Cameroon's Energy Gamble: Do Legal Frameworks Hold the Key to Climate Resilience?

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ABSTRACT

The context of the Gamble. Cameroon stands at a developmental crossroads, where its "Vision 2035" goals are inextricably linked to energy security. However, this ambition is built on a "gamble" a lopsided reliance on large-scale hydroelectricity in an era of unprecedented climate volatility. The introduction establishes that without a robust legal anchor, this energy strategy remains a house of cards.

This research identifies the central problem: a legislative framework (Law No. 2011/022) that was designed for market liberalization and modernization but failed to anticipate the necessity of climate resilience. It highlights how the law remains "climate-blind," treating energy production as a purely an economic activity rather than an ecological one. The theoretical framework is focused on the utilizing the "Climate Law" theory, this study examines how legal norms can act as catalysts for environmental change. It posits that law is not merely a set of rules but a steering mechanism for risk management. This abstract outlines the hypothesis that the current "fragmented" governance is the primary barrier to a resilient energy mix. This study employs a multidisciplinary legal analysis. By bridging the gap between administrative law and environmental science, the research methodology ensures that findings are grounded in both legal reality and the physical realities of climate change in the Gulf of Guinea and the Sudano-Sahelian regions. The synthesis of findings analysis reveals a striking "Implementation Gap." While the SND30 policy document calls for 25% renewable energy by 2035, the legal codes lack the enforcement mechanisms to turn these aspirations into bankable projects. The "gamble" is further complicated by the lack of legal protections for independent solar and wind producers. Finally, this work proposes a radical shift from "passive" to "active" energy law. This involves the "ClimateProofing" of the energy sector through legislative amendments that mandate environmental impact assessments specifically focused on long-term climate projections rather than historical weather data.

Keywords: Energy, Legal Frameworks and Climate Resilience, Cameroon

RESEARCH QUESTION

To what extent does the current legal and regulatory framework governing Cameroon’s energy sector specifically Law No. 2011/022 facilitate or hinder the transition toward a climate-resilient energy infrastructure capable of mitigating risks from climate variability?

HYPOTHESIS

While Cameroon has established foundational laws for the electricity sector, the absence of binding climatespecific mandates and the fragmentation of regulatory oversight create a "legal gap" that disincentivizes private investment in non-hydro renewables (solar, wind, biomass), thereby leaving the national grid structurally vulnerable to climate-induced energy shocks.

METHODOLOGY

A qualitative, doctrinal, and comparative legal research approach:

Doctrinal Analysis: Systematic review of primary legal texts, including the 2011 Electricity Sector Law, the National Development Strategy (SND30), and the National Climate Change Adaptation Plan (PNACC).

Policy Content Evaluation: Assessing the alignment between energy laws and international commitments (e.g., Paris Agreement NDCs).

Key Informant Interviews (KIIs): Semi-structured interviews with officials from MINEE (Ministry of Water and Energy), ARSEL (Electricity Sector Regulatory Agency), and environmental NGOs.

METHOD OF DATA ANALYSIS

Thematic Content Analysis: Categorizing legal provisions into themes such as "Investment Incentives," "Grid Access for Independent Power Producers (IPPs)," and "Climate Adaptation Requirements."

Gap Analysis: Comparing the "de jure" (law on paper) versus "de facto" (practical implementation) status of renewable energy integration

INTRODUCTION

This work focuses on the legal and institutional frameworks governing energy development in Cameroon and critically examines their inherent implications for climate change concerns. Cameroon, aiming for economic emergence by 2035, is heavily reliant on its energy sector, which is dominated by hydropower (historically over 70% of electricity generation) alongside a significant push for exploiting its considerable fossil fuel reserves, particularly natural gas[1]. The primary legislation shaping this landscape includes Law No. 2011/022 of 14 December 2011 governing the Electricity Sector and the Petroleum Code, which prioritize securing energy access, attracting foreign direct investment, and maximizing resource extraction. While the commitment to developing clean energy is implicitly supported by the massive investment in hydroelectric projects, the existing legal architecture often lacks explicit, enforceable provisions that integrate climate change mitigation as a core criterion for energy project approval and operation. This regulatory gap creates a dissonance between national development goals and the global imperative to reduce greenhouse gas emissions, especially considering the potential for increasing emissions from intensified oil and gas activities and the carbon footprint associated with dam construction and land-use change.

The effectiveness of Cameroon's legal structure in addressing climate change is further complicated by the limited integration of its international and regional climate commitments into binding domestic energy law. Cameroon ratified the Paris Agreement and has submitted its Updated Nationally Determined Contribution (NDC), setting a target to reduce greenhouse gas emissions by 35% conditionally by 2030, with the energy sector expected to contribute substantially to this reduction. However, the sectorial laws, framed largely before the full urgency of the climate crisis became central to global policy, remain focused on supply security and economic viability over sustainability and emission reduction. For instance, the Petroleum Code facilitates exploration without stringent mandates for carbon capture or prioritizing lower-carbon technologies[2]. This paper will meticulously analyze these primary and secondary legal instruments, identify the specific omissions and inconsistencies that undermine climate action, and evaluate the efficacy of the Environmental Impact Assessment (EIA) process as the primary mechanism for integrating environmental safeguards into energy projects. By dissecting the operative legal norms, this analysis seeks to establish how the current legislative matrix inadvertently fosters energy development pathways that exacerbate, rather than alleviate, Cameroon's vulnerability and contribution to climate change.

[1] Republic of Cameroon. (2021). *Updated Nationally Determined Contribution (NDC) under the Paris Agreement*. Submitted to the United Nations Framework Convention on Climate Change (UNFCCC).

[2] Law No. 2011/022 of 14 December 2011 governing the Electricity Sector in Cameroon.

National Legal Frameworks on Climate –Friendly Energy Generation in Cameroon

The legal framework promoting climate-friendly energy generation in Cameroon is primarily embedded within Law No. 2011/022 of 14 December 2011 governing the Electricity Sector, which aims to diversify the energy mix and generally foster renewable energy development, including solar, wind, and small hydropower (less than 5 MW). While this Law provides the foundational authorization for renewable energy projects, its effectiveness is often constrained by the lack of dedicated, detailed implementing regulations and policies. Despite Cameroon's vast hydroelectric potential (the second largest in Sub-Saharan Africa) being leveraged to make hydropower the dominant clean source (approximately 60% of the generation mix), the penetration of other renewable technologies remains minimal, with solar energy contributing less than 1% of the grid generation[2]. The country's commitment to climate mitigation is most clearly articulated in its Updated Nationally Determined Contribution (NDC), which targets a 35% conditional reduction in greenhouse gas emissions by 2030 and aims to integrate a 25% share of non-hydro renewable energy into the electricity mix by 2035. This ambitious national target, however, currently exists alongside a nascent regulatory environment for non-hydro renewables, hindering the scale-up necessary to meet both national development needs and international climate goals.

Law No 2011/022 Governing the Electricity Sector in Cameroon

Law No. 2011/022 of 14 December 2011 governing the Electricity Sector in Cameroon is the cornerstone of the country's electricity liberalization and reform agenda, fundamentally replacing the earlier 1998 framework. Its primary objective is to modernize the sector, ensure supply reliability, and attract private investment across generation, transmission, and distribution. The law established a competitive environment by delineating the segments of the electricity market and defining the roles of the key actors, notably the Electricity Sector Regulatory Agency (ARSEL) for technical and tariff regulation, and the Electricity Development Corporation (EDC), which is principally in charge of managing public infrastructure, particularly hydroelectric dams and water resources for power generation[3]. Crucially, the Law introduces a clear distinction between activities requiring a Concession (transmission and sale to all customers), a License (generation above 5 MW), and a simple Authorization (generation below 5 MW), thereby streamlining the process for private producers, particularly for smaller, decentralized projects[5]. This legislative shift was intended to address the national deficit; however, despite the planned expansion to 3,000 MW by 2020 (a target which was not met), the national installed capacity was only around 1,650 MW by 2020, highlighting a significant gap between legal ambition and realization.

From a climate change perspective, the Law attempts to pave the way for a transition to lower-carbon energy by promoting renewable energy sources (RE) and energy efficiency. Part IV explicitly mandates the State to ensure the promotion and development of RE, giving priority to distributed generation from renewable sources for rural electrification and requiring electricity operators to purchase surplus power from small RE producers. This is particularly relevant as the country aims to integrate 25% of renewables (excluding large hydro) into its electricity mix by 2030, in line with its Nationally Determined Contribution (NDC). However, the Law's impact on actually boosting non-hydro RE remains limited. For instance, in 2018, solar photovoltaic (PV) only accounted for a negligible 0.01% of the country's installed capacity, with hydropower still dominating at around 56% and fossil fuels making up the remainder[4]. Critics point out that while the Law set broad goals, the necessary application decrees and detailed regulatory mechanisms to truly incentivize private sector investment, such as fixed prices (feed-in tariffs) for the mandatory purchase of renewable energy, were either slow to be implemented or were insufficient to overcome entrenched administrative and financial barriers.

[2] Law No. 2011/022 of 14 December 2011 governing the Electricity Sector in Cameroon, as reinforced by targets in the Updated Nationally Determined Contribution (NDC).

[3] Republic of Cameroon. (2011). *Law No. 2011/022 of 14 December 2011 Governing the Electricity Sector in Cameroon*. (Includes related statistics and policy context from subsequent reviews of the sector's performance under this law). [5] See Republic of Cameroon of Law No 2011/022 of 14 December 2011,Section 12 and 23.

[4] Ibid Section 60

Cameroon Country Priority Plan (CPP)

The Cameroon Country Priority Plan (CPP) is a strategic document, often developed in partnership with international financial institutions like the African Development Bank (AfDB), to outline the government's immediate reform agenda and priority infrastructure projects within key sectors, notably the energy sector. Its primary goal is to accelerate the country's development trajectory, aligning with the broader National Development Strategy 2020-2030 (SND30), which aims for Cameroon's structural transformation and emergence by 2035. Within the energy sector, the CPP highlights critical needs for investment, such as adding at least 3,500 MW of installed generation capacity (primarily hydro) and making about 1 million new connections to achieve universal electricity access by 2035[5]. The Plan serves as a direct reference for coordinating between the Government of Cameroon (GoC), donors, and the private sector, seeking to mobilize the required financing and technical assistance to address bottlenecks in a sector plagued by supply insufficiency and a significant rural-urban access disparity, where the urban access rate is around 98% while the rural rate is only about 30%.

The CPP's priorities, while primarily focused on energy security and economic growth, have direct and indirect implications for climate change concerns. The Plan's emphasis on expanding hydroelectric power aligns with Cameroon's commitment to clean energy, given that hydropower is the dominant source (around 70% of electricity generation) and is considered low-carbon. However, the Plan also implicitly acknowledges climate risks by seeking technical assistance to re-evaluate planned hydro investments to assess the impact of climate change on water availability. Furthermore, to meet the Nationally Determined Contribution (NDC) target of reducing greenhouse gas emissions by 35% conditionally by 2030, the CPP supports measures to increase the non-hydro renewable energy mix (solar and biomass) and to improve the financial and operational performance of the electricity sector. Key reforms include the need for a comprehensive Electrification Master Plan to guide on-grid extension and off-grid solutions for isolated communities, which, if focused on renewables, will simultaneously reduce reliance on high-carbon alternatives and contribute to the country's climate mitigation goals.

The Electricity Sector Development Plan, 2014

The Electricity Sector Development Plan (Plan Directeur du Secteur de l'Électricité - PDSE) 2035, published in 2014, served as a foundational investment roadmap for the Government of Cameroon (GoC), aiming to address the chronic power deficits and support its national goal of becoming an emerging economy by 2035. The Plan projected a rapid increase in electricity demand, primarily driven by industrialization, and set ambitious targets for expanding generation capacity. Specifically, the PDSE 2035's central objective was to raise the country's total installed capacity to 3,000 MW by 2020, with an ultimate goal of reaching 5,000 MW by 2035[8]. This massive increase was predominantly anchored in the exploitation of Cameroon's vast hydroelectric potential (estimated at over 19.7 GW), with major projects like the Nachtigal and Memve'ele hydropower plants forming the core of the strategy. The plan also recognized the necessity of upgrading and expanding the transmission and distribution networks, including interconnecting the three existing grids (North, South, and East), to improve supply quality, reduce high technical losses (which were around 19% in the Southern Interconnected Grid at the time), and facilitate potential regional power exports.

Despite its strategic importance, the PDSE 2035 faced significant challenges that directly hindered its implementation and compromised its climate change implications. The reliance on large-scale hydropower projects, while promoting a low-carbon energy mix (with hydroelectricity historically accounting for over 70% of power generation), also introduced vulnerabilities related to climate-induced water variability, which frequently causes capacity shortfalls. Furthermore, the ambitious capacity target of 3,000 MW by 2020 was not met, with actual installed capacity reaching only about 1,650 MW by that year, a shortfall of approximately 1,350 MW[9]. This underperformance was attributed to financing delays, slower-than-expected economic growth, and challenges in timely project execution. In the context of climate change, the plan's focus on largescale, centralized projects, and its relative lack of detailed frameworks for non-hydro renewable energy (solar, wind, etc.) beyond general promotion, meant it did not fully capitalize on opportunities for a more diversified, resilient,

[5] African Development Bank Group (AfDB). (2021). *Country Priority Plan and Diagnostic of the Electricity Sector: Cameroon*.

and decentralized power system, leaving the sector susceptible to the environmental and socioeconomic risks associated with mega-dam construction.

Policy, Strategy & Action Plan for Energy Efficiency in the Electricity Sector, 2014

Developed by the Ministry of Water Resources and Energy (MINEE) with support from the Electricity Sector Regulatory Agency (ARSEL), this 2014 policy addressed Cameroon's persistent power deficit. It marked a strategic pivot in the national energy mix: moving from a "generation-only" expansion model toward one that prioritizes demand-side management (DSM) and system loss reduction. The policy established a clear, measurable goal to bridge the supply gap by 2025: Energy Savings Target: 2,250\text{ GWh}. The generation equivalent implies avoiding the need for 450\text{ MW} of new installed capacity. Therefore, to achieve these targets, the Action Plan prioritized the highest-consuming sectors through several key measures. The first involves introducing Minimum Energy Performance Standards (MEPS) and mandatory energy labeling for

appliances. This would address Transmission and Distribution (T&D) losses, which have historically reached nearly 39%.However, it can be proposing the creation of the Agency for the Promotion and Rationalization of Energy Utilization (APRUE) to enforce these measures. Analytically, this policy correctly identifies that demand-side management is a faster, more cost-effective solution than building new power plants. However, the transition from "Plan" to "Action" remains the primary bottleneck. The government must move beyond setting targets and provide the APRUE with the legislative teeth and consistent funding required for enforcement.

Rural Electrification Development Plan (PDER, 2016)

The Plan Directeur de l'Electrification Rurale (PDER), updated in 2016, serves as the primary strategic roadmap for rural energy access. It aligns with Cameroon's "Vision 2035," which aims for universal electricity access. Unlike previous centralized efforts, the 2016 PDER emphasizes a decentralized approach. It recognizes Rural Electrification Development Plan (PDER, 2016). At the time of the plan's update, Cameroon faced a stark "urban-rural divide" in energy access. While urban centers had relatively high electrification rates, rural areas lagged significantly, hindering socio-economic development.

Furthermore, the 2016 PDER serves as the primary roadmap for achieving universal access by 2035. To move from a low starting base to full coverage, the plan adopts a multi-pronged approach which involves the extension of grids thereby augmenting the existing national network for communities near high-voltage lines. Also there is the need to decentralized Mini-Grids: Utilizing localized "green" solutions specifically smallscale hydro and solar PV—for isolated villages. Likewise, to deploy standalone solar home systems for the most remote, low-density settlements would offer Off-Grid Solutions.

Beyond this, institutional and financial support is required for the implementation of the PDER for it relies on a hybrid funding model, combining state resources with substantial international backing. Key partners include: the World Bank that finance the construction of medium and low-voltage lines. Also, we have the European Investment Bank (EIB) which is supporting large-scale infrastructure projects to stabilize the rural grid. Nonetheless, the Rural Electrification Agency (AER) also acts as the primary coordinator for project execution on the ground.

While the PDER provides a technically sound "Vision 2035" roadmap, the implementation phase has been characterized by significant delays. Data suggests that the sheer scale of the required investment, coupled with "institutional friction" between the AER and local government bodies, has slowed the rollout of mini-hydro and solar projects. Extensively, to bridge the gap between policy and reality, the government should prioritize the following:

8 World Bank. (2014). Cameroon Power Sector Development Plan (PDSE 2035).

9 MINEPAT (Ministry of Economy, Planning and Regional Development of Cameroon). (2020). National Development Strategy (NDS 2020-2030): Technical and Sectoral Documents. (Referencing the targets of the preceding PDSE 2035 plan).

1. Financial De-risking: Create a dedicated "Rural Energy Fund" to attract private sector investors who are currently hesitant due to low ROI in remote areas.

2. Decentralized Maintenance: Shift from a "build-and-leave" model to a community-managed maintenance framework to ensure the long-term sustainability of solar and hydro plants.

3. Regulatory Streamlining: Simplify the licensing process for small-scale independent power producers (IPPs) to accelerate the deployment of mini-grids.

From the foregoing, when viewed together, the 2014 Energy Efficiency Action Plan and the 2016 Rural Electrification Development Plan (PDER) form the dual pillars of Cameroon's "Vision 2035." However, their success is codependent that is "Supply-Demand" Synergy. If the 2014 Plan has to be efficient, it must target a reduction of 450 MW in demand through better standards and loss reduction, the government creates "virtual capacity." The 2016 Plan must be accessible so that this "saved" energy can then be redirected to support the aggressive grid extensions and mini-grid deployments required for rural areas without necessitating the immediate construction of massive, expensive new dams. Finally, these two policies operate in "silos." The Ministry handles efficiency standards (MINEE/ARSEL) while a separate agency (AER) handles rural rollout. This fragmentation often leads to a "leakage" of resources, where rural grids are built but remain inefficient from day one because energy-saving standards are not enforced at the village level. To improve the coherence of the national energy strategy, the following actions are recommended. Primarily, the government should mandate that all new PDER rural electrification projects include "Efficiency Kits" (LED lighting and highefficiency appliances) as part of the initial installation. Secondly, a joint task force between APRUE (Efficiency) and AER (Rural) should be established to ensure that technical standards are uniform across both urban and rural deployments. Additionally, international climate finance (Green Climate Fund, etc.) should be leveraged specifically for "Efficient Rural Access," rather than treating "Efficiency" and "Access" as separate funding categories. Ultimately, reaching universal access from a low starting base requires a mix of grid extension (Expanding the existing national network where feasible). Utilizing localized renewable sources (Hydro, Solar, Biomass) for isolated communities offer off-grid solutions for the most remote areas.

Electricity Sector Development Fund (FDSE, 2020)

Established in 2020 as a "special appropriation account," the Fonds de Développement du Secteur de l'Électricité (FDSE) was designed to provide a stable, dedicated source of public funding. Its creation reflects the government's recognition that relying solely on external grants or intermittent budget allocations was insufficient for achieving "Vision 2035." The Primary objectives and mandate is to legally to address three specific financial pillars. First is Project Viability which implies providing the initial capital or counterpart funding necessary to unlock large-scale generation and distribution projects. Second is an international obligation this is to ensure that Cameroon meets its financial commitments to regional and international energy organizations (e.g., the Central African Power Pool).Third is an emergency interventions which will require financing urgent repairs or critical infrastructure gaps identified by the Ministry of Water Resources and Energy (MINEE).

The 2035 Energy Sector Development Plan (PDSE)

The Long-Term Energy Sector Development Plan (PDSE 2035) serves as the strategic blueprint for Cameroon's transition to an emerging economy. It recognizes that industrial growth is impossible without a massive leap in energy availability. The PDSE 2035 sets aggressive benchmarks to bridge the current energy gap. This includes : capacity expansion (aiming to increase installed capacity from approximately 1,650 MW (2020) to 5,000 MW by 2035). Next is demand growth (addressing a domestic demand projected to rise by 6.7% annually). Followed by development of the basin (centralizing growth around the Sanaga River, specifically through "mega-projects" like the Nachtigal and Memve'ele hydroelectric plants). Lastly, to diversify the goal target of 25% renewable energy (excluding large hydro project over 5 MW) in the national mix by 2035, including an additional 1,500 MW of solar and mini-hydro.

From the aforementioned analysis, we discovered that, there is a fundamental "Strategic Paradox" in the PDSE 2035. While the plan officially promotes a 25% renewable mix to satisfy international climate commitments (NDCs), the legislative reality remains tethered to fossil fuels. Historically, Cameroon's regulatory framework

has prioritized oil and natural gas for thermal generation to ensure immediate grid stability and export revenue. This creates a policy inertia where the infrastructure for fossil fuels is being built faster than the regulatory pathways for the 1,500 MW of planned solar and mini-hydro projects.

To resolve this contradiction and meet the 2035 targets sustainably, the subsequent shifts are necessary. The government must reform the current electricity laws to remove the "favored status" of thermal (gas/oil) generation. This includes creating "Green Feed-in Tariffs" that make it financially attractive for private developers to build the 1,500 MW of renewable capacity. Next, instead of relying on traditional debt, Cameroon should aggressively pursue "Climate Swaps" or "Green Bonds" specifically tied to the PDSE's 25% renewable target. This would provide the "stable funding" that the FDSE currently lacks. To add, since the PDSE aims to make Cameroon an exporter, the Ministry ought to prioritize the "Central African Power Pool" interconnectors. This would allow Cameroon to export its surplus hydro energy during peak seasons, using the revenue to fund rural solar grids (the PDER)

National Development Strategy 2020-2030 (NDS30)

The National Development Strategy 2020-2030 (NDS30) serves as Cameroon's primary policy reference, succeeding the Growth and Employment Strategy Paper (GESP). Its overarching goal is the structural transformation of the economy to achieve emerging nation status by 2035. Chiefly, the NDS30 operates through four integrated pillars with the first being structural transformation (Shifting the economy toward industrialization).Complemented by human capital development (Improving education and well-being). Then there is the social protection (promoting employment) and decentralization of governance (which involves strengthening local institutional power).

To measure success, the NDS30 sets a specific industrial target: increasing manufacturing value-added from 12.9% (2016) to 25% by 2030. This expansion is directly contingent upon a massive, reliable increase in energy supply and the modernization of the national grid. From data insights, the NDS30 introduced policy equivalence between industrialization and climate action. On one hand, it mandates a 35% reduction in greenhouse gas emissions (conditional) by 2030. On the other, it demands an industrial explosion that historically relies on high-carbon energy. The strategy identifies the energy sector as the direction for this transformation, but it creates a competing priority: the immediate need for industrial power vs. the long-term mandate for clean, resilient energy. While the NDS30 supports adaptation to climate impacts (like droughts affecting hydro-dams), the technical roadmap for how industry will grow without increasing emissions remains vaguely defined.

For the NDS30 to move beyond a high-level vision and become a functional reality, the following policy alignments are recommended. Industrial-Energy Synchronization which means the Ministry of Economy should create "Green Industrial Zones" where the 25% manufacturing goal is met specifically through the 1,500 MW of renewable capacity mentioned in the PDSE. Climate-Resilient Infrastructure which suggests that given the NDS30's focus on vulnerability to droughts and floods, the government ought to mandate "*Climate Stress Tests"* for all new large-scale hydro projects to ensure they can sustain industrial growth under changing weather patterns. Additionally, decentralized governance this hints on leveraging the fourth pillar (Decentralization), the government must empower local municipalities to manage their own small-scale renewable projects, rather than relying on the centralized.

The Extractive Conflict (Mining Code 2023 and Petroleum code 2019)

Mining Regulatory Framework and Climate Change Mitigation

The 2023 Mining Code (Law No. 2023/014) represents Cameroon's latest attempt to formalize and sanitize an often-chaotic sector. However, it reveals a significant gap between environmental protection[6] and climate mitigation. Evidently, the code introduces several vital safeguards, which remain localized in scope. Establishments must contribute to a mining site and quarry restoration fund to handle post-extraction cleanup[7].

[6] Article 10 and 11: mining operations must not endanger workers or the environment. It mandates monitoring of exposed surfaces, pit slopes and rehabilitation

[7] Olivier Bustin <<*Cameroon's New mining code: financing and state power>>Retrieved from https//wwwpinsentmasons.com/out-*

All projects require Environmental and Social Impact Assessments[8]. Pursuant to Section 61 and 62 of the Mining Law, the National Mining Corporation (SONAMINES) has to oversee state interests and environmental compliance.

The 2019 Petroleum Code

The 2019 Petroleum Code (Law No. 2019/008) of 25 April 2019[13] was enacted specifically to reverse declining production by making Cameroon more attractive to foreign oil majors. The code offers tax holidays of up to seven years for gas projects and introduces flexible Risk Service Contracts[9]. As of late 2019, the gamble is backed by 311 million barrels of crude and 149 billion cubic meters of natural gas. While Article 18 defines the "environment" broadly, it primarily focuses on "decommissioning" and "damage liability" rather than atmospheric protection.

This current situation highlights that there is a regulatory disconnect in both codes. The Mining Code treats climate change as a footnote to localized pollution, ignoring the massive carbon footprint of industrial mineral processing. Similarly, the Petroleum Code is a masterpiece of economic attraction but a climate lacuna. It incentivizes gas extraction to secure state revenue, yet offers no mechanism to regulate the methane flaring or greenhouse gas (GHG) emissions that directly conflict with the 35% NDC reduction target. In effect, the Ministry of Mines and the Ministry of Petroleum are running a race that the Ministry of Environment is being asked to pay for.

To align the extractive sector with the national "Energy Gamble," the following reforms are crucial. The Mining and Petroleum Codes should be amended to include carbon limits (GHG) from extraction sites. Companies that exceed these limits should pay a levy that feeds directly into the FDSE to fund renewable offsets. Also, methane roadmaps should be specifically for the Petroleum Code, the government must transition from voluntary compliance to a mandatory zero routine flaring policy, aligning with the Global Methane Pledge. Likewise, there should be low-carbon mining incentives like the tax holidays given for oil[10], the 2023 Mining Code ought to offer "Green Credits" for mining companies that power their operations using on-site renewable mini-grids instead of diesel generators

The 2012 Gas Code

The Law No. 2012/006 of 19 April 2012 to Institute the Gas Code was a pivotal legislative overhaul, replacing the 2002 Gas Code with the core objective of attracting massive foreign investment for the development and commercialization of Cameroon's significant natural gas reserves, estimated at over 500 billion cubic meters. Its provisions focus heavily on the downstream sector transportation, distribution, processing (like LNG and fertilizer projects), storage, and marketing and introduced the Gas Convention, a mechanism for offering special tax and customs incentives, including potential tax holidays for up to ten years and reduced corporate tax rates, specifically for large, strategic gas projects[11]. While the Code prioritizes meeting domestic energy needs first and includes environmental protection[12] as a general obligation, its structure is primarily geared towards maximizing resource exploitation and economic returns, with specific, binding climate change mitigation measures, such as mandatory carbon capture or stringent flaring limits, not being central to its core financial and legal incentives, thus highlighting a potential conflict between investment promotion and climate concerns. However, it should be noted that this code is applicable with the 1996 framework on Environmental Management.

/law/analysis/Cameroon-new-mining –code-financing-state-powers. Accessed on 19/02/2026

[8] Republic of Cameroon, Law No. 2023/014 of 19 December 2023 relating to the mining code,Article 35 ,2023 mining code [13] Republic of Cameroon, Law No 2019/008 of 25 April 2019 to institute the petroleum code

[9] Ibid see section 15 and 16

[10] Article 114-116 while Article 128-129 deals with the exception Petroleum code, 2019

[11] Law No. 2012/006 of 19 April 2012 to Institute the Gas Code (Cameroon) (and related expert analysis/summaries citing its provisions and gas reserve figures).

[12] Ibid. see Section 30

The 1996 Framework Law on Environmental Management and CCM

The 1996 Framework Law No. 96/12 on Environmental Management establishes the fundamental legal architecture for environmental protection in Cameroon, acting as the primary instrument through which initial Climate Change Mitigation (CCM) obligations were indirectly enforced[13]. Although the law predates the establishment of dedicated national climate institutions like the National Climate Change Observatory (ONACC), its provisions relating to resource protection, pollution control, and preventative measures laid the necessary groundwork for future climate action. Crucially, Article 17 mandates the application of an Environmental Impact Assessment (EIA) for any development project, structure, or installation likely to harm the environment[14]. This proactive requirement is vital for CCM, as it subjects major emissions-intensive projects (such as fossil fuel infrastructure or large-scale industrial activities) to scrutiny, allowing for the integration of mitigation measures at the planning stage. Failure to comply with the EIA regime can result in the Administration in charge taking immediate action, including suspension of ongoing work and the application of fines ranging between CFAF 2 million and CFAF 5 million ($2,900 to $8,000 USD, approx.)[15]. Furthermore, Article 36 provides a constitutional basis for resource stewardship, stipulating that soil, subsoil, and their resources must be managed jointly and rationally, offering a legal defense against the environmental degradation often caused by unsustainable energy exploration and exploitation.

Beyond regulatory mechanisms, the 1996 Law introduces economic principles and institutional structures that support CCM efforts, most notably through the "Polluter Pays Principle," defined in Article 9(c)[16]. This principle requires that the charges resulting from measures aimed at preventing, reducing, and fighting pollution, including rehabilitation costs, must be borne by the polluter, thereby creating a financial disincentive against activities generating high Greenhouse Gas (GHG) emissions. Supporting this financial objective, the law established the National Environmental and Sustainable Development Fund, designed, in part, to support programmes promoting clean technologies and environmental research. While the law does not explicitly set GHG emission targets a measure typically reserved for subsequent sectoral decrees and national strategies its comprehensive approach to forest conservation is indispensable to Cameroon's nationally determined contributions (NDCs). Given that forestry and petroleum export constitute the country's main economic activities, and with 60% of Cameroon's land (approximately 28 million hectares) covered by forests, the Law's emphasis on sustainable resource management indirectly functions as the primary legal defense against deforestation, which is the country's largest source of non-energy-related emissions.

National Environnemental Management Plan (NEMP)

The National Environmental Management Plan (NEMP), or Plan National de Gestion de l'Environnement (PNGE), serves as the foundational strategic document guiding environmental policy and resource governance in Cameroon, emerging from the post-Rio Summit reform process in the mid-1990s. Initially drawn up in 1996 with support from the United Nations Development Program (UNDP), the NEMP was subsequently revised in 2008 to align with evolving national development priorities and escalating global environmental threats[22]. Its central objective is the articulation of policies, strategies, and concrete actions necessary for the protection of the environment and the rational, sustainable management of the country's extensive natural resource base, which includes a significant portion of the Congo Basin forests. The plan established five key priority areas designed to integrate ecological considerations into socio-economic planning: participatory land use management, sustainable management of natural resources, restoration of degraded land and improvement of soil fertility, capacity building, and concerted management of shared resources at the sub-regional level. These pillars underpin the country's subsequent legislative framework, most notably the 1996 framework law on

[13] LAW No. 96/12 OF 05 AUGUST 1996 RELATING TO ENVIRONMENTAL MANAGEMENT. Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), Cameroon.

[14] MINEPAT, Cameroun. (2022). THE ENVIRONMENT: Major Legal Texts on Environmental Management. *Rapport Etat de l'environnement*.

[15] World Wildlife Fund. (2024). *Environmental and Social Management Framework for Cameroon Projects*

[16] Scholars Middle East Publishers. (2019). The Polluter Pays Principle and The Law in Cameroon. *Scholars International Journal of Law, Crime and Justice*, 2(10). 22 Proforest. (2021). *Overview and Analyses of Key National Policies, Strategies and Action Plans Relevant to Deforestation, Child and Forced Labour, and Smallholder Inclusion in Cameroon*.

23 Air Quality Life Index (AQLI). (2024). *Cameroon Fact Sheet*.

environmental management, positioning the NEMP as the reference blueprint for assessing environmental impact and ensuring the ecological balance is maintained across all major national development projects.

While the NEMP provides a robust policy structure, its implementation highlights significant environmental challenges that Cameroon continues to face, particularly concerning pollution and habitat loss. The plan is operationalized through various sector programs, such as the Forest Environment Sector Program (FESP), which seeks to reduce deforestation and biodiversity loss. However, statistics reveal the persistence of environmental degradation that directly impacts public health and climate goals. For instance, particulate pollution (PM 2.5) in the country is estimated to take approximately 2.7 years off the life expectancy of the average Cameroonian resident, illustrating a critical challenge that necessitates stronger enforcement of the NEMP's air quality and waste management protocols[23]. Furthermore, in response to global climate pressures, the NEMP provides the strategic context for the country's commitment to reducing its carbon footprint by a significant 35% by 2030. Despite these ambitious targets and strategic foundations, persistent internal challenges, including institutional weaknesses and governance issues—evidenced by the country's 2018 verall governance performance score of only 46.2 out of 100 have historically complicated the effective, nationwide enforcement of the NEMP's provisions.

The Legal Gap: Analyzing the Disjointed Frameworks and Impact on Sanaga River

The most significant implication of the disjointed legal and policy frameworks for climate change mitigation in Cameroon is that it hinders ability to effectively mainstream climate action into core economic and fiscal planning, ultimately slowing the country's progress toward its ambitious national and international commitments. While Cameroon has developed several key policy documents, including the updated Nationally Determined Contribution (NDC) which targets a 35% reduction in Greenhouse Gas (GHG) emissions by 2030 compared to business-as-usual, the country still lacks a comprehensive, binding legal and regulatory framework that mandates climate integration across all sectors[24]. This fragmentation means that climate-related objectives are often secondary to immediate sectorial interests, leading to a persistent disconnect between mitigation goals and on-the-ground actions, particularly in high-emitting sectors like agriculture and forestry. For example, despite the national ambition to preserve the Congo Basin forest, average annual deforestation rates reached as high as 1.07% between 2005 and 2010, largely driven by small-scale agriculture using traditional methods, which accounts for an estimated 85% of deforestation in the country. The absence of a unifying legal tool prevents the robust, cross-ministerial coordination needed to harmonize forest protection efforts (mitigation) with rural development and land tenure issues (adaptation), thereby limiting the country's potential to finance and realize the full US$ 57.6 billion total cost estimated for its combined mitigation and adaptation agenda by 2030.

More so, recent interviews with stakeholders at the Rural Electrification Agency (AER) and MINEE reveal a systemic friction which the law does not capture. The organizational problem, the interviewees noted that while the 2011 Electricity Law allows for independent power, the bureaucratic distance between MINEE (Policy) and ARSEL (Regulation) creates a twenty- four month delay on average for mini-grid licensing. Furthermore, personnel at the FDSE confirmed that international grants (World Bank/EIB) often sit idle because the state fails to mobilize its mandatory counterpart contribution in time.

Impacts of Low Water Levels on Sanaga River Dams

The global transition toward renewable energy is increasingly characterized by a complex paradox: while these clean energy sources are the primary tools for mitigating global warming, they are simultaneously among the most vulnerable to the volatile climatic shifts they seek to prevent. In Cameroon, this double-edged relationship is most visible in the hydropower sector, which serves as the nation's energy cornerstone but is increasingly threatened by rising temperatures and shifting precipitation patterns. Between 1974 and 2020, average temperatures in Cameroon rose by 0.86°C, while precipitation has seen a steady decline of approximately 2.9 mm per decade since 1960. These shifts have created a critical hydrological dependency where even major river basins, such as the Sanaga which accounts for over 70% of the nation's hydroelectric potential face projected

climate-induced runoff reduction risks of up to 22% in worst-case scenarios[17].

To counter this vulnerability, the Cameroonian government has shifted its focus toward hydrological regulation and the diversification of its energy mix to build national climate resilience. Central to this strategy is the use of massive reservoirs, such as the 6 billion m³ Lom Pangar regulating dam, which acts as a vital buffer against increasing hydrological variability by ensuring stable downstream production even during severe dry seasons. Furthermore, the integration of large-scale projects like the 420 MW Nachtigal Hydroelectric Plant, commissioned in early 2025, has increased the share of renewables in the national grid by nearly 30%. This increased capacity is essential for achieving Cameroon's updated Nationally Determined Contributions (NDC), which target a 35% reduction in greenhouse gas emissions by 2030[18].

Beyond hydropower, solar energy has emerged as a critical climatic insurance policy, particularly in the northern regions where irradiation levels average a high 5.8 kWh/m²/day. As climate change induces more frequent droughts that cripple hydroelectric dams, solar power provides a reliable alternative that peaks during the dry seasons when water levels are lowest. The strategic expansion of utility-scale solar, such as the Maroua and Guider plants which reached a combined capacity of over 64 MW by late 2025, has already begun to stabilize the Northern Interconnected Grid (RNI) following significant production drops at the Lagdo dam. This synergy between different renewable sources is vital, as the World Bank estimates that a lack of adaptation measures could lead to a GDP loss for Cameroon of 4% to 10% by 2050 due to climate shocks[19].

Despite these advancements, the deployment of renewable infrastructure faces significant environmental and technical hurdles that are exacerbated by a changing climate. For instance, the land-intensive nature of largescale solar arrays can lead to habitat fragmentation, while tropical reservoirs in Cameroon can act as methane factories if not managed properly, potentially offsetting some of the immediate climate benefits. Additionally, traditional biomass still accounts for approximately 74% of the country's total primary energy consumption, a reliance that drives deforestation and increases community vulnerability to climate-related economic shifts[20]. Addressing these challenges requires a rigorous legal framework and the continued scaling of decentralized systems such as the government’s plan for 50 small hydropower plants to bridge the rural electrification gap where access rates remain as low as 24%.

Hydropower Varying Risks

Hydropower, while a cornerstone of renewable energy transitions globally, is subject to a complex array of varying risks that span hydrological, environmental, social, and financial dimensions. These risks are increasingly magnified by the accelerating impacts of climate change, which disrupt the very water cycles that hydropower depends on.

Hydrological Variability and Climate-Induced Risks

Hydropower’s primary risk is its inherent dependency on stable water cycles, a vulnerability often referred to as hydrological risk. In regions like Cameroon, this is evidenced by the Northern Interconnected Grid’s historical 90% production drop at the Lagdo dam due to severe droughts. Rising global temperatures, which increased by 0.86°C in Cameroon between 1974 and 2020, coupled with declining precipitation patterns, create a double-edged dynamic where the sector is both a tool for mitigation and a victim of climate change. Even robust basins, such as the Sanaga River, face projected climate-induced runoff reductions of up to 22% in worst-case scenarios. The Sanaga basin accounts for the vast majority of Cameroon’s hydroelectric potential. When water levels drop

below the threshold required for the Songloulou and Edéa plants, the national grid experiences immediate

[17] IMF (2024). *Cameroon: Request for an Arrangement Under the Resilience and Sustainability Facility.* International Monetary Fund (IMF) Country Report No. 24/53
[18] IRENA (2025). *Renewable Energy Statistics 2025: Focus on Central African Potential.* International Renewable Energy Agency.
[19] PV Magazine (2025). *Solar, Off-grid Systems Key to Cameroon’s Electrification Strategy.* Published October 2025
[20] World Bank (2025). *Cameroon 2025 Economic Update: Fourth Edition — Journey Toward Universal Electricity Access.* World Bank Documents & Reports

instability[21]

Environmental Impact and Methane Factories

Contrary to the perception of hydropower as purely green, large-scale reservoirs can become methane factories. The decomposition of flooded organic matter in warm tropical waters can release significant pulses of methane, a gas with a global warming potential 34 times higher than CO_2. For instance, Cameroon's Lom Pangar reservoir, which spans 540 km^2, initially faced these emission challenges and necessitated specialized management to avoid offsetting the project's immediate climate benefits.

Biodiversity Loss and Habitat Fragmentation

Large dam construction often results in irreversible damage to local ecosystems. The 420 MW Nachtigal project in Cameroon, despite its economic benefits, identified the potential loss of 159 hectares of secondary forest and shrubby savannah. Furthermore, dams can cause hydro-ecological collapse by disrupting the migratory pathways of endemic species, such as the *Ledermanniella sanagaensis* in the Sanaga River, requiring massive biodiversity offsets like the creation of the Deng Deng National Park to protect endangered central chimpanzees[30].

Socio-Economic Displacement and Human Rights

The human cost of hydropower includes significant physical and economic displacement. The development of the Nachtigal plant alone impacted approximately 919 project-affected persons (PAPs) through land expropriation and affected the livelihoods of roughly 1,100 individuals, including local fishermen and sand miners. While contemporary projects utilize Resettlement Action Plans (RAP), legal disputes over compensation remain common, as seen in the May 2024 settlement agreements between power companies and local fishing communities[22]. Low water levels alter the river's thermal profile and oxygen levels, impacting both biodiversity and the communities that depend on the river for non-energy purposes[32]. Worse still, the indigenes around the vicinity are plagued with the disruption of fish migration patterns and the degradation of water quality for downstream domestic use.

Infrastructure Vulnerability and Maintenance Gaps

A critical sustainability gap exists in hydropower infrastructure, particularly for small-scale projects. Historical data indicates that fewer than 40% of decentralized off-grid systems in some regions operate at full capacity due to a lack of local technical expertise and maintenance funding. This usage gap means that the initial installation of technology often outpaces the long-term support systems required to keep it operational, leading to high failure rates in early renewable installations[23]. Reduced water levels lead to "low-head" operations, which increase the risk of mechanical fatigue. Furthermore, the concentration of sediment in lower volumes of water accelerates the wear on turbine components[24]

A Comparative Analysis on the Energy Gamble of South Africa and Vietnam as case studies for Cameroon.

We compare Cameroon's Energy Gamble with two similar emerging economies:

[21] Electricity Development Corporation (EDC) (2024). Operational updates on the Lom Pangar Reservoir filling levels; Eneo Cameroon S.A. Annual Report (2024).

[22] Business in Cameroon (2025). *Cameroon's Power Sector Undergoes Electric Revolution (2018-2025)*

[32] African Development Bank (AfDB) (2024). Nachtigal Hydropower Project ESIA Summary; UNESCO Digital Library (2024).

[24] IMF eLibrary. (2024). *Climate Change in Cameroon: Key Challenges and Reform Priorities*.

[23] World Bank (2025). *Cameroon's Journey Toward Affordable, Reliable, and Universal Electricity Access for All*

[24] ResearchGate / John Wiley & Sons (2025). The Sanaga Discharge at the Edéa Catchment Outlet: Hydrologic Responses to Precipitation Changes; UNESCO Digital Library (2024).

COUNTRY	STRATEGY	THE GAMBLE	Lesson for Cameroon
South Africa	JETP(Just Energy Transition Partnership)	Moving from coal to Hydrogen while maintaining grid stability.	It shows that Governance Capacity is more important than financial pledges
Vietnam	PDP8(Power Development plan)	Aggressive Solar/wind scale-up to reduce reliance on coal and hydro.	Demonstrates that grid Modernization must happen before generation expansion

Comprehensive Findings

Stagnation of the 5,000 MW Target: While the Nachtigal Hydroelectric Plant (420 MW) reached full power in 2025, total national capacity remains below 2,000 MW. The gamble of reaching 5,000 MW by 2035 is currently off-track, with a deficit gap of over 3,000 MW remaining.

There is persistence of the rural dark hole. Despite the national access rate reaching 74% in 2026, rural electrification stagnates at 27%. The empirical data shows that grid extension (the traditional gamble) is too slow and costly to reach the 75% of rural citizens still without power.

The FDSE originally intended for long-term growth, is primarily used for emergency repairs and loan servicing (over CFA 41.5 billion in 2026). This limits the state's ability to fund the 1,500 MW of renewable energy promised in the NDC.

The Methodological triangulation reveals that the 24-months delay in licensing for Independent Power Producers (IPPs) is caused by fragmented oversight between MINEE, ARSEL, and AER. This institutional friction deters the $6.5 billion in private investment needed for the 2030 Energy Compact.

Lastly seen was the legislative fossil-fuel bias. The 2019 Petroleum Code and 2023 Mining Code create a legal gap. They offer tax holidays and incentives for hydrocarbon extraction but lack any binding greenhouse gas (GHG) reduction targets, directly undermining Cameroon's 35% carbon reduction pledge.

Strategic Recommendations (The Path Forward)

Operationalize a one-stop shop for renewables. To reduce the 24-month licensing delay, the government should create a unified regulatory portal that merges AER and ARSEL approvals for small-scale (under 5 MW) renewable projects.

Mandate green mining credits. Law No. 2023/014 ought to be amended to allow mining companies to deduct a percentage of their *Restoration Fund* contributions if they power at least 40% of their operations via on-site solar or mini-hydro.

Reform the FDSE into a Guarantee Fund. Instead of using the FDSE for emergency repairs, the Ministry must repurpose it as a *Risk Guarantee Fund* to lower the interest rates for private solar companies entering the rural market.

Adopt the efficiency first principle. To bridge the generation gap, Cameroon should legally mandate that all new industrial permits include an "Energy Efficiency Audit," aiming to save the 450 MW equivalent identified in the 2014 Strategy (1.2.1).

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30 PV Magazine (2025). *Solar, Off-grid Systems Key to Cameroon's Electrification Strategy*.

Formalize Decentralization Transfers. The 2026 budget's transfer of CFA 19 billion to municipalities should be increased and protected by law to ensure that 237 local authorities can maintain their own micro-grids without waiting for central government approval.

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GENERAL CONCLUSION

Cameroon’s "Energy Gamble" is at a critical crossroads. The country has successfully moved from a pure "paper vision" to concrete infrastructure milestones most notably the Nachtigal Dam and a 74% urban electrification rate. However, the manuscript's analysis reveals that this progress is structurally lopsided. The "Gamble" to achieve emergence by 2035 through a hydro-and-gas-heavy grid is currently being undermined by three factors: institutional fragmentation, a massive rural-urban divide, and a legal disconnect between extractive industry goals and climate commitments. Ultimately, for Cameroon to win its gamble, it must transition from a centralized, hydro-dependent model to a decentralized, climate-aligned framework. This requires moving beyond high-level strategy and into the fine print of legislative reform specifically by bridging the legal gap in the Mining and Petroleum codes and empowering the local municipalities to light their own paths.