), scored projects using a benefit-cost ratio built on property value protected, not population or need. This resulted in large grants going to wealthy communities like Menlo Park, California, which have many high value properties like technology company campuses.

In addition to these broader political and economic inequities, the burdens of climate change and other environmental issues disproportionately impact racial minority groups in the United States. Environmental injustice today has its roots in redlining, a discriminatory mortgage appraisal practice used by the federal government in the 1930s to systematically deny mortgages, loans, and insurance to residents of racial minority neighborhoods. Nearly 100 years later, there is persistent residential segregation; of historically redlined neighborhoods, 74% are majority low-to-moderate income households and 64% are primarily minority households. Historically redlined areas, and minority communities more broadly, experience lower access to green space, elevated air pollution, and greater exposure to extreme heat and flooding.,, The U.S. Environmental Protection Agency (EPA) projects that this impact gap will grow as climate change symptoms worsen; the EPA found that Black and African American individuals (those targeted most by redlining) are 40% more likely than non-Black and non-African American individuals to currently live in areas with the highest projected increases in mortality rates due to climate-driven changes in temperature extremes.

However, there has been substantial progress in addressing environmental justice through policy and advocacy. Weeks of protests in 1982 against a proposed polychlorinated biphenyl (a carcinogen) landfill in the rural, poor, and majority Black Warren County of North Carolina catalyzed the modern American environmental justice movement. Specifically, the protests prompted the first government study of environmental justice and environmental racism in 1983, then the founding of the EPA Environmental Equity Workgroup in 1990 and subsequently the EPA Office of Environmental Justice in 1992. The EPA continues to lead amongst federal agencies in tracking greenhouse gas emissions, conducting environmental and climate science research, and creating public data and tools for state- and community-level climate adaptation.

By the end of the Biden administration in 2024, environmental justice was no longer an isolated endeavor of the EPA but rather a pillar of climate action embedded in the federal government across agencies and departments via laws, executive orders, legal processes, grant programs, and more. A hallmark environmental initiative of the Biden presidency was Justice40, announced through Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" in 2021. Justice40 set a government-wide goal of delivering 40% of benefits from climate spending to historically disadvantaged communities. The administration acted on this goal through a wide range of grant programs funded by the Inflation Reduction Act and Bipartisan Infrastructure Law, including the $2 billion Climate Justice Community Change Grants Program, which was the "single largest investment in environmental justice ever to go directly to communities". Additional grant programs funded home energy efficiency, climate resilience renovations, and residential solar for low-income individuals, families, and seniors. These grants were complemented by regulatory change regarding toxic exposures and air pollution, and governance transparency measures including the Environmental Justice Scorecard and updated guidance broadening public engagement in the regulatory process.

Further, the American Climate Corps was created under the Biden administration to better connect people with climate jobs, particularly individuals working in historic fossil fuel communities. While fossil fuel jobs account for less than 1% of direct total employment in the U.S., in some areas (particularly in states including Montana, North Dakota, Utah, Wyoming, Ohio, Kentucky, and West Virginia) these jobs account for more than 20% of total employment. Recent research demonstrates that clean energy jobs often do not match up with these fossil fuel communities in terms of geography and required skills, so initiatives like the Climate Corps are key in bridging these gaps.

Environmental justice work has been deprioritized by the current administration. Diversity, equity, and inclusion (DEI) policies became widespread in policy and the private sector due to protests against the police killings of unarmed Black people, particularly George Floyd in May 2020. The wave of DEI work fit naturally into the realm of environmental justice, particularly during the Biden administration. However, there has been substantial conservative backlash against DEI. Some of the earliest federal workforce reductions under the current administration were in DEI- and environmental justice-related roles and teams. The current administration has also re-oriented to recognize gender as an immutable male-female binary, and to halt federal programs addressing climate change through the lens of gender equity. These actions have created challenges in managing gender-based vulnerabilities to climate change.

9.2 Feasibility

Overall, ambitious climate action in the United States can be feasible due to 1) spurts of political commitment under climate-friendly federal administrations, 2) energy demand and affordability issues that intersect with climate action, 3) innovative policy levers at the subnational level that can be widely adopted, 4) large fiscal capacity for climate action, and 5) a mobilized civil society. However, policy consistency is a major vulnerability that has limited progress in the country.

Recent U.S. leadership has been credible on climate beyond campaign rhetoric. Both Obama and Biden campaigned on climate change, not just in broad language but also with specific financial and policy goals., Both presidents took aggressive action on climate change once elected. Under the current administration, the Republican Party holds the majority in both chambers of Congress and tends to vote in line with the administration's priorities. However, many positions are up for election or re-election in November 2026. If Democrats are able to win the majority of either or both chambers, this could help ease current environmental deregulation and rollbacks.

Recent concerns related to energy affordability and electricity load growth have become a broad, bipartisan issue, which can further incentivize renewable energy deployment. Over a dozen bills have already been introduced by Democrats in this Congress that would make sweeping changes to utility rates, regional transmission, clean energy permitting and interconnection. In March 2026, over 120 House Democrats introduced the 419-page Energy Bills Relief Act to ensure affordable consumer access to renewable energy. Additionally, many states have enacted laws and regulations to expedite renewable energy project permitting, transmission system buildout, and expand electric vehicle infrastructure. For example, Virginia directed its Department of Transportation to make recommendations on how the state can speed up transmission line permitting in areas where relevant infrastructure already exists, and New Jersey established a clean energy-focused Cross-Agency Permitting Team to streamline state permitting processes. These changes are happening across the country and across party lines.

Subnational actors, including states, cities, and businesses, have remained engaged with climate issues in the United States despite federal government inaction and rollbacks. Many individual states have their own legislatively mandated climate targets; Maryland, for example, requires the state to reduce GHG emissions by 60% below 2006 levels by 2031 and achieve net-zero emissions by 2045. New York's Climate Leadership and Community Protection Act requires a 40% reduction in GHG emissions by 2030 and an 85% reduction by 2050.States like California, Maryland, Colorado, Washington, and New York have also adopted comprehensive climate policies across sectors, including renewable energy standards, zero-emission vehicle programs, landfill methane regulations, and building performance standards

With the 12th highest GDP per capita globally, the United States has substantial fiscal capacity to act on climate change. Over a trillion dollars were allocated to climate and clean energy projects through the Inflation Reduction Act of 2022 and Bipartisan Infrastructure Law of 2021. In 2025, the U.S. collected $5.23 trillion in revenue and spent $7.01 trillion. The federal government (as of 2021) spends $31,538 per capita. While the United States depends financially on the fossil fuel industry, as of 2021, oil rent as a share of the U.S. GDP was only at 0.6%. Because the political responsibility for climate action is dispersed across the federal government (and state and local governments), there is flexibility in terms of where money is allocated and how it is spent to address climate change. There is also a wide range of financial mechanisms that can be employed for climate action, including tax incentives, "direct pay" to tax-exempt entities for clean energy projects, and grant and loan programs.

There is a high level of concern about climate change in the American public, and civil society is mobilized on the issue. 63% of Americans are worried about climate change, and 72% agree with the statement that global warming is happening. About two thirds of Americans support the U.S. economy transitioning from fossil fuels to 100% clean energy by 2050, and the majority of people feel that global warming should be a priority for the next President and Congress. This public concern is reflected in non-governmental and community organizations which have been active in advocating for environmental policy. For example, The Natural Resources Defense Council is suing the current administration regarding its use of the Endangered Species Committee to exempt Gulf of Mexico oil and gas activities from the Endangered Species Act. Another example is the Southern Environmental Law Center's successful suit against the Trump administration, filed in partnership with the Public Rights Project (which represents 13 nonprofits and six cities in the case), to unfreeze IRA funding to farmers via the U.S. Department of Agriculture's Climate-Smart Agriculture program.

However, policy consistency has been difficult to achieve in the United States due to changing federal priorities. The U.S. withdrawals from the Paris Agreement are illustrative of this: initial sign-on under the Obama administration, withdrawal from the agreement under the first Trump administration, re-joining under the Biden administration, and again withdrawing under the current federal government. Clean energy and manufacturing infrastructure can take a decade or more to site, permit, finance, build, and interconnect. The financing component of these projects alone often requires large-scale, sustained investment which is more unlikely in a volatile political environment. Furthermore, climate policy implementation often requires long-term research and deep institutional knowledge within government, both of which have been upended by the vast federal workforce restructuring.

The partisanship of climate change and its role in a broader culture war in the United States has further limited policy consistency. In 2024, philanthropic funding for U.S. left-of-center climate work totaled to $128 billion, while funding for right-of-center climate work sat at only $45 million. Among Democrats, 61% say global warming will be a very important issue in determining their vote for Congress in the upcoming midterm election, while only 8% of Republicans say the same. Federal climate policy is also influenced by informal powers, including lobbyists and organized interest groups, who can mobilize resources to block reforms. For example, major fossil fuel companies and large agricultural companies and trade associations spend hundreds of millions of dollars per year on lobbying the government, often to scale back climate policies and regulations.

Without increased bipartisanship and policy stability, U.S. climate goals will be challenging to reach.

9.3 Adequacy

The most recent U.S. NDC references the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) as the core policy mechanisms through which the near-term NDCs and 2050 net-zero goal will be achieved, in tandem with complementary policies and regulations. As such, this section will focus on the BIL, IRA, and other national policies as opposed to plans/policies articulated in the NDC itself.

Transformations to Support a Decrease in Fossil Fuels

In the power sector, many economic mechanisms were used to decrease fossil fuel dependence. The IRA instituted tax credits for zero-emission electricity production, such as 45Y, which pays a set amount for every unit of electricity generated, and 48E, which pays a fraction of the capital cost for qualifying generation or storage technology. The One Big Beautiful Bill Act of 2025 limited the availability of both tax credits and phased out certain components., The IRA also established the $250 billion Energy Infrastructure Reinvestment (EIR) program that guarantees loans to projects that retool, repower, repurpose, or replace energy infrastructure that has ceased operations, or to enable operating energy infrastructure to run more cleanly. EIR is still in effect, though the loan criteria has changed to consider a broader definition of energy infrastructure. The BIL also created the still-active $10.5 billion Grid Resilience and Innovation Partnerships (GRIP) Program to enhance grid flexibility and improve the resilience of the power system against growing threats of extreme weather. The U.S. Environmental Protection Agency also released in 2024 a number of new rules to reduce pollution from fossil fuel-fired power plants, though the agency is now in the process of repealing these rules.

In the buildings sector, a transformation away from fossil fuels was facilitated by components of the IRA such as the $8.8 billion investment in the HOMES and HEAR residential energy efficiency programs. Home Energy Rebates (HOMES) provides rebates to households for whole-home energy retrofits, and Home Electrification and Appliance Rebate (HEAR) provides rebates to households for residential upgrades to electric equipment or appliances. Both of these programs are still in place under the current administration. The IRA also has a number of relevant tax credits, such as the Energy Efficient Home Improvement Credit (25C) which incentivizes consumers to make energy efficiency improvements or get a home energy audit, and the Energy Efficient Commercial Buildings Deduction (179D)., However, these tax credits were repealed under the One Big Beautiful Act of 2025. Meanwhile, the BIL

allocated $250 million to create the Department of Energy (DOE) Revolving Loan Fund Capitalization Grant Program. Grants provided through this program enable states and territories to establish revolving loan funds to invest in energy audits and energy efficiency upgrades and retrofits of commercial and residential buildings. The Grant Program is in effect through the expiration of BIL funding in September 2026.

Transformative policy in the transportation sector has focused primarily on implementing and enhancing transit-oriented development, public transportation infrastructure, and electric vehicles (EVs). The IRA created many EV tax credits for both personal vehicles and commercial fleets. These credits were complemented by mechanisms to accelerate the auto industry's transition to EV production, including tax incentives for domestic production of battery cells and critical minerals necessary for EVs, and new EPA tailpipe emissions standards for light- and medium-duty vehicles., The BIL authorized up to $108 billion in public transportation through 2026, making it the largest federal investment in public transportation in U.S. history. The BIL also included the National Electric Vehicle Infrastructure Formula Program (NEVI), which provided funding to states to strategically deploy EV charging infrastructure. Additionally, the BIL dedicated $5 billion over five years to replacing existing school buses with zero-emission and clean buses.

A number of initiatives, such as the Department of Transportation's (DOT) Pilot Program for Transit-Oriented Development Planning, integrated the buildings and transportation sectors by supporting local planning and investment near transit hubs to promote sustainable communities. Rail infrastructure rehabilitation and safety policy is also important both for sustainable passenger and freight transit; the BIL Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program ($2.4 billion) and DOT Railroad Rehabilitation and Improvement Financing ($35 billion) both contribute to this mission. Both rail initiatives are active as of April 2026, and the proposed 2027 fiscal year budget, if approved, would increase CRISI Program funding. However, the public transportation programs, the federal tailpipe emissions standard, NEVI, and the IRA tax credits related to electric vehicles have largely been repealed or modified to expire early.

The IRA supported net-zero progress in the industrial sector through tax credits and the Advanced Industrial Facilities Deployment Program. Relevant tax credits include 45Q incentivizing carbon capture, utilization, and storage (maintained with modifications), and 45V incentivizing clean hydrogen production (phased out in 2028)., The Advanced Industrial Facilities Deployment Program provided competitive financial assistance for deploying technologies that reduce greenhouse gas emissions in energy-intensive industrial processes, although all unobligated funds were rescinded by the One Big Beautiful Bill Act.

While previous federal policy has supported decarbonization for the power, buildings, transportation, and industrial sectors, the current nature of initiatives means that a change in leadership in Congress and/or the White House, in addition to subnational climate action, will be necessary to achieve net-zero by 2050.

Transformations Related to Land Use and Non-CO2 Agricultural Emissions

The approach to transformation towards net-zero in the land use, forestry and agriculture sectors under the Biden administration was primarily through conserving and reforesting landscapes, incentivizing climate-smart agricultural practices, and building healthy and sustainable food systems. Executive Order 14072, "Strengthening the Nation's Forests, Communities, and Local Economies" directed BIL funding to conserve mature and old growth forests on federal lands, conduct forest management incorporating Indigenous traditional ecological knowledge with science-based practices, and by scaling up climate-smart reforestation. Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" (mentioned previously in the Fairness section), accompanied 14072, setting a national "30x30" target: conserve 30% of American lands and waters by 2030. Unfortunately, both executive orders were rescinded by Trump's Executive Order 14154, "Unleashing American Energy". Climate-smart agriculture was a core part of the Biden environmental agenda, including the Partnership for Climate-Smart Commodities grant program

benefitting farmers and ranchers, particularly small and underserved producers. These efforts have been cancelled by the Trump administration.