Working paper

Mapping current incentives and investment in Uganda's energy sector

Lessons for private climate finance

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Abstract

This paper describes the findings from the very first application of a new methodology to support governments and development partners that wish to mobilise private finance for climate-compatible development (CCD). Piloting this methodology in Uganda's energy sector allowed us to make two distinct sets of findings that are useful for actors seeking to mobilise private climate finance.

The first set of findings emerges from the available data and information, through which we can we can identify opportunities for the Ugandan government and development partners to develop additional market level incentives that can support scaled up climate compatible investment, and where there are gaps in sources of capital that might be filled by both public and private investment. The second set of findings is around data gaps. As unfortunately, due to the absence of granular information on investment in the energy sector, and discrepancies in the definitions and categories in international and national data sets, we found that it was not possible to map historic investment.

We aim to apply this methodology in a number of additional countries and sectors, with the goal of identifying additional opportunities to mobilise private climate finance, including through improved transparency of private investment data in climate relevant sectors.

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We would welcome further inputs to this report from climate finance practitioners and those working and investing in the energy sector in Uganda.

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Abbreviations

Abbreviation	Description
ADC	Austrian Development Cooperation
AEEP	Africa EU Energy Partnership
AfDB	African Development Bank
BIO	Belgian Investment Company for Developing Countries
BMU	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Germany
BOU	Bank of Uganda
BRICS	Brazil, Russia, India, China, South Africa
BRT	Bus rapid transit
CCD	Climate-compatible development
CDM	Clean Development Mechanism
Ci-Dev	Carbon Initiative for Development
CSP	Concentrated solar power
CSR	Corporate social responsibility
CTI PFAN	Climate Technology Initiative's Private Financing Advisory Network
DANIDA	Danish International Development Agency
DB	Doing Business index (World Bank)
DFI	Development finance institution
DGIS	Directorate General for International Cooperation of the Dutch Ministry of Foreign Affairs
EAC	East African Community
EAPMP	East African Power Master Plan
EC	European Commission
EE	Energy efficiency
EIB	European Investment Bank
ERA	Electricity Regulatory Authority
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
FF	Fossil fuel
FMO	Dutch development bank
FSF	Fast-start finance
GEF	Global Environment Facility
GET FiT	Global Energy Transfer Feed-in Tariff
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GoU	Government of Uganda
GVEP	Global Village Energy Partnership
HDI	Human Development Index
HFO	Heavy fuel oil
IA	Investment agreement
ICT	Information and communication technology
IFC	International Finance Corporation
IFI	International financial institution
IMF	International Monetary Fund
IPP	Independent power producer
JICA	Japan International Cooperation Agency
kWh	Kilowatt hour
KfW-GRMF	KfW Geothermal Risk Mitigation Facility

MDB	Multilateral development bank
MEMD	Ministry of Energy and Mineral Development
MW	Megawatt
MWE	Ministry of Water and Environment
NDF	Nordic Development Fund
NDP	National Development Plan
NGO	Non-governmental organisation
ODA	Official development assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OOF	Other official flows
OTC	Over-the-counter (in relation to debt securities)
PPA	Power purchase agreement
PPP	Private public partnership
PVTMA	PV Targeted Market Approach
RE	Renewable energy
REA	Rural Electrification Agency
REF	Rural Electrification Fund
RE FiT	Renewable energy feed-in tariff
SACCO	Savings and Credit Cooperative
SME	Small and medium enterprises
Solar PV	Solar photovoltaics
TLC	Transparency, Longevity and Certainty
UBOS	Uganda Bureau of Statistics
UEB	Uganda Electricity Board
UECCC	Uganda Energy Credit Capitalisation Company
UEDCL	Uganda Electricity Distribution Company Ltd.
UEGCL	Uganda Electricity Generation Company Ltd.
UETCL	Uganda Electricity Transmission Company Ltd.
UGX	Ugandan Shilling
UIA	Uganda Investment Authority
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USADF	United States African Development Foundation
USAID	US Agency for International Development
WB	World Bank
WENRECo	West Nile Rural Electrification Company Ltd.

Executive summary

This paper describes the findings from the very first application of a new methodology to support governments and development partners that wish to mobilise private finance for climate-compatible development (CCD). In this case, the methodology – developed by the Overseas Development Institute (ODI) – has been applied to the mapping of current incentives and investment in Uganda's energy sector.

There is consensus within the discourse on climate finance that there is a key role for the public sector (and donor funds more specifically) in mobilising private investment in CCD. However, there has been limited analysis about what specific role the public sector and public resources should play, particularly in light of recent findings on 1) the importance of domestic private investment, and 2) the current domination of public investment in international finance for CCD.

The first aim of this methodology is to fill these key information gaps about incentives and investment at country level in climate-relevant sectors, in order to support governments in their efforts to shift or direct additional private resources to CCD. The second is to enhance understanding of the links between public support (both domestic and international) through regulatory, economic, and information instruments, and through private investment in CCD.

Applying this methodology involves completing three frameworks for any given country and sector (and sub-sectors).

- Framework 1: industrial policy tools (incentives)
- Framework 2: sources of capital (current)
- Framework 3: investment trends (historic)

Piloting this methodology in Uganda's energy sector allowed us to make two distinct sets of findings that are useful for actors seeking to mobilise private climate finance.

The first set of findings emerges from the available data and information on incentives and investment in Uganda's energy sector. By completing Frameworks 1 and 2 respectively, we can identify opportunities for the Ugandan government and development partners to develop additional market level incentives that can support scaled up climate compatible investment, and where there are gaps in sources of capital that might be filled by both public and private investment.

The second set of findings is around data gaps. As unfortunately, due to the absence of granular information on investment in the energy sector, and discrepancies in the definitions and categories in international and national data sets, it was not possible to complete Framework 3. This finding (or lack thereof) has significant implications for the second aim of this research: to determine the links between incentives and private investment within a sector. Although this is a burning question within the international climate negotiations and beyond, without the type

of information sought within Framework 3 (historic investment trends), it will not be possible to assess the impact of support on climate-compatible activities and investment.

We aim to apply this methodology in a number of additional countries and sectors, with the goal of identifying additional opportunities to mobilise private climate finance, including through improved transparency of private investment data in climate relevant sectors.

1. Introduction

Developed countries have committed to mobilise $100 billion annually in long-term climate finance from public and private sources to address the needs of developing countries by 2020 under the United Nations Framework Convention on Climate Change (UNFCCC). While estimates of the scale of climate-financing needs vary substantially, depending upon 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 (Nakhooda, 2012; Montes, 2012). These estimates are 5-10 times higher than the prospective annual flows under the UNFCCC and 3-5 times higher than global climate-finance flows in 2012[1], of which 62% is estimated to have come from the private sector (Buchner et al, 2013).

In addition to widespread acceptance that significant increases in financial resources are needed to help countries undertake climate-compatible development (CCD), there is growing consensus that:

- most of this funding needs to come in the form of private climate finance
- the creation of a stable and attractive regulatory environment through 'Transparency, Longevity and Certainty' (TLC) (or long, loud and legal signals) is essential for the private sector to make these investments, and
- there is a critical role for public finance (domestic and international) to enable greater investment in CCD by the private sector.

See High Level Advisory Group on Climate Change Financing (2010), Mabey (2012), UNFCCC (2012), and Kreibiehl and Miltner (2013).

There are also early research findings that:

- the majority (76%) of climate finance is domestic: sourced and/or originated in the country in which it is used
- the minority of international climate finance (North-South) originates primarily from public sources, and
- there is very limited information available on private investment by climate-relevant sector and sub-sector beyond that for renewable energy, and very little country level data beyond the OECD and BRICS.

See Buchner et al. (2013), Whitley (2013a), Whitley (2013b), Illman et al. (2014), OECD (2014) and IFC (2013).

The Overseas Development Institute (ODI) has developed a methodology to fill key information gaps about incentives and investment at the country level, with the first aim of supporting donor governments in their efforts to shift or direct additional private resources to CCD. This work should also benefit a wider group of stakeholders, including those within government and the private sector. Where information is available, the parallel aim of this research project is to enhance understanding of the links over time between public support (both domestic and international) and private investment in CCD.

This report outlines the findings from the first application of this methodology to the energy sector in Uganda. It is accompanied by a report outlining the data-collection methodology,

[1] This includes investment in both developed and developing countries.

key sources of information, current data gaps, and areas where additional work might be undertaken to improve information on investment at the country and sub-sector level (see Whitley, 2014).

2. Methodology

2.1 Rationale

As outlined above, there is consensus within the discourse on climate finance on a key role for the public sector (and donor funds more specifically) in mobilising private investment in CCD. However, there has been limited analysis about what specific role the public sector and public resources should play, particularly in light of recent findings on 1) the importance of domestic private investment, and 2) the fact that that international finance for CCD is currently dominated by public investment.

To date, those seeking to use public climate finance to support private investment have built their approaches on a two widely held perceptions:

- that there are higher costs and risks to investment in CCD than in other parts of the economy, and
- that approaches to address barriers to investment must be innovative (and have not been undertaken in the past), resulting in a rhetoric around 'tools to mobilise the private sector', 'innovative instruments to leverage private capital', and 'de-risking tools to catalyse private capital'.

These perceptions have led to a focus on interventions to support private investment at the project level through the use of financial instruments such as grants, concessional lending, guarantees and equity investments. See Whitley (2013b) for a database of donor interventions, and Green Climate Fund (2013) for a useful typology of these financial instruments.

There appears to be limited recognition of the role that public sector can (and does) play in shaping private investment. Support to private actors is often justified (by proponents of free markets) on the basis that there is room for government intervention to ensure socially efficient outcomes in the case of market failures, market distortions, or where markets are incomplete (Pack and Saggi, 2006). However, in the broader discourse on industrial policy[2] (Figure 1:) there is a more general acceptance that the public sector has a key role to play in mobilising the private sector, and that a significant portion of the private sector globally depends in some way on support from the public sector[3] (Mazzucato, 2013).

This growing recognition of the critical role for industrial policy in driving investment might call for a more nuanced approach to the allocation of climate finance – an approach that would complement current interventions focused at the project level by re-shaping incentives that drive investment at the sector or country level.

[2] Definitions of industrial policy:
- Government efforts to alter industrial structure to promote productivity-based growth (World Bank, 1993).
- 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).

[3] Recent data from Bloomberg New Energy Finance show that in 2012 total investment by state investment banks in renewable energy totalled $80 billion, compared to a mere $12.5 billion by the private sector (Economist, 2014).

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.

The broader analysis of incentives and investment in key sectors for CCD has two important potential outcomes (0):

- lesson-learning from other sectors on the effectiveness of incentives in mobilising and shifting investment, and
- greater understanding of current incentives (or subsidies) that act as an impediment to private investment in CCD.

It is critical that national-level diagnostic tools be developed that review the different (and often competing) drivers of private investment simultaneously, and that provide valuable lessons and enable replication of best practice across a wide range of sectors.

Box 1: Climate-relevant sectors (Whitley, 2014)[4]

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

2.2 Approach

To address the information and methodological gaps outlined above, we propose to develop an approach to collecting information on climate-relevant investment and incentives using three frameworks and typologies (Figures 1-3). In contrast to the majority of existing research in this space, which has been undertaken using global data sets, this work will complement international data with a review at country level that focuses on investment and incentives in climate-relevant sectors.

Our research aims to answer the following questions.

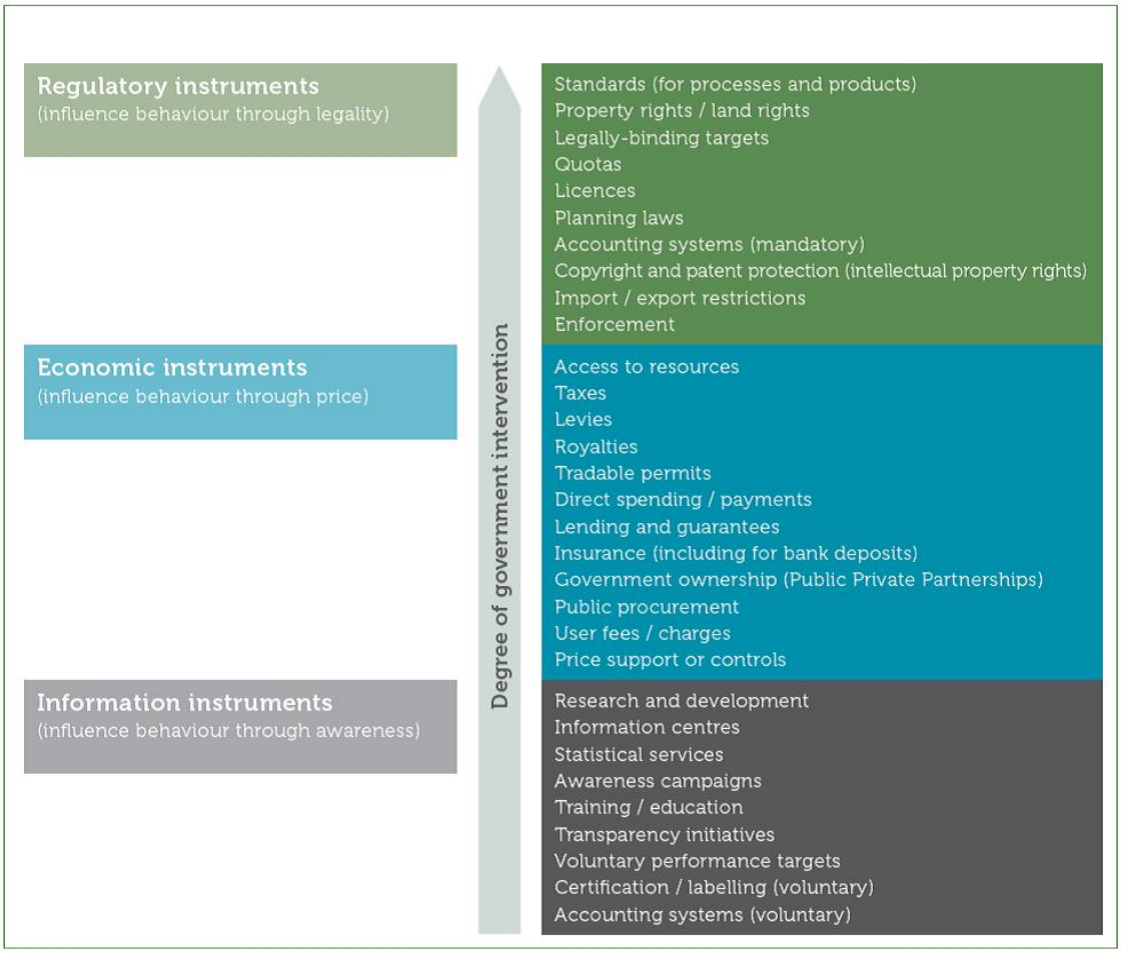
- What are the aspirations regarding investment for the given country / sector?
- What are the primary incentives (regulatory, economic, and information) in place in the given country / sector (Framework 1)?
- What are the sources of capital (current) and investment trends (historic) in the given country / sector (see Framework 2 and 3)?
- How can the information from Frameworks 1-3 inform governments seeking to use climate finance to mobilise private investment?
- What are the data gaps, and how could additional information and data inform domestic and international incentives?

[4] Preliminary list based on Climate Bonds Taxonomy and the International Standard Industrial Classification of All Economic Activities, Rev.4 (Climate Bonds, 2014) and (United Nations, 2008).

The three frameworks were completed at sector (and sub-sector level) based on the review of relevant international and domestic data sources and information, and interviews with key stakeholders in government, private sector and civil society.

This first country study focuses on the energy sector in Uganda[5], and is accompanied by a report outlining the data collection methodology (Whitley, 2014). The aim is to refine this methodology and these frameworks through the application of this approach across multiple countries and sectors.

Figure 1: Template for Framework 1 - Incentives (industrial-policy tools)[6] **(Whitley, 2013a)**



[5] 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.

[6] This preliminary typology is to be refined as part of methodology development.

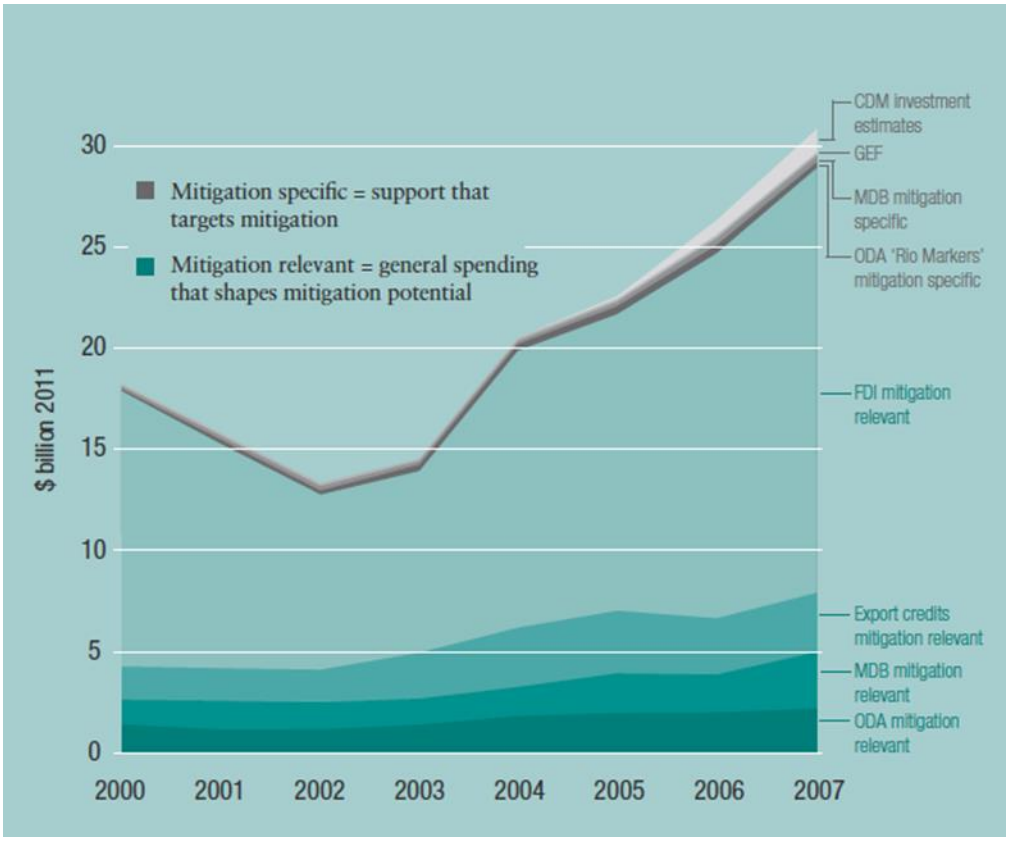
Figure 2: Template for Framework 2 - Sources of capital **(Nakhooda, 2013)**

Sector / Source of capital[1]	Debt (OTC and market traded etc.)		Equity (listed and unlisted – including balance sheet finance)		Guarantees / loan insurance		Insurance (including export credit insurance)		Grants (including philanthropy and corporate social responsibility)	
Investors	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Mature renewable projects (onshore wind, solar PV)										
Maturing renewable projects (geothermal and biomass power)										
Developing renewable projects (offshore wind or CSP)										
Industrial efficiency / Efficient FF generation projects										
Sustainable buildings										
RE / EE equipment										
Sustainable transport solutions (BRT, Rail)[2]										
Waste and water management										
Sustainable agriculture and forestry										
Climate proofing (of infrastructure)[3]										

Key: Established[4] Emerging Limited

1 The table could be expanded by breaking out debt and equity in more detailed sub-categories, and include levels of concessionality
2 Transport and waste/water management are often last to be privatized; public private partnerships may be elusive, and private sector participation is not always possible
3 It may be useful to look at this in terms of specific infrastructure types (roads, buildings, power plants etc.)
4 Specific levels of investment under each category and thresholds for ongoing monitoring need to be refined, and undoubtedly vary across countries.

Figure 3: Template for Framework 3 - Scale of support **(Corfee-Morlot et. al., 2009)**



3. Context – Uganda

The following section provides a brief overview of the climate for investment in Uganda and a snapshot of the country's current energy mix, and energy sector governance.[7] We have included this broader information because, in addition to the incentives for investment in the energy sector (reviewed in Section 4), macroeconomic conditions and levels of financial-sector development at national level can also have significant impact on investment.

3.1 Investment climate

3.1.1 Economy

Uganda's economy has experienced robust economic growth over the past decade, especially in financial services, construction, manufacturing, transportation, telecommunications, energy, infrastructure, and oil and gas sectors (U.S. Department of State, 2013). However, the economy has slowed in the past two years, with GDP growth falling from 6.7% in fiscal year 2010/11 to just 3.4% in 2011/12, which was below the global average. In late 2012, the International Monetary Fund (IMF) lowered its 2012/13 GDP growth projections for Uganda to 4.3% from 5%, after foreign donors suspended nearly $300 million in foreign aid over allegations that as much as $20 million in foreign assistance funds had been stolen by public officials (U.S. Department of State, 2013). ODA flows to state programmes in Uganda have also been reduced in response to the recent passing of the country's anti-homosexuality law (The Associated Press, 2014).

In spite of recent growth, Uganda remains one of the poorest countries in the world (in terms of 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 to reach and sustain high rates of growth of human development. Addressing the current financing constraints requires the ability to harness a combination of tax revenue, foreign direct investment (FDI), official development assistance (ODA), and remittances (see Section 6 for historic sources of finance). In addition, the Government of Uganda (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 countries poor rankings in terms of indices on Corruption Perceptions, Global Competitiveness, and Doing Business (DB). The World Bank's DB ranking details also highlight the negative impact of low access to electricity, protection for investors, and infrastructure for cross-border trade (Figure 5:).

[7] As defined for the purpose of this study, using ISIC) groupings, the energy sector does not include a review of investment in oil exploration and production, which are activities in the extractives sector (see Box 1)

Figure 4: Uganda's ranking on key global indices **(KPMG East Africa Limited, 2013)**

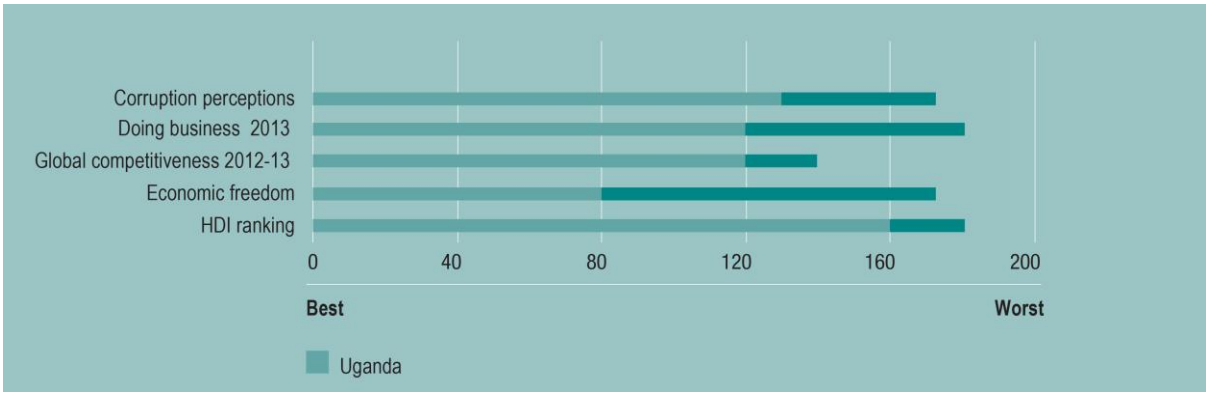
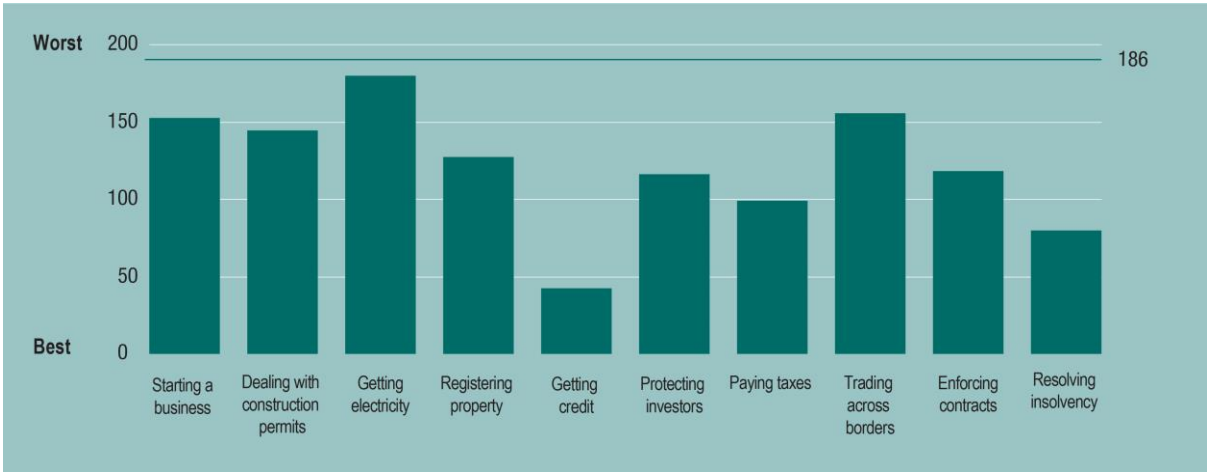


Figure 5: Uganda ranking on World Bank Doing Business topics **(The World Bank, 2013)**

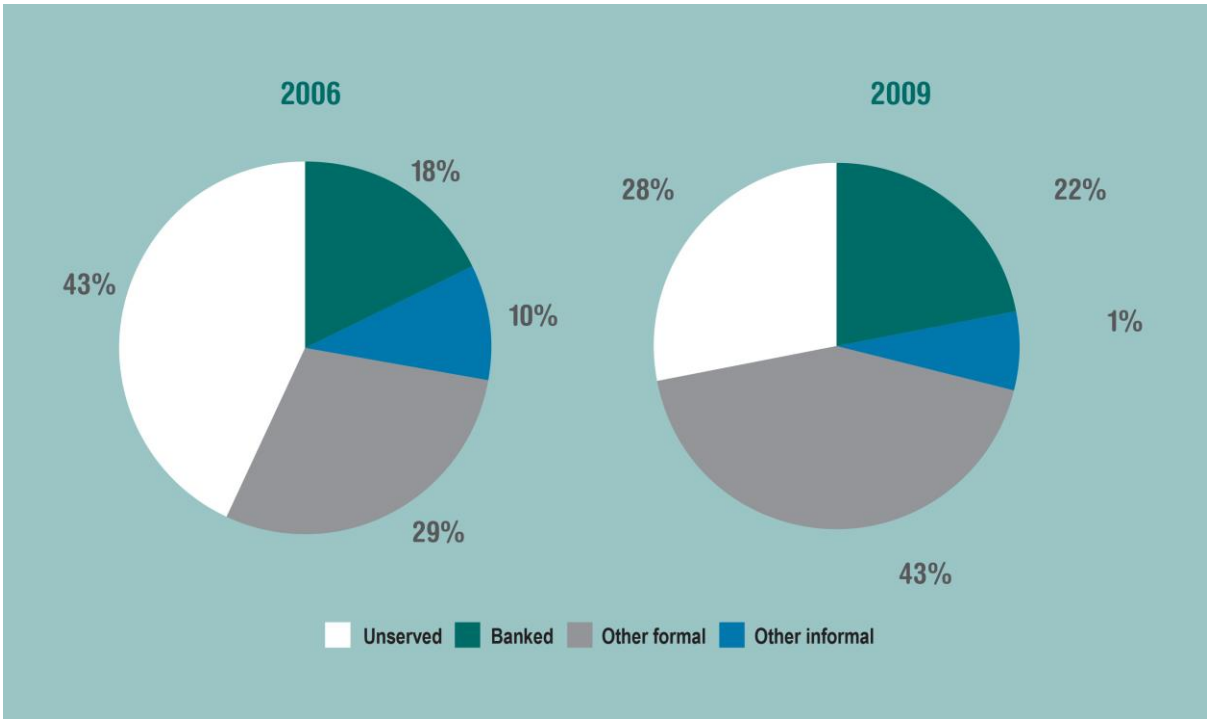


3.1.2 Finance and investment

In recent years, Uganda has moved away from an ad hoc, venture-specific approach to supporting investment at sector level through the Uganda Investment Authority (UIA). The country has also codified investment incentives in its tax laws (see Section 4) (U.S. Department of State, 2013). In addition, Uganda's financial sector has also undergone impressive growth in the past decade, following the passage of a series of laws that have improved governance. Uganda now has a tiered system of financial institutions: commercial banks, credit institutions, microfinance deposit-taking institutions and non-regulated institutions such as savings and credit cooperatives, as well as credit-only NGOs that offer microfinance services to the poor in rural and remote areas of Uganda. Data collected in July 2013 showed Uganda's microfinance industry served over 556,000 borrowers and nearly 2 million depositors (UNCDF, 2013).

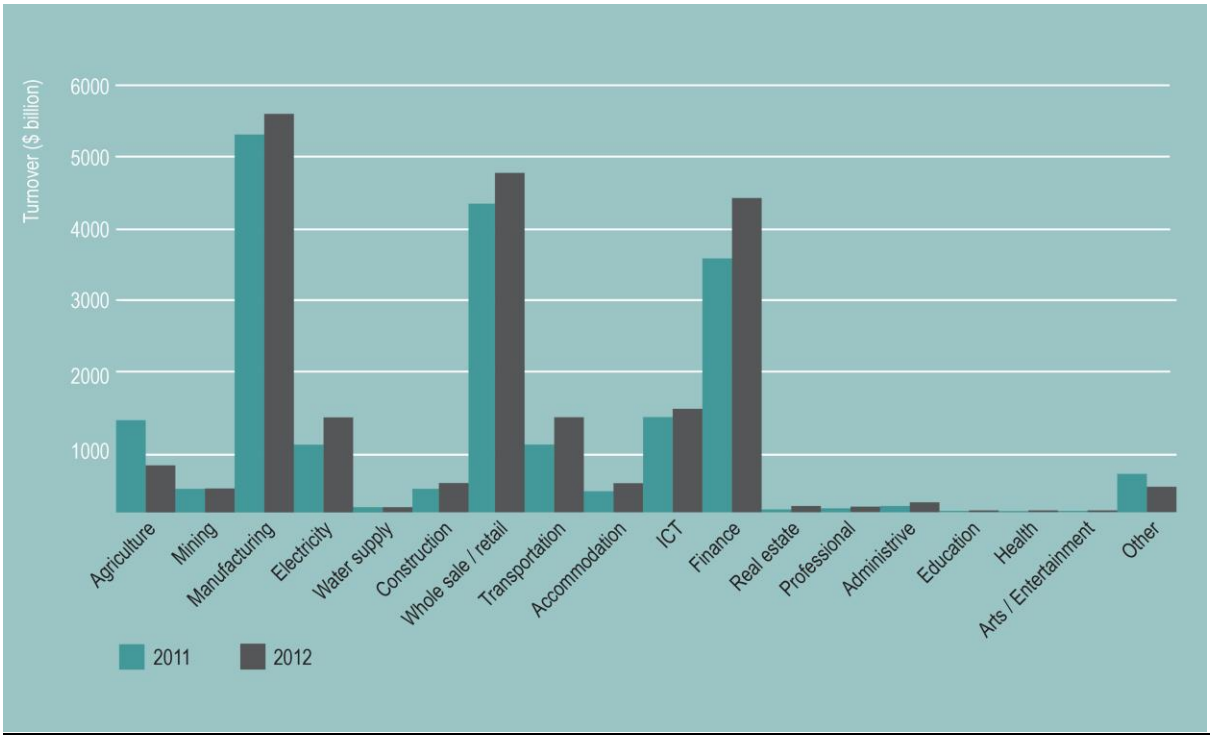
However, with total assets of $4.23 billion as of June 2012, Uganda's financial sector is still small by global standards. A financial inclusion survey conducted in 2009 revealed that only 29% of Uganda's population has access to formal financial services (Figure 6:) (UNCDF, 2013). Also, the Bank of 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 (U.S. Department of State, 2013).

Figure 6: Financial access in Uganda **(UNCDF, 2013)**



In spite of significant FDI investment in the energy sector (see Section 6), private economic activity in electricity still lags behind that in manufacturing, wholesale / retail, finance, and information communication technology (ICT) (Figure 7:).

Figure 7: Private-entity turnover by economic activities in 2011/12[8] **(BOU, UBOS and UIA, 2014)**

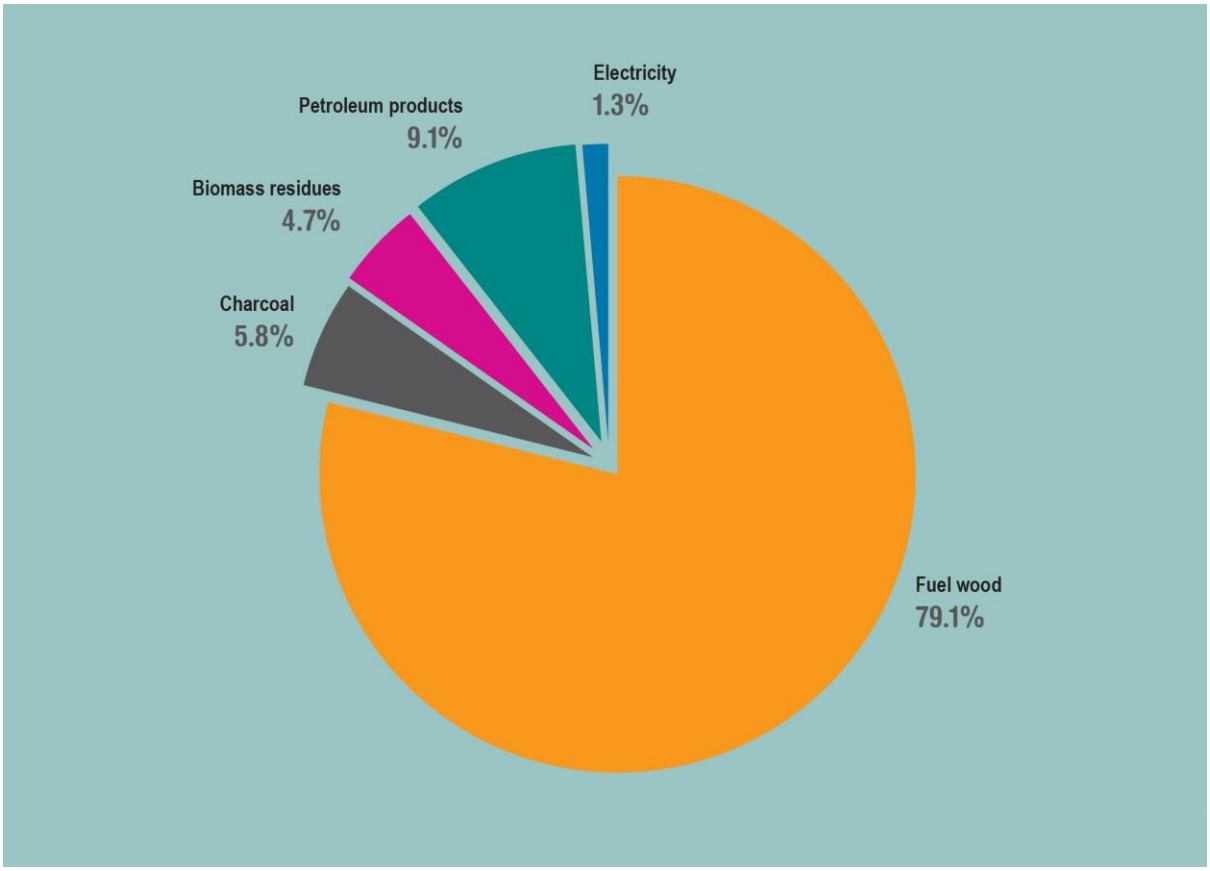


[8] Exchange rates October 29, 2011 and December 31, 2012: $ 1 = UGX 2355.6878, $ 1 = UGX 2682.0642. (http://www.exchangerates.org.uk)

3.2 Energy mix

Although Uganda has made enormous strides in reform to the electricity sector (see Section 3.3), access and coverage remains 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, and depend mainly on biomass (fuel wood and charcoal) for energy (Figure 8:). 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 8: Uganda's energy mix (2011) **(Ndawula, 2014)**

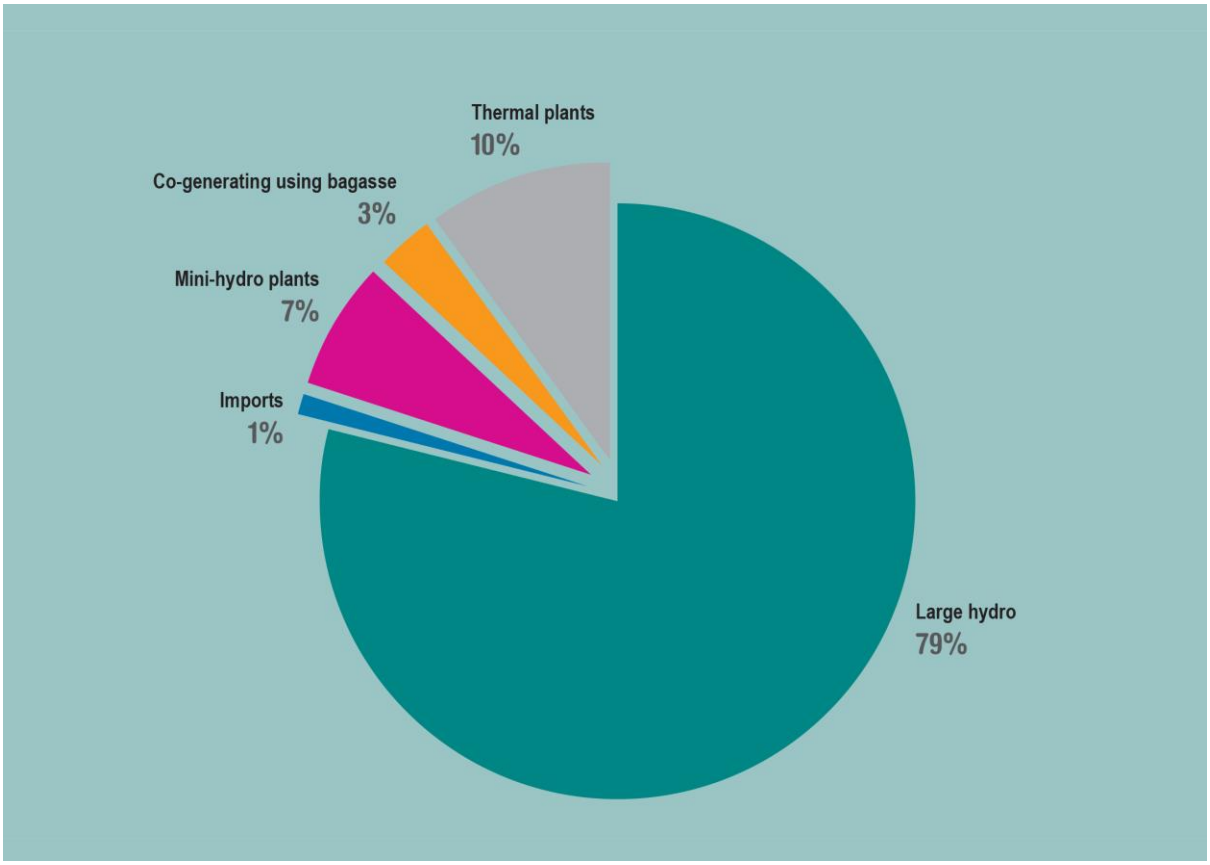


3.2.1 Urban and industrial

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

[9] The country's installed generation capacity is over 800 megawatts (MW), but the 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 (Taremwa, 2013).

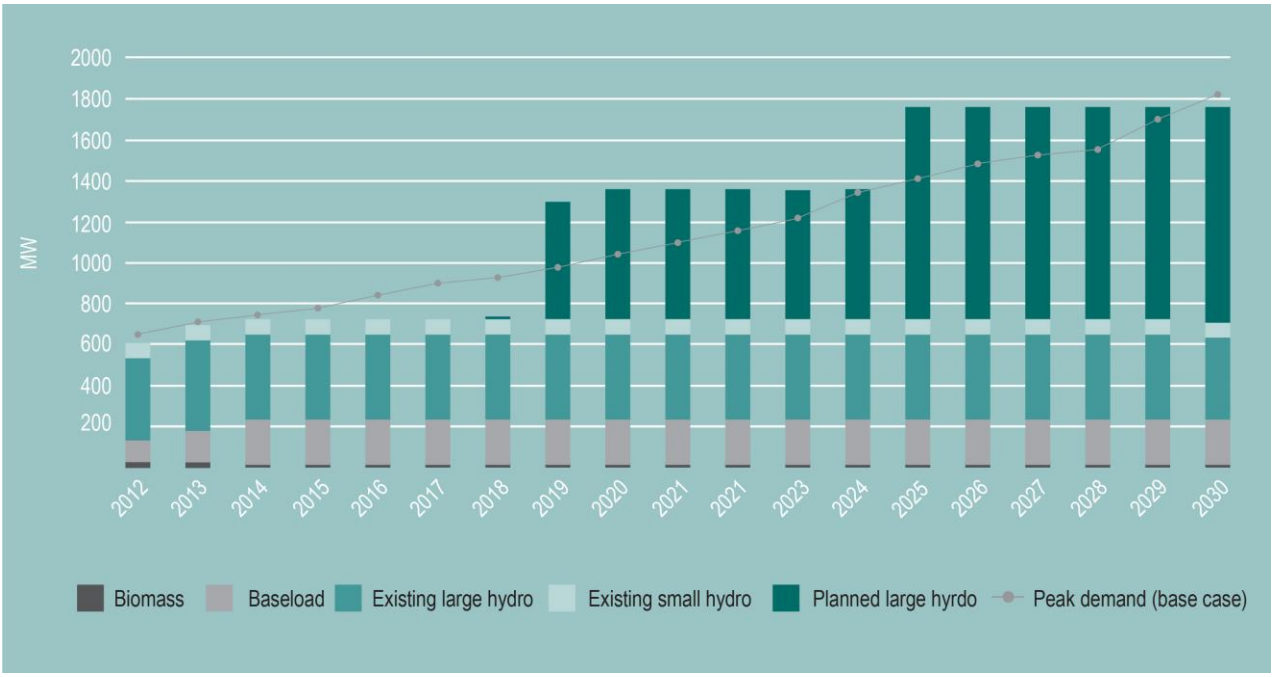
Figure 9: Uganda's electricity generation mix (2012) **(Ndawula, 2014)**



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, climate change impacts such as droughts and erratic rainfall have made hydropower production less consistent.

Though load shedding reduced with the commissioning of the 250 MW Bujagali hydro power plant at the end of 2012, demand-growth scenarios show a significant supply shortage from 2015 onwards because of an average annual increase in demand from industrial and domestic consumers of 7-9% per year (Sustainable Energy for ALL, 2012; Kreibiehl and Miltner, 2013) (Figure 10:). It is predicted that heavy fuel oil (HFO) 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 forthcoming large hydro projects (see Section 5).

Figure 10: Uganda's forecast generation capacity vs. peak demand **(Rieger, 2013)**



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. The development of fossil fuel resources will make a significant contribution to the economy, particularly in terms of reducing the country's dependence on oil imports, which are second only to machinery and equipment (Figure 11:). However, some analysts state that oil will not be immediately transformative for the country, comparing its potential value to Uganda's state revenues, which stood at $4.5 billion in 2012/13, and to receipts from development aid, which were $1.7 billion in 2010 (Shepherd, 2013) (see Section 6).

Figure 11: Uganda's primary imports **(KPMG East Africa Limited, 2013)**

Main imports: % share of total	2012	2013	2014
Machinery equipment, vehicles and accessories	23.89	25.16	24.69
Petroleum products	15.82	15.90	15.11
Vegetable product, animal, beverages, fats and oil	8.45	9.21	9.24
Chemical and related products	8.33	8.79	8.19

Large-scale oil production is forecast to begin in 2016, and in parallel the GoU is planning to construct an oil distribution network, an oil refinery, and potentially an additional thermal power plant (EIU, 2012). This conflicts with the Government's previous goal of increasing generation without a parallel increase in base load fossil fuel (FF) power production, on the basis that thermal power is 'not sustainable...costly, untimely, limited and has serious environmental effects' (NPA, 2010).

3.2.2 Rural

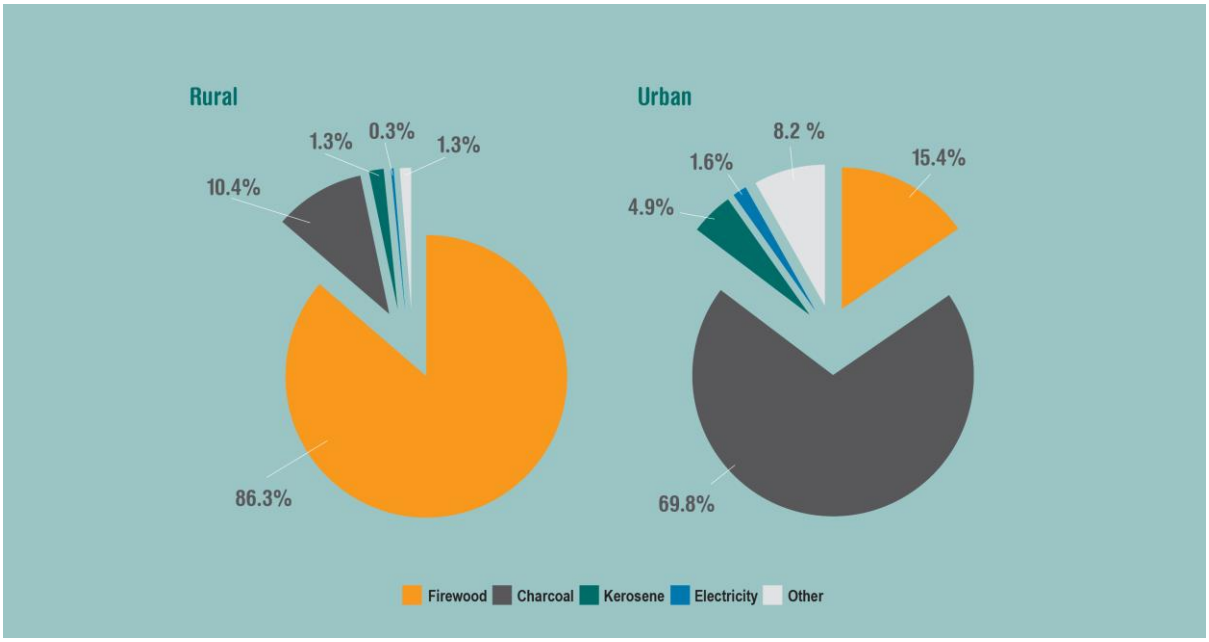
Electricity supply is distributed unequally across the country and even the limited provision of electricity has been restricted to mainly urban and semi-urban areas (Figure 12:), with rural electrification standing at less than 5% (Tumwesigye et al., 2011).

According to the latest Uganda Household Survey (2009/2010) (UNCDF, 2013):

- 95% of Ugandan households still use wood and charcoal as a main source of energy for cooking, with rural families mostly depend on firewood, while about 70% of urban families burn 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 (UNCDF, 2013).

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

Figure 12: Cooking fuel for rural and urban residences (2010) **(UNCDF, 2013)**



3.3 Policies and institutions

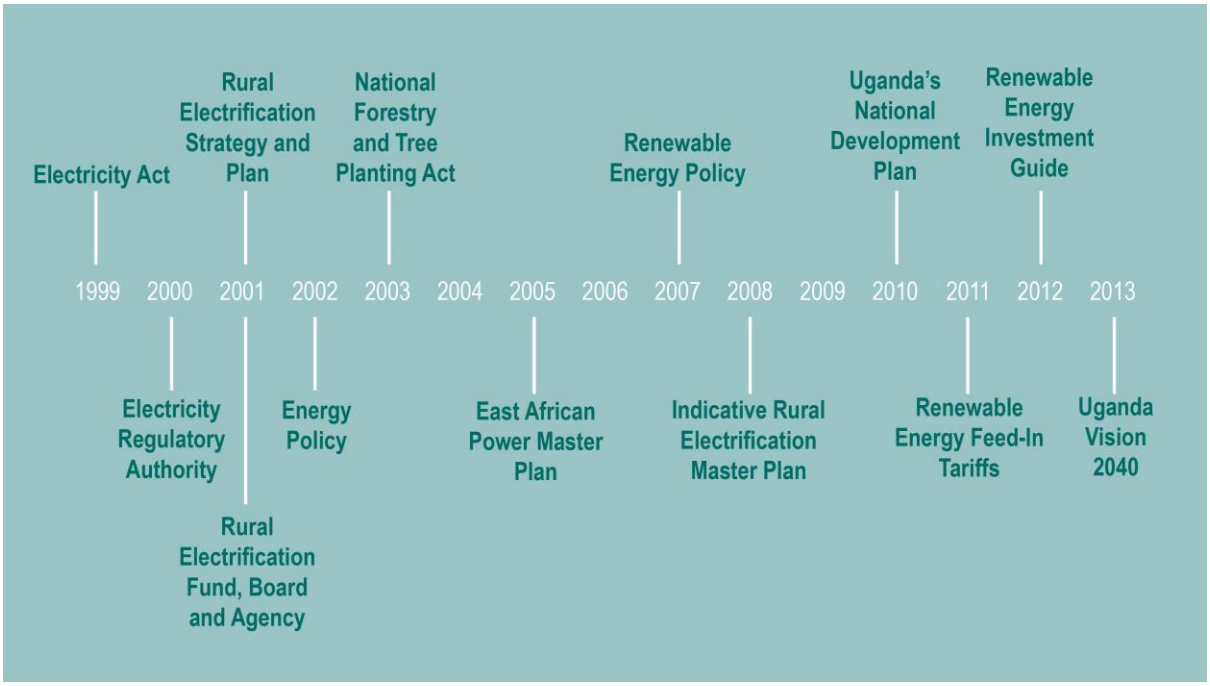
In 1999, Uganda embarked upon an extensive power-sector reform programme, unprecedented on the African continent (Kapika and Eberhard, 2013). The goals of the reforms were to: reduce the burden of subsidies; improve the quality of service; improve collection rates; reduce network losses (from levels 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 (UEB) was unbundled into different private business entities for generation, transmission and distribution through the Uganda

Electricity Generation Company Limited (UEGCL), Uganda Electricity Transmission Company Limited (UETCL) and Uganda Electricity Distribution Company Limited (UEDCL) 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 (see Figures 13 and 14). 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).

In addition to domestic reforms, the GoU has also collaborated with the East African Community (EAC) on regional power interconnection. The East African Power Master Plan (EAPMP) shows that there are economies of scale associated with electricity interconnection and trade within EAC countries, and that the development of hydro projects in Uganda and Tanzania would increase EAC capacity to produce cost-effective electricity and reduce its level of dependency on imported oil (Tumwesigye et al., 2011).

Figure 13: Uganda energy policy timeline



These reforms resulted in the mobilisation of substantial private resources for investments, improvement in power-systems planning, and in levels of professionalism and financial transparency in the sector (Kapika and Eberhard, 2013). Private operators are now dominant in generation and distribution, though this may change in the context of significant Chinese state-owned company investment in the pipeline of large hydro projects to be built between 2013-2018 (see Section 5).

Figure 14: Institutions in Uganda's energy sector

Ministries	The Ministry of Energy and Mineral Development (MEMD) provides policy guidance in the development and exploitation of the energy and mineral resources. The Ministry of Water and Environment (MWE) drives forestry biomass policy. The Ministry of Finance, Planning and Economic Development plays a key role in the forestry and energy sectors. The Ministry of Local Government supports the MEMD and MWE with local reach.
Electricity Regulatory Authority (ERA)	ERA is responsible for regulating the electricity sector and sets standards and procedures for electricity investment.
Electricity Disputes Tribunal	A mechanism through which any of the entities regulated by ERA or other persons can appeal the decisions of the ERA.
Uganda Electricity Transmission Company Limited (UETCL)	The state-owned UETCL operates the high voltage transmission network and serves also as a bulk supplier to the distribution company. It is the purchaser of all independently generated power in the country that is fed into the national grid. UETCL issues licenses for generation and distribution of electricity by the private sector.
Uganda Electricity Distribution Company Limited (UEDCL)	Owner of the electricity distribution network, which has been leased by Umeme Ltd. Umeme is a private company, 100% owned by the UK Government's Commonwealth Development Corporation (CDC).
Uganda Electricity Generation Company Limited (UEGCL)	Owner of Kiira and Nalubaale Hydropower Stations in Jinja, which were concessionned to ESKOM (a South African public utility).
Rural Electrification Authority	Broad mandate in rural electrification, which includes providing policy advice to the Rural Electrification Board, operationalisation of Uganda's Rural Electrification Strategy and Plan and administering the Rural Electrification Fund (REF).
Concessionaires including Umeme, Ferdsult, WENRECo, and URECL	Energy distribution network companies in Uganda.
Uganda Energy Credit Capitalisation Company (UECCC)	GoU owned company to promote private sector led renewable energy infrastructure development; to provide transaction advisory services; to introduce innovative financing modalities
Uganda Investment Authority (UIA)	Promotes and facilitates private sector investment in Uganda
Uganda National Bureau of Standards (UNBS)	Mandated to develop and promote standardisation, quality assurance, laboratory testing and metrology.

3.4 Demand for energy investment

Since the start of the reform process, Uganda has made considerable progress in attracting both public and private funding in the energy sector. However, it is still recognised that the lack of adequate and reliable power supply continues to be among the top five key constraints on Uganda's economic growth. Consequently, attracting additional investment in the energy sector has a direct bearing on the performance of the other sectors. Uganda's own National Development Plan (NDP) for 2011-2015 acknowledges that limited access to, and use of, energy slows economic and social transformation significantly. The energy sector is also major contributor to government revenues, through fuel taxes,

VAT on electricity, a levy on the transmission of bulk purchases of electricity, licence fees and royalties and foreign exchange earnings (Tumwesigye et al., 2011).

Uganda's NDP has highlighted that electricity consumption per capita must be raised to the levels of middle-income countries (MICs) like Malaysia and Korea (from 75 kWh/capita to 674 kWh/capita) in order to improve the country's competitiveness and accelerate socio-economic transformation. This would require an additional 3,500 MW to be added to the existing capacity over the long term.

Projects that are in the construction and planning stage include a number of larger (>300 MW) hydropower plants, thermal plants (as part of refinery), various mini hydropower plants (HPP), solar power and solar thermal, geothermal, peat and co-generation from biomass (NPA, 2010). These add up to 1,400 MW of additional capacity (see Figure 19), or only 50% of the generation mix envisioned in the NDP. This also does not take into account the fact that hydropower installations in Uganda, which make up the majority of planned projects, do not have a track record of generating at full capacity.

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 a fairly high per-capita energy 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 is in fuel wood and charcoal for cooking, a parallel integrated cooking-fuel strategy (or investment plan) for Uganda is yet to be developed (Sustainable Energy for ALL, 2012).

4. Framework 1: incentives (industrial policy tools)

> 'The role of government is to align its functionaries into provision of incentives…to enable investment…build natural partnerships with local governments, private sector, academia…promote local research, innovation and awareness of the available options for energy services provision.'
>
> Godfrey Ndawula, Asst. Commissioner, Renewable Energy, MEMD, Uganda

Framework 1 (Figure 15:) is completed to highlight the key regulatory, economic and information instruments in Uganda's energy sector. These instruments are mapped to understand the incentives that are available in Uganda, and to show whether they are provided across the energy sector, or are targeted at specific sub-sectors. Where secondary analysis was identified on the effectiveness of these incentives in shaping or mobilising investment, this information has been included.

Additional detail on economic instruments can be found in Section 5, and the incentives most frequently referenced in interviews are outlined in more detail in the section below. It was possible to complete the framework on the basis of interviews with key stakeholders (see Appendix 1in Uganda and of a review of publicly available government documents.

Figure 15: Framework 1 - Industrial policy tools

Regulatory	• UECTL: Power Purchase Agreement (PPA) and Investment Agreement (IA) • Presidential decisions to fast track projects in terms of procurement processes and tendering (large hydro) • Electricity Act – established: - 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 license 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[10], first arrival privileges and export promotion incentives and facilities) • VAT eliminated on imports of solar energy components
Economic	• Subsidies from Energy Fund and Rural Electrification Fund[11] - 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 (PVTMA) - Support for interconnectors • Renewable Energy Feed in Tariffs (RE FiT) • Global Energy Transfer Feed-in Tariff (GET FiT) • UECCC – loan guarantees • Guarantee of payment (Umeme) • See cost reflective tariffs (more detail ERA) (changed three years ago) • Domestic and International, Private and Public provision of Grants, Debt, Equity, Insurance and Guarantees • Policy Risk Guarantees – (WB support) • CDM and Voluntary Carbon (including via Ci-DEV – KfW and WB)
Information	• Uganda Energy Credit Capitalisation Company (UECCC) • Uganda Investment Authority (UIA) • Uganda Renewable Energy Association • REA Department for Off-Grid Renewable Energy • Digitalising land registry (World Bank support) • MEMD developing packaged sites for small hydro to tender (10 in pre-feasibility, and four at FS stage) • MEMD establishing a geothermal resources department (JICA support) • Government visions, policies and plans, and background to budget statements • Climate Technology Initiative's Private Financing Advisory Network (CTI PFAN) • Support to skills and training (public universities): - Makerere University - Master of Science in Renewable Energy, Department of Civil and Environmental Engineering, and Renewable Energy Incubator - Kyambogo University – Faculty of Engineering

[10] The Ugandan Government 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.

[11] Capacity price payments (thermal) fell from UGX. 482 billion in FY2011/12 to UGX 75 billion in FY2012/13. The Government 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).

4.1 Regulatory instruments: key incentives, gaps, and considerations

4.1.1 Standardised Power Purchase and Investment Agreements (and Private Public Partnership guidelines)

There is a range of regulatory incentives for private investors in the energy sector. A number of energy sector stakeholders interviewed for this study highlighted the importance of UECTL's standardised and transparent Power Purchase and Investment Agreements (PPA and IA)[12] in reducing transaction costs for both project developers and investors. These were developed as part of the establishment of the Global Energy Transfer Feed-in Tariff (GET FiT) programme and resulted from extensive dialogue between KfW, MEMD, ERA and UETCL and a number of private sector stakeholders (Kreibiehl and Miltner, 2013).

Building on this achievement, several developers suggested the GoU should next look at guidelines for Private Public Partnerships (PPP), building on the experience of the Bujagali project, where the MEMD used an firm with experience of PPPs in Africa as the international transaction advisor. It should be noted, however, that the GoU is now moving away from tendered PPPs for large hydro and toward the use of presidential decisions to speed contracting.

4.1.2 Presidential decisions

There has, in general, been an improvement in the investment climate in the energy sector over the past five years, based on significant reforms by the GoU, as outlined above. However, the level of bureaucracy remains significant, with multiple institutions exercising technical, policy, and legal oversight across the energy sector.

Though the President has fast tracked decisions on a number of recent large projects (including the Karuma hydro project), this has undermined investor confidence. This is because the President has decided that projects should proceed with one investor and developer, contravening previous agreements with different partners for design, feasibility studies and project implementation (see Section 5). Stakeholders interviewed for this study emphasised the need for the GoU to respect the sanctity of contracts, as failure to do so creates widespread uncertainty in business and is a major source of disincentive for private investors.

A number of interviewees suggested that rather than relying on decision-making by the President, a pre-requisite for attracting private capital in the energy sector would be the dismantling of the current bureaucratic inertia. It was recognised that this would require a significant culture change within implementing institutions, with the creation of incentives for timeliness and successful implementation.

In addition, interviewees highlighted the lack of feedback or tracking mechanism for parliament on the implementation of energy policy. Audits are currently limited to financial aspects, and could be expanded with a second report from the Auditor General on implementation. It has been suggested that such a mechanism could be created through a Parliamentary Forum on Energy (following the example of the forum already created for climate change with the support of the UK's International Climate Fund (ICF)).

[12] Independent Power Producers (IPPs) in Uganda enter into a PPA with the UETCL and an IA with the government. The PPA defines terms and conditions for grid access, priority feed-in of electricity and the commitment of UETCL to buy electricity at the FiT level determined by ERA (Kreibiehl and Miltner, 2013).

4.1.3 Land and intellectual property rights

The Land Act codified Uganda's land tenure system[13], but the system and rules are complex, which increases costs for investors. In general, businesses deem the acquisition of land with a clean title as one of their biggest challenges in Uganda, with stakeholders raising issues of bureaucracy, slow processes and lack of transparency. The lack of access to land is also considered to be a major constraint to the development of solar energy in the country. In response to these concerns, the Ministry of Lands, Housing and Urban Development is automating the land registry and intends to establish five land offices across the country in collaboration with the Private Sector Foundation Uganda and using a loan from the World Bank (WB) (U.S. Department of State, 2013).

In addition to the need to develop a system to enforce land rights, a number of interviewees highlighted the importance of enforcing intellectual property rights in the energy sector. This is in the context of project design documents and feasibility studies that are submitted as part of the licensing process.

4.1.4 Product standards and certification

One of the barriers raised in the context of the deployment of newer technologies in the energy sector in Uganda has been the lack of adequate standards and mechanisms to monitor and ensure the quality of these technologies. One example cited by interviewees was lowered consumer demand as the result of market penetration by low-quality solar technologies and batteries. Reflecting a global trend, the majority of clean energy technologies or components in Uganda are imported from China, and have a reputation for being cheap but not durable (UNCDF, 2013).

Several renewable energy products and services still lack national standards, and the quality control by standard bodies is perceived as poor. This includes slow certification process by the Uganda National Bureau of Standards (UNBS), even on products with international certifications (AEEP, 2012). At a minimum, the GoU should be able to certify products that are already certified by international accreditation bodies, although this will require additional resources to test equipment and to support the enforcement of standards (Sustainable Energy for ALL, 2012).

4.2 Economic instruments: key incentives, gaps and considerations

Details of public and private provision of grants, debt, equity, guarantees and insurance by domestic and international actors are outlined in detail in Section 5. This section highlights the balance of economic instruments deployed by the GoU (often with the support of development partners).

4.2.1 Electricity subsidies

As mentioned, Uganda initiated a comprehensive power sector reform programme in 1999, under which the ERA is responsible for setting the tariffs. Tariff design often has to meet competing objectives, balancing sound pricing to meet investment needs, while ensuring equity and affordability (IMF, 2013a). Over the past decade, the GoU has provided subsidies to: UETCL to protect costs to consumers and industry; low-income consumers through lifeline tariffs; and thermal power producers to ensure capacity (NEPAD-OECD Africa Investment Initiative, 2009).

In order to maintain affordable tariffs for end-users, ERA kept the UETCL's bulk-supply tariff at less than full-cost recovery. The result was a shortfall that had to be filled by GoU as a subsidy to the sector (Sustainable Energy for ALL, 2012). Rising demand and supply shocks that followed falling water levels at hydro plants as a result of drought), required the commissioning of costly emergency thermal power plants, pushing the subsidy up dramatically between 2006 and 2011 (IMF, 2013a). At its peak, as a result of rising fuel costs and the depreciation of the Ugandan Shilling (UGX), the fiscal

[13] Foreigners cannot hold land title but may obtain contracts for leases of between 49 and 99 years.

cost of this electricity subsidy to UETCL was UGX 400 billion in FY2010/11, equivalent to 1.1% of GDP (Sustainable Energy for ALL, 2012) (see Box 2).

Box 2: Lessons from subsidy reform in Uganda (IMF, 2013a)

Subsidy reform and resulting tariff increases require a careful strategy for communication and implementation. In Uganda, the Government's communication campaign surrounding the 2012 electricity tariff adjustment was very effective, pointing out that it could no longer afford costs of more than 1% of GDP to subsidise electricity to which only 12% of the country had access (a small and relatively rich elite). Some newspapers agreed that the tariff hike was a pro-poor measure, especially because lifeline tariffs were to be maintained.

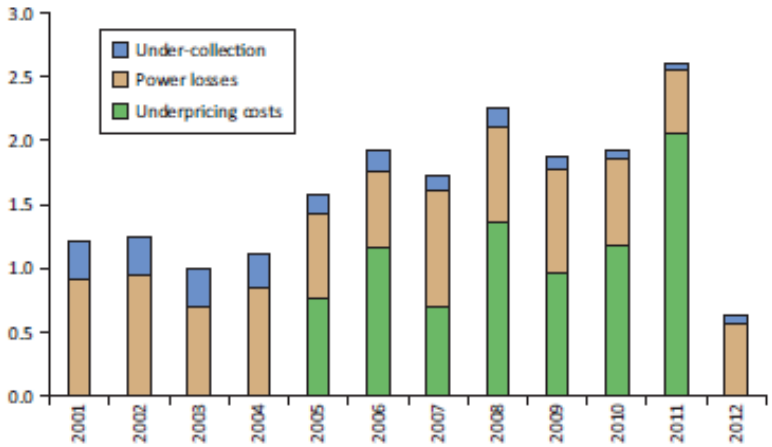
Industry associations acknowledged that the new tariffs would be bearable if power supply was reliable, based on government investment in new hydropower infrastructure. In 2010, industrial consumers accounted for 44% of total power consumption – almost two-thirds of the power subsidy accrued to a small group of industrial consumers.

The limited protest at subsidy reform in Uganda validated 2011 research by the World Bank, which noted that average coping costs for intermittent power supply (including the costs of self / diesel generation) as well as residential consumers' willingness to pay for improved service was quite high. Both consumers and industry representatives recognised that the cost of any tariff increase would be more than offset by reduced load shedding and enhanced electricity supply.

In order to relieve this significant budgetary pressure, the GoU adjusted the subsidy downwards in January 2012, leading to an increase in the tariff rates. The average effective tariff was increased by about 41%, and the cross-subsidisation from households to industrial consumers was also reduced significantly, increasing tariffs to industry by about 73% (IMF, 2013a). Following these tariff increases, Uganda's power tariffs came into line with other members of the EAC, and subsidies were reduced significantly, with the remaining support amounting to UGX 189 billion in 2011/12 (MoFPED, 2012).

Although reforms were successful (see Box 3), Uganda retained the lifeline tariff of UGX 100 per unit up to 15 kilowatt hour (kWh) per month for all domestic consumers, and capacity payments to thermal power producers (UGX 0.4 trillion in 2011/12) (Sustainable Energy for ALL, 2012).

Figure 16: Quasi-fiscal costs of the power sector (percentage of GDP) **(IMF, 2013a)**



4.2.2 Renewable Energy Feed-in Tariffs (RE FiTs) and Global Energy Transfer Feed-in Tariffs (GET FiTs)

In addition to the subsidies outlined above, the GoU developed a Renewable Energy Feed-in Tariff (RE FiT) under the country's 2007 Renewable Energy (RE) Policy, to facilitate the renewable energy targets in its NDP. The RE FiT was unsuccessful at first, as the UETCL failed to develop a standardised PPA and continued to negotiate tariffs (at a low level) on a project-by-project basis with individual developers, which resulted in long delays as well as wide differences in approved tariffs.

In 2011, Uganda adopted cost-reflective technology-specific FITs, including automatic tariff-adjustment mechanisms to protect the economic viability of a project against the risks of domestic inflation using the following formula:

$$FIT_y = [FIT_{y-1} * (1-w)] + \left[FIT_{y-1} * \frac{CPI_y}{CPI_{y-1}} * w \right] \quad (7.1)$$

Where
FIT_y is the applicable FIT in year y,
FIT_{y-1} is the applicable FIT in the previous year,
CPI is the core producer price index for the United States as published by the Bureau of Labor Statistics, and
w is the share of O&M in the initial FIT in year y (ERA 2011, 6).

The applicability of the FiT limited cumulative PV capacity to 2 MW in 2011 and 7.5 MW in 2014, and limited mini-hydro capacity to 60 MW in 2011 and 270 MW in 2014. This strategy gained ground after the experience of Spain in 2008, where applications to produce 3,000 MW of solar electricity far exceeded expectations (Tenenbaum et al., 2014).

In spite of the 2011 updates to the FiT programme, no PPAs were concluded under the scheme. To address the low levels of investment in grid-connected renewable electricity supply, the MEMD worked with development partners to establish a tariff top-up programme through a Deutsche Bank developed approach called the Global Energy Transfer Feed-in Tariff (GET Fit). The Ugandan pilot of this initiative was launched in 2013 and is supported by a number of governments and development finance institutions. Together these donors have committed $90 million to finance the feed-in tariff top up (Kreibiehl and Miltner, 2013).

To date, 150 MW has been contracted under GET FiT, through 15 projects (80% hydro, most of which are below 10 MW, and 20% bagasse and small biomass projects), and a new call has been launched for solar projects. The project-developer mix includes private companies from Norway, Sri Lanka, India, and Uganda who are providing balance-sheet finance (equity) alongside developers supported by private equity firms, some of which benefit from development finance institution (DFI) investment (See Section 5). The majority of debt financing is being provided by international finance institutions (IFIs) and DFIs, including FMO (the Dutch development bank, the Emerging Africa Infrastructure Fund (EAIF), the International Finance Corporation (IFC), and the Belgian Investment Company for Developing Countries (BIO). A roundtable was recently organised with locally based commercial banks to discuss the potential for their provision of debt finance (Barclays, Standard Chartered, Stanbic).

In order to reduce the long-term dependency of small-scale renewable energy projects on donor money, the GoU has committed to increase base FiTs over time. This could be feasible for the GoU, given decreasing costs for RE, and if commercial banks can replace debt financing from development finance institutions. For the time being however, the government's focus has been on rapid realisation of large-scale hydro projects to avoid load shedding (Kreibiehl and Miltner, 2013) (see Section 5).

4.2.3 Energy Fund and Rural Electrification Fund

The Energy Fund was created in the context of the 2008/09 budget, with allocations from tax revenue, in response to the challenges the country was facing at that time with electricity supply (Climate Parliament, 2011). By 2013/12 the stock of the Energy Fund was UGX 301 billion ($181 million) (IMF, 2013b). The Energy Fund is required to spend at least 70% of its money on renewable energy, and the expenditure to date has been devoted to two large hydroelectric projects: Karuma and Isimba (Figure 17:). The Petroleum Fund is also supporting these projects and the balance of finance is being provided through loans from Chinese entities (see Section 5).

Figure 17: Financing of key infrastructure projects **(IMF, 2013b)**

	Financing Modality			
	Cost	**EF&PF** [1]	**NCB**	**PPP**
	(Billions of US$)			
Karuma hydro power project	1.7	0.3	**1.4**	
Isimba hydro power project	0.6	0.1	**0.5**	
Industrial substations for transmission	0.1		**0.1**	
Oil-related infrastructure projects	0.2		**0.2**	
Kampala-Mpigi highway	0.4			0.4
Kampala-Jinja highway	0.5			0.5
Total	3.5	0.3	**2.2**	**0.9**

Source: Ugandan authorities.

[1] Drawdown of the Energy Fund and the Petroleum Fund.

The Rural Electrification Fund (REF) was established 'to promote the equitable coverage of rural electrification in Uganda through increased provision of access to electricity for economic, social and household use'. REF invests in transmission lines and in power-distribution networks, isolated grid projects comprising generation and distribution activities, and in stand-alone systems using renewable energy, such as solar home systems (Sustainable Energy for ALL, 2012). The REF, which is administered by the REA, is financed through: a levy of 5% applied on all bulk electricity sales, parliamentary appropriations, surpluses from the operations of the ERA, and grants from donors and loans (including the World Bank) (Tenenbaum et al., 2014). However, these incentives appear to have had limited impacts on the levels of electrification in rural areas of Uganda.

The PV Targeted Market Approach (PVTMA) programme managed by the REA provides two specific subsidies for solar installations.[14] Each subsidy is paid in tranches, with 70% provided when the solar installation is contracted, and the remainder paid after independent verification of installation. The UECCC is also offering credit and liquidity support to regulated financial institutions and Savings and Credit Cooperatives (SACCOs) to support their provision of solar PV loans (see Section 5). These activities are complemented by a GIZ programme to assist solar PV dealers to qualify for subsidies, and that supports solar marketing, commercial and technical skills (MEMD, 2012).

Uptake of these incentives across the sub-sector has been limited, as exemplified by a single company, SolarNow, which has benefitted from 800 out of 1,000 subsidies delivered by June 2012 (See also Section 5. The reasons discussed for limited uptake of solar subsidies is that up-front

[14] The first subsidy is for eligible solar PV providers and regulated micro-finance institutions (MFIs) who receive $5.50 watt-peak (Wp) for systems up to 50 W, the second is for commercial or institutional PV systems which can benefit from $4.00/Wp up to 500 W.

financing requirements remain high, accreditation requirements are significant, and companies must have existing resources to take advantage of certain incentives (UECCC required 50% matched funds). Local financial institutions also have limited awareness and interest in promoting solar loans in the context of their wider loan products, and may see new technologies and products as having high levels of risk. Capacity building of financial institutions, in parallel to that for solar dealers will be essential to enhance uptake of these incentives.

4.2.4 UECCC

The Uganda Energy Credit Capitalisation Company (UECCC) was established by MEMD in 2011, with the support of a loan from the World Bank, to pool resources, including private investment into small-scale renewable energy projects (U.S. Department of State, 2013).

While one of the mandates of the UECCC is to provide credit enhancement through local financial institutions[15], the majority of its activities since inception have focussed on technical support to small-scale renewable energy project developers. This technical support targets a key gap in the country's current energy mix: hydro, solar, biomass and wind energy projects with capacities ranging from 1 MW to 20 MW.

To date, the UECCC has received €1.2 million in support from KfW to provide early stage advisory services to about 10 project developers. These services include: full pre-feasibility study, technical evaluation project studies, business plan preparation, financial/economic modelling, risk assessment, market assessment, and the marketing of projects to local participating financial institutions and potential investors (MEMD, 2012). In parallel, the UECCC is also managing a grant of up to €13.1 million from the Netherlands Enterprise Agency's ORIO Infrastructure Fund to support the development of 10 mini hydro sites with capacities of 1-1.5 MW (the construction of which is projected to cost €24.4 million).

There appears to be some level of mismatch between the services offered by UECCC, and the current needs of small-scale renewable energy project developers. Prior to providing support, the UECCC requires that project owners already have: completed sufficient technical work on the project to hold a permit from ERA, experience in developing capital investment projects, and sufficient technical/business knowledge in project management in the energy sector (MEMD, 2012). It is difficult to imagine that such actors would be those requiring €150,000, and that such a level of support would be sufficient to offset the high costs of project origination.

In parallel, UECCC also offers technical assistance to local financial institutions to build their capacity to appraise renewable energy projects. This combination of technical support with the capitalisation of local financial institutions is being undertaken increasingly through climate finance in other countries, so that local banks will, over time, begin to invest in renewable energy and energy efficiency projects with their own resources (Whitley, 2013b).

4.2.5 Support to interconnectors and access roads

Uganda's Rural Electrification Strategy and Plan was developed based on the assumption that if the GoU provided the enabling environment, there would be private sector investment in rural electrification projects. However, although the de-bundling and privatisation of the electricity system has led to some degree of private sector interest in renewable energy generation and utility operation,

[15] The instruments developed include (1) a partial risk guarantee – whereby a facility would be available during the construction phase that allowing developers to access an additional financing for up to 15% of the project cost in the case of cost overruns, and (2) a standby liquidity option – whereby a cash reserve held at a local bank could be disbursed to the project developer upon commissioning, thereby enabling the financing institution to extend the tenure of their loan and the project developer to get long term financing. Both local and international investors can access UECCC's instruments; although international players have to be locally registered (MEMD, 2012).

this has not been the case for rural electrification (grid extension), which requires significant public investment (Sustainable Energy for ALL, 2012).

To address this barrier, the GoU has sought to finance new transmission and distribution projects under an arrangement in which it builds and owns electrification projects that meet agreed criteria of economic viability, which are then leased to the private sector for operation and maintenance. Through the REF, the GoU is investing in grid expansion, interconnections and refurbishment alongside development partners including the WB (Energy for Rural Transformation - ERT), Norway, the Japan International Cooperation Agency (JICA) and the African Development Bank, all of which are providing loans and grants (Sustainable Energy for ALL, 2012). As a high proportion of households are not connecting to the grid, even when it reaches their area, in its third phase, the ERT programme has also provided a grant through which REA will subsidize electricity connections for over 100,000 low-income households over 4.5 years using an output based aid model (GPOBA, 2012).

Alongside the facilitation of the wider national electrification programme, there are a number of electrification policies that also act as incentives for renewable energy project developers. Government will finance interconnection to plants that are more than 5 km from the grid, and where the interconnection is less than 5 km investors can meet the costs and recover their investment costs through the tariff structure. In addition to electricity interconnection, there is also demand for support to road construction that links to rural electrification projects. One interviewee emphasised the need for cooperation between the Ministry of Works and Transport (Road Fund) and ERA to facilitate road infrastructure to facility access to energy generation facilities, including isolated mini-hydro power stations. The WB and AfDB are already supporting road development in the context of broader support to agricultural clusters in the Albertine region.

4.3 Information instruments: key incentives, gaps and considerations

4.3.1 Uganda Investment Authority (UIA), investment and resource information

The GoU established the Uganda Investment Authority (UIA) in 1991 as a semi-autonomous government agency to assist investors and facilitate the process of registering a business. In 2009 UIA established a Domestic Investment Division to assist local small and medium enterprises (SMEs), and is currently supporting the development of industrial parks, and special economic zones. (U.S. Department of State, 2013). UIA's priority sectors are matched with the priorities under the country's Vision 2040 and the NDP, which are agriculture, agricultural processing, ICT, tourism, and minerals (including oil and gas).

In terms of direct support to the energy sector, the UIA has published a list of energy investment opportunities including: design, construction, sales and service support of biomass plants (draft proposal for a waste-to-power plant in Kampala); assembly and marketing of solar units in Uganda (draft proposal for a solar-unit assembly plant); manufacturing and marketing of charcoal briquettes (draft proposal for a briquetting plant based on dried organic municipal solid waste in Kampala); and development and investment for micro-hydro projects.

A lack of information on resource availability for energy projects (geothermal, solar, wind, and mini- and micro-hydro), is often cited as a key barrier for investment. In Uganda, this information is in the hands of a diverse group of agencies and ministries including UIA, in ERA's current list of hydropower sites, MEMD's activities to develop packaged hydro-power sites for tender, and in the land registry offices that are being established with the support of the WB (see Section 5.2).

The provision of resource information is highly valuable for private investors. Government agencies have been established in Kenya and Tanzania to support exploitation of their geothermal resources, and in Uganda to support mineral development. While still subject to confirmation from the Ministry

of Finance in January 2014, the MEMD is looking to establish a geothermal resources department with technical assistance from JICA (Kasita, 2014). It remains to be seen how the GoU will then proceed with development, with options ranging from full government-funded exploration followed by tendering to private sector, to full private-sector development covered by (partial) risk guarantees (Sustainable Energy for ALL, 2012).

4.3.2 Industry hubs and associations

Though financial resources and financing mechanisms may be available, smaller energy companies and project developers often lack awareness of these funds. A number of interviewees mentioned that industry hubs and associations could be one solution to build awareness and capacity among local private-sector actors, including in terms of human resources, access to information, and investment.

Such an industry group should build on existing associations such as the Uganda National Renewable Energy Association (UNREA), their counterparts in the biomass and biogas sectors, private developers and investors within the GET FiT and UECCC programmes, the UNFCCC Regional Collaboration Centre in Kampala, CTI PFAN, UIA, and REA's new programme to promote the development of off-grid and mini-grid projects. The group could also include or link to major end-users of energy who have the potential to generate power on site, industrial parks currently under development, and productivity initiatives in the agriculture sector. This group could link to other regional and national associations, and technology centres (including the Climate Innovation Centre in Kenya), and could drive demand for local public and private providers of skills and training.

The potential for such an association is already being discussed within the Uganda Chamber of Commerce and the Private Sector Foundation, with some support from the Norwegian government. In addition to the potential for support from other development partners, the association would benefit from recognition by the Ugandan government as an important instrument for sector growth (AEEP, 2012). Precedents exist in associations in other countries and regions, and in the Association of Uganda Oil and Gas Service Providers.

4.4 Key themes emerging from Framework 1

Regulatory instruments

- The deregulation of Uganda's electricity sector has enabled the streamlining of a number of processes and increased transparency of documentation (PPA and IA: 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 Section 5)

- Uganda still provides significant support to thermal and large hydropower producers in the form of capacity payments[16] (to ensure security of supply even when these facilities are not operating), and has focussed the majority of its own investment on these sub-sectors. There is potential that these might be eliminated over the longer term once additional generation comes online.

- Though the government 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 (PV) in the medium term.

- Significant gaps remain in support to small, mini-grid and off-grid energy technologies and projects (including hydro, biomass, biogas and solar). These have yet to be rectified through the establishment of the Rural Electrification Fund, UECCC and direct solar subsidies.

- There is virtually no support for biomass for cooking through economic instruments.

Information instruments

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

[16] A payment received in exchange for making electrical capacity available.

5. Framework 2: sources of capital

Framework 2 (Figure 18:) 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 data sets (government and international), and informal data, including 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 Appendix 2 and Figure 18:.

Figure 18: Framework 2 – sources of capital

		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 19: Projects and companies included in Framework 2 (see also Appendix 2)[17]

	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 (unlcear if reached financial close)

* Imports = 1%

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

5.1 Sources of capital, gaps, and considerations – by sub-sector

5.1.1 Established (private investment) – hydro, thermal (fuel oil), and biomass

Hydro (large)

Hydropower is the largest source of electricity (by far) in Uganda, and will be for the foreseeable future (See Figures 9 and 18). There are three major hydro projects commissioned in Uganda, Kiira, Naalubale (Owen Falls) and Bujagali, and three more large projects under development. Each of these installations has been financed using a very different model, and it is difficult to determine which (if any) of these will serve as the precedent for future large hydro projects and other large energy sector investments in the country. The Naalubale and Kiira projects were financed and built in the 1950s and 1990s respectively by the GoU.

Following liberalisation of the power sector, the Bujagali project was the first to be developed through an independent power producer (IPP) arrangement. The project encountered many delays in reaching financial close, as the original sponsors (AES Corporation) pulled out in 2003 following the Enron scandal and allegations of impropriety (Kapika and Eberhard, 2013). However, the GoU remained committed to the role of private investment in the energy sector, and new investors were identified as a consortium of IFIs and private financial institutions (see Appendix 2).

It was anticipated initially that the next series of large hydro projects (Karuma, Isimba, and Ayago) would be developed under a PPP model similar of that for Bujagali, however all of the projects are now being developed with the support of Chinese ExIm Bank and in partnership with Chinese government-owned companies. Each project has involved multiple announcements in terms of financial structure and sponsor and has, ultimately, been awarded to a Chinese-owned entity through a presidential decision (see Section 5.2). It is now anticipated that all projects will be financed through GoU investment, through the Energy and Petroleum Funds (see Section 5.3.3), alongside Chinese government debt. Speculation (in the media and in discussions with interviewees) is that this may stem from the lower transparency and/or Environment, Health and Safety (EHS) requirements[18] of Chinese government partners, in contrast to IFIs involved in the Bujagali project. International private banks are unlikely to invest in the absence of an IFI who is able to provide a political risk guarantee (directly or indirectly through taking a first loss position).

Box 3: 'Uncertain' environment for private investment in large hydro projects

Isimba: The project was to be developed initially through an Indian public loan and Indian private developer, and was then to be based on German and Norwegian feasibility studies. It was finally was awarded to China International Water & Electric Corporation (CWE).
Karuma: The contracts for design and feasibility were awarded to a Norwegian firm, and the project concession was offered to Sinohydro Corporation Limited.
Ayago: Project development was initiated in cooperation with the Japanese development agency (JICA), based on a process of international bidding for a contractor and support from the Japanese Government. The project was then awarded to a Turkish infrastructure construction company (in April 2013). In August 2013, that award was rescinded and the construction contract was awarded to China Gezhouba Construction Company.

[18] The Isimba dam will potentially impact the 'Kalagala offset area' which the Ugandan Government agreed to set aside to 'conserve natural habitat and environmental and spiritual values' as a condition for World Bank support for the Bujagali Dam (World Bank, 2011). For the Ayago project, the MEMD claimed that the Japanese had pulled out of the study 'due to the perceived adverse environmental impacts' with indications that the project would 'permanently' impact the daytime habitat of hippopotami (Wesonga, 2013) and (Musisi, 2014).

Hydro (small)

In contrast to the large hydro sub-sector, small hydro has received very little GoU support until recently, beyond REA's construction of evacuation lines to the national grid for small scale projects. As a result, investment in small hydro has not reached the scale it has in countries such as Sri Lanka, where there is a longer history of streamlined processes for these projects.[19] Support for small-hydro projects in Uganda comes primarily through international public finance from IFIs and bilateral agencies in the form of debt and some grants, which has enabled domestic private (equity) and international private (debt and equity) to come into the sub-sector at limited scale (see Appendix 2).

It is anticipated that the support provided through the GET FiT programme (including through common PPAs and IAs) and the MEMD's development of packaged small-hydro sites for tender should facilitate additional private investment in this sub-sector. However, a number of interviewees cited a range of remaining barriers alongside opportunities for support. The key barriers mentioned were high up-front costs and limited access to early-stage support and equity investment. Also, most debt financiers secure equity financing first, creating a cyclical problem. For example, one small-scale hydro project developer in Uganda stood to benefit from five different climate-finance interventions (including capital and technical assistance) but had still been unable to secure debt financing to reach financial close.

Suggestions of additional support that could be provided by development partners in cooperation with the GoU include: streamlining processes across the multiple ministries involved in permitting for hydro projects (ERA, MEMD, MWE etc.); up-front financial support for construction of access roads potentially through the National Roads Authority (UNRA) and the Uganda Roads Fund (URF); and lines of credit or other facilities for local financial institutions to provide balance sheet finance to local project developers. Finally, a number of international private investors in the small-hydro sector are developing bundles of projects in other countries (Norway, India, Sri Lanka), from which lessons could be learned for the further scale-up of this sub-sector in Uganda.

Thermal (heavy fuel oil)

In 2006, the Ugandan government needed to procure emergency generation, as a result of increasing demand and shortfalls in production from hydro power plants. As other forms of power have long lead times, this was commissioned in the form of thermal power from heavy fuel oil (HFO). As the regulatory framework had been established for private power production, the first thermal power project was licensed to an IPP in 2007. Other smaller plants also began to be licensed, and by 2010, approximately 30% of available generation capacity was supplied by IPPs (Kapika and Eberhard, 2013).

These projects were all financed through combinations of public international grants and debt (from the WB and Norway) along with domestic and international balance sheet finance (equity). Local private banks were involved in the provision of debt, which is rare in the context of the country's energy sector, but not surprising given the long history of banks financing fossil-fuel power globally. The GoU did not provide capital to the projects, but does make capacity payments to ensure supply. The Agrekko project was decommissioned in 2012 when the Bujagali hydro project came online, and a new thermal power plant is being discussed to run on domestic commercial crude, but this has not reached financial close.

[19] Since the inception of Sri Lanka's small power producer (SPP) programme in 1996, 102 SPPs (each less than 10 MW) have been developed which are owned and operated by the private sector, with a total capacity of 243 MW (Tenenbaum et. al., 2014). Uganda currently has less than 10 commissioned projects.

Biomass (thermal)

The two largest biomass power projects in Uganda are bagasse co-generation projects linked to sugar production. These projects have been capitalised through balance sheet finance, and corporate debt, and benefit from the GET FiT top up, and grid connections from REA.

Private local debt is available to these projects because it is commercially viable for a sugar factory to invest in bagasse-fired cogeneration even at relatively low FiTs as they: have an abundant supply of free fuel (a factory by-product); need substantial quantities of steam and electricity for factory operation; and the economies of scale are substantial (a steam turbine/boiler that can export electricity to a utility is only marginally more costly than one that is sufficient only to meet the factory's own demand) (Tenenbaum et al., 2014).

Further biomass co-generation from agricultural wastes (sugarcane, rice husk, sisal, etc.) is seen to hold particular promise for domestic industry, as the disposal of biomass waste by burning, without extracting the energy content, is a common practice country-wide. For example, Lafarge's Hima Cement is also investing its own capital so that it can substitute HFO with coffee-crop residues at its production facility. This $790,000 investment in boosting coffee production in Kasese and Kamwenge districts will allow the company to save $12 million in oil costs, while improving the incomes of at least 45,000 smallholder farmers (Lafarge, 2012).

5.1.2 Emerging (private investment) – fuel wood, charcoal and solar

Fuel wood and charcoal

In spite of the fact that most Ugandans use biomass for cooking and that this is a very important activity within the country's economy, the biomass energy sub-sector remains extremely fragmented. It is likely, however, that commercial woody biomass energy accounts for more rural revenues than any crop or rural activity. In 2009, the value of firewood and charcoal consumption was estimated at $122 million and $39 million respectively, having risen by more than 10 times between 1996 and 2010 (UBOS, 2010). The sector is composed mainly of small producers located in rural areas, operating informally, and accounts for one of the most important sources of rural livelihoods. In terms of employment, biomass production provides nearly 20,000 jobs for Ugandans (Ferguson, 2012).

As outlined in a 2012 report on Uganda's energy sector by Sustainable Energy for ALL:

'Biomass energy remains the most decentralised, least efficient, least regulated, least managed and one of the least economically and environmentally sound sub-sectors in the energy sector. The lines of policy and political responsibility are blurred with a proliferation of actors, from local governments, to police and tax authorities, to the MEMD and the MWE and other ministries having some authority in the sector, and effectively no co-ordinated policy, regulation, technical support and or management in the sector. There is no concrete policy or policy framework to support the efficient utilisation of biomass energy (or production, transformation and supply of biomass energy) whether that be in industries, small and medium enterprises (SMEs), institutions (particularly schools) and commercial establishments (particularly bakeries, hotels and restaurants) and to offer more sustainable and in a longer term less expensive alternatives or efficient end-user devices'.
(Sustainable Energy for ALL, 2012)

Other East African countries have formalised and regulated their biomass energy sectors, with Rwanda developing a biomass energy strategy and Kenya streamlining charcoal harvesting, transporting and trading. Ethiopia has a well-organised charcoal industry, and Sudan is exporting charcoal to the United Arab Emirates, despite its arid environment (Begumana, 2013).

As exemplified in the case of electricity generation and distribution, clear policy frameworks and regulatory processes are required to drive private investment. A recently approved project by the

Global Environment Facility (GEF) in coordination with a number of Ugandan and international partners[20] is taking on a series of stakeholder recommendations to formalise Uganda's biomass sub-sector including: development of a comprehensive biomass resource use database; standards and certification schemes for charcoal production and biomass efficient technologies (BETs); awareness campaigns and demonstration of BETs; formulation of a National Biomass Energy Strategy; and development of a Biomass Energy Investment Guide (along the lines of the existing guide for renewable energy investment) (Sustainable Energy for All, 2012; GEF, 2013).

Such formalisation of the broader biomass sub-sector is critical to scale-up private investment in 'greening' activities in the charcoal sector. This will complement the Loan Guarantee Fund of the Global Village Energy Partnership, which was established to increase the availability of credit for small energy enterprises, while reducing the risk to financial institutions. The Fund provides a partial guarantee to local financial institutions[21], sharing in 50% of the loss in the case of a default. Over time, the aim is for local banks to become comfortable lending to financially sustainable energy enterprises (Gibbs and Melnyk, 2013). GVEP has now completed nine separate loan guarantee agreements with five financial institutions in Uganda, a portion of which supports 139 green briquette businesses (Ferguson, 2012) (see Appendix 2).

Solar

Though ERA has invited companies to bid for the financing and development of interconnected solar PV projects (above 5 MW) under the new GET FiT facility (with a medium term goal of 50 MW), solar energy in Uganda is currently restricted to very small systems including: off-grid electrification for rural communities; solar water heating; solar power for public buildings, including hospitals; and solar cooking (Kreibiehl and Miltner, 2013). As mentioned, however, the uptake of government incentive programmes for solar has been limited.

Many different financial models exist within the solar sub-sector. The primary beneficiary of government support (through PVTMA and UECCC) has been SolarNow, a Dutch company that has a payment-plan model. SolarNow installs and services solar home systems that come with a credit facility, whereby clients make a down payment of 25% and pay the balance in 12 monthly instalments at interest rates that compare favourably with those of microfinance institutions. SolarNow is in the process of raising equity, and has received a loan guarantee from USAID to obtain investment from Centenary Bank, a local Ugandan financial institution.

SunFunder is supporting crowd-funding for off-grid solar projects in Uganda. Barefoot Power is a company that designs, manufactures and distributes micro-solar lighting and phone-charging products in Uganda and has received a €1 million grant from European Investment Bank (EIB), while Solar Sister (which uses an Avon-style distribution system for solar lamps) has received support from Exxon Mobil, USAID and a number of US-based foundations (see Appendix 2).

5.1.3 Limited (private investment) – geothermal, biogas and wind

Geothermal

The most advanced instrument available to support geothermal power development is the $66 million Geothermal Risk Mitigation Facility (GRMF) for Eastern Africa (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda) which was established with the support of the African Union Commission, Germany's BMZ, and the EU-Africa Infrastructure Trust Fund. The GRMF uses grants to support

[20] MEMD, MWE, National Forest Authority (NFA), Forest Sector Support Department (FSSD), UNDP, FAO, GIZ and District governments of Mubende, Nakaseke, Kiboga and Kiryandongo.

[21] In terms of types of institutions, GVEP has completed loan guarantee agreements with three SACCOS, one Ugandan tier two bank, and one micro-finance institution. GVEP has placed a total of approximately $92,441 on deposit with the various financial institutions in Uganda to back up the guarantee. So far, only approximately $578 has been claimed by financial institutions from those deposits due to losses incurred via defaults see Gibbs and Melnyk (2013) for detailed lessons from the loan guarantee programme.

80% of surface exploration surveys and 40% of exploration drilling costs (with a 30% additional success fee). While the GRMF absorbs some of the cost of resource development, it still leaves project developers and investors with considerable levels of cost and risk in the context of exploration drilling. This has been acknowledged, with the GoU likely to establish a department for geothermal resources within MEMD to provide resource information to the market as a whole.

The GRMF led to some progress, with eight projects short-listed following the first application round in late 2012. In 2013, UECTL signed a PPA with AAE Systems Inc. on the construction of a 150 MW geothermal power plant in Western Uganda (a joint venture with local Katwe Geothermal) at an estimated cost of $1.2-2.1 billion. Since the execution of the PPA, AAE has entered into a dispute with their local representative over a $60 million arrangement fee, which may aggravate perceptions of risks in the sub-sector (Kasita, 2014; Candia, 2013).

Biogas

In 2007, the total potential market size for biogas in Uganda was estimated at 200,000 units, with a market value of $100-280 million. There are only 5,000 units being used at present in the country, and so there is significant potential to scale up biogas systems financing for domestic and institutional users for cooking and small-scale electricity generation (UNCDF, 2013). These technologies have proven to be successful in other parts of the world including China and India, where more than 40 million bio-digesters have been installed (Begumana, 2013).

Although there are 26 companies producing biogas systems in Uganda, and a National Biogas Association, the systems' high up-front costs have limited uptake to date. While there is a clear need for financial support, there has been limited uptake for loans by local banks (including microfinance institutions) as systems are difficult to reclaim following payment default (UNCDF, 2013). One solution is to provide loans to biogas installer / technicians, who are at lower-risk for default, and who can then on-lend to their clients in the form of vendor financing, as shown in the case of SolarNow. To explore these options further, in 2014, the Dutch Government has commissioned a researcher to complete a study of financing opportunities for biogas (ABBP, 2012). New financing models may be complemented with by a number of new biogas producers entering the market, importing less expensive systems from China, which have undergone quality control measures and are faster and simpler to significantly (UNCDF, 2013).

Wind

Wind-resource studies supported by the EU have concluded that although wind resources in Uganda are insufficient for large-scale power generation, possible small-scale applications exist for water pumping and for small-scale power generation (from 2.5 kV to 10 kV) in mountainous and rural areas. Small industries in rural areas could benefit from wind resources, but our research did not identify any systems under development at present.

5.2 Key themes emerging from Framework 2

- The GoU is only providing capital to projects and companies in 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 biomass power and biogas sub-sectors not benefitting 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 are providing grants in sub-sectors with 'Emerging' or 'Limited' private investment (biogas, solar, biomass for cooking, and geothermal).
- 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 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 funds[22]
    - Biomass power – large Ugandan companies (sugar sector)
    - Charcoal (green) – international companies, NGOs and foundations
    - Solar – small international companies and foundations
    - Biogas – small Ugandan companies
- In parallel to 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. This should be undertaken in financial 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. As with GET FiT, such support could replace investment lost in these areas as the result of the collapse of the carbon markets.

[22] ODI research on Private Climate Finance Support has found that a number of these funds are capitalised significantly with public resources. See Whitley (2012).

6. Framework 3: scale of support

6.1 Findings - summary (Framework 3)

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 data sets 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 data sets, in terms of both year and sub-sector coverage.

In addition, it was 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 data sets.[23] It was also impossible to find sub-sector information for FDI, with the lowest level of classification in Bank of Uganda (BOU) statistics being 'electricity and gas'.

Through our own research, however, we have managed to find some information on the average scale of investment (public and private) by sub-sector, as highlighted in Figure 20. It should be noted, as per Appendix 2, that this covers many years of investment, and for some sub-sectors is only an estimate of potential scale or rough consumption value.

This general lack of data has significant implications for tracking climate finance effectiveness, not only as it pertains to private investment. 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 the shifts or increases in climate-compatible activities and investment. It is anticipated that finding private investment information will be even more challenging for other climate-relevant sectors (see Box 1), and their sub-sectors.

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, official development assistance (ODA), other official flows (OOF) and fast-start finance (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.

Key themes emerging from Framework 3

- 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).

[23] With support from DFID, Bloomberg New Energy Finance (BNEF) will be publishing Climatescope data for Uganda which 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 methodology for review of investment in countries in Latin America.

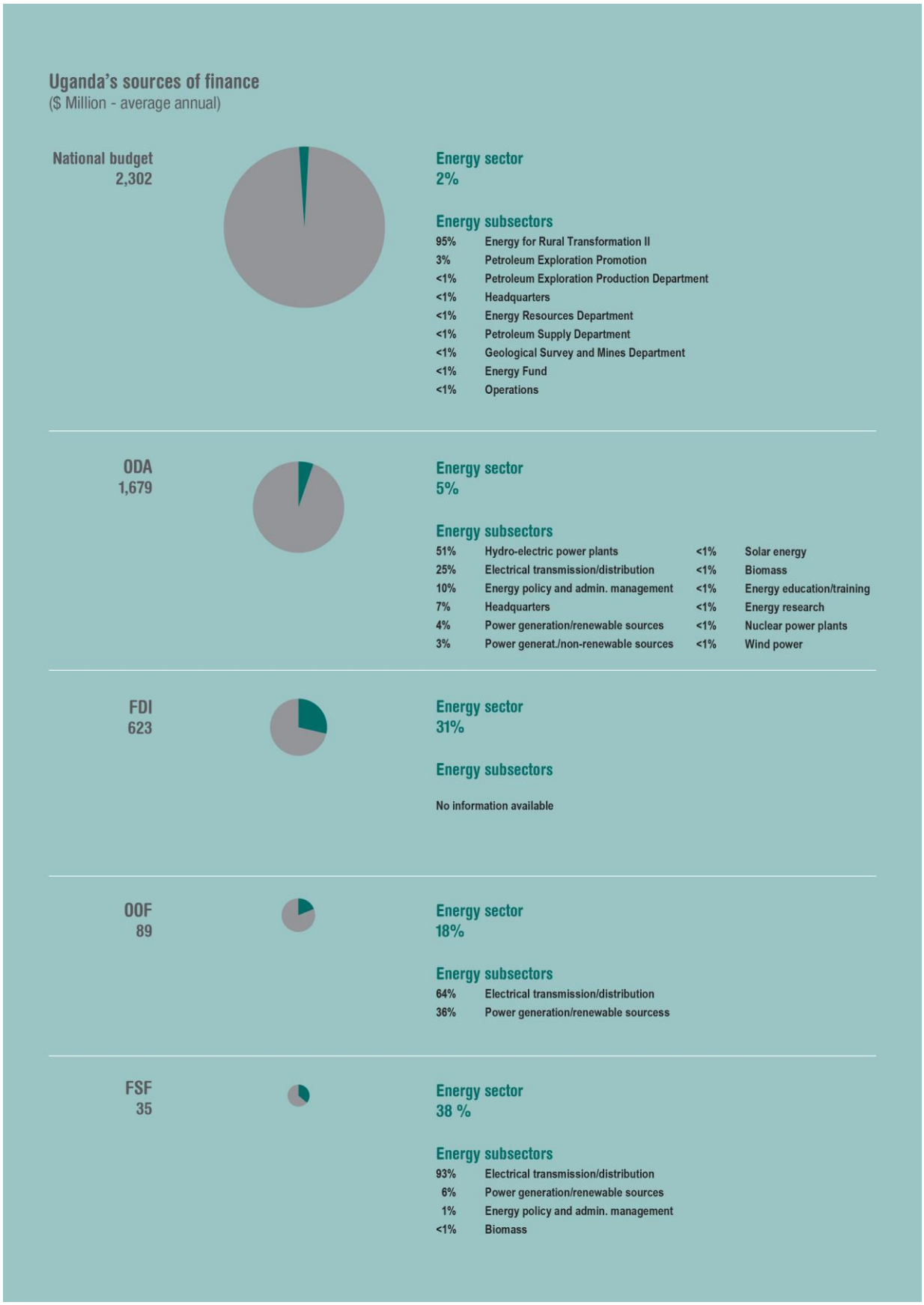
- All data sets track sub-sectors differently, but it is interesting to note the similarity in patterns of support and investment by public actors that focus on transmission and distribution and hydro-power generation through OOF, ODA and FSF.

- 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 WB-supported Energy for Rural Transformation programme indicated 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.

Figure 20: Framework 3 – scale of support (see also Appendix 3)



7. Conclusions

This research had two goals. The first was to test a methodology that would fill key information gaps about incentives and investment at country level, in climate-relevant sectors, to support donor governments in their efforts to shift or direct additional private resources to CCD. The second was to enhance understanding of the links between public support (both domestic and international) through regulatory, economic and information instruments, and through private investment in CCD.

This research was 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 without seeking to isolate climate-positive activities, and is distinct from the majority of climate-finance studies, which do not include incentives and investment in climate in-compatible development (Whitley, 2013a).

We were able to complete Frameworks 1 and 2 at sub-sector level for the energy sector in Uganda using: government websites and documents, interviews with key stakeholders (see Appendix 2) and publicly available information – much of which was gleaned from local media sources. This provided primarily qualitative information that could be used to inform climate-finance spending, particularly as it pertains to actors and programmes that seek to mobilise private investment.

We were unable to complete Framework 3 at sector or sub-sector level, because of 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 is anticipated that it will be even more challenging to find private investment information for other climate-relevant sectors (Box 1), and sub-sectors.

This has significant implications for the second aim of this research, which was to determine links between incentives and investment within a sector. It also has serious implications for the assessment of climate-finance effectiveness, and not only as it pertains to private investment. If it is not possible to track support and investment at sub-sector level, it will be very challenging to make a causal link between the support provided and any shifts or increases in climate-compatible activities and investment.

However, by linking the key findings across the three frameworks, we were able to identify some important considerations for the deployment of climate finance in Uganda's energy sector 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 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.

- The historic focus of the GoU and its development partners on grid extension, the development of large hydro projects, and on back-up thermal power has resulted in the lack of instruments oriented towards private financing of technologies for cooking, and for off-grid or mini-grid solutions that would 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, it will also address the investment gap 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 starts-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 MICs (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: un-bundling and privatisation of elements of the electricity sector, establishment of a transparent and effective Electricity Regulatory Authority (ERA), Renewable Energy Feed-In Tariffs, and template Power Purchase and Investment Agreements (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 renewable energy feed-in tariffs (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 incipient 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 this data, which includes not only government ministries, but 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.

The findings summarised here are focused on agencies that deploy climate finance. However this methodology can be applied without a climate-change lens (or the use of the terms 'mitigation' or 'adaptation'). It is hoped that this 'climate agnostic' approach allows for the information on incentives and investment in a given sector and sub-sector to be used by a range of stakeholders beyond a

climate-finance audience. A diverse group of actors are trying to understand how private finance can be shifted and mobilised toward global public goods, and these actors will have to work together if we are to fill the significant data gaps that we encountered during this exercise.

These wider questions about data for tracking and shaping private investment are explored in more detail in a parallel report which explains our data collection methodology in greater detail, highlights key sources of information and current data gaps, and sets out where additional work might be undertaken to improve information on investment at the country and sub-sector level (Whitley, 2014).

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Appendix 1: Interviewees

- Africa Institute For Energy Governance
  - Dickens Kamugisha,
- Agency for Transformation
  - Morrison Rwakakamba,
- Angelo Izama (Open Society Fellow)
- Bank of Uganda
  - Emmanuel Ssemambo, Statistics Department
  - Nicholas Okot, External Sector Statistics
  - Bryony Willmott
- Bujagali Energy Limited
  - John Berry
- Clean Energy Partnership Africa
  - David Ebong
- Electricity Regulatory Authority
  - Ivan Kisembo, Project Development Engineer
- The Independent Magazine
  - Andrew Mwenda
- KfW (German development bank)
  - Stephanie Rieger
- Ministry of Finance, Planning and Economic Development
  - Allan Mugume, Private Sector Development
  - Ivan Rwakijuma, Private Sector Development
  - Joyce Ruhweza, Senior Economist, Aid Liaison
  - Fredrick Matyama, Asistant Commissioner, Aid Liaison
- National Planning Authority
  - Edith Kateme-Kassajja

- Ministry of East African Community Affairs
  - Malcolm Spence, Trade and Finance Economist
- The Madhvani Group
  - Farhan Nakhooda
- Norfund
  - Inge Stølen, Senior Investment Manager, Renewable Energy
- Norwegian Embassy
  - Kristin Waeringsaasen
  - Dr. Elin Graae Jensen
- Rural Electrification Agency
  - Barbara Asiimwe Kasule
- Tulow Oil
  - Konrad Nkutu
- Uganda Investment Authority
  - Albert Ouma
  - Frank Sebbowa
- UK Department for International Development (DFID) - Uganda
  - Howard Standen
- UK Foreign & Commonwealth Office (FCO)
  - Richard Cox
- UK Trade & Investment (UKTI)
  - Eric Olanya
- Uganda Energy Credit Capitalization Company
  - Roy Baguma
- Uganda Carbon Bureau
  - Bill Farmer
- World Bank
  - Andreas Eberhard
  - Jean-Pascal N. Nganou, Country Economist Poverty Reduction and Economic Management
  - Mbuso Gwafila, Senior Energy Specialist

Appendix 2: Additional information for Framework 2

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, WB/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 per cent by the China Exim bank. (from Daily Monitor 2 articles) Isimba – construction started in 2013 (188 MW, 570m) China International Water and Electric Corporation (CWE) - CWE petitioned the East African Court of Justice (EACJ) to compel Uganda to follow procurement laws in sourcing for an EPC for Karuma. State-owned CWE signed a memorandum of understanding with the Ugandan government 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 Limited – the contract was 'controversially awarded' directly by President Museveni, reportedly after signing bilateral agreements between the Uganda and the Chinese governments. China will finance 85% of the project (Daily Monitor) The Government 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, however the signed contract is reported at $1.65 billion. The report adds that government 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 – Jan 2013 ($30 million, 9 MW) Hydromax Ltd. (from Daily Monitor articles). Funding for the project is facilitated by loans from the African Development Bank ($9 million) and from the PTA Bank (regional development bank for South and East Africa) ($10 million). Hydromax (Ugandan – Dott Services Limited) will invest $8 million in the project. Mpanga (EMS), 18 MW, $27 million, EAIF $20 million loan (PIDG), $7 million SEAMS (US). Mpanga River hydro-power plant is one of a portfolio of 13 small hydro-power (SHP) 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 (SAEMS), 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 DFIs including EAIF (from EAIF). 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 WB) (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 the Government of Uganda. 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: (a) National Development Bank of Sri-Lanka, (b) Hatton National Bank and (c) 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 the power plant to 12 MW. Mubuku III (2008, 10 MW) and Kasese Cobalt Company Limited (25% state, 75% Blue Earth Refineries Ltd., BritishVirgin 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 will provide $6 million, DEG $4 million and Finnfund $2 million. Barclays Bank Plc: corporate actor, international bank (contribution through the EAIF), primary headquarters in the UK. Standard Bank of South Africa Ltd: corporate actor, international bank (contribution through the EAIF), 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 – Euro 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 WB 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 UETCL 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 benefitted from these arrangements and further funding to support expansion of the scheme has been provided by the Vitol Foundation. Through the DEEP programme, GVEP developed a sustainable and widespread industry of micro and small energy enterprises. Spanning five years, the Developing Energy Enterprises Project (DEEP) started in March 2008 and ended in February 2013. This €4 million initiative was supported by the European Union and the Dutch Ministry of Foreign Affairs (DGIS). 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 Government of Uganda, 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 (Swedish International Development Cooperation Agency). 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. In1992 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 United States African Development Foundation grant ($85,000) for developing business plans and staff training. In 2008/9, 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 Euros has been committed by the Directorate General for International Cooperation (DGIS) 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. They 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: Euro 54 million from households, Euro 6.9 million from host governments, Euro 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 fertilizer. 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.

Appendix 3: Additional information for Framework 3

Sources 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

Sources 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[24]
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

[24] 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.

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