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Hydropower-Climate Change Nexus: The need for a New policy approach

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Abstract
Hydropower as a major source of energy is a red flag for climate change given the numerous effects that development of hydropower projects could have on the environment. Governments have responded to the challenge of climate change through a number of approaches; including policies and legislation that border on environmental protection. Energy production and consumption are among the biggest culprits in climate change, notwithstanding, climate change and energy are currently disjointed in many West African countries. The disjoint between climate change, environment and hydropower policy is more obvious than in the past. There is need for cohesion and coordination among institutional role players. The national climate change plans and policies, environmental policies and hydropower development in some West African countries are compared to establish the need for enhanced policy cohesion and institutional integration in the bid to address climate change challenges. A review of existing legislation is made and recommendations for enhanced policy coordination, and integrating institutional frameworks to ensure concerted efforts are outlined.

Keywords
Climate change–Hydropower–Environmental Impact Assessment–policy framework.

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Contents

1. Introduction

Climate change is presently a global challenge that impacts all countries irrespective of natural boundaries. It has been defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods.1 Considerable attention is now being paid to the challenge of climate change and there is now a consensus that we are developing unsustainably. The environment bears the heaviest impact of unsustainable development. Hydropower development has significant impact on the climatic conditions and as such climate should become a core consideration in hydropower development and management. Connecting these two aspects is also essential for addressing the environmental and development dimensions of sustainable development. This paper examines the international historical perspective, regional landscape and national framework in Nigeria, Ghana and Liberia. It is imperative to understand the basic underpinnings of international and regional efforts towards the sustainable development of hydropower from a climate change perspective in order to understand how countries can replicate or domesticate internationally recognized rules and principles.

The nexus between environment and development first gained international recognition during the United Nations Conference on the Human Environment held in Stockholm in 1972 also known as the Stockholm Conference with its resultant Declaration of Twenty Six (26) Principles. The World Commission on Environment and Development (WCED) was created in 1983 as an independent body by the United Nations General Assembly. Its mandate was to advance an agenda for change given the outcome of the Stockholm Conference that anthropogenic factors should become a cause for concern. However, attention to climate change as a global challenge did not become prominent in the field of energy until the United Nations Framework Convention on Climate Change (UNFCCC)2 was adopted in 1992 as one of the outcomes of the United Nations Conference on Environment and Development (UNCED). The Conference was, in part, a result of the Brundtland Commission Report titled “Our Common Future,” because the debates and Conference

Documents were framed from the Report. The Report wove together social, economic, cultural and environmental issues and global solutions, and reaffirmed that "the environment does not exist as a sphere separate from human actions, ambitions, and needs, and therefore it should not be considered in isolation from human concerns. The environment is where we all live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable."3 On the other hand, as a framework Convention, UNFCCC allows protocol to be adopted from it and the Kyoto Protocol4 was adopted pursuant to the Convention in 1997.

Most recently, the United Nations Sustainable Energy for All (UNSE4ALL) Initiative was launched in 2011 to ensure universal access to modern energy services, double the global rate of improvement in energy efficiency, and double the share of renewable energy in the global energy mix by the year 2030. It requires each country to prepare and implement an Action Plan that strategically maps out the policy, institutional, financial infrastructural and human capital structure to enable each country achieve these goals. Countries need to address the challenge of climate change make decisions based on their own circumstances, the commitment and efforts of the Economic Community of West African States (ECOWAS) that portend regional and multilateral co-operation also drives the region's goal of universal access by 2030, but national commitments vary. Hence, the national measures are also assessed alongside the commitment to implementation of regional and international agreements that have the capacity to accelerate hydropower use and development.

The persuasive nature of international agreements and principles the practice of dualism by most countries in Africa in that internationally agreed principles do not have automotive application to the national home front indicates that hydropower legislation mostly falls within the residual powers of national governments even though these will be influenced by regional and international trends to various extents. It is apt to underscore that international and regional efforts have rapidly increased in the last decade and continues to expand rapidly, indicating that they may very well be the real cutting edge of hydropower legislation in the future. The Brundtland Commission also indicated that interstate cooperation in hydropower development could transform supply potential in neighboring developing countries in Africa. The reason that legislative measures are so significant is that the future progress in hydropower deployment is significant to the development of a sustainable energy framework for the region's future. The development of energy resources and advancing their significant inclusion in the energy mix largely depends on the availability and strength of government policies, and laws as well as the institutional feasibility to implement such policies and laws.

2. Hydropower in the ECOWAS region

In 1999, the West African Power Pool (WAPP) was created by Decision A/DEC.5/12/996 of the 22nd Summit of the Authority of ECOWAS Heads of State and Government to integrate the operations of national power systems into a unified regional electricity market, which will, over the medium to long term, assure the citizens of ECOWAS Member States a stable and reliable electricity supply at competitive cost. The Pool is projected to develop through three consecutive phases. Phase 1 commenced in 2012 with the commissioning of the regional transmission infrastructure, trading arrangements and establishment of the regulator. Phase 2 proceeds from the previous phase and the third phase reflects a long-term vision to optimize the operations of the pool. As of 2014, hydropower made up 31% of current electricity generation in the region. The Pool will provide the essential building block for a sustainable energy infrastructure network in the region. The mandate of WAPP includes the development of large hydropower projects of 100 megawatts and above. This leaves less priority for small scale hydropower projects. Considering the goal of WAPP to facilitate cross-border energy trade between utilities in the member countries, small scale projects could be directed to local consumers and increasing access to electricity in rural areas. All ECOWAS States are members of WAPP.

An Environmental Policy for ECOWAS was adopted in 2008 at the Thirty Fifth Ordinary Session of the Authority of Heads of State and Government Abuja, Nigeria. The Policy covers all aspects of natural resources management, environmental protection and human settlements and particularly of the urban habitat. It was aimed at reversal of the state of degradation of natural resources and to improve the quality of their living conditions and environment, to conserve biological diversity, so as to secure a healthy and productive environment by improving the ecosystem balance and the well being of the populations.8 As part of its strategic lines of action, the policy called for the set up and support for a functional regional technical consultation to monitor and boost the implementation of the international Conventions with special attention to the UNFCCC and the Kyoto protocol. There is no clear indication of mainstream. Notwithstanding, ECOWAS does not have a climate change policy and no mention of climate change or hydropower development is made in the Policy. It remains unclear how the policy can implicitly impact hydropower development as a strategy to address the challenge of climate change occasions by high carbon emissions. ECOWAS Renewable Energy Policy9 was adopted in 2012 in keeping with the Treaty as noted above. The purpose of the Policy is to enable increased use of renewable energy resources for grid electricity supply and for the provision of access to energy services in rural areas. It was designed to complement conventional sources for power production like large hydro and natural

gas). The policy primarily targets the electricity sector, but also considers some additional issues regarding the domestic energy sector. The renewable energy Directive of the European Union provides a strong model for the policy as the former indicated that regional co-operation is essential to garner national commitment towards a common objective. The commitment of ECOWAS Member States to mainstream renewable energy into their national policies requires co-operation in order to surmount the multifaceted barriers they currently encounter from national initiatives.

The policy marks the initial steps of aligning the national renewable energy policy with the ECOWAS renewable energy (EREP). The plan of the policy is to translate same into national targets and activities by developing National Renewable Energy Policies (NREPs) and corresponding Action Plans by the end of 2014. The Policy aims to enable universal access to electricity in the region by 2030. The NREAPs are a five-year bound and their implementation of NREAPs is coordinated and monitored by ECREEE on behalf of the ECOWAS Commission.

The ECOWAS White paper of 2006 was adopted as a regional policy to support access to energy services for rural areas known by ECOWAS Heads of States. The White Paper aims to contribute to the Millennium Development Goals (MDG) and to reduce poverty. This effort to improve energy access for populations in rural and peri-urban areas in the region forecasts that at least 20% of new investment in electricity generation should originate from locally available renewable resources. These would in turn ensure that member States are able to achieve self- sufficiency, and sustainable environmental development. ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) in Cape Verde in 2010 are key steps to establish the institutional feasibility necessary to support small hydropower development in the region. ECREE drives renewable energy in the region through technological capacity and facilitate exchange among Member States.

The ECOWAS Small-Scale Hydropower Program (First Phase: 2013 to 2018) jointly developed and executed by ECREEE and United Nations Industrial Development Organization was adopted by the ECOWAS Ministers of Energy in October 2012 to be implemented between 2013 and 2018. The program was aimed at establishing an enabling environment for small-scale hydropower investments and markets in the ECOWAS region. As a priority action under the regional SE4ALL framework for West Africa, the SSHP program contributes to the objective of the ECOWAS Renewable Energy Policy to increase the share of renewable energy (excluding large hydro) in the region's electricity mix to an average 10% in 2020 and 19% in 2030. It will boost the ECOWAS White Paper on Energy Access in Peri-urban and Rural Areas which targets 25% renewable energy-based service to rural population. The SSHP complements the West African Power Pool (WAPP) Master Plan which is mainly focused on the expansion of transmission lines and generation from large hydro and natural gas.10 The UNIDO-Regional Center for Small Hydropower was established in Nigeria in 2006 to implement the SSHPP.

One of the core objectives of the program is to enable strengthening of policy and regulatory frameworks for small hydropower use and development in Member States. It is projected that by 2018 ECOWAS countries would have improved their legal framework and that SSHP would have become an integral part of ECOWAS/WAPP planning documents. Assessment of the relevant existing policies on SSHP policies and legal and regulatory frameworks is a core activity of the program. The assessment will enable comparison with successful policy models across countries.

3. National frameworks

There is essentially a difference between large hydro and small hydropower system; while large hydropower systems date many decades back in the region, interest and commitment to developing small hydropower systems is nascent and has evolved with the advancement of sustainable development, renewable energy and rural access to electricity. In the countries where hydropower makes up the most portion of the energy mix, the legislation on the use and development of hydropower were enacted to establish implementing institutions alongside. Hence, the following examination of the legislative landscape for hydropower in some ECOWAS countries is made bearing in mind that hydropower and climate change intersect the environment and energy sector.

4. Ghana

Hydropower is the major source of Ghana's electricity generation- 67% in2011 and a projected 41% additional capacity by 2020.11 This indicates that Ghana's energy supply is vulnerable to climate change disruptions occasioned by drought and as such requires resilience and mitigation measures. The Government of Ghana has a national energy policy objective to provide affordable access to electricity to all communities by 2020. It also hopes to become a net exporter of electricity by 2015.12 The policy also set a goal of 10% from renewable energy in the electricity mix by 2020, but this goal does not include the share of large hydropower plants, which already represents a share of between 60-70% in its power generation. The government's policy on small hydropower was stated to include the creation of appropriate incentives and a regulatory framework for its development. The Policy aimed to promote the development of hydropower by improving the fiscal and regulatory framework and incentivizing development of small hydropower. This policy objective was

realized through the Renewable Energy Act. Prior to the enactment of the Renewable energy Law in 2011, the challenge of developing small hydroelectric projects persisted due to the absence of a legal and regulatory framework for renewable energy. The Renewable Energy Act, 2011 (Act 832) aims to promote, develop, manage, utilize, sustain and ensure adequate supply of RE resources for power and heat and other related purposes. RE as defined by the Act includes wind, solar, hydro, biomass, bio fuel, landfill gas, sewage gas, geothermal energy and ocean energy. The Law created a Feed in Tariff scheme to further incentivize private sector investment in renewable energy. The feed-in- tariff component will ensure return on investment for independent power providers; including small hydro generators in both urban and rural areas. Sequel to the Act, the Energy Commission published the License Manual in 2013 for Service Providers in the Renewable Energy Industry to complement the scanty provisions of the Act with regards to independent generation from renewable sources including hydro.

As part of efforts to meet her obligations under the UNFCCC and as a signatory to the Kyoto Protocol, the government of Ghana restated its commitment to achieve 15% penetration of rural electrification by decentralized renewable by 2015 and 30% by 2020. In its second communication to the UNFCCC13 It also outlined policy options for coordination of climate change and the Convention activities with the creation of an implementation framework consisting of relevant government agencies led by the Ministry of Environment, Science and Technology which serves as the focal institution for climate change activities and host of a functional National Committee on Climate Change. The Committee consists of experts from government Ministries, Universities, Research Institutions, the Private sector and Non-Governmental Organizations and has a Ministerial directive to, among other things formulate a National Climate Change Policy, map mitigation and adaptation strategies and make recommendations for scaling up climate change training awareness and planning. The Report highlighted the result of a technology needs assessment conducted in 2006 to Prioritize portfolios of technologies in the energy sector small and mini hydropower technologies emerged last on the list in order of priority after eight other kinds of technologies. It also identified a number of government agencies and academic institutions which mandates border on climate change and the need to enhance their capacity to ensure higher delivery on their mandates. However, these agencies are not strictly energy sector institutions and raises the possibility of lop sided efforts in the absence of strong coordination with energy sector institutions.

Ghana's Environmental Protecting Act was enacted in 1994 to establish an Environmental Protection Agency. The main functions of the Agency include policy planning, coordination of relevant ministries and collaboration with relevant stakeholders. It is understandable that the Act was made before the Kyoto Protocol was adopted, but it precedes the UNFCCC. However, the provision of Section 3 of the Act comes in useful when construed constructively. The Section enacts that the Minister may give to the Agency such directives of a general nature as to the policy to be followed by the Agency in the performance of its functions as appears to the minister to be necessary in the public interest. The challenge of climate change sufficiently fits this obligation.

In 2015, Ghana became the first African country to use the Hydropower Sustainability Assessment Protocol. The Protocol is a voluntary scorecard by which the hydropower industry can assess the social and environmental performance of its projects. The Protocol was prepared by the Hydropower Sustainability Assessment Forum (HSAF), a self-selected group of industry representatives, government agencies, financiers, and large NGOs. It allows the assessment of projects at four stages (early stage, preparation, implementation and operation). Projects are assessed across a range of aspects with scores from 1 to 5. The scorecard is not a standard, but could inform policy and design of appropriate frameworks at country levels. The protocol hasn been criticized for its lack of independence, substantive weaknesses, and the exclusion of dam- affected people from its preparation and use due to the exclusion of civil society groups and affected people were excluded from the process.

Ghana has a national energy policy and institutional framework on energy and environment, but did not have a climate change law or national policy on climate change that addresses climate change in its complex and multi sectoral dimensions until 2013. The country needed a unified strategy that addresses environmental concerns, hydropower development and climate change challenges in a cohesive manner. The National Climate Change Policy was issued in 2014 ensure a coherent and pragmatic approach to addressing the impact of climate change on the socio-economic development agenda of the economy. One of its cores areas of priority is Energy, Industrial and Infrastructural Development. Although the Policy makes copious reference to Ghana's commitment to international environmentally related agreements, Ghana national Water Policy, National Climate Change Adaptation Strategy and the Energy Strategy. However, no specific attention is paid to hydropower energy development and management in relation to climate change. There is also no legal framework outlined to guide its implementation.

The Ministry of Energy provides policy direction for the energy sector in Ghana, and is responsible for setting energy policy, including in the power sector. It exercises supervisory functions over the Energy Commission and the Public Utilities Regulatory Commission in their roles and technical and economic regulators of the energy sector respectively. The Energy Commission was established

in 1997 to regulate the country's energy sector and to co-ordinate all policies in the sector. The Commission is responsible for issuing licenses to utilities for electricity and natural gas in Ghana. The Public Utilities Regulatory Commission (PURC)15 was also established in the same year as an economic regulator while the Energy Commission is the technical regulator. PURC is responsible for setting electricity tariff. Accordingly, existing hydroelectric power utilities, independent small hydropower projects and potential projects are within the purview of both regulators. However, it is not clear whether there are clear line of co-operation among the Environmental Protection Agency and both regulators, and the laws are silent on the point.

5. Nigeria

Hydropower is presently the second largest energy resource for electricity generation in Nigeria. Nigeria's Energy Policy16 was approved by the federal government in 2003 to provide for optimal utilization and management the country's diverse energy resources. In addition to developing and harnessing hydropower with particular attention to the development of the mini and micro hydropower schemes and their integration into the energy mix, the policy also envisaged private sector and indigenous participation in hydropower in the process. Its major objectives were to increase the percentage contribution of hydro electricity to the total energy mix and employ mini and micro hydropower schemes for rural electrification.

Several strategies were outlined to achieve the above named objectives including the establishment and maintenance of multilateral agreements to monitor and regulate the use of water in international rivers flowing through the country, increased indigenous participation in hydropower stations planning, design and construction and active private sector participation. It also sought to ensure that rural electricity boards incorporate small-scale hydropower plants in their development plans an active support for R & D activities for the local adaptation of hydropower plant technologies. In order to scale up electricity generation, the policy aimed to develop other potential sites for hydropower, gas and coal-fired power plants for electricity generation. The short term strategy for hydropower implementation was the constant review and improvement of multilateral agreements on the use of water in international rivers flowing through the country, increased local participation and creation of appropriate fiscal measures as incentives to indigenous and foreign entrepreneurs for the local production of hydropower plants and accessories. Establishment of appropriate institutional arrangements, regulations, and guidelines for the development of small-scale hydropower plants was also outlined. In the medium term, government would introduce alternative technological options to ease the impact of water shortage on hydropower plants and establishment of mini - and micro- hydropower plants. Encouragement of the wide-spread construction of mini- and micro hydropower plants was set as a long term strategy. In keeping with the policy's goal to undergo a review every ten years, the Energy Commission of Nigeria commenced review of the policy in late 2013.

A Renewable Energy Master Plan was also drafted by the Commission with technical assistance from the United Nations Development Programme in 2005. The Plan identifies considerable potential for generating small and large hydro energy in the country. The Plan was reviewed in 2014 to make more concise projections based on the country's commitment to universal access to energy. The plan envisions deployment of small and medium hydropower projects for rural areas and as a strategy to increase the share of renewable in the country's energy mix. As a follow up, the Renewable Energy Policy Guidelines were issued by the Federal Ministry of Power in 2006 with the core objective to expand the role of renewable electricity in sustainable development through effective promotional and regulatory instruments. The Guidelines define renewable electricity to include electricity to include small, mini and micro hydropower.It adopted the definition ofhydro as stated in the Renewable Energy Master Plan 2005 was adopted and they are:

(i) Small hydro is all hydroelectricity schemes below 30 MW

(ii) Mini hydro is all hydroelectricity schemes below 1MW

(iii) Micro hydro is all hydroelectricity schemes below 100kW

(iv) Pico hydro is all hydroelectricity schemes below 1kW

The policy also aimed to develop regulatory procedures that are sensitive to the peculiarities of renewable energy-based power supply. The Guidelines define renewable energy as the use of energy from a source that does not result in the depletion of the earth's resources whether this is from a central or local source. "Renewable electricity" refers to electric power obtained from energy sources whose utilization does not result in the depletion of the earth's resources. Renewable electricity also includes energy sources and technologies that have minimal environmental impacts, such as less intrusive hydro and certain biomass combustion. These sources of electricity normally will include hydropower. The policy essentially reiterated the institutional and regulatory framework set out by the Constitution and the Power Sector Reform Act of 2005.

The Electric Power Sector reform Act of 2005 is presently the legal framework for the Nigerian electricity industry. It rests on the National Electric Power Policy

of 2001 that laid down the road map for reform of the electricity industry. The Act also established the Nigerian Electricity Regulatory Commission as the sole regulator of the electricity industry in Nigeria. The Commission is empowered to make regulation in furtherance of the provision of the Act.

Environmental protection and enforcement is the responsibility of the National Environmental Standards and Regulations Enforcement Agency (NESREA). It was established by the National Environmental Standards and Regulations Enforcement Agency. Act of 2007 which also currently governs climate change in Nigeria. It enacted that the Agency will enforce compliance with the provisions of such treaties to which Nigeria is a party. In accordance with the Constitution17 that requires every Treaty to be enacted into law by the National Assembly

through a process referred to as specific adoption or domestication, such international treaty must have been domesticated before compliance can be enforced by the Agency. The Agency is principally mandated to enforce compliance with the provisions of international agreements, protocols, conventions and treaties on the environment. The UNFCCC and the Kyoto Protocol, although ratified by Nigeria, have not been domesticated, meaning that the Agency is not at liberty or under obligation to enforce its provisions. This essentially leaves Nigeria without specific climate change regime with which to implement her commitments under both Treaties.

A Bill to establish a National Climate Change Commission for Nigeria was sponsored in 2008. The Bill sought to create the Commission with responsibility management and control of climate change and other related environmental matters. The Commission is charged with responsibility for the strategic planning and co-ordination of national policies on climate change and energy in all its ramifications. The Bill has been passed by the National Assembly but did not receive Presidential Assent.

The Bill empowered the Commission to implement both national and international regimes on climate change, act as Designated National Authority (DNA) for the purpose of implementation of theKyoto Protocol financial mechanisms; liaise with theUnited Nations Framework Convention on Climate. The UNFCCC and the Kyoto Protocol have been ratified by Nigeria but are yet to be domesticated. This portends that even when the Bill is enacted into law, the Commission will be unable to on the strength of the Act enforce the provision of international treaties. Therefore, domestication of relevant climate change treaties must precede the Act.

Nigeria's First National Communication18 to the UNFCCC was made in 2003, and it noted increased use of renewable resources, consisting of the introduction of small-scale hydro plants as a GHG mitigation strategy in the Energy Sector. The Communication precedes the Power Sector Reform Act of 2005 and the NESREA Act of 2007. A second national communication was made in 2014. The actions to combat climate change outlined in the second communication include deployment of more efficient Hydro Electric Power turbines that can be installed on small streams for electricity production. This strategy is of high priority and medium cost that both government and private sector can implement.

The Federal Government, through the Federal Executive Council, is at the apex of energy policy in Nigeria. FEC provides overall direction for the development of the electricity industry in Nigeria, in alignment with other national policies and, and also facilitate their alignment with Nigeria's international obligations, especially on climate change. The required legal and regulatory measures required to support renewable electricity policies are also its responsibility.

Federal Ministry of Power and Steel is saddled with policy making for the electricity industry; including renewable electricity policy. The Ministry also proposes policy options and recommendations to the Federal Government concerning legislation, policy and investment on renewable electricity; and Monitors and evaluates the implementation and performance of the policy within governmental agencies and in the electricity market. The Ministry has supervisory oversight over the regulatory institutions in the industry.

The Nigerian Electricity Regulatory Commission (NERC) was established by the Electric Power Sector Reform Act of 2005 and is responsible for independent regulation of the electricity industry and the creation, promotion and preservation of efficient industry and market structures to ensure the optimal utilization of resource for the provision of electricity services. In respect of renewable electricity, the Commission has the duty to develop simplified licensing procedures for renewable energy investments, a framework for power purchase agreement that ensures access to grid-based renewable electricity; preferential prices for renewable electricity to cover additional costs due to size, technology, location and the intermittent nature of the particular renewable electricity resource base and lower licensing charges for renewable electricity licensees. It must be noted that even though the Act empowers the Commission to regulate hydro electric power generation, transmission and distribution, the Commission does not enforce environmental protection. The latter is within the purview of the National Environmental Standards Regulation and Enforcement Agency created in 2007 as a federal agency to regulate the environment. However, at licensing stage, the Commission is bound to ensure that Environmental Impact Assessment of each hydropower project has satisfied the EIA standards as regulated by the Agency. NESREA is under the supervision of the federal Ministry of Environment; created in 1999 with overall mandate for protecting Nigeria's environment and the conservation of its natural resources. A Climate

Change Unit was created in the Department of Environmental Assessment. The CCU exists solely to coordinate the UNFCCC and the Kyoto Protocol and ensure Nigeria's performance of the parties' obligations under both treaties.

A Rural Electrification Agency exists to extend the national grid, develop isolated and mini- grid systems and renewable energy power generation for rural electrification. The Agency is also designed to serve as an implementation agency for the renewable electricity and provide a coordinating point for renewable electricity activities among state and federal agencies. One of the core implementation strategies of the Agency is the use of renewable energy resource for off grid projects including small hydro. The responsibility of conducting strategic planning and coordination of national policies in the field of energy in all its ramifications lies with the Energy Commission of Nigeria. The Commission was established by Act 62 of 1979 as amended by Acts 32 of 1988 and 19 of 1989. While the creation of the CCU is a welcome development, there is need for the Unit to maintain co-ordination and cohesion with the energy sector institutions with regards to combating climate change and creating adaptation strategies through hydropower development. Nigeria could use some more coordination between the regulatory institutions to improve climate change coordination and environmental protection as well as hydropower development.

6. Liberia

Liberia's Renewable Energy and Energy Efficiency Policy and Action Plan were adopted in 2008 and is presently implemented by the Centre for Sustainable Energy Technology. Both are targeted at facilitating government support through tax subsidies for renewables and increase investment in off-grid rural electrification through the deployment of renewable energy technologies. In 2009, the National Energy Policy was issued to lay down the country's vision for the energy sector. The policy is aimed towards universal access to modern energy services in the country.

The Ministry of Land, Mines and Energy has the statutory responsibility for the development of mineral, water and energy resources of the country and the administration of its lands. The Department consists of the Bureau of Hydrocarbons and the Bureau of Energy Technology and Policy Development. The Department regulates the electricity sector is in charge of linkages with energy-oriented organizations both state-controlled and privately owned. In addition, the department monitors and coordinates the energy sector (both conventional and non- conventional). The Rural and Renewable Energy Agency was established after the adoption of the NEP in 2009 to implement rural electrification to rural areas through grid-based and renewable energy technologies; including micro-hydropower systems. The National Energy Policy proposed that the Department shall have at least three divisions managed by Assistant Directors – the Division of Hydrocarbons, with management responsibility over the petroleum sector; the Division of Electricity and Renewable Energy, to look after the electricity sector and promote the development of renewable energy resources, and the Division of Energy Policy and Planning to look after all cross-cutting issues. However, the Division of Electricity and Renewable Energy is responsible for the formulation of electricity sector policy and plans, including the development and review of policies, quality standards, and master plans for grid, off-grid and renewable energy investments.

The environment protection and management law of the republic of Liberia was enacted in 2002 to create the Environmental Protection Agency as a monitoring, coordinating and supervisory authority for the sustainable management of the environment in partnership with other government ministries. The EPA is the successor of the National Environmental Commission of Liberia (NECOLIB) that was first established in 1999. The Act does not make any reference to climate change protection or to renewable energy development as a strategy for environmental protection. The EPA serves as the UNFCCC National Focal Point (NFP) and coordinates the preparation of National Greenhouse Gas (GHG) inventories and compilation of the National Communication (NC) under the UNFCCC. Liberia's made her first national communication19 to the UNFCC in 2013. For the energy sector, the country's targets included reducing greenhouse gas emissions by 10% by 2030, improving energy efficiency by 20% by 2030, and raising the share of renewable energy to 30% of electricity production and 10% of overall energy consumption by 2030. The Mitigation options to achieve these targets include the promotion of hydroelectricity as in the pre-war period, promotion of the use of renewable energy technologies and energy efficient appliances, declaration of emission standards and reduction of the losses in the electricity supply system. The non-existence of technology development and diffusion policy has been identified as a challenge to the development of hydropower. The challenge would be effectively addressed by increased awareness among regulatory authorities, investors and development partners about the potential contribution of hydropower to the country's economy.

Liberia's membership of WAPP could aid development of the country's huge hydropower potential. Part of the development planned for Liberia under the WAPP project is the co- operative construction of the Mount Coffee and Mano River hydroelectric dams, with the Ivory Coast and Sierra Leone respectively. These projects would be connected with the partner countries via 220 kV lines, connecting Mount Coffee to the Danane substation, and the Mano River project with the existing substation at

the Bumbuna hydroelectric project. The major adaptation needs and infinitives are summarized relative to the key vulnerable sectors indentified during the consultation process did not include the energy or environmental sectors.21 Institutional and regulatory structures will be necessary to integrate climate change into national action and development activities; especially in the light of the fact that the country has identified the development of hydropower as a panacea for the challenge of climate change. The civil conflicts that Liberia witnessed in the 1990s and 2000s had a devastating impact on the country's electricity sector. The implication is that the country will need to take steps to counter the significant risk posed by the country's political history for much needed private investors.

7. Conclusion and Recommendation

Hydropower in renewable energy is not exclusive, but where a policy is not targeted exclusively at only one kind of renewable resource, it may be inferred from the ordinary definition of renewable energy that it includes small hydro. Hydropower policy is largely embedded in a national energy policy together with government's goals and objectives for other forms of energy. However, hydropower policy is classified with renewable energy. As a result, the stated targets for hydropower is also contained in larger renewable energy targets broader regulatory framework for energy and are often not sufficient to drive development of smaller hydropower systems. Climate Change and environmental protection as well as hydro electric regulation are provided for and regulated by different institutions. Cohesion in policy and cooperation among institutions can strengthen mitigation and adaptation measures. Beyond policy, legislation can address many of the barriers to the use and development of hydropower, and as such is a strong panacea for many of these barriers-from creating regulatory certainty, appropriate incentives to investment-friendly financial mechanisms. Since hydropower use and development cannot be divorced from larger energy policy nor can hydropower be separated from the energy mix because it forms a critical part of it, advancing its use and development can e addressed by overall energy policy. Hydropower development can be used to achieve gains in the environmental dimension of sustainable development, and as such should be given a new policy approach that harmonizes water specifically hydropower development energy and environment and climate change.

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