



Private climate finance

Mapping incentives and investment in Sub-Saharan Africa

Shelagh Whitley, Ilmi Granoff, Emilio Chiofalo, Aidy Halimanjaya and Sam Pickard

Abstract

There is widespread acceptance that significant increases in financial resources are needed to help countries undertake climate compatible development (CCD), that a significant portion of such resources is expected in the form of private sector investment, and that public finance and incentives shape such investment.

There is however, little global—let alone regional—data on private investment in CCD beyond that to renewable energy. This paper applies a methodology to address this data gap and to support greater understanding of the role of public incentives in shaping private investment in climate relevant sectors. Because of the granularity needed to understand private investment choices as they relate to CCD, the paper focuses on lessons learned from analysis of four countries and two sectors: Uganda and Namibia's energy sectors and Zambia and Tanzania's agricultural sectors.

Cross-cutting findings suggest:

- There remains a significant gap in support to the diffusion of decentralised and smaller-scale technologies (hard and soft) which are particularly relevant for Africa;

Creating the enabling environment for private investment in CCD requires greater support at market level and increased policy coherence within climate relevant sectors;

Designing interventions to mobilise private finance for CCD requires a clear understanding of the distinct roles of the finance sector and other sources of capital for businesses and households;

Public support to market-level information collection and dissemination can help facilitate private finance for CCD; and

Lesson learning on effective tools to mobilise private finance for CCD will require changes in the approaches used for collection and dissemination of investment data at national, regional and international level.

The paper comprises: an introduction to the available global data and limitations, summary of the applied methodology, detailed country and sector case studies, and findings at the sector, country and regional level.

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Abbreviations

ABPP	African Biogas Partnership Programme
ADB	Asian Development Bank
AEEP	Africa–EU Energy Partnership
AfDB	African Development Bank
AFRODAD	African Forum and Network on Debt and Development
AgFiMS	Agricultural Finance Markets Scoping
BIT	Bilateral Investment Treaty
BNEF	Bloomberg New Energy Finance
BRICS	Brazil, Russia, India, China and South Africa
CBT	Climate Bonds Taxonomy
CCD	Climate-Compatible Development
CDM	Clean Development Mechanism
CIA	Central Intelligence Agency
COMESA	Common Market of Eastern and Southern Africa
CPI	Climate Policy Initiative
CRS	Creditor Reporting System
CSO	Central Statistical Office
DFID	Department for International Development
EBRD	European Bank for Reconstruction and Development
ECB	Electricity Control Board
EDI	Energy Development Index
EIB	European Investment Bank
EIU	Economist Intelligence Unit

ERA	Electricity Regulatory Authority
EU	European Union
EUEI PDF	EU Energy Initiative Partnership Dialogue Facility
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FISP	Fertiliser Input Support Programme
FSF	Fast Start Finance
GBOPA	Global Partnership on Output-Based Aid
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GET FiT	Global Energy Transfer Feed-In Tariff
GoU	Government of Uganda
GRZ	Government of the Republic of Zambia
HDI	Human Development Index
IA	Investment Agreement
IADB	Inter-American Development Bank
IAPRI	Indaba Agricultural Policy Research Institute
ICMM	International Council on Mining & Metals
ICT	Information and Communication Technology
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFI	International Finance Institution
IITA	International Institute of Tropical Agriculture
IMF	International Monetary Fund
IPP	Independent Power Producer
ISIC	International Standard Industrial Classification

JICA	Japan International Cooperation Agency
KfW	German Development Bank
MAL	Ministry of Agriculture and Livestock
MDB	Multilateral Development Bank
MEMD	Ministry of Energy and Mineral Development
MENA	Middle East and North Africa
MIGA	Multilateral Investment Guarantee Agency
MFNP	Ministry of Finance and National Planning
MoFPED	Ministry of Finance, Planning and Economic Development
MTENR	Ministry of Tourism, Environment and Natural Resources
NAIP	National Agriculture Investment Plan
NAP	National Agriculture Policy
NCCRS	National Climate Change Response Strategy
NDP	National Development Plan
NGO	Non-Governmental Organisation
NHIES	Namibia Household Income and Expenditure Survey
NLTV	National Long-Term Vision
ODA	Official Development Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Cooperation and Development
OOF	Other Official Flow
PCCR	Pilot Project for Climate Resilience
PCFS	Private Climate Finance Support
PPI	Private Participation in Infrastructure
PPA	Power Purchase Agreement
PPP	Public–Private Partnership
PRP	Poverty Reduction Programme
PSD	Private Sector Development

PV	Photovoltaic
REA	Rural Electrification Agency
RE FIT	Renewable Energy Feed-In Tariff
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Corridor of Tanzania
SAPP	Southern Africa Power Pool
SFRP	Strategic Food Reserves Programme
Sida	Swedish International Development Cooperation Agency
SNDP	Sixth National Development Plan
SSA	Sub-Saharan Africa
TIC	Tanzania Investment Centre
TLC	Transparency, Longevity and Certainty
UECCC	Uganda Energy Credit Capitalisation Company
UIA	Uganda Investment Authority
UK	United Kingdom
UN	United Nations
UNCDF	UN Capital Development Fund
UNCTAD	UN Conference on Trade and Development
UNDP	UN Development Programme
UNFCCC	UN Framework Convention on Climate Change
URT	United Republic of Tanzania
US	United States
USAID	US Agency for International Development
WFP	World Food Programme
WRI	World Resources Institute
ZANACO	Zambian National Commercial Bank
ZDA	Zambia Development Agency

Executive summary

Introduction

There is widespread acceptance that significant increases in financial resources are needed to help countries undertake climate compatible development¹ (CCD), both through mobilisation of additional funds and shifting of existing resources (High-Level Advisory Group on Climate Change Financing, 2010; UNFCCC, 2012). There is also growing recognition at the global level that a significant proportion of current funding for CCD comes in the form of investment by the private sector, and that there is a critical role for public finance and public policy (domestic and international) to enable greater investment in CCD by the private sector (Buchner et al., 2013; Mabey, 2012).

Although estimates of the financing needs for climate compatible development (CCD) have been completed at the global and regional level, early research shows there is very limited information available on current private finance for CCD for specific countries beyond those within the Organisation for Economic Co-operation and Development (OECD) and Brazil, Russia, India, China and South Africa (the BRICS). Globally, there is also limited information by climate relevant sectors² beyond that for renewable energy (Jachnik, 2013). Consequently, analyses of regional or national level data sets on Africa reveal little about private finance for CCD. This information gap calls for a new approach that creates a picture of financial flows to CCD in Africa.

Analyses of private finance for CCD also need to take into account certain identifiable trends that emerge from the global data on climate finance:

- The majority (76%) is domestically sourced (originates in the country in which it is used);³
- The vast majority of private flows (62%) is invested in developed countries; and
- Of the smaller volume of international flows (North–South), the majority originates primarily from public sources (see Buchner et al., 2013; IFC, 2013; Illman et al., 2014; Whitley, 2013a, 2013b).

Methodology

We have developed a methodology to address (i) this limited availability of information on private climate finance beyond renewable energy and in less developed countries (including those in Africa) and (ii) the importance of domestic and public finance and incentives in shaping private investment (Whitley, 2014). Our research aims to answer the following questions for a given country and sector:

- What are the broad public policy aspirations regarding private investment?
- What are the primary incentives (regulatory, economic and information) in place to support private investment?
- What are the i) current sources of financial capital and ii) historic investment trends, both public and private?

¹ Climate-compatible development (CCD) safeguards development from climate impacts (climate-resilient development) and reduces or keeps emissions low without compromising development goals (low-emissions development) (CDKN, 2013).

² For the purpose of this research climate relevant sectors have been defined to include: agriculture, forestry, extractives, manufacturing, energy, water and waste, construction, transportation, and information and communication technology (ICT)

³ This information from the Climate Policy Initiative (CPI) is based on a global data review, and it is unclear how this finding would change across different country contexts (or apply to African countries).

- How can the information on incentives and investment inform those seeking to use climate finance to mobilise private investment towards CCD?
- What are the remaining data gaps, and how could additional information and data inform domestic and international interventions?

This approach takes a more holistic view of financial activity for each climate-relevant sector, on the theory that incentives within a sector are what most directly shape the decision of private investors. The methodology is an attempt to fill key information gaps about both private and public finance, and the incentives that shape such investment, and to create a framework to identify remaining gaps where data is simply uncollected. The primary aim of this work is to support governments in their efforts to shift or direct additional private resources to CCD.

In the absence of granular sector level data sets at the country level, our approach required in-depth country analysis, which meant that research had to be limited to a set of examples intended to provide a degree of representativeness of differing country circumstances and sub-sectors. In this case, we focused research on four countries, Uganda, Namibia, Zambia and Tanzania, and two sectors (energy and agriculture) in Africa; however, the approach has been developed to be relevant and applied globally, to all climate relevant sectors.

Findings

Based on our analysis of incentives and investment at sub-sector level, we identified a number of findings regarding the nature and structure of private finance for CCD across the countries reviewed, which indicate the possibility of a larger pattern across other contexts and regions. We also identified persistent challenges with access to information that must be addressed in order for existing effective approaches to mobilising private finance for CCD to be scaled and replicated.

There remains a significant gap in support to the diffusion of decentralised and smaller-scale technologies (hard and soft) which are particularly relevant for Africa.

Consistent across energy and agriculture subsector case studies, the greatest private financing gap was found to be the lack of resources for widespread diffusion of small-scale technologies (both hard, such as distributed generation, and soft, such as conservation agricultural practices) at smaller scales, which are particularly relevant to least developed country contexts.

In Uganda's energy sector, public and private financing tended to chase larger energy generation projects, with limited financial sector activity in small-scale energy generation, and for resources formalising and increasing sustainability of the large biomass energy finance (primarily or household thermal energy demand). This is despite the fact that nearly 80% of Uganda's energy mix is in the form of fuel wood (and 95% of households use biomass for cooking at significant expense), incentives to shape investment choices (including through climate finance) in this portion of the energy sector were few. In Zambia's agriculture sector, private investment is larger for agribusiness activities, with limited resources for small-holder farmers adapting to climate risk.

Findings across case studies points to a larger trend of available financial capital (from both the private financial sector and public climate finance) aggregating in fewer larger projects, rather than providing financing of capital investments in more diffuse sub-sectors. Targeting smaller business requires a focus on different financial instruments, moving from few large allocations of project financing to many small applications of working capital loans, lines of credit, venture capital, loan-to-own of consumer goods, etc. It also requires focus on domestic financial institutions in a position to broker such financial services at reasonable transaction costs and at scale. Such approaches have begun to be undertaken for renewable energy and energy efficiency investment through climate-specific resources, and could be transferred to a range of sub-sectors in Africa.

Using public resources to mobilize the financial sector and private economic choices for diffuse small-scale technological change also effectively serves the dual ambitions of climate compatibility and poverty alleviation at the core of many relevant public institutions.

Creating the enabling environment for private investment in CCD requires greater support at market level and increased policy coherence within climate relevant sectors.

Our research reinforced the observation that market conditions and the perceived investment climate at country and sub-sector level has a significant impact on private sector growth, and thus the availability of private capital in climate relevant sectors. It is, however, a necessary but not sufficient condition for private sector CCD. Our analysis has confirmed that specific public sector incentives within each sub-sector are critical to steering capital investment toward, and can also steer investments away from, CCD.

By way of example, Uganda's recent advancement to encourage private sector investment in the power sector have been based on its ability to present a package of regulatory reforms bundled to provide a coherent set of incentives. While these incentives have brought new private investment into the energy sector, resources have primarily flowed to large hydro and thermal projects because of particularly strong government support. In Zambia's agriculture sector, challenges arise from not yet having a coherent framework that merges its high-level policy ambitions, public investment, and its regulatory regime. While high-level policy ambitions support both climate compatibility and private and financial sector expansion, regulatory reform to support such priorities (in agriculture and more generally) is partial, and public financing in the agricultural sector has been dominated by expensive price supports for maize and fertilizer, at an opportunity cost to other priorities and without consideration to its implications for climate vulnerability.

For large- and small-scale investment alike, the combination of incentives (regulatory, economic and information) that constitute the 'enabling environment' for private sector investment remains the critical issue for mobilising private climate finance. Ensuring that such an environment draws private capital toward CCD as opposed to away from it requires understanding and designing interventions at the country and sector level.

Likewise, piecemeal identification of incentives and investments that support a few flagship projects or sub-sectors will have less impact than sector-wide, coordinated activities aimed at providing viable climate-compatible investment propositions for the private sector.

Designing interventions to mobilise private finance for CCD requires a clear understanding of the distinct roles of the finance sector and other sources of capital for businesses and households.

Discussions of private sector participation in climate finance often focus on the availability of capital from the financial sector for CCD projects, and which often overlooks the investment decisions made within, and availability of financing for, businesses and households which constitute a large, albeit diffuse, portion of the economic activity in many sectors, particularly in Africa.

By way of example, in Uganda's energy sector, project level investment by international and domestic banks is focussed on hydro and thermal power while biomass, solar and biogas projects are developed and financed by a broader range of actors including domestic and international companies, NGOs and foundations. Also, the largest energy sub-sector (charcoal) is informal with no official tracking of finance flows. In Zambia, although the dominant agricultural model is through smallholder activity, most commercial lending is directed toward large agribusiness. Furthermore, the small portion of smallholders with access to finance (13%) received it through corporate input credit schemes as opposed to from banks or other financial institutions.

As demonstrated in the detailed findings by sub-sector, understanding investment decisions of both the financial sector and other private actors at different scales is necessary in order to design public incentives and investment (including through climate finance) to maximize the private finance for CCD.

Public support to market-level information collection and dissemination will help facilitate private finance for CCD.

There is a critical role for investing in information collection and provision by government and development partners as a resource for private markets. Investing in cross-market information, about renewable energy resources or agricultural vulnerabilities, can be facilitated through business associations to help build confidence of private actors across scales, although the cost to adequately invest in supporting such organisations should not be underestimated.

Lesson learning on effective tools to mobilise private finance for CCD will require changes in the approaches used for collection and dissemination of investment data at national, regional and international level.

Finally, we find that there is a significant gap in publicly available information on historic levels of private investment at sub-sector level. This has significant implications for tracking the effectiveness of public interventions to mobilise private climate finance. If it is not possible to track support and investment at sub-sector level, it is not possible to make a causal link between the support provided and any shifts or increases in climate-compatible activities and investment. In order to truly facilitate a shift in private finance toward CCD, international, regional, and country level investment data must be collected and published in a manner that allows for the identification of trends in financing across climate relevant sectors and sub-sectors.

1 Introduction

There is widespread acceptance that significant increases in financial resources are needed to help countries undertake climate compatible development⁴ (CCD), both through mobilisation of additional funds and shifting of existing resources (High-Level Advisory Group on Climate Change Financing, 2010; UNFCCC, 2012). There is also growing recognition at the global level that a significant proportion of current funding for CCD comes in the form of investment by the private sector, and that there is a critical role for public finance and public policy (domestic and international) to enable greater investment in CCD by the private sector (Buchner et al., 2013; Mabey, 2012).

To address this financing gap, developed countries have committed to mobilising \$100 billion annually in long-term climate finance from public and private sources to address the needs of developing countries by 2020 under the UN Framework Convention on Climate Change (UNFCCC). This commitment, has led to early research to understand specific financing needs for CCD at the global and regional level, and to assess the effectiveness of existing efforts to mobilise private climate finance.

While estimates of the scale of climate-financing needs vary substantially depending on the assumptions and methodologies used, current estimates of the costs of addressing climate change in developing countries alone range from \$0.6 to \$1.5 trillion per year (Montes, 2012; Nakhouda, 2012). These estimates are five to ten times higher than the prospective \$100 billion target under the UNFCCC, and three to five times higher than current global climate finance flows (Buchner, et al., 2013). Studies have shown that, of these substantial resources to undertake CCD at the global level, the resources required in Africa are also significant. A report by the African Development Bank (AfDB) estimates adaptation and mitigation costs in Africa to be in the range of \$40-100 billion per annum over the next 10-20 years (AfDB, 2012a; AfDB, 2012b).

Though these high level estimates of financing needs have been completed at the regional level, early research shows there is very limited information available on private finance for CCD at country level beyond the Organisation for Economic Co-operation and Development (OECD) and Brazil, Russia, India, China and South Africa (the BRICS), and by sector beyond that for renewable energy (see Table 1) (Jachnick, 2014).

Where climate finance information is aggregated globally, it is found that:

- The majority (76%) is domestically sourced (originates in the country in which it is used);⁵
- The vast majority of private flows (62%) is invested in developed countries; and
- Of the smaller volume of international flows (North–South), the majority originates primarily from public sources (see Buchner et al., 2013; IFC, 2013; Illman et al., 2014; Whitley, 2013a, 2013b).

To address i) this limited level of information on private climate finance beyond renewable energy and in less developed countries (including those in Africa) and ii) the importance of domestic and public finance and incentives, we build on an approach developed by (Whitley, 2014) to fill key information gaps about both private and public finance, and the incentives that shape this investment. The primary

⁴ Climate-compatible development (CCD) safeguards development from climate impacts (climate-resilient development) and reduces or keeps emissions low without compromising development goals (low-emissions development) (CDKN, 2013).

⁵ This information from the Climate Policy Initiative (CPI) is based on a global data review, and it is unclear how this finding would change across different country contexts (or apply to African countries).

aim of this work is to support governments in their efforts to shift or direct additional private resources to CCD. In this case, our focus is on countries and sectors in Africa; however, the approach has been developed to be relevant and applied globally.

In the balance of the report, we outline:

- Current publicly available information on private climate finance in Africa (Section 2);
- A proposed approach for tracking and understanding private climate finance through mapping incentives and investment in climate-relevant sectors (Section 3);
- The findings from applying this approach in two sectors and four countries in Africa⁶ (energy in Uganda and Namibia, agriculture in Zambia and Tanzania) (Sections 4 and 5); and
- Implications of these findings for those seeking to mobilise private finance for CCD (Section 6).

⁶ The sectors which receive the highest levels of climate finance in Uganda and Zambia are energy and agriculture respectively.

2 What do we know about private climate finance in Africa?

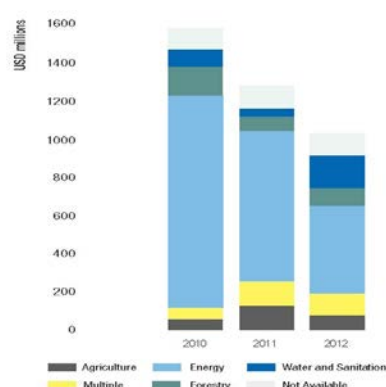
2.1 Information from climate finance datasets

There is very limited information available on public support in Africa in publicly available climate finance data sets, let alone on volumes of private finance.

A review of fast start finance (FSF) by the Overseas Development Institute (ODI) and the World Resources Institute (WRI) provides detailed information about recipients of public finance by country and region, but does not review private finance in the same level of detail. FSF to Africa was \$4.1 billion⁷ between 2010 and 2012 (13% of total FSF) (ODI, 2014). Information on FSF is also available by sector, and shows that the majority of support is focused on the energy sector (see Chart 1).⁸

Additional reviews of public climate finance include that of the Joint Multilateral Development Bank (MDB) approach of seven international finance institutions (IFIs),⁹ whose most recent publication was in 2012. This allows for a review of climate finance provided by region, but does not present information at country or sector level. It shows that 18% of mitigation finance and 33% of adaptation finance from these IFIs targets MENA and SSA (EBRD, 2013). Building on this work, the AfDB has developed a project-level climate finance tracking tool for its activities in Africa. Although information is not provided at country level, and private investment is not identified, there is sector-specific guidance available for agriculture, energy, transport and water and sanitation, as these project types currently dominate the Bank's portfolio (AfDB, 2013a).

Chart 1: Fast-start climate finance to Africa by sector (US\$ millions)



Source: ODI (2014).

⁷ This figure is based on analysis of FSF at country level in Africa and therefore excludes any FSF aggregated at regional level in the Middle East and North Africa (MENA) or in Sub-Saharan Africa (SSA) (the groupings used in the dataset).

⁸ Detailed information on FSF support for Uganda, Namibia, Zambia and Tanzania are found in Sections 3 and 4 of this report.

⁹ International Finance Corporation (IFC), World Bank, Inter-American Development Bank (IADB), Asian Development Bank (ADB), AfDB, European Bank for Reconstruction and Development (EBRD) and European Investment Bank (EIB).

The IFC's comprehensive review of datasets on public and private climate finance shows the limited availability of information on private finance (Table 1). However, its findings are restricted to the renewable energy and infrastructure sectors, and adaptation (irrespective of sector). Also, the review does not provide information by country or region, therefore it is not possible to identify trends in private climate finance to and in Africa.

Table 1: Summary of sector-specific climate finance

		Total	Public money					Private money					
Sources / Sectors		Annual investment (US\$ billion)	Dedicated climate funds	National finance institutions	Government budgets	International finance institutions	Total public sector	Corporate actors	Institutional investors	Project developers	Households	Private finance intermediaries	Total private sector
Adaptation	Total (2010/2011)*	14	NA	5.2	2.7	6	13.9	NA	NA	NA	NA	NA	NA
	Agriculture and Forestry (2011)	5.1	NA	3.78	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Water preservation, supply and sanitation (2011)	3.22	NA	3.22	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Capacity building and technical assistance (2011)	1.4	NA	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disaster risk reduction (2011)	1.4	NA	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mitigation	Total (2010/2011)	350	1.1-1.5	37.5	14.9-19.2	26.9	82	74.9	0.6	122.2	32.3	37.95	267.9
	Energy efficiency (2011)	23.58	NA	NA	NA	23.58	NA	NA	NA	NA	NA	NA	NA
	Infrastructure (2011)	74.4	NA	NA	NA	NA	NA	NA	74.4	NA	NA	NA	74.4
	Renewable energy (2004-2011)	141.4	NA	NA	3.1	NA	NA	NA	NA	138.3	NA	NA	138.3
	Least (2009-2010)	23	NA	NA	23.54	NA	23	NA	NA	NA	NA	NA	NA
	Redd+ (2010-2012)	1.3	NA	NA	NA	1.3	NA	NA	NA	NA	NA	NA	NA
Other	Total (2010/2011)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Water (2010)	276**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Waste management (2011)	0.52	NA	0.52	NA	NA	NA	NA	NA	NA	NA	NA	NA

Source: IFC (2013).

The CPI's Global Landscape of Climate Finance 2013 (Buchner et al., 2013) also distinguishes between private and public flows, and flows to adaptation and mitigation, but *does not* break out its global figures by sector, country or region. References to Africa are limited to information from dedicated climate funds (see below) and case studies of project finance in South Africa and Morocco.

In addition, ODI has completed a review of private climate finance support (PCFS) provided by four donors (the US, the UK, Japan and Germany)¹⁰ between 2010 and 2012 (Whitley, 2013b). This research identifies 16 interventions (projects and programmes) in Africa by these four donors that have involved private co-financing. Public investment across these interventions has been almost \$1.4 billion, although only \$83.5 million in private co-financing is identified. The focus of support has been geothermal projects in Kenya, solar projects in Morocco and South Africa and a number of investment funds. Investment by the private sector may be greater than this, but details on transaction structures and participants are not readily available in the public domain.

¹⁰ This dataset can be reviewed by country, region and sector, and includes over 70 donor interventions to mobilise private climate finance, representing \$8.5 billion (of which 20% comes from the private sector) (Whitley, 2013b). It excludes South-South investment, private finance mobilised by other donors and both international and domestic finance that is relevant to climate mitigation or adaptation but not linked to donor activities.

Finally, although potentially distinct from climate finance, related investment in carbon markets also provides an indication of private support for climate-relevant activities in Africa. From 2003 to 2013, the UN-led¹¹ portion of the carbon market attracted investment of over \$215 billion to projects in developing countries. However, as is well known, little of this reached Africa, with almost 80% of registered Clean Development Mechanism (CDM) projects taking place in four countries (India, China, Brazil and Mexico), and only 3% of projects (and volume of carbon credits) in Africa (UNEP DTU, 2014). A review of registered CDM projects in the countries included in the analysis in this report shows a focus on hydro and biomass projects (see Table 2).

Table 2: Registered CDM projects in Uganda, Namibia, Zambia and Tanzania

Country	Registered CDM projects ¹²	Project focus
Uganda	14	Hydro, reforestation, landfill gas, and biogas
Namibia	2	Landfill gas and biogas
Zambia	2	Hydro and cook stoves
Tanzania	3	Hydro, landfill gas, and biomass power

Source: UNFCCC (2014).

2.2 Information from broader investment datasets

In addition to the information above on climate finance and carbon market investment in Africa, a review of broader support to and investment in the region provides some information at sector level (including and beyond energy). Although this does not provide a full picture of the current or potential levels of private climate finance in Africa, the following section seeks to underline current trends in investment and support to climate-relevant sectors¹³ where information is available (see also Appendix 1).

The World Bank's Private Participation in Infrastructure (PPI) Project Database has information by country, sector and sub-sector, covering energy, transport, telecoms and water and sewerage. According to the PPI website, the types of projects included are operations and management contracts, operations and management contracts with major capital expenditure, greenfield projects (in which a private entity or a public-private joint venture builds and operates a new facility) and divestitures. A review of PPI by sector shows a significant focus of private investment on the telecoms and energy sectors, with overall private investment increasing over time. A country review shows a focus on the largest economies in Africa: Nigeria and South Africa (see Charts 2 and 3).

Foreign direct investment (FDI) data for Africa¹⁴ are available from the UN Conference on Trade and Development (UNCTAD) by country but not by sector or sub-sector. In some countries, more detailed FDI data are available from domestic sources (see for the four countries analysed in this paper, Chart 4). A review of FDI to the countries included in the analysis in this report shows increasing FDI flows over time, and relatively low levels of FDI to Namibia as compared with Tanzania, Uganda and Zambia.

¹¹ In 2012 over 4 million tonnes of voluntary carbon offsets were transacted from Africa, the majority of which were generated in Kenya (Ecosystem Marketplace and BNEF, 2013).

¹² Total registered CDM projects (globally) = 8,740.

¹³ For a list of 'climate-relevant sectors' as defined for this analysis (and rationale for selection) see Section 3.

¹⁴ FDI inflows to Africa were 3.7% of the global total in 2012 (UNCTAD, 2013a).

Additional datasets that are available by country, sector and sub-sector include the OECD's Creditor Reporting System (CRS), which covers official development assistance (ODA) and other official flows (OOF)¹⁵ (see Charts 5 and 6, respectively). ODA data can provide an indication of where donors are currently providing grant-based support to countries in Africa; OOF data may also provide an indication of where donors are providing concessional and non-concessional finance (primarily non-grant-based instruments). ODA in climate-relevant sectors (see Box 1) is focused on transport and storage, energy, agriculture and energy. By contrast, OOF in these sectors focuses on energy, transport and mineral resources and mining.

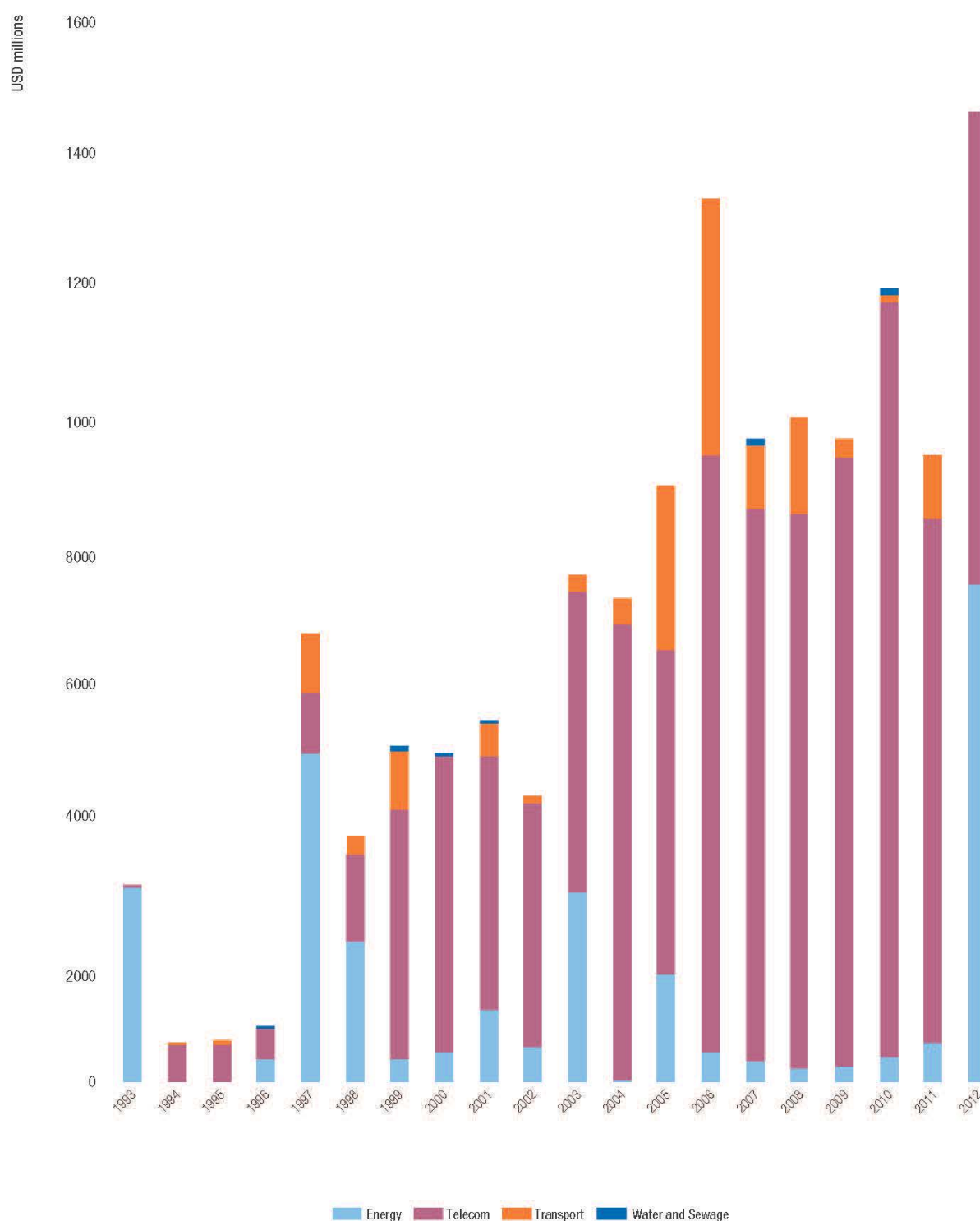
Finally, a recent status report from the Africa–European Union (EU) Energy Partnership (AEEP), which focuses on information on energy investment data (only) from the public and private sectors, found that development finance institutions do not yet collate data on their financing flows and outcomes; there is no central database from which African budget or other data on energy infrastructure spending can be tracked authoritatively, although the AfDB has begun to compile this for 20 countries; and much more work is needed to identify each of the financial instruments that feed into each of the several thousand projects recorded in the AEEP project database¹⁶ (AEEP, 2012).

The following section proposes an approach to deepen this high-level information on climate finance and investment in Africa with more detailed sector-level reviews of public, private, domestic and international investment, and of incentives, with the aim of drawing out considerations for mobilising private climate finance.

¹⁵ OOF are defined as: transactions by the official sector with countries on the List of Aid Recipients which do not meet the conditions for eligibility as Official Development Assistance (ODA) or Official Aid, either because they are not primarily aimed at development, or because they have a Grant Element of less than 25 per cent (OECD, 2014a).

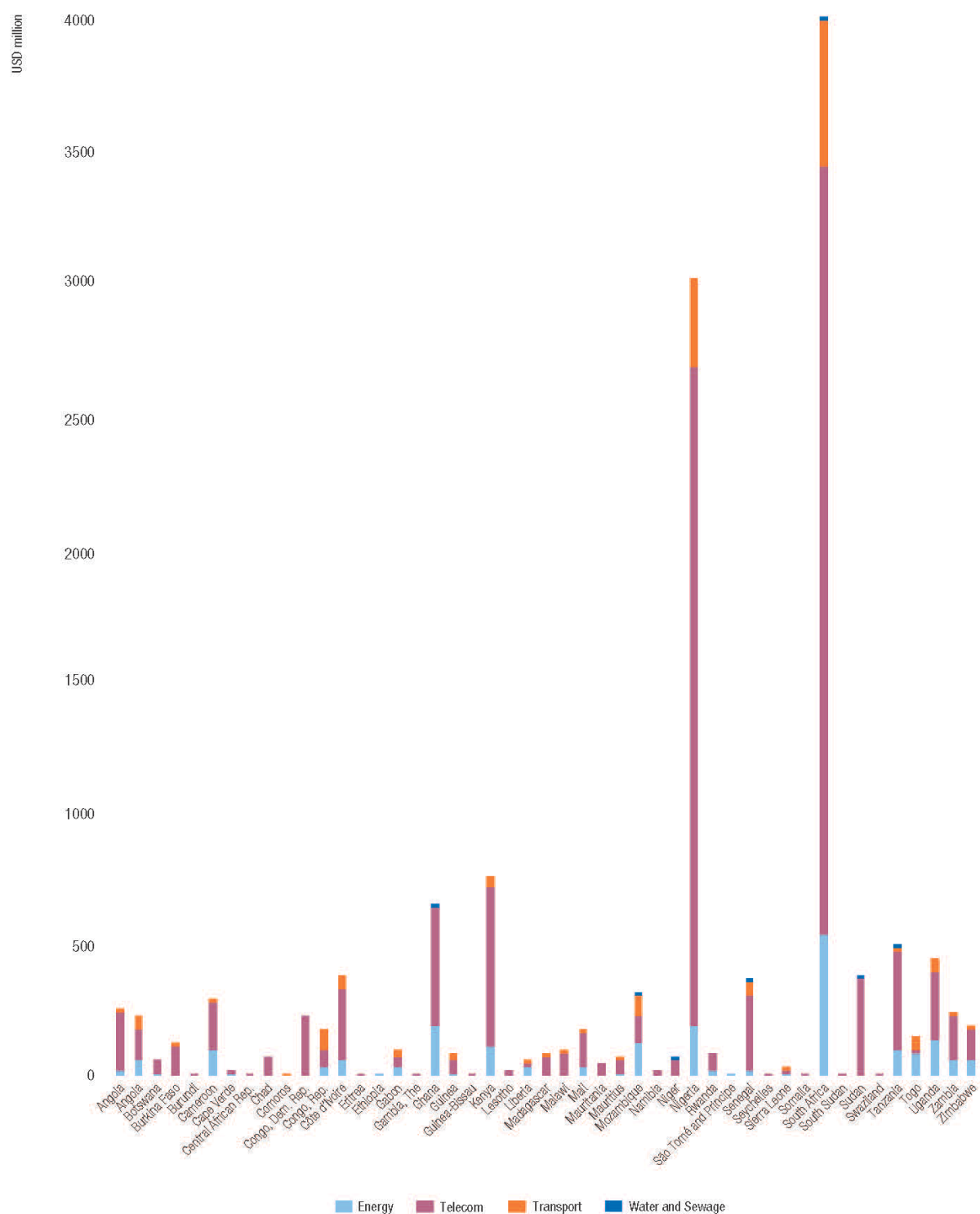
¹⁶ The AEEP Project Database would appear to be an important resource for tracking energy investment in Africa, as it tracks 2,700 generation and transmission projects, is continually updated and it follows the Sustainable Energy for All Global Tracking Framework. However, even though it was commissioned by an EU partnership, the information is not publicly available. The private firm that compiled the information now owns the underlying dataset.

Chart 2: PPI in Africa by sector (US\$ millions)



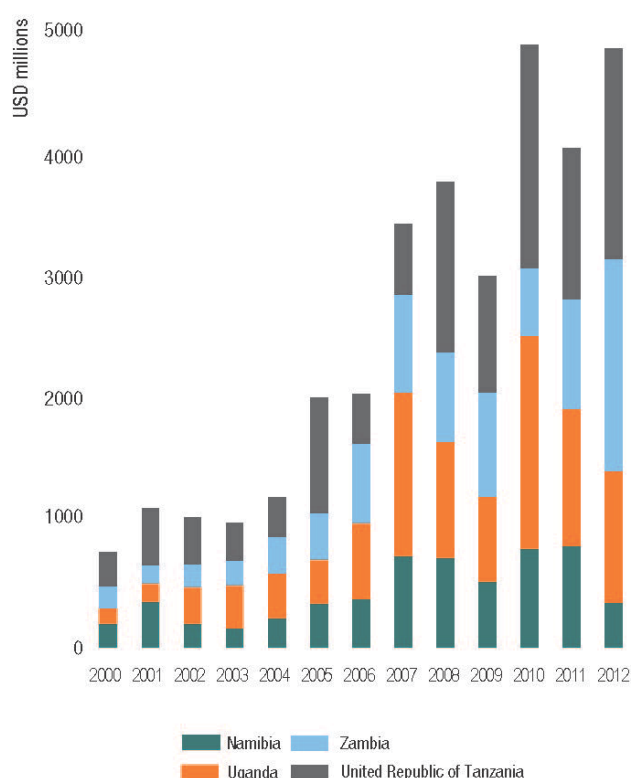
Source: World Bank (2014).

Chart 3: PPI in Africa by country (US\$ millions)



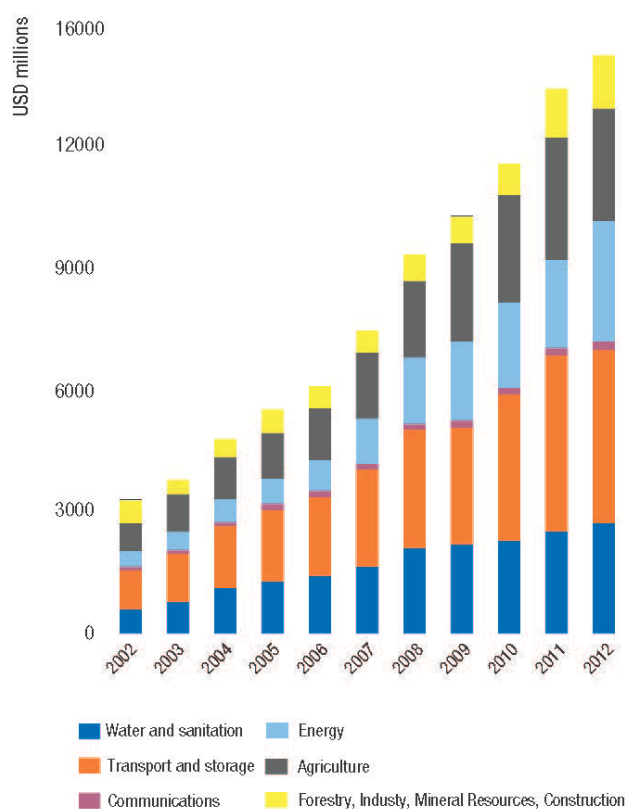
Source: World Bank (2014).

Chart 4: FDI to Namibia, Tanzania, Uganda, and Zambia (US\$ millions)



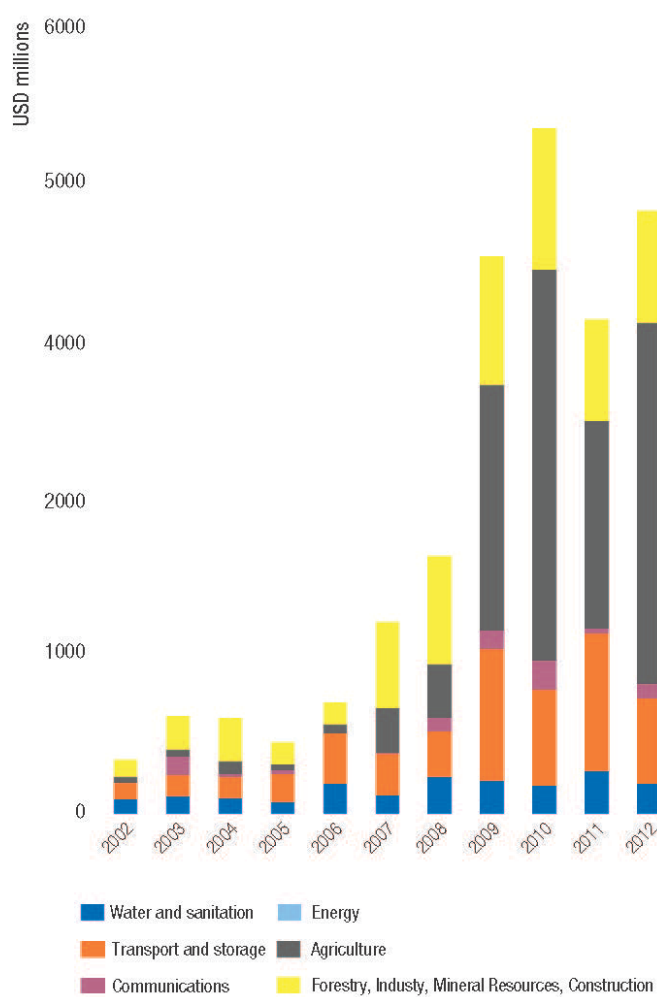
Source: UNCTAD (2014b).

Chart 5: ODA disbursed to Africa by climate-relevant sector (US\$ millions)



Source: OECD (2014a).

Chart 6: OOFs disbursed to Africa by climate-relevant sector (US\$ millions)



Source: OECD (2014a).

3 Methodology (rationale and approach)

3.1 Rationale

As outlined above, there is consensus within the discourse on climate finance on a key role for public finance (and donor funds more specifically) in mobilising private investment in CCD. These perceptions have led to a focus on financial interventions by international actors to support private investment at the project level through the use of instruments such as grants, concessional lending, guarantees and equity investments.¹⁷

However, there has been limited analysis about the broader role the domestic public sector and resources in developing countries play in mobilising private climate finance, particularly in light of parallel findings:

- On the importance of domestic private climate finance;¹⁸
- That North–South finance for CCD is currently dominated by public (not private) investment; and
- That, to enable the private sector to make investments in CCD, it is essential to create a stable and attractive regulatory environment through transparency, longevity and certainty (TLC) (or long, loud and legal signals) (Hamilton, 2009; Kreibiehl and Miltner, 2013).

It is surprising that, in the discourse on climate finance, there is relatively limited recognition of the role the domestic public sector can (and does) play in shaping private investment. Support to private actors is often justified only in the cases of market failures or market distortions, or where markets are incomplete (Pack and Saggi, 2006). However, in the broader discourse on industrial policy,¹⁹ there is a more general acceptance that the public sector has a key role to play in establishing and formalising domestic markets, and that a significant portion of the private sector globally depends in some way on support from the public sector²⁰ (Mazzucato, 2013).

This recognition of the critical role for the domestic public sector in driving investment calls for a more nuanced approach to understanding and allocating climate finance – an approach that would complement current interventions focused at the project level by reshaping incentives that drive investment at the sector or country level. For the purpose of this research, we use the term ‘incentives’ to describe all industrial policies, subsidies, support, aid, assistance, fiscal policy and fiscal instruments.

¹⁷ See Whitley (2013b) for a database of donor interventions, and Green Climate Fund (GCF, 2013) for a useful typology of these financial instruments.

¹⁸ It is unclear if the role of domestic private climate finance in Africa is similar to that found in analysis undertaken at the global level.

¹⁹ Definitions of industrial policy (including activities in sectors beyond those typically associated with ‘industry’): concerted, focused, conscious efforts on the part of government to encourage and promote a specific industry or sector with an array of policy tools (UNCTAD, 1998); any type of selective intervention or government policy that attempts to alter the structure of production toward sectors that are expected to offer better prospects for economic growth than would occur in the absence of such intervention (Pack and Saggi, 2006).

²⁰ Recent data from Bloomberg New Energy Finance show that, in 2012, total investment by state investment banks in renewable energy totalled \$80 billion, compared with a mere \$12.5 billion by the private sector (Mazzucato, 2014).

3.2 Approach

3.2.1 Analysis at sector and sub-sector level

In order to understand the role of public policy and incentives for private climate finance, it first is necessary to understand how public policy and incentives shape investment decisions across entire sectors. This research is to be undertaken using a sector and sub-sector lens, as this is the approach used most often by investors and government departments in categorising their activities and investment, and in tracking spend. This approach to data gathering can be seen as ‘climate agnostic’, as the information on investment and incentives is collected for the entire sector, including but not limiting the review to climate-positive activities (Whitley, 2013a).

The broader analysis of incentives and investment in key sectors for CCD (see Box 1) has two important potential outcomes:

- Lesson learning from other sectors on the effectiveness of incentives in mobilising and shifting investment; and
- Greater understanding of current incentives (i.e. subsidies) that act as *either* an impediment to private investment in CCD (including subsidies to fossil fuels, to key commodities driving deforestation etc.) *or* an enabler.

To assist this analysis, the typology of climate-relevant sectors in Box 1 was developed using the UN’s International Standard Industrial Classification (ISIC)²¹ of economic activities Rev. 4, filtered by using the categories within the Climate Bonds Taxonomy (CBT)²² (Climate Bonds, 2014; UN, 2008). The main contrast with the CBT is that we would propose looking at questions of private investment in adaptation and resilience across all sectors with climate relevance, as opposed to within a separate category or sector of ‘adaptation’.

Box 1: Climate-relevant sectors

- **Agriculture**
- Forestry
- Extractives
- Manufacturing
- **Energy**
- Water and waste
- Construction
- Transportation
- Information and communication technology (ICT)

Source: Whitley (2014).

3.2.2 Frameworks to map incentives and investment

To address the information and methodological gaps outlined above, we have developed three frameworks to be used in collecting information on incentives and investment in climate-relevant sectors. In contrast with the majority of existing research in this space, which has been undertaken using global datasets, this work will complement international data with a review at country level.

Our research aims to answer the following questions for a given country and sector:

- What are the broad public policy aspirations regarding private investment?

²¹ ‘The International Standard Industrial Classification of All Economic Activities (ISIC) is the international reference classification of productive activities. Its main purpose is to provide a set of activity categories that can be utilized for the collection and reporting of (economic and social) statistics according to such activities.’ (United Nations, 2008) The main alternative typologies or classifications to ISIC that could have been referenced are those of investor groups including the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor’s (S&P) and the Industry Classification Benchmark (ICB) by FTSE International.

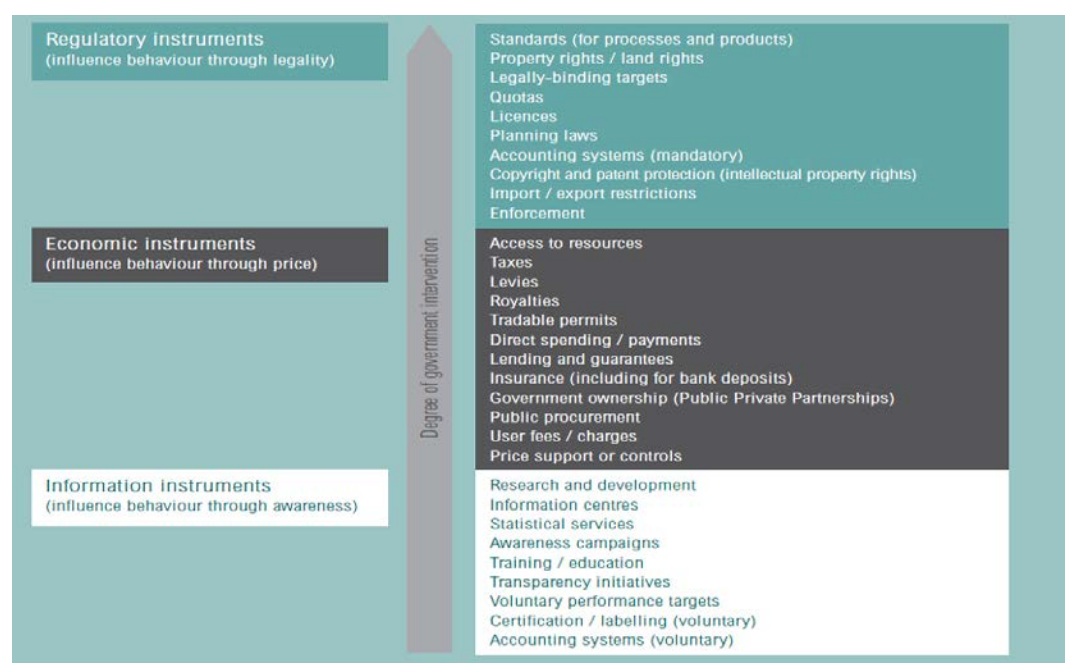
²² The Climate Bonds Initiative tracks climate-themed bonds issuances per year.

- What are the primary incentives (regulatory, economic and information) in place to support private investment (see Framework 1)?
- What are the i) current sources of financial capital and ii) historic investment trends, both public and private (see Frameworks 2 and 3)?
- How can the information from Frameworks 1-3 inform those seeking to use climate finance to mobilise private investment towards CCD?
- What are the remaining data gaps, and how could additional information and data inform domestic and international interventions?

3.3 Framework 1: incentives

For the purposes of this research, we are using a typology developed in Whitley (2013a) for the incentives framework, building on existing categories of subsidies and the industrial policy tools most commonly used to mobilise private finance for CCD. The list of examples within Figure 1 serves as an example and should be expanded and refined through the process of in-country application.

Figure 1: Template for Framework 1 – incentives (industrial policy tools)²³



Source: Whitley (2013a).

3.4 Framework 2: sources of capital

For the sources of capital framework, we built on the typology of instruments developed in a report for the Green Climate Fund (GCF, 2013), which already included grants, concessional lending (debt), equity instruments and guarantees and added insurance.

These instruments were then sub-divided in terms of the source of capital, be it public or private, domestic or international. While these categories are not always clear-cut, for example where companies listed on stock exchanges are majority publicly owned or where finance flows through a range of intermediaries, we used information on corporate or institutional headquarters to determine location (domestic vs. international) and on ownership structure to determine type (public vs. private) for each source of capital included in Figure 2. Building on lessons from exercises in tracking private climate

²³ This preliminary typology is to be refined as part of methodology development.

finance (Illman et al., 2014; Whitley, 2013b), references are included for each project and company included in the completed framework, so the underlying information is transparent.

As outlined in the GCF report, each instrument can be applied through a number of modalities (such as credit lines, performance-based payments, public–private partnerships (PPPs) and advanced market commitments). As these are applied in a given country or sector, they are explained in greater detail in the text accompanying the framework.

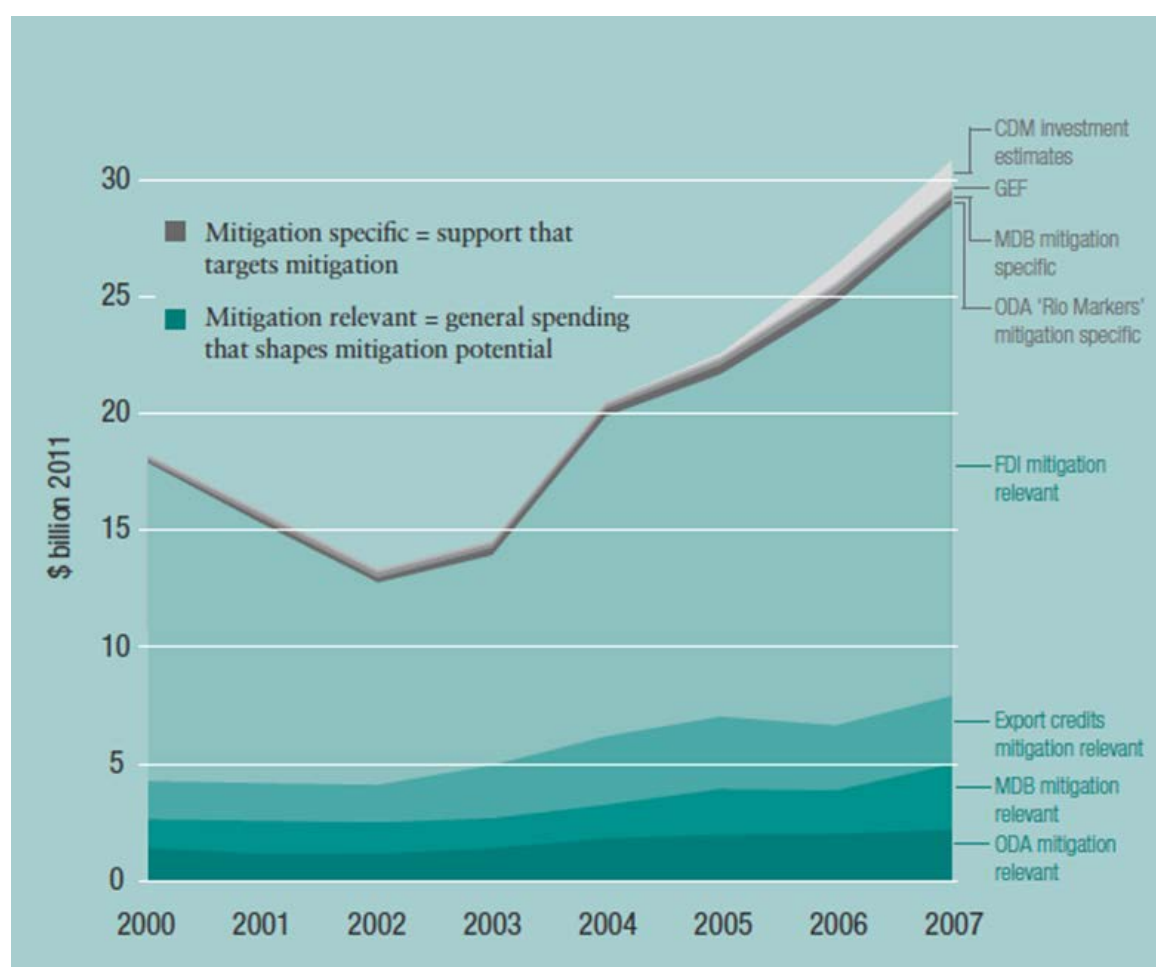
Figure 2: Template for Framework 2 – sources of capital

		Established private finance	Emerging private finance	Limited private finance
Sector / source of capital		Sub-sector A, B, C	Sub-sector C, D, E	Sub-sector F, G, H
Grants (including philanthropy and CSR)	Public			
	Private*			
Debt (OTC, market traded, microfinance, etc.)	Public			
	Private*			
Equity (listed and unlisted, including balance sheet finance)	Public			
	Private*			
Guarantee (including loan insurance)	Public			
Insurance (including export credit insurance)	Private*			

3.5 Framework 3: scale of support

For the scale of support framework, we referenced analysis completed in 2009 by the OECD, which tracked climate-specific (climate-positive) and climate-relevant investment at the global level over time (Figure 3:). The aim in our analysis would be to track shifts in investment over time at the sub-sector levels and, if possible, also by source (international, domestic, public and private). We anticipate some of the information required could be found within the different international datasets referenced by the OECD in Figure 3, and could be used to complement national-level data.

Figure 3: Template for Framework 3 – scale of support



Source: Corfee-Morlot et al. (2009).

The three frameworks are to be completed at sector (and sub-sector level) based on the review of relevant international and domestic data sources and information, and, where possible, interviews with key stakeholders in government, the private sector and civil society. This work should benefit a wider group of stakeholders seeking to mobilise private climate finance, including those within government and the private sector. Where information is available, the parallel aim of this approach is to provide a baseline of information that might allow for assessing the effectiveness of existing public support (both domestic and international) and private investment in CCD.

The balance of this report outlines the findings from the application of this methodology to the energy sector in Uganda²⁴ and the agriculture sector in Zambia.²⁵ In order to understand the replicability of these findings, and scalability for other countries in Africa, we compare these findings through a less in-depth review of the same sectors in Namibia and Tanzania, respectively.

²⁴ Support to projects and programmes in the energy sector made up 60% of average annual Fast Start Finance to Uganda in between 2010 and 2012. (see Figure 13)

²⁵ Support to projects and programmes in the agriculture sector made up 48% of average annual Fast Start Finance to Zambia in between 2010 and 2012. (see Figure 27)

4 Findings: Uganda's energy sector²⁶

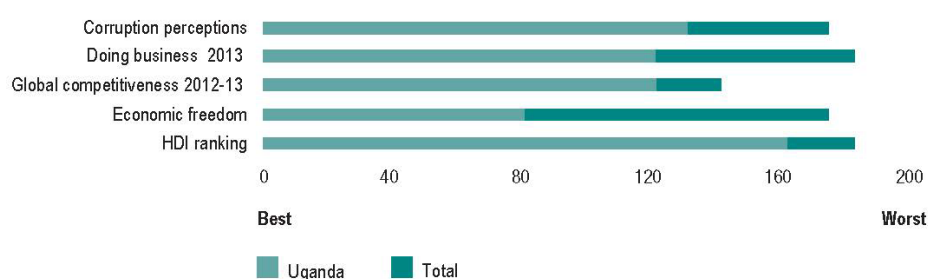
4.1 Uganda context

4.1.1 Investment climate

In spite of recent growth, Uganda remains one of the poorest countries in the world (in terms of gross domestic product (GDP) on a per capita basis) and has one of the world's lowest Human Development Index (HDI) Rankings (Figure 4:). According to the OECD, major financing is needed for Uganda to reach and sustain high rates of growth for human development. Addressing the current financing constraints requires the Government of Uganda (GoU) to harness a combination of tax revenue, FDI, ODA and remittances (see Section 6 for historic sources of finance). In addition, the GoU must also have the ability to address major constraints to growth, particularly in relation to access to affordable and reliable energy resources (OECD, 2013).

Another binding constraint on economic growth and poverty reduction in Uganda is corruption, which hinders the efficacy of public policy and deters investment (EIU, 2012). This is reflected in Figure 4:, which shows the country's poor rankings in terms of indices on Corruption Perceptions, Global Competitiveness and Doing Business. The World Bank's Doing Business ranking details also highlight the negative impact of low levels of access to electricity, protection for investors and infrastructure for cross-border trade.

Figure 4: Uganda's ranking on key global indices



Source: KPMG (2013a).

Figure 5: Key features of Uganda's economy

Infrastructure	Diversity of Economy	Banking Sector	GDP Growth	Socio-Economic Development
Improving, but severe deficit	Limited, but improving	Fair, and improving	Modest	Low
Stock Market	Capital Market	Listed Companies	Dominant Sector	Foreign investment
Yes	Yes	17	Banking	Strong and rising

Source: KPMG (2013a).

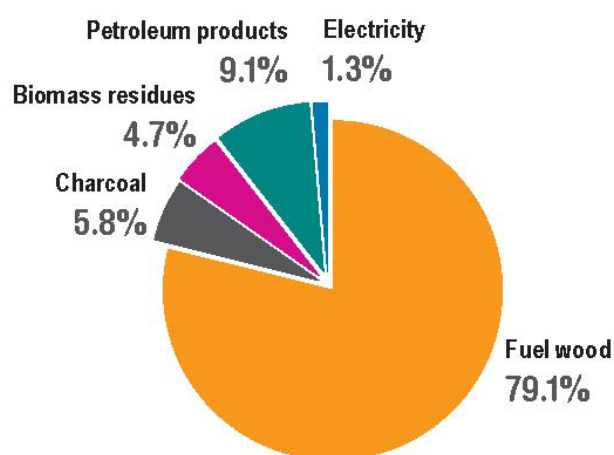
²⁶ For more detailed information on incentives and investment in Uganda's energy sector see (Whitley and Tumushabe, 2014).

With total assets of \$4.23 billion as of June 2012, Uganda's financial sector is still small by global standards. A financial inclusion survey conducted in 2009 revealed that only 29% of Uganda's population had access to formal financial services (UNCDF, 2013). Also, the Bank of Uganda began raising interest rates in mid-2012, leading commercial lending rates to soar as high as 34%, and resulting in more loan defaults and business closures, and slower investment and growth (US Department of State, 2013a).

4.1.2 Energy mix

Although Uganda has significantly reformed the electricity sector (see Section 4.1.3), access and coverage remain low by international and even regional standards. An estimated 85-90% of the country's population has no access to electricity (Sustainable Energy for ALL, 2012). Over 90% of Uganda's people live in rural areas, depending mainly on biomass (fuel wood and charcoal) for energy (Figure 6:). By way of comparison, in 2010 17% of the world's population (1.3 billion people) lacked access to electricity, and 2.6 billion did not have access to clean cooking facilities (OECD, 2014).

Figure 6: Uganda's energy mix, 2011

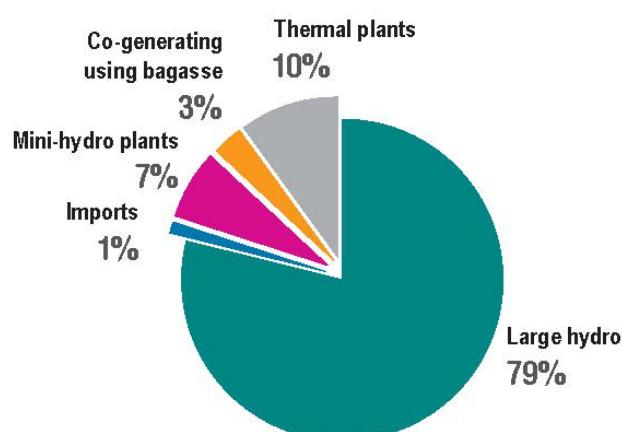


Source: Ndawula (2014).

The bulk of electricity in Uganda is used for industrial activities (production of building and construction materials and consumer goods), with 30% for residential activities and just over 10% for commercial activities. Current installed capacity is 870 MW, coming from hydropower (80%),²⁷ thermal power (10%) and cogeneration from biomass (7%), with projects developed by both public and private actors (see Figure 9 and Section 5).

²⁷ The country's installed generation capacity is over 800 MW, but actual generation capacity fluctuates at around 558 MW. Hydro installations in Uganda have continuously produced less power than initial projected capacity. For instance, Owen Falls produces 74 MW instead of the planned 180 MW and the Kiira Dam produces 50 MW instead of the planned 200 MW (Taremwya, 2013).

Figure 7: Uganda's electricity generation mix, 2012



Source: Ndawula (2014).

Electricity supply is distributed unequally across the country, and what there is has been restricted mainly to urban and semi-urban areas, with rural electrification standing at less than 5% (Tumwesigye et al., 2011).

According to the latest Uganda Household Survey (2009/10) (UNCDF, 2013):

- 95% of Ugandan households still use wood and charcoal as a main source of energy for cooking, with rural families mostly depending on firewood and about 70% of urban families burning charcoal. Urban and rural poor households mostly depend on wick candles and kerosene lanterns for light.
- Poor households in urban areas spend one quarter of their income on energy per month, while those in rural areas spend a little less, at 21%. Most of their energy budget goes toward fuels such as paraffin, firewood and charcoal.

This is similar to the status of energy access in many parts of Africa, where the development of modern services for lighting and cooking has been alarmingly slow in recent years. The 2012 AEEP Status Report emphasises that projects designed to produce large amounts of power often fail because they rely on inadequate infrastructure for electricity distribution, and that domestic planners often lack an effective way to measure the extent and reach of electricity grids (EUEI PDF, 2012).

4.1.3 Policies and institutions

In 1999, Uganda embarked on an extensive power sector reform programme, unprecedented on the African continent (Kapika and Eberhard, 2013). The goals of the reforms were to reduce the burden of subsidies; improve the quality of service; improve collection rates; reduce network losses (from levels of 40%); and attract private capital in generation and distribution networks (Ndawula, 2014).

As a result of the reforms, the state-owned Uganda Electricity Board was unbundled into different private business entities for generation, transmission and distribution through Uganda Electricity Generation Company Ltd, Uganda Electricity Transmission Company Ltd and Uganda Electricity Distribution Company Ltd, respectively (MEMD, 2002). An independent regulator, the Electricity Regulatory Authority (ERA), was established, together with the Electricity Disputes Tribunal and the Rural Electrification Fund (Kapika and Eberhard, 2013). The Electricity Act also created a basis for the private sector to participate in electricity generation and distribution. In addition, the GoU also established the Rural Electrification Agency (REA) to promote grid and off-grid private sector-led rural electrification (Tumwesigye et al., 2011).

4.1.4 Demand for electricity investment

Uncertain power supply remains one of the largest obstacles to broader investment in Uganda. Consistent and unpredictable load shedding (rolling blackouts) as a result of insufficient power generation causes major disruptions to households, businesses and industry (Kreibiehl and Miltner, 2013). This is the result, in part, of underinvestment in energy infrastructure and the fact that the GoU has traditionally focused its limited resources on the development of large hydropower schemes (which can take many years to commission), while neglecting the country's extensive small-scale hydro and biomass energy resources for power production (Sustainable Energy for ALL, 2012). In addition, increased droughts and more erratic rainfall in recent years have made hydropower production less consistent.

Demand-growth scenarios show a significant power supply shortage from 2015 onwards because of an average annual increase in demand from industrial and domestic consumers of 7-9% per year (Kreibiehl and Miltner, 2013; Sustainable Energy for ALL, 2012) (Figure 8:). It is predicted that heavy fuel oil plants may need to be brought back online to fill this gap, particularly if large industrial projects are taken forward (including a new steel plant), and if there are delays in the commissioning of planned large hydro projects.

Figure 8: Uganda's forecast generation capacity vs. peak demand



Source: Rieger (2013).

Projects in the construction and planning stage include a number of larger (>300 MW) hydropower plants, thermal plants²⁸ (as part of refinery) and various mini hydropower plants, as well as projects related to solar and solar thermal, geothermal, peat and co-generation from biomass (NPA, 2010). These add up to 1,400 MW of additional capacity (see Figure 10), or only 50% of the generation mix envisioned in the National Development Plan (NDP). This also does not take into account that hydropower installations, which make up the majority of planned projects in Uganda, do not have a track record of generating at full capacity in the country.

A power sector investment plan shows that \$95.2 billion will be required from 2010 to 2030, to achieve the NDP target, most of which will be in the area of generation. This, however, assumes fairly high per capita electricity consumption that, if optimised with energy efficiency measures, could result in a much lower investment requirement to achieve the same target. While most of Uganda's energy consumption

²⁸ Large-scale Ugandan on-shore oil deposits were announced in 2006 and subsequently proven by the drilling of numerous successful test wells. Current reserves are estimated to have the potential to generate over \$2 billion in annual revenue for more than 20 years. Oil production is forecast to begin in 2016; in parallel, the GoU is planning to construct an oil distribution network, an oil refinery and potentially an additional thermal power plant (EIU, 2012).

is in fuel wood and charcoal for cooking, and not electricity, a parallel cooking fuel strategy (or investment plan) is yet to be developed (Sustainable Energy for ALL, 2012).

4.2 Framework 1: incentives (industrial policy tools)

Framework 1 was completed to highlight the key regulatory, economic and information instruments in Uganda's energy sector. These instruments were mapped to understand the incentives available in Uganda, and to show whether they are provided across the energy sector, or are targeted at specific sub-sectors.

Additional detail on economic instruments can be found in Section 4.3 below. It was possible to complete the framework on the basis of interviews with key stakeholders in Uganda and a review of publicly available government documents (Whitley and Tumushabe, 2014).

4.2.1 Key themes emerging from Framework 1: incentives

Regulatory instruments

- The deregulation of Uganda's electricity sector has enabled the streamlining of a number of processes and increased transparency of documentation (PPAs and IAs: power purchase and investment agreements), and other key information for investors. The ERA is seen as particularly efficient.
- Parallel formalisation and streamlining of institutions and regulations in the biomass sub-sector (which accounts for over 85% of Uganda's energy use) has not yet been undertaken, limiting investment in the sub-sector (see Section 5).
- In spite of (or perhaps because of) increased transparency, significant bureaucracy remains across the energy sector, with the president making decisions that bypass ministerial- and department-level systems. This may create additional uncertainty for private investors.
- Remaining barriers that could be addressed through regulatory instruments include enforcing land and intellectual property rights and developing and enforcing product standards.

Economic instruments (see also 3.3)

- Uganda still provides significant support to thermal and large hydropower producers in the form of capacity payments²⁹ (to ensure security of supply even when these facilities are not operating), and has focused the majority of its own investment on these sub-sectors. These might be eliminated over the longer term once additional generation comes online.
- Although the government has instituted renewable energy feed-in tariffs (RE FiTs), these were ineffective at driving investment until supplemented with a donor grant-supported top-up (Kreibiehl and Miltner, 2013). This intervention is predicted to increase investment in small-hydro projects and biomass/bagasse co-generation in the short term and on-grid solar photovoltaics (PVs) in the medium term.
- Significant gaps remain in support to small, mini-grid and off-grid renewable energy technologies and projects (including hydro, biomass, biogas and solar). These have yet to be rectified through the establishment of the Rural Electrification Fund, the Uganda Energy Credit Capitalisation Company (UECCC) and direct solar subsidies.
- There is virtually no support for efficient biomass technologies for cooking through economic instruments.

Information instruments

- Although there has been some improvement in the provision of information for investors in the energy sector through the Uganda Investment Authority (UIA), in the development of energy resource datasets and in the facilitation of project pipelines, there are significant opportunities for additional support, particularly through the development of sector and sub-sector industry associations.

²⁹ A payment received in exchange for making electrical capacity available.

Figure 9: Framework 1 – industrial policy tools (Uganda, energy sector)

Regulatory	<ul style="list-style-type: none"> • UECTL: PPA and IA • Presidential decisions to fast track projects in terms of procurement and tendering (large hydro) • Electricity Act – established: <ul style="list-style-type: none"> - ERA with responsibility and guidelines for permitting and licensing (through fair open and competitive processes for transmission sale and distribution) and tariff setting (Kapika and Eberhard, 2013) - Rural Electrification Fund - Potential licence exemptions for small-scale (<2 MW) rural electrification - Cost-reflective tariff guidelines • Land Act codified land tenure system • Uganda investment incentives codified in Tax Act (include investment capital allowances, duty and tax free import of plant and machinery,³⁰ first arrival privileges and export promotion incentives and facilities) • VAT eliminated on imports of solar energy components
Economic	<ul style="list-style-type: none"> • Subsidies from Energy Fund and Rural Electrification Fund³¹ <ul style="list-style-type: none"> - Capacity payments for thermal power - Large hydro projects (Karuma Dam) - Grid connection for small renewable projects (hydro and bagasse co-generation) - PV Targeted Market Approach - Support for interconnectors • RE FiT • Global Energy Transfer Feed-in Tariff (GET FiT) • Geothermal Risk Mitigation Facility for Eastern Africa African Union Commission, the German Federal Ministry for Economic Cooperation and Development and the EU–Africa Infrastructure Trust Fund • UECCC – loan guarantees • Guarantee of payment (Umeme) • See cost -effective tariffs (more detail ERA) (changed three years ago) • Domestic and international, private and public provision of grants, debt, equity, insurance and guarantees (see Framework 2) • Policy risk guarantees (World Bank support) • CDM and Voluntary Carbon (including via the Carbon Initiative for Development – German Development Bank (KfW) and World Bank)
Information	<ul style="list-style-type: none"> • UECCC • UIA • Uganda Renewable Energy Association • REA Department for Off-Grid Renewable Energy • Digitalising land registry (World Bank support) • Ministry of Energy and Mineral Development (MEMD) developing packaged sites for small hydro to tender (10 in pre-feasibility and 4 at feasibility study stage) • MEMD establishing a geothermal resources department (Japan International Cooperation Agency (JICA) support) • Government visions, policies and plans, and background to budget statements • Climate Technology Initiative's Private Financing Advisory Network • Support to skills and training (public universities): <ul style="list-style-type: none"> - Makerere University – Master of Science in Renewable Energy, Department of Civil and Environmental Engineering, and Renewable Energy Incubator - Kyambogo University – Faculty of Engineering

³⁰ The GoU is now publishing tax expenditure information on the website of the Ministry of Finance. Information reviewed for Q1 and Q2 of 2013/14 showed the majority of tax expenditures (tax breaks and exemptions) in the materials and textiles sectors.

³¹ Capacity price payments (thermal) fell from UGX 482 billion in FY2011/12 to UGX 75 billion in FY2012/13. The GoU committed these saved funds to the Karuma Dam construction, interconnection and compensation targets (MoFPED, 2012). This represented 97% of the overall energy budget in 2012/13 (Sustainable Energy for ALL, 2012).

4.3 Framework 2: sources of capital

Framework 2 was completed to understand the different sources of capital available for the energy sub-sectors in Uganda, and where there may be gaps that could be filled by the GoU, donors and/or private investors. This framework was completed on the basis of interviews and desk-based research, including both formal datasets (government and international) and informal data, such as from local media. Sub-sectors are categorised in the section and figures below to show where private finance is ‘established’, ‘emerging’ or ‘limited’: a qualitative judgement based on the scale and depth of private investment. The sources of capital are also categorised as ‘international’ or ‘domestic’. Additional details on the value of transactions and investment and sub-sector contributions to Uganda’s energy mix can be found in Figure 10:

4.3.1 Key themes emerging from Framework 2: sources of capital

The following are key messages identified from Framework 2 based on data summarised in Figure 10: and Figure 11: below.

- The types of private actors providing capital are distinct for each sub-sector.
 - Large hydro and thermal (fuel oil) power plants – large international banks and companies
 - Small hydro – smaller national banks and companies (mostly non-Ugandan), and private equity funds³²
 - Biomass power – large Ugandan companies (sugar sector)
 - Charcoal (green) – international companies, non-governmental organisations (NGOs) and foundations
 - Solar – small international companies and foundations
 - Biogas – small Ugandan companies
- Domestic private debt is limited to where domestic private sector equity is provided in the form of corporate finance or company balance sheets for bagasse power and thermal (fuel oil) power plants. Microfinance is also being provided to the solar sub-sector by local financial institutions.
- The GoU is providing capital to projects and companies in only a restricted number of sub-sectors in the energy sector. These include large hydro at significant scale, and small hydro, solar and green charcoal at a very limited scale, with the biomass power and biogas sub-sectors not benefiting from domestic public grants, debt, equity or guarantees.
- Public international finance is divided primarily between the provision of loans by multilateral and bilateral financial institutions in sub-sectors with ‘established’ private investment and development agencies providing grants in sub-sectors with ‘emerging’ or ‘limited’ private investment (biogas, solar, biomass for cooking and geothermal).
- In parallel with the gaps in domestic government support, there are significant opportunities for donors to scale up support to sub-sectors with ‘emerging’ or ‘limited’ private investment, particularly where technologies and project benefit poor and rural populations. This includes significant additional support to mini-grid and distributed solar, wind and small hydro systems, formalising the biomass-for-cooking sub-sector and scaling up biogas installations. These efforts should be financed in collaboration with national and local government agencies and departments, and local financial institutions.
- The use of public grants at sub-sector level (as opposed to project level) has been limited to GET FiT, with potential for similar sub-sector-level interventions to be undertaken to scale up private investment in biomass and biogas. Such support could replace investment lost to biomass energy as the result of the collapse of the carbon markets.

³² ODI research on private climate finance support has found that a number of these funds are capitalised significantly with public resources. See Whitley (2013b).

Figure 10: Framework 2 – sources of capital (Uganda, energy sector) (see Appendix 2)

		ESTABLISHED				EMERGING		LIMITED	
Sub-sector / sources of capital		Hydro (large)	Hydro (small)	Thermal (heavy fuel oil)	Biomass (thermal)	Solar	Charcoal	Biogas	Geothermal
Grants (including philanthropy and CSR)	Public		International (Norway, GET FiT)	International (Norway)	International (GET FiT)	Domestic (MEMD) International ⁱ	Domestic (MEMD and MWE) International ⁱⁱ	International (DGIS and African Union, KfW, WB, Norway)	International (EU AITF, ICEAID, African Union Commission, BMU and KfW - GRMF)
	Private*		International (UK)			International (US)	International (US - Harvest Fuel Initiative)		
Debt (OTC, market traded, microfinance etc.)	Public	International ⁱⁱⁱ	International ^{iv}	International (WB)	International (WB)				
	Private*	International (UK and South Africa)	International (UK, South Africa, Sri Lanka)	Domestic International (Norway)	Domestic	Domestic International (US-microfinance)			
Equity (listed and unlisted, including balance sheet finance)	Public	Domestic (Energy Fund)	Domestic (REA) International (Norfund, IFC, KfW)						
	Private*	International (Kenya and US)	Domestic International (Norway, British Virgin Islands, India)	Domestic International (Norway and UK)	Domestic	International (Netherlands, Australia)	Domestic International (Norway)	Domestic (pilot stage)	
Guarantees (including loan insurance)	Public	International (WB)		International (Norway)		International (USAID)	International (USAID via GVEP)		
	Private*						International (foundations)		

* NGOs and charities included in 'Private'

** Wind power and Insurance not included as no information on this sub-sector and instrument were identified in the research on sources of capital.

ⁱ WB, EIB, EC, ADC and UNDP, GET FiT; ⁱⁱ DANIDA, EU and DGIS, USADF, NDF, GEF, FAO, UNDP, UNCDF and BIO);

ⁱⁱⁱ IFC, AfDB, EIB, KfW, FMO and Chinese Ex Im Bank ^{iv} PTA Bank, AfDB, PIDG, FMO, DBSA, DEG, KfW, OeEB, IFC, and Finnfund

Figure 11: Projects and companies included in Framework 2³³

	Hydro (large)	Thermal	Hydro (small)	Biomass / biodiesel	Charcoal	Solar	Biogas	Geothermal
Contribution to electricity generation mix in 2012 (%)*	79	10	7	3	n/a	0	n/a	0
Installed capacity in 2012 (MW)	630	150	54	36.5	0.6 tonnes of oil equivalent or ~800k tonnes per year	4	5,000 units	0
Additional capacity installed or contracted in 2014 (MW)	1,388	0	25	55.5	not available	0	12,000 units (target)	150 (under PPA)
Direct support (government budget / price support) - see also Framework 1 (Economic Instruments)	Capacity charge / payment on 250 MW (running at 130 or 140) (Bujagali), and CDM revenue (Bujagali)	Capacity charge to thermal power producers	Carbon revenue (CDM and VCS)		Carbon revenue (CDM)	Direct subsidy from govt to solar companies (for home, institutional and commercial systems)		
Average scale of investment / support (where available) (USD)	0.5 - 2 billion	60-70 million	10 - 50 million	1-60 million	Firewood / charcoal consumption value 122 million / 39 million (10-100 thousand - grants)	0.07-2.5 million	Total potential market value 100-200 million at 200k units (current = 5k)	UECTL PPA for 1.2 - 2.1 billion project (unclear if reached financial close)

Projects and companies included in analysis:

Hydro (large): Kiira (Eskom), Nalubaale / Owen Falls (Eskom) and Bujagali (PPP). Contracted: Ayago, Karuma, and Isimba
Thermal: Tororo (Electro-maxx), Namanve (Jacobsen) and Mutundwe (Aggreko)
Hydro (small): Buseruka (HydroMax), Mpanga (SAEMS), Bugoye (Tronder), Ishasha / Kanungu (Eco-Power), Mubuku I (Kilembe Mines), Mubuku III (Kasese Cobalt), Hospitals (0.24MW), Nyagak (WENREco), Nyamwamba (SAEMS)
Biomass / biodiesel: Charcoal: Hima Cement (Lafarge), Kinyara Sugar, Kakira Sugar (Madhvani)
Charcoal: Eco Fuel Africa, Green Bio Energy, Green Resources, KJS, TEWDI, Nakabale Integrated Group
Solar: Solar Now (Dutch), FINCA (US), Solar Sister, Barefoot Power (Aus)
Geothermal: Katwe (unclear if reached financial close)

* Imports = 1%

³³ At least seven CDM projects are registered in Uganda (four hydro, one biogas, one landfill gas, one West Nile Electrification), although it is difficult to determine the levels of support this provides to projects and companies, given fluctuating carbon prices (and potential delays in implementing or commissioning underlying projects). There are also nine voluntary carbon projects, seven cook stove projects and one biogas project under the Gold Standard, and one small hydro project under the Voluntary Carbon Standard.

4.4 Framework 3: scale of support

The goal of completing Framework 3 was to understand the trends in investment across sub-sectors of the energy sector. It was anticipated that this information would be available within the different international datasets referenced by the OECD in Figure 3. Unfortunately, it was not possible to complete a framework that would show investment trends over time, as a result of significant gaps in international and national datasets, in terms of both year and sub-sector coverage. Although beyond the resources available for this analysis, the data collected in Framework 2 could be gathered and harmonized over multiple years, which over the longer term could provide a basis for completing a framework in keeping with Figure 3.

In addition, it was not possible to identify levels of private investment in the energy sector beyond FDI, none of the publicly available national or international datasets covered as domestic investment.³⁴ It was also impossible to find sub-sector information for FDI, with the lowest level of classification in Bank of Uganda statistics being ‘electricity and gas’.

It was possible, however, to find sub-sector information for public support and investment to Uganda’s energy sector in the form of national budget expenditure, ODA, OOFs and FSF (across a number of different years). This allows us to observe some interesting trends in the relative scale of support and investment from these different public sources, and different emphases in terms of sub-sector support and investment.

4.4.1 Key themes emerging from Framework 3: scale of support

The following are key themes identified regarding investment flows in Uganda’s energy sector, based on the data summarised in Figure 12: below.

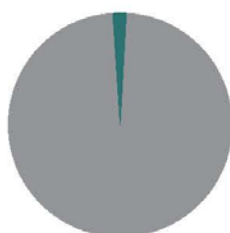
- Perhaps reflecting the deregulation of the country’s electricity sector, the highest levels of investment and support in Uganda’s energy sector come from average annual FDI, which is significantly higher than national budget and ODA support to the sector. Energy also makes up a significant portion of overall FDI, but this is likely to include support to the oil and gas sector (which we would include under extractives).
- All data sets track sub-sectors differently, but there are similarities in patterns of support and investment by public actors that focus on transmission and distribution and hydropower generation through OOFs, ODA and FSF.
- As indicated in Sections 4 and 5, there is limited support from public sources of capital for biomass (for cooking and thermal power), biogas, solar and geothermal power, all of which show significant potential for climate-compatible development in Uganda.
- The coding of national budget by cost centres makes it difficult to determine the primary sub-sectors receiving support, but the primary focus on the World Bank-supported Energy for Rural Transformation programme indicates that the majority of national budget support is also for grid expansion, interconnections and refurbishment (see Section 4).
- The national budget and ODA (for now) appear to provide the greatest potential for investment in and support to the energy sector, and climate-compatible sub-sectors and companies, although it is anticipated that we would also see significant potential from domestic private sources of capital, were the information available.

³⁴ With support from the UK Department for International Development (DFID), Bloomberg New Energy Finance (BNEF) will be publishing Climatescope data for Uganda. This will cover private investment for some of the sub-sectors and sources of capital in this report. However, it will not be possible to identify the different types of capital provided by sub-sector as in Framework 2. See BNEF (2013) for data and the methodology for the review of investment in countries in Latin America.

Figure 12: Framework 3 – scale of support (Uganda, energy sector)

Uganda's sources of finance
(\$ Million - average annual)

National budget
2,302



Energy sector
2%

Energy subsectors

95%	Energy for Rural Transformation II
3%	Petroleum Exploration Promotion
<1%	Petroleum Exploration Production Department
<1%	Headquarters
<1%	Energy Resources Department
<1%	Petroleum Supply Department
<1%	Geological Survey and Mines Department
<1%	Energy Fund
<1%	Operations

ODA
1,679



Energy sector
5%

Energy subsectors

51%	Hydro-electric power plants	<1%	Solar energy
25%	Electrical transmission/distribution	<1%	Biomass
10%	Energy policy and admin. management	<1%	Energy education/training
7%	Headquarters	<1%	Energy research
4%	Power generation/renewable sources	<1%	Nuclear power plants
3%	Power generat./non-renewable sources	<1%	Wind power

FDI
623



Energy sector
31%

Energy subsectors

No information available

00F
89



Energy sector
18%

Energy subsectors

64%	Electrical transmission/distribution
36%	Power generation/renewable sources

FSF
35



Energy sector
38 %

Energy subsectors

93%	Electrical transmission/distribution
6%	Power generation/renewable sources
1%	Energy policy and admin. management
<1%	Biomass

4.5 Considerations: mobilising private climate finance (in Uganda's energy sector)

By linking the key findings across the three frameworks, we are able to identify some important considerations for the deployment in Uganda's energy sector of climate finance that aims to mobilise private investment.

- Despite numerous climate finance programmes (or similar interventions) and Uganda's urgent needs for electrification, there are still significant gaps in support for small-scale energy generation and for access to efficient biomass technologies. These have yet to benefit from private investment at scale, in spite of early investment as the result of carbon finance.
- The historic focus of the GoU and its development partners on grid extension, the development of large hydro projects and back-up thermal power has resulted in a lack of instruments oriented towards private financing of technologies for cooking, and off-grid or mini-grid solutions that would have an impact the greatest (and poorest) proportion of the Ugandan population. Government resources, such as the Energy Fund and the Petroleum Fund, could be applied to energy sector investment more broadly.
- Focusing on smaller-scale projects will not only fill a gap left by the GoU and development partners but also address the investment gap identified by a number of small-scale project developers that has resulted from the sharp decline in carbon prices in recent years. Such a focus would also support areas where the private sector is less inclined to invest because of the common barriers of high transactions costs in proportion to overall deal size.
- There are opportunities to scale up technologies and approaches to finance small and distributed energy that have, to date; only been piloted or supported using limited resources. These approaches could attract significant private investment with additional resources from climate finance and through the replication of approaches that have been used with success in other countries.
- The GoU and its development partners need to design financial instruments that suit the current environment, as most local companies are start-ups without significant cash flows. The majority of current support instruments can only be accessed by foreign entities (as shown in the small solar and small hydro sub-sectors). To change this requires recognition that different private actors and sources of capital are important for different sub-sectors and scales of investment, and that government and donor support must take into account the structure of the local capital markets.
- This research also highlights the importance of partnership with local financial institutions for the development of smaller-scale energy projects and programmes. This is an approach that has been undertaken through the use of climate finance at scale in a number of middle-income countries (EUEI PDF, 2014; Whitley, 2013b), and could begin to be replicated in certain sub-sectors in Uganda. This approach would also support access to local and diaspora resources resulting from increased savings across Africa, and to local currency financing.
- The GoU has attracted private investment in electricity generation assets through unbundling and privatisation of elements of the electricity sector, establishment of a transparent and effective ERA, RE FiTs (topped up through GET FiT) and template PPAs and IAs. There are opportunities to replicate these approaches in other countries (with similar objectives) with donor support through the innovative use of grants to top up RE FiTs (Kreibiehl and Miltner, 2013).
- There is a critical role for information provision by government and development partners, and information sharing by private actors, which can be scaled up through support to early-stage government programmes to share information on the country's renewable energy resources. This is exemplified in the MEMD's exploration and development of bundled hydro and geothermal sites, and in the potential to establish industry associations for clean energy, including biogas and biomass businesses.
- Information on energy sector investment can also be scaled up and harmonised through support to the current holders of these data, which include not only government ministries but also often

the press and non-profit organisations. This would include support for the REA to track investment in off-grid projects and formalisation of the biomass cooking sector.

4.6 Replicability and scalability of findings (Namibia case)

Based on a high level review of Namibia's energy sector in terms of energy mix, current investment, investment targets, policies and institutions, we were able to analyse some key areas where some of the findings and considerations for private climate finance in Uganda might apply equally to Namibia. This brief review also builds on findings from a parallel case study on understanding climate finance readiness needs in Namibia (van Rooij et. al., 2013).

These similarities between Uganda and Namibia's energy sectors include the following:

- Namibia has a historic lack of investment in domestic generation, with significant domestic capacity provided by a single hydroelectric power plant, Ruacana (332 MW, 31%). As with Uganda, the balance of power has also historically provided through fossil fuels, though in the case of Namibia this is a coal-fired power plant, with diesel-fuelled power stations for backup (KAS, 2012). As with Uganda, Namibia has subsidised the development and running of fossil fuel power plants for base load or backup, respectively (NamPower, 2013).
- Both Uganda and Namibia have substantial objectives for increasing domestic electricity supply. Namibia forecasts a 430 MW power deficit by 2015 as a result of expiring power purchase arrangements with interconnected suppliers, Eskom's requirement to reduce electricity exports from South Africa and the increasing demand of the Namibian mining sector (Norton Rose, 2013).
- Namibia has also recently discovered fossil fuel resources that have yet to come on-stream (the offshore Kudu natural gas field), and is seeking to develop a power plant to use these resources (in this case a 800 MW combined cycle gas-fired power plant). NamPower is currently understood to be seeking equity participation of up to 49% from international power developers, to contribute to the \$1.1 billion forecast project costs.
- Both countries have significant renewable energy resources that are primarily at the feasibility study stage, though in Namibia the focus is on a different mix, dominated by solar and wind opportunities.
- In both Uganda and Namibia, the fuel of choice for cooking in households is wood or wood charcoal, even in urban areas (Namibia: 56.4%; urban: 15.9%; rural: 87.4%) (NSA, 2012).
- Namibia has significant rural populations that will require access to electricity through other means than the extension of the grid. This would include off-grid and mini-grid applications through solar home systems, wind systems, biogas digesters, biogas gasifiers, micro hydro power plants etc. (UNDP, 2012).

There are also significant differences in the two countries' energy sectors, which should be taken into account in assessing replicability and scalability of considerations for mobilising private climate finance.

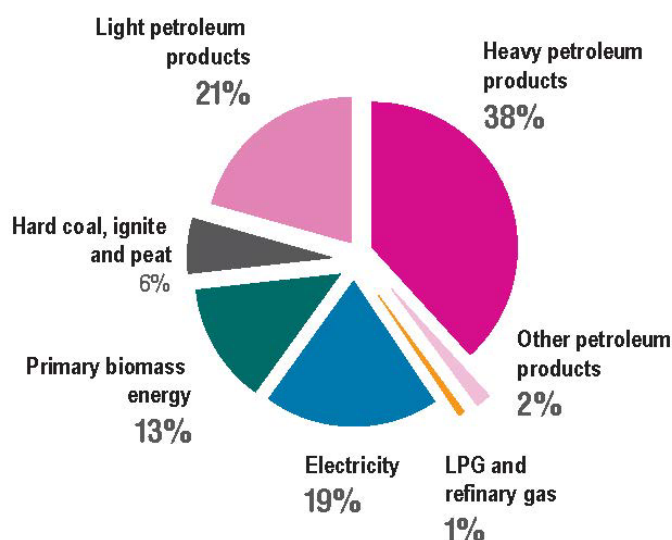
Differences between Uganda and Namibia's energy sectors include the following:

- Uganda has unbundled and allowed for private ownership of electricity generation, transmission and distribution assets, while Namibia's electricity sector is dominated by a vertically integrated state-owned company and as a result has very limited private investment.
- Although procedures for the establishment of independent power producers (IPPs) exist in Namibia, and there is the aim of private participation in a large gas-fired power project at Kudu, to date only one PPA has been signed for a small-scale solar project (Norton Rose, 2013). Government-owned enterprises have to date generally been closed to all investors (Namibian and foreign), with the exception of joint ventures in telecoms and mining sectors (US Department of State, 2013b). Namibia's Electricity Control Board (ECB) chairman stated that,

‘Private sector interest has been overwhelming in the renewable energy resources with solar and wind being the most sought after’, but ‘despite the persistently high demand for generation licences from potential investors, the ECB’s initiative of issuing conditional/provisional licences has not yet yielded the expected results’ (Duddy, 2012).

- The ECB 2012 annual report said the absence of a clearly pronounced policy framework, explicit procurement guidelines and technical baseline data, as well as an unfavourable tariff and sector structure, necessitated additional intervention measures if new entries into the Namibian electricity supply sector were to be realised (US State Department, 2013).
- Namibia does not have RE FiTs (or a feed-in top-up) as in Uganda, although the US Agency for International Development (USAID) has proposed them (Nexant, 2013).
- Namibia is connected to a regional power pool (the Southern Africa Power Pool (SAPP)), which means it is more dependent on imported electricity than Uganda but also has greater opportunity for energy export. The country also has greater dependence on fossil fuels in its energy mix (Figure 12). In 2013, 68.6% of the electricity consumed in Namibia was imported, from South Africa (41%), Zimbabwe (18%) and Zambia (9%), with a small contribution from Mozambique. Namibia’s current dependence on imports means the carbon intensity of its electricity is linked to choices neighbouring countries make about their energy mix.
- Namibia has a far greater electrification rate than Uganda, with 70% of its urban population and 25% of its rural population having access to electricity (CIA, 2014a; Reegle, 2014). The 2010 Energy Development Index (EDI) ranking for Namibia of 0.46 is higher than that for most of its neighbouring countries, except South Africa (0.65). For comparison, EDI values for other nations include India 0.3, Malawi 0.13 and Uganda 0.08 (IEA, 2012).
- Unlike Uganda, in Namibia solar PV technologies are already widely used for off-grid applications, and the country implemented a Cabinet directive in 2007 that made solar water heaters mandatory in government buildings (van Rooij et al., 2013).
- Namibia has a stronger ranking on the World Bank’s Doing Business index, at 98th of 189 countries compared with Uganda’s position of 135. Also, Namibia is one of the only countries in Africa with an investment-grade sovereign credit rating.

Figure 13: Total energy requirements in Namibia (petajoules - PJ)



Source: UN (2013).

Finally, trends in support for and investment in the energy sector are also quite different when comparing Uganda and Namibia, likely because of the virtual absence of IPPs in Namibia, in spite of efforts to increase their contribution to domestic generation (Table 3).

Table 3: Comparing the scale of support to energy in Uganda and Namibia

Source of finance	% of average annual support or investment directed to the energy sector	
	Namibia	Uganda (Figure 11)
National budget	1% (energy and extractives)	2% (energy and extractives)
ODA	3%	5%
OOF	0%	18%
FDI (net)	Not available (PPI is equivalent to 1% of FDI)	31%
FSF	2%	38%

4.7 Common lessons to support private finance for CCD - energy

By reviewing Namibia's energy sector incentive and investment at a high level, we are able to identify some important considerations for the deployment of private climate finance in Uganda's energy sector that are equally applicable to Namibia. We can also identify opportunities for lesson learning across both countries (Table 4).

The most significant finding is that, in spite of Namibia's higher level of economic development, credit rating, electrification and investment attractiveness, the structure of its energy sector (vertically integrated and publicly owned) and lack of streamlined processes for PPAs has meant lower private investment in energy than in Uganda. Nonetheless, there are a number of common barriers that can be overcome through climate finance support to mobilise increased private investment in CCD.

Table 4: Options for mobilising private climate finance in the energy sector in Uganda and Namibia

Considerations for Uganda equally applicable to Namibia	<p>There are still significant gaps in support to small-scale energy generation and access to sustainable biomass resources for cooking. These have yet to benefit from private investment at scale, in spite of early investment as the result of carbon finance. Focusing on smaller-scale projects will fill not only the gap left by the GoU and development partners but also the investment gap resulting from the sharp decline in carbon prices in recent years. It will also support areas where the private sector is less inclined to invest (initially) because of barriers of high transactions costs in proportion to overall deal size.</p> <p>There are opportunities to scale up technologies and approaches to financing small and distributed energy that have, to date, been piloted or supported using limited resources. These approaches could attract significant private investment with additional resources from climate finance and through the replication of approaches that have been used with success in other countries.</p> <p>There is a critical role for information provision by government and development partners (at market as opposed to project level), and information sharing by private actors, which can be scaled up through support to incipient government programmes to share information on the country's renewable energy resources. This would include scaling up feasibility studies at project level to market-level exploration and development of bundled renewable energy resources and sites, and the establishment of industry associations for clean energy, with a focus on solar and wind in Namibia.</p> <p>Information on energy sector investment can also be scaled up and harmonised through support to the current holders of this data, which includes not only government ministries, but also often the press and non-profit organisations. This would include support for a government agency to track investment in off-grid projects, and formalisation of the biomass cooking sector.</p>
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Lessons for Namibia from Uganda	The GoU has attracted private investment in electricity generation assets through RE FiTs and template PPAs and IAs. There are opportunities to replicate these approaches in Namibia with donor support through the innovative use of grants to top up RE FiTs.
Additional considerations for Namibia	Because of the high level of electrification in Namibia, there are opportunities for donor support to private models for delivering energy efficiency and distributed small-scale renewable energy generation, particularly in urban areas (as reflected in current Global Environment Facility-supported activities) that would be of lower priority in Uganda. These are also opportunities for technical support in the development of regulations that would drive investment in renewable technologies along the lines of the country's existing Cabinet directive on government use of solar water heaters.
Lessons for Uganda from Namibia	Uganda may also be able to learn from the experience of Namibia's Solar Revolving Fund (administered by the Renewable Energy Division). This facility has been unable to keep up with demand for low interest rate loans to households and communities for solar water heaters, solar water pumps or solar homes systems. This contrasts with Uganda's solar incentives, which have experienced very low uptake.

It would be useful to undertake a more in-depth analysis of Namibia's energy sector to uncover where public and private investment is currently focused, and opportunities for domestic and international support to mobilise additional private flows.

5 Findings: Zambia's agriculture sector

5.1 Zambia context

5.1.1 Economic context

Zambia has experienced significant economic growth in the past decade, with an average GDP growth rate of 6% per year (MAL, 2013) and an overall increase of GDP growth per capita of 80% between 2000 and 2010 (Sutton and Langmead, 2013). The vast majority of the Zambian population, however, has not benefited from this growth. The overall poverty rate is over 60%, and in rural areas it is over 80% (CSO, 2012) (Figure 14). The HDI ranks Zambia one of least developed countries in the world (Figure 15).

Figure 14: Poverty rates in Zambia, 2006 and 2010

Overall and Extreme Poverty in Rural and Urban Zambia, 2006 and 2010				
Year	2006		2010	
Percentage	Overall	Extreme	Overall	Extreme
Zambia	62.8	42.7	60.5	42.3
Rural	80.3	58.5	77.9	57.7
Urban	29.7	13.0	27.5	13.1

Source: CSO (2012).

Copper makes up 80% of Zambia's export earnings, although mining employs only 2% of the labour force and comprises 8% of total formal sector jobs (ICMM, 2013). The country's historic dependence on copper exports has exposed it to commodity price fluctuation and limited economic diversification (AFRODAD, 2010; Arora et al., 2012). Zambia embarked on International Monetary Fund- (IMF-) and World Bank-endorsed economic liberalisation in the 1990s, which prompted a move towards diversification and resulted in increased foreign investment in the mining sector, as well as in construction, industry and agriculture (AfDB, 2013b).

The Government of the Republic of Zambia (GRZ) launched a Private Sector Development (PSD) initiative in 2005 to promote private sector investment, which identified a number of areas for reform, and has also sought to promote financial sector expansion through its Financial Sector Development Plan II in 2012. However, in 2013 the country ranked 83rd out of 185 on the World Bank's Doing Business index, and only 37% of the bankable population had access to financial services. Access is particularly low in rural areas, where it would be needed to reach smallholders and smaller agricultural businesses (AfDB, 2013b).

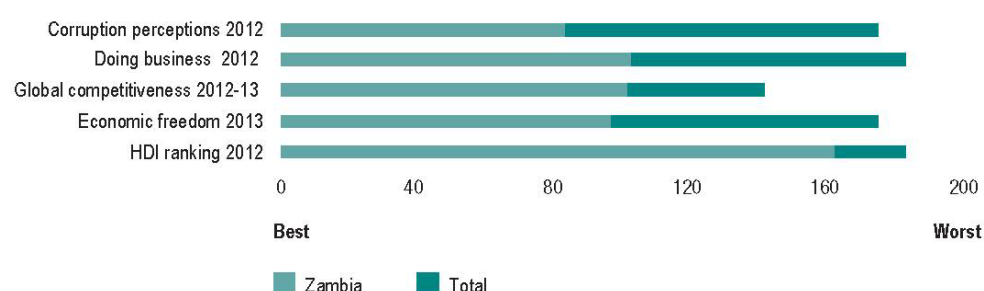
Figures 15 and 16 provide an overview of key features of Zambia's economy and investor-relevant socioeconomic indicators.

Figure 15: Key features of Zambia's economy

Infrastructure	Diversity of Economy	Banking Sector	GDP Growth	Socio-Economic Development
Poor	Limited	Fairly liberal	Strong	Low
Stock Market	Capital Market	Listed Companies	Dominant Sector	Foreign investment
Yes	Yes	22	Retail	Reasonable

Source: KPMG (2013b).

Figure 16: Zambia's ranking on key global indices

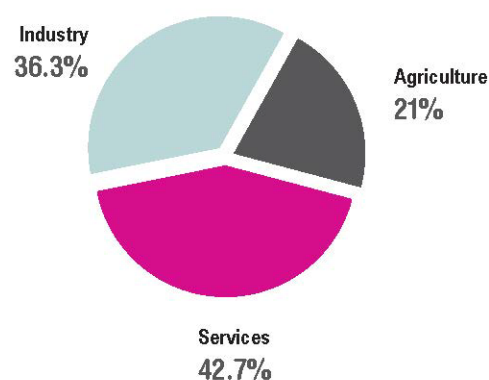


Source: KPMG (2013b).

5.1.2 Agriculture sector

Agriculture accounts for 21% of Zambia's GDP, and 70% of the population is employed in the sector, with rates as high as 91% in rural areas (Figure 17) (MFNP, 2012). Zambia possesses extensive arable land and significant water resources, but only approximately 15-19% of the arable land is currently under cultivation and crop productivity rates remain low (Deloitte, 2013; MFNP, 2009; ZDA, 2012).

Figure 17: Sectors contribution to Zambia's GDP



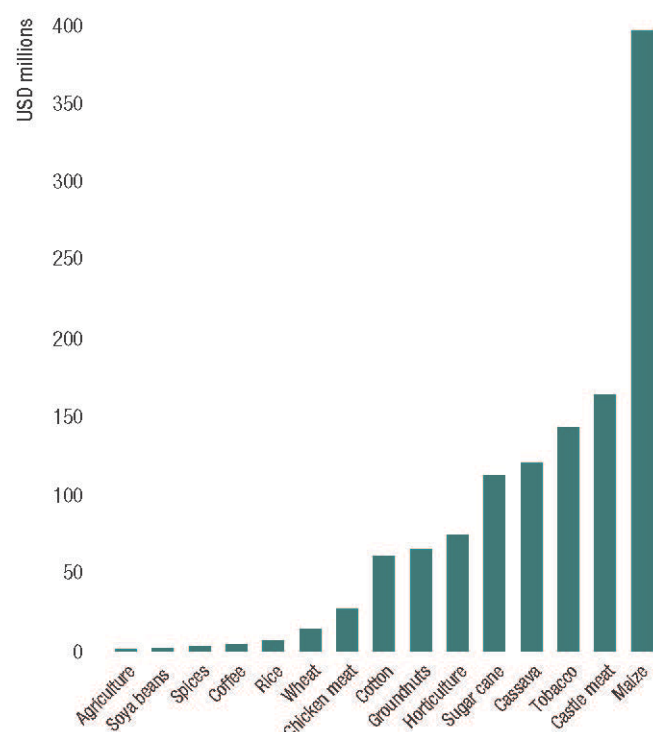
Source: KPMG (2013b).

A single commodity (maize) dominates agricultural production; smallholder farmers produce 70%, through significant support from the GRZ's food security programmes (see Section 4.2.1) (Sutton and Langmead, 2013). Smallholder farmers are the poorest segment of the population (MAL, 2103).

GRZ took initial steps towards liberalising agriculture in the 1990s, prompting a move towards diversification driven by private companies participating in the production of commodities such as

cotton, coffee and tobacco, as well as horticultural and floricultural products (Funder et al., 2013; GRZ, 2006). Figure 18 provides a summary of major crops by aggregate value under production.

Figure 18: Crop production, 2010 (US\$ millions)



Source: FAOSTAT (2014).

Zambia's agriculture sector is particularly vulnerable to climate change. This is in part because it is dependent on rainfall for crop production for commerce, subsistence and livestock, making production vulnerable to changing patterns of precipitation (GRZ, 2006; Ngona and Dube, 2013). According to the Ministry of Tourism, Environment and Natural Resources (MTENR), the opportunity cost of extreme weather events is high, representing a loss of about \$13.8 billion in GDP over the past 30 years (Watson et al., 2013). Extreme weather events are expected to prevent the Zambian economy from increasing its GDP by \$4.2-5.4 billion in the next decade, of which over 50% is in agriculture (ibid.).

Overall, Zambia's agriculture sector has suffered from underinvestment and policy design that has hindered infrastructure development and discouraged technological enhancement and efficient practices (Watson et al., 2013). As a consequence, access to markets is constrained (especially in rural areas), soil fertility has declined and farmers have limited capacity to optimise arable areas (ibid.). This is a matter of concern, as the vast majority of Zambians rely on agriculture for food and income.

5.1.3 Policy context

Zambia's National Long-Term Vision (NLTV) 2030 reflects the country's long-term development ambitions to achieve the status of middle-income country by 2030. The NTLV envisions a progressive decline in the GDP share of agriculture sector in favour of industrial production and private services. Agriculture nevertheless remains one of the main drivers of economic growth identified in the NTLV. The NLTV implemented by way of the Sixth National Development Plan (SNDP) (2011-2015), identifies agriculture as a priority growth sector. The SNDP acknowledges the constraint posed by climate change adaptation for agriculture, particularly for smallholder farmers, and highlights that the consequences of a changing climate are exacerbated by the underdevelopment of other supporting sectors, including infrastructure and natural resources management.

Zambia's National Agriculture Policy (NAP) principal objectives are ensuring food security and promoting economic development through liberalisation, commercialisation and PPPs within the sector. This policy is currently under review by the Ministry of Agriculture and Livestock (MAL), in order to foster synergies with the National Climate Change Response Strategy (NCCRS). Main themes addressed during this revision of the policy include crop diversification, climate-smart agriculture and conservation agriculture, along with the incorporation of climate change mitigation and adaptation objectives in agricultural policies and programmes (Watson et al., 2013).

Zambia has prepared a National Agriculture Investment Plan (NAIP) (2013-2017) as a requirement of the African Union's Comprehensive African Agricultural Development Programme (Watson et al. 2013). This emphasises the link between agricultural development, food security and poverty reduction, with the aim of ensuring climate-compatible development of the agriculture sector (MAL, 2013). The NAIP estimates costs of \$2.7 billion, with 78.4% expected to come from the government and donors, 14.4% from farmers and 7.2% from the private sector. It identifies the following investment areas: sustainable natural resources management;³⁵ agricultural production and productivity improvement;³⁶ market access and services development;³⁷ and food and nutrition security and disaster risk management.³⁸

5.2 Framework 1: incentives (industrial policy tools)

Framework 1 (Figure 19) was completed to highlight the key regulatory, economic and information instruments in Zambia's agriculture sector. These instruments were mapped to understand the incentives available in Zambia, and to show whether they are provided across the economy, the agriculture sector or specific sub-sectors. It was possible to complete the framework on the basis of a review of publicly available government documents and secondary sources.

5.2.1 Key themes emerging from Framework 1: incentives

Regulatory instruments

- Zambia has attempted to improve its general business climate and attract FDI, with an emphasis on commodity export. Zambian law permits private property ownership and prohibits expropriation without due compensation, and participates in 15 bilateral investment treaties (BITs), 21 international double taxation agreements and key international arbitration frameworks (Mousseau and Mittal, 2011). However, several business reforms identified as necessary by the government have not been implemented³⁹.
- Zambia has also aimed to liberalise the agricultural sector specifically, but this process has also only been partial. Zambia's Agricultural Credit Act and Agricultural Marketing Bill, which aim to facilitate private commerce in agricultural commodities, remain unimplemented and un-enacted, respectively (AfDB, 2013b).

Economic instruments

- GRZ's flagship fiscal policies in the agriculture sector are the Strategic Food Reserves Programme (SFRP) and the Fertiliser Input Support Programme (FISP) of its Poverty Reduction Programme (PRP). Under the SFRP, the Food Reserve Agency buys smallholder maize production at above-market prices to then on-sell to millers. Under the FISP, the government subsidises agricultural inputs to maize producers. These programmes provide the main public policy mechanism for poverty alleviation and food security. The use of public

³⁵ Includes land-use planning, administration and management; ensuring efficient water use and irrigation; forestry management; energy efficiency promotion; and capturing fisheries management.

³⁶ Includes livestock; crops; and aquaculture development.

³⁷ Includes institutional market arrangements and performance; increasing access to rural and market infrastructure; increasing access to rural finance; and promoting value chain integration.

³⁸ Includes food security; nutrition security; and disaster risk management and mitigation.

³⁹ Under its PSD initiative of 2005, GRZ identified reforms in business licensing, micro, small and medium enterprise development, PPPs, labour law, insolvency and promotion of productivity and trade. As of 2012, only insolvency laws had been addressed. Under the Financial Sector Development Plan II of 2012, GRZ has sought to address constraints to financial inclusion by increasing outreach and access, improving market infrastructure, but implementation has been limited (AfDB, 2012b).

finance to support maize production remains a dominant force shaping private capital investment choices across the agriculture sector. GRZ is contemplating expansion of the FISP to other agricultural products such as soybeans, cotton, sunflower and rice (AfDB 2013b).

- GRZ also plans to implement an additional price support system, whereby farmers are issued with electronic vouchers with which they can purchase agricultural inputs from registered private dealers (AfDB, 2013b).
- Outside of the PRP, the Zambia Development Act (ZDA) provides the primary incentives for the agriculture sector. It provides preferred tax and duty treatment, and land improvement allowances to promote capital investment and trade in the sector.
- GRZ also provides incentives in the form of infrastructure and land access via titling and demarcation for the expansion of farm blocks as a means of expanding commercial agricultural development (ZDA, 2011). Farming blocks are designed to include and integrate a large-scale farm of 10,000 ha, several commercial farms of 1,000-5,000 ha and small farms of 30-3,000 ha through out-grower schemes (ibid.). Through this, GRZ is seeking to commercialise agriculture in a way that maintains agricultural employment of smallholders.
- Development finance institutions provide concessional financings to the sector, both for general agricultural expansions and for climate-specific activities, such as the Pilot Project for Climate Resilience (PPCR). Much of the FSF to Zambia has also gone to agriculture activities, primarily intended to improve the agricultural practices of small-scale farmers to improve food security, diversify crop production and change agricultural methods.

Information instruments

- GRZ has identified private sector and financial sector reforms to expand the Zambian economy generally, attract additional foreign investment and expand the domestic financial sector. However, these reforms have been slow to develop.
- GRZ has sought to mainstream climate adaptation and mitigation into public agriculture sector regulation and investment through a review of the Zambian Agricultural Policy, and incorporating issues like natural resource management and disaster risk management in the NAIP. However, as these have yet to be through regulatory or economic instruments, they currently only provide an informational signal to investors in the agriculture sector about GRZ's possible future policy orientation.
- The Zambian Cooperative Societies Act of 1998 has attempted to support collective action by smallholders, which in theory could increase their access to finance, increase their bargaining power and decrease transaction costs (Mtonga, 2012).⁴⁰ Despite the significant potential of these cooperatives in supporting the scale-up of private investment in the agriculture sector, and recognition of this by GRZ, there has been limited support provided thus far. In contrast, sectors with a predominance of commercial agribusiness (see the following section) have developed a number of trade associations, such as the Zambian Coffee Growers Association, the Zambian Cotton Ginners Association, the Zambian Export Growers Association, the Poultry Association of Zambia and the Tobacco Association of Zambia.

Figure 19: Framework 1 – industrial policy tools (Zambia, agriculture sector)

Regulatory	<ul style="list-style-type: none"> • Constitution, Lands Act and Zambia Development Act recognising the right to private property and prohibit expropriation without compensation • BITs, protecting eligible foreign investors against undue expropriations and inequitable compensations • Cooperative Societies Act of 1998 granting the right to establish cooperatives • Entered into 21 international double taxation agreements with European, African and Asian countries • Regional trade organisations such as the Common Market of Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC)
Economic	<ul style="list-style-type: none"> • Government subsidies from FISP and SFRP to maize production and e-voucher system • Government provision of infrastructure facilities and land access to designated farm blocks

⁴⁰ We treat this as an informational tool on the basis that its main function is to provide a mechanism for communication and coordination, which allows the flow of sub-sector-relevant information and collective action.

	<ul style="list-style-type: none"> • Government fiscal incentives for commercial agricultural activities⁴¹ • Concessional lending and guarantees from AfDB, IFC, IBRD, the Multilateral Investment Guarantee Agency (MIGA) and USAID • Multilateral and bilateral donors providing infrastructure development with the support of the national government and/or NGOs (including irrigation schemes for climate resilience) (World Bank and AfDB) • Zambian National Commercial Bank (ZANACO) in collaboration with the Zambia National Farmers Union providing smallholder farmers with credit (Lima Credit Scheme) • Input support across agricultural commodities (World Bank, AfDB, Food and Agricultural Organization (FAO), EU, Norwegian government, CARE, Catholic Relief Services, Heifer International, Concern, Consortium for Food Security, Agriculture and Nutrition, AIDS, Resiliency and Markets, Muzika, Community Markets for Conservation etc.) • Input support provided by large agribusinesses out-grower schemes across agricultural commodities (e.g. Dunavant, Cargill, Zambia Sugar etc.) • Financial products and/or input support smallholders across agricultural commodities (from donors and NGOs): International Fund for Agricultural Development (IFAD) (Rural Finance Expansion Programme); IFC (MicroEnsure project to provide index-based weather insurance to smallholders); IFC (rural microfinance promotion to support small-scale farmers and small and medium enterprises); DFID rural finance programme; and ActionAid (recapitalisation of 3,000 smallholder farmers) • Private equity firms investing in agribusinesses that engage smallholder farmers (e.g. Chayton Africa)
Information	<ul style="list-style-type: none"> • Zambian development and agricultural plans, including NLTV 2030, SNDP 2011-2015, NAP and NCCRS • Technical assistance provided by large agribusiness out-grower schemes across agricultural commodities (e.g. Dunavant, Cargill, Zambia Sugar etc.) • Agricultural Credit Act may, once implemented, establish a Warehouse Receipt System for regulating charges on, and quality control and deposit of, agricultural assets • Agricultural Marketing Bill, once enacted, may provide legal framework for agricultural marketing, exchange and export and further liberalisation • ZDA established to assist private sector with procedural requirements • Private trade associations providing technical assistance and/or extension services to smallholder farmers: Zambian National Farmers Union, Zambian Cotton Ginners Association, Zambia Coffee Growers Association, Zambia Export Growers Association, Poultry Association of Zambia and Tobacco Association of Zambia • Donors providing smallholder farmers with agronomy training and information as well as facilitating crop marketing with the financial and logistical support of national government and/or a number of NGOs – major stakeholders include World Bank (Agricultural Development Support Programme); IFC (Mobile Phone Platform for Disseminating Information to Smallholder Farmers); AfDB (Strengthening Climate Resilience in Kafue River Basin); IFAD (Smallholder Productivity Promotion Programme; Smallholder Agribusiness Promotion Programme); USAID (Feed the future); World Food Programme (WFP) (Purchase for Progress); and IITA (International Institute of Tropical Agriculture)/Sida (Swedish International Development Cooperation Agency) (marketing of livestock products)

5.3 Framework 2: sources of capital

5.3.1 Approach

Application of Framework 2 (Figure 20) to the Zambian agriculture sector has been organised by crop type, reflecting the segregation of available private sector data. Analysis of private finance (i.e. not just explicitly climate-positive finance) will therefore need to rely on this data organisation, alongside the other frameworks, to assess climate compatibility. The following crops are included (in order of market size): maize, livestock (beef, dairy and poultry), tobacco, sugarcane, horticulture and floriculture, groundnuts, cotton, wheat, coffee and soybeans. These crops are among those that have generated the highest levels of revenue in terms of production (Figure 18), and appear to be growing in significance based on market activity (i.e. soybeans). Each commodity can also be categorised in terms of scale of

⁴¹ These include (i) Guaranteed four-year input tax credit for pre-production VATable agribusiness, (ii) Zero-rating of agricultural products and supplies when exported, (iii) VAT deferment on import of selected agricultural equipment, (iv) Income tax at reduced rate of 10%, (v) 100% allowance for farm fencing, brick or stone wall improvements, (vi) K10 million allowance for farms occupied by farm workers, (vii) Full cost farm works allowance for stumping and clearing, soil erosion prevention, boreholes, wells, aerial and geophysical surveys and water conservation, (viii) Exemption for dividends paid out of farming profit for first five years of farming, (ix) Development allowance for expenses for cultivation of tea, coffee, and certain horticulture products, (x) No import duty on irrigation equipment and reduced duty rates on imports of other farming equipment, (xi) Reduced customs duty at 5% on pre-mixes (e.g. animal feed additives).

activity (from smallholders to commercial agribusiness), each of which benefits from different sources of capital.

5.3.2 Key themes emerging from Framework 2: sources of capital

The following are key themes identified regarding investment flows in Zambia's agriculture sector, based upon the data summarised in Figures 20 and 21.

- **Smallholder-dominated agriculture.** Maize, cassava and groundnut production is dominated by smallholder farmer rain-fed agricultural production, with only 30% of maize produced large-scale commercial growers producing under irrigation (Sutton and Landmead, 2013). Maize is financed primarily by public price supports (FISP and PRSP) and by smallholders with very limited financial sector participation. Where agribusiness is active in maize production, this is financed predominantly through domestic debt and international equity. Groundnut and cassava production by smallholders is supported primarily by development agencies and NGOs. We did not identify any private capital (beyond smallholder investment) in the cassava sub-sector, even though it is the fourth-largest commodity by market value.
- **Commercial banking is underdeveloped** and principally targets large-scale farmers or commercial businesses, as opposed to smallholders, who have limited collateral to secure loans. Nonetheless, some initiatives, such as the Lima Credit Scheme, target smallholder farmers by compensating for an absence of collateral, through the support of the Zambian National Farmers Union. This initiative is a partnership between cooperatives and commercial banks, and has achieved high repayment rates in certain cases (e.g. 99% with ZANACO) (Dalberg, 2012).
- **Commercial agribusiness using smallholder out-grower schemes.** The remaining economically significant crops, tobacco, horticulture/floriculture and cotton, are characterised by a strong commercial agribusiness presence that has incorporated smallholder farming via out-grower schemes. Under this arrangement, smallholder production is financed via commercial agribusinesses providing inputs and technical assistance on credit in exchange for produced agricultural commodities (Sutton and Landmead, 2013). Commercial agribusiness receives a mix of financing, dominated by domestic private debt and international private equity. Out-grower schemes are now also emerging in the maize and soybean sub-sectors, driven by the efforts of large agribusinesses such as Dunavant and Cargill.
- **Mixed smallholder and commercial agribusiness.** The livestock subsector has significant smallholder and commercial agribusiness participation, supported by international public debt and private investment in the form of international equity and domestic debt and equity (Sutton and Landmead, 2013; ZDA, 2011).
- **Commercial agribusiness dominated.** The wheat, soybean and coffee sectors are consolidated among a few large commercial agribusinesses, supported primarily through corporate, balance sheet finance (private equity) and domestic debt. They were each relatively small markets according to 2010 data, but soybeans show substantial investment activity. Multilateral and bilateral financial institutions are also financing commercial agribusinesses and related infrastructure.

Bilateral and multilateral donors often provide support across sub-sectors to develop the enabling environment of the agriculture sector. This includes providing guarantees either as support to financial institutions on-lending in relevant sub-sectors or as support to agri-businesses. Two examples of guarantees include one from MIGA to Chayton Atlas (a private equity fund investing in wheat, soybeans and maize) and a USAID Partial Guarantee Scheme for ZANACO to increase lending to emergent farmers (Dalberg, 2012).

Figure 20: Framework 2 – sources of capital (Zambia, agriculture sector) (see Appendix 3)

Sub-sector (by producer)		Mainly smallholder farmers			Mixed farm scales	Commercial agribusiness using smallholder outgrower schemes				Mainly commercial agribusiness		
Sub-sector (by commodity)		Maize	Cassava**	Groundnuts / Peanuts	Livestock	Tobacco	Sugarcane	Horticulture Floriculture	Cotton	Coffee	Wheat	Soyabeans
Grants (including philanthropy and CSR)	Public	Domestic	Domestic International FAO, Finland	Domestic International USAID, US Agricultural Development Fund (USADF)	Domestic AfDB, UNDP, KfW, UN, Nordic Development Fund (NDF), Sweden, Finland, USAID / USDAF, Japan			Domestic International AfDB, UNDP, KfW, UN, NDF				International (USAID / USADF)
	Private*				International Concern Worldwide, Red Cross, Oxfam, WorldFish			International Concern Worldwide, Red Cross, Oxfam, WorldFish				
Debt (OTC, market traded, microfinance, etc.)	Public	International IFC	International IFAD	International WB, IFAD	International (AfDB, WB, IFAD, IFC)		International (IFC)		International (WB)			International (WB, IFC)
	Private*	Domestic Zambia National Commercial Bank (ZANACO)		Domestic Community Markets for Conservation (COMACO)	Domestic ZANACO	Domestic (Alliance One, Africa Leaf)	Domestic (ZANACO)	Domestic (York Farm Ltd)	Domestic (Dunavant, Cargill)			Domestic (ZANACO, COMACO)
Equity (listed and unlisted, including balance sheet finance)	Public	International Norfund							Domestic International (China)		International (Norfund)	International (Norfund)
	Private*	Domestic Zambeef International Zimbabwe, USA, South Africa, France, Cayman Islands		International Zimbabwe	Domestic Zambeef International Kenya, USA, South Africa	International USA, Japan	International (South Africa)	Domestic International (UK, Zimbabwe)	International (South Africa)	International (Singapore)	Domestic (Zambeef) International (USA, Zimbabwe, South Africa, Cayman Islands)	Domestic (Zambeef) International (USA, Kenya, Malaysia, Zimbabwe, South Africa, France, Cayman Islands)
Guarantee (including loan insurance)	Public	International MIGA to Chayton, USAID to ZANACO			International USAID to ZANACO		International (USAID to ZANACO)				International (MIGA to Chayton)	International (USAID to ZANACO)
Insurance (including export credit insurance)	Private*	Domestic Madison Insurance				Domestic Madison Insurance	Domestic Madison Insurance		Domestic Madison Insurance		Domestic Madison Insurance	Domestic Madison Insurance

* NGOs and charities included in 'Private'

** No private (commercial) financial support was identified for cassava production beyond smallholder resources.

Figure 21: Access to agricultural debt finance (by farm size)

Lending market	Name of bank	Comment
Largescale farmers and commercial agribusinesses	Stanbic Bank	Competitive and dominated by Stanbic, Standard Chartered and ZANACO
	Standard Chartered Bank	
	Zambian National Commerce Bank (ZANACO)	
	First National Bank	
	Barclays Bank	
Emergent farmers and smes	ZANACO	Secured lending only to more established SMEs but growing, with unsecured lending only by ZANACO and impact investors
	Root Capital	
	African Agricultural Fund - Phatisa Fund Managers	
	Investtrust Bank Plc	
	Finance Bank Zambia	
	Indio Zambia Bank	
	GroFin	
Smallholder farmers	Various commercial agribusinesses providing inputs on credit	Predominantly input credits
	ZANACO, in cooperation with National Farmers Union (NFU)	Leading players for commercial lending are Cetzam and ZANACO-NFU
	Christian Enterprise Trust of Zambia (Cetzam)	
	VisionFund International	
	MicroBanker's Trust	

Source: Dalberg (2012).

5.4 Framework 3: scale of support

The goal of completing Framework 3 was to understand the trends in investment across sub-sectors of the agriculture sector. It was anticipated that this information would be available within the different international datasets referenced by the OECD in Figure 3. Unfortunately, it was not possible to complete a framework that would show investment trends over time, as a result of significant gaps in international and national datasets, in terms of both year and sub-sector coverage. Although beyond the resources available for this analysis, the data collected in Framework 2 could be gathered and harmonized over multiple years, which over the longer term could provide a basis for completing a framework in keeping with Figure 3.

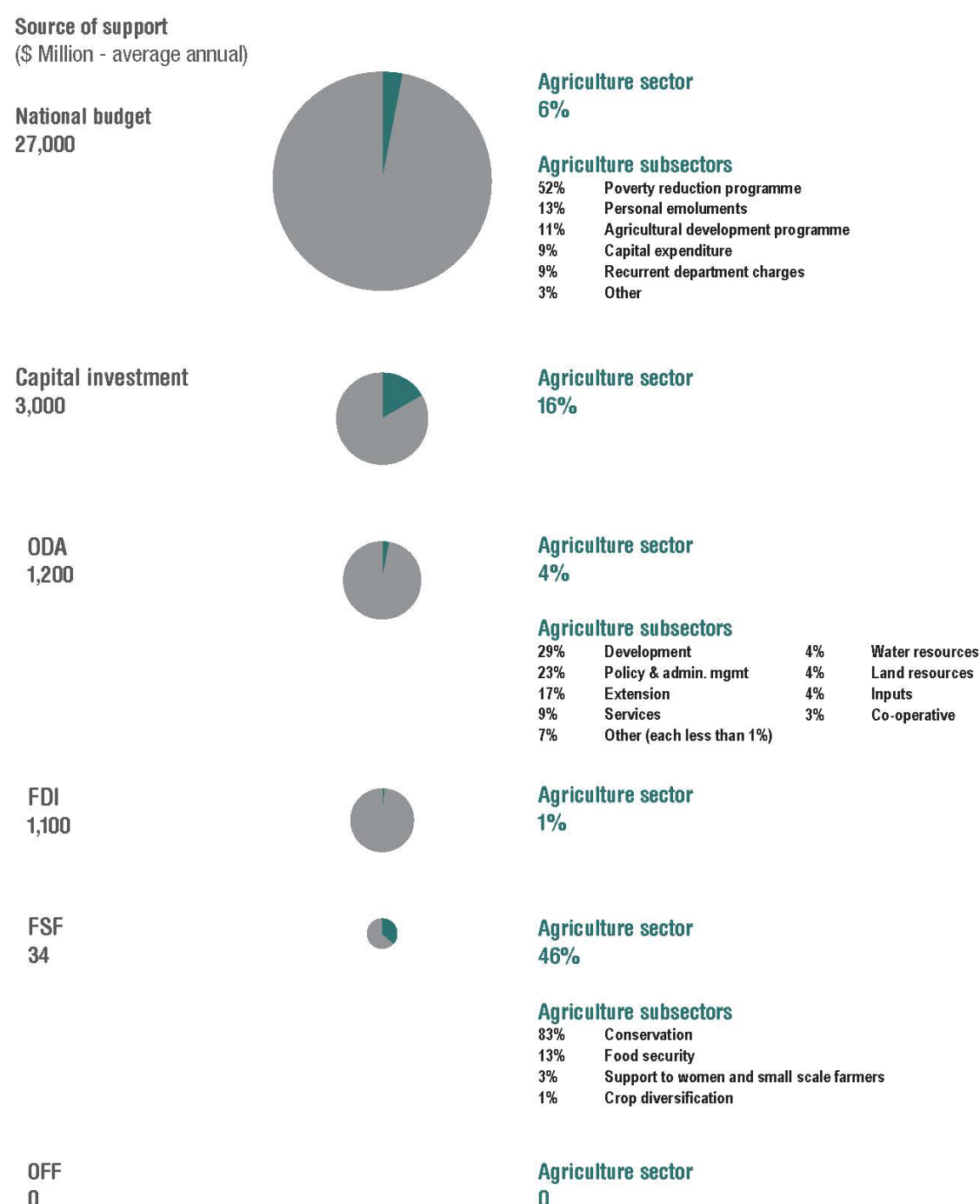
5.4.1 Key themes emerging from Framework 3

The following are key themes identified regarding scale of capital investment in Zambia's agriculture sector, based on the data summarised below (Figures 22).

- The greatest level of investment in Zambia's agriculture sector comes through the national budget, and more specifically the PRP (52%), which primarily consists of maize production support (IAPRI, 2013a). Of this amount, 96% was for FISP and SFRP (food reserves and fertiliser inputs), with only 4% spent on irrigation support, commercialisation of farm blocks, livestock development and disease control and training and education of agricultural cooperatives (Ngona and Dube, 2013). The remaining budget is to be spent on overheads such as salaries, recurring charges and capital expenditures). This means there are very limited resources to spend on other aspects of agricultural development that may create longer-term development and climate adaptation.

- Commercial lending to the agriculture sector totalled roughly \$491 million in 2012, or 16% of all domestic lending. Investment pledges in the same year and the same sector accounted for approximately \$379 million (Figure 22). As discussed above, most of this lending was for commercial agribusiness. An estimated 13% of smallholders have access to finance. Of these, an estimated 70% are financed through out-grower schemes (i.e. through input credit schemes) rather than through financial institutions and intermediaries.
- Zambia received an average of \$48 million of ODA per annum between 2008 and 2012 to the agriculture sector, and no OOFs. Of dedicated international climate finance, Zambian agriculture received \$16 million in FSF, or 46% of the total, primarily projects aimed at conservation agriculture and food security for smallholders (ODI, 2014). We also did not identify any PCFS (see Section 1.2) (all such funds were provided to renewable energy and energy efficiency, and one forestry project) (ibid.).
- FDI has grown over tenfold in the past decade, but agricultural investment has represented only a small portion of this. The only FDI data at sector level we were able to access was for 2010, when only 0.1% of FDI (net) was directed to the sector. Given the results of Framework 2, this is likely to be equity investment (balance sheet, corporate finance) in commercial agribusinesses. This represents only a fraction of total financial activity in the sector, which has significant amounts of domestic investment.

Figure 22: Framework 3 – scale of support (Zambia – agriculture sector)



5.5 Considerations: mobilising private climate finance (in Zambia's agriculture sector)

By linking the key findings across the three frameworks, we are able to identify some important considerations for the deployment of climate finance in Zambia's agriculture sector that aims to mobilise private investment.

- Unlike, for example, mitigation finance in the energy sector (which clearly distinguishes between higher- and lower-carbon electricity generation investments), the implications of patterns of investment in the agriculture sector for adaptation and reduction in climate

vulnerability are not clearly identifiable through available sub-sector data, which are largely divided among agricultural commodity types, whereas agricultural adaptation is only in part attributed to choice of agricultural commodity. However, high-level observations can be made about the sources of capital and incentives available in the agriculture sector, which indicate where there may be opportunities to shape private investment towards CCD.

- GRZ has a number of policy activities aimed at promoting adaptation and resilience in the agriculture sector. These include the NCCRS and the National Climate Change Policy NCCP, each of which has yet to be implemented. The success of these plans in mobilising private capital investment towards adaptation will depend on whether they are able to shape the major public incentives for agricultural investment when placed in the context of other sector policies that affect investment choices. There is a risk, however, that, even if climate is mainstreamed into plans and strategies, existing strong incentives will continue to drive private finance towards vulnerable investments in agriculture, such as subsidy- and input-dependent maize production.
 - No public domestic fiscal policy mechanism was identified that expressly sought to incentivise capital towards more climate-compatible agricultural investments, although there were a few instances where existing incentives may (weakly) favour more climate-adaptive choices (e.g. import duty exemption irrigation equipment), and quite a number of national exercises beginning to explore linkages across strategies and plans.
 - Two public instruments dominate the capital investment choices of the agriculture sector: i) fiscal policy incentives to prop up smallholder maize production, which is the primary employer in the country; and ii) gradual policy reforms aimed at liberalising the sector and promoting private capital investment in commercial agriculture as a way of expanding its economic productivity. Mobilising private finance in support of adaptation will require shaping budgetary allocation that encourages climate-compatible private capital investment and accelerating the implementation of regulatory reforms aimed at creating an enabling environment for the private sector.
1. **Zambian government spending to address agricultural vulnerability has almost entirely consisted of a costly welfare programme to support maize production.**
 - This programme causes overcapitalisation of maize production relative to other commodities, which depresses economic diversification (i.e. maize relative to a range of crops) and would in theory crowd economic activity as purchases for the PRP account for 80% of production. It can also cause expansion of production into unsuitable areas (Watson et al., 2013).
 - **Zambian fiscal incentives in the agriculture sector are dominated by price support programmes with the goal of improving food security through maize production.** This focus may steer private climate finance towards climate vulnerability by i) causing overcapitalisation by smallholders in a climate-vulnerable sub-sector (maize) (Thurlow et al., 2009) and ii) leading to under-funding of other policy interventions better able to steer private finance to climate compatibility, such as extension services, irrigation, storage and transportation infrastructure, smallholder access to mechanisation and Zambia-specific research and development (Kaczan et al., 2013; Watson et al., 2013). Food security for the poorest itself is an important component of climate adaptation and resilience, but there is also evidence that price support resources do not actually reach the poorest smallholders, but pool with better-off farmers with greater access to capital and local political power (IAPRI, 2013b), and are economically regressive (Mason and Myers, 2011). This brings into question whether expansion or reform of these programmes will improve food insecurity and vulnerability, or whether private climate finance for adaptation would be better incentivised through alternative policy mechanisms, such as those discussed above.
 - The use of public grants at sub-sector level (as opposed to the entire agriculture sector or the project level) has been limited to price supports under the PRP, with potential for similar sub-sector-level interventions that support the marginal additional cost of

more adaptive practices, such as those discussed in the prior two bullets, and thus help them scale up.

2. Zambia has indicated its intention to liberalise and diversify the agriculture sector, and to create an enabling environment for further private investment.
 - However, a closer look at the data discussed above reveals two factors limiting the expansion of private sector investment: i) the disproportionate allocation of fiscal resources towards price support programmes (see Figure 22) and ii) the slow rate of regulatory reform (see footnote 39). In the absence of fiscal choices⁴² to create an environment enabling private finance in the sector, it is difficult for private investment to be geared towards climate-compatible investment.
 - In order for Zambia to mobilise private finance towards adaptation and resilience in the agriculture sector, it needs to advance already identified reforms to attract private investment to the sector. This requires sector-specific reforms, but also advancement of public policy measures aimed at supporting the expansion of the financial sector, particularly in rural areas and to smallholders.
 - The little private finance flowing to smallholder farmers is primarily via input credit programmes within out-grower schemes of large commercial agribusinesses. This may be a viable model for promoting private finance of agricultural development while also ensuring commercial expansion includes smallholder development. However, the benefits to smallholders will very much depend on the nature of the contractual arrangements between agribusinesses and smallholders, and will require regulatory oversight to ensure the transaction benefits the poorer contracting party and is not exploitative. The current approach also means current private 'climate' finance for smallholders will depend on whether commercial agribusinesses are promoting more adaptive agricultural practices or ones that reinforce maladaptive ones.

At this stage, development institutions are the only significant source of finance expressly directed towards climate compatibility. Private capital investment may, in practice, take into account climate risks and thus be fairly characterised as 'private climate finance', if it is anticipating climate variability and risk. However, understanding if investment is climate compatible would require additional resources in order to gather data on company-level on-balance sheet capital investment choices, or those of smallholders, which currently are neither readily available nor easily aggregated at the national level. Domestic and international resources and incentives can, however, steer agribusiness (and consequently) smallholder choices towards technically more adaptive ones by making concessional resources or incentives that favour adaptive investments.

5.6 Replicability and scalability of findings (Tanzania case)

As with Namibia's energy sector (see Section 4.6), we conducted a high-level review of Tanzania's agriculture sector to identify the scalability of considerations identified for Zambia, and the replicability of the methodology to other country contexts.

Similarities between Zambia and Tanzania's agriculture sectors include the following:

- Tanzania, like Zambia, had strong economic growth in the past decade, alongside low per capita income rates and a low HDI ranking (CIA, 2014b; UNDP 2013). The agriculture sector plays a similarly important role in the economy as well: it accounts for 27.6% of GDP and employs 80% of Tanzania's workforce, 70% of whom are smallholders (CIA, 2014; Malhotra, 2013).
- Both Zambia and Tanzania have extensive water and land resource, but cultivate a small portion of arable land (15% and 27%, respectively) (URT, 2011). Cultivation is affected by low productivity rates arising from the predominance of rain-fed agriculture, and by low levels of

⁴² Note that even private sector regulatory reform will require budgetary reallocation, as the promulgation of new laws creates a small but material fiscal burden, even if the reforms are eventually net revenue neutral or revenue generating.

formal private sector participation, poor rural infrastructure and inadequate value-addition facilities (Rowhani et al., 2010; URT, 2011).

- Similarly to Zambia, Tanzania has tried to ensure food security through input subsidies schemes (the National Agriculture Input Voucher Scheme) targeting maize and rice, and direct purchase of maize and sorghum by the National Food Reserve Agency (Barreiro-Hurle, 2012; Malhotra, 2013).
- Both Zambia and Tanzania have also sought to facilitate private sector investments through economic liberalisation, including fiscal incentives, and to varying degrees to use public finance to attract private investment through integration of the value chain, in particular by supporting out-grower schemes (TIC, 2013). Tanzania's flagship project to promote private agricultural investment is the Southern Agricultural Corridor of Tanzania (SAGCOT), a PPP in which vertically integrated commercial agribusiness expands cultivation through out-grower schemes with smallholders, which is supported by publically financed infrastructure (SAGCOT, 2011). The programme covers one third of the Tanzanian mainland, primarily for the production of maize, rice and sugar. The \$3.4 billion programme is financed by both international and domestic public and private sources (Cooksey, 2013).⁴³ Development finance institutions also support other out-grower schemes through initiatives such as the charitable foundation and DFID-supported Alliance for a Green Revolution in Africa (ibid.) and the USAID–Government of Tanzania New Alliance for Food Security and Nutrition.
- Both Zambia and Tanzania have low levels of available domestic commercial debt finance for agricultural production, particularly for smallholders and small and medium enterprises (AgFims, 2011).

Differences between Zambia and Tanzania's agriculture sectors include the following:

- Zambia's public policy discourse has mainly focused on liberalisation. Tanzania's has faced a tension between public- and market-led agricultural growth, and agricultural policy approaches adopted in the past 15 years reflect parallel agricultural programmes of public or market-based approach for agricultural development (Cooksey, 2013). This distinction may, however, be relatively superficial, since both countries' agricultural policies reflect a division between public finance-supported agricultural production and the aim of creating an enabling environment more amenable to private investment. If anything, Zambia's public financing of the sector is even more strongly biased towards public-financed production than Tanzania's because of the significance of the PRP.
- While Tanzania's agricultural budget has a similar attention to smallholder food security and poverty reduction, it is less concentrated than Zambia's on a price support scheme for a single agricultural commodity. Based on a high-level review, Tanzania's budget appears to distribute resources across a broader range of interventions for agricultural development. Certainly, the SAGCOT scheme is a much more ambitious attempt to crowd in private resources than the tentative fiscal steps taken by Zambia in this regard.

⁴³ Partners of the initiative are the national government, the government of Norway and Norfund; international/aid organisations the Alliance for a Green Revolution in Africa (AGRA), FAO and USAID; global food and drink, seed and fertiliser corporations Unilever, YARA, DUPONT, General Mills, Monsanto, Syngenta, SAB Miller and DIAGEO Africa; banks STANBIC and National Microfinance Bank; Tanzanian umbrella organisations such as the Agricultural Council of Tanzania, the Confederation of Tanzania Industry, Tanzania Sugarcane Growers Association; AgDevCo; the Tanzania Agricultural Partnership and Prorustica, a consultancy. AgDevCo, a British firm, manages SAGCOT's 'Catalytic Fund' (Cooksey, 2013).

Table 5: Comparing scale of support for agriculture in Zambia and Tanzania

Source of finance	% of average annual support or investment directed to the agriculture sector	
	Zambia	Tanzania
FSF	47%	15%
Capital investment	16%	n/a
National budget	6%	7%
ODA	4%	5%
FDI (net)	1%	2%
OOF	0	0

5.7 Common lessons to support private finance for CCD – agriculture

Table 6: Options for mobilising private climate finance in the energy sector in Uganda and Namibia

Findings for Zambia applicable to Tanzania	There is strong policy discourse in both countries around creating an enabling environment for private investment. Zambia and Tanzania could, however, both more effectively align their economic and regulatory instruments to encourage greater private investment in the sector. The building blocks are there, but politically expedient spending, like input support programmes, divert valuable resources away from more public investment in more durable sector development. Although these programmes are aimed at the poor, there are significant criticisms about their ability to actually create longer-term development, particularly as designed (e.g. Cooksey, 2013; IAPRI, 2013b).
Findings for Tanzania applicable to Zambia	SAGCOT provide some evidence, at least in principle, that large-scale out-grower scheme development could provide a way of promoting private sector investment in the agriculture sector that supports smallholder farmers, although it is still at inception stage. Its ability to benefit smallholders will depend on factors like their relative bargaining power, and thus terms of trade. However, it remains to be seen whether this policy approach can also mainstream climate change considerations.

It would be useful to undertake a more in-depth analysis of Tanzania's agriculture sector to uncover where public and private investment is currently focused, and opportunities for domestic and international support to mobilise additional private flows.

6 Conclusions

This research had two goals. The first was to test an approach that would support collection of information on private climate finance, while identifying the incentives (both domestic and international) that shape this investment. The second was to support governments in their efforts to shift or direct additional private resources to CCD, by analysing the findings from this application of this methodology. In this case, our focus is on countries and sectors in Africa; however, the approach was developed to be relevant and applied globally.

6.1 Crosscutting findings: private climate finance in Africa

Most discussions of private climate finance focus on the availability of capital from the financial sector, such as debt and equity markets, guarantees and insurance. This neglects the investment decisions made within businesses (on-balance-sheet finance) and households, which constitute a large portion of the economic activity in many sectors, particularly in Africa. This would include business decisions at all scales of the economy, from large businesses to households. Understanding capital investment decisions at these different levels will be necessary in order to design public investment and incentives to mobilise private climate finance.

The greatest private financing gap in Africa is for smaller-scale activities and diffusion of innovations and new technologies. This is illustrated by the challenge in Uganda's energy sector of effectively financing small-scale energy generation, and formalising and increasing sustainability of biomass energy, and in Zambia's agriculture sector in agricultural investments that will help smallholders farmers adapt to climate risk.

Often, the route to overcoming this gap is assumed to be through project-level interventions to finance small, diffuse technologies. However, the financing of such technologies is not amenable to current frameworks of project financing (with significant and thus costly structuring), and requires the deepening of other forms of capital, such as venture equity financing for businesses developing the technology, and local commercial debt available to facilitate dissemination. At least one major obstacle is access to finance for the poorest (or access to products and services on an affordable fee basis). Therefore, interventions that improve the capacity of local financial institutions and businesses to support small-scale investments, and products and service at the bottom of the pyramid, particularly those that are climate compatible, will be an important means to overcoming this barrier.

Private capital investment is also significantly determined by both the financial opportunities presented by various economic sectors and the regulatory, economic and information instruments that create the environment for those financial opportunities. For public policy to effectively mobilise private resources requires more than the isolated climate finance-based incentives that sit within a larger set of public policies pulling in other directions. Uganda's increasing advancement in the power sector has been based on its ability to present a package of regulatory reforms bundled to provide a coherent set of incentives. Challenges in Zambia's agriculture sector in part arise from not yet having a coherent framework that merges its high-level policy ambitions (which include recently developed climate objectives), its public investment (primarily price supports for small farmers) and its regulatory regime (aimed at increasing liberalisation).

The primary drivers of (primarily public) climate finance remain international development institutions. They may sometimes get traction in national strategies, but these activities generally run in parallel with

governments' regulatory and investment decisions. Effectively shaping the private finance of climate decisions will require that these act in concert.

This means that, for large- and small-scale investment alike, the combination of incentives (regulatory, economic and information) that constitute the 'enabling environment' for private sector investment remains the critical issue for mobilising private climate finance. Piecemeal identification of incentives and investments that support a few flagship projects will have less impact than sector-wide, coordinated activities aimed at providing viable climate-compatible investment propositions for the private sector.

6.2 Crosscutting findings: data collection and analysis

6.2.1 Applicability of typologies and frameworks

Categorising incentives (Figure 1)

It was a straightforward process to identify the relevant incentives for private investment at sector level to fill in the industrial policy tools (incentives) framework (Framework 1) to the energy sector in Uganda and the agriculture sector in Zambia.

From the case studies in Uganda and Zambia, we would suggest including the following additional incentives in Figure 3 (template for Framework 1):

- Regulatory: executive orders and court orders, enforceable PPAs and IAs, independent regulatory authority, land use laws;
- Economic: capacity payments, parallel infrastructure (roads and transmission lines), *ex-post* analysis of economic incentives to sub-sector actors;
- Information: policies, plans and strategies, land and resource registries, independent investment authority, industry associations, availability of sector-relevant climate data to market participants.

One of the most surprising findings from applying this typology was that the majority of policies, plans and strategies would sit under information instruments for private sector investment as opposed to under regulatory instruments. This was because these documents primarily contained indicative information or objectives as opposed to binding regulations or incentives.

Establishing sub-sector categories for tracking climate finance (Figure 2)

It was a straightforward process to find the information required to fill in the sources of capital framework (Framework 2) for the energy sector in Uganda and the agriculture sector in Zambia.

However, it was very challenging developing the sub-sector groupings to use for analysis within the framework. Although we attempted to use the lowest level of ISIC classification ('classes') for our sub-sector categories used at country level, these were not granular enough to analyse information in a manner relevant to climate finance. By way of example for the energy sector, ISIC Class 3150, which is the highest level of granularity, encompasses a wide range of energy project types, including *operation of generation facilities that produce electric energy, including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable*. As a result, in the case of the energy sector in Uganda and the agriculture sector in Zambia, we developed our own sub-sector categories based on the country's heat and electricity generation mix, and key commodities, respectively. Additional reviews of relevant ISIC classes (sub-sectors) can be completed through testing of the methodology across additional sectors, which together may over the longer-term inform amendments to ISIC and other finance coding approaches to better allow for tracking climate finance.⁴⁴

⁴⁴ One next step may be to determine how ISIC codes and other systems to monitor investment might become more granular to enable greater tracking of the shift (or lack thereof) to climate-compatible investment.

Assessing the climate-relevance of sub-sector categories is also challenging because, although it identifies where resources are directed, many activities relevant to the climate compatibility of a sector will cut across these categories. This is less so for sectors like energy, where many investments have clear life-cycle emissions consequences that are translated into mitigation implications. The dilemma becomes more apparent for climate-relevant sectors like agriculture, where private investment data are divided by commodity, but climate relevance may have more to do with specific agricultural practices, landscape uses and other factors about which there are little private sector-specific data.

Tracking investment trends over time (Figure 2:)

The primary barriers to completing Framework 3 were the absence of publicly available data on private investment, discrepancies in the definitions and categories used in international and national data sets, gaps in coverage for particular years and the fact that sub-sector data are not collected by a number of actors.

It was also not possible to identify levels of private investment in the energy sector beyond FDI, as domestic investment was not covered by any of the national or international datasets.⁴⁵ This is a critical limitation because domestic private investment is the predominant source of private finance under most circumstances, and data on it are crucial to understanding how private climate finance is mobilised. It was also impossible to find sub-sector information for FDI, with the lowest level of classification in Bank of Uganda statistics being ‘electricity and gas’, which links to the ISIC category limitations outlined above. The lowest level of classification in Bank of Zambia statistics is ‘agriculture, forestry and fishing’.

Further, sub-sector classification tends to provide greater granularity for project finance investment than for corporate finance. Because corporate finance may flow to cross-sector enterprises and is on-balance sheet, determining the flow of these resources towards climate-relevant economic activity would require company-level financial information.

Despite these obstacles to data collection, and in order to highlight the trends observed in the available information, we calculated average annual investment (or support provided) where data were provided across multiple years. This enabled us to show investment to the energy sector as compared with investment to the country as a whole (for national budget, ODA, FDI, OOFs and FSF), and investment by sub-sector (for all categories except FDI, where this information was not available). Each data provider uses different sub-sector categories, and these have been shown to demonstrate the opportunities both for additional investment data collection and transparency but also for harmonisation across datasets.

It remains to be seen whether applications of this methodology in additional countries will allow for this framework to be completed in a manner that tracks changes in sub-sector investment over time (as per Figure 3), or if it is possible only to develop ‘snap-shot’ investment information (as per Figures 12 and 22). It is anticipated that it will be even more challenging to find private investment information for other climate-relevant sectors (Box 1) and sub-sectors.

6.2.2 Access to information

The absence of publicly available information on historic levels of investment has significant implications for tracking climate finance effectiveness, and not only because it pertains to mobilising further private capital. If it is not possible to track support and investment at sub-sector level, it is not possible to make a causal link between the support provided and any shifts or increases in climate-compatible activities and investment.

⁴⁵ With support from DFID, BNEF will be publishing Climatescope data for the energy sector in a number of countries in Africa, which will cover private investment in the country for some of the sub-sectors and sources of capital in this report. However, it will not be possible to see information by both sources of capital and sub-sector (only separately). See BNEF (2013) for data and the methodology for a review of investment in countries in Latin America.

Given the relatively significant levels of information and data sets for energy⁴⁶ (and renewable energy in particular), it is anticipated that finding private investment information for other climate-relevant sectors and sub-sectors will be as challenging as it was for the agriculture sector, for which we did not identify any global datasets. Research relied on compiling data from multiple sources, with different time scales and categorisations of capital and of sub-sectors.

As a result, in addition to applying the methodology in a number of additional countries and sectors, we propose looking into the following questions on data availability for private climate finance assessments:

- To what extent are investment data for climate-relevant sector transparent, comparable and publicly available?
- What is the cost (time and financial) of accessing data?
- Who are the data holders in a given country/sector – and what are the drivers and barriers for making information open and transparent?

This work will seek to build on existing open data and data transparency initiatives. One possibility may be to look at countries that have already accepted and adopted open data protocols for public finance, including the US (data.gov), the UK (data.gov.uk and openei.org), Kenya (opendata.go.ke) and Ghana, and therefore see the benefits of the wider disclosure of private climate finance.

Finally, in addition to applying the methodology to a range of countries and sectors to inform climate finance, where possible, we hope this approach will inform a broader group of actors who want to understand how private finance can be shifted and mobilised towards global public goods.

⁴⁶ In addition to BNEF Climatescope data, there are a number of data sources on energy investment including International Energy Agency (IEA), REN 21 (Renewable Energy Policy Network for the 21st Century), International Renewable Energy Agency (IRENA), Ernst and Young RE Attractiveness Index, and the Vivid Low Carbon Economy Index. However, the majority of these sources do not have information at sub-sector level, or are not updated annually, or only cover BRICS and OECD countries.

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Appendix 1: African countries included in international datasets

Dataset	PPI – World Bank	FDI – UNCTAD	ODA and OOF – OECD	FSF – ODI
Climate-relevant sectors covered (see Box 1)	Energy, Transport, Water and Sewerage (also by sub-sector)	None	Construction, Mineral Resources, Industry, Forestry, Agriculture, Energy, Communications, Transport and Storage, Water Supply and Sanitation (also by sub-sector)	Water and Sanitation, Energy, Forestry, Industry, Transport, Agriculture
Algeria	x	x	x	x
Angola	x	x	x	x
Benin	x	x	x	x
Botswana	x	x	x	x
Burkina Faso	x	x	x	x
Burundi	x	x	x	x
Cameroon	x	x	x	x
Cape Verde	x	x	x	x
Central African Rep	x	x	x	
Chad	x	x	x	
Congo, Dem. Rep.	x	x	x	x
Congo (Zaire)	x	x	x	
Comoros		x	x	x
Djibouti	x	x	x	x
Egypt	x	x	x	x
Eritrea	x	x	x	x
Ethiopia	x	x	x	x
Equatorial Guinea		x	x	
Gabon	x	x	x	x
Gambia	x	x	x	x
Ghana	x	x	x	x
Guinea Bissau	x	x	x	
Guinea	x	x	x	
Côte d'Ivoire	x	x	x	x
Kenya	x	x	x	x
Lesotho	x	x	x	x
Liberia	x	x	x	x
Libya		x	x	
Madagascar	x	x	x	x
Malawi	x	x	x	x
Mali	x	x	x	x
Mauritania	x	x	x	x
Mauritius	x	x	x	x
Mayotte			x	
Morocco	x	x	x	x
Mozambique	x	x	x	x
Namibia	x	x	x	x
Niger	x	x	x	x

Dataset	PPI – World Bank	FDI – UNCTAD	ODA and OOF – OECD	FSF – ODI
Climate-relevant sectors covered (see Box 1)	Energy, Transport, Water and Sewerage (also by sub-sector)	None	Construction, Mineral Resources, Industry, Forestry, Agriculture, Energy, Communications, Transport and Storage, Water Supply and Sanitation (also by sub-sector)	Water and Sanitation, Energy, Forestry, Industry, Transport, Agriculture
Nigeria	x	x	x	x
Rwanda	x	x	x	x
São Tomé and Príncipe	x	x	x	x
Senegal	x	x	x	x
Seychelles	x	x	x	x
Sierra Leone	x	x	x	
Somalia	x	x	x	x
South Africa	x	x	x	x
South Sudan	x	x	x	x
Sudan	x	x	x	x
St Helena			x	
Swaziland	x	x	x	
Tanzania	x		x	x
Togo	x	x	x	x
Tunisia	x	x	x	x
Uganda	x	x	x	x
Zambia	x	x	x	x
Zimbabwe	x	x	x	x

Note: x = available; not available.

Appendix 2: Sources of information for Framework 2 (Uganda and Zambia)

Uganda

Large hydro – existing

Bujagali (250 MW – ~\$900 million – 2012), IPS (Kenya) Aga Khan Foundation and Sithe Global (US company) 50/50 equity (15-20%), eight other lenders, World Bank/IFC, AfDB, Absa (RSA), Standard Chartered, EIB, KfW and FMO, GoU (\$75 million loan from energy fund) (from interviews) (CDM registered). The project suffered continuous delays and increased project costs of 56% from \$550 million at its inception, to more than \$860 million at completion in 2012 (from EIU). Nalubaale and Kiira (380 MW, 1954/2000), Eskom concession and investment of \$35 million.

Large hydro – planned

Karuma, Isimba and Ayago are being financed 85% by the China ExIm bank (from Daily Monitor, two articles). Isimba – construction started in 2013 (188 MW, 570m) China International Water and Electric Corporation (CWE) – CWE petitioned the East African Court of Justice to compel Uganda to follow procurement laws in sourcing for an EPC for Karuma. State-owned CWE signed a memorandum of understanding with GoU to build the dam, which is being financed by a Chinese government loan of \$570 million. The Chinese government and China's ExIm Bank will provide the funds for the dam through a bilateral arrangement. Karuma – works will not start until 2018 (600 MW, 2.2 billion). Sinohydro Corporation Ltd – the contract was 'controversially awarded' directly by President Museveni, reportedly after signing bilateral agreements between the Ugandan and Chinese governments. China will finance 85% of the project (from Daily Monitor). GoU would use money from the Energy Fund as well as credit from China to fund the project. Bukenya added that proceeds from the recently discovered oil would be used to finance future energy infrastructure projects. A 2012 energy report says that the 600 MW Karuma Hydropower Project is estimated at \$2.2 billion, but the signed contract is reported at \$1.65 billion. The report adds that GoU would provide \$700 million co-financing while China provides concessional funding amounting to \$500 million (from Red Pepper). Ayago – not clear when construction will start (\$1.9 billion, 600 MW, government funded, Chinese contract – China Gezhouba Group). JICA pulled out after supporting development of feasibility studies, also awarded concession to Turkish Company (Mapa Construction) and then withdrawn.

Small hydro

Buseruka (Kabelega) mini hydro dam – January 2013 (\$30 million, 9 MW), Hydromax Ltd (from Daily Monitor). Funding for the project is facilitated by loans from the AfDB (\$9 million) and from the PTA Bank (regional development bank for South and East Africa) (\$10 million). Hydromax (Ugandan – Dott Services Ltd) will invest \$8 million in the project. Mpanga (EMS), 18 MW, \$27 million, EAIF \$20 million loan (PIDG), \$7 million SEAMS (US). Mpanga River hydropower plant is one of a portfolio of 13 small hydropower projects located in Sri Lanka and Uganda with a combined generation capacity of 70 MW. They are being developed, owned and operated by South Asia Energy Management Systems, a US-based renewable power developer, requiring a total investment of \$110 million. \$38 million of this has been raised in the form of equity investment by the project sponsor, and the balance of \$72

million in the form of long-term debt from a consortium of development finance institutions, including EAIIF (from EAIIF). Bugoye (Mubuku II) (13 MW, \$52.7 million, 2009). The Emerging Africa Infrastructure Fund (\$33 million) played a significant part through its 15-year senior loan, while Norfund (\$6.3 million) and the commercial sponsor Tronder Energi (\$13.4 million) both made equity contributions to the project. Guarantee provided on full tariff by UECTL (provided by the World Bank) (stopped from Bujagali onward) (Tronder Power Limited – Norwegian-owned, Uganda-based). This does not include the construction of a 33 kV transmission power line linking the power station to the substation where the power is integrated into the national grid. The power line was funded by a grant from the government of Norway to GoU. By mutual consent between the two governments, Tronder Power Limited assumed the responsibility of developing, constructing, maintaining and servicing the power line. Tronder Power Limited is a Ugandan company co-owned by TronderEnergi and Norfund. VCS ‘active’ and CDM registered. Ishasha/Kanungu (Eco-Power – Sri Lanka) (6.6 MW, 2011, \$14 million) (imperial group). Funding is provided by three Sri-Lankan financial institutions; namely i) National Development Bank of Sri-Lanka, ii) Hatton National Bank and iii) Commercial Bank of Sri Lanka. CDM registered. Mubuku I (Kilembe Mines 5 MW, 1950s, for copper mining – stopped in 1970s) Tibet-Hima Consortium, has plans to increase capacity of power plant to 12 MW. Mubuku III (2008, 10 MW) and Kasese Cobalt Company Ltd (25% state, 75% Blue Earth Refineries Ltd., British Virgin Islands corporation located in Hong Kong). Kuluva, Kisiizi (2008 Church of Uganda and UK NGO) and Kagando Hospitals (Charity Friends of Kagando) (0.24 MW). Nyagak (Wenreco) 2012 – (3.5 MW) – part of larger (15 MW, \$12 million) electrification project – KfW is providing \$ 11 million for the construction of Nyagak Power Station through the government. The West Nile Rural Electrification project was the first African project to qualify for carbon financing under the World Bank’s Prototype Carbon Fund (CDM registered). The project was developed by the West Nile Rural Electrification Company Ltd. (WENRECO), a subsidiary of Industrial Promotion Services (IPS). WENRECO is 100% owned by the Industrial Promotion Services (K) Ltd. IPS is in turn the industrial and infrastructure arm of the Aga Khan Fund for Economic Development (AKFED). Other IPS shareholders include the IFC (the World Bank’s private arm), Germany’s DEG and Jubilee Insurance Company. Nyamwamba – financial close (14 MW, \$36 million, construction not started) – \$24 million loan – FMO will provide \$12 million, the Emerging Africa Infrastructure Fund \$6 million, DEG \$4 million and Finnfund \$2 million. Barclays Bank Plc: corporate actor, international bank (contribution through the EAIIF), primary headquarters in the UK. Standard Bank of South Africa Ltd: corporate actor, international bank (contribution through the EAIIF), primary headquarters in South Africa. Equity funding – \$12 million SAEMS (US). SAEMS – also received credit for road construction.

Thermal – heavy fuel oil

Tororo (50 MW –\$ 60 million – 2010), Electro-maxx, Stanbic and Crane Bank (debt), Simba Group (equity). Namanve (50 MW – €66 million – 2008), Jacobsen, NORAD (grant), Nordea Bank Norway, Stanbic Bank Uganda, Jacobsen Elektro and a GIEK guarantee. Mutundwe (50 MW), Aggreko (on London Stock Exchange), no longer running. Part of a broader package of World Bank support, including the capacity and energy charges of a 50 MW thermal plant to be installed at Mutundwe, Kampala. Supporting capacity for generation of additional power to alleviate shortages in the short term, including facilitating Uganda Electricity Transmission Company Ltd to purchase thermal power produced by a 50 MW thermal power generation plant at Mutundwe in the territory of the recipient.

Biomass

Kakira (22 MW to 52 MW, \$65 million, 2013). As of November 2013, Kakira Sugar Works was in the middle of a \$75 million (about UGX 191 billion) upgrade and expansion. \$30 million (about UGX 76 billion) will be raised through a 10-year corporate bond on the Uganda Securities Exchange and the rest will be sourced from local banks. When the upgrade is completed, the cogeneration capacity of Kakira Power Station will be increased from 22 MW to 52 MW. Kinyara (14.5 MW to 40 MW, 2015) – Kinyara Sugar Works Limited.

Charcoal

GVEP Loan Guarantee (from GVEP website) – funding from USAID and support from the Garfield Weston Foundation, Jump Up and Barclays Bank allowed GVEP to set up the fund and to work with

microfinance institutions to develop loan products for energy enterprises. It was pioneered in Kenya, Tanzania and Uganda, and sought to establish a methodology that could be applied elsewhere in the developing world. So far around 135 businesses have benefited from these arrangements, and further funding to support expansion of the scheme has been provided by the Vitol Foundation. Through the Developing Energy Enterprises Project (DEEP), GVEP developed a sustainable and widespread industry of micro and small energy enterprises. Spanning five years, DEEP started in March 2008 and ended in February 2013. This €4 million initiative was supported by the EU and the Dutch Ministry of Foreign Affairs. It aimed to deliver energy access to 1.8 million people in Kenya, Tanzania and Uganda. Eco-Fuel Africa Ltd is a start-up enterprise based in eastern Kampala. Founded in 2010 by Moses Sanga, an experienced entrepreneur and graduate in Business Administration and having received a seed grant of \$10,000 from the GoU, Eco-Fuel established itself making carbonised briquettes from agricultural wastes. Investors are Halloran Philanthropies, Global Catalyst Initiative (not clear where their money comes from), Sida. Green Resources is Africa's leading forestation company and a leader in East African wood manufacturing. The company was established in 1995 and is a private Norwegian company with 80 shareholders. In Jinja, Green Resources operates a pole treatment plant. There has been a recent addition of an integrated charcoal production with retort charcoal kilns and a charcoal briquetting plant. A simple sawmill started up during 3Q 2012 to saw second thinning from the company's own pine forest. Green Bio Energy (long list of partners – not clear investors). KJS was founded by Mr Abasi Musisi in 1976 to produce cosmetic products from petroleum jelly. The business diversified into coffee processing and baking, using LPG as the fuel. In 1992, Mr Musisi started to look for cheaper alternative fuels, and experimented with using loose biomass residues, but found that these burned too quickly. The Danish Embassy funded a feasibility study on biomass briquetting, with funding provided through Danida to buy the first briquetting machine and set up production. The company has been financed by its founder and its own income, the grant from Danida (\$100,000) and a US African Development Foundation grant (\$85,000) for developing business plans and staff training. In 2008/09, KJS had a turnover of \$160,000 and employed 43 staff. The Harvest Fuel Initiative has partnered with four entities in the few months since it was launched (TEWDI, Nakabale and Green Bio).

Solar

SolarNow combines two separate high-volume consumer businesses in one, distribution and credit. With customer payments well within the set targets and the company set to reach institutional break-even in 2012, the culmination of this success has been to reach term sheets with three major equity providers and to have approval for a \$2.5 million loan guarantee from USAID to Centenary Rural Development Bank. The loan guarantee is the first of its kind in Uganda and was to a large extent facilitated by Arc Finance. Launched last year, US-based site SunFunder raises finance for off-grid solar projects in developing countries. By April 2013, it had raised some \$70,670 from 539 people for projects in Uganda, Zambia, Kenya and the Philippines (from UNEP-BNEF Global Investment in RE 2013). Solar Sister partners – Exxon Mobil, Draper Richards Kaplan Foundation, Ashoka, Global Social Benefits Incubator, USAID. Barefoot Power – support from EIB, based in Australia (raised finance from SE funds).

Biogas

However, uptake of Biogas technology in Uganda and Africa in general has been considerably slow and faced a lot of barriers. Progress by a tripartite programme composed of Heifer International (as the National Implementing Agency), HIVOS as Fund Manager and SNV as a Technical Advisor to install biogas systems countrywide has been very slow. The Uganda Domestic Biogas Programme targets small-scale livestock farmers to address the challenge of domestic energy (woodfuel and its associated problems) and has plans to construct 12,000 digesters by end of 2013. The African Biogas Partnership Programme (ABPP) is being implemented in six African countries through a multi-stakeholder sector development approach. This is a systemic approach to developing biogas programmes inspired by SNV experience in Asia. €30 million has been committed by the Directorate-General for International Cooperation of the Ministry of Foreign Affairs for the Netherlands government to finance 70,000 digesters, knowledge management, fund management and SNV technical assistance. This is a five-year programme, running from 2009 to 2013. The target countries are Burkina Faso, Senegal, (West Africa) Ethiopia, Uganda, Kenya, Tanzania (Eastern Africa). The Dutch Ministry of International Trade and

Development Cooperation has approved the funding for Phase II of ABPP. It will provide €20 million, which constitute 23% of the total programme budget of €87.9 million. The funding will cover five current countries. The other part of the budget is distributed as follows: €54 million from households, €6.9 million from host governments, €7 million from other donors. Kentainers initiates a pilot programme for biogas units – following a memorandum of understanding with Jaramogi Oginga Odinga University, the institute of higher learning will carry out pilot tests on Kentainer’s biogas units. They will be assessed on functionality, productivity and suitability in regards to agriculture and energy. Through research on its viability, the university will give scientific data of output in terms of gas and application of slurry, which is organic fertiliser. The independent data and research will add validity to Kentainer’s own results. Green Heat is implementing and facilitating biogas installation for the Afri-Flame Network, a team of agriculture, soil science and renewable energy researchers and developers from universities, institutes and technology companies in Uganda, Cameroon, Ethiopia and Scotland. The consortium has received a grant from the African Union to set up biogas digesters and fuel saving stoves in ‘energy villages’ in Uganda, Ethiopia and Cameroon.

Zambia

Maize: GRZ (via FISP and FRA programmes); IFC (Loans to Zambeef and Zanaco); Zanaco; Zambeef Products Plc; Speciality Foods (Z) Ltd; Amigo Foods Ltd; Zambia Seed Company Ltd; Dunavant Zambia Ltd; Cargill Zambia Ltd; National Milling Corporation Ltd; Mpongwe Milling Ltd; Chayton Atlas Agricultural Company; CENAFARM Zambia Ltd; MIGA (Guarantee to Chayton Africa); USAID Partial Guarantee Scheme to ZANACO; Madison Insurance Company Ltd.

Cassava: FAO is supporting cassava production in Central and Luapula provinces of Zambia; Smallholder Productivity Promotion Programme (IFAD; government of Finland; GRZ).

Groundnuts/peanuts: World Bank (Agricultural Development Support Programme); USAID/USADF (Feed the Future; Profit +); IFAD (Smallholder Productivity Promotion Programme); COMACO; Zambia Seed Company Ltd; Smallholder Productivity Promotion Programme (IFAD; government of Finland; GRZ).

Livestock: Various public PPCR stakeholders (Strengthening Climate Resilience in Zambia); AfDB (Livestock Infrastructure Development Support Project); USDAF (grants to MONDACO and ZATAC); World Bank (Development and Animal Health project); IFC (Loans to Zambeef; Zanaco; Country Bird); IFAD, GRZ, Sweden, Finland (Smallholder Agribusiness Promotion); ZANACO; USAID Partial Guarantee Scheme to ZANACO; Zambeef Products Plc; Simba Milling Ltd; Olympic Milling; Hybrid Poultry Farm (Zambia) Ltd; Parmalat Zambia; Ross Breeders Zambia; Africa Feeds; Madison Insurance Company Ltd; Professional Corporation Zambia Ltd.

Tobacco: Alliance One Zambia Ltd; Africa Leaf Zambia; Madison insurance Company Ltd.

Sugarcane: Zanaco; Zambia Sugar Plc; Actis Africa Agribusiness Fund; USAID Partial Guarantee Scheme to ZANACO; Madison Insurance Company Ltd.

Horticulture and floriculture: Various public PPCR stakeholders (Strengthening Climate Resilience in Zambia); York Farm Ltd; Khal Amazi Ltd; Zambia Seed Company Ltd; Gwaza Holdings.

Cotton: World Bank (Agricultural Development Support Programme); Dunavant Zambia Ltd; Cargill Zambia Ltd; Mulungushi; Chipata China-Africa Cotton Zambia Ltd; Alliance Ginneries Ltd; Continental Ginnery Ltd; Madison Insurance Company Ltd; MicroEnsure Ltd; Focus General Insurance.

Coffee: Northern Coffee Corporation Ltd.

Wheat: Zambeef Products Plc; National Milling Corporation Ltd; Zambia Seed Company Ltd; Cargill Zambia Ltd; Mpongwe Milling Ltd; Chayton Atlas Agricultural Company; CENAFARM Zambia Ltd; MIGA (Guarantee to Chayton Africa); Madison Insurance Company Ltd

Soybeans: World Bank (Agricultural Development Support Programme); IFC (Loans to Zambeef and Zanaco); ZANACO; COMACO; Dunavant Zambia; Cargill Zambia Ltd; Zambeef Products Plc; National Milling Corporation Ltd; Gourock Industries Ltd; Zambia Seed Company Ltd; Dunavant Zambia Ltd; Cargill Zambia Ltd; Chayton Atlas Agricultural Company; USAID Partial Guarantee Scheme to ZANACO; CENAFARM Zambia Ltd; Madison Insurance Company Ltd.

Appendix 3: Sources of information for Framework 3 (Uganda and Zambia)

Table A3.1: Scale of finance – Uganda

Scale of finance - Uganda (total)

	Years	Average annual investment / support (USD million / yr)	Data source
Uganda budget	2010/11-2012/13	2,302	(IMF, 2013b)
ODA disbursed	2008-2012	1,679	OECD Creditor Reporting System
FDI net inflows	2005-2012	623	WB, World Development Indicators (2005 – 2011) UNCTAD, World Investment Report 2013 (2012)
FSF	2010-2012	35	ODI, Climate Funds Update, FSF data set
OOF disbursed	2008-2012	89	OECD Creditor Reporting System

Scale of finance – Uganda (energy sector and sub-sectors)

	Years	Average annual investment /support (USD million)	Data source
Uganda budget (MEMD)	2010/11-2012/13	141	Uganda Budget Information and MEMD Annual Ministerial Policy Statements ⁴⁷
ODA disbursed (energy)	2008-2012	95	OECD Creditor Reporting System
FDI net (electricity and gas)	2009-2012	278	Bank of Uganda, Private Sector Investment Surveys
FSF (energy)	2010-2012	21	ODI, Climate Funds Update, FSF data set
OOF disbursed (energy)	2007-2012	20	OECD Creditor Reporting System

⁴⁷ There are also energy projects in the budget for Ministry of Water and Environment (MWE) which have not been included in our analysis, as this would have required qualitative selection from project lists, as opposed to using the Ministry's own department and project categories.

Table A3.2: Scale of finance – Zambia**Scale of finance - Zambia (total)**

	Years	Average annual investment / support (USD million / yr)	Data source
Zambia budget	2011-2013	2,700	IAPRI
ODA disbursed	2008-2012	1,200	OECD Creditor Reporting System
FDI net inflows	2009-2012	1,100	Bank of Zambia
FSF	2010-2012	34	ODI, Climate Funds Update; FSF data set
OOF		0	OECD Creditor Reporting System

Scale of finance - Zambia (agriculture sector and sub-sectors)

	Years	Average annual investment /support (USD million)	Data source
Zambia budget	2011-2013	1,600	IAPRI
ODA	2008-2012	48	OECD Creditor Reporting System
FDI net (agriculture, forestry, fishing and hunting)	2010	13.2	Sutton and Langmead, 2013
FSF	2010-2012	16	ODI, Climate Funds Update
OOF		0	OECD Creditor Reporting System



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Overseas Development Institute
203 Blackfriars Road
London SE1 8NJ
Tel +44 (0)20 7922 0300
Fax +44 (0)20 7922 0399

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