



HARVARD Kennedy School

MOSSAVAR-RAHMANI CENTER
for Business and Government

NDC Score Card: Measuring the Nationally Determined Contributions (NDCs) under the Paris Agreement

Farrukh Khan

May 2019

M-RCBG Associate Working Paper Series | No. 123

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under the Paris Agreement



BY

FARRUKH KHAN

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Foreword

I thought of measuring Nationally Determined Contributions (NDCs) at the close of the Paris COP. A brief conversation with a few colleagues suggested that everyone whether remotely or strongly associated with the Paris Summit, was thinking along the same lines. This did dampen my enthusiasm and I dropped the thought.

Later, I joined as Senior Fellow at the Mossavar Rehmani Center, Harvard Kennedy School and part of my research, I again – somehow – found myself wondering how we assess and measure the NDCs implementation? The fate of the world efforts at counter climate change hinges on these NDCs. I was fairly cautioned that anything called a “score card” is dead on arrival. It will find its political death so quickly that this effort will simply not be worth it. I agree with that but then again, as Oscar Wilde would say, the only thing I can’t resist is temptation.

I don’t have any doubt that creating a measure is inherently a complex, difficult and more so controversial exercise. No one – least of all countries – want someone to measure their effort on a desktop with a bunch of arbitrary indicators and numbers assigned to them. Yet, I also believe that it is always some measure which helps guide the national and international efforts. There are all kinds of score cards available. This one focuses on preparedness. DEAL is a score card towards NDCs implementation and economic transformation. It is aimed at (i) providing a framework for evaluating a country’s climate change action against the commitments stated in its respective NDC; (ii) assigning a score between zero and one and (iii) establishing a starting point for identifying strengths and weaknesses of the existing NDCs with a view to strengthening them. DEAL Score Card is an attempt to build a measure on efforts that countries are undertaking in implementing the Nationally Determined Contributions (NDCs) to meet the goals and objectives of the Paris Agreement.

My logic has been quite simple. If we can’t measure what we are doing, we can’t figure out where we want to be.

One, over the years, I observed that most of the climate related indices and indicators speak to technical experts and the specialists, whether governmental or non-governmental. Barring aside the brilliance behind them and the fact that I have relied on nearly all of them, I always felt the need for a simple matrix that relies on state practice and captures diversity of circumstances.

Also, implementation for the NDCs is roughly a 15-year horizon (on average) and therefore, could only be measured on a longer time horizon. I wanted to find a way in which we simply find those elements which are vital for the implementation and their success. Hence the focus on regulations and enabling environment.

Simply put, DEAL Score card is just an attempt to simplify what already exists and what would it take countries to achieve what they promised themselves in their NDCs.

The choice of Ghana, like many aspects of this work, was based on the detailed work that Ghanaians did with their NDCs. Ghana deserve full accolades for presenting a NDC that actually makes sense and measurable.

I am conscious that building a score card is difficult and by nature somewhat controversial. In that sense, it is not possible that everyone would agree with the approach I have taken. Also, I have no doubt that those who may tend to agree with the concept may also find this deficient in more than one way. I am conscious that this is not comprehensive at all and nor this is first attempt is intended to be. It is an attempt to place the measure on the table and hopefully help the countries to improve.

Credits

There are so many remarkable people who contributed to this effort that I think I am bound to miss a few but let me try.

Let me also admit that this is too late. I should have done this during my stay as Senior Fellow with the Mossavar Rehmani Center at the Harvard Kennedy School. I couldn't. I was neither certain whether this was a good thing to do nor I could manage digging into it due to the work load from my job and travelling.

I am grateful to Professor Robert Stavins, A.J. Meyer Professor of Energy & Economic Development, at the Kennedy School for his guidance and support.

Scott Leland, Executive Director, Mossavar-Rahmani Center for Business & Government, who has been so immensely helpful with my work and in administrative support. Despite me constantly missing my own deadlines, he remained patient and there has never been a time, when he did not reply to me in less than a day and always with a positive solution.

Samantha MaCrain, my very first researcher at the Mossavar Rehmani Center, Kennedy School. She is a passionate and dedicated individual. She helped me in developing my initial thoughts on measurement which eventually led to this score card.

My gratitude also goes to the Coalition for RainForest Nations (CfRN) led by Kevin Conrad and Federica Bieta. I remember broaching this very vague idea about measuring NDCs with them more following the Paris Summit. Kevin, in his usual, non-hesitant and forthright manner said, "what would you need to pull this. Let us know and we will help" and help they did. The most critical support came from Federica, when I finished my official stay as Senior Fellow, I was looking for some support to undertake research to help me pull different pieces together. Federica went all the way to University of Milan to arrange a researcher – Margherita.

Margherita Bertossi, the then a dual degree student of international Economic Policy at the University of Milan and Institute de Science Politique (Paris). This endeavour would have been simply impossible, if she had not agreed to work with me and use all resources available to her from the University of Milan and Institute de Science Politique. I must admit that Margherita has been brave is agreeing to work with me, since DEAL score card was an idea requiring significant research in four different directions. Often overlapping (something that Margherita kept pointing out) and above all, we lived in two distinct parts of the world: US and Italy. Notwithstanding, this did not deter her in coming to my rescue. Her passion for sustainable development stems from her undergrad volunteer work in Tanzania and India, during which she developed a strong interest in sustainable development. Amongst many researchers, I interviewed and went through, she was most keen and wanting to work on an imaginative and out of the box project. She was quick to pick up and worked with complete dedication in building the back-ground material that I have been looking for. I am confident that the work she did, not only helped her develop a better understanding of the climate challenge, enhanced her passion for dealing with environmental challenges but also help shape her final dissertation which she dedicated to the DEAL.

Mome Gull, Executive Director of Institute of Urbanism (Islamabad), who poured hours and hours in reviewing and editing the manuscript. I made her do this twice. She has a sharp eye in finding mistakes. Her extensive experience in dealing with environmental issues in Pakistan as well as in the multilateral negotiations on climate change, gave her in edge in her editing and critique. She made me revise nearly all indicators and many portions of the text. I am profoundly grateful for her time and effort.

My thanks also go to my former collaborator in Triple Transformation, Dustin Schinn (World Bank), Shakeel Ramay, Executive Director of the Zalmi Foundation in Pakistan as well as Ms. Rita Rouhonen (United Nations) for their valuable support and critique.

Farrukh Khan

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Abbreviations

APL	Adaptable Program Loans
AQR	Asset Quality Review
B4C	Building Capacity for Climate Change Challenge
BCCC	Building Capacity for Climate Change Challenge
ccGAP	Climate Change Gender Action Plans
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CDR	carbon dioxide removal
CCGAPs	Climate Change Gender Action Plans
CRE	Community Renewable Energy
CRfN	Coalition for Rain Forest Nation
CRN	Coalition for Rainforest Nations
COP	Conference of Parties
DEAL	Decision-making, Economic growth, Alignment and Livelihood
DEAT	Department of Environmental Affairs and Tourism
DSA	Debt Sustainability Analysis
ECBC	Energy Conservation Building Code
ECF	Extended Credit Facility
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EPWP	Expanded Public Work Programme
EUCCP	European Union Climate Change Policy
EUTS	EU Emission Trading System
EU	European Union
EVs	Electric Vehicles
FiP	Feed-in Premiums
FiT	Feed-in tariffs
G-CARP	Ghana Climate Ambitious Reporting Program
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	global greenhouse gas
GSGDA 2	Ghana Shared Growth Development Agenda II
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
LAPA	Local Adaptation Plan of Action
LCR	Low Carbon and Resilient
MDBs	Multilateral Development Banks
MESTI	Ministry of Environment, Science, Technology and Innovation
NADMO	National Disaster Management Organization
NAPA	National Adaptation Plan of Action
NAPSP	National Action Plan for Sustainable Production
NDCs	Nationally Determined Contributions
NEEAP	National Energy Efficiency Action Plan

NEIP	National Entrepreneurship and Innovation Plan
NIP	National Infrastructure Plan
OECD	Organization for Economic Cooperation and Development
PAT	Perform, Achieve and Trade
PCCB	Paris Committee on Capacity-building
PES	Public Employment Schemes
PPCR	Pilot Program of Climate Resilience
PPAs	Power Purchasing Agreements
PPES	Public Payment for Eco-System
PPM	Part Per Million
PPP	Private-Public Partnerships
PVs	Photovoltaic
R&D	research and development
RFP	Renewable Energy Policy
RPS	Renewable Portfolio Standards
SDGs	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SILs	Sector Investment Loans
SIPs	Strategic Infrastructure Projects
SME	Small Medium Enterprise
TEC	Technology Executive Committee
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resource Institute

Introduction

The adoption of the Paris Agreement (herein after referred to as “the Agreement”) is conceived as a milestone in international negotiations around climate change. The Agreement strengthens the aim of limiting the global temperature increase below 2 degrees Celsius as stated in Article 2:

“This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

- (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature

increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;”

1.1 Voluntary Pledges – Nationally Determined Contributions

Nationally Determined Contributions (NDCs) laid the very foundation of the Agreement as the starting point of aggressive emission reduction. Overall, the two-fundamental premises of the NDCs were (i) informed, consistent, long term strategic thinking that offers a portfolio of options and periodically evaluate outcome and results and; (ii) ability to ratchet up ambition before or within a period of 5 years. Yet, all 180+ NDCs submitted to date, fall short of what is required to limit the global temperature increase. According to the UNEP Gap report 2017,

“The NDCs that form the foundation of the Paris Agreement cover only approximately one third of the emissions reductions needed to be on a least- cost pathway for the goal of staying well below 2°C. The gap between the reductions needed and the national pledges made in Paris is alarmingly high. Also, looking beyond 2030, it is clear that if the emissions gap is not closed by 2030, it is extremely unlikely that the goal of holding global warming to well below 2°C can still be reached. Even if the current NDCs are fully implemented, the carbon budget for limiting global warming to below 2°C will be about 80 percent depleted by 2030. Given currently available carbon budget estimates, the available global carbon budget for 1.5°C will already be well depleted by 2030.”

More recently, the Intergovernmental Panel on Climate Change (IPCC) in its Special Report on 1.5°C confirms,

“estimates of the global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas (GHG) emissions in 2030 of 52–58 GtCO₂eq yr⁻¹ (medium confidence). Pathways reflecting these ambitions would not limit global warming to 1.5°C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030 (high confidence). Avoiding overshoot and reliance on future largescale deployment of carbon dioxide removal (CDR) can only be achieved if global CO₂ emissions start to decline well before 2030 (high confidence).”

1.2 Measuring the implementation of the NDCs

Tremendous support – ranging from financial resources to supportive international rules - is required for the implementation of the NDCs. Much is being done. Countries, supported by the UN, Multilateral Development Banks (MDBs), innovative partnerships such as the NDC Partnership and bilateral financing mechanism, are identifying frameworks and methodologies to help implement NDCs. This implementation hinge on a variety of factors: degree of economic, social and human development within a country, reliance on internal and external funding, geographical location, stability and reliability of the governance, and natural resources endowment.

This paper attempts to put forward a universal framework that would help in assessing progress of countries vis-a-vis the transformation towards low carbon emission pathways in line with their respective NDCs and the peculiar and complex national characteristics. It will

look at the policy options that countries must - at the very least - employ or exercise to be on a path to economic transformation that considers the impacts of climate change. It shall also assess whether or not the NDC led pledges made by Paris Agreement signatories take into account minimal factors for low carbon/sustainable economic transition.

1.3 Designing the DEAL framework

The DEAL will assess the NDCs and the implementation into four main categories: Decision-making, Economic growth, Alignment and Livelihood (DEAL).

More specifically, DEAL is a score card towards NDCs implementation and economic transformation. It is aimed at (i) providing a framework for evaluating a country's climate change action against the commitments stated in its respective NDC; (ii) assigning a score between zero and one and (iii) establishing a starting point for identifying strengths and weaknesses of the existing NDCs with a view to strengthening them.

Every country's attempt to address climate challenges is distinct. Applied to two different countries with similar regulatory, fiscal, and monetary measure, DEAL could yield different results, largely due to distinct industrial or agro make up. These differentiations result from: degrees of multidimensionality, policy options utilized by a country, economic risks and composition, cost differential due to capital input and the capital vintage effect.

Developing a score card, to assess progress towards the implementation of the NDCs, is therefore a challenging task. A number of studies and associated indices/targets have focused on determining the impact – abatement cost, economic make up especially industrial composition, revenue from environmental taxes and similar instruments to calculate actual impact from efforts to control emissions and/or environmental research and development (R&D) expenditures or total revenues from environmental taxes.

The challenge of determining actual impact is tedious and complicated for a variety of reasons not least the political ones. In this case, it would be even more complicated given that the implementation of the NDCs has not even commenced.

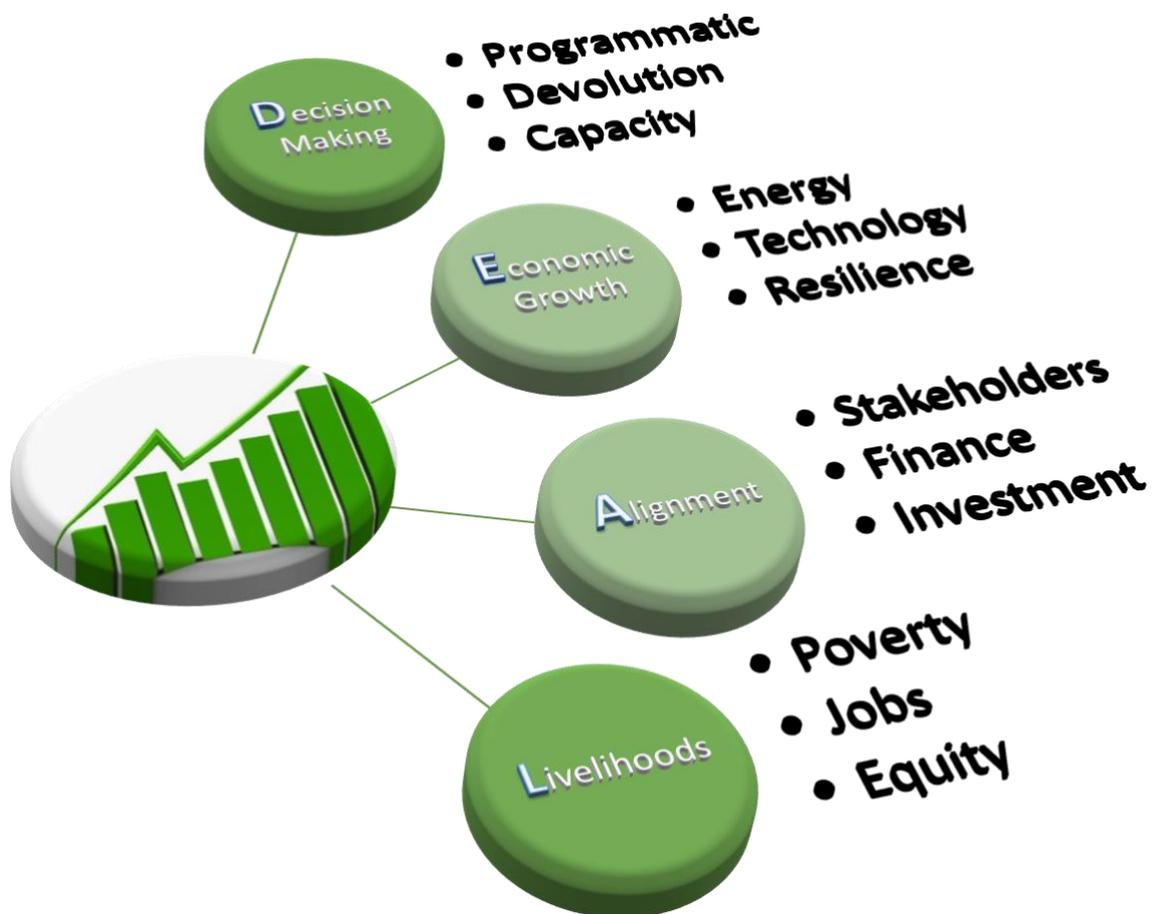
Consequently, the scope of the DEAL score card is limited. It is not designed to measure the impact rather on what enables implementation and transformation that countries are seeking through their respective NDCs. By focusing on policies and regulations, the DEAL score card will avoid making any attempt to place countries in one or other category. Yet, this score card could help visualize the path so far taken and highlight areas where further intervention may be needed.

The working assumption is that the intent at structural transformation would manifest into policy formulation and reforms, integrating climate change related challenges into the larger economic framework and finally making a consistent effort at improving them. Once the intent is translated into policies, the impact – in all likelihood – will occur and in most cases accelerate. Consequently, this simple and narrow focus of the DEAL score card is based on the counts of essential and critical policies and regulations as the actual starting point of impact, change and transformation. The score card will capture this by giving a score on the number of policies captured through indicators and identify what policy measures are missing.

It is important to underline that even this rather narrow focus is embedded in the vast literature on measuring climatic stringency i.e. those critical indicators which, at the very minimum, need to be accounted for in a quest to design, implement and pursue economic transformation towards a low carbon and resilient economic system. The list of indicators developed are targeting aspects of climate change response that are distinct, limited, though interdependent.

Notwithstanding, designing a score card and its methodology carries arbitrariness and degree of interpretation, it is hoped that in due course the score card would strengthen and receive input from other experts in the field for it to become a better measurement tool.

Graph-1: The DEAL Score Card Framework



Structure:

The first section of this paper presents literature review around each of the four elements of the DEAL Score Card with examples from various countries. A set of successful instruments

and their indicators are deduced/identified from these example ¹. The second section of the paper brings together these indicators and instruments, to construct a score card. Later in the same section a comparison of NDCs in each of the category is given. A quick review of previous attempts at building similar frameworks or indices.

The third and final section presents practical application of the framework on the Republic of Ghana. It gives an overview of the national context, an evaluation of the NDCs and of the climate change policies setup against the framework and the computation of the index. A set of policy recommendations is also presented on the basis of the scores obtained in the various parts of the framework.

2. DEAL on Transformation

2.1 Decision Making:

A. Programmatic Approach

What represents a country's unequivocal desire to transform its economic growth patterns? The fourth IPCC report (2013) states, "Effective decision-making to limit climate change and its effects can be informed by a wide range of analytical approaches for evaluating expected risks and benefits, recognizing the importance of governance, ethical dimensions, equity, value judgments, economic assessments and diverse perceptions and responses to risk and uncertainty". There is no fixed formula on determining the type of analytical process best suited to the policy-making on climate changeⁱ. At the very minimum, an effective decision making on climate change should take into account the following:

- i. *Climate risksⁱⁱ*: An effective decision-making hinge on identification of climate risksⁱⁱⁱ that a country faces and their integration within the national policy and decision making.
- ii. *Long-term approach*: Such decision making should reflect longevity, defined through the following three characteristics: lasts for at least one human generation, highlights a high degree of uncertainty and highlight/integrate issues related to public good^{iv}. Policies are optimal over a short-time (corresponding to the electoral cycle) but sub-optimal in long-term (projected in the future).
- iii. *Cross sectoral Integration^v*: An effective decision making from climate change perspective results from the "interaction and negotiation between the interests and values of multiple agents in order to reach consensus on priorities for action, recognizing uncertainty as an unavoidable characteristic, and taking into consideration the dynamicity of needs and values"
- iv. *Uncertainty^{vi}*: Integrating uncertainty in decision making means understanding the uncertainty in the probability of the outcomes even if there is a precise knowledge of different components^{vii}. Reason being that the methods that are used to evaluate

¹ Neither the identification of national policies and instruments nor the example of countries is comprehensive. Also, this was neither intended nor the central purpose of the DEAL Framework. These examples merely act as guidance to identify core elements of the NDC score card.

projects with well-defined, short-run consequences are unlikely to be appropriate for a problem as global, long run, and uncertain as climate change^{viii}.

- v. *Ethical and Inter-generational risks:* While it is debated as to what weight must be attributed to future generations compared to current ones, decision on climate change show implications that stretch far in the future. Therefore, underlining the necessity to balance needs and interests of the two-time horizons.

Practice and national instruments:

In practice, countries have opted to show case effective decision making through one, or more of the policy frameworks.

- i. *Integration with sustainable development agenda.* At least ten countries, including **India** and **Ghana** have opted to mainstream NDCs contents into Sustainable Development Goals (SDGs). Whilst ninety-six parties, the totality of developing countries mentioned sustainable development in their NDCs thus recognizing the strong interconnectedness between the two.^{ix}
- ii. *Making development policies sensitive to impacts of climate change:* Though not fully started to take the climate risk into account, the following examples illustrate inclusion of environment as a priority. India, for instance, has assimilated environmental issues in its last five-year development plan. It identified several areas to implement a low-carbon strategy and improve the sustainability of its growth process. The **Indian** Finance Bill 2010-11 provided for the creation of a National Clean Energy Fund in the country's public account. The projects eligible for financing must be approved by the Inter-Ministerial Group, headed by the Finance Secretary and including representatives from Ministries of Power, Coal, Chemicals and Fertilizers, Petroleum and Natural Gas, Renewable Energy and Environment. **Zimbabwe** has identified climate change as one of its policy priorities in its Medium-Term Plan and openly stated its centrality for programs in all sectors of economy. Tanzania included both adaptation and mitigation as policy goals of its Five-Year Development Plan. **Chile** has produced a National Action Plan for Sustainable Production and Consumption, with the purpose of combining the environmental discourse and the development of some key sectors such as tourism, construction and industry, with a series of targeted initiatives
- iii. *Overarching legislative development:* **Pakistan**, besides recognizing climate change as one the major challenges to be addressed in its Vision 2025 development plan, has recently issued its Climate Change Act. This Act provided for the institution of the Climate Change Council, comprising a group of ministers including the Ministers in charge of climate change, finance, agriculture, food security, planning, development and reform and natural resources plus a number of other public authorities. The overall purpose of the Council is to approve and monitor adaptation and mitigation frameworks. The Act also underscores the establishment of a Climate Change Fund within the national budgeting framework.

- iv. *Creation of coordinating bodies:* coordination bodies are created to enhance collaboration between exponents of different sectors and those which have included climate change expenditure in their national budget. **Paraguay**, besides largely including climate change in its National Development Plan 2030, has recently issued a National Law on Climate Change. The law mandates the creation of two important institutions-. The National Commission on Climate Change and the Climate Change Fund. The National Commission on Climate Change, - a multi-institutional body, was formed by the representatives of various sectors. It is in charge of designing and updating the national policy strategy and a Climate Change Fund. The commission aims to include climate change funding into the public budgeting.

Indicators:

The amount of ideas, literature and practices that exists around decision making, present a number of indicators. These indicators are helpful in determining effective decision making for the implementation of NDCs. Nonetheless, the common aspects/indicators could help devise a framework to gauge political will i in a country to adopt a programmatic and long-term perspective. The Organization for Economic Cooperation and Development (OECD) policy guidance report titled “Integrating climate change adaptation into development cooperation” (2011) presented a series of indicators. The indicators below are deduced from that work.

- i. Identification of climate risks and the need for mitigation and adaptation within national (sustainable) development plans;
- ii. Calculating uncertainty and the expected needs of the future generation;
- iii. Integration of climate challenge within key national development and finance frameworks and
- iv. Existence of a mechanism for cross-sectoral adaptation and mitigation response built in respective bodies, projects and activities identified at the national level.

B. Devolution/Localization:

At least five factors underline the critical importance of devolving climate decision making at the local level^x.

1. Climate change is broadly understood as a global rise in temperature however, its manifestations occur locally and impacts local livelihood activities, communities’ resources, health conditions and so on.
2. sensitivity on one side and adaptation capacity on the other, are both realized locally, as they are context-specific, resulting from the interaction between an array of socio-ecological factors such as income level, infrastructures, human development and individual behavior.
3. adaptation initiatives are best observable at local level, in the form of households’ livelihood practices, investment decisions and individual

consumption. Therefore, the policymakers must effectively enable devolution of decision-making power at local level. The local entity's intervention is increasingly seen, not only as useful, but as indispensable in the fight against climate change. Another explanation lies in the general concept of local knowledge^{xi}, defined as the unique set of information and skills developed over an extended lapse of time by a community in a given context. The contribution of local knowledge is crucial with respect to several areas, including identifying causes, consequences and the prevalence of climate change, with particular attention on vulnerable populations that are often left at the margins of national or supra-national assessments.

4. Cities, home to over half of the global population and responsible for more than 70 percent of global GHG emissions, are particularly vulnerable to the impacts of climate change.
5. A large number of studies conducted on distinct territories prove how local knowledge represents a useful addition to crafting policies at the national levels. Actors at the national level can gain (knowledge from local actors) without incurring into excessive costs^{xii}.

Practice and Instruments:

- i. *Financing local action: Sweden* is an example of effective and successful devolution and delocalization of climate decision-making^{xiii}. As an early adopter, Sweden devolved the first local energy and climate policy planning back in 1977. Since then a number of initiatives have contributed to place climate change initiatives at the center of local action. These initiatives include the establishment of a national support program to local climate investment, called Climate Investment Programmes (KLIMP) and also enabling municipalities to formulate their own climate strategy.
- ii. *Enabling Environment and devolution in policy making: The United Kingdom* (UK) provides another solid example of devolution. Since early 2000s, UK has been empowering the local governments to become a hub of climate policy formulation and implementation^{xiv}. In this regard urban areas have been the primary vehicle in the strategic use of agency (Heidrich et al., 2013).
- iii. *Local Adaptation Plans: Nepal*^{xv}. Among emerging countries, an interesting strategy has been adopted by **Nepal**. After having received a large amount of resources, about \$650 millions, for the implementation of its National Adaptation Plan of Action (NAPA), the government of **Nepal** has recognized the importance of leveraging local dimension and recently created a framework for the development of Local Adaptation Plan of Action (LAPA). The aim of this framework is to transform adaptation into a bottom-up, flexible and participative process which pays attention to the priorities and the needs of the most vulnerable people.

Indicators

A collective set yet minimalistic indicators have been derived from three international reports on local integration and decentralization namely; Integrating Climate Change Adaptation into Development Co-operation (OECD 2010) Financing Local Responses to Climate Change (UNDP 2016) and International Guidelines on Decentralization and Access to Basic Services for All (UN-HABITAT 2009). The following indicators stand out among the findings and practices presented in the three studies:

i. Enabling Institutional Environment:

- a. Development of an empowered institutional set up with clear determination of regional and local competence and responsibilities with respect to environmental and climatic issues
- b. Establishment of a formal mechanism of dialogue and coordination among national and local governance

ii. Improved Delivery of Climate Finance:

- a. Size of intergovernmental budgetary allocation to the local governments
- b. Ability of the local governments to receive financing from bilateral and multilateral finance institutions or from foreign governments

iii. Monitoring and Evaluating:

- a. Existence of local plan of action on climate change especially on adaptation
- b. Establishment of an accountability mechanism for climate spending at the local level

C. Capacity to Implement

The stand-alone presence of a functioning and well-designed decision-making system as well as long term planning are not sufficient if these are not accompanied by the capacity to implement the decisions and policies. Capacity-building remains one of the most important challenges for the undertaking of effective climate action.

Within UNFCCC, Capacity-building has been importance priority issue^{xvi}. Parties have continued to focus on evolving targeted initiatives to secure capacity building support. In 2001, the seventh Conference of Parties (COP) to the UNFCCC adopted the Marrakech Accords, which provided for a framework for capacity building in developing countries and in transition economies (EITs). In 2011, at COP-17, the first Durban Forum on Capacity-building took place.

The Paris Agreement under Article 11 established an ad hoc body, the Paris Committee on Capacity-building (PCCB) with the purpose of addressing capacity gaps. In addition, the Warsaw International Mechanism for Loss and Damage, the Executive Board of the Clean Development Mechanism (CDM), the Technology Executive Committee (TEC) and many bilateral and multilateral actors are engaged in promoting capacity building. The need for further capacity-building has been openly recognized by at least 112 parties in their NDCs.

Under the capacity-building framework, the UNFCCC (2018) has issued a report analyzing the biggest challenges faced by developing countries. It has highlighted an array of recurrent factors that need a targeted intervention both at the national and supra-national level.

- i. Public governance capacity:* Foremost is the need to promote good governance i.e. well-designed and functioning institutions with sufficient accountability. Lack of accountability and corruption-risk assume various shapes in climate governance^{xvii}. In the case of climate governance, powerful lobby groups pose a threat of undue influence and policy capture.
- ii. Human resource capacity:* human resource is another long-standing issue. Besides erection of new dedicated governance structures for higher degree of coordination among agencies around climate change issues, there is a need to engage trained staff endowed with expertise and a range of climate specific skills. Human capacity can be classified into four domains:^{xviii} the ability to create credible scenarios of anticipated future changes, the ability to assess vulnerabilities that would arise from the exposures to such changes and recover from harm, the ability to effectively communicate information about exposures, vulnerabilities and adaptations to technically trained managers, and ability to understand and use the information, and finally, the ability to communicate information to the wider public.
- iii. Financial capacity:* building capacity for implementation means addressing a rightful amount of financial resources towards climate strategies. Climate budget needs to be adequate to the scope of the planned action. This implies increased access to climate finance but also a more sustainable management of a country's own financial resources. Tackling climate change needs to be recognized as a priority, and as such, receiving a share of the national budget currently employed for less urgent purposes.

Practice and instruments

- i. Human resource development:* Some developing countries have begun to formulate a formal strategy for boosting climate learning and education. So far nine governments- **Benin, Burkina Faso, Dominican Republic, Ghana, Ethiopia, Indonesia, Malawi, Niger and Uganda**- have chosen to collaborate with the UN under the UNFCCC: Learn initiative. The undertaken projects vary from country to country, but the projects represent a common goal of building human capacity to address climate change, integrating climate change into the national education systems and raising awareness of parties.
- ii. Resource allocation:* While some countries, like **Brazil** and the **United States of America (USA)**, are opting for reducing the share of the national budget dedicated to fighting climate change, some others are recognizing the relevance and prioritizing its resolution through an effective devolution of public finance. The current **European Union** budget (2014-2020), has devolved 20% of total spending to climate action. For the term 2021-2027, climate action has been integrated in all the major spending programs, particularly in cohesion policy, regional development, energy, transport and agriculture.

- iii. Increased spending:* Similarly, **Ethiopia, Ghana, Kenya and Uganda** have all increased the share of their national budget, for the following two to four years period, to environmental related sectors and projects^{xi}. Nevertheless, for countries with significant human development deficits, this increase in climate spending comes accompanied by considerable opportunity costs^{xx}. **Ethiopia** committed to climate change one half of its spending in public education, while **Tanzania** devoted to the cause two-thirds of its health expenditure.

Indicators

Building on the above examples, following set of indicators emerge from the practices of various states,

- i. Developing human resources:*
- a. Integration of climate change learning and education into national plans: primary, secondary and high school
 - b. Available support for internal training and programs for the administrative staff
- ii. Improving financial capacity:*
- a. Existence and/or creation of climate change sections in the national budget
 - b. Share of total budget devolved to climate change initiatives
 - c. Share of total budget devolved to the major environmental body (Ministry of environment or analogous)
- iii. Improving public governance:*
- a. Institution of a ministry or body for coordination
 - b. (In the absence of an overarching body) establishment of an ad hoc sub-ministerial body (agency, institute) in charge of promoting and coordinating climate change action
 - c. Existence and/or establishment of an accountability system especially at the local level of governance (monitoring and reporting)

2.2 Economic Growth:

The Paris Agreement declared that goals of fighting climate change and economic growth are compatible. Economic growth and development are seen as one of the most critical factors in all NDCs. There is little doubt that a negative relationship between rising temperature and income exists both within and across countries^{xxi} and a vast literature dealing with the determination and the quantification of these effects has emerged. From that literature, we find that climate change affects growth in multiple ways. Typically, if not cumulatively, these among others include:

- i. Direct impacts:* Affecting private businesses by directly damaging assets, increasing costs of insurance and maintenance, reducing availability of raw materials and disrupting the supply chain.^{xxii}

- ii. *Indirect Impacts*: Affecting capital accumulation and householders' propensity to saving, with long term consequences on Gross Domestic Product (GDP)^{xxiii}
- iii. *Reduction in human welfare*: Reduction in over-all welfare could result due to a drop-in food and water supply^{xxiv} and health indicators^{xxv}. A reduction in welfare equal to a permanent decrease in consumption ranging from 5% to 20% has been forecasted ^{xxvi}. On the GDP side, assuming no actions, by 2060 annual losses are predicted to fall in the range 0.7-2.5%, with 1.5% being the most likely estimate, without accounting for large-scale disruptive events. On the longer term, GDP losses might be exceeding the 3% threshold by the end of the 21st century^{xxvii}.
- iv. *Aggravating fragile environment*: Exacerbating an already fragile environment leading to lowering of incomes owing to the limited adaptation capability especially in areas with rapid population growth trajectories and having high dependence on agriculture and ecosystems^{xxviii}. While, the size of the effects of climate change on economy are still object of debate. Many studies aiming to compute the marginal damage cost of carbon dioxide emissions have provided a wide range of estimates, whose combined mean is not higher than \$62/tC with a probability of 95%^{xxix}.

Even though there are a number of ways in which climate change impacts could be managed, some key issues on which national progress is needed include the following:

A. Energy: Renewable and Decoupling^{xxx}

The share of fossil fuel led growth, which hitherto was paramount, is gradually giving way to an increase in the use of the renewable sources. The share of coal, oil and natural gas in global energy consumption has been gradually falling for the past decades. Data indicate that the trend is accelerating and pushing for the complementary share of renewable sources up to 40% of the global energy mix by 2040^{xxxi}.

While the CO₂ emissions have continued to rise, during the last three decades, GDP growth has outpaced that of CO₂ emissions, a phenomenon called “relative decoupling” of GDP from CO₂. GDP is expected to grow at an average rate equal to 3.25% p.a. while global energy demand grows at only the 1.3% p.a. – against the 2% p.a. showed in the past twenty years. This gap is due to a fall in energy intensity, which offsets the rise in prosperity in developing countries driving global economic growth^{xxxii}. All of the NDCs, except for that of **Argentina**, have listed renewable energy as one of their primary targets. Accordingly, the World Energy Outlook 2017 forecasts that if the NDCs are actually translated into practice, renewable sources will account for 40% of the global energy mix by 2030, surpassing the share of coal in the production of electricity. This is an ambitious, yet implementable signal provided the right set of policies are enacted and there is a political will in fulfilling what countries have stated in their declaration of intents.

The degree of penetration of renewable energy is not equal across countries, and it is necessary to make a distinction between countries, based on the extent of their development. Amongst the lot, least developed countries present peculiar challenges that must be dealt with through different approaches. In least developed countries, renewables deployment is driven by an increase in energy demand, especially in rural areas.

Renewable energy penetration comes with an equally important number of challenges: high up-front costs, long-term financing necessitating functioning credit-markets, and knowledge intensity.^{xxxiii} Among other associated factors include inefficiency and corruption.

Practice and instruments

Despite the challenges faced in the Renewable energy sector development, best practices, lessons and indicators have started to emerge:

- i. *RE Quotas/Target setting*: According to IRENA 164 countries have adopted at least one type of renewable energy target. **European Union (EU)** as a whole has adopted a 32% renewable target, **Brazil** 45%, **Germany** 45%, **Nigeria** 30%, **Barbados** 100% and **India** 175 GW by 2030.
- ii. *Emission trading schemes*: Emission-trading schemes aim at decoupling growth and creating a level playing field for renewable energy against the traditional energy sources. Such schemes require a high degree of coordination at the governmental level and with the private actors, and strong technical expertise hence these are mostly present amongst the developed countries. **The EU** launched the EU Emission Trading System (EUTS) in 2006 on the basis of a cap and trade mechanism. The global economic slowdown in 2008 led to a large surplus of allowances transacted in the system, peaking at 2.1 million in 2013. This distortion, due to an altered economic growth, considerably undermined the EUTS's ability to incentivize emission reduction and low-carbon innovation. Similarly, **China** launched its unified carbon market at the end of 2017, even though actual implementation has been pushed to 2020. The Chinese carbon mechanism will initially include only the power sector, and will later expand to other heavy industrial sectors, like petrochemicals and construction. The Chinese carbon market is twice the size of the European, accounting for about 8% of global emissions. It is expected to provide China with one of the most viable options to cut emissions and implement its NDC.
- iii. *Feed-in-Tariffs and Auction Mechanisms*: Feed-in tariffs (FiT) and auction mechanism are some of the popular methods for the economic support of renewable energy deployment among developed and developing countries. However, FiT is on a relative decline. More recently, the auction system presents interesting advantages compared to its more commonly used alternatives^{xxxiv}. Auctions limit the risk for investors as they assure the existence of a market of electricity, and thus guaranteed revenues, under Power Purchasing Agreements (PPAs, as opposed to FiT that usually take the form of long-term contracts. Moreover, price competition usually leads to cost efficiency, reducing the concerns related to feed-in premiums (FiP and FiT overpayments). Auctions also provide for volumes and budget control. **Brazil** held its first auction on technology in 2007 aimed at disclosure and increasing pricing efficiency. Other countries which have switched to auctions are **Mexico** and **South-Africa**, while **China**, **India**, **the US** and part of the **EU** adopted a mixed system, where auctions are used in support of specific projects or technologies.

Indicators

Indicators for promoting renewables can assume a variety of forms^{xxxv} yet state practice is prominent in three broad categories, and these act as useful indicators:

- i. *Regulatory policies*: Presence of – at the national levels - renewable energy targets, quotas and renewable portfolio standards (RPSs), fuel blending mandates, taxes and bans on dirty fuels;
- ii. *Direct economic support*: Presence of FiTs and FiPs, auction mechanisms, capital grants, soft loans, and tax relief;
- iii. *Indirect economic support*: Existence or establishment of emission trading system and carbon pricing

B. Technology

Technology has been included in 75% of the total 194 NDCs, and in 95% of the NDCs issued by developing countries. In particular, 100 developing countries explicitly stated the need for international support in the development, adoption and diffusion of technologically advanced solutions.

Amongst other technologies, there is a stronger synergy between the NDCs^{xxxvi} and Energy technology^{xxxvii}. In that context, the IEA has already identified six fields where technology advancement can be most effective in achieving transformation: energy efficiency, electrification of end-use sectors, decarbonization of power generation, use of sustainable bioenergy, carbon capture and storage (CCS) deployment and clean energy.

To achieve technological transformation within the energy sector alone, a wide range of policies will be needed to accelerate decarbonization and adoption of sustainable technologies in energy intensive industries. These include, but not limited to, targeting energy efficiency opportunities, deployment of clean energy, R&D, the deployment of underpinning infrastructure for new technologies – such as Electric Vehicles (EVs) and the smart grids-, and retirement of high-emissions infrastructures already in place^{xxxviii}.

Practice and instruments

Like capacity building, access to and provision of technologies that acts as both an instrument to combating climate change and promoting economic growth have been central to the UNFCCC's work. Over the years, countries have undertaken a number of innovative approaches to enhance their access to such technologies.

i. *Command and Control Policies*:

India launched several national initiatives^{xxxix} for securing access to necessary climate friendly technologies. The initiatives also provided manufacturers with incentive to invest in the energy efficient products. For example, (i) the Indian Standards and Labelling program, 2006, provide households with information on the potential energy, cost and savings. (ii) the Indian Energy Conservation Building Code: The building sector accounts for a significant share of energy usage in India. (iii) The Energy

Conservation Building Code (ECBC) was launched in 2007 setting a minimum standards of energy efficiency for constructing commercial buildings.

China - from Electric Vehicles to artificial intelligence - China is no longer focusing on heavy industries but massively deploying new technologies and reforming the secondary sector. Since 2007, the Chinese Government has been targeting the phasing-out of outdated production facilities in 13 energy-intensive industries. It subsequently published specific indications on deadlines and modalities for closing inefficient facilities and replacing them with new technologies^{xi}. Simultaneously the Top-1000 Energy-Consuming Enterprises Program was launched by the National Development and Reform Commission. The program identified a total of one thousand large consuming firms as a major source of energy saving and subjected them to strict management requirements and to energy-auditing, benchmarking, workshops and annual reporting on energy consumption.^{xii}

ii. *Market based Incentives:*

India launched a market-based mechanism called “Perform, Achieve and Trade” (PAT) scheme, with the main goal of fostering energy efficiency and promoting a shift towards more adequate technologies. This scheme established reducing targets that are almost unit-specific, with energy bands created within each sector, based on current energy intensity.

China has allocated resources in grants and subsidies for the development of renewable sources, becoming a leading actor in wind and photovoltaic technology development. For the support of the EVs sector, China is positioning itself as the global player in the production of hybrid and electric vehicles.

Indicators

Overall, fostering environmental innovation requires clear policy signals and the right allocation of public expenditure^{xlii}. Thus far, four kinds of public intervention in countries have been leveraged to foster technology development and diffusion:

- i. *Market-based instruments:* Availability and the size of monetary contributions, grants, dedicated funds and R&D subsidies
- ii. *Command and control policies:* there has been an introduction of new taxes as well as specific standards and minimum outcomes
- iii. *Demand-based instruments:* Government supported campaigns to raise consumer awareness and end-consumer’s subsidies

C. Resilience

Building resilience is central to combatting climate. New Climate Economy (2016) stated the next five years window will be crucial for the establishment of a sustainable pathway, and the investment choices made in the immediate future will mark the direction of the next decades^{xliii}.

Building resilience could mean everything and anything. For instance, it could amount to a specific area of climate adaptation^{xliv}, to create an enabling environment, such as information collecting and spreading, transforming governance systems and increasing technical capacities, and the investments directed to fill the infrastructure gap.

The existing stock and use of infrastructures are responsible for about the 60% of global GHG emissions change. A total of 24 NDCs pledge to invest in adaptation measures for transport infrastructures and road, 16 to urban buildings, 37 countries promote building of public transports, 24 focus on building rail networks, 18 on urban roads, and 22 pledge to build water infrastructures.

Climate change is going to pose significant challenges to infrastructures. Besides increasing investments to meet current economic growth, an emerging need is that of creating systems that are LCR (low carbon and resilient). Investments in energy, transport, water and telecommunications are essential for the promotion of an inclusive and sustained growth as well as for the achievement of the SDGs. Increasing investment in infrastructures has positive impacts on income growth, welfare and productivity^{xlv}.

With respect to mitigation, \$103 trillions of cumulative investment between 2016 and 2030 is required to achieve the objectives of the 2°C scenario (remaining below the 2°C threshold with a 66% probability). Infrastructure adaptation on the other hand requires \$13-27.5 billions per year, mostly addressed to urban infrastructures^{xlvi}.

Practice and instruments

- i. *National Plans on Infrastructure: South Africa* represents a brilliant example of an emerging economy having managed to integrate resilient infrastructures in its long-term vision. In 2012, the South African Government issued two national plans, which, inter alia, pushed the green agenda by moving away from the resource-rich energy-intensive development model. More specifically, the National Infrastructure Plan (NIP), identified 18 Strategic Infrastructure Projects (SIPs) to “transform the economy, direct national growth and drive job creation by implementing a long-term, government led infrastructure investment program”.
- ii. *Environmental Risk Assessment:* Nearly all countries have some form of Environmental Risk Assessment policies and tools. For instance, **South Africa** was also amongst the earliest proponent of environmental assessment tools, namely the Environmental Impact Assessment (EIA) and its successor, the Strategic Environmental Assessment (SEA). In 2007, the Department of Environmental Affairs and Tourism (DEAT) published SEA guidelines, strongly encouraging its use in the evaluation of the environmental impact of development projects. A step forward would be its transformation into a mandatory process through an appropriate regulatory framework^{xlvii}.
- iii. *Budgetary and International Finance Allocation: Zambia*, which secured a US \$1.5 billion grant from the Pilot Program of Climate Resilience (PPCR), integrated resilience objectives into broader development plans^{xlviii}. Zambia,

among other things, aims to make more than 500 km of roads resilient to floods and droughts.

- iv. *Command and Control Instruments: Zambia's* has also re-designed standards and codes of practice, and training of contractors and regulators. Revised standards are to be built on improved hydrological and morphological modelling in the sub-basin. Training also covers how to review bid documents and make appropriate choices. Besides Zambia, eight countries, **Bangladesh, Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan and Yemen**, and two regions, the Caribbean (**Dominica, Grenada, Haiti, Jamaica, St. Lucia, St. Vincent and the Grenadines**) and the Pacific (**Papua New Guinea, Samoa, Tonga**), are also pursuing similar strategies for a total of 66 projects building on the support they have received from the World Bank.

Indicators

Building on the state practice, following indicators can be formulated.

- i. Size of the allocation within the National budget towards sustainable infrastructure and related projects;
- ii. Existence of policy and regulatory measures incorporating climate resilience into national infrastructure plans;
- iii. Existence of a set of command-and-control instruments to mitigate or adapt such as technical standards;
- iv. Integration of climate risk assessments in the regulatory framework which governs both public and Private-Public Partnerships (PPP).

2.3 Alignment:

One of the central purposes of the NDCs has been to go past the idea of climate change as an isolated discipline, recognizing its interrelation with fields other than environmental science, politics, economics and so on. Policymakers should treat climate change as a part of a larger system and not as independent problem^{xlix}.

Climate change affects a number of key economic sectors, notably agriculture, forestry, fisheries, water resource management, human health, nature conservation, tourism and infrastructure. For climate action in general and the NDCs in particular, to be successful, it is indispensable to move out of environmental silos. Unless a country does not ensure alignment, engagement and contribution from the key national governmental and non-governmental actors including the private sector, its progress towards climate goals will remain deficient, unsustainable and in majority of the cases, reversible.

A. Multi-stakeholder Approach:

The Paris Agreement underlines the need for national governments to engage other stakeholders in improving climate action. Stakeholders consultations are mentioned in the NDCs of 118 countries, out of which, 63 indicated their role in the specific processes. Even

though the modalities of consultation and collaboration widely vary from one country to another. The fact that other parties' inclusion is so extensively present in the submitted NDCs, is a clear signal that the importance of adopting a multi-stakeholder approach in formulating climate change decisions has been well understood on a global scale¹.

The UNFCCC classifies climate stakeholders into two broad categories of Parties and Non-Party stakeholders. The first group is composed by national governments, divided into Annex I, Annex II and Non-Annex I countries (according to the stage of their development), whereas Non-Party stakeholders include members of the civil society, the private sector, financial institutions, cities and other sub-national bodies, local communities and indigenous people.

Some Non-Party stakeholders, mainly INGOs and NGOs, are also entitled to participate in the meeting and conferences held within the UNFCCC process as observers. Moreover, the COP22 established the Marrakech Partnership for Global Climate Action, in order to strengthen the collaboration between governments and key stakeholders.

Practice and instruments

In practice, stakeholder inclusion and engagement follow both bottom-up direction as well as top-down processes, stimulated and encouraged by national governments through an array of national mechanisms. A vast majority of the governments are opting for formal inclusion of stakeholders or in the very least fostering dialogue. At the same time, stakeholders are finding ways to reunite, organize and act on climate change. During the past decades multi-stakeholder initiatives have proliferated.

- i. *Enhanced transparency*: The **Open Government Partnership** is a multilateral initiative currently involving seventy countries who have ensured concrete engagement in increasing their transparency in a number of areas, including climate change. Countries like France, Argentina, Mexico, United States, Kenya, Sierra Leone, Macedonia, Jordan, Chile, Honduras and Tunisia have committed to holding public consultations and to engage non-state actors on climate policy making. These countries also emphasize on adoption of an open data regime with respect to climate information.
- ii. *Formalized participation*: The European Union through its European Union Climate Change Policy (EUCCP) has established stakeholder working group on several aspects of EU's Climate Policy which includes: Review; Adaptation, Carbon Capture and Storage, Aviation, CO₂ Emissions, Light Duty Vehicles, and Ships to secure structured input from stakeholders other than the governments.
- iii. *Collaboration*: RE100 is a global initiative promoting the collaboration of 136 influential firms which have publicly set the goal to source the totality of the electricity they consume from renewable source by a specific year.
- iv. *Coalitions*: Coalition for Rainforest Nations (CRfN) assists tropical governments, communities and peoples to conserve their rainforests. Healthy rainforests protect against a changing climate, generate much needed biodiversity and provide safe habitats. Due to the Coalition's innovative leadership, around 90%

of the world's remaining rainforests are now included under the United Nation's REDD+ Mechanism to incentivize conservation.

- v. *Alliances:* Rainforest Alliance, another well-known partnership, is the Rainforest Alliance, a network comprising farmers, communities, scientists, businesses and also governments, united under the common purpose of preserving biodiversity and ensuring sustainable livelihoods.
- vi. *Partnerships:* The Climate & Urban System Partnership is a group of climate scientists, educators and community partners that explores ways of educating city residents about climate change in Philadelphia, New York, Pittsburgh and Washington DC. In 2015 the EU also launched the Innovation Partnership on Smart Cities and Communities, bringing together private sector, cities and citizens to adopt more sustainable solutions for urban centers.
- vii. *New Financial and Insurance Products^{li}:* Within the financial services industry, private actors such as Aviva, Allianz, AXA, Munich Re, Zurich Re and HSBC developed a range of new risk insurance products such as flood insurance, and parametric weather insurance that are offered to exposed categories. In addition, G7 launched a new Global Partnership called InsuResilience to scale up climate risk finance and insurance solutions in the developing countries.

Indicators

There are a number of indicators presented under a host of studies including the OECD^{lii} and the World Bank. These products focus on four equally weighted categories, methodology, systematic adoption, oversight and control and transparency. The three most critical indicators relevant to the work at hand are:

i. Systematic adoption:

- a. Existence of and/or establishment of mechanisms both formal and informal for stakeholder's engagement (forums, workshops, public-private partnerships)
- b. Existence of legislative or policy formal requirements within national climate policies to engage stakeholders

ii. Oversight and quality control:

- a. Requirement and/or publicly available third-party evaluation of stakeholder engagement in formulation and execution of climate policy at the national level

iii. Transparency:

- a. Practice or requirement for the consultations on climate change topics to be made open to public
- b. Information on climate change conditions and initiatives made publicly available

B. Finance and Investment

The Paris Agreement called for making financial flows consistent with a low-carbon and climate resilient pathway. Its implementation means aligning approaches with the private sector financial actors, asset managers and other business community.

This alignment becomes vital for mobilizing finance as well as shifting investment from high carbon assets to low carbon or zero carbon assets. The World Economic Forum projects that by 2020, about \$5.7 trillion will need to be invested annually in green infrastructure, much of which will be in today's developing world. The Climate Policy Initiative estimates that currently \$360 billion annual investment both through public and private sources is taking place with developed country governments providing somewhere between \$10-20 billion per year^{liii}.

Policy and alignment, both in formulation and implementation, is vital to attracting billions of dollars that developing countries are seeking as a part of the implementation of their NDC. For instance, by 2030, Bangladesh needs US \$ 40 Billion for adaptation, Central African Republic US \$ 3.5 Billion, Egypt US \$ 73 Billion, Ghana US \$ 16 Billion, Fiji US \$ 500 Million, and Uganda US \$ 7.8 Billion. Out of the 189 countries which submitted NDCs, a total of 112, almost the totality of developing countries, mentioned a need for international financial support to achieve full implementation of their national climate plans. Out of these, about eighty (80) have quantified their external financing needs, and 54 specified the potential allocation of the received funds.

A realistic way to mobilize required resources, both domestic and international, would entail deepening alignment and evolving integrated policy framework cutting across areas and securing collaboration of multiple government agencies, from national to regional, to local level^{liiv}. It is necessary to not only scale up new investments but to readdress part of the \$710 billion, currently employed in the fossil-fuels sector^{liv}, towards greener applications.

The ongoing efforts at alignment is leading to both effective policies, their implementation as well as innovation. The past years have seen the proliferation of a wide range of instruments for the mobilization and the allocation of climate finance flows. Public sector actors, whether they are multilateral, bilateral or domestic sources and intermediaries, can leverage an array of mechanism which can be grouped into five categories^{livi}: Grants, concessional lending, guarantees, equity and quasi-equity capital injections, and ad hoc funds. Within these five categories, assistance is provided through Adaptable Program Loans (APLs), Sector Investment Loans (SILs), credit lines, debt swaps, PPPs and discounted grants, just to name a few.

Furthermore, the growth of private investment has encouraged innovation and promoted the creation of new financial instruments. The private investment has the potential to play a breakthrough role in scaling up investments use of which entails significant alignment. For instance, Green bonds are debt instrument that can provide support and financing to host of projects. Proceeds of these bonds are earmarked for green projects, but are backed by the entire balance sheet of the issuers and are particularly appealing due to their tax-exempt status.

Alignment is not only necessary in the primary but also secondary capital markets. Driven by the growing investors' appetite for portfolio diversification and climate-risk reduction. Owing

to the deepening of secondary market several indexes have been launched to reduce investors' exposure to carbon intensive assets, with the corresponding rise in the number of exchange-traded funds ETFs tracking them. Increasing alignment can boost secondary markets by enhancing transparency, lowering volatility and improving price signals.

On the flip side, countries in need, i.e. the developing countries suffer from specific constraints in their ability to catalyze this alignment and thereby promote financial flows from the private sector. The main barriers include the political and regulatory environment, underdeveloped access to capital markets, a lack of human capital, (and investors) higher level of risk^{lvii}. Absence of alignment can also undermine the efficient and effective use of resources mobilized. Despite these limitations, many low-income and emerging economies are taking significant steps with a view to aligning finance and investment with their climate policies.

Practice and instruments

- i. *Fostering new instruments - Green Bonds:* In 2017, **Nigeria** became the first large developing country involved in the green bond market, with a \$10.7 billion issuance, larger than that of **France**. This launched a strong signal of the country's willingness to diversify its economy, shifting from an oil revenues-based model, and to fulfill its environmental commitments^{lviii}.
- ii. *Correcting market failures- Carbon Pricing:* The **China** national ETS was officially launched in December 2017. The work on implementation of the same is underway. Furthermore, the **Kazakhstan** ETS was restarted in 2018 following a two-year suspension. Looking ahead, carbon taxes in **Argentina** and **Singapore** are scheduled to come into force in 2019. In addition, most of the recent developments in carbon pricing initiatives came from the Americas, with all six newly implemented carbon pricing initiatives (2017–2018) located in this region^{lix}.
- iii. *Re-allocation:* **Brazil** initiated a strategic approach to foster private sector's involvement in financing green projects through coordination between government, financial regulators, public financial institutions and market actors. This strategy has enhanced access to subsidized credit of those who are compliant with environmental legislation. **Brazil** has also established requirements for socio-environmental factors to be mainstreamed into bank and other financial institutions' risk governance, issuing market guidelines around green bonds.
- iv. *Risk:* **Bangladesh** has been a pioneer in embedding environmental risk into banking regulation. In 2011, the Bangladesh Central Bank issued the Green Banking Policy and Strategic Framework, setting the guidelines for banks on how to adopt green policies and to account for climate risk into their risk management practices. The framework has been a success and nowadays almost the totality of the banking system presents green banking units and policies.^{lx}

Indicators

State practices and private sectors innovation offers an important insight into how successful alignment has also led to emergence of indicators and policy instruments that can be employed in order to create the basis for climate investments.

- i. *Reallocation*^{lxi}: Has the country fostered policies for the mobilization and reallocation of private capitals, including policies supporting the growth of green financial markets (e.g. green bonds, Small Medium Enterprise (SME) finance, alternative finance)? Are these policies directly leveraging balance-sheet resources (e.g. fiscal incentives, sovereign green bonds, budget allocation)?
- ii. *Risk*^{lxii}: Formulation or presence of policies and regulations aimed at mainstreaming climate-related risk into financial sector risk management, accounting both for physical risk and climate change policies which could alter the regulatory environment (e.g. stress test, systemic risk assessment)
- iii. *Reorganizing markets*: Establishment of mechanisms or policies aimed at introducing market-based mechanism to correct market failure and reallocating financial resources such as carbon pricing

2.4 Livelihood:

For any national policy to succeed, it must have a direct and incontrovertible link with the livelihoods of people. The USA² example^{lxiii} suggests that there are winners and losers when a climate strategy is implemented. These impacts could range from economic dislocation, loss of jobs, or inequity in the distribution of national resources and wealth. Therefore, policies and strategies must consider the rights, needs and development of the weaker segment of the society. Embracing principles like equity, common but differentiated responsibility, resilience and protection of vulnerable entities are some of the considerations in this regard. Therefore, for effective implementation of the current NDCs, three aspects need to be considered: poverty alleviation, job creation and equity.

A. Poverty Alleviation

Climate change and poverty are linked in a two-way relationship i.e. they feed one another. Negative impacts are borne heavily by the poor and often marginalized. Such marginalized and poor could be anywhere i.e. in the massive urban metropolis, rural drylands to indigenous

² The USA announced its intention in June 2016 to walk out of the Paris Agreement. Ostensibly due to perceived serious and negative economic repercussions of the Paris Agreement on a vast segment of economy and people. President Trump stated “the Paris Climate Accord is simply the latest example of Washington entering into an agreement that disadvantages the United States to the exclusive benefit of other countries, leaving American workers — who I love — and taxpayers to absorb the cost in terms of lost jobs, lower wages, shuttered factories, and vastly diminished economic production. Thus, as of today, the United States will cease all implementation of the non-binding Paris Accord and the draconian financial and economic burdens the agreement imposes on our country.”

communities. Yet the common factors which define such a lot and thereby the impact include strong reliance on ecosystems for their subsistence^{lxiv}, fewer assets, even stronger dependence on climate sensitive sectors, such as forestry, fishing, pastoralism with simultaneously lower access to climate-relevant information.

Poor often have high risk perception in leveraging their asset. If the climate risk is perceived to be high, poor household living in vulnerable areas will apply low-risk low-return lens to their investment strategies, eroding the potential for long-term income growth^{lxv}. Even good climate policies such as fossil fuel or other subsidies removal, beside causing price to increase, may also impact industries, slow down poverty reduction efforts and reduce elasticity of poverty to GDP^{lxvi}.

Climatic impact on these people leads to enhanced economic disruption, challenge and often complicates their recovery and adaptation, affects their consumption pattern due to price rise and volatility. Take the example of agriculture, with changing rainfall, endearing droughts and increasing temperatures jeopardize agriculture productivity. The result is heavy constraints on the ability of low-income household to access subsistence goods^{lxvii}. Extreme weather events can damage livestock and infrastructures thus leading to the loss of assets which would exacerbate the poverty trap^{lxviii}. Similarly, if a country focuses on the installation of low-carbon technologies, the chances are that disadvantaged communities would incur excessive costs. However, if new low-carbon policies are accompanied by measures targeting energy efficiency the financial burden on marginalized populous would be minimal^{lxix}.

Practice and instruments

The drafters of the Paris agreement, therefore, were conscious that the implementation of the NDCs should avoid regressive effects of putting a higher financial burden on poor households as opposed to the wealthy ones^{lxx}. The need for strengthening the global response to climate change in a context of poverty eradication is established in three different sections of the Paris Agreement (Art. 2, Art. 4, Art. 6) and calls for the alignment between climate objectives and SDGs.

Interestingly, Poverty reduction is not currently a core issue in the NDCs as compared to SDGs and ranks 14th on the priority list covering only 2% of the total commitments of NDCs submitted. Only a total of 127 poverty-related activities have been mentioned. Principally, these are related to targets 1.2 i.e. halving the proportion of men, women and children living in poverty, and target 1.5 i.e. building resilience^{lxxi}. Notwithstanding, the NDCs, efforts at eradicating poverty have long been a major policy discourse and countries have pursued a vast array of instruments and policies to both reduce poverty while achieving climate and sustainable objectives. Following the adoption of the SDGs, such efforts at drawing close linkages between the national climate and poverty frameworks have enhanced. It should be borne in mind that the best practices for dealing with poverty through climate initiatives vary from country to country. The difference is primarily due to poverty determinants and type and intensity of climate risk exposure and affected population.

- i. *Mainstreaming Poverty Objectives in National Frameworks*: National practice and instruments confirm the emerging close link between NDCs and the SDGs. According to Climate Watch data, 45 countries, mostly in **Africa, South and Southeast Asia**, have highlighted one or more targets addressing SDG-1 i.e. no poverty, in their NDCs.

Vietnam, Cambodia and Zambia have mentioned four targets of the SDGs, including reviewing production processes to making them appropriate under climate change conditions, disaster risk insurance and community-based adaptation. **Vietnam** has set poverty reduction among the monitoring and evaluation criteria and aims to achieve a 2% annual reduction.

- ii. *Mechanism addressing climate and poverty:* Community Renewable Energy (CRE) approaches constitutes a brilliant example of how to enable the access to modern energy services for rural and disadvantaged populations^{lxxii}. As recently as 2017, **Costa Rica** obtains the totality of its electricity production from renewable sources. Large-scale adoption of renewable energy technologies come with disadvantages, such as price increase, that are particularly heavy on the poorest strata of population. In Costa Rica the problem has been partially tackled by the electric cooperatives like Coop Guanacaste. The cooperative Coopeguanacaste was created in 1965 by 229 members and supported by national institutions such as the National Bank of Costa Rica and Costa Rican Institute of Electricity, under the guidance and technical assistance of the U.S. Government. Nowadays it provides electricity to over 100,000 people living in semi-urban and rural areas. Indeed, it first led to the substitution of diesel mini-grids with grid extension powered by hydropower, and two decades later, to the implementation of photovoltaic (PV) stand-alone system which allowed a 99.7% coverage of the concession area^{lxxiii}. Overall, the four largest Costa Rican energy cooperatives account for the 10% of total national distribution. In **Argentina** this percentage rises up to 16%, with about five-hundred cooperatives comprising more than one million members^{lxxiv}. In 2016 the Argentinian Government launched the Prosumidores program, assigning a fundamental role to energy co-operatives that have been established in Argentina since the early twentieth century. This policy aims at securing energy access at affordable prices in regions where energy distribution is more difficult, such as in the country's north. One of the principal result had been the financial strengthening of public service cooperatives, which enabled many of them to expand their territorial coverage and improve the efficiency of their system.

Indicators

The following indicators have been derived from the documents- Mainstreaming Poverty and Climate for Poverty Reduction and Sustainable Development (UNDP-UNEP, 2015), Shock Waves-Managing the impacts of Climate Change on poverty (World Bank report 2016)^{lxxv} and Strategies for Reducing Vulnerability and Building Resilience to Environmental and Natural Disasters in Developing Countries (World Resources Institute 2017)^{lxxvi}.

- i. Conducting vulnerability assessment, incorporating socio-economic factors including people's capacity to cope with and plan to mitigate the impacts of natural disasters
- ii. Mainstreaming poverty objectives into environmental national and subnational plans. Accounting for climate risks and climate vulnerabilities in national and subnational strategies for poverty reduction
- iii. Promoting emission-reduction initiatives that create synergies with development goals and yield economic co-benefits: initiatives aimed to enhance energy access, energy

efficiency, climate finance access, resilient rural or urban areas infrastructure and technology transfer to low-income households

- iv. Development of mechanism(s) for the economic support of communities affected by climate change impact

B. Jobs Creation

At the time of announcing withdrawal from the Agreement, the US President Donald Trump suggested that US compliance with the Paris accord could "cost America as much as 2.7 million lost jobs by 2025^{lxxvii}.

The need for the development of green skills and occupations is not explicitly mentioned in the Paris Agreement, even though a general interest for "climate change education, training, public awareness, public participation and public access to information" is stated multiple times (Art. 11, Art 12).

Within the NDCs nearly 307 listed activities target decent jobs creation^{lxxviii}. In comparison to poverty eradication, countries have focused more on job creation. Among the top ten worldwide emitters, Canada and India have mentioned the importance of green skills development. The latter being the only party with specific programs and strategies in place.

The labour market is changing and changing for good. On the one hand, it is impacted by climate change on the other hand, from technological advancement and globalization. Both proceeding at a breakneck speed. World Economic Forum forecasts that by 2025, machines will perform more work-related tasks than humans, compared to 71% being performed by humans today. It is imperative to be careful in assessing the climate change impacts on the labour market which will be exacerbated by the rapid evolution of machines and algorithms in the workplace. Per World Economic Forum's assessment, the technological disruption could create 133 million new roles, but it will also eliminate 75 million roles between now and 2022. Besides mitigating the climate risks, other urgent challenges include providing reskilling opportunities, enabling remote work and building safety nets to protect at-risk workers and communities^{lxxix}.

Whether the US job loss data can exclusively be attributed to climate change policies or not, there is little doubt that the climate change strategies are reshaping most aspects of the global economy including the labor market^{lxxx}. Floods, heat waves and fall in precipitation levels affect both the demand (health and food security) and the supply side (economic activities at risk) of the labor market. Jobs are also impacted when some businesses choose to shift from their current location and move to less risky areas^{lxxxii}. Sectors that are significantly vulnerable to these employment drops are fisheries, tourism, insurance, forestry and of course energy and agriculture.

Similarly, new or modified regulations or regulatory frameworks, impacts both the supply and the demand side. This is largely either due to change in the production pattern or the shift in the consumer preferences. Some policy instruments, such as education and training programs, are explicitly aimed at modifying workforce conditions. Other regulatory measures do not directly target the labor markets, but nevertheless have strong consequences on them. For instance, carbon prices can increase production-costs, both directly and through a rise in

fuel prices^{lxxxii} readdress innovation and transform the demand side. Other instruments, such as fuel subsidies removal or renewable portfolio schemes are likely to lead to similar effects.

Keeping in view the technological disruption, in the short-term, direct employment is affected. Reduced mobility of labor and the consistent skills-gap might cause structural unemployment in the developing countries and emerging sectors. While more mature economies experience a positive net job creation which however is expected to shrink as low-carbon sectors become more competitive. Over the medium-term, effects are forecasted to turn economy-wide, as the impact of climate change expands through the whole economy causing consumers behavior and the value chain to modify. The impact on employment strongly depends on the budget constraints that this new economic model will impose on a country or a firm. The lower the price differential between low-carbon alternatives and traditional solutions, the more positive the impact on employment. Finally, the long-term is characterized by dynamic innovation effects. R&D jobs will be created, and the development of new technologies will foster new investments and further job opportunities, especially for skilled and qualified workers. As technological change and innovation constitute a major source of economic growth, a virtuous cycle is established.

Effects on employment are highly context-specific and unpredictable. The shift towards a greener economy is taking place according to different schedules and modalities around the world. The development of a workforce capable of mastering a set of new green functions and capable of performing during an age of machine and algorithms will be required. Notwithstanding the dual impacts, green jobs^{lxxxiii} are one way of dealing with the emerging challenge.

Overall, despite the relative challenge, there are host instruments which have emerged in generating green jobs. Some of the most prominent ones are:

Practice and instruments

- i. *Green Jobs Policy Formulation:* **Philippine** issued a Green Jobs Act in 2016: formal attempt made by a developing country towards generating and sustaining green occupation. This comprehensive act identifies an array of new initiatives including listing out of needed capabilities, a database of green careers, training regulations, skills assessment and certification, the integration into academic curricula, and the implementation of skills training programs and fiscal incentives to encourage the provision of training by companies. Similarly, **Cambodia** and **Mongolia** have issued National Policy on Green Growth in 2013 and 2014 respectively. **France** added a clause in the 2017 Climate Plan on the creation of “ecological transition contract” for workers whose jobs are threatened by the shift towards a more sustainable economic model^{lxxxiv}.
- ii. *Specific Policy Frameworks:* In 2004 **South Africa** commenced the Expanded Public Work Programme (EPWP) and grouped the environmental public works under the definition of Environmental Sector of the EPWP. The Environmental Sector program provides for the employing of people to work on projects to improve their local environment through the implementation of projects managed and supervised by various departments. The declared objectives, among others, are the creation of jobs and the provision of adequate training,

linking marginalized communities' members with opportunities and resources, creation of land-based livelihoods and promotion of community-based resource management.

- iii. *Public payment for Eco-System Services:* In **India**, the Indian National Rural Employment Guarantee Act (2005), ensures a household the right to work by at least 100 days of paid employment to people who volunteer for unskilled manual work. Undertaken activities include preventing soil erosion, water harvesting and the rehabilitation of degraded land.

Indicators

Drawing from the latest World Employment Social Outlook namely, Greening with Jobs^{lxxxv}, there are four indicators that could foster job creation while simultaneously forging a shift towards a greener economic model.

- i. *Green jobs policy formulation:*

- a. Presence of a specific policy act or framework on employment transition
- b. Presence of clauses integrating wider development and green growth policies
- c. Presence of green clauses in the job creation pertaining to sectorial policies

- ii. *Presence of environmental component* into public employment programs

- iii. *Availability of Public Payment for Eco-System (PES) Schemes*

- iv. *Establishment of national skills development programs:* government institutions often in accordance with sectorial mandates, carry out both initial and continuous training initiatives

C. Equity

As much as climate change impacts are inequitable both within and amongst countries, so are the impacts of responses to climate change³. IPCC states that “equity and efficiency considerations in the context of decision making that addresses global climate change are important for various reasons, including ethical concerns, effectiveness, sustainable development, and implementation of UNFCCC itself”.

A total of 111 of the submitted NDCs included a section on equity and fairness. Out of these, 94 contextualized their emissions in the same section. While 36 parties mentioned gender considerations in their contribution, but only less than a half dedicated an entire section to the matter.

The principle of equitable rights and duties among all the individuals is stated in the preface of the Paris Agreement., where Parties agree to “acknowledge that climate change is a

³ This part we will only deal with equity within a country and not amongst nations (which has been dealt earlier as part of the alignment discussion)

common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity”.

In this short statement are enclosed all of the facets of climate change equity. Responses to climate change, therefore, must be sensitive to these facets of equity and should be:

- i. *Access neutral*: seek to provide equitable access to health facilities, education, access to credit, propensity to saving or to long-term profitable investments and reliance on natural resources to all in a given community. Measures targeting financial access or credits for adaptation and building resilience can help put low-income or women minorities on the same level as wealthier male individuals. Similarly, dedicated allocation of funds can help build resilience and adaptation capacity for vulnerable minorities.
- ii. *Geography neutral*: for instance, arid and semi-arid areas are usually the most exposed to climate change, due to increasing desertification, water scarcity and animal species endangerment. Renewable energy, if applied to mini-grids in rural areas can improve energy access for communities living in disadvantaged conditions.
- iii. *Development neutral*: since climate change effects are likely to be most felt in urban areas. The worsening of air quality and the increase in the risk of morbidity and mortality will increase many folds. Increased infrastructure resilience, for example in overpopulated urban areas, can help build resilience for the most vulnerable segments of population.
- iv. *Gender neutral*: climate change does not affect men and women equally. For this reason, a gender equality perspective is essential when assessing and implementing climate action. It is important to take into account women’s (differentiated needs and) higher vulnerability mostly derived from a series of social factors^{lxxxvi}. Consequently, an affirmative action approach is needed to overcome considerable constraints of their ability to autonomously re-locate following disruptive events. Technology transfer can improve energy efficiency and reduce exposure to energy price variations or facilitate tasks that are typically undertaken by women. Women, generally, have limited access to assets like land, crops and livestock, but also to non-physical assets like education, technology and decision-making potential.

Practice and instruments

If well designed and well implemented, any of the measures described in the previous sections can help to foster equitable approach to climate change resolution.

- i. *National Plans for vulnerable communities*: **Bangladesh**, with the support of the Green Climate Fund, has recently launched US\$33 billion worth six-years project. The project is aimed at enhancing the adaptive capacity of coastal

communities, especially women and adolescent girls, to cope with impacts of climate change-induced salinity on their livelihoods and water security.

- ii. *Integrating Gender perspective:* A group of countries, including **Nepal, Liberia, Tanzania, Zambia, Mozambique, Jordan, Egypt, Cameroon, Panama, Haiti, Uganda and Ghana** have developed, under the assistance of International Union for the Conservation of Nature (IUCN) and its partners, Climate Change Gender Action Plans (ccGAPs). The main purpose of the ccGAPs is to adopt gender strategies for the transformation of national and regional climate decision making (IUCN, 2012).

Indicators

On the basis of these considerations and of previously implemented initiatives three indicators were extracted:

- i. Integrating equity considerations into national and subnational climate plans and in the major policy frameworks
- ii. Presence of emission-reduction initiatives for the enhancement of resilience and adaptation capacity of specific marginalized groups, like women and other indigenous communities
- iii. Establishment of mechanisms for the consultation of the most vulnerable groups in the implementation of new initiatives and programs

3. Building the Index

A. Earlier Attempts

There have been several attempts to build an index based environmentally composite indicators. The OECD Environmental Stringency Index^{lxxxvii} is one good example. The index was designed to link with the Instruments to cover the most commonly adopted approaches to environmental policies, including both market and non-market ones. Subsequently, each country- and instrument-specific variable was given a score from 0 to 6 in accordance to specific threshold. These thresholds are based on the distribution of values for the same type of instrument across countries and time. This way, the assigned score reflected the relative stringency i.e. the country's position with respect to a given instrument relative to the other countries and previous years. Eventually, the different scores were aggregated using a two-levels equal-weights system that results into the ultimate index. Indexes have been constructed for all the OECD plus BRICS countries and annually updated database is available on a specific OECD portal.

Although a brilliant example, this index cannot be faithfully replicated for the purpose of this analysis due to the following reasons. First, data that are easily accessible for developed or large emerging countries, endowed with effective transparency and disclosure systems, are harder to obtain when it comes to developing and/or low-income nations. Second, the variables considered in the above-mentioned index represented a reduced fraction of the total indicators that need to be incorporated. Most of the policies, initiatives and governmental best practices that have been enumerated cannot be expressed in a

quantitative manner. Such data refer to facets of a country's action against climate change that are not possible to be measured, normalized and transformed into numbers.

Indexes based on policy counting have been widely used in literature. For instance, Javorcik and Wei (2004) studied the effect of constraints on pollution on international trade and for the purpose measured the strength of environmental protection in a country by constructing an index based on the interaction between three variables: the number of environmental treaties in which the nation had an active participation, the number of treaties that had been ratified and the number of NGOs active on the territory as a proxy for enforcement.

The Renewable Energy Policy (REP)^{lxxxviii} index attempted to correlate environmental regulation and innovation in the renewables sector. To design an index that varies over years and across countries the authors created a series of dummy variables assuming value 1 when one of the following eight policies was adopted: investment incentive schemes, tax measures, incentive tariffs, feed-in tariffs, voluntary programs, obligations, tradable certificates, and public investment in research and development in renewable energy. The REP index was the sum of the implemented policies expressed as dummies.

Another analogue research^{lxxxix} identified six different policy types and merged them into a single index to check their correlation with innovation: R&D support, investment incentives, tax incentives, tariff incentives, voluntary programs, obligations and tradable certificates. However, a substantial difference is observable with respect to the previous case. While for some of these policies that can be expressed as continual variables, the authors have counted the number of times, they have been implemented in each OECD country from 1978 to 2003. For R&D expenditure and feed-in tariffs the actual values are considered.

The examples mentioned above suffer from two kind of limitation with respect to the main purpose of this research. First, they all refer to data collected from a small set of countries, mostly OECD without accounting for developing countries, being the real fulcrum of this transformation. Second, renewably energy sources innovation and deployment are most definitely a central aspect of climate change mitigation but are not the only solution that calls for implementation. Adaptation is equally important and needs to be targeted effectively, with a specific eye on infrastructures and investments.

The DEAL Score card approach, though less sophisticated, is adequate for the limited number of variables to be considered i.e. an index based on counts of regulation.

B. DEAL Score Card

The DEAL Score Card is different and broader than those so far observed in the literature. It seeks to integrate governance, institutional capacity, stakeholder engagement and economic growth in a coherent manner towards securing necessary transformation and international financing for implementing the NDCs.

In the first section, the importance of putting into place a number of governance measures and to strengthen institutional capability has been underlined. A well-diversified portfolio of policies addressing climate change can lead to lower than expected results if the governing institutions fail to involve the key stakeholders in the decision-making processor to extend the climate change logic to all the related sectors. Within these, other factors, related to

development and livelihood conditions, have also been considered essential, such as poverty eradication and the creation of green jobs. Indicators outlined are a result of state practice and somewhat new in the field of climate change or environmental indexes.

The approach adopted is that of policy counting. A maximum score of 1 to be assigned if a country is fully on track and meets fundamental requirement for all indicators. Each element of the DEAL Score has a maximum of three components. Indicators and country(ies) NDC and wider development framework is measured on three levels: On track, partial and lagging. The country is assigned a less than 1 if it has achieved partial progress. In case it is lagging behind, it is awarded zero.

Calculating the DEAL Score

Maximum Score		1
DEAL Component		
	Decision Making <ul style="list-style-type: none"> • On track⁴ • Partial • lagging 	0.24 <ul style="list-style-type: none"> • 0.24 or full • 0.12 or half • 0.00 or none
	Economic growth	0.24
	Alignment	0.24
	Livelihood	0.24
NDC ⁵		0.04

4. Applying the DEAL Score Card: The case of Ghana

In the first part of this section, an overview of Ghana economic and environmental condition and its main vulnerabilities to the climate change are outlined. In the second part the DEAL framework is applied. For each a set of questions are posed in the scoring system to find answers based on publicly available information. The third and last part is dedicated to designing a way forward. The information provided by the final and the intermediate scores

⁴ Sub-components are applied to the four elements of the DEAL Framing

⁵ NDC is a national framework on managing the risks associated with Climate Change.

are used to develop a perspective on Ghana's degree of commitment followed by a series of recommendations.

4.1 Setting the context

In its 2013 National Climate Change Policy, issued by the Ministry of Environment Science, Technology and Innovation, Ghana recognizes that the incredible growth path of the country is put under immense pressure and irreversible damage.

Over the period (1960-2000), available data show an average annual temperature increase of 0.21%, associated with a gradual decrease in mean annual rainfall. Projections, on a business as usual trajectory, show that the number of days of heat waves, the so-called warm spell might increase from 10 per year in 1990 up to 285 by 2040 and a 1.7% further decrease during 2060-2080. Ghana has also displayed an annual average sea level rise of 2.1 mm during the last 40 years. According to the third National Communication Report to the UNFCCC (2015), potential increases of 5.8 cm, 16.5 cm and 34.5 cm are estimated by 2020, 2050 and 2080, respectively.

Ghana has been a carbon sink until the mid-1990s, absorbing through its forests and rangelands more than what it produced. However, over the past decade emissions levels have gradually increased, due to the process of economic development that transformed it into a middle-income nation. In current times, Ghana's CO₂ emissions reached 0.33 metric tons, mostly driven by the agriculture and the energy sector, together with land use change and deforestation that have contributed to the deterioration of the largest carbon sinks.

Changes in temperature and rainfall levels are expected to have disruptive effects on agriculture that contributes to 20% of GDP growth and affects 60% of people, the majority of whom are small rural farmers. Coupled with water scarcity, there is a strong potential for increasing migration and deteriorating health conditions.

Ghanaian Strategy

Implementation of Ghana's NDC will commence by 2020. At present, Ghanaian efforts, since 2015 were focused on implementing "Shared Growth and Development Agenda" for the period 2014-2017 (approved and adopted in May 2015) and forging a Master Plan for the implementation of its NDCs (2015-2020).

Ghana is working with UNDP as well as with other bilateral actors such as NDC Partnership to determine how best to proceed with its NDC implementation. Ghana's post 2020 experience would guide how best it could measure the impact and determine the component and thrust of its NDC beyond year 2025.

Over all, Ghana has experienced incredible levels of economic and social development and has emerged as a stable democracy with high degrees of freedom of speech, freedom of press and media. Put together, it stands apart from its neighbors in the West-Africa. The real GDP increased by 8.5% over the last few years. The economic forecast is 7.0% growth in 2018, and an average growth equal to 6.4% for the two subsequent years. To incentivize the private sector, the government introduced a series of fiscal reforms: eliminated fifteen tax measures known as "nuisance taxes". Fiscal consolidations were made under the Extended Credit

Facility (ECF) program of International Monetary Fund (IMF). These included capping and realignment of earmarked funds, rationalization of internally generated funds (IGFs), improved tax administration and compliance, and realigned priority spending. As a result, the fiscal deficit decreased from 8.9% of the country's GDP in 2016 to 6.7% in 2017. In addition, Ghana also made an impressive progress on monetary policy. Inflation has been reduced towards its 8% target, reaching 9.6% in April 2018. This allowed the Bank of Ghana to cut interest rates by 3%, down to 18%, which has acted as a tremendous stimulus for the economic development of the country.

Another element of great interest for the full comprehension of Ghana's climate change exposure is its economic structure, detectable through the decomposition and analysis of its GDP growth and formation. The contribution paid by the industrial segment to GDP growth increased slightly from 24.3% in 2016 to 25.5% in 2017. The sector as a whole grew by 16.7%, mostly driven by the mining and quarrying sub-sectors, supported by the improved performance in the oil and gas industries (5.7%). The tertiary sector grew by 4.7% in 2017, as transport, storage and communication contributed by 17.1% to GDP, followed by the retail sector (12.1%), construction (14.3%) and financial services (9.1%). The agriculture sector grew by 8.4%, but its contribution to growth remained stable, going from 18.9% in 2016 to 19.1% in 2017. Sub-sectoral growth included fishing (11.7%), crops 9.4%, forestry and logging (1.6%), and livestock (1.1%).

Even though Ghana's economic model is gradually shifting towards a modern structure, with services gradually gaining GDP share and showing sustained growth. However, reliance on both energy intensive and climate vulnerable sectors make the challenge posed by climate change a significantly urgent one for its government.

Interestingly, this economic upturn has been driven by expanded oil production and a favorable condition on the oil market. The shared growth agenda focuses on expanding infrastructure and oil and gas⁶. Together, the two make up more than 50% of the total US \$ 16 Billion implementation cost of the Agenda. Ghanaian Growth Agenda is aimed at diversifying the economy towards non-oil sector, by focusing especially on labor-intensive agriculture sector, and private-led growth.

Ghanaian Climate Vulnerabilities and Risks

Climate variability and change are posing threats to future growth and development. Rising sea levels, drought, higher temperatures and erratic rainfall negatively impact infrastructure, hydropower production, food security and coastal and agricultural livelihoods. One-quarter of the population lives along the coast in rapidly expanding urban areas like Accra, and are especially vulnerable to flooding and waterborne disease^{xc}.

Despite its incredible level of growth, Ghana is still classified as a high-risk debt-stress country by the IMF and World Bank under the Debt Sustainability Analysis (DSA). Over and above, Ghana is seeking US \$ 16.3 billion from external sources to implement its US \$ 22.3 billion

⁶ Infrastructure development takes lion share of around 45% and oil and gas sector take up nearly 10%

NDCs. Given Ghana’s fragile economic status, there are concerns with respect to the debt-to-GDP and debt-to-revenue ratios. Official accounts inform that progresses have been already made with the debt-to-GDP ratio falling from 73.3% to 69.8% over the past year. Debt accumulation went from 42% in 2012 to 13.5% in 2017. The maturity profile of debt has significantly improved with only 23% being represented by short-term securities. Over all, the Ghana’s risk profile for securing more debt both from private and public lenders at the international level is limited, unless the IMF changes the debt profile definition. Notwithstanding, improving the Ghana’s debt rating represent a primary political and economic objective. The current rating poses significant constraints to the expenditure capacity of that country including mobilization of external aid and multilateral transfers for climate related objectives.

NDC analysis vis-à-vis the DEAL Score Card

Ghana submitted its NDC on September 2016, which provided a viable agenda, identified goals, assessed means through which to achieve them and established principles to follow throughout the process. In the released document, Ghana presented 20 mitigation and 11 adaptation actions, connected to seven priority sectors and to be accomplished over a ten-year time span, starting in 2020.

Below is an analysis of NDCs, and associated implementation plans based on the DEAL framework. An evaluation for each of the indicator identified in the first chapter has been undertaken to determine where the country stands and the likely trajectory.

4.2 Decision Making:

a. Programmatic Approach

Ghana’s NDC states “The inclusion of both mitigation and adaptation in the NDC resonate with the medium-term development agenda (Ghana Shared Growth Development Agenda II – GSGDA 2), the anticipated 40-year socio-economic transformational plan and the universal sustainable development goals. Furthermore, in the adaptation goals’ declaration it is stated that adaptation under Ghana NDC must be informed by “Good governance and inter-sectoral coordination”.	On track
There has been a progress in Ghana on the need for integrating climate risks in the overall decision making and planning. The challenge and risks posed by climate change in Ghana had been fully reflected in Ghana’s (GSGDA 2). While, its 40-year national development plan is yet to be published, the Master Plan on the Implementation of the NDCs, lays out critical roles for several important ministries including the Ministry of Finance.	On track
The Master Plan on the implementation of the NDC has highlighted the need for integrating sectoral medium-term plans, including: health sector development plan, local government and rural development plan, roads and highways, tourism and culture, trade and industry, transport and water resources, work and housing. This integration with Ghana’s Growth Strategy reflects a positive movement towards a programmatic and long-term approach,	On track

even though programmatic approach is not among the main objectives and there is less clarity on a precise course of action.	
The institutional set up lacks a formal mechanism for the coordination among the entities towards the common objectives of adaptation and mitigation.	Lagging

b. Devolution/localization

No explicit reference to delocalization nor to delegation to regional and local government is made in any of the document	Lagging
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c. Capacity to implement

Even though the need for enhancing capacity building is not directly reflected in the submitted NDC, several related national climate change, economic growth policy documents ^{xc} have highlighted the need for capacity building in managing the risks of climate change. The NDC only refers to the need for enhancing the “capacity to implement”. The capacity is only defined in terms of the need for financial resources. There has been varying degree of progress on some indicators on capacity to implement.	Partial
A ten-year Climate Change Learning Strategy in order to mainstream climate change and green economy into national education plans has been elaborated by the EPA and the Ministry of Environment, Science, Technology and Innovation (MESTI) in collaboration with the UNFCCC and the UNDP. It is expected that this will soon be translated into primary and secondary education curricula. According to the Program-Based Budget of MESTI, 35 members of its staff have been trained to deal with environmental assessment in 2015 and 2016. The number was increased up to 112 in 2017. It has been forecasted that this will increase in the following years. The Ministry of Food and Agriculture organized a total of five training on environmental integration on climate change for the staff.	On Track
Since 2013, the EPA under the MESTI has been doing partial monitoring under the Ghana Climate Ambitious Reporting Program (G-CARP). The program aims at the establishment of an online database containing a GHG database, an Electronic Registry System for monitoring all past and present initiatives with the respective sources of funding, and a Dashboard on Climate Policies registering all climate policies implemented in the Ghanaian productive and economic context. An online platform called Climate Change Data Hub is currently in place. However, it only contains data on GHG emissions and related information, whereas it does not serve as a climate policy tracker yet.	Partial
From Ghana’s published economic and financial reports, it is not clear if and what allocation has been directly made to climate change in the national budget. It is, therefore, not easy to determine with accuracy the share of the budget allocated to the subject. A rough estimate can be provided through an analysis of the program-based budget of the ministries listed in the National	lagging

Climate Change Policy. However, programs voices are very broad and single sub-program descriptions do not include data on forecasted needed resources.	
The amount of resources allocated in the national budget (2018) to MESTI, which is the main national environmental body, is just 5% of the Ministries of comparable size i.e. 362 Million Ghanaian Cedi. The MESTI is by and far, one of the weakest Ministries in the system, the one dealing with the climate challenge.	lagging
There is neither overarching body or institution managing the NDC implementation or doing monitoring and reporting. In addition, the EPA deals with the whole spectrum of environmental issues, including, but not exclusively on climate change.	lagging

4.3 Economic Growth:

a. Energy

Ghana has established a target of establishing 10% penetration of the renewable energy by 2030 in its Renewable Energy Act (2011). This Act is central to its overall objective of 45% emission reduction target. The program of action is articulated into five points: increase small-medium hydro installed capacity up to 150-300MW; attain utility scale wind power capacity up to 50-150MW; attain utility scale solar electricity installed capacity up to 150-250MW; establish solar 55 mini-grids with an average capacity of 100kW and translates to 10MW; scale up the 200,000 solar home systems for lighting in urban and selected non-electrified rural households.	On track
The Renewable Energy Act, though a comprehensive framework, suffers from lack of concomitant implementation. For instance, the Act provides for (a) the establishment of Renewable Energy Purchase Obligation, which obliges electricity distributors and bulk consumers to purchase a given percentage of electricity generated from renewable sources. However, the Public Utilities Regulatory Commission is still in the process of defining the mandatory share as well as the modality of implementation; (b) the establishment of a feed-in tariff system. The rate is applicable to power purchase agreements (PPAs) from the day they are signed and remains fixed for a time span of 10 years but regulatory authorities need to complete the process and (c) the creation of a Renewable Energy Fund to catalyze and address financial resources towards the promotion and the development of the renewable energy sector, both in the form of reduction in the grants and loan rates. However, the fund has yet to be operationalized.	Partial
Ghana has been the first West African country to adopt low sulfur diesel fuel standards and to ban high sulfur content fuels, both imported and produced locally. The aim is to move from 3,000 ppm (part per million) to a maximum of 50 ppm. However, there is no ban on dirty fuels and imposition of taxes on the use of fossil fuels. In fact, the current growth is very strongly influenced by the	partial

extensive and enhanced use of the oil and gas sector in addition to subsidy given to the petroleum products.	
In 2013, following a steep increase in debt to GDP ratio mostly due to low tax revenues, Ghana has completely removed subsidies on petrol, gas and LPG products. Subsidies were later on reintroduced in July 2014 due to an excessive increase in oil prices. In 2015, the Ghanaian Government announced it would cut subsidies. According to IEA, in 2016, oil subsidies accounted for a modest 30.9 million. This reflects almost 100% reduction with respect to pre-reform levels.	Partial
The NDC further underlines the need for “access to market-based mechanisms/emission trading schemes where these emission reduction units would be fungible and tradable i.e. compliance grade emission reductions units from actions in the waste and energy sectors and REDD+. However, neither a mechanism has been defined and nor the carbon pricing system in particular has been implemented or is scheduled for implementation. No framework exists for the engagement of local banks in the financing of renewable energy initiatives.	lagging

b. Economic Growth: Technology

Three out of seven mitigation policy actions rely on technological development. The NDC outlines that “The following NDC policy actions will be implemented to achieve the mitigation goals: double energy efficiency improvement to 20% in power plants; double energy efficiency improvement to 20% in industrial facilities; promote the Green Cooling Africa Initiative. Under the Adaptation goal, NDC states that “Ghana’s NDC is informed by the role of sciences, technology and innovation”. It is also stated that “without the requisite technology, the technical capacity and favorable conditions that stimulate innovation, Ghana will not have the capability to fully implement its INDC. Finally, Ghana will be looking for international partnerships to take advantage of the opportunities for technology development and transfer and continuous up-skilling especially in the priority NDC sectors”.	On track
In 2016 MESTI launched the Ghana Climate Innovation Center to encourage the development of new technologies. This hasn’t been captured in the annual budget.	Partial
The National Energy Efficiency Action Plan (NEEAP, 2015), focuses on energy efficiency measures. In addition, there is a dense corpus of regulations providing for efficiency standards since 2005. e.g. (i) minimum energy performance standard for refrigeration, air-conditioning and lighting devices; (ii) prohibition on the sale of incandescent lamps (ii) energy certification for building materials (2009); and Ghana Building Code (2011) replacing the original issued in 1970.	On Track

Many initiatives have been undertaken with the purpose of encouraging end consumers to adopt more efficient devices. In 2012 the Energy Commission launched the refrigerator rebate scheme, which entails buying back old and inefficient refrigerators in exchange for a rebate on the price of new and efficient ones. A similar program has been launched for the replacement of fluorescent bulbs with new LED technology. A considerable effort has also been put into introducing the Ghanaian market efficient and accessible cook stoves.	Partial
In addition, 70,000 units of portable solar lanterns (with phone charging functionality) were sold at 70 percent subsidy to poor off-grid rural households. These programs have been accompanied by communication and sensitization strategies in order to raise awareness on the importance of energy efficiency.	Partial
Energy efficiency in the industrial sector is at an early phase and the dialogue between the Government and private companies regarding efficiency is still quite limited.	Lagging
Even though awareness campaigns have been widely promoted and dialogue has been fostered, especially in relation to end-consumers, the country is yet to move towards translating them either into guidelines or standards on the respect of efficiency standard and on the use of low-carbon technologies	Lagging
Within the master plan for implementation of the NDC, there is a significant emphasis on the adoption of efficient technology for securing outcomes enlisted. However, neither within the NDC nor within the Master plan, there is any nationally determined pathway to achieving technological input.	Lagging

c. Economic Growth: Resilience and Infrastructures

Infrastructure has been identified among the priority sectors for emission reduction. NDC states that “the implementation of the actions is expected to help attain low carbon climate resilience through effective adaptation and greenhouse gas (GHG) emission reduction in the following priority sectors: climate proof infrastructure; sustainable mass transportation” Infrastructure resilience is listed as a focus in two adaptation and one mitigation policy actions: city-wide resilient infrastructure planning; early warning and disaster prevention and scale up sustainable mass transportation. Focus area 2 of the Master Plan for the implementation of the NDC very clearly and strongly provides for national budget allocation, integration of climate resilience in the national infrastructure plans as well as seeks to integrate climate risk assessment in both public and PPP project regulations.	On Track
The threats posed by climate change and the need for increasing infrastructure resilience is recognized in the national infrastructure plan.	Partial
As emerging from the 2018 program-based budget, specific budget allocation is made with respect to coastal and drainage infrastructures. Moreover, even though no specific allocation has been made, the need for increasing	Partial

infrastructure resilient is acknowledged in the budget of the Ministries of Water Resources and of Roads and Highways.	
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4.4 Alignment:

a. Stakeholders

The National Climate Change master plan has been prepared with active involvement and assistance of a wide range of stakeholders. These include the management and staff of Ministry of Environment, Science, Technology and Innovation, the Environmental Protection Agency, as well as sector ministries and agency, civil society and Non-Governmental organizations. Responsible ministries, departments and agencies and stakeholders are to verify that their programmes and activities in relation to climate change and disaster risk reduction have been fully captured in the document.	On Track
Information on Ghana's levels of emission and potential vulnerabilities to climate change effects are included in all the main documents issued within the framework dictated by the National Climate Change Policy. However, information on public initiatives on climate change are not collected in a systematic and easily accessible manner.	Lagging
Stakeholder involvement is not formalized. There are no guidelines to determine the inclusion or exclusion of the stakeholders. Evaluations by the stakeholders are not made publicly available. Stakeholders are not allowed to make public comments. In fact, parliament and involved ministries' consultations are not made open to external stakeholders.	Lagging
Following the adoption of the Master Plan, some workshops and forums have been held on a number of climate-related topics. However, such involvement is not conducted on a systematic and formalized basis. Some ministries, such as Ministry of Food and Agriculture, have produced guidelines on stakeholder's consultation and involvement. Overall, climate change and environmental protection lacks a structured organization.	Lagging
Ghana has been included by the Green Climate Fund (GCF) in the GCF Readiness Programme, a joint partnership between UNDP, UNEP, and World Resource Institute (WRI), designed as a global program to support countries in enhancing access to international climate finance. Under this framework, the Climate Change division within the Ministry of Finance has developed a Climate Finance Tracking Tool, with the purpose of registering and reporting climate finance flows in a structured and organized manner.	Partial

b. Alignment: Finance and Investment

Out of a total of 16 billion to be mobilized from the international sources, 3.8 billion are supposed to be the private capital investments including from the	Lagging
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private carbon market. However, there is neither an explicit recognition in the NDC nor in the Master Plan, on the necessity of creating basis for sustainable investment mechanisms for reallocating resources towards the green sector.	
The Ghanaian fiscal system does not provide for any form of favorable taxation of green investments. Following the adoption of the Paris Agreement, the Greening of financial markets where the private sector can or should participates are still at the discussion phase.	Lagging
Ghana is a good candidate for launching the green bonds in the upcoming years to become a second West African country, after Nigeria, to reach this achievement. However, at the moment, the project is still at the discussion phase.	Lagging

4.5 Livelihood:

a. Poverty alleviation

The need for addressing livelihood especially that of the highly vulnerable rural population is reflected within the NDC and picked up in the Master Plan with identified focus area.	On Track
Within the Master Plan for the implementation of the NDCs, Poverty reduction has rightly been linked to the livelihood protection. Ghana still presents a high percentage of population living below poverty threshold and the Ghanaian Government is conscious of the redistributive effects of climate change typically on food, health and income security. Land use, food security and energy security are among the priority sectors for adaptation and mitigation of GHG emissions with their corresponding programs of action, that can be circumscribed to poverty reduction: promote clean rural households lighting; expand the adoption of market-based cleaner cooking solutions; agriculture resilience building in climate vulnerable landscapes and managing climate-induced health risk. Moreover, rise in income; higher agricultural productivity and increased access to electricity for rural population have been included as co-benefits of some of the programs of action, a further sign of the attention that the poverty eradication deserves.	On Track
<p>Action^{xcii} within the Ghanaians Master Plan aims at:</p> <ul style="list-style-type: none"> • Developing competencies of local authorities and communities on hazard, vulnerability and risk assessment • Enhancing and integrating poverty alleviation efforts with climate change mitigation and adaptation actions • Creating synergies with development goals and yield economic co-benefits: enhancing energy access, improving energy efficiency, promoting climate finance access, improving rural or urban areas infrastructure resilience and technology transfer to low-income households. • Expanding the scope and coverage of current efforts while building synergies with ongoing activities towards increasing benefits to target communities as well as enhancing coordination and greater synergies 	On track

across the relevant sectors and among appropriate agencies (NADMO, MESTI, EPA, MOH, NHIS and other relevant partners) to address vulnerability stemming from risks associated with climate change.	
Ghana has also sought to ameliorate the impacted communities by establishing support mechanism such as (i) pricing mechanism for food commodities impacted by climate change; (ii) early warning mechanism; (iii) land use rights, carbon rights, tenure system and equitable benefit sharing; (iv) health related consequences of extreme weather events; (v) mainstreaming gender impact; (vi) financial mechanism to support operations of technology incubation centers etc.	On Track
Synergies between climate-change mitigation and adaptation and poverty reduction are extensively recognized in the Low-Carbon Development Strategy (2016). Among the actions proposed in the NDCs, Ghana has set the objective of ensuring 100% electrification by 2020. The number is expected to be ten times higher by 2021. Moreover, more than five-hundreds photovoltaic standalone facilities have been installed, providing further access to clean energy for rural communities.	On track

b. Livelihood: Job creation

The Government of Ghana has recently launched the Youth in Afforestation Programme, employing 20,000 young people across the whole country in the fight against deforestation and desertification. The National Entrepreneurship and Innovation Plan (NEIP), a governmental initiative, has also launched the NEIP Greenhouse Estate Project, with the purpose of building one-thousand greenhouses across the ten regions of Ghana providing 10,000 direct jobs annually.	On Track
Education and training programs have been promoted by an array of international organizations and on a more sophisticated level by the University of Ghana under the Building Capacity for Climate Change Challenge (B4C) program, the Government of Ghana does not directly hold training programs for green skills development.	Partial
Job creation is not explicitly set as an objective but is included in a large number of programs of action as a co-benefit. The Ghanaian government acknowledges the importance of promoting the development of a green job market and that many of the measures undertaken are targeted to this goal, although not primarily.	Lagging
The country has not formulated a specific framework or policy for employment transition. Moreover, the topic is not a standalone topic of interest in any of the medium-term sectorial plans issued by the Ministry of Energy, the Ministry of Work and Housing and the Ministry of Agriculture and the Ministry of Education.	Lagging

National Climate policy does not provide for any plan for green jobs transitioning and creation.	
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c. Livelihood: Equity

The principle of equity in climate change intervention is a part of the Ghanaian NDC. It is stated that “the implementation of the actions is expected to help attain low carbon climate resilience through effective adaptation and GHG emission reduction in the following priority sectors: equitable social development”. Subsequently, there is an explicit recognition of gender differences and the higher degree of vulnerability of some specific communities, such as indigenous ones, in the section dedicated to setting adaptation goals. Indeed, one of the objectives is to “Increase the resilience for gender and the vulnerable”, which is set to be achieved through “the implementation of community led adaptation and livelihood diversification for vulnerable groups”.	Partial
Equity is widely mainstreamed in the National Climate Change policy, as equitable social development is among the five focus areas. To “address gender issues in climate change” is one of the sub-areas. Equity and gender sensitivity are listed among the guiding principles of climate action. The Ministry of Gender, Children and Social Protection is listed among the key actors involved in the process. Also, other minorities, such as local and indigenous communities are often mentioned, especially with respect to the acknowledgment of the role they can play in natural resources management. Gender considerations have been included also in many sectorial policies, such as the National Energy Policy.	Partial
Even though equity and specifically gender issues are recognized in national plans and strategies, in practice, on the basis of the available information, no initiative has been conducted by the government targeting women or other vulnerable minorities.	partial

4.6 Deriving the final score

The aim of the following section is that of applying the DEAL framework in order to evaluate Ghana’s progress in the field of climate policy and measures against what is provided in its NDC. The framework is not utilized in its entirety but according to the elements present in the NDC. For this reason, also the weights adopted in the original version are modified in order to account for possible missing factors. In this case, the delocalization indicators have been removed since it has been identified as the only element that does not lie among Ghana’s principles and objectives.

Indicators	Level of progress	Accrued DEAL Points	Total DEAL Points
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Decision Making		0.06	0.24
Programmatic approach		0.04	0.08
	Identification of climate risks and the need for adaptation within national development plans	On track 0.02	0.02
	Calculating uncertainty and the expected needs of the future generation	lagging 0.00	0.02
	Integration of climate challenge within key national development and finance frameworks	On track 0.02	0.02
	Mechanism for cross-sectoral adaptation and mitigation response built in cross-sectoral adaptation and mitigation bodies, projects and activities identified at the national level	lagging 0.00	0.02
Devolution		0.000	0.08
	Development of an empowered institutional set up with clear determination of regional and local competence and responsibilities with respect to environmental and climatic issues	lagging 0.000	0.013
	Establishment of a formal mechanism of dialogue and coordination among national and local governance	lagging 0.000	0.013
	Size of intergovernmental budgetary allocation to the local governments	lagging 0.000	0.013

	Ability of the local governments to receive funds from bilateral and multilateral sources	lagging	0.000	0.013
	Existence of local plans of action on climate change	lagging	0.000	0.013
	Establishment of an accountability mechanism for climate spending at the local level	lagging	0.000	0.013
Capacity to implement			0.025	0.08
	Integration of climate change learning and education into national plans	partial	0.005	0.01
	Support of internal training programs for the administrative staff	partial	0.005	0.01
	Creation of climate change section into the national budget	lagging	0.000	0.01
	Share of total budget allocated to climate change initiatives	partial	0.005	0.01
	Share of total budget devolved to the major environmental body (Ministry of Environment or Analogous)	partial	0.005	0.01
	Institution of an ad hoc ministry	lagging	0.000	0.01
	Institution of an ad hoc sub-ministerial body (agency, institute) in charge of promoting and coordinating climate change action	lagging	0.00	0.01
	Establishment of an accountability system at all levels	partial	0.005	0.01

	of governance (monitoring and reporting)		
Economic Growth		0.045	0.24
Energy		0.03	0.08
	National RE targets, quotas, renewable portfolio standards (RPSs)	On track 0.01	0.01
	Taxes and bans on dirty fuels	lagging 0.00	0.01
	Feed-in tariffs (FiTs), feed-in premiums (FiPs), auction mechanisms	partial 0.005	0.01
	Engagement and existence of monetary framework for the local banks in renewable energy sector	lagging 0.00	0.01
	Public capital grants or soft loans	lagging 0.00	0.01
	Existence of a carbon pricing, ETS mechanism	lagging 0.00	0.01
	Removal of fossil fuel subsidies	partial 0.005	0.01
	Share of renewable energy budget	On track 0.01	0.01
Technology		0.02	0.08
	Market Based Instruments: Monetary contributions, grants, dedicated funds and R&D subsidies	lagging 0.00	0.20
	Command and Control: Taxes, standards and minimum subsidies	partial 0.01	0.20

	Demand Instruments: campaigns to raise consumer awareness, end-consumer subsidies	partial	0.01	0.20
	Voluntary agreements with private sector companies	lagging	0.00	0.20
Resilience			0.03	0.08
	National budget allocated into sustainable and resilient infrastructure project	partial	0.01	0.02
	Incorporation of climate resilience into national infrastructure plans (or analogous documents)	On track	0.02	0.02
	Technical standards for climate resilience	lagging	0.00	0.02
	Integration of climate risk assessments both in public and PPP projects regulation	lagging	0.00	0.02
Alignment			0.036	0.24
Stakeholder engagement			0.036	0.12
	Establishment of formal mechanisms for the engagement of stakeholders conducted in practice (forums, workshops, public-private partnerships)	partial	0.012	0.024
	Existence of formal requirements for stakeholder's involvement	On track	0.024	0.024
	Publicly available evaluation of stakeholder engagement	lagging	0.00	0.024

	Consultations on climate change topics made open to public	lagging	0.00	0.024
	Information on climate change conditions and initiatives made publicly available	lagging	0.00	0.024
Finance & Investment			0.00	0.12
	Green financial markets (green bonds, SME finance, alternative finance)	Lagging	0.00	0.04
	Fiscal incentives for green investments	lagging	0.00	0.04
	Sovereign green bonds	lagging	0.00	0.04
	Mechanisms for the measurement of green and sustainable financial flows	lagging	0.00	0.04
livelihoods			0.14	0.24
Poverty Eradication			0.08	0.08
	Conducting of vulnerability assessment incorporating socio-economic factors including people's capacity to cope with and plan for natural disasters	On track	0.02	0.02
	Mainstreaming poverty objectives into environmental national and subnational plans, and, if there is any, accounting for climate risks and climate vulnerabilities in national and subnational poverty reduction strategies	On track	0.02	0.02

	Promoting emission-reduction initiatives that create synergies with development goals and yield economic co-benefits: these types of action are extremely context specific and can vary across a wide range of interventions; they may include initiatives aimed to enhance energy access, energy efficiency, climate finance access, rural or urban areas infrastructure resilience and technology transfer to low-income households	On track	0.02	0.02
	Development of mechanism(s) for the economic support of communities affected by climate change impact	On track	0.02	0.02
Jobs Creation			0.02	0.08
	Green jobs policy formulation	partial	0.01	0.02
	Inclusion of an environmental component into public employment programs	lagging	0.00	0.02
	Public Employment Schemes (PES)	partial	0.01	0.02
	Green skills development programs	lagging	0.00	0.02
Equity			0.04	0.08
	Integrating equity and gender considerations into national and subnational climate plans and policy frameworks	partial	0.0135	0.027
	Emission-reducing initiatives for the enhancement of resilience and adaptation capacity of	partial	0.0135	0.027

	specific minorities, like women or indigenous communities		
	Establishment of mechanisms for the consultation of the most vulnerable groups in the implementation of new initiatives and programs	partial 0.0135	0.027
Public Availability of the NDC		0.04	0.04
Overall DEAL Score		0.361	1

Way forward

The purpose of the DEAL Score card is to help track progress of countries committed to the fight against climate change. DEAL measures the areas where the country under study is on track, has made partial progress and is lagging behind. As such, on a simple scale of zero to one, it presents a measure where a country is on its quest for transformation towards a low carbon society.

Overall, Ghana has scored 0.361, which, based on the methodology, range between partial progress and lagging despite a number of very important steps that Ghana has taken: formal climate strategy, a national policy and a master plan for the implementation, a low carbon strategy as well as linkages with other national frameworks. It is opening up for a multi-stakeholder approach to cope up with the challenges posed by climate change.

The emerging picture tells us that Ghana acknowledges the serious risk that climate change poses to the country and it has developed a set of plans and strategies to combat it. When it gets to the next phase, it would require translating those plans and strategies into regulatory structure, create more transparency, engage other stakeholders, create incentives for mobilizing private finance and the confidence of the multilateral donors to help facilitate the transition. This on the one hand is a global imperative and on the other hand Ghana's internal priority. Simply put, it needs to develop those fundamental frameworks that can actually deliver on the NDC. To that end, Ghana is in a good position, having commenced its work for implementation of the NDC in 2020.

The following paragraphs contain some concluding thoughts on Ghana, with a specific focus on the points where Ghana's progress has been partial or lagging consistent with the DEAL framework. The five points under analysis are: devolution, Energy, financing & investment, transparency and local engagement.

i. Decision Making: Devolution

One of the key areas where Ghana is lagging behind turns out to be an absence of empowered sub-national governments and local communities. Acknowledging the importance of regional and local entities is a first step but engaging them and empowering them to become an active participant is another. History suggests that without empowering local communities even the best of plans often fail. Engaging city and village level government in a formal mechanism would level this out. Moreover, community-based sustainable development needs to gain further recognition. Ghana's rural communities must be involved in the management of natural resources by virtue of their wider knowledge of the necessities and the characteristics of the territory and of its inhabitants.

ii. Economic Growth: Finance and Investment

Ghana needs an investment of US \$ 16 Billion to meet its NDC requirements by 2030. However, Ghana's reliance on public intervention and public financing alone to promote climate related industries, including renewable energy, needs serious up gradation. It requires proper access to financial markets for investments in green technologies as shown by the examples of many developing countries. Without mobilizing private investment and a mature financial sector, the dream of transformation is unlikely to translate into reality. The recent report by the Bank of Ghana on the state of the financial sector in Ghana (BoG, 2018) called for deepening reforms towards liberalization and introducing competition. The existing reforms have not lifted the significant pressure on the financial sector, which is compounded by overall weakened regulation and risk constraints and poor governance. In 2016 the BoG conducted an Asset Quality Review (AQR) that exposed a severe deterioration of banks' balance sheets, mostly due to bad governance, risk and credit management practices. Low asset quality and liquidity scarcity affected the microfinance sub-sector, with the 40% of the institutions being at risk of severe distress. Together with the challenge of meeting the Basel Regulatory Capital Requirements Directive and the implementation of deposit insurance scheme and more, it is not surprising that green finance and sustainable investment are struggling to forge a financial framework. Without deepening these regulatory reforms, Ghana cannot utilize instruments such a Green Bonds, which has emerged as a viable platform to mobilize internal and external resources.

iii. Economic Growth: Energy

Ghana is among the few low-income countries that are focusing on the development of renewable energy sources, through its the Renewable Energy Act (2011). This very important step is laudable. The Act provides a framework for the production, distribution and utilization of renewable energy sources. In fact, the act also lays the basis for the creation of an enabling environment for private investments to be addressed towards renewable energy projects. The main points raised by the policy are: (i) the establishment of a license for engaging in any commercial activity in the renewable energy sector; (ii) the development of a feed-in tariff scheme, including, a renewable energy purchase obligation, a feed-in rate and the connection to the transmission system; (iii) the establishment of the Renewable Energy Fund, where financial resources coming both from domestic and international sources are allocated to be primarily spent for the provision of financial incentives, feed-in tariffs, capital subsidies and equity participations in grid, mini-grid and off-grid renewable power systems and other related projects approved by the Energy Commission.

The DEAL Score card highlight that on account of regulations and framework, Ghana has made progress, yet it is lagging in creating a level playing field with the traditional sources of energy. It can overcome this by creating Emission trading system, carbon pricing, removal of subsidies on fossil fuel development, and if not removal of oil and gas sector development financing, at least providing similar incentives for renewable energy development; and (ii) monetary framework (such a public grants) for incentivizing the private sector. Of course, the situation is also complicated due to lack of investment and affordability, complicated licensing process low incentives to R&D, and inadequate capacity building. For this to change, Ghana should accelerate the establishment of a dedicated fund. REPO system is yet to be translated into an approved policy

iv. Alignment: Multi-stakeholder engagement

Ghana has received a fairly low score on multi-stakeholder engagement. There is no prescribed mechanism for integrating the stakeholders in a formal decision-making process. There is an absence of information on the projects and initiatives adopted in a certain area available to the outside world. While strategies, plans, declarations of future action are made easily accessible, information on initiatives and projects are often not published. There is a lack of adequate reporting on sources of funding, actors involved, goals and actual achievements. This overall lack of disclosure is particularly prominent for what concerns financial data. As highlighted in the capacity building section, it is impossible to know exactly the size of budget allocated to initiatives related to climate change as no specific budgeting document is produced for this purpose. Shortage of publicly available information translates into a low degree of stakeholders' involvement. Ghana's Government won't be able to achieve its adaptation and mitigation targets without bringing on board key private sector players. As a first step Ghana could improve its Climate Change Data Hub and transform it into a real reporting system.

The annual issuance of a standalone climate change budget is important, as it constitutes a signal of political and economic intent. This would allow the private sector, especially with respect to the heavy industry, to engage.

END NOTES

ⁱ A complete review of the literature concerning the decision-making process behind climate policies goes beyond the scope of this paper.

ⁱⁱ Risk is the combination of the probability of a consequence and its magnitude. Therefore, risk considers the frequency or likelihood of occurrence of certain states or events (often termed 'hazards') and the magnitude of the likely consequences associated with those exposed to these hazardous states or events.

ⁱⁱⁱ climate adaptation: Risk, uncertainty, and decision-making, UKCIP Technical Report May 2003

^{iv} Sprinz, 2008

^v Fertel and Waaub, 2013

^{vi} Climate adaptation: Risk, uncertainty, and decision-making, UKCIP Technical Report May 2003

^{vii} Numerous studies have attempted to identify mechanisms through which uncertainty manifests and how we should group them into decision-making. Fertel and Waaub (2013) distinguish between epistemic and ontological uncertainties. Bardely and Steele 2015 focused on empirical uncertainty about the current and the

future state of the world (state uncertainty) and that about which options are available to act on climate change and what their potential consequences are (option uncertainty). Overall, there are several uncertainties defined in the literature. Regardless all the possible categorizations, uncertainty enormously affects the way decisions regarding the environmental dimension of our planet are taken. It appears clear that standard decision-making theory, where empirical uncertainty is integrated in a probability function over the possible states of the world does not hold when it comes to climate change and that the use of traditional decision-making approaches, such as cost-benefit, cost-effectiveness and multi-criteria analysis suffer from strong limitations due to high uncertainty (Dittrich et al., 2016; Ackerman, 2016). A series of alternative models have been proposed but their application is still mostly restricted to theory and there is no consensus on what the best approach to model uncertainty is.

^{viii} Heal and Millner 2006

^{ix} Deutsches Institut for Entwicklungspolitik, 2018; UNFCC 2017.

^x OECD, 2010.

^{xi} Naess, 2013; Heinelt and Lamping, 2015

^{xii} Gamble et al., 2010; Reedy et al., 2014; Rivera-Ferre et al., 2016

^{xiii} Lundqvist and Kasa, 2017; Nilsson et al., 2012; Granberg and Elander, 2007

^{xiv} Romsdhal et al., 2017

^{xv} Battharai et al, 2012; Nepal CPEIR, 2012; UNDP, 2016

^{xvi} Article 6 of the Convention lays emphasis on the promotion of “education, public awareness, public access to climate change information, public participation in addressing climate change, and training of scientific, technical and managerial personnel”. The same formulation was adopted for Article 10 of the Kyoto Protocol (1997).

^{xvii} Transparency International and European Investment Bank, 2011

^{xviii} Leary et al., 2003

^{xix} Bird, 2017

^{xx} Bird et al, 2016

^{xxi} Dell et al., 2013

^{xxii} Agrawal et al. 2011

^{xxiii} Fankhauser and Tol, 2005

^{xxiv} Arnell, 2004; Rosenzweig and Parry, 1994

^{xxv} Costello et al. 2009

^{xxvi} The Stern review 2007

^{xxvii} Dellink et al., 2014

^{xxviii} Stern, 2007

^{xxix} Tol, 2004

^{xxx} Four areas most suited in the accomplishment of the ambitious Paris goal include: (i) support to renewable energy sources; (ii) development and the diffusion of new technologies; (iii) investment in climate change resilient infrastructure and (iv) creation of mechanisms capable of mobilizing and addressing investments towards a low-carbon economic and social model.

^{xxxi} WEO, 2017

^{xxxii} BP, 2018

^{xxxiii} deLucia, 1998

xxxiv IRENA, 2013

xxxv IEO, 2017; Cullen, 2016; Baldwin et al., 2016.

xxxvi OECD, 2012

xxxvii International Energy Agency (IEA) 2017

xxxviii IEA, 2014

xxxix Chaudhary, Sagar and Mathur, 2012

xl Yang and Yang, 2016

xli McKane et al., 2014

xlii CGEC, 2014

xliii New Climate Economy, 2016.

xliv Agrawala and Fankhauser, 2008

xlv Calderón and Servén, 2014; Canning and Pedroni, 2008

xlvi World Bank, 2010

xlvii Patel and Giordano, 2014

xlviii NCE, 2016.

xlix Bhaskar et al., 2010; Benton, 2013

¹ Deutsches Institut for Entwicklungspolitik, (2018) \

ⁱⁱ <https://www.worldbank.org/en/results/2017/12/01/climate-insurance>

ⁱⁱⁱ Arndt et al., 2015

ⁱⁱⁱⁱ Climate finance capitals peaked in 2015, when they reached the record flows of \$437 billions, mainly driven by Chinese investments, and then dropped to \$383 billions the following year. This sudden decrease was the result of falling technology costs, especially in the wind and in the PV sector, and of a slowed capacity addition in China, which shifted the focus on grid extension and capacity integration. Even though the investments in PV and wind onshore plants are in line to meet the 2°C goal (WEO, 2017), the current level of total climate investments is well below the average \$1 trillion per year required until 2050 (Climate Policy Initiative, 2017). According to the Climate Landscape of Climate Finance (CPI, 2017), in 2015 and 2016 public actors provided a yearly average of \$139 billions, about the 35% of total climate finance flows. Most public funds must be attributed to development finance institutions (DFIs), accounting for the 89% of total public finance. Private climate finance averaged \$270 billions per year in 2015 and 2016, peaking up to almost \$300 billion in 2015. The largest share, \$125 billions in 2016, is provided by project developers, followed by commercial financial institutions and households. As concerns the recipients of these investments, the 93% are employed in mitigation projects, mostly for renewable energy generation. It is interesting to note that flows mobilized for RES have more than doubled those for fossil fuels power generation in 2016, with \$242 billions invested in the former versus the \$118 billions of the latter (IEA, 2017).

^{liv} Beg et al., 2011

^{lv} IEA, 2017

^{lvi} WRI, Venugopal et al, 2012

^{lvii} Green Climate Fund, 2017

^{lviii} Climate Bond Initiative, 2018

^{lix} World Bank 2018, state and Trends in carbon pricing

^{lx} New Climate Economy (NCE), 2016

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- lxi UNEP, 2016
- lxii UNEP, 2016
- lxiii <https://climateanalytics.org/briefings/fact-check-trumps-paris-agreement-withdrawal-announcement/>
- lxiv IPCC, 2007
- lxv Dang, 2012; Bernedo, 2017
- lxvi Hallegatte et al., 2014
- lxvii Kurukulasuriya and Menderson, 2008; Hare, 2011; Knox et al., 2012
- lxviii Carter and Barret, 2006
- lxix Ürge-Vorsatz and Tirado Herrero, 2012
- lxx Barbier, 2014; World Bank, 2010
- lxxi German Development Institute and Stockholm Environment Institute, 2018
- lxxii Vargas, Bruce and Watt, 2018
- lxxiii Vargas and al., 2016
- lxxiv Buenos Aires Federation of Electric and Public Services Cooperatives, 2018
- lxxv Hallegatte et al., 2016
- lxxvi Chaudury, 2017
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