



# **Country case study – Ghana**

## **Climate for Sustainable Growth**

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The views expressed are attributable only to the authors in a personal capacity and not to any institution with which they are associated, or the funders and supporters of this project.

\* The authors of this case study would like to gratefully acknowledge the cooperation of Aaron Cosby and Tomasz Chruszczow, who worked closely with the project team.

This case study is part of the CEPS project 'Climate for Sustainable Growth', whose main objective is to analyse the impacts of climate change mitigation measures on the three pillars of sustainable development: the economic, environmental and social dimensions.

It does so by looking at the positive as well as negative, both intended and unintended, impacts of climate change mitigation policies and projects. While this case study fully recognizes that mitigation policies have both positive and negative impacts, the focus of is on any (potential negative).

The structure of this case study comprises of four sections:

- (1) Country characteristics,
- (2) Climate-related policies,
- (3) Environmental, social and economic impacts of climate change mitigation policies,
- (4) Measures to mitigate impacts of mitigation policies,

This case study, and the methodology it follows, are not intended to analyse the merit of the policies and measures that are being implemented, or their effectiveness and efficiency, but will focus on their socio-economic-environmental impacts, and measures to alleviate these impacts in the period of transition.

It is important to note that lack of information and analysis of impacts and tools to mitigate negative impacts can act as a brake on ambitious climate action. This case study and the overall project's focus should be seen in this light.

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## Executive Summary

This study, which is part of the project entitled “Climate for Sustainable Growth “, focuses on whether climate mitigation policies and projects, implemented for Ghana’s transition to a low-GHG economy, are being put in place in a sustainable way,. It identifies their impact on the three dimensions of sustainable development: 1) economic 2) social and 3) environmental. This understanding is critical for the speed with which mitigation measures can be implemented, for the buy-in they receive from stakeholders and for ensuring that they meet the conditions for sustainable development, which implies there is progress on all three dimensions in a harmonious way.

This study looks at the positive as well as negative, both intended and unintended, impacts of climate change mitigation policies and projects, and considers both domestic and international policies and policies implemented domestically in other jurisdictions outside Ghana. After identifying the impacts, the study focuses on the domestic and international measures that are put in place to mitigate the (potential) negative impacts.

Given the broad scope of the topic, this study sets boundaries through the selection of a limited number of sectors and policies that it focuses on. It looks at the following three sectors, which together account for more than 98% of Ghana’s GHG emissions:

- energy (including transport)
- AFOLU
- waste

The study identifies a range of 22 specific climate-related policies and projects that impact the selected sectors. First, it looks at domestic policies, including for example the phase-down of fossil fuel subsidies in the energy sector, and the National Forest Plantation Development Programme in the AFOLU sector.

Secondly, it looks at policies that have been initiated in other countries with an impact on Ghana. Such policies entail for example the inclusion of aviation in the EU Emissions Trading System and the EU FLEGT (Forest Law Enforcement, Governance and Trade).

Thirdly, it analyses international policies, that is, policies set up under international agreements, such as planned climate mitigation policies in international aviation and maritime (ICAO and IMO), and food labelling initiatives on cocoa and several CDM project.

This study finds that climate change mitigation policies result in a wide range of both positive and negative impacts on the three dimensions of sustainable development.

First, in the energy sector, domestic policies and projects created a variety of economic and social impacts. These policies and projects contribute to the diversification of the energy matrix and towards the enhancement of energy security (e.g. as a result of Ghana’s Solar PV Electrification Programme and Natural Gas Fuel Replacement Programme), as well as increased

household disposable income (e.g. in the context of the efficient lightbulb replacement programme).

An illustration of economic and social impacts of domestic climate change mitigation policies in the energy sector include rising fuel costs, which particularly affect the poorest and most vulnerable (through the phase-down of fossil fuel subsidies).

Impacts from policies initiated in other countries and from international projects in the energy sector include potential economic impacts from the inclusion of aviation in EU ETS, which results in an increase in transportation prices and reduced tourism revenues. Similar impacts would result from the planned international aviation and maritime (ICAO, IMO) policies. On the positive side, one can point to increased revenues from CDM project activities (including a number of efficient cooking stoves projects).

Secondly, in the AFOLU sector, this study also finds a series of significant economic and social impacts from climate change mitigation policies. When it comes to domestic policies and projects, the Sustainable Land and Water Management (SLWM) project, has enhanced food production by making practices in forestry and agriculture more sustainable. On the other hand, certain technologies (e.g. irrigation systems) may create an initial hardship for farmers through the need for high up-front investment.

Programmes implemented outside Ghana also have various positive and negative impacts in the AFOLU sector. Cocoa food labelling initiatives, for example, have contributed in a positive manner to the increased socio-economic resilience of local communities. At the same time, programmes in the forestry sector, such as EU FLEGT, while resulting in many positive socio-economic and environmental effects, could be also considered to potentially negatively impact communities that depend on informal logging.

Thirdly, in the waste sector, many contributions to the enhanced economic welfare are reported, resulting from CDM projects. This includes enhanced energy security and waste management. The latter also result in job creation, technology transfer and sanitary and health benefits. In contrast, there are considerable up-front investment costs related to these CDM waste management projects. In addition, some jobs are at risk in the informal waste collection sector.

In all three sectors, the study finds that climate change mitigation policies, both domestic and international, have a positive environmental impact, through the intended reduction of GHG emissions, as well as other types of emission reductions and an increased contribution to biodiversity and water quality. The negative environmental impacts include, as an example, leakage of methane in pipeline systems as a result of the Natural Gas Fuel Replacement Programme.

The case study finds that several individual domestic flanking measures were put in place to mitigate the impacts of policies and projects. For example in the energy sector, the Solar Lantern Distribution Programme aims to minimise the negative impacts of the implementation of the

phase-down of fossil fuel subsidies by distributing 200,000 solar lanterns at heavily subsidised prices (note that this policy simultaneously addresses the negative impacts of climate policies, while also contributing to the reduction of GHG emissions). Another example relates to efforts to tackle the issues of unequal benefit sharing and tree tenure rights in the context of Ghana's REDD+ programme. Two options are being put in place here: the establishment of Community Resource Management Areas (CREMAs) and the drafting of a legal reform to find long-lasting solutions.

Internationally, this study finds that international donor funding (e.g. from the World Bank, GEF, IMF and CDM projects) can be important components in mitigating the high costs (i.e. opportunity costs) for the government of Ghana to engage in climate mitigation activities. In addition, most projects that receive such funding are also required go through a social or environmental assessment procedure, which is a very important element in ensuring sustainability.

In other cases, specific flanking measures are foreseen that are tasked with the monitoring and review of the implementation of projects, including the potential negative impacts, and ways to mitigate them (e.g. Joint Monitoring and Review Mechanism (JMIRM) in the context of EU FLEGT).

The study finds that many negative impacts were mitigated, but not all of them (e.g. potential job losses in the informal waste collection sector and the leakage of methane in pipelines). In addition, Ghana does not, at present, approach the monitoring of negative impacts of climate impacts in a comprehensive and systemic way.

In summary, most flanking policies and tools are sector- and policy-specific. Few economy-wide tools are in place or required at present. International tools and flanking policies to provide a safety net and address any current or potential negative impacts are not well identified and/or used, or may not exist. As more aggressive GHG mitigation policies and projects are put in place, the identification and measurement of impacts, and the design of more comprehensive tools (including monitoring tools) becomes not a luxury, but a necessity.

It must be emphasized that this discussion must not be in any way be interpreted or construed as encouraging lack of mitigation action. On the contrary, it must be seen as providing a way forward that will ensure that action can be undertaken with full support by all stakeholders, domestic and international.

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# Country case study – Ghana

## Climate for Sustainable Growth

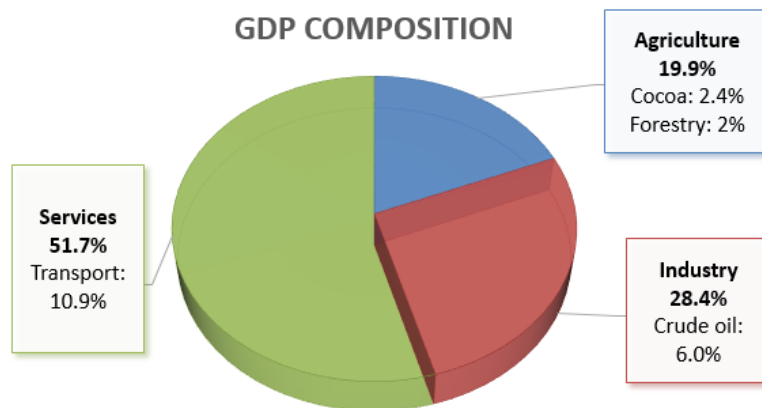
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### 1 Country characteristics

#### 1.1 *Importance of natural environment to the economy of Ghana*

With a land area is approximately 238 540 square km (FAOSTAT, 2015), Ghana's economy is to a large extent based on natural resource extraction, forestry and agriculture. Agriculture alone accounts for 19.9% of GDP and in particular cocoa and forestry are relevant sectors (2.4% and 2.0% of GDP respectively). In the services sector (51.7% of GDP), transport stands out at 10.9% of GDP. The oil and gas sector became important after the 2007 discovery of the Jubilee oilfield, explaining the 2011 peak in annual GDP growth (15.0%, see Table 3).

Figure 1. GDP composition in Ghana (2014)



Source: GSS 2015: 5

Simultaneously, Ghana encounters a high deforestation rate which has cleared most of the natural rainforest over the last century. FAO reports a decline in forest cover from 7.4 million hectares in 1990, to 4.9 million hectares in 2010 (FAO, 2010: 13 (see Table 1 below)). The annual rate of deforestation between 2000 and 2010 amounted, on average, to 1.89%.

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Table 1. Evolution of forest cover in Ghana (1990-2010)

Year	1990	2000	2005	2010
Forest cover (hectares)	7 447 854	6 093 906	5 516 932	4 939 958

Source: FAO (2010: 13).

Ghana encounters serious energy security issues as the country increasingly suffers from power shortages and black-outs due to increasing demand, droughts, and the resulting low water levels in Lake Volta (VRA, 2015). Hydropower, generated predominantly from Lake Volta, is very important for Ghana's electricity supply, accounting for 50% of total installed capacity, and 75% of total electricity generation in 2012 (see Table 2).

In addition, with a population of 26.9 million (2015) and an annual growth rate of 2.9 %, Ghana faces a rapid population growth.

All these elements point to the reliance of Ghana's economy on its natural environment and the threat climate change poses to national development. At large, economic development is the key priority that underpins Ghana's view on climate change. Climate adaptation and resilience are uncontested priorities. Climate change mitigation policies, in contrast, are either implemented at the lowest possible cost, or for economic or fiscal reasons, while, as a co-benefit, contributing to climate change mitigation.

## 1.2 Drivers of transition to low GHG economy

Ghana's response to climate change seeks to simultaneously **address the risks** that climate change poses to its socio-economic development, while at the same time **pursue opportunities** that stem from the development of a low emissions growth path.

International financial aid for mitigation and related opportunities are actively exploited and are an important driver. The 2013 National Climate Change Policy (see below) notes, in this context that "new international mechanisms of support are emerging to safeguard the delivery of national development objectives in the face of climate change" (NCCP, 2013: 1-7). This mix of risks and opportunities drives recent policy developments in Ghana.

Most of the projects related to climate change have largely been financed from external sources (multilateral agencies, donor governments, etc.). The national budget indicates priorities other than climate change, such as education, health, and infrastructure development. At the same time, Ghana reportedly received climate and environmental assistance worth 893 million USD between 2005 and 2015, mainly from development partners (LCDS, 2015: 8). This accounts for two-thirds of funds spent on climate change activities.

There is a concern that the impacts of climate change will erode recent development gains (see Government of Ghana, 2014). The related desire to move towards a climate-resilient economy is a key driver and, as such, climate adaptation and sustainable development are central to Ghana's climate policy. Mitigation is a third – but arguably less central – pillar.

Potential climate impacts are also a driver for the transformation. In addition to decreasing water levels at Lake Volta, these includes issues such as increased flooding, rising temperatures, loss of biodiversity and soil fertility, land degradation and increased deforestation and rising sea levels which can all negatively impact the economy. (National Climate Change Adaptation Strategy, 2013; SNC, 2011; TNC, 2015, SNC, 2011: 37-38).

Energy security is also a key driver. The development of renewables (notably solar power), with Ghana’s energy strategy setting a 10% target for renewables by 2020 (NCCP, 2013: 3 -13), should also be seen primarily in terms of energy security. The climate change mitigation impact is recognised but climate concerns are not necessarily the main driver of the deployment of renewables.

### 1.3 Energy matrix, sectors of economy and GHG emissions

*Table 2. Total electricity capacity and generation in Ghana (2012)*

<b>Total installed capacity (2012):</b>	2280 MW
of which hydro:	1180 MW
of which thermal:	1100 MW
<b>Total electricity generation (2012):</b>	12 024 GWh
Hydro:	8071 GWh
Thermal:	3956 GWh

*Source: TNC (2015).*

As can be seen in Table 2, there is a low utilisation factor for thermal power (1100 MW installed capacity, producing 3986 GWh, while hydro has a similar level of installed capacity, 1180 MW, but produces more than twice the amount of electricity, i.e. 8071 GWh).

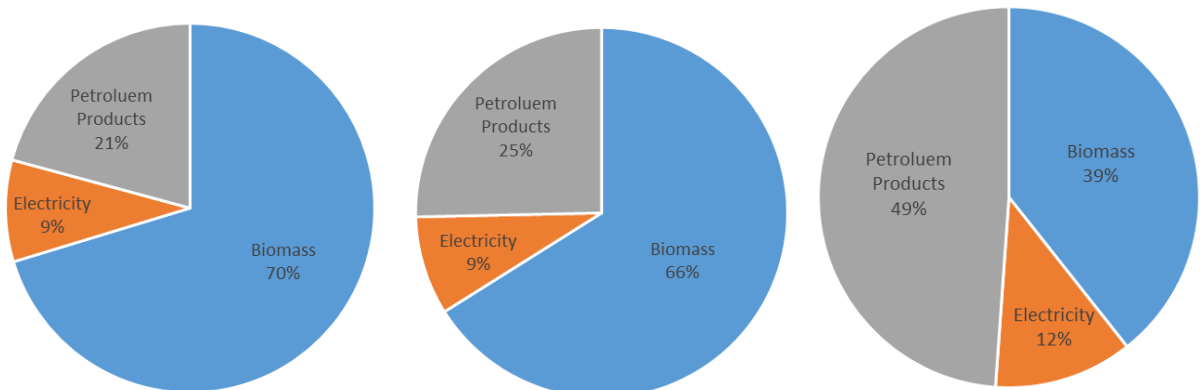
Ghana also has a large solar potential, but so far it has remained largely underexploited. Solar generation contributed only 0.1% of the total generation (VRA, 2015). Ghana aims to increase the share of renewables<sup>1</sup> on the grid to 10% by 2020, as outlined in Section 2.

Until recently Ghana relied heavily on biomass (wood fuels and charcoal) to meet energy demand. Over the last few years, the dominant share has shifted from biomass to petroleum products (see Figure 2; TNC, 2015). In 2012, biomass accounted for 39% (down from 70% in 1990), petroleum products for 49% and electricity for 12% of final energy consumption (with electricity production relying heavily on hydro and thermal, see Table 2). The shift towards increased use of petroleum products can be explained by the discovery in 2007 of the Jubilee oilfield.

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<sup>1</sup> This excludes large hydropower.

Figure 2: Share of final energy consumption by type (Left-1990, Middle - 2000 and Right-2012)



Source: TNC (2015)

Ghana's evolving energy matrix, reliance on biomass, petroleum products and hydropower, and the resulting strains on the provision of electricity, are connected in several ways to finding and managing a sustainable pathway to a low GHG economy.

Ghana qualifies as a lower middle income country. Its GDP per capita increased from US\$ 1326.1 in 2010 to US\$ 1858.2 in 2013 (Government of Ghana, 2014: xiii; World Bank, 2015a). As one of the more economically sound countries in Africa, Ghana witnessed annual GDP growth rates of between 4.0% and 15%, or 7.6% on average, in the period 2005-2014 (see Table 3; World Bank, 2015a).

Table 3. Ghana Annual GDP Growth (2005-2014)

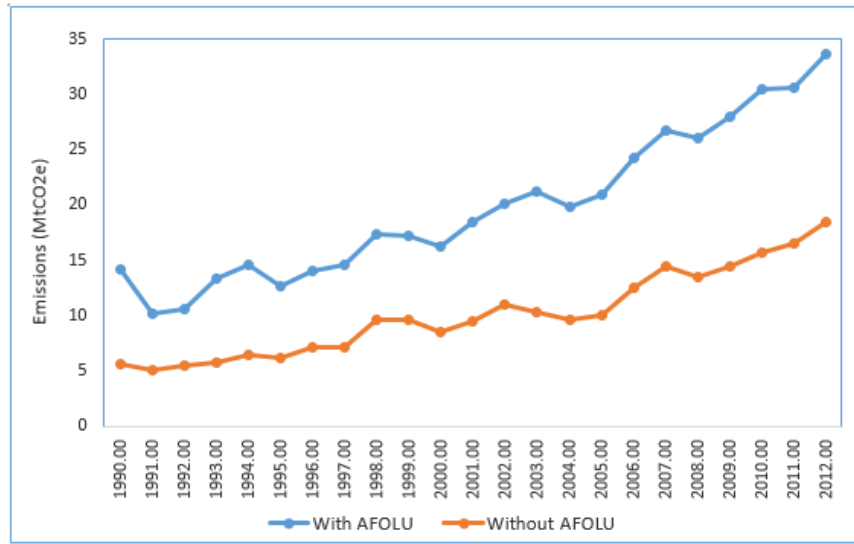
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
5.9%	6.4%	6.5%	8.4%	4.0%	8.0%	15.0%	8.8%	7.6%	5.6%

Source: World Bank (2015a)

According to Ghana's Third National Communication (TNC, 2015), for the year 2012, total emissions stood at 33.7 MtCO<sub>2e</sub>, up from 14.2 MtCO<sub>2e</sub> in 1990 (see Figure 3). In addition, the evolution of the economy, particularly in the energy and transport sector, indicate a strong growth potential in terms of GHG emissions in the near to medium term (TNC, 2015). While overall domestic emissions are rising, Ghana's per capita emissions, at 0.71 tCO<sub>2e</sub> in 2012, are still much lower than other major developing economies (e.g. China at 6.2 or India at 1.7 tCO<sub>2e</sub>, World Bank, 2015a).

Under a BAU scenario (i.e. without additional climate change mitigation measures), national GHG emissions could rise to as high as 57 Mt CO<sub>2e</sub> in 2030 and 125 Mt CO<sub>2e</sub> in 2040 (TNC, 2015: 73-74).

Figure 3. Historical GHG emissions, including and excluding AFOLU (1990-2012)



Source: TNC (2015)

The major sectors that contributed to GHG emissions were the energy, AFOLU, waste and industrial processes sector (see Table 4).

Table 4. GHG emissions by sector (2015)

Sectors & Sub-sectors	Emissions MtCO <sub>2</sub> e					Percent Change		
	1990	2000	2010	2011	2012	1990-2012	2000-2012	2010-2012
<b>1. All Energy (combustion &amp; fugitive)</b>	<b>3.50</b>	<b>5.54</b>	<b>11.27</b>	<b>11.63</b>	<b>13.51</b>	<b>286.08</b>	<b>143.65</b>	<b>19.79</b>
<i>(1.A1,A2&amp;A5) Stationery energy combustion</i>	2.03	2.73	6.48	6.22	7.05	247.28	158.10	0.09
<i>(1.A5)Transport</i>	1.47	2.81	4.80	5.41	6.46	339.66	129.85	34.67
<i>(1.B) Fugitive emission</i>	0.000	0.003	0.001	0.001	0.002	284.71	-51.74	139.35
<b>2. Industrial Process &amp; Product Use</b>	<b>0.81</b>	<b>0.77</b>	<b>0.24</b>	<b>0.44</b>	<b>0.47</b>	<b>-42.47</b>	<b>-39.56</b>	<b>94.24</b>
<b>3. AFOLU</b>	<b>8.61</b>	<b>7.72</b>	<b>14.67</b>	<b>14.08</b>	<b>15.17</b>	<b>76.28</b>	<b>96.65</b>	<b>3.46</b>
<i>3A Livestock</i>	1.72	2.20	2.82	2.80	3.05	77.29	38.66	8.01
<i>3B Land</i>	-3.02	-4.00	1.85	1.31	1.84	-160.73	-145.86	-0.96
<i>3C. Aggregated and Non-CO<sub>2</sub> emissions</i>	9.91	9.52	9.99	9.98	10.29	3.83	8.08	3.00
<b>4. Waste</b>	<b>1.31</b>	<b>2.29</b>	<b>4.24</b>	<b>4.45</b>	<b>4.52</b>	<b>245.97</b>	<b>97.03</b>	<b>6.54</b>
<b>Total emissions (excluding AFOLU)</b>	<b>5.61</b>	<b>8.61</b>	<b>15.75</b>	<b>16.51</b>	<b>18.49</b>	<b>229.31</b>	<b>114.81</b>	<b>17.36</b>
<b>Total net emissions (including AFOLU)</b>	<b>14.22</b>	<b>16.32</b>	<b>30.42</b>	<b>30.60</b>	<b>33.66</b>	<b>136.69</b>	<b>106.22</b>	<b>10.66</b>

Source: BUR (2015)

The BUR notes that: “The expansion in the economy has resulted in notable rise in emissions from road transport, electricity generation from crude oil-fired thermal plants, increasing demand for biomass use. In addition, emissions from land use change also recorded increases between 1990 and 2012 mainly due to deforestation. However, with the continuous implementation of the government’s national reforestation program, emissions from “land” have seen some decreases between 2010 and 2012.” (BUR, 2015; see Table 4)

#### **1.4 Boundaries: Key sectors**

In addressing climate change all sectors of the economy need to contribute. However, from a methodological point of view, this study will set boundaries through the selection of a limited number of sectors.

The sectors are selected based on two criteria:

- contribution of the sector to Ghana's GHG emissions, and
- importance of the sector for the Ghanaian economy.

Three sectors were selected for Ghana:

1. *Energy* accounts for 40.1 % of total GHG emissions (2012) and groups the following interrelated subsectors: (A) energy generation and (B) transport. It goes without saying that these sectors are crucial to the Ghanaian economy and society.
2. *AFOLU* (agriculture, forestry and other land use) accounts for 45.1 % of total GHG emissions (2012). Due to the limited scope of this study, we exclude the category "other land use" and instead focus on the following interrelated subsectors: (A) forestry and (B) agriculture. Agriculture has a 19.9 % share of GDP (of which cocoa: 2.4%, and forestry: 2.0%, see GSS, 2015). Cocoa beans and other crops are a central feature of the Ghanaian economy, with a majority of the Ghanaian population's livelihoods depending in some way on this sector.
3. *Waste* accounts for 13.4 % of total GHG emissions (2012) and offers a large and currently untapped mitigation potential.

These three sectors combined account for nearly all domestic GHG emissions and represent the most important areas of the domestic economy from the perspective of climate change mitigation and adaptation in Ghana.

#### **1.5 Barriers to the adoption and implementation of climate change mitigation policies**

There are considerable barriers to the adoption and implementation of climate change policies in Ghana. Understanding these barriers – and the concerns of the most important public and private sector stakeholders involved – is fundamental when assessing the sustainability of the transformation. This is because these concerns reveal some of the challenges and bottlenecks in the system. In the democratic context of Ghana, the stakeholder whose concerns are not addressed could potentially slow down the transformation process – e.g. by opposing the adoption or implementation of certain policies – and make the transition unsustainable.

##### **1.5.1 Economic concerns**

A very important concern is related to Ghana's development priorities. As a developing country, it is first and foremost concerned with domestic economic growth and poverty alleviation. This

also means that Ghana prioritises adaptation and sustainable development over climate change mitigation.

Despite high levels of economic growth, Ghana has significant fiscal problems. The economic growth figures of the last few years starkly contrast to rising debt levels, as the government drastically increased spending (including on government wages, Bank of Ghana, 2013: 15; see also Campbell, 2014; Cooke et al., 2014: 5). Debt levels reached as much as 55% of GDP in 2014 (around USD 20.9 billion, as total GDP amounted to Ghana Cedi 112 billion or USD 38 billion in 2014; Bank of Ghana, 2015; GSS, 2015: 3). This led to an IMF bailout in 2015 (following an earlier one in the 2000s, IMF 2015). Rising debt levels may be an important obstacle to implementing the low GHG transition, as it increases concerns for the cost impacts of climate measures in Ghana.

### *1.5.2 Social concerns*

There is a fear that the transition to a low GHG emissions economy would be at the expense of job creation, workers' rights, economic growth, while poverty reduction remains one of Ghana's key development priorities.

### *1.5.3 Political concerns*

Addressing climate change requires a long-term approach which is made challenging by the shifting political priorities and lack of long-term vision.

It should also be mentioned here that some political, economic and social concerns could be alleviated by increasing the understanding of both the negative impacts of climate policies and the (domestic and international) tools that are available to mitigate those impacts.

### *1.5.4 Capacity and awareness concerns*

Human capacity, in technical and institutional aspects, creates barriers to the adoption and implementation of climate policies. (LCDS, 2015: 60-63).

## **1.6 Conclusion**

Socio-economic development in Ghana has benefited from the emergence of a stable and increasingly democratic political system, coupled with over 7% of annual GDP growth during the past decade (World Bank, 2015a). This has had a huge positive impact on living standards in the country.

However, we must also note some of the negative environmental impacts that this transformation has brought in, as illustrated by the impact on Ghana's forest stock. Besides deforestation, the rise in GHG emissions has been further catalysed by the development of oil-fired thermal plants and a significant increase of emissions from a more active, but also more emissions-intensive, (road) transport sector (TNC, 2015). With regard to local impacts of climate change, the Ghanaian government notes that "the strong dependence on agriculture for economic development is of great concern with respect to potential climatic changes" (INC, 2001: 2).

All these elements combined resulted in climate change climbing up the ladder of government priorities, with Ghana's most recent Shared Growth and Development Agenda (GSGDA II – 2014-2017; Government of Ghana, 2014) acknowledging climate change as a major challenge, that has the ability to erode the development gains made over the past two decades, and hinder further growth and sustainable development. It concludes that “the challenge is to turn climate change and variability into an opportunity to expand national output and productivity and embark on systemic protection programmes” (Government of Ghana, 2014: 27).

In summary, while climate change mitigation is definitely on the agenda in Ghana (especially when international support is provided), climate adaptation and building resilience are more important, as the underlying priorities for the government remain poverty reduction and socio-economic development.

## ***2 Climate change mitigation policies***

As mentioned above, the project methodology sets boundaries, which is a recognition of the limited scope of this case study. The first boundary was set through the selection of the three sectors that constitute the focus of the case study: energy (incl. transport), AFOLU and waste.

The second boundary relates to the selection of policies that impact each sector. The policies that are selected are deemed to directly and indirectly impact climate change mitigation and adaptation efforts. Many of them are domestic in nature, but we will also include, as appropriate, international policies and instruments as well as policies implemented as domestic policies in other jurisdictions (e.g. in the EU). Also, both policies that are currently implemented, as well as policies that are being developed, will be included.

More specifically, the first section discuss most important general and sector-wide (energy, incl. transport, AFOLU, waste) climate-related policies in Ghana. Other policies and (i.e. nation-wide) are further described in Annex I.

A second section identifies 22 specific climate projects and programmes in the energy (incl. transport), AFOLU and waste sectors in Ghana. Many of these projects are the translation of the sector-wide policies into concrete actions on the ground, but they also include international climate projects or programmes such as market-based mechanism (MBM) in ICAO, Clean Development Mechanism (CDM) projects and food labelling initiatives as well as policies implemented in other jurisdictions such as aviation in EU ETS and EU FLEGT.

We define only those projects/policies that have a clear international dimension, i.e. that are implemented internationally and have an impact on Ghana domestically as “international”. We list those policies that are implemented in another jurisdiction as a domestic policy and impact a wide range of other jurisdictions, e.g. Ghana. Projects that are implemented domestically, but receive international support (grants, loans), are listed as “domestic” (e.g. World Bank-funded projects).

Because of a lack of available data, a comprehensive impact assessment of the sector-wide policies falls outside the scope of this case study. Chapter 3 (Impacts) will focus on the

implications of the 22 specific climate projects and programmes identified in the third section below.

## **2.1 Sector-wide and general climate-related policies**

### *2.1.1 General policies and climate change governance in Ghana*

At present, the overarching economic development planning document is the “*Ghana Shared Growth and Development Agenda II (GSGDA II – 2014-2017)*”. It includes ample references to climate change and serves as the umbrella policy for Ghana’s *National Climate Change Policy (NCCP)* adopted in 2013. The NCCP’s key vision is “to ensure a climate-resilient and climate compatible economy while achieving SD through equitable low-carbon economic growth for Ghana”, which is translated into three main objectives, i.e. (1) effective adaptation, (2) social development, and (3) mitigation.

The mainstreaming of climate change mitigation/adaptation in other sectoral policies is in need of further strengthening. The NCCP mentions that in a future phase, “climate change programmes and actions identified” would be “mainstreamed and embedded in a time-bound and budgeted manner, into annual work plans of implementing units” (NCCP, 2013: ix).

Improvements and actions are outlined in the Low Carbon Development Strategy (LCDS) (which builds on the framework established by the NCCP) will also need to be reconciled and/or further integrated with the different sectoral policies already in place (e.g. water, sanitation, mining, agriculture, energy). This will be promoted by the application of the National Development Planning System Act (Act 480), which will guide mainstreaming of climate change in national, sector and district medium-term plans.

Ghana recently announced in its INDC in September 2015 that it will unconditionally reduce GHG emissions by 15% compared to business-as-usual (BAU) by 2030. It also announced an additional 30% reduction on condition that external support is made available. With such support (finance, technology transfer and capacity building), a total emission reduction of 45% compared to BAU is attainable (the INDC estimates that total emissions under BAU amount to 73.95MtCO<sub>2e</sub> by 2030). To reach these targets, Ghana would need USD 22.6 billion between 2020 and 2030 to finance its mitigation and adaptation actions, of which USD 6.3 billion would come from domestic sources and 16.3 billion from international support (INDC, 2015: 2-4).

### *2.1.2 Sector-wide policies in the energy sector (incl. transport)*

Regarding energy and transport, the following sectoral policies are considered relevant (for more information, see Annex I):

1. The *National Energy Policy (2010)* which contains the broad principles and strategic objectives of Ghana’s energy sector
2. The *Strategic National Energy Plan (SNEP) 2006-2020* reviews the energy supply structure for Ghana and sets out the energy needs to meet development objectives
3. The *Renewable Energy Act 832 (2011)* contains a target of generating 10 percent of electricity on national grid from renewable sources by 2020, and foresees the



implementation of number of measures to facilitate private sector participation (Feed-In-Tariff rate, Renewable Energy Purchase Obligations, rules on connection to distribution and transmission system, and the establishment of a National Renewable Energy Fund.

4. The *Sustainable energy for all action plan (SE4ALL, 2012)* outlines a number of priority energy projects for Ghana (including e.g. efficient cookstoves)
5. Ghana is also drafting a *National Bioenergy Policy*, covering areas such as biomass, biogas and waste in the context of energy and electricity generation.
6. The *2008 National Transport Policy* and the *Sector Medium-term Development Plan (2012-2014)* – while former sets out the main objectives of transport sector development in the country, the latter is to guide its implementation.

### 2.1.3 Sector-wide policies in the AFOLU sector

Overarching sectoral policies in the AFOLU sector (agriculture and forestry<sup>2</sup>) include

1. The *Food and Agriculture Sector Development Policy (FASDEP II)*,
2. The *Medium Term Agriculture Sector Investment Plan (METASIP 2010-15)*
3. The *National Climate Change Adaptation Strategy (2013)* and
4. The *Forest and Wildlife Policy (2012)*

The most relevant sector-wide policy in Ghana's forestry sector is the *Forest and Wildlife Policy (2012)*. This policy explicitly mentions the "development of climate change adaptation and mitigation measures" as one of its key goals (Ministry of Lands and Natural Resources, 2012: x).

For more information on other policies, see Annex I.

### 2.1.4 Sector-wide policies in the waste sector

There are two sector-wide policies that relate to climate change and waste in Ghana:

1. *National Environmental Sanitation Strategy and Action Plan (NESSAP, 2010)* acknowledges that Ghana's waste sector is an important contributor to total national GHG emissions.
2. *National Bioenergy Policy (currently being drafted)*, contains a chapter on energy generation based on biomass waste

## 2.2 Specific climate projects and programmes in the energy, AFOLU and waste sectors

This section identifies and describes 22 specific climate projects and programmes in the energy (incl. transport), AFOLU and waste sectors. The impact analysis of Chapter 3 will focus on these programmes or projects and their impacts on the three dimensions of sustainable development (economic, social and environmental).

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<sup>2</sup> As explained in Chapter 1, we focus on agriculture and forestry, and exclude measures in the "other land use" category in view of the limited scope of this case study.

Table 5 below contains a description of the projects and policies on the different sectors which will be analysed in this case study (as identified in Chapter 1). This list is not exhaustive, but aims to capture the most important and impactful climate projects and programmes in the three sectors. These projects and programmes are described in further detail in Annex II.

The table also indicates whether the projects and programmes are domestic or international in nature or implemented in another jurisdiction domestically and briefly describes their main objectives. We list those policies that are agreed upon at international level and impact a wide range of jurisdictions, as international policies. We consider those projects/policies that are implemented domestically in another jurisdiction, e.g. in the European Union, separately. Projects that are implemented domestically, but receive international support (grants, loans), are listed as “domestic”.

*Table 5: Climate projects and programmes in the energy (incl. transport), AFOLU and waste sectors*

<i>Policy/Programme</i>	<i>Description</i>	<i>Level</i>
<b>ENERGY (INCL. TRANSPORT)</b>		
<b>Solar PV Electrification Programme (1999-2018)</b>	Cluster of activities aiming to e.g. install 9536 solar systems in deprived off-grid communities from 2009-2014.	Domestic
<b>Natural Gas Fuel Replacement Programme</b>	Fuel switch programme from light crude oil to natural gas at a grid-connected stationary combustion thermal plant.	Domestic
<b>Phase-down of fossil fuel subsidies</b>	Removed subsidies from 2006 onwards after public awareness campaigns (previous attempts failed).	Domestic
<b>Solar Lantern Distribution Programme</b>	Aims to distribute 200,000 solar lanterns by 2018 at heavily subsidised prices to off-grid communities.	Domestic
<b>Efficient Lighting – CFL replacement programme 2007</b>	Bans import incandescent bulbs. Free distribution of 6 million Compact fluorescent lamp (CFL) bulbs in exchange for incandescent bulbs in households during the 2007 power crisis.	Domestic
<b>Refrigeration Appliances Rebate and Replacement Scheme</b>	Aimed to replace 15,000 old and inefficient refrigerators by 2014, but only 5,000 fridges were effectively replaced. Uses regulatory tools such as labelling & innovative economic tools.	Domestic
<b>Installation of capacitors in commercial/industrial buildings</b>	Improves energy efficiency in buildings e.g. by installing 27 capacitor banks (which correct power factors and save electricity) in public buildings.	Domestic
<b>Bus Rapid Transit (BRT) project</b>	Construction and operation of a new bus rapid transit	Domestic

<b>in Accra</b>	system for passengers on the Kasoa – Central Business District corridor in Accra.	
<b>Aviation under EU ETS</b>	Inclusion all aviation to and from the EU into the EU ETS was announced but was put on hold.	Policies in other jurisdictions
<b>Market-based mechanism (MBM) in ICAO</b>	Agreed to establish a global market-based mechanism (MBM), to be developed by 2016, entering into force by 2020.	International
<b>Market-based mechanism (MBM) in IMO</b>	IMO discusses a global market-based measure (MBM). MBMs under consideration include e.g. an energy efficiency crediting and trading scheme and a global ETS for international shipping.	International
<b>Natural Gas Recovery and Utilization from Jubilee Oil Field (CDM project)</b>	Aims to recover associated gas from the Jubilee Oil Field which would otherwise have been flared.	International
<b>Improved Cookstoves (CDM POA and Gold Standard projects)</b>	Promotes the uptake of more efficient (improved) cookstoves instead of the more traditional wood fuel cookstoves.	International
<b>AFOLU</b>		
<b>Sustainable Land and Water Management (SLWM) Project</b>	Supports practices which would counteract e.g. desertification and deforestation with construction of dykes or other structures to avoid water runoff and soil erosion.	Domestic
<b>National Forest Plantation Development Programme (NFPDP)</b>	Aims to have an annual average of 15300 ha of degraded forestlands restored and maintained Funded e.g. by the IMF and the African Development Bank	Domestic
<b>Forest Investment Programme (FIP)</b>	Aims to reduce GHG emissions from deforestation and forest degradation while reducing poverty and conserving biodiversity. Promotes Ghana’s REDD+ readiness. Not fully implemented.	Domestic
<b>Cocoa REDD+ Programme</b>	Performance-based emission reduction payments in the High Forest Zone covering 5.9 million ha (4.3 million off-reserve and 1.6 million on-reserve area) (BUR, 2015: Annex 3). The programme is planned but not yet fully implemented.	Domestic <sup>3</sup>
<b>Cocoa food labelling initiatives (UTZ Certified, Rainforest)</b>	Demand side tools promoting better social and environmental practices in cocoa farming. Provide producers with training on good agricultural practices	Policies in other jurisdictions

<sup>3</sup> The Cocoa REDD+ Programme may also be considered as an international policy, depending on future developments regarding REDD+ negotiations and international implementation.

<b>Alliance, IFOAM, and Fairtrade)</b>	also beneficial to climate.	
<b>Voluntary Partnership Agreement (VPA) and Forest Law Enforcement, Governance and Trade (FLEGT)</b>	Objective is to reduce illegal logging by strengthening sustainable and legal forest management, improving governance and promoting trade in legally produced timber.	Policies in other jurisdictions

#### WASTE

<b>Development of institutional biogas</b>	Promotes the use of institutional biogas systems in public institutions e.g. by establishing institutional biogas systems for 200 boarding schools, hospitals and prisons in 2012-2015 Planned but not fully implemented.	Domestic
<b>CDM project on Composting of Municipal Solid Waste in Accra area</b>	Aims to improve waste through the development of a Municipal Solid Waste (MSW) sorting and composting plant in Adjen Kotoku. The organic fraction of the waste is recovered into saleable compost for e.g. agricultural activities.	International
<b>Landfill with gas collection: CDM POA project</b>	Landfill gas capture, flaring and utilization program in Africa. In Ghana, aims at avoid methane emissions from municipal waste treated in the Oti landfill.	International

Source: compiled by the authors (BUR, 2015, UNFCCC, 2012c; Cooke et al., 2014; Coady et al.; 2006 DG CLIMA, 2013a; DG CLIMA, 2013b; ICAO, 2013; IMO, 2015; Mimica, 2015; UNFCCC, 2012e; CSF, 2012; Natural Resources, 2012; World Bank, 2015b)

This concludes the overview of climate policies and projects in Ghana. The next chapter will focus on the impacts resulting from the climate projects listed above.

### ***3 Impacts of climate change mitigation policies***

This chapter analyses the positive and negative economic, social and environmental impacts of the 22 concrete (i.e. specific and on-the-ground) climate programmes and projects identified in Chapter 2. For each sector (energy, AFOLU and waste), the most important impacts are mapped on the three dimensions of sustainable development, i.e. economic, social and environmental.

The chapter is structured as follows: section one describes the (positive and negative) economic and social impacts in the energy sector, section two identifies the economic and social impacts in the AFOLU sector, section three explains the economic and social impacts in the waste sector, and a final section describes the environmental impacts in all three sectors.

We observed positive and negative impacts, which can be intended or unintended. It is not always possible to quantify the positive and negative impacts of the various (direct and indirect, national and international) climate policies. The information listed below is therefore both qualitative and quantitative in nature. Most of the information is drawn from official sources including government communications submitted to the UNFCCC, impact assessments,

international project design documents (World Bank), but some of it is also based on independent expert assessments.

Not all information can be quantified, particularly when impacts have not yet materialised, are difficult to measure (e.g. stakeholder participation), or when the share of the impact attributable to climate policies is hard to identify numerically. Still, the combination of quantitative and qualitative information allows a relatively clear picture to emerge with regard to climate policy impacts in Ghana.

### **3.1 Energy sector: economic and social impacts**

#### *3.1.1 Energy sector: economic impacts*

##### *A. Positive impacts*

The main positive economic impacts of climate policy actions in Ghana's energy sector, including energy generation and transport, can be categorized as follows:

##### 1. Financial savings for the government

Firstly, there are three projects or initiatives that result in considerable financial savings for the government, i.e. the Natural Gas Fuel Replacement Programme (between USD 67 and 610 million, BUR, 2015: Annex 3), the Natural Gas Recovery and Utilization from Jubilee Oil Field (USD 2 billion over a 10-year period, BUR, 2015: Annex 3) and the phasing down of fossil fuel subsidies (without the reforms, USD 1.2 billion would have been spent on fuel subsidies in 2013, Cooke et al., 2014: 2). Financial considerations were, as a matter of fact, a key reason for their implementation in the first place.

##### 2. Diversified energy matrix and enhanced energy security

Secondly, several projects diversify the energy matrix and enhance energy security in the country. The Solar PV Electrification Programme, for instance, modestly contributes<sup>4</sup> to Ghana's target of reaching 10% of renewables in the electricity mix by 2020 (Energy Commission, 2006: 31). By driving down imported fuel costs, the Natural Gas Fuel Replacement Programme and the Natural Gas Recovery projects also contribute to energy security, because gas is now increasingly generated from domestic sources. Much more gas is going to come online as of 2018, as a result of the very recent discovery of the Sankofa field, located east of the Jubilee oil field. The exploration and commercialisation of the gas will be carried out by ENI and Vitol, in close collaboration with Ghana's National Petroleum Corporation (World Bank, 2015c).

##### 3. Some actions increase household disposable incomes and/or business revenues

Thirdly, a number of energy efficiency programmes, and notably the Solar Lantern Distribution Programme, the Efficient Lighting – CFL Replacement Programme, and the Refrigeration

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<sup>4</sup> The programme would add a very modest 0.3% (a bit more than 6 MW) to the installed national generating capacity (2280 MW) if successfully implemented (see also Chapters 1 and 2).

Appliances Rebate and Replacement Scheme have resulted in increased household disposable income. The introduction of efficient lightbulbs reduced an estimated 40% of household electricity costs for lighting (BUR, 2015: Annex 3), while the use of efficient refrigerators reportedly led to a total increase in disposable income of GH¢ 21 760 for the 5000 households that were involved per year (BUR, 2015: Annex 3).<sup>5</sup>

The Solar Lantern Distribution Programme reduces kerosene demand for lighting and in that way also results in an increase in household disposable income. They are sold or distributed by the government at 30 GH¢, while the market price is up to 90 GH¢ (BUR, 2015: Annex 3).

Furthermore, the Installation of Capacitors in Commercial/Industrial Buildings project has a positive impact on business revenues, with an average 12-month pay-back time for the capacitor and negative costs thereafter due to electricity cost saving, TNC, 2015; BUR, 2015: Annex 3). The BRT project may also lead to increased business revenues, due to enhanced access to local commercial zones (Okoye et al., 2010: 43).

#### 4. Carbon revenues from the CDM

Fourthly, there is one CDM project in the energy sector, namely the Natural Gas Recovery and Utilization from Jubilee Oil Field, which produces Certified Emission Reductions (CERs) that will be sold on the international carbon market. No CERs have been issued yet; but the project design documents indicated expected yearly emission reductions of over 2.6 million tonnes of CO<sub>2</sub>-eq, for the period 2014-2023 (UNFCCC, 2012c). While CER prices have been very low since 2013 (0.3 - 0.4 euro), the large amount of emission reductions will still result in considerable financial revenues if CERs are successfully issued and sold (7.8 – 10.4 million euro, cumulatively up to 2023)<sup>6</sup>.

Regarding cookstoves, there are four CDM Programme of Activities (POAs) and two voluntary carbon projects (Gold Standard) in Ghana that are earning CERs and VERs (Gold Standard Verified Emission Reductions) and lead to substantial carbon revenues for the project owners (including local cookstove enterprises) despite low international prices.

In addition, planned market-based mechanisms in ICAO and IMO are likely to use offsets from mechanisms such as the CDM. This may boost CDM prices and project development in Ghana (Climate Strategies, 2013).

#### *B. Negative impacts*

The main negative economic impacts of domestic and international climate policies and projects in Ghana's energy sector (including transport) are:

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<sup>5</sup> On average this would be GHS4.35 per household. That does not actually seem much in comparison to average spending on electricity of about GHS240/yr, but there are wide disparities in consumption between the 10 regions (own estimates).

<sup>6</sup> The value of 26 million CERs estimated at current prices (0.3 - 0.4 euro per CER).

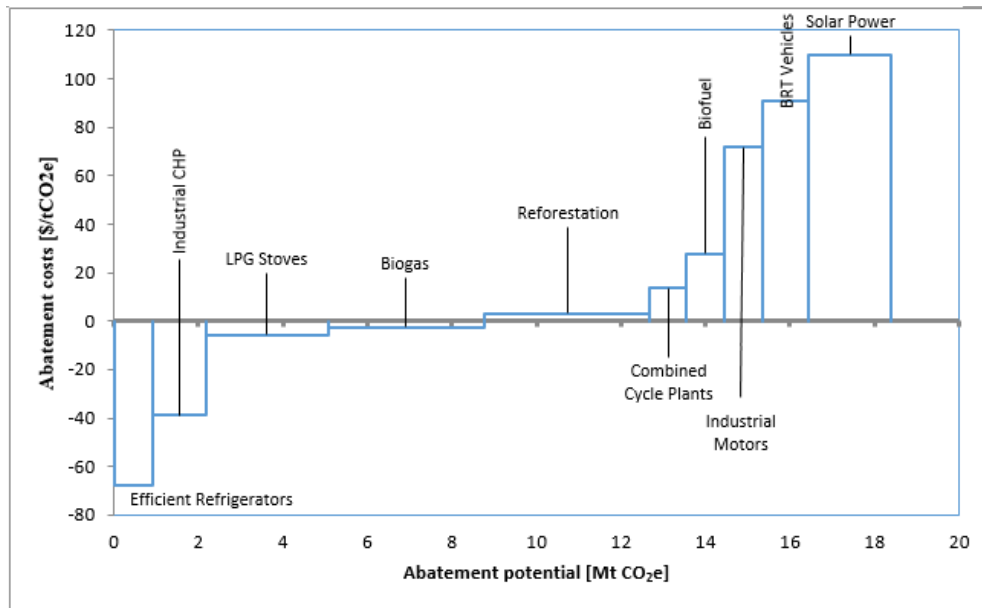
### 1. Costs for businesses and consumers

One of the most costly initiatives for consumers and businesses is the phase down of fossil fuel subsidies. It leads to rising fuel costs, particularly for (road) transport. Prices of fuels reportedly went up between 15% and 50% in 2013 (Cooke et al., 2014: 5) and since then, further increased in 2014 and 2015. While this is a significant detrimental impact, it is also an impact that can be expected to take place as a part of the policy design.

### 2. Barriers for implementation due to high marginal abatement costs

Analysis also shows that some technologies, notably solar power and BRT programmes (see Figure 4) also have relatively large marginal abatement costs compared to cheaper options such as reforestation or efficiency measures. Sustainable transport systems and renewable energy programmes such as solar power development obviously have many positive impacts, especially in the mid- and long-term, but the relatively high marginal abatement costs nevertheless need to be managed in the short-term.

Figure 4. Marginal Abatement Cost Curve for Selected Technologies in Ghana



Source: TNC (2015)

### 3. Government expenditure

Government expenditure, finally, can also be interpreted as a negative impact,<sup>7</sup> and is, quantitatively, the largest negative economic impact of the climate measures in Ghana's energy sector. These impacts are for the most part mitigated by international support (e.g. Global Environmental Facility, World Bank, African Development Bank), or through loans (notably a 1

<sup>7</sup> In the sense that it represents an opportunity cost (as these funds cannot be spent elsewhere, e.g. on adaptation or other government priorities).

billion USD loan from China to construct the natural gas recovery CDM project at Jubilee oil field). The different funding sources and the estimated costs per policy action are listed in Table 6 below.

### 3. International transport policies and their expected impacts

With regard to planned international policies in aviation and maritime (as part of the EU ETS or covered by market-based mechanisms in ICAO and IMO), some impacts can be expected. A carbon price for aviation and maritime may lead to increased costs for both export/import companies and consumers, and potentially have negative effects on GDP growth due to impacts on tourism and trade. Tourism directly accounts for about 3% of GDP and 2.3% of employment in 2014 (World Travel & Tourism Council, 2014), while Ghana's reliance on exports (especially cocoa, oil, timber and gold) is even more significant as 60% of the workforce is in agriculture.

No precise estimates for the impacts of future market-based mechanisms in aviation and maritime are available for Ghana at present, however. Existing studies and projections for other developing countries reveal that by and large, the negative impacts will be modest. Climate Strategies (2013) estimates that the *combined* economic impacts of a MBM for both international shipping and aviation on developing countries are small overall: reductions in GDP of less than 0.01% on average, and less than 0.2% GDP for nearly all countries studied (Mexico, China, India, Trinidad and Tobago, Togo, Kenya, Maldives, Samoa, Cook Islands and Chile).

A Vivid Economics report states that if carbon costs were incurred on airlines, ticket prices increases would be almost equal to the carbon costs (Vivid Economics, 2007). The estimations of the impacts of an inclusion of aviation into the EU ETS on long haul tickets prices vary:

- 7,9 € - 39,6 € (carbon cost of 6 € and 30 € per tonne, see European Commission, 2006)
- 10 € - 30 € (carbon cost of 15 € and 45 € per tonne, see CE Delft and MVA Consultancy, 2007)

As a proportion of the total ticket price, these increases appear modest and would therefore have a limited impact on reducing demand. Moreover, since international aviation is currently not covered by the EU ETS or any other carbon pricing mechanisms (and allowances prices in the EU ETS are currently around 8 euro), we cannot expect these impacts to fully materialise in the short-term.



Table 6. Energy Sector (incl. transport) – economic Impacts

	<u>Positive economic impacts</u>	<u>Negative economic impacts</u>
<b>Energy generation</b>		
<b>Solar PV Electrification Programme 1999-2018</b>	Contributes to energy security (target: 10% share of installed capacity by 2020, Energy Commission, 2006; BUR, 2015)	High marginal abatement costs. Estimated at 109.8 USD/Ton CO <sub>2</sub> e (TNC, 2015).  → COSTS (but rapidly decreasing world prices of PV cells)
<b>Natural Gas Fuel Replacement Programme</b>	<ol style="list-style-type: none"> <li>1. Total savings for the country, depending on demand scenarios, are estimated between USD 67 and 610 million</li> <li>2. WAGP (West African Gas Pipeline) is the most cost-effective means of providing the primary energy needed to fuel electricity demand in Ghana.</li> <li>3. Projected income taxes to be paid by WAPCO (West Africa Gas Pipeline Company) to Ghana over the lifetime of the project is in the range of USD 466 – 588 million (BUR, 2015: Annex 3).</li> </ol>	Total capital investment for this programme is estimated at USD 500 million (delivered by both government and private sector, shares unknown).  → COSTS (offset by savings/tax revenues)
<b>Natural Gas Recovery and Utilization from Jubilee Oil Field (CDM project)</b>	<ol style="list-style-type: none"> <li>1. Financial savings for Ghanaian government equivalent to USD 2 billion over a 10-year period (BUR, 2015: Annex 3).</li> <li>2. Sale of CERs (none issued yet; expected yearly emission reductions of over 2.6 million tonnes of CO<sub>2</sub> UNFCCC, 2012c).</li> </ol>	Total capital investment estimated at USD 1 billion, financed through a loan from China  → COSTS (offset by savings/carbon revenues)
<b>Phase-down of fossil fuel subsidies</b>	Government savings. without the reform, the Government would have spent approximately USD 1.2 billion USD) on fuel subsidies in 2013, equalling 3.2 % of GDP, (Cooke et al., 2014: 2)	Increased fuel costs, particularly for (road) transport. Prices went up by 15% to 50% in 2013. (Cooke et al., 2014: 5).
<b>Solar Lantern Distribution Programme</b>	Facilitates reduction in fossil fuel subsidies and related government savings of GH¢ 74 million (approx. USD 19 million at 2015 exchange rates) annually (BUR, 2015).	Total direct government investment: 2 million USD; BUR, 2015: Annex 3).

<b>Efficient Lighting – CFL replacement programme 2007</b>	<ol style="list-style-type: none"> <li>1. Alleviated some of the immediate economic impacts of the 2007 electric power crisis.</li> <li>2. Increases household disposable income through an estimated 40% electricity cost saving for lighting (BUR, 2015: Annex 3).</li> </ol>	Total direct government investment amounts to USD 15 million (BUR, 2015: Annex 3).
<b>Efficient Fridges Market Transformation and Rebate Programme</b>	Mildly increases household disposable income through electricity cost savings, amounting to a total of GH¢ 21 760 (approx. USD 550 at 2015 exchange rates) for 5000 households per year.	Total direct government investment: USD 4.4 million. Total project cost is estimated at 6.1 million, 28 % of which is provided by the Global Environment Facility (BUR, 2015: Annex 3).
<b>Installation of capacitors in commercial/ industrial buildings</b>	Average 12 month pay-back time and negative costs thereafter due to electricity cost savings (TNC, 2015; BUR, 2015: Annex 3).	Total direct government investment: USD 5.9 million
<b>Improved Cookstoves (series of CDM POA and Gold Standard projects)</b>	<ol style="list-style-type: none"> <li>1. Business development: cookstove factories, small- and large-scale retailers.</li> <li>2. Carbon revenues for project participants.</li> </ol>	<ol style="list-style-type: none"> <li>1. Potential problems with the design features of the stoves (size, weight, quality of the material (UNFCCC, 2012a: p.50).</li> <li>2. Significant investment costs for cookstove users</li> </ol>
<b>Transport</b>		
<b>Development of Bus Rapid Transit (BRT) - Accra</b>	<ol style="list-style-type: none"> <li>1. Increased access to local commercial zones (Okoye et al. 2010: 43).</li> <li>2. 10 % increase in number of trips by public transport in pilot corridor (BUR, 2015: Annex 3).</li> </ol>	<p>Estimated total cost: USD 29 million, mainly provided through loans and grants by the GEF, World Bank and AFD;</p> <p>USD 2 million counterpart funding by the government of Ghana (BUR, 2015: Annex 3).</p> <p>→ COSTS (largely offset by international donor support)</p>
<b>Aviation in EU ETS &amp; MBM in ICAO and IMO</b>	May boost CDM projects in Ghana (Climate Strategies, 2013). Could provide some demand for REDD+ ERU's. (Ghana's INDC, 2015)	<ol style="list-style-type: none"> <li>1. Potential (small) negative impact on GDP (Climate Strategies, 2013)</li> <li>2. Potential increase in airline ticket prices (European Commission, 2006; CE Delft, 2007)</li> </ol>

Source: Authors' own illustration

### 3.1.2 Energy sector: social impacts

#### A. Positive impacts

The main positive social impacts of the climate policy actions and projects in the energy sector in Ghana are:

##### 1. Job creation and capacity building

Job creation and capacity building (mainly technicians and engineers) has resulted from those initiatives in the energy sector that require the fabrication and installation of solar PV systems, CFL light bulbs, efficient fridges, capacitor banks and improved and LPG cookstoves. The BRT project, in addition, also involves the employment of bus drivers and operators, in addition to other social benefits such as reduced traffic time and congestion levels.

##### 2. Redistributive effects (and household disposable incomes)

Redistributive effects also emerge as a result of some energy sector policies. Fossil fuel subsidies, for instance, are inherently regressive, as they benefit the rich much more than the poor. Their reduction therefore has a redistributive effect on society as a whole. Funding for local community programmes in the Jubilee Oil Field CDM project is another example. Part of the funding (5%, or 45,316,100 USD) of the total capital expenditures will be allocated to a community fund to finance local community programmes (UNFCCC, 2012c: 35).

As mentioned in the section on economic impacts, several energy efficiency programmes (e.g. efficient cookstoves, solar lanterns) also increase household disposable incomes, including households in poor and/or off-grid communities.

#### B. Negative impacts

The main negative social impacts in the energy sector relate to:

##### 1. Unequal cost impacts for the poor

Firstly, while phasing out fossil fuels subsidies has a social upside (overall redistributive effects), it also has a serious social downside, as fuel price increases represents a serious direct negative impact on the poor. While the policy intends to raise the price of fossil fuels, the social concerns the phase-out of fossil fuel subsidy raises are not intentional.

Subsidy removal would result in an estimated loss of income to the poorest households of up to 7% and a reduction in consumption of 2.1% (Cooke et al., 2014: 5). Fuel subsidy removal can increase poverty up to 1.5% as new households fall below the poverty line and those that were already vulnerable before will be even worse off, increasing the severity of poverty these household experience.

There are series of social policies in place to offset these negative impacts (see Chapter 4). Other programmes also have a considerable cost impact for the poor, including increased public transport fares resulting from the BRT project and the fact that efficient fridges with rebate are still more expensive than imported used fridges (initial capital cost that is).

## 2. Potential job losses in the informal sector

Secondly, some initiatives potentially result in (small amounts of) job losses in the informal sector. This is particularly the case in the BRT project, where other private passenger transport operations (“tro-tro” operations) may be impacted (Okoye et al., 2010: 29). It may also lead to the displacement of street hawkers (informal) and other commercial operations (formal/informal) along the corridor (900 temporary structures, e.g., metalized containers, wooden kiosks, etc. would be affected) (Okoye et al., 2010: 44).

## 3. Limited stakeholder participation

Thirdly, there are some complaints regarding limited or inadequate stakeholder participation in at least two projects, i.e. the BRT project and the efficient lighting project. In the former, stakeholders complained that their voice was not sufficiently heard during planning phase of the project (Okoye et al., 2010: 29), while in the latter, lack of cooperation of some major stakeholders (reportedly for political reasons) and inadequate training and awareness creation hindered smooth implementation (Energy Commission, 2009: 28).

*Table 7. Energy Sector (incl. transport) – social impacts*

<b>Sector: Energy</b>	<b><u>Positive social impacts</u></b>	<b><u>Negative social impacts</u></b>
<b><i>Energy generation</i></b>		
<b>Solar PV Electrification Programme. 1999-2018</b>	Job creation opportunities for artisans and electricians (BUR, 2015: Annex 3).	/
<b>Natural Gas Fuel Replacement Programme</b>	/	/
<b>Natural Gas Recovery and Utilization from Jubilee Oil Field (CDM project)</b>	Part of the funding (5%, or 45,316,100 USD) of the total capital expenditures will be allocated to a community fund to finance local community programs (UNFCCC, 2012c: 35).	/
<b>Phase-down of fossil fuel subsidies</b>	Removes regressive policy tool. Almost 78% of subsidies benefits wealthiest group, with less than 3% of subsidy benefits reaching the poorest quintile. Reduction in inequality estimated at 0.6 % (Cooke et al., 2014: 3).	Direct impact on poor, estimated loss of income to the poorest households of up to 7% and reduction in consumption of 2.1% (Cooke et al., 2014: 5)  → Unequal impacts on poor

<b>Solar Lantern Distribution Programme</b>	Reduces some of the burden of removing fossil fuel subsidies on off-grid and remote communities, by switching to clean off-grid lighting at minimal cost to the consumer: the market price for a solar lantern is GH¢ 90, while a government-distributed lantern is sold for GH¢ 30 (BUR, 2015: Annex 3).	For poor communities, the benefits of receiving 1 solar lantern do not offset the negative impacts of the removal of fossil fuel subsidies, and need to be complemented with other social interventions such as a scaling up of Ghana's national cash transfer programme (LEAP) (see Cooke et al., 2014).
<b>Efficient Lighting – CFL replacement programme 2007</b>	<ol style="list-style-type: none"> <li>1. Capacity building for indigenous (Ghanaian) private installation firms and training of local electricians</li> <li>2. Job creation through the establishment of two local factories to produce CFLs in Ghana</li> <li>3. Savings in electricity bills to households (BUR, 2015: Annex 3).</li> </ol>	<ol style="list-style-type: none"> <li>1. Lack of cooperation of some major stakeholders</li> <li>2. Inadequate training and awareness creation</li> <li>3. Politicisation: some members of the general public (including opponents of the ruling party) read political meanings into the exercise and tried to frustrate the process (Energy Commission, 2009: 17, 28-30).</li> </ol> <p>→ Implementation issues</p>
<b>Efficient Fridges Market Transformation and Rebate Programme</b>	<ol style="list-style-type: none"> <li>1. Job creation (100 direct jobs in recycling, retailing centres and assembling plants)</li> <li>2. Health benefits for scavengers</li> <li>3. Capacity building for indigenous (Ghanaian) private installation firms</li> <li>4. Savings on electricity bills (BUR, 2015: Annex 3).</li> </ol>	Efficient fridges with rebate are still more expensive than imported used fridges; initial capital cost that is. Poorer households may not be able to afford them.
<b>Installation of capacitors in commercial/industrial buildings</b>	Capacity building for indigenous (Ghanaian) private installation firms (BUR, 2015: Annex 3).	/
<b>Improved Cookstoves (series of CDM POA and Gold Standard projects)</b>	<ol style="list-style-type: none"> <li>1. Job gains (technicians, retailers and marketers)</li> <li>2. Improved livelihood of the poor due to lower fuel expenditure.</li> <li>3. Improved health levels and time savings for households (especially women) (UNFCCC, 2012a: 2-3)</li> </ol>	Concerns about the net benefits of the carbon revenues for households. Projects rely on the integrity of local salesmen to translate carbon revenues into subsidized prices for the stoves (UNFCCC, 2012a: 50)
<b>Transport</b>		
<b>Development of Bus Rapid Transit (BRT) - Accra</b>	1. Potential job gains and capacity building within the BRT system (drivers, operators)	1. Potential job losses in other private passenger transport operations (“tro-tro”

	2. Reduced traffic time and congestion levels (BUR, 2015: Annex 3).	operations) 2. Displacing street hawkers (informal) and other commercial operations (formal/informal) along the corridor (900 temporary structures, e.g., metalized containers, wooden kiosks would be affected) 3. Higher public transport fares (Okoye et al. 2010: 29, 43-43). → unequal social impacts
<b>Aviation in EU ETS &amp; MBM in ICAO and IMO</b>	/	/

Source: Authors' own illustration

### **3.2 AFOLU sector: economic and social impacts**

#### *3.2.1 AFOLU sector: economic impacts*

##### *A. Positive impacts*

The main positive economic impacts of climate policy actions in Ghana's AFOLU sector, including agriculture and forestry, can be categorised as follows:

##### 1. Enhanced food production

The policy actions taken in the AFOLU sector generally imply making forestry and agriculture practices more sustainable, which includes their economic sustainability. In that context, a number of individual projects are (or are expected to be) particularly successful in enhancing food production, i.e. the cocoa labelling initiatives, the Sustainable Land and Water Management Project (SLWM), the National Forest Plantation Development Programme (NFPDP), the Forest Investment Programme (FIP) and the Cocoa Forest REDD+ Programme.

##### 2. Some actions increase farmer incomes and enhance livelihoods

As a result of increased production levels, farmers, including small-holder farms, can increase their incomes and, because products are more diversified, enhance their livelihoods. This, in turn, enhances their adaptive capacity to adverse impacts of climate change and builds resilience. In addition, there are direct benefits in some schemes, for example as a result of a price premium on certified products (food labelling) or secure market access (EU FLEGT VPA).

##### 3. Carbon revenues from REDD+.

A final positive impact relates to the expected carbon revenue from REDD+, through Payments for emission reductions (ER), once the system is fully operational (both in Ghana and internationally).

## B. Negative impacts

The main negative economic impacts of climate policy actions in Ghana’s AFOLU sector are:

### 1. Costs for businesses

In the agriculture sector, the two initiatives that are analysed here (SLWM and cocoa labelling) come with a price tag for the farmers involved. Some SLWM technologies (e.g. sustainable irrigation systems) may be too expensive for farmers (World Bank, 2010: 4), while labelling schemes also require considerable upfront investment costs in order to comply with the standard. The multiplicity of schemes and standards, in addition, increases costs. Small-holders are especially vulnerable to these impacts (ITC, 2013; KPMG, 2012).

### 2. Government expenditure

As in the energy sector, however, government expenditure can be regarded as the largest negative economic impact – taking into account that these impacts are to a large extent mitigated through international donor support. The actual share paid by the government of Ghana varies along the different projects, ranging from a fraction of total costs (e.g. 10 million USD out of 578 million USD total implementation costs for REDD+, and no costs at all for the government in the case of labelling) to more than half of total expenditures (60% of 52 million USD required for the National Forest Plantation Development Programme, NFPDP). The detailed amounts are listed in Table 8.

Table 8. AFOLU sector – economic impacts

Sector: AFOLU	Positive economic impacts	Negative economic impacts
<b>A. Agriculture</b>		
<b>Sustainable Land and Water Management Project (SLWM)</b>	Expected: “substantial long-term productivity gains” (World Bank, 2010).	<p>1.Total costs 2010-2016: USD 15.95 (split between government of Ghana: USD 7.8 million and GEF: USD 8.15 million)</p> <p>2. Additional finance (project extension to 2018: USD 13.25 million (split between Government of Ghana: USD 4.5 million and GEF: USD 8.75 million)</p> <p>3. Initially, SLWM technologies may be too expensive for farmers (see negative social impacts) (BUR, 2015: Annex 3; World Bank 2010: vi-vii, 4).</p> <p>→ COSTS (partly offset by international donor support)</p>
<b>Cocoa food labelling</b>	Price premium for producers (see the CEPS case study on Food Labelling as part of this	Increased costs of production, particularly affecting small-holders

<b>initiatives</b>	<i>project</i> )	(ITC, 2013; KPMG, 2012)
<b>B. Forestry</b>	<b><u>Positive economic impacts</u></b>	<b><u>Negative economic impacts</u></b>
<b>National Forest Plantation Development Programme (NFPDP)</b>	Food production: - 2012: 46 502.78 tonnes to 56 660.67 tonnes (BUR, 2015: Annex 3; Forestry Commission, 2013: ii).	Estimated total costs: USD 52 million (BUR, 2015: Annex 3). - Government of Ghana: 60% - Private sector: 15% - Donor (IMF): 25%  → COSTS (partly offset by international donor support)
<b>Forest Investment Programme (FIP)</b>	Likely increases in yields and incomes, and enhanced livelihoods (see positive social impacts) (BUR, 2015: Annex 3)	Estimated costs: USD 50 million - Donors: World Bank, AfDB, IFC (USD 41.5 million) - Government of Ghana: USD 8.5 million co-finance (17%) (BUR, 2015: Annex 3).  → COSTS (largely offset by international donor support)
<b>Cocoa Forest REDD+ Programme</b>	1. Payments for emission reductions (ER). 2. Sustainable supply from climate-smart and climate-resilient cocoa agriculture, in view of expected climate impacts. (FCPF, 2014: 64).	1. Programme development costs: Forest Carbon Partnership Facility (FCPF): USD 12.6 million 2. Estimated implementation costs: USD 578 million (BUR, 2015: Annex 3)  - Government of Ghana: USD 10 million - Private sector: USD 284 million - Dutch government: 7 million - World Bank Carbon Fund: 50 million (payment for ER) - Unknown source: 227 million (payment for ER)  (BUR, 2015: Annex 3).  → COSTS (partly offset by international donor support and carbon revenues)
<b>EU FLEGT VPA</b>	1. Secures market access (EU market) for legal timber 2. Institutional strengthening and capacity building in the forestry sector (including industry, civil society and government) (see also: Ghana and the European Union, 2012)	/  (Potential adverse impacts on indigenous and local communities that depend on illegal logging, IIED, 2008:2; see social impacts)

Source: Authors' own illustration



### 3.2.2 AFOLU sector: social impacts

#### A. Positive impacts

The main positive social impacts in Ghana's AFOLU sector are:

##### 1. Job creation

There is one project in the forestry sector, the National Forest Plantation Development Programme (NFPDP) that reportedly created 29 277 jobs in 2012 and 30 120 jobs in 2013 (BUR, 2015: Annex 3), mainly tree planters and other plantation personnel.

##### 2. Increased resilience of local communities, through enhanced livelihoods and economic diversification

The most important positive social impact in the forestry and agriculture sectors, however, is increased socio-economic resilience of local communities. The SLWM project, for example results not only in greater yields and returns for participating farmers, but also leads to economic diversification (including agro-forestry and ecotourism), which enhances farmers' livelihoods and overall resilience to external shocks (including adverse effects of climate change). Cocoa food labelling initiatives have a similar positive impact, as do the FIP and REDD+ programmes. Community empowerment takes place as farmers and communities organise themselves and invest in community projects (e.g. public corn mills or mobile clinics, see CEval, 2012).

#### B. Negative impacts

The main negative social impacts in the AFOLU sector are:

##### 1. Unequal benefit sharing for the poor

Firstly, there are concerns that some of the benefits of the actions taken do not trickle down to the poorest or most vulnerable. This is the case for hired labourers in smallholder farms in cocoa labelling initiative. It also potentially applies to REDD+, where there is a risk for unequal benefit sharing (including carbon revenue benefits) and elite capture (FCPF, 2014: 61).

##### 2. High initial investment costs for smallholders

A second issue relates to high initial investment costs for smallholders, particularly for SLWM technologies and compliance costs for labelling initiatives. In addition, a series of barriers exist for implementation, including socio-cultural habits related to certain agricultural practices (e.g. bush burning) and delayed or non-payment of monthly wages (NFPDP).

##### 3. Barrier: tree tenure rights

An important barrier for implementation of the forestry projects (particularly FLEGT and REDD+) pertains to tree tenure rights. On the lands that they cultivate, tenant farmers only have legal rights on planted trees, and are not allowed to harvest any naturally growing trees for commercial or domestic purposes. While logging without authorization from concerned groups is prohibited, in practice this arrangement creates tensions and distorts incentives (World Bank,

2015b: 99). This issue could potentially lead to unintended negative impacts if not properly addressed.

Table 9. AFOLU sector – social impacts

Sector: AFOLU	<u>Positive social impacts</u>	<u>Negative social impacts</u>
<b>A. Agriculture</b>		
<b>Sustainable Land and Water Management Project (SLWM)</b>	<p>1. Greater returns for participating farmers</p> <p>2. Economic diversification (including agro-forestry and ecotourism)</p> <p>3. Increased climate-resilience of livelihood systems</p> <p>4. Community empowerment through engagement in e.g. planning activities (SAL, 2010: 37-38).</p>	<p>1. Initial high costs for some SLWM technologies for participating farmers or communities (World Bank, 2010: 4).</p> <p>2. Potential barriers for implementation:</p> <ul style="list-style-type: none"> <li>- social/cultural attachment to bush burning</li> <li>- requires higher management skills and is more labour-intensive</li> <li>- land tenure issues</li> <li>- competition for irrigation water</li> <li>- people's livelihoods may worsen (e.g. hunters)</li> <li>- challenges in enforcement</li> <li>- decreased authority of traditional institutions (chiefs)</li> </ul> <p>3. Potential restricted access to resources due to community-led decisions (Ministry of Environment, Science and Technology, 2010).</p> <p>→ Unequal cost impacts</p> <p>→ Implementation issues</p>
<b>Cocoa food labelling initiatives</b>	<p>1. Increased resilience through more sustainable agro-forestry practices</p> <p>2. Potential effect: price premium for producers (<i>see the CEPS case study on Food Labelling as part of this project</i>)</p>	<p>1. Concerns about high barriers to entry and transactions costs for SMEs.</p> <p>2. Benefits do not trickle down to hired labourers in smallholders. These are the most marginalized (<i>see the CEPS case study on Food Labelling as part of this project</i>)</p> <p>→ Unequal cost impacts</p>
<b>B. Forestry</b>		
<b>National Forest Plantation</b>	Job creation :	Delay in the release of funds; delayed or non-payment of monthly

<b>Development Programme (NFPDP)</b>	<p>- 2012: 29 277 jobs</p> <p>- 2013: 30 120 jobs (BUR, 2015: Annex 3).</p>	<p>wages to field assistants by the Service Companies (Forestry Commission, 2008: 1; 2013: ii).</p> <p>→ Delay/non-payment of funds</p>
<b>Forest Investment Programme (FIP)</b>	<p>1. Likely increase in yields and thus income (poverty alleviation). Estimated at USD 69 million, for 9500 households over a period of 20 years (World Bank, 2015b: 103).</p> <p>2. Economic diversification and enhanced food security (livelihoods)</p> <p>3. More climate-resilient agricultural system. (Ministry of Lands and Natural Resources 2012:78; BUR, 2015: Annex 3).</p>	<p>1. Land/tree tenure rights: “Under current legislation, while farmers and land owners have legal rights to planted trees, it is illegal for farmers and other users of Off-Reserve lands to harvest any naturally growing trees for commercial or domestic purposes” (World Bank, 2015b: 99).</p> <p>2. Commercial tree plantations often deny local communities from having access.</p> <p>(Ministry of Lands and Natural Resources, 2014: 13, 39).</p> <p>→ Land/tree tenure rights</p>
<b>Cocoa Forest REDD+ Programme</b>	<p>1. Farmers’ livelihoods: a projected doubling of yield per ha would double farmers’ income (BUR, 2015: Annex 3).</p> <p>2. If properly implemented, may resolve land/tree tenure rights</p> <p>(FCPF, 2014: 64).</p>	<p>1. Potential unequal benefit sharing (including carbon revenue benefits) and elite capture</p> <p>2. Potential inter- and intra-community disputes (FCPF, 2014: 61-62).</p> <p>→ Unequal benefit sharing</p>
<b>EU FLEGT VPA</b>	<p>1. Improved formal sector accountability, management and engagement with stakeholders (IIED, 2008:2)</p> <p>2. Potential ‘formalization’ of part of the informal sector (FERN, 2013: 23)</p>	<p>1. Potential issues regarding tree tenure rights (see REDD+)</p> <p>2. Potential unequal benefit sharing, including elite capture (Wageningen University, 2010)</p> <p>3. Potential negative job impacts in communities that depend on illegal logging (IIED, 2008: 2)</p>

Source: Authors’ own illustration

### **3.3 Waste sector: economic and social impacts**

#### **3.3.1 Waste sector: economic impacts**

##### *A. Positive impacts*

The main positive economic impacts of climate policy actions in Ghana's waste sector, include:

##### 1. Enhanced fertilizer and energy production

All three initiatives taken in the waste sector contribute to either fertiliser or energy production. The CDM project on Composting of Municipal Solid Waste in Accra generates compost, the landfill with gas collection project (part of the CDM Programme of activities (POA) "Landfill gas capture, flaring and utilization program in Africa") generates up to 2.5 MW electricity and the proposed institutional biogas project has the potential to enhance the production of both fertiliser and energy for cooking and heating.

##### 2. Carbon revenues from the CDM

Another positive impact relates to the carbon revenues from the sale of CERs. The compost CDM project is predicted to generate 68 902 tCO<sub>2</sub>/y, while the landfill project aims to reduce an annual average of 103 249 tCO<sub>2</sub> (UNFCCC, 2012d: 21; 2012e: 4). It has also been considered to register the institutional biogas project under the CDM, but the provision of sufficient funding is uncertain at current CER prices.

##### *B. Negative impacts*

The main negative economic impacts of climate policy actions in Ghana's waste sector are:

##### 1. Costs for businesses

It appears from the "Composting of municipal solid waste" CDM project in the Accra area project's design documents that without the additional financial incentives from CER sales, the project would not have taken place due to the high costs associated with expensive and specialised imported equipment (UNFCCC, 2012e: 3).

The same reasoning holds true for all CDM projects, of course, as long as they are indeed in compliance with the additionality principle. For example, without the additional financial incentives from CER sales, the "landfill with gas collection" CDM POA project would also not have been able to finance the high cost of modern methane capture and flaring technology.

##### 2. Government expenditure

The composting CDM project, in addition, suffered from delays of payments by the local government, causing the compost plant that hosts the project to shut down between May and July 2014. Total debts to the plant amounted to GHC 20 million (Citifm, 2014).<sup>8</sup>

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<sup>8</sup> This is a barrier for implementation and has negative impacts on the project, but cannot really be classified as a negative impact of the project.

The high upfront investment costs for institutional biogas systems also potentially have a negative impact on the government budget. Total costs for the programme are estimated at 38 million euro (CFS, 2012). Some funding for technical assistance was provided through the EU Climate Support Facility (CSF), but it is unclear at the time of writing whether sufficient international support can be secured (e.g. through the CDM).

*Table 10. Waste sector – economic Impacts*

<b>Sector: Waste</b>	<b><u>Positive economic impacts</u></b>	<b><u>Negative economic impacts</u></b>
<b>CDM project on Composting of Municipal Solid Waste in Accra area</b>	<ol style="list-style-type: none"> <li>1. Sale of CERs: 68 902 tCO<sub>2</sub>/y. (CER buyer: Standard Bank Plc, UK) (UNFCCC, 2012e: 4)</li> <li>2. Production of fertilizer (compost)</li> </ol>	<p>High upfront investment cost: import of “robust and expensive” equipment from China. (UNFCCC, 2012e: 3).</p> <p>→ COSTS (offset by carbon revenues)</p>
<b>Landfill with gas collection: CDM POA project</b>	<ol style="list-style-type: none"> <li>1. CER revenues - Annual average of 103 249 tCO<sub>2</sub>/y</li> <li>2. Electricity generation (2.5 MW; UNFCCC, 2012d: 21).</li> </ol>	<p>High upfront investment cost: without the additional financial incentive the high cost of modern methane capture and flaring technology preclude their implementation at landfill sites in Ghana (UNFCCC, 2012d: 1).</p> <p>→ COSTS (offset by carbon revenues)</p>
<b>Institutional biogas project</b>	<ol style="list-style-type: none"> <li>1. Production of fertiliser and energy for cooking/heating</li> <li>2. Strengthening of biogas business sector (Partners for Innovation, 2015)</li> </ol>	<ol style="list-style-type: none"> <li>1. Estimated costs: 38 million EUR (CSF, 2012)</li> <li>2. Funding through the CDM may be a challenge at current CER prices.</li> <li>3. Investment costs for biogas systems prevent increased uptake by public institutions (Partners for Innovation, 2015)</li> </ol> <p>→ High Initial COSTS</p>

Source: Authors’ own illustration

### 3.3.2 Waste sector: social impacts

#### A. Positive impacts

The main positive social impacts in Ghana’s waste sector are:

##### 1. Job creation and capacity building

The two CDM projects in the waste sector each report job creation and professional capacity building as positive social impacts. The compost project reports as much as 1000 extra jobs (200 operational, 500 indirect, rest: construction), and technology transfer and capacity building in waste management techniques (UNFCCC 2012e: 3, 11). The landfill gas project does not specify the number of jobs but finds that there are not enough qualified people on the market, and that they will therefore invest in training activities in order to get a properly skilled staff (engineers, technicians, operators, etc.) (UNFCCC 2012d: 2).

##### 2. Enhanced waste management and related sanitary benefits

The planned institutional biogas project and the landfill CDM project also report positive effects in terms of enhanced waste management and related sanitary and health benefits.

#### B. Negative impacts

The main negative social impact in Ghana’s waste sector is the potential for job losses in the informal sector. The two CDM projects may, more specifically, remove a significant amount of informal jobs as on-site waste pickers. Efforts could be made to integrate them into the waste collection or sorting process, which would for example involve the construction of shelters or even the formalisation of their work, thereby enhancing their working and sanitary conditions (BMZ, GIZ and ECN, 2013: 35).

Table 11. Waste sector – social impacts

Sector: Waste	Positive social impacts	Negative social impacts
<b>CDM project on Composting of Municipal Solid Waste in Accra area</b>	<p>Job creation: 1000 (200 operational, 500 indirect, rest: construction))</p> <p>Technology transfer and capacity building in waste management techniques (UNFCCC, 2012e: 3, 11)</p>	<p>1. Temporary lay-off of workers during closure of the plant in mid-2014)</p> <p>2. Potential negative impact on waste pickers (informal waste collectors)</p> <p>→ Potential impacts on informal sector</p>
<b>Landfill with gas collection: CDM POA project</b>	<p>Capacity building and job creation: there are not enough qualified people on the market; proponents will invest in training activities in order to find properly skilled staff (engineers, technicians, operators, etc.) (UNFCCC, 2012d: 2).</p>	<p>May remove a significant amount of informal jobs as waste pickers (BMZ, GIZ and ECN, 2013: 35).</p> <p>→ Potential impacts on informal sector</p>

<b>Institutional biogas project</b>	Diverse potential positive effects: <ul style="list-style-type: none"> <li>• capacity building</li> <li>• waste handling</li> <li>• sanitation, health</li> </ul> - energy access (CFS, 2012; Partners for Innovation, 2015)	/
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Source: Authors' own illustration

### 3.4 Energy, AFOLU and waste sectors: Environmental impacts

#### 3.4.1 Positive impacts

The main positive environmental impacts of the climate policy actions and projects in the energy, AFOLU and waste sector in Ghana pertain to:

##### 1. GHG emission reductions

Annual GHG emission reductions result from both large- and small-scale projects (in terms of reductions), and can be listed as:

- Large-scale (> 100 kt CO<sub>2</sub>/y):
  - Natural gas fuel replacement 235.63 kt CO<sub>2</sub>/y
  - Jubilee Oil Field CDM project 148.84 kt CO<sub>2</sub> up to 2400 kt CO<sub>2</sub>/y
  - Efficient Lighting 121.1 kt CO<sub>2</sub>/y
  - Forest Investment Programme 316.6 to 440 kt CO<sub>2</sub>/y
  - Cocoa REDD+ Programme 1400 kt CO<sub>2</sub>e/y
  - Landfill gas CDM POA project 103.249 ktCO<sub>2</sub>/y
  - Improved cookstoves (6 projects): 476.9 kt CO<sub>2</sub>/y
- Small-scale (<100 kt CO<sub>2</sub>/y):
  - Solar PV: 5.21 ktCO<sub>2</sub>/y
  - Solar lanterns: 1.29 ktCO<sub>2</sub>/y
  - Fridges: 18.04 ktCO<sub>2</sub> by 2014
  - Capacitors: 5.9 ktCO<sub>2</sub>/y
  - Bus rapid transit: 10.2 ktCO<sub>2</sub>/y
  - SLWM: 2.6 ktCO<sub>2</sub>/y
  - NFDp: 43.68 ktCO<sub>2</sub>/y
  - CDM project (composting plant): 68.902 ktCO<sub>2</sub>/y
  - No estimates: (EU FLEGT; LPG cylinders and stoves, institutional biogas, aviation in EU ETS, ICAO, IMO, phase-down of fossil fuel subsidies)

An indicative estimate, resulting from the sum of the projects listed above (which includes planned policies), is an annual reduction of 2.96 million t CO<sub>2</sub>.<sup>9</sup> This is an indication of Ghana's ambition level and equals about 6% of total annual GHG emissions (see also BUR, 2015).

Estimated emission reductions in the energy sector amount to 1023.11 kt CO<sub>2</sub>/y<sup>10</sup>, emission reductions in AFOLU amount to 1762.88 kt CO<sub>2</sub>/y<sup>11</sup> and in waste 172.15 kt CO<sub>2</sub>/y. This excludes emission reductions resulting from the institutional biogas, the distribution of LPG cylinders and stoves, phase-down of fossil fuel subsidies, aviation in EU ETS, ICAO, IMO and EU FLEGT policies/projects, for which there are no precise estimates available at the time of writing.

## 2. Various co-benefits

In addition to GHG emission reductions, several environmental co-benefits arise as a result from the different policy actions, including most importantly (1) reduced in-door air pollution, (2) reduced local air pollution, (3) conservation of biodiversity, and (4) reduced deforestation.

### 3.4.2 Negative impacts

The negative environmental impacts are mainly potential in nature, i.e. they may or may not happen, with the following impacts having the highest risks because of their probability and relative effect:

1. Mercury emissions (CFL bulbs)
2. Non-permanence of emission reductions (AFOLU)
3. Leakage of methane in pipeline systems

There are potential, unintended negative impacts due to mercury emissions from improperly disposed CFL bulbs, non-permanence of emission reductions in several AFOLU projects (e.g. REDD+) and leakage of methane in pipeline systems in the two natural gas projects. The actual negative environmental impact and weight of the impact depends on the sound implementation of the policies (e.g. REDD+, forest plantations, SLWM), and the (non-)optimal usage of technologies (e.g. institutional biogas).

Tables 12, 13 and 14 below list the details of the positive and negative environmental impacts in the energy, AFOLU and waste sectors, per policy action.

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<sup>9</sup> This is a conservative estimate, based on the lowest values in the list. Based on the maximum values indicated for the Jubilee Oil Field CDM project and the Forest Investment Programme, total emission reductions could be as high as 5.34 million t CO<sub>2</sub>/y.

<sup>10</sup> This figure is a conservative estimate and may increase up to 3273.9 kt CO<sub>2</sub>/y, depending on the Jubilee Oil Field project.

<sup>11</sup> This figure is a conservative estimate and may increase up to 1886.28 kt CO<sub>2</sub>/y, depending on the FIP project.



Table 12. Energy sector (incl. transport) – environmental Impacts

Sector: Energy	<u>Positive environmental impacts</u>	<u>Negative environmental impacts</u>
<b>Energy generation</b>		
<b>Solar PV Electrification Programme 1999-2018</b>	<p>1. GHG emissions by 2014 (compared to burning light crude): 5.21ktCO<sub>2</sub>/yr, with an installed capacity of 3.54 MWh. May increase to 22.99 ktCO<sub>2</sub>/yr if plans to install 12.56 MWh by 2020 succeed.</p> <p>2. Reductions in indoor pollution (BUR, 2015: Annex 3).</p>	/
<b>Natural Gas Fuel Replacement Programme</b>	<p>1. GHG emission reductions:</p> <ul style="list-style-type: none"> <li>-2010: 231.85 kt CO<sub>2</sub></li> <li>- 2011: 229.38 kt CO<sub>2</sub></li> <li>- 2012: 235.63 kt CO<sub>2</sub></li> </ul> <p>Cumulatively (2010-2012): 696.63 kt CO<sub>2</sub></p> <p>2. Reduction in flaring of associated gas in Niger Delta oil fields (BUR, 2015: Annex 3).</p>	<p>Possible leakage from the gas distribution pipeline could be a source of emissions (BUR, 2015: Annex 3).</p> <p>→ Potential effect</p>
<b>Natural Gas Recovery and Utilisation from Jubilee Oil Field (CDM project)</b>	<p>1. GHG emission reductions: 2015: 148.84 kt CO<sub>2</sub>. Annually between 2016 and 2025: 297.68 kt CO<sub>2</sub>. Cumulatively by 2025: 3125.64 kt CO<sub>2</sub>. (BUR, 2015: Annex 3). <i>Note: this does not match the emission reduction estimates of the related CDM project. Other sources also indicate a much higher potential annual reduction of 2.4 million tonnes per year (see ECN 2010: 2)</i></p> <p>2. Reduce pressure on biomass and forestry resources</p> <p>3. Reduce local air pollution from flaring (NO<sub>x</sub>, VOCs, and particulates (UNFCCC, 2012c: 5).</p>	<p>Possible leakage (fugitive methane emissions) from the network of (off-shore and on-shore) gas transmission pipelines (BUR, 2015: Annex 3).</p> <p>→ Potential effect</p>
<b>Phase-down of fossil fuel subsidies</b>	<p>GHG emission reductions. Globally, a phase-out of subsidies could lead to a 5% reduction compared to BAU by 2020 (Crawford, 2012: 3). No specific data for Ghana is available, but a 5% reduction of current GHG emission levels (33.7 million t), would equal a reduction of 1.685 million t CO<sub>2</sub>.</p>	<p>May lead to increased use of charcoal and woodfuels over LPG for cooking, but further research is required; (Laan et al., 2010: 24).</p> <p>→ Potential effect</p>

<b>Solar Lantern Distribution Programme</b>	1. Avoided GHG emissions: - in 2013/2014 : 1.29 kt CO <sub>2</sub> /y - in 2014/2015: 2.46 kt CO <sub>2</sub> /y - by 2018: 6.23 kt CO <sub>2</sub> /y; 2. Reduction of in-door air pollution (BUR, 2015: Annex 3).	Avoided GHG emissions may not be achieved in the event that HH gain access to the grid  → Potential effect
<b>Efficient Lighting – CFL replacement programme 2007</b>	Avoided GHG emissions: - In 2007: 121.1 kt CO <sub>2</sub> - cumulatively by 2014: 587.2 kt CO <sub>2</sub> - expected cumulative reductions by 2020: 2303.6 kt CO <sub>2</sub> (BUR, 2015: Annex 3).	Potential mercury emissions from the improper disposal of CFL bulbs (BUR, 2015: Annex 3).  → Potential effects (but very likely)
<b>Efficient Market Transformation and Rebate Programme</b>	GHG emissions: Primary (electricity savings) and secondary (ODS emission reductions) effects combined: - 18.04 kt CO <sub>2</sub> e by 2014 (cumul.) - 58.12 kt CO <sub>2</sub> e by 2025 (cumul.) (BUR, 2015: Annex 3).	/  (As of 2014, only 5000 of the 15000 planned fridge replacements have taken place; BUR, 2015: Annex 3).
<b>Installation of capacitors in commercial/ industrial buildings</b>	GHG emissions : - Phase 1 : 5.9 kt CO <sub>2</sub> - Phase 2: (expected:) 393.78 kt CO <sub>2</sub> (after 10 years)  (BUR, 2015: Annex 3).	/
<b>Improved cookstoves (series of CDM POA and Gold Standard projects)</b>	1. Average annual GHG emission reductions for the 6 improved cookstove projects combined: 476.9 kt CO <sub>2</sub> /y (based on the amounts reported in the different Project Design Documents; see UNFCCC, 2012a; 2012b; 2013a; 2013b; The Gold Standard, 2009; 2010). Total expected reductions, over the entire life-time of the projects combined: 3.8 mt CO <sub>2</sub> -eq. 2. Reduction of indoor air pollution 3. Reduced deforestation (UNFCCC, 2012a: p.2-3)	/
<b>Transport</b>		

<b>Development of Bus Rapid Transit (BRT) - Accra</b>	<p>1. GHG emission reductions:</p> <ul style="list-style-type: none"> <li>- 2012: 10.2 kt CO<sub>2</sub>e</li> <li>- Cumul. by 2040: 728 kt CO<sub>2</sub>e</li> </ul> <p>2. Reduction in air pollutants from less GHG intensive transport modes (BUR, 2015: Annex 3).</p>	/
<b>Aviation in EU ETS &amp; MBM in ICAO and IMO</b>	No estimates available.	/

Source: Authors' own illustration

Table 13. AFOLU sector – environmental impacts

<b>Sector: AFOLU</b>	<b><u>Positive environmental impacts</u></b>	<b><u>Negative environmental impacts</u></b>
<b>A. Agriculture</b>		
<b>Sustainable Land and Water Management Project (SLWM)</b>	<p>1. Annual GHG reductions in 2012: 2.6 ktCO<sub>2</sub>/y (BUR, 2015).</p> <p>2. Biodiversity conservation and enhancement (including aquatic)</p> <p>3. reduced run-off, soil erosion and risk for desertification</p> <p>4. improved regulation of hydrological flows</p> <p>5. reduced need for agricultural chemicals (SAL, 2010: 37)</p>	<p>Diverse potential impacts, incl.:</p> <ul style="list-style-type: none"> <li>- habitat conversion and increased use of agricultural chemicals (pesticides) due to successful and productive agricultural techniques</li> <li>- increased water demand</li> <li>- effects taking place during the construction of spillway dykes (SAL, 2010: 39).</li> </ul> <p>→ Diffuse potential impacts</p>
<b>Cocoa food labelling initiatives</b>	GHG and biodiversity benefits from avoided deforestation ( <i>see the CEPS case study on Food Labelling as part of this project</i> )	/
<b>B. Forestry</b>		
<b>National Forest Plantation Development Programme (NFPDP)</b>	<p>GHG emission reductions:</p> <p>In 2013: 43.68 Kt CO<sub>2</sub>/y (BUR, 2015: Annex 3).</p>	Rate of annual carbon uptake depends on the degree of permanence, determined by pests, fire and harvesting (BUR, 2015: Annex 3).
<b>Forest Investment Programme (FIP)</b>	<p>1. GHG emission reductions:</p> <p>Between 316.6 kt (World Bank, 2015b: 23) and 440 kt CO<sub>2</sub>e per year (BUR, 2015)</p> <p>2. May help conserve biodiversity (but see</p>	1. Potential negative impacts on biodiversity as a result of converting diverse mixed forest tree species to monoculture stands or creating plantation growth in existing

	negative impacts)	degraded lands  2. Plantation trees have a potential negative impact on soils and water resources compared to naturally grown trees (Ministry of Lands and Natural Resources, 2014: 36-37).  → Diffuse potential impacts
<b>Cocoa Forest REDD+ Programme</b>	1. GHG emission reductions :  - 2016 : 1.4 million t CO <sub>2</sub> e/y (BUR, 2015: Annex 3). 2. Reducing deforestation and degradation is expected to help maintain and conserve biodiversity with the cocoa-forest landscape (BUR, 2015: Annex 3).	1 Additional potential GHG emissions from displacement and leakage (unknown amount, but low overall risk) (BUR, 2015: Annex 3; FCPF, 2014: 53).  2. GHG emissions reversal risks: illegal mining, international price hikes, political instability (FCPF, 2014: 53).
<b>EU FLEGT VPA</b>	Reduces illegal logging and associated deforestation	/

Source: Authors' own illustration

*Table 14. Waste sector – environmental impacts*

<b>Sector: Waste</b>	<b><u>Positive environmental impacts</u></b>	<b><u>Negative environmental impacts</u></b>
<b>CDM project on Composting of Municipal Solid Waste in Accra area</b>	1. GHG emission reductions: - 68.902 ktCO <sub>2</sub> /y, - 689.023 ktCO <sub>2</sub> over 10 years crediting period 2. Reduced local water pollution 3. Reduced use of chemical fertiliser in agriculture (UNFCCC, 2012e: 3, 11)	Health/environmental impacts of unprocessed waste during temporary closure of the plant in mid-2014 (Citifm, 2014).
<b>Landfill with gas collection: CDM POA project</b>	1. GHG emission reductions:  Annual average of 103.249 ktCO <sub>2</sub> /y Cumulatively over 7 years: 722.741 ktCO <sub>2</sub> /y  2. reduced leaching (UNFCCC, 2012d: 2, 8)	/
<b>Institutional biogas project</b>	1. Reduction of in-door air pollution (replacement of charcoal cookstoves) (CSF, 2012) 2. Reduction of greenhouse gas (GHG) emissions (no specific data).	Non-optimal usage may lead to the release of harmful microbes when disposing or using the produced fertiliser (Partners for Innovation, 2015)

Source: Authors' own illustration

## ***4 Mitigation of impacts of climate change policies***

While the road to a low GHG emission society is one that is accepted as necessary to combat climate change, how that transition is managed is what preoccupies many stakeholders, and will determine whether the transition is sustainable. The long-term promise of win-win may be true, but in the short term adjustments will need to be made and a safety net needs to be put in place. That safety net will include domestic measures put in place by the government, but also international cooperative agreements and tools.

Since addressing climate change should not hamper sustainable development, it is important to ensure that any unforeseen and unintended (negative) impacts of climate change mitigation policies are addressed, and the transition takes place by moving in a harmonious way on all three axis of sustainability.

This Chapter looks at the domestic as well as international tools put in place to mitigate those impacts.

### ***4.1 Domestic Mitigation Tools***

Several individual domestic initiatives are taken to mitigate the unintended economic, social and environmental policy impacts in Ghana, mostly in response to or in the immediate context of a specific project. A more comprehensive, systemic approach is lacking, although options for that may be available, as elaborated upon below.

#### ***4.1.1 Domestic mitigation of economic impacts***

An important initiative is the Solar Lantern Distribution Programme, which aims to distribute 200 000 solar lanterns by 2018 at heavily subsidised prices to off-grid communities as part of the government's policy to minimise the negative impacts of the implementation of the phase-down of fossil fuel subsidies (BUR, 2015: Annex 3). It is part of a wider set of social policies to mitigate the negative economic impacts of the subsidy phase-out, which also includes:

- Removal of fees for state-run schools;
- A price ceiling for public transport fares;
- Increase in the number of public buses;
- Increased spending on the existing Community Health Compound Scheme;
- Increased spending on the rural electrification scheme;
- Minimum wage increase from US\$ 1.24 to US\$ 1.50 (Coady et al., 2006; Crawford, 2010; Laan et al., 2010).

Each of these social policies is explicitly aimed at mitigating the costs incurred by the increase in kerosene and LPG prices as a result of the phase-down of the subsidies, in particular for the most vulnerable sections of society (rural population and lower income households).

Another tool relates to the SLWM project, and entails feasibility studies that are currently being made to implement a PES (Payment for Environmental Services) system, in order to mitigate initial high costs of SLWM technologies for farmers (World Bank, 2014). The PES system would

open up an additional revenue stream for farmers and make up for the costs initially incurred by investing in a sustainable agricultural technique (e.g. tree or shrubs planting in agroforestry).

A 15% environmental tax on plastics, finally, is to mobilise funds at the national level to support proper waste disposal. The pharmaceutical and agricultural sectors are exempt from this tax. Waste disposal is a huge challenge in Ghana, particularly in the urban areas. Across Ghana 58.9% of waste is dumped indiscriminately (NESSAP, 2010). This measure helps to better mobilise funds for Ghana's challenging waste issue.

#### *4.1.2 Domestic mitigation of social impacts*

The Solar Lantern Distribution Programme and other policies mentioned above have both an economic and a (strong) social dimension, in that they primarily target the poorest and most vulnerable communities. It should be noted in this context that the phase-down of fossil fuel subsidies also has a positive social effect: it is a regressive policy, meaning that higher incomes benefit relatively more from it than lower incomes. Removing or reducing it actually improves equality (while simultaneously having a serious negative effect on the poor, as previously explained).

In the context of REDD+, several tools to mitigate the negative social impacts can be identified. A dispute settlement mechanism is planned to address grievances and resolve any disputes arising from REDD+ in Ghana (FCPF, 2014: 58). In addition, benefit-sharing mechanisms are discussed, e.g. by including carbon under the Community Resource Management Area (CREMA) mechanism. Other options are also under consideration (e.g. individual payments, community funds) (FCPF, 2014: 61).

Two options are considered to handle the tree tenure rights issue. In an effort to address the disincentives to sustainable management that result from individuals and communities lacking economic rights to the forest resources in their farms and lands, the CREMA mechanism was conceived as a tenure mechanism that grants natural resource governance and management rights to communities (FCPF, 2014: 60). In addition, legal reform is considered to tackle the issue in a long-lasting way, including tenurial reform that would give tenant farmers a financial interest in preserving naturally grown trees.

#### *4.1.3 Domestic mitigation of environmental impacts*

Very few domestic mitigation measures for environmental impacts are in place in the energy and waste sectors (but see international tools). In AFOLU, two initiatives are in place, a first one in the SLWM project, and the other in the context of REDD+.

For the SLWM project, all subprojects need to undergo an environmental assessment procedure, and the entire project is subject to an Environmental Analysis and Management Plan (SAL, 2010: 109), a requirement to obtain funding from the World Bank and GEF (see below). Data and information on negative environmental impacts are collected and there is a supervision and management process in place, under scrutiny of Ghana's Environmental Protection Agency, its Forestry Commission and its National Sustainable Land Management Committee (SAL, 2010: vi).

For REDD+, the selection of the programme's boundaries along the ecological gradient (covering the entire High Forest Zone (HFZ) zone, where cocoa is mainly grown) represents a key leakage avoidance strategy (FCPF, 2014: 53). If the program would have covered only part of that zone, carbon leakage could occur in the sense that deforestation or forest degradation would be pushed out of the zone covered by the scheme, but occur elsewhere. By covering the entire HFZ zone, the risk for leakage in the programme is therefore sharply reduced.

#### 4.1.4 What domestic tools may be needed and do not currently exist?

For institutional biogas, an intersectoral approach is required, involving the relevant government agencies in charge of sanitation, energy and agriculture (fertilizer is a by-product of the process), in order to make institutional biogas a success (Partners for Innovation, 2015).

In the context of REDD+, at present there is no legislation in Ghana which pertains directly to carbon, meaning that ownership rights or exploitation and transaction rights cannot be stated with any level of certainty and this presents a risk for REDD+. At this stage, of key importance is deciding how carbon will be characterised; either as an ecosystem service (carbon storage/sequestration) or as a natural resource, and then outlining the associated ownership and management of user-rights (FCPF, 2014: 60). Part of Ghana's Redd+ Readiness involves the engagement of a consultant to make recommendations on rights to carbon. This assignment is being supported/financed by the World Bank's FCPF.

Negative social impacts on the informal sector, particularly for waste-pickers on waste dumps, can plausibly be mitigated by integrating and formalizing their activities, with potential positive health benefits and improved living conditions as co-benefits.

No plans or policies are currently in place to address the following environmental impacts:

- Mercury emissions (CFL bulbs)
- Leakage of methane in pipeline systems

In order to mitigate and manage the unintended negative impacts of climate change mitigation policies and projects, it is necessary to first identify and quantify those impacts. The most important conclusion is that at present, Ghana does not approach the negative impacts of climate impacts in a comprehensive, systemic way. It does not have a system at its disposal to comprehensively monitor the negative impacts of climate policies. Such a system could be designed as either an *ex ante* and/or *ex post* control mechanism and would allow mitigation measures to be developed more comprehensively.

There are options available to introduce such a system, however. The most obvious way is to integrate the assessments of impacts in the existing Monitoring and Evaluation (M&E) system. The current system, according to Ghana's draft Low-Carbon Development Strategy, will be based on two issues: "monitoring emission reduction as well as the sustainable benefits (co-benefits) from the implementation of the LCDS" (LCDS, 2015: 64). Ghana's Environmental Protection Agency (EPA) is responsible for monitoring GHG emission reductions, while co-benefits are tracked by a system under scrutiny of the National Development Planning

Commission (NDPC), through an Annual Progress Report (APR), which is a monitoring and evaluation tool for tracking the implementation of development policies in all sectors.

Further research is required, but it seems to make sense to not only monitor the co-benefits, but also the negative impacts, and include this in the work coordinated by the NDPC. Such a system may strongly contribute to the sustainability of Ghana's transition towards a low GHG economy.

## **4.2 International cooperative approaches**

### *4.2.1 International tools*

International donor funding is one of the key strategies to mitigate the high costs for the government of Ghana to engage in climate change mitigation activities. Without this external funding, programmes would either not be implemented at all, or result in a much higher financial impact on the already strained and debt-mired government budget. The following international sources of support have been used so far:

- GEF (substantial funding for efficient fridges, SLWM and BRT projects)
- World Bank (SLWM; FIP and REDD+ via Forest Carbon Partnership Facility)
- IMF (NFDPD project)
- CDM projects (2 + several Programmes of Activities, POAs)
- A USD 1 billion commercial loan from China (Gas flaring at Jubilee Oil Field)
- EU support for institutional biogas (through Climate Support Facility, CSF)
- Bilateral support: e.g. Dutch and French development agencies

Internationally funded projects usually have to go through a social, environmental or sustainable development assessment procedure. For World Bank/GEF projects such as the FIP, REDD+ or SLWM project, for instance, comprehensive social and environmental impact assessments and corresponding management plans need to be established. The control on negative impacts in CDM projects is less comprehensive, and Ghana's CDM project documents indicate relatively few negative socio-economic or environmental impacts.

For the SLWM project, funded by the World Bank and GEF, a pest management plan (PMP), designed to counteract potential increases in pesticide use (pesticide use could inadvertently increase due to increased agricultural activities resulting from the project), and a plan containing measures to guarantee the sustainable construction of spillway dykes, are included in the Environmental Analysis & Management Plan (EAMP; see SAL, 2010). A mitigation measure is also in place to mitigate potential social impacts related to (involuntary) resettlement: the Resettlement Process Framework, including measures to regulate compensation and conflict resolution (Ministry of Environment, Science and Technology, 2010).

For FIP/REDD+, funded by the World Bank, the results of the SESA (Strategic Environmental and Social Assessment) will help to refine the REDD+ strategy by prioritising the options in terms of their environmental and social costs and benefits and also by outlining recommendations to enhance socially friendly land use and forest management activities. The process also leads to the development of an Environmental and Social Management Framework (ESMF) that outlines



the procedures to be followed for managing potential environmental and social impacts of specific policies, actions and projects.

For the EU FLEGT VPA, a Joint Monitoring and Review Mechanism (JMRRM) is tasked with the monitoring and review of the implementation of the agreement. It will monitor any negative economic, social and environmental impacts that may occur once licensing starts, and identify measures to mitigate those impacts. The Ghana VPA also explicitly recognises the need for social safeguards in Article 17:

1. In order to minimize possible adverse impacts, the Parties agree to develop a better understanding of the livelihoods of potentially affected indigenous and local communities as well as the timber industry, including those engaged in illegal logging;
2. the Parties will monitor the impacts of this Agreement on those communities and other actors identified in paragraph 1, while taking reasonable steps to mitigate any adverse impacts. The Parties may agree on additional measures to address adverse impacts” (Ghana VPA, 2009: Art. 17).

In the context of multilateral policies identified in this study, ICAO and IMO, the possible revenues of the planned MBMs may be used to compensate adversely affected developing countries, potentially including Ghana. Increased investments in CDM or similar baseline-and-credit mechanisms may also occur in Ghana and act as a cost mitigation measure.

With regard to ICAO, it is also not clear whether Ghana would be eligible for a *de-minimis* exception. Such an exception would exclude countries or routes that do not contribute significantly to international aviation activities. This provision would help simplify the international market-based mechanism by excluding small operators and could potentially be used to help shield developing countries (potentially including Ghana) from the negative impacts of the measure.

#### 4.2.2 *What international tools exist but are not used?*

Under the umbrella of the UNFCCC, the following options remain to be further exploited by Ghana in the near future:

- Technology mechanism
- Green Climate Fund
- Adaptation Fund
- Capacity Building Framework
- Response Measures

Taking into account its development aid record so far, it is to be expected that Ghana will be able to successfully apply for projects under these various frameworks, particularly under the newly established Green Climate Fund. In June 2015, Ghana launched a *Green Climate Fund Readiness Programme*, in collaboration with the United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP) that will contribute to these efforts

by building national capacity, both at the governmental level and in the private sector and among non-governmental stakeholders (UNDP, 2015).

Under the Adaptation Fund, one project, i.e. *Increased Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods*, is currently submitted for approval by the AF Board.

Other issues to bear in mind include the future and direction of the technology mechanism and the capacity building framework, and the future demand for ER credits from REDD+. Much will also depend on the pace of international negotiations at and beyond Paris, notably related to climate finance promised by developed countries to assist developing countries in the low GHG transition.

In addition, at the UNFCCC level there is a commitment by Parties to consider the adverse impacts of climate change policies and projects (also known as 'response measures'), especially for developing countries. The Kyoto Protocol includes a promise to strive to minimize the adverse economic, social and environmental impacts of climate change mitigation policies on other Parties, especially developing countries. However, there has been significant debate on how to implement this.

In response to the lack of information on response measures, a forum to discuss response measures was established at COP 17 in Durban. This forum is a joint agenda programme of both the subsidiary bodies, and has the specific goal of improving the understanding of the negative impacts of climate change mitigation policies and projects. However, the progress achieved through this forum has been limited. Currently there is a discussion ongoing on the continuation of the forum. While Parties have expressed support for the continuation, the forum is currently in a grey zone. Progress on this topic is expected during COP21 in Paris.

## **5 Conclusion**

A wide range of positive and negative socio-economic and environmental impacts stemming from climate policies has been observed in Ghana. The most important negative economic impacts relate to high (upfront) investment costs for businesses (e.g. SLWM, food labelling), costs incurred by households (e.g. the phase-down of fossil fuel subsidies) and government expenditures (opportunity costs). Planned international policies in maritime and aviation could also have modest negative impacts on Ghana's economy, through impacts on trade (exports) and tourism.

Socially, some jobs in the informal sector (e.g. waste-pickers, illegal loggers in the case of EU FLEGT) are threatened, and some of the policies potentially result in unequal impacts and/or benefit sharing for the most vulnerable (e.g. REDD+; phase-down of fossil fuel subsidies; EU FLEGT). Environmentally, the negative impacts are very limited or potential in nature (e.g. mercury emissions from improperly disposed CFL bulbs).

The majority of the measures taken to mitigate the negative impacts are tailored towards specific environmental, economic and social issues and mostly relate to very specific policies or

projects. They are not, at present, resulting in any significant diversification of the economy. More broadly however, climate policies such as REDD+ and the SLWM project have the potential to diversify agriculture technologies and crop types to such an extent that the livelihoods of the people relying on them are strengthened significantly. In this sense economic diversification allows them to be better able to withstand both the adverse effects of climate change, and the potential negative side-effects of a low GHG emissions transition.

Many of the impact mitigation tools effectively address important issues and do so in a reasonably efficient manner. However, they do so in a patchy, non-comprehensive way, which leaves room for improvement. Most measures are also in place indefinitely, while some have been introduced as a one-off measure, depending on the issue and associated costs. A more systemic approach may also contribute to monitoring impacts over time e.g. by studying whether the current work done by the NDPC on monitoring co-benefits could be complemented with monitoring of negative impacts

In addition, most tools are sector- and policy-specific. Few economy-wide tools are in place or required at present. If the low GHG emission transition continues and deepens, however, the design of more comprehensive tools (including monitoring tools) may be helpful.

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## Annex I: General and sector-wide policies

- *General policies*

At present, the overarching economic development planning document is the “*Ghana Shared Growth and Development Agenda II (GSGDA II – 2014-2017)*”. It includes ample references to climate change and serves as the umbrella policy for Ghana’s *National Climate Change Policy (NCCP)*, adopted in 2013.

The NCCP embraces the following key vision: “to ensure a climate-resilient and climate compatible economy while achieving SD through equitable low-carbon economic growth for Ghana”, which is translated into three main objectives, i.e. (1) effective adaptation, (2) social development, and (3) mitigation.

The NCCP also outlines 3 phases. A first phase embraces the NCCP itself, while a second phase includes the development of a Low Carbon Development Strategy (LCDS). Finally, Phase 3, “will detail how climate change programmes and actions identified in phase two can be mainstreamed and embedded in a time-bound and budgeted manner, into annual work plans of implementing units” (NCCP, 2013: ix).

In addition, Ghana announced in its INDC in September 2015 that it will unconditionally reduce GHG emissions by 15% compared to business-as-usual (BAU) by 2030. It also announced an additional 30% reduction on condition that external support is made available. With such support (finance, technology transfer and capacity building), a total emission reduction of 45% compared to BAU is attainable (the INDC estimates that total emissions under BAU amount to 73.95MtCO<sub>2</sub>e by 2030). To reach these targets, Ghana would need USD 22.6 billion between 2020 and 2030 to finance its mitigation and adaptation actions, of which USD 6.3 billion would come from domestic sources and 16.3 billion from international support (INDC, 2015: 2-4).

There are several other general policies that have a bearing on climate mitigation and adaptation in the country. With regard to adaptation, a *National Climate Change Adaptation Strategy (NCCAS)*, was put in place in 2013, drafted with the assistance of CC-DARE, a joint UNEP-UNDP project funded by Denmark. The National Disaster Management Organization (NADMO) also adopted a *Ghana Plan of Action for Disaster Risk Reduction and Climate Change Adaptation (2011–2015)*.

Other relevant measures include the *National Development Planning System Act (Act 480)* to guide mainstreaming of climate change to national, sector and district medium term plans; the *Environmental Assessment Regulations (Legislative Instrument)* to address climate change issues at the project level and the *Local Government Act (Act 462)*, guiding local governments (Metropolitan, Municipal and District Assemblies) in budgeting for climate change activities in their annual budgets.

Finally, a list of 55 NAMAs was submitted to the UNFCCC in 2010 (Government of Ghana, 2010). This list is indicative, and not all initiatives are likely to be put into practice. Others are subsumed in existing programmes and projects at the sectoral level.

- Sector-wide policies in the energy sector (incl. transport)

First, the 2010 National Energy Policy contains the broad principles and strategic objectives of Ghana's energy sector (please refer to Chapter 1 for more details on Ghana's energy structure).

Second, the 2011 Renewable Energy Act 832 contains an aspirational target of generating 10 percent of electricity on national grid from renewable sources by 2020, and foresees the implementation of number of measures to facilitate private sector participation. These include a Feed-In-Tariff rate, Renewable Energy Purchase Obligations, rules on connection to distribution and transmission system, and the establishment of a National Renewable Energy Fund.

Third, the Strategic National Energy Plan (SNEP) 2006-2020 reviews the energy supply structure for Ghana and sets out the energy needs to meet development objectives. The Plan has four sectoral Annexes: "Energy Demand Sectors of the Economy", the "Electricity Plan", the "Petroleum Plan" and the "Woodfuels & Renewables Plan".

Fourth, the 2012 Sustainable energy for all action plan (SE4ALL) outlines a number of priority energy projects for Ghana (including e.g. efficient cookstoves), and was drafted with the assistance of several foreign donors. Fifth, Ghana is also drafting a National Bioenergy Policy, covering areas such as biomass, biogas and waste in the context of energy and electricity generation.

Finally, the *2008 National Transport Policy* and the *Sector Medium-term Development Plan (2012-2014)*. The former sets out the main objectives of transport sector development in the country, while the latter is to guide its implementation. Regarding climate change, this has resulted in e.g. proposals for motor emissions standards, penalties on imported over-aged vehicles (10 years) and annual road-worthy certification for all vehicles after inspection.<sup>12</sup>

- Sector-wide policies in the AFOLU sector

Climate change is mentioned as a concern in Ghana's Food and Agriculture Sector Development Policy (FASDEP II) and subsequent Medium Term Agriculture Sector Investment Plan (METASIP 2010-15), particularly in the context of environmental resilience and agricultural productivity. This is further acknowledged in the National Climate Change Adaptation Strategy of 2013, which has a strong focus on agriculture. In these documents, the solution to integrating climate change within the agricultural sector is to introduce sustainable management practices. These practices include for example irrigation and flood management and related infrastructural works, reduced requirements for agricultural chemicals due to better management of natural soil fertility and agroforestry techniques (growing trees or shrubs around or among crops or pastures).

- Sector-wide policies in the waste sector

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<sup>12</sup> In view of limited data availability, these specific proposals and actions are not included in this case study's impact analysis.

There are two sector-wide policies that relate to climate change and waste in Ghana, (1) the *National Bioenergy Policy (currently being drafted)*, and (2) the *National Environmental Sanitation Strategy and Action Plan (NESSAP, 2010)*. The Environmental Sanitation Strategy (2010) mentions climate change and acknowledges that Ghana's waste sector is an important contributor to total national GHG emissions. It also devotes several paragraphs to the CDM and how it constitutes a possible source of finance for mitigation activities in Ghana. The draft National Bioenergy Policy also acknowledges the climate challenge and contains a chapter on energy generation based on biomass waste.

### *Annex II: 2 Specific climate projects and programmes in the energy (incl. transport), AFOLU and waste sectors*

In the sections below, first the domestic and then the international projects and programmes will be identified per subsector.

- Energy sector

#### A. *Energy generation*

##### ○ Domestic

1. Solar PV Electrification Programme (1999-2018)
2. Natural Gas Fuel Replacement Programme
3. Phase-down of fossil fuel subsidies
4. Solar Lantern Distribution Programme
5. Efficient Lighting – CFL replacement programme 2007
6. Refrigeration Appliances Rebate and Replacement Scheme
7. Installation of capacitors in commercial/industrial buildings

First, the Solar PV Electrification Programme (1999-2018) is a cluster of activities which aims to (1) establish 3.54 MW national grid-connected utility-scale solar systems in selected institutions and VRA (Volta River Authority) installations, and (2) install 9536 solar systems in deprived off-grid communities from 2009-2014 and other individual standalone installations which translates into another 3.41 MW (BUR, 2015: Annex 3).

Second, the Natural Gas Fuel Replacement Programme is a fuel switch programme from light crude oil to natural gas at a grid-connected stationary combustion thermal plant resulting in a reduction of combustion emissions from generating electricity (BUR, 2015: Annex 3). Natural gas is imported from Nigeria, through WAGP (West African Gas Pipeline) and from the Jubilee Field after processing from the Atuabo Gas Plant in the Western Region of Ghana.

Third, since the early 2000s, Ghana has attempted several times to phase out or phase down fossil fuel subsidies. Facing public protests and pressure from the electorate, the first few

attempts were withdrawn. Public communication campaigns highlighting the regressive nature of these subsidies and the mitigation measures put in place to protect the poor (including e.g. the solar lantern distribution programme mentioned below; a minimum wage increase; price ceilings for public transport; removal of fees for state-run schools; etc.) resulted in more successful attempts to remove subsidies from 2006 onwards (for more details, see e.g. Cooke et al., 2014; Coady et al., 2006).

Fourth, the Solar Lantern Distribution Programme is an ongoing programme that aims to distribute 200,000 solar lanterns by 2018 at heavily subsidised prices to off-grid communities, as part of the government's policy to minimize the negative impacts of the implementation of the phase-out of fossil fuel subsidies (BUR, 2015: Annex 3).

Fifth, the 2007 Efficient Lighting – CFL replacement programme consisted of the free distribution of 6 million Compact fluorescent lamp (CFL) bulbs in exchange for incandescent bulbs in households during the 2007 power crisis. It also involves a ban on the import of incandescent bulbs (BUR, 2015: Annex 3).

Sixth, the Refrigeration Appliances Rebate and Replacement Scheme is an ongoing programme that seeks to improve energy efficiency through a combination of regulatory tools such as labelling and innovative economic tools (rebate scheme). The project aimed to replace 15,000 old and inefficient refrigerators by 2014, but only 5,000 fridges were effectively replaced (BUR, 2015: Annex 3).

Seventh and finally, the installation of capacitors in commercial/industrial buildings project is ongoing and aims to improve energy efficiency in commercial and industrial buildings by installing 27 capacitor banks (which correct power factors and save electricity) in public buildings (phase 1) and upscale this to cover 1047 commercial and industrial buildings (phase 2) (BUR, 2015: Annex 3).

- International

1. Natural Gas Recovery and Utilization from Jubilee Oil Field (CDM project)
2. Improved Cookstoves (CDM POA and Gold Standard projects)

First, the Natural Gas Recovery and Utilization from Jubilee Oil Field, which is partly registered as a CDM project, aims to recover associated gas from the Jubilee Oil Field which would otherwise have been flared, and subsequently process it into lean gas for electricity generation, LPG for domestic use and other products, such as condensates and pentanes for the energy market (BUR, 2015: Annex 3; UNFCCC, 2012c)

Second, Improved Cookstoves (CDM POA and Gold Standard projects): in recent years, a cluster of activities emerged in Ghana to promote the uptake of more efficient (improved) cookstoves

instead of the more traditional wood fuel cookstoves.<sup>13</sup> These activities include 4 CDM Programmes of Activities components that are currently being implemented in Ghana (see also BUR, 2015)<sup>14</sup>. In addition, there are two voluntary carbon projects that are registered under The Gold Standard, the carbon credits of which can be sold on the voluntary carbon market.<sup>15</sup> These projects generate emission reductions as households use less fuel (wood fuel or charcoal) for cooking because of the improved efficiency of the cookstoves that are provided at subsidized prices in these projects.

## B. Transport

- Domestic<sup>16</sup>
  1. Bus Rapid Transit (BRT) project in Accra

The BRT project involves the construction and operation of a new bus rapid transit system for passengers, including the necessary replacements and adjustments (e.g. a dedicated lane) to the existing traffic situation on the Kasoa – Central Business District (CBD) corridor in Accra (BUR, 2015: Annex 3).

- International
  1. Aviation under the EU ETS
  2. Market-based mechanism (MBM) in IMO
  3. Market-based mechanism (MBM) in ICAO

First, the EU has included *aviation* as a sector under its EU Emissions Trading System (EU ETS). It had announced the inclusion into the EU ETS of all aviation to and from the EU. This was however put on hold with the Stop the Clock-measure, in response to the decision at ICAO's 2013 General Assembly to develop a global market-based mechanism (MBM) addressing

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<sup>13</sup> In addition to improved cookstoves the government is also engaged in the promotion and distribution of LPG cookstoves. In 2014, the government announced to distribute 53 000 LPG cylinders and stoves within the next few years (Ministry of Petroleum, 2014). Due to a lack of available date, we did not include this initiative in the impact analysis of this case study.

<sup>14</sup> Namely: African Improved Cooking Stoves Programme of Activities) – CPA No. 00001 (Ghana), African Improved Cooking Stoves Programme of Activities – CPA No. 00002 (Ghana), African Improved Cooking Stoves Programme of Activities – CPA No. 00003 (Ghana), and Clean Cook Stoves in Sub-Saharan Africa by ClimateCare Limited) – CPA CookClean Ghana Limited (see UNFCCC, 2012a; 2012b; 2013a; 2013b).

<sup>15</sup> Namely: Gyapa Improved Cook-Stoves in Ghana (registered in 2010), and Improved Household Charcoal Stoves in Ghana (registered in 2009).

<sup>16</sup> A number of domestic transport measures such as proposals for motor emissions standards, penalties on imported over-aged vehicles (10 years) and annual road-worthy certification for all vehicles after inspection may also be related to climate change, but due to the limited scope of this study and a lack of available data, they are not included in the analysis.

emissions from aviation. At the moment only flights within the European Economic Area (EU + Norway, Iceland and Lichtenstein) are included in the EU ETS (DG CLIMA, 2013a).

Second, the *International Civil Aviation Organization (ICAO)* agreed to establish a global market-based mechanism (MBM) in an effort to address the rapidly rising GHG emissions of the international aviation sector. By 2016 the mechanism should be developed and it should enter into force by 2020. The agreement also mentions technical and operational measures for mitigating emissions, among which biofuels and the possibility of member states implementing a separate MBM in the period up to the establishment of an international mechanism (see ICAO, 2013). Interviews with stakeholders have indicated that the most likely candidate for global implementation is an offsetting mechanism. Costs would be kept low by allowing carbon units from a wide variety of offsetting mechanisms (including the CDM and possibly REDD+). This would be coupled with a previously confirmed aspirational goal of carbon neutral growth of the aviation sector after 2020.

Although there is no clarity on the form and scope of future climate change policies for the aviation sector, it is reasonable to assume that climate change measures will be introduced in the mid-term, and that they will increase costs for airlines, potentially including those active in Ghana.

Third, In the *International Maritime Organization (IMO)*, a global market-based measure (MBM) to mitigate GHG emissions is also under discussion. MBMs under consideration include an offsetting fund financed by a tax on bunker fuels, an energy efficiency crediting and trading scheme and a global ETS for international shipping. Concerns from developing countries are taken on board by discussions on mitigation of adverse effects, for instance through a rebate mechanism compensating developing countries (IMO, 2015). The EU has been active both domestically and internationally (in the IMO) to develop market based instruments in the international maritime sector (DG CLIMA, 2013b). It is supporting discussions on a global ETS by preparing for its possible implementation: MRV requirements have been set in emissions from large vessels (over 5000 gross tonnage) visiting EU ports 2018 onwards.

- AFOLU sector

#### A. *Agriculture*

- Domestic

##### 1. Sustainable Land and Water Management (SLWM) Project

The SLWM project supports a comprehensive landscape approach (including some of the techniques mentioned above) to sustainable land and watershed management at the community level with planning activities at the regional and district level (BUR, 2015: Annex 3). The adoption of SLWM practices would contribute to halting the environmental degradation caused by poor agricultural practices. Agroforestry techniques, for example, counteract both desertification and deforestation, as do many of the water management techniques (e.g. construction of dykes or other structures to avoid or control water runoff and soil erosion).

- International
  1. Cocoa food labelling initiatives (i.e. UTZ Certified, Rainforest Alliance, IFOAM, and Fairtrade).

The cocoa-labelling initiatives have a similar goal as the SLWM project, but rely on demand for sustainably produced cocoa from (mainly) developed countries to promote better social and environmental practices, including in relation to climate change, by cocoa farmers. A very important component of each of these labels is the associated training that goes on at the producer level to bring them up to the standards, i.e. to good agricultural practices that are also beneficial to the climate. For Ghanaian cocoa, the following four labels exist: UTZ Certified, Rainforest Alliance, IFOAM and Fairtrade (for more details, see the CEPS case study on Food Labelling as part of this project).

#### *B. Forestry*

- Domestic

There are at least four programmes, two of which international (FLEGT and REDD+), that contribute to this goal:

1. National Forest Plantation Development Programme (NFPDP)
2. Forest Investment Programme (FIP)
3. Cocoa REDD+ Programme

First, the National Forest Plantation Development Programme (NFPDP) aims to have an annual average of 15300 ha of degraded forestlands restored and maintained under a series of nationally and internationally funded schemes (including by the IMF and the African Development Bank) and in that sense enhance forest plantation activities in Ghana.

Second, the Forest Investment Programme (FIP) aims to reduce GHG emissions from deforestation and forest degradation while reducing poverty and conserving biodiversity. FIP investments will focus on the High Forest Zone in the Western Region and the Brong Ahafo region, where deforestation rates and carbon stocks are high. Funding comes from the World Bank, the African Development Bank and the International Finance Corporation (World Bank, 2015b: 4). The programme is an integral part of and aims to promote Ghana's REDD+ readiness (Ministry of Lands and Natural Resources, 2012: vii; World Bank, 2015b: 77). The programme is planned but not yet fully implemented.

Third, the Cocoa REDD+ Programme aims to enable the transition to a climate-smart cocoa production system, while simultaneously reducing emissions from deforestation and forest degradation. It aims to establish performance-based emission reduction payments in the High Forest Zone (HFZ, in the south-west of Ghana) covering 5.9 million ha (4.3 million off-reserve and 1.6 million on-reserve area) (BUR, 2015: Annex 3). The programme is planned but not yet



fully implemented. Funding comes partly from the World Bank's Forest Carbon Partnership Facility (FCPF).

- International

1. Voluntary Partnership Agreement (VPA) and Forest Law Enforcement, Governance and Trade (FLEGT)

Ghana has a Voluntary Partnership Agreement (VPA) with the EU, in the context of the EU's Forest Law Enforcement, Governance and Trade (FLEGT). The VPA's objective is to reduce illegal logging by strengthening sustainable and legal forest management, improving governance and promoting trade in legally produced timber. Ghana is expected to be one of the first countries to issue FLEGT licenses (Mimica, 2015).

- Waste

- Domestic

1. Development of institutional biogas

The development of institutional biogas project aims to promote the use of institutional biogas systems for cooking/heating in public institutions. The specific activity (formulated within the SE4ALL action plan, see the section on energy policies above) is "to conduct a feasibility study and establish institutional biogas systems for 200 boarding schools, hospitals and prisons" with 2012-2015 as implementation timeline (CSF, 2012; SE4ALL, 2012: 58). Technical assistance comes from the EU's Climate Support Facility (CSF), to prepare a feasibility study, develop an implementation plan and prepare CDM project application (CSF, 2012). The programme is planned but not fully implemented yet.

- International

1. CDM project on Composting of Municipal Solid Waste in Accra area
2. Landfill with gas collection: CDM POA project

First, the CDM project on Composting of Municipal Solid Waste in Accra area was registered in 2012 and is part of a larger Public-Private Partnership (PPP) between the local Accra government and Zoomlion Ghana Ltd, creating the Accra Compost and Recycle Plant. The Project owner is Zoomlion Ghana Ltd. The aim of the CDM project is to improve waste management issues in Accra area and surroundings, through the development and operation of a Municipal Solid Waste (MSW) sorting and composting plant in Adjen Kotoku, Ghana. The organic fraction of the waste is recovered into saleable compost for agricultural, horticultural and landscaping activities. (UNFCCC, 2012e: 2).

Second, the Landfill with gas collection project is part of the CDM Programme of activities (POA) "Landfill gas capture, flaring and utilization program in Africa". It aims at avoiding methane emissions from municipal waste treated in the Oti landfill in Ghana.