

ACHIEVING UGANDA'S DEVELOPMENT AMBITION

The Economic Impact of Green Growth: An Agenda for Action



A Report by the Government of Uganda and the New Climate Economy Partnership
November 2016



THE REPUBLIC OF UGANDA



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About this paper

This paper was jointly prepared by the Government of Uganda through the Ministry of Finance, Planning and Economic Development (MFPED), the Ugandan Economic Policy Research Centre (EPRC) Uganda, the Global Green Growth Institute (GGGI), the New Climate Economy (NCE), and the Coalition for Urban Transitions (an NCE Special Initiative).

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THE NEW CLIMATE ECONOMY

The Global Commission on the Economy and Climate

COALITION FOR URBAN TRANSITIONS

A New Climate Economy Special Initiative

Foreword

As Uganda embarks on accelerating its economic development, the Government is taking conscious steps to ensure that growth is socially inclusive and that the protection of the environment is upheld. The Second National Development Plan and the Vision 2040 strategy set out Uganda's development priorities. The forthcoming Green Growth Strategy, which the findings of this report will support, will comprehensively address challenges and opportunities to ensure Uganda's development trajectory is sustainable, in accordance with the Sustainable Development Goals and the ambitious climate change commitments this Government pledged a year ago at the 21st Conference of Parties in Paris.

Uganda's economic transformation and the related growing demand for energy, water and other natural resources as well as unprecedented levels of urbanisation pose immense challenges to the Government of Uganda's commitment to sustainable development. Against this background, research and analysis of green growth related issues will support the integrated long-term planning by the Government. This report has pointed out that economic and social development and action on climate change are heavily interwoven, with green growth potentially supporting a 10% boost to GDP and 4 million jobs by 2040, as well as positioning Uganda as a green growth leader in the region.

The Government of Uganda fully participated in the drafting of the report process from the onset and it was the Ministry of Finance, Planning and Economic Development (MFPED) which led this process. Therefore, I am very pleased to release this report, *Achieving Uganda's Development Ambition – The Economic Impact of Green Growth: An Agenda for Action*, to the people of our nation and the international community.

This study is an outcome of extensive research and analysis carried out by a partnership of eminent institutions active in our country. I wish to congratulate the participating institutions and individuals for their effort and pioneering research. In particular, I would like to thank the New Climate Economy – the flagship project of the Global Commission on the Economy and Climate, the Global Green Growth Institute and the Economic Policy Research Centre.

The Government of Uganda is committed to serving the needs of its people and therefore, I would like to highlight the important contribution that this report will provide to our national decision-making bodies and the international community's tools for improved aid effectiveness and coordination. This work will promote improved medium- and long-term planning of development interventions aimed at generating sustainable economic growth and development benefits for Uganda.



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The work has benefitted from extensive consultation with institutions and individuals who met and advised the team, and through three expert workshops held in Kampala in February, June, and August 2016 under the auspices of the MPFED.

The Ugandan government agencies consulted include: the Office of the Vice President; the Ministry of Agriculture, Animal Industry and Fisheries; the Ministry of Education, Science, Technology and Sports; the Ministry of Energy and Mineral Development; the Ministry of Foreign Affairs; the Ministry of Lands, Housing, and Urban Development; the Ministry of Gender, Labour and Social Development; the Ministry of Tourism; the Ministry of Trade, Industry and Co-operatives; the Ministry of Water and Environment; the Ministry of Works and Transport; the National Environment Management Authority; the National Forestry Authority; the National Planning Authority; the Kampala Capital City Authority; and the Ugandan Bureau of Statistics.

Civil society and private sector organisations consulted include: the Climate Action Network Uganda (CAN-U); the Uganda Local Government Association (ULGA); the Environmental Management for Livelihood Improvement (EMLI); the Uganda National Farmers Federation (UNFFE); the Eastern and Southern Africa Small Scale Farmers Forum (ESAFF – Uganda); the Private Sector Foundation for Uganda (PSFU); the Uganda Industrial Research Institute (UIRI); the Ugandan Manufacturer's Association (UMA); and the Ugandan Small Scale Industries Association (USSIA -Uganda)

Development partners consulted include: the UK Department for International Development (DFID); the International Growth Centre (IGC); the East African Development Bank; the United Nations Development Programme (UNDP); the United Nations Framework Convention on Climate Change (UNFCCC); the Overseas Development Institute (ODI); the World Bank; and the World Resources Institute (WRI).

Editing was undertaken by Nikki Lee (Overseas Development Institute). The report was typeset by Anil Shamdasani.

About the Partners

The Economic Policy Research Centre

The Economic Policy Research Centre (EPRC) is an autonomous not-for-profit organisation, established in 1993 with a mission to foster sustainable growth and development in Uganda through advancement of research based knowledge and policy analysis. Since its inception, the EPRC has made significant contributions to national and regional policy formulation and implementation in the Republic of Uganda and throughout East Africa.

The New Climate Economy

The Global Commission on the Economy and Climate, and its flagship project the New Climate Economy, were set up to help governments, businesses and society make better-informed decisions on how to achieve economic prosperity and development while also addressing climate change. It has been supporting a number of country governments including Columbia, China, Ethiopia and India.

The Global Growth Institute

The Global Green Growth Institute is an international organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies. Established in 2012, at the Rio+20 United Nations Conference on Sustainable Development, GGGI is accelerating the transition toward a new model of economic growth – green growth – founded on principles of social inclusivity and environmental sustainability.

GGGI is an interdisciplinary, multi-stakeholder organization that believes economic growth and environmental sustainability are not merely compatible objectives; their integration is essential for the future of humankind.

The Coalition for Urban Transitions

The Coalition for Urban Transitions is a special initiative of the New Climate Economy, made up of over 20 leading institutions across five continents who share a common purpose: delivering a better urban future for all. This includes leaders from think-tanks, research institutions, city networks, international organizations, major investors, infrastructure providers, and strategic advisory companies. The work of the coalition supports decision makers to unlock the power of cities for enhanced national economic, social, and environmental performance, including reducing the risk of climate change. The initiative is hosted by the WRI Ross Center for Sustainable Cities, and jointly managed with the C40 Climate Leadership Group.

Executive Summary

Uganda has seen an average of 7% annual economic growth over the last two decades. This has resulted in a reduction in headcount poverty, from 56% in 1992-1993 to 20% in 2012-2013; around half a million jobs created annually; and improved access to basic services. To build on this progress, Uganda will need to place even greater emphasis on diversifying the economy and overcoming a number of constraints to development that could limit future prosperity for a growing, young and increasingly urbanised population. This is critical as the country strives to reach upper middle-income status by 2040, realise the Sustainable Development Goals (SDG), and deliver on its international commitment to low-carbon economic growth as part of the Paris climate change agreement.

Uganda's leaders understand that they will need to reconsider its growth model to deliver economic and social outcomes at the same time as protecting natural capital, managing the impacts of climate change and using environmental policy to actually drive growth: a "green growth" model. This green growth model will require a continued focus on macroeconomic stability, improving the investment climate, and investing in health and education. It will also need to include an enhanced focus on improving the productivity of agriculture, developing high-value services and industry, providing access to modern energy, and harnessing the opportunities from urbanisation. All are features of the development priorities outlined in the 5-year National Development Plan II (NDPII), and the President's strategic priorities for 2016-2021.

Process

To improve its understanding of the challenges and opportunities related to this green growth model, the Government of Uganda, in collaboration with the New Climate Economy Partnership in Uganda, sought to address four questions:

1. Is green growth an economic opportunity for Uganda?
2. Given the range of urgent development priorities, is green growth affordable?
3. What are the key policy shifts required for green growth to support the aims of the NDPII and Vision 2040?
4. What are the actions required to drive implementation?

Using macroeconomic, sector modelling and expert stakeholder engagements, evidence gathered suggests that there is a strong economic case for the implementation of 23 priority green growth interventions in Uganda spanning the agriculture, industry, energy, and urban infrastructure sectors. Moreover, many of these investments would support not only economic outcomes, but also pro-poor social and environmental outcomes.

Summary of findings

If the identified interventions are fully implemented, they could provide a boost to economic activity, worth around 10% of GDP by 2040 compared to business as usual; deliver employment of up to 4 million jobs; and reduce future greenhouse gas (GHG) emissions by 28% relative to a conventional growth pathway (exceeding Uganda's current nationally determined contribution). These benefits accrued in the short term, could also boost GDP by 10% in 2020, compared with expected business as usual growth – this is an increase in national income of an estimated US\$3.4 billion.

Inevitably, green growth comes with some trade-offs in terms of which investments to prioritise, and value judgments over which outcomes are most desirable. For example, a commitment to more labour intensive climate-smart agricultural practices may involve a trade-off with the mechanisation and commercialisation strategy for national agricultural development that could reduce employment overall. However, managing the impact of Uganda's future development on the natural environment will be needed under any scenario or investment programme. Even achieving a green growth pathway by 2040 through implementation of actions highlighted in this report, will lead to an approximate doubling of GHG emissions relative to today. Though this doubling will originate from a small base, at a much slower rate than if green growth measures were not implemented, and in the context of a near doubling in

population. While the green growth scenario in this report will reduce the GHG intensity of GDP by around 35% and emissions per capita will remain at a low base, this will require Uganda's policy makers to actively increase ambition over time, as technologies evolve and new capacities emerge.

The investment required to unlock the identified green growth interventions is estimated at US\$1.8 billion annually to 2020. The investment programme distinguishes between what is already included in the government's current plans – which in some places can be enhanced – and what would represent new interventions. Not all options require additional investment – for example, smarter urban development could reduce overall infrastructure costs by around 11% (and improve access to basic services by a third). Current plans already cover 75% of the investment required (of which 44% is expected to come from private sources). This report offers a strong case for prioritisation of this existing investment. Total, additional annual investment needs are estimated to be around US\$450 million per annum, of which US\$200 million would be expected to come from public sources, an uplift to the annual public budget of 3%. This appears manageable in the context of the government's current fiscal programme, especially with enhanced support from development finance (including climate finance which has only been modestly accessed to date). Moreover, it is estimated that these new investments could generate US\$3 of economic benefit for every dollar invested, even excluding wider benefits.

Summary of recommendations

For successful implementation of the identified green growth interventions, a twin-track agenda for action is required. First, a continued focus on the fundamentals that are preconditions for successful development – green growth or not – including the implementation of current, progressive government proposals on land reform and the reinvestment strategy from oil revenues. Second, the transformation of priority sectors for green growth: agriculture, energy, industry and cities. The study concludes by suggesting catalytic investments in climate-smart agriculture, off-grid electricity, efficient cookstoves, industrial energy efficiency, and integrated urban planning to galvanise action.

List of abbreviations

ASSP	Agriculture Sector Strategic Plan	MAAIF	Ministry of Agriculture Animal Industry and Fisheries
BAU	Business As Usual	MAMS	Maquette for MDG Simulations
BCR	Benefit Cost Ratio	MCA	Multi-Criteria analysis
BRT	Bus Rapid Transit CAADP Comprehensive Africa Agriculture Development Programme	MCM	Million Cubic Metres
CAN-U	Climate Action Network Uganda	MFPEd	Ugandan Ministry of Finance Planning and Economic Development
CDKN	Climate and Development Knowledge Network	MtCO₂e	Million Metric Tons of Carbon Dioxide
CGE	Computable General Equilibrium	NCCP	National Climate Change Policy
COMESA	Common Market for Eastern and Southern Africa	NCE	New Climate Economy
CSA	Climate-Smart agriculture	NDP	National Development Plan
DFID	UK Department for International Development	NDPII	National Development Plan II
DRC	Democratic Republic of Congo	NIAF	Nigerian Infrastructure Advisory Facility
EAC	East African Community	NPA	National Planning Authority
EMLI	Environmental Management for Livelihood Improvement	NUP	National Urban Policy
EPRC	Economic Policy Research Centre	ODI	Overseas Development Institute
ESAFF	Eastern and Southern Africa Small Scale Farmers Forum	PHS	Pico-Hydro Systems
FDI	Foreign Direct Investment	PPP	Public-Private Partnership
GCEC	Global Commission on the Economy and Climate	PSFU	Private Sector Foundation for Uganda
GDP	Gross Domestic Product	PwC	PricewaterhouseCoopers
GETFiT	Global Energy Transfer for Feed in Tariffs	REA	Rural Electrification Agency's
GGGI	Global Green Growth Institute	RESP	Rural Electrification Strategy and Plan
GHG	Greenhouse Gas	SDGs	Sustainable Development Goals
GIS	Geographic Information System	SGR	Standard Gauge Railway
GIZ	German Corporation for International Cooperation	SHS	Solar Home Systems
GNI	Gross National Income	SMEs	Small and Medium-sized Enterprises
IGC	International Growth Centre	SREP	Scaling-up Renewable Energy Program
INDC	Intended Nationally Determined Contribution	TFP	Total Factor Productivity
JICA	Japan International Cooperation Agency	UIRI	Uganda Industrial Research Institute
KCCA	Kampala Capital City Authority	ULGA	Uganda Local Government Association
kWh	Kilowatt Hour	UMA	Ugandan Manufacturer's Association
LPG	Liquid Petroleum Gas	UNDP	United Nations Development Programme
LRT	Light Rail Transit	UNFCCC	United Nations Framework Convention on Climate Change
LULUCF	Land Use, Land Use Change, and Forestry	UNFFE	Uganda National Farmers Federation
		USSIA	Ugandan Small Scale Industries Association
		WHS	Wind Home Systems
		WRI	World Resources Institute
		WtE	Waste-to-Energy

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Overview

In June 2015, President Yoweri Museveni launched Uganda's second 5-year National Development Plan (NDPII), a national development strategy laying the foundations for reaching Uganda's "Vision 2040" of upper-middle income status. This plan places emphasis on achieving "*A transformed Ugandan society from a peasant to a modern and prosperous country within 30 years*". This path is consistent with the SDGs and places emphasis on the creation of modern industry and services, ensuring the benefits of development are shared, and promoting development that takes into account the natural environment.

Uganda is starting from a strong base to realise its aims. The economy has seen strong economic growth in the past two decades, with a doubling in GNI per capita and GDP growth averaging 7% per year, driven largely by substantial capital investment. The poverty headcount has nearly halved in a decade from 56.4% in 1992-1993 to 19.7% in 2012-2013, and around half a million jobs have been added to the economy each year over the same period.

Challenges

However, challenges exist in maintaining this progress, which means putting emphasis on new drivers of growth. Due to tough external conditions, growth has slowed in the last three years to below 5%, and much needed structural transformation has been limited. An example is that while there has been a need to shift economic output towards non-agricultural activities because of (among other things) the rapid decline in agricultural productivity, there has been minimal observed shift over the past 15 years.

Uganda's development will need to manage existing challenges and overcome constraints that are holding back progress. These include high population growth, low levels of productivity (particularly in agriculture), managing the needs of rapid urbanisation (particularly in Kampala), slow delivery of infrastructure projects, modest levels of private sector investment, and a nascent financial sector. A key cross-cutting constraint is that of land rights; the ongoing processes around land reforms will be needed to unlock the potential benefits highlighted in this report.

A further challenge is ongoing climate variability and future climate change. This is not just a challenge for the future, but is impacting Uganda right now. Climate variability already impacts water availability, crop yields and energy production. Crop losses of 16% were attributed to extreme weather in 2010 and losses are predicted to be worse in 2016, with widespread famine as another effect. Together with natural resource

depletion, the effects of climate change negatively impact the most vulnerable in society and pose a major threat to prosperity. A recent study estimated that climate impacts could cost Uganda US\$3-6 billion per annum by 2050.

Window of opportunity

The next 15 years will be critical in managing a successful transition towards Vision 2040. Uganda faces a window of opportunity in which the demographic and urbanisation opportunities provided by its young population and pending urban transition can be harnessed as positive drivers of growth. Moreover, not harnessing these opportunities will create new challenges for the future. For example, relative to 2040, at least three quarters of the nation's infrastructure, industry and urban areas are unbuilt. This offers a "once only" opportunity to invest well in infrastructure to avoid costly lock-ins and legacy costs (e.g. unplanned urban sprawl).

Uganda is already making strides to put in place the required conditions for success. A number of interventions proposed by the NDPII can help to unlock regional economic integration and wider developmental benefits, such as the development of the standard gauge railway stretching from Mirama Hills in the southwest that will connect with the Nairobi-Mombasa trade corridor.

Structure of the report

Against this wider development backdrop, and based on feedback from the Government of Uganda, this report seeks to answer four questions related to green growth:¹

1. Is green growth an economic opportunity for Uganda?
2. Given the range of urgent development priorities, is green growth affordable?
3. What are the key policy shifts required for green growth to support the aims of the NDPII and Vision 2040?
4. What are the actions required to drive implementation?

This report's analysis outlines the potential for green growth to support structural transformation. It does so by first identifying the most important constraints to development in Uganda. It then looks at how a range

of green growth investments in the four sectors of agriculture, industry, energy, and cities can overcome these constraints relative to current trends.

The investments are analysed for their economic, social, and environmental impacts (including managing GHG emissions). Delivering all three concurrently would represent a “triple win”. The starting point has been the national development trajectory expected under the NDPII, and how green growth can support this ambition. However, the analysis goes further to identify the trade-offs from implementation, acknowledging the inherent difficulty in overcoming constraints and that difficult choices on which outcomes to prioritise will need to be made.

Driven by feedback from the Government of Uganda, the analysis has also undertaken a more detailed “deep dive” related to Uganda’s future urban transition and its link to wider development issues. Unstructured, unplanned urban development is widely considered one of the major factors holding back effective development to date. The analysis suggests how Uganda might unlock the benefits of its growing urban population, exploring in detail the spatial implications of Uganda’s development trajectory. The focus here is on the national picture: both what is happening outside and between cities, as well as within them.

The report’s analysis is grounded in the financial realities of Uganda. The findings build on the NDPII, highlighting the priorities for green growth which (i) already exist within NDPII and should be prioritised and enhanced and (ii) are new and additional, and exploring the likely investment profiles for both (i) and (ii) from public and private sectors.

The analysis then seeks to provide practical evidence to support decisions when implementing Uganda’s NDPII and the measures needed to deliver the national Vision 2040. In addition, this report provides input to the development of Uganda’s Green Growth Strategy, set out to respond to the country’s international and domestic climate change commitments.

We now explore the four questions in turn.

Is green growth an economic opportunity?

The starting points for this green growth assessment are:

- a) to identify the main drivers of growth;
- b) to corroborate the existing constraints holding back development in Uganda;
- c) to build on the existing evidence base through a “growth and climate diagnostic”.

The outcome of this diagnostic demonstrates that cross-cutting reforms and investments in vital sectors will not only help to drive structural transformation and economic outcomes, but also social and environmental outcomes. Economy, equity, and the environment are strongly interconnected.

Therefore, the factors that will determine successful structural transformation and development will also determine Uganda’s ability to unlock a better green growth model. The economic “systems” most pertinent to this report’s analysis are Uganda’s *agriculture, energy, industry, and cities*. These also reflect the economic systems which provided the greatest opportunities for growth and the reduction of climate risk (see Figure 1), identified in the Global Commission on the Economy and Climate’s 2014 report, *Better Growth, Better Climate*.

By better harnessing the drivers of growth in these economic systems, Uganda will be able to support improved economic, social and environmental outcomes – or a “triple transformation”. Work by the Global Commission on the Economy and Climate has demonstrated that this can be achieved through three main drivers of growth and climate action:

- **Resource productivity:** Enhanced resource productivity improves efficiency, freeing up resources for more uses, reducing waste and pollution, and relieving pressure on natural capital stocks.
- **Infrastructure investment:** Uganda will invest billions of dollars annually in infrastructure over the coming years. Growth and development outcomes will be determined by the extent to which this investment in infrastructure is efficient, low-carbon and resilient to a changing climate, and provides basic services.

- **Innovation:** Uganda will need to adapt, adopt or develop technologies and innovative activities that can help drive growth over the coming decades. Given its limited natural resources, innovation will be a core determinant of the growth trajectory for Uganda.

There are a number of green growth options in Uganda across the four identified sectors of agriculture, industry, energy, and cities. From a long list of 126 possible interventions, 23 priority green growth interventions have been identified, filtered, and then quantified across the four sectors. These include integrated urban planning, improved cookstoves, solar irrigation, off-grid renewables, and industrial energy efficiency. These interventions were identified through stakeholder engagement and a review of literature, based primarily on their relevance to Uganda and ability to provide economic benefits. In addition, these interventions were also identified by considering wider co-benefits, including job creation, emission reduction potential, and improved health outcomes.

Using the government's preferred macroeconomic model – Maquette for MDG Simulations (MAMS) – the analysis compared three scenarios:

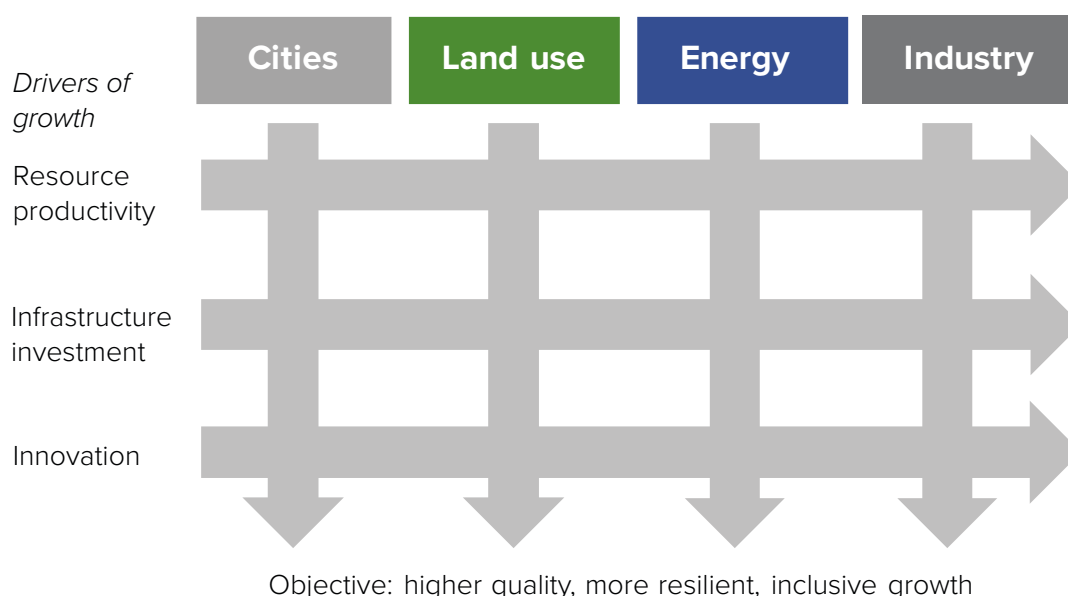
- The business as usual (BAU), or reference scenario, pathway shows what is likely to happen in Uganda if green growth interventions are not prioritised or implemented.
- A “planned policy” scenario is the predicted growth from activities if the proposed green growth options in the current NDPII are delivered. This scenario will validate and support existing project interventions for accelerated implementation in order to *optimise* the green growth impacts of the NDPII.
- A green growth or “new policy” scenario assesses the impact of new and additional project and policy interventions not currently in Uganda’s policy framework. This scenario forms part of an *enhanced* NDPII or green growth development pathway.

Overall, the analysis shows that well-designed policies and investments can yield benefits across multiple areas, which largely corroborates New Climate Economy’s (NCE) global findings. For example, planning and designing compact and connected cities in Uganda to incorporate transit-oriented urban development, including rails and buses, could significantly boost economic productivity, reduce poverty, improve health outcomes and improve the environment.

The results indicate that fully implementing all of the 23 planned and new green growth interventions in the green growth scenario would contribute an additional 10% to Uganda’s GDP versus BAU. This would be equivalent to benefits of US\$3.4 billion in 2020 and US\$11.5 billion by 2040. In 2040, a full US\$6.9 billion would represent new and additional growth

Figure 1

Drivers of growth and four core economic systems



Source: Adapted from GCEC (2014).

Note: “Cities” includes urban transport; “agriculture” includes forests; and “innovation” includes economy-wide innovation.

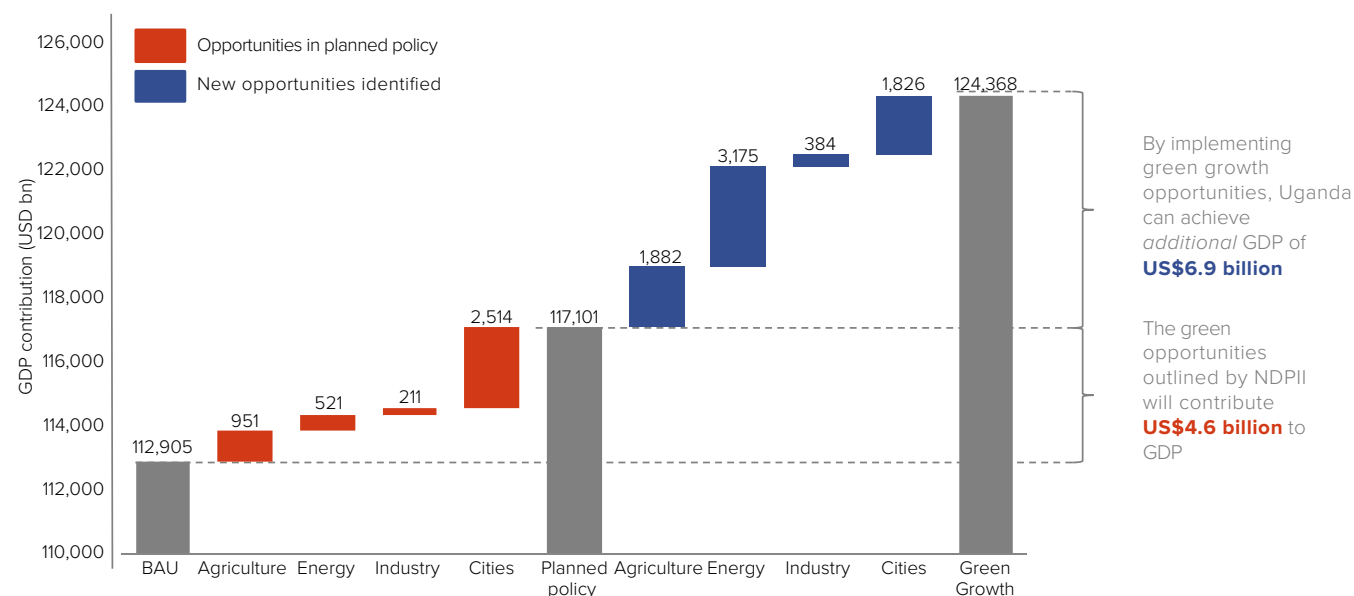
beyond currently planned policy (see Figure 2). The total GDP contribution includes direct benefits but does not include the full spillover productivity gains from economic infrastructure investments such as the Standard Gauge Railway (e.g. the job creation which could result from improved transport infrastructure). In narrow aggregate terms, this will generate average benefit-cost ratios of 3:1 by 2040, as the upfront sunk costs are outstripped by the benefits generated. This would raise the average expected growth rate from 6.1% per annum in BAU to 6.6% in the green growth scenario, also supporting up to 1.3 million new jobs (gross) by 2020, rising to 4 million by 2040. Many of these new jobs would be created directly or indirectly through higher productivity agriculture. These estimates are based on expected direct job creation from

the implementation of the identified interventions. The analysis has not estimated the potential displacement of other jobs in the economy from shifting from BAU to green growth (which could result in total net job creation that is lower than the figures presented here).

This GDP and jobs contribution is expected to be complemented by a 30.4 million tonne, or 28%, reduction in projected GHG emissions by 2040. The scale of avoided GHG emissions by 2030 would exceed the commitments set out in Uganda's national contribution under the Paris Agreement, which is a 22% reduction from BAU emissions by 2030. This suggests that Uganda should have confidence in its Paris commitment and it could potentially be even more ambitious over time.

Figure 2

The GDP contribution of existing and new interventions for green growth in 2040 versus BAU growth



Source: NCE modelling

Table 1

The impact of green growth interventions in Uganda in 2020 and 2040 relative to a BAU growth pathway

	Investment	GDP contribution	GHG impact	Jobs impact
2020	\$1.9 billion (6.6% of GDP)	\$3.4 billion (10.3% of total GDP)	11 MtCO _{2e} (-21%)	1.3 million (7.1% of jobs)
2040	\$2.0 billion (3.2% of GDP)	\$11.5 billion (10.2% of total GDP)	30.4 MtCO _{2e} (-28%)	4.0 million (10.6% of jobs)

Source: NCE modelling

These aggregate benefits come from a combination of factors such as more efficient growth (e.g. through industrial energy efficiency and the resultant lower operating and energy supply costs) or reduced upfront capital investment (e.g. displacing some grid extension with more cost-effective off-grid solutions). Productivity gains within sectors also contribute (e.g. making cities more efficient at driving growth through public transport) as does more rapid innovation (e.g. creating an environment for new business models in the agriculture sector or energy solutions in agroprocessing).

However, the analysis also recognises that there are trade-offs for some investments, and a green growth pathway does not come without difficult choices. For example, some measures analysed have a greater economic growth impact compared to their job creation and environmental impact; others have a greater environmental impact compared to their growth and jobs impact; while some have a greater jobs impact compared to their growth and GHG impacts. Further still, some measures deliver a significant GDP contribution but their direct employment gains are limited in comparison (e.g. improved cookstoves); others have high GHG returns but without the equivalent GDP contribution to match (e.g. green industrial parks). Balancing these different priorities will be needed in understanding where to devote policy effort and resources.

Managing the impact of Uganda's development trajectory on the natural environment will be required under any scenario or investment programme. Even in the green growth scenario, by 2040 GHG emissions will still approximately double relative to today. However, this doubling will originate from a low base, at a much

slower rate than if green growth measures were not implemented, and in the context of a near doubling in population. There will be a need to periodically review progress (perhaps at five-yearly intervals in line with the NDP and/or international processes on nationally determined contributions (NDC) to climate action) to increase ambition over time. Nevertheless, the GHG intensity of GDP will be reduced by around 35% in the green growth scenario and emissions per capita will flatline at around 1.3 tonnes per capita.

Is green growth affordable given the range of urgent development priorities the government faces?

Relative to BAU, achieving the green growth scenario will require prioritising and channelling investment to fund different measures. The annual average investment requirement from 2015 to 2040 is just under US\$1.8 billion, 75% of which is already programmed under the NDPII.

The NDPII sets out a detailed capital investment profile to 2020 which represents the expected investment profile under the planned policy scenario, including the expected split between the public and private sectors. Of the US\$1.8 billion required for the green growth interventions, US\$1.35 billion are already earmarked as interventions in the current NDPII – with the public sector expected to deliver US\$0.75 billion in investment and the private sector US\$0.6 billion (see Table 2). In these cases, there is a need to continue to focus on both prioritising public investment and leveraging and incentivising private capital for green growth.

Table 2

Total annual public versus private investment needs during NDPII budget period (2016-2020)

	Total annual average investment (USD billions)	Total annual private investment (USD billions)	Total annual public spending (USD billions)
NDPII average budget figure	11.70	4.94	6.76
Total investment needs of green growth pathway	1.80	1.00	0.80
Green growth investment already within NDPII	1.35	0.75	0.60
New and additional green growth investment needs	0.45	0.25	0.20

Source: NCE modelling.





The incremental annual investment requirements for *new and additional* green growth investments in the green growth scenario is US\$450 million per annum, of which approximately US\$250 million can be expected to be leveraged from private sources. Therefore, at an incremental annual public investment of US\$200 million (which could be from either national or international sources) and a weighted average return of 3:1, the green growth scenario appears to be within the range of a reasonable increase. This is in the context of the government's current fiscal programme, which is based on benefit-cost ratios, and representing a 3% uplift on the current public budget.

This financing will need to rely on multiple sources. The scale of needed investment is well beyond the scale of current level of climate finance, but climate finance could still play a role as part of a broader investment strategy that looks to tap into wider development finance sources (total aid flows in Uganda are around US\$1.6 billion annually). To date, the various challenges involved have meant that Uganda has not accessed substantial funding from bodies such as the Green Climate Fund. Meeting the investment requirements is likely to involve the private sector and should be led by effective deployment of the government's own resources in leveraging more private sector investment.

What are the key policy shifts required for green growth to support the aims of the NDP II and Vision 2040?

The assessment of possible interventions is important for prioritising where Uganda should focus its resources and policy effort. We explore each of the sectors – agriculture, energy, industry and cities – in turn.

Transforming agriculture

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.3 billion	\$0.9 billion	-2.2%	1.0 million
2040	\$0.6 billion	\$2.8 billion	-1.1%	3.4 million

Raising productivity in agriculture is a major development objective for Uganda, with 76% of households earning income generated from agriculture (accounting for around 25% of GDP). The main outputs are coffee and tea (making up 24% of exports in 2014).





There are also a number of challenges. Agriculture within Uganda has been characterised by low yields, a reliance on basic agricultural techniques, and slow uptake of more productive practices and technologies. In addition, low yields and high population growth, coupled with poor land management practices, are contributing to deforestation and soil erosion. Uganda's agricultural productivity levels are some of the lowest in sub-Saharan Africa and productivity growth has been in decline in the last 5 years (falling on average 0.4% per annum between 2008 and 2012). Extreme weather events are also having a detrimental impact on agriculture, resulting in significant crop losses. Increasing yields and farmer income through improving agricultural practices and technological uptake is a priority, with the Government of Uganda targeting an increase in market output of 50% by 2025.

Green growth interventions that raise agricultural productivity, increase farm incomes, and improve climate resilience have the potential to significantly improve growth and reduce poverty. Potential economic gains from investing in green growth interventions in agriculture are high, contributing US\$2.8 billion to GDP in 2040 under the green growth pathway, with the majority of these gains attributed to increases in yields. With such a large proportion of the labour force engaged in agriculture, investments in productivity and facilitating trade will have far-reaching benefits. The reform of the agriculture sector is a precondition for Uganda's structural transformation. It will also provide jobs for those currently leaving rural areas for cities and putting a strain on public services. Specific interventions in agriculture include the following:

- Public spending targeted at enabling the adoption of climate-smart agriculture could be increased. Spending was 3% of the public budget over the last 5 years, which is low relative to required spending and to the Ugandan commitment under the Comprehensive African Agricultural Development Programme to increase spending to 10% of GDP. Programmes could include farmer field schools (e.g. promoting practices including agroforestry and drip irrigation), support for rural credit lending facilities, capital support for resilient seed varieties, organic farm inputs and new, small-scale technologies.

- Increasing the use of organic fertiliser by Ugandan small holders can improve productivity in agriculture, as outlined in the National Fertiliser Strategy (although there will likely be a balance of organic and chemical fertilisers). Ugandan farmers currently apply an average of less than 1.5 kg/ha (kilograms per hectare) of fertiliser, far below the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) 2020 target of 50 kg/ha. Uptake of improved crop varieties is also slow, and progress is partly hampered by inefficient markets that contain a large amount of counterfeits. Formal distribution centres will ensure that genuine inputs are available for farmers to use, and that farmers are aware of how these should be applied and maintained.
- Current rural land tenure practice is widely considered a significant barrier to agricultural reform across all interventions. There is good progress being made and it should continue to be a focus as this will increase the amount of registered land and enable the use of land as collateral. Through land reform, the government can enable farmers to have full incentives to maintain the fertility of their land as well as the ability to unlock financial markets for on-farm investments.

Encouraging a clean energy transition

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.6 billion	\$0.6 billion	-6.7%	0.08 million
2040	\$0.7 billion	\$3.7 billion	-11.4%	0.3 million

Access to affordable, reliable electricity is a major constraint to new business formation, investment and growth in Uganda which is impacting job creation, poverty reduction, education and quality of life. Energy consumption per capita was 3.7 kWh (kilowatt hour) in 2014, among the lowest in the world. Access to grid electricity is also low, at 15% nationally and 7% in rural areas.

Currently, both household and industrial energy demand is dominated by biomass, which is used for cooking in households and supplies 89% of total energy required in industry. Predictions suggest that there will be a huge deficit of biomass in the 2020s and beyond. This may result in the need to import liquid petroleum gas (LPG) in order to close the gap.





Uganda's energy strategy for green growth should focus on continued electrification, an enhanced role for off-grid access, a more prominent role for energy efficiency, and prudent management of resources from oil. Potential economic gains from investing in green growth interventions in the energy sector are US\$3.7 billion to GDP in 2040. To realise green growth in the energy sector, the following issues are relevant:

- Extending electricity access, nationwide, is a primary objective for Uganda. This includes increasing access to 30% in 2020 and 80% (a 6% increase annually) in 2040, with off-grid playing only a minor role. While this is expected to be mainly low-carbon due to large hydropower resources, there is potential to achieve 100% access cost-effectively by 2040 with a greater emphasis on small-scale off-grid renewable solutions. Off-grid energy can be faster to implement because it is generally small-scale and avoids the costs involved in major infrastructure planning and development. Mobile payment infrastructure, customer-driven, affordable pay-as-you-go systems and new-entrant business models are playing a part in a new bottom-up energy access model that can complement national grid extensions.
- There is a clear case for supporting the widespread adoption of more efficient cookstoves in households and small businesses. This will alleviate pressure on biomass resources and deforestation, reduce costs, reduce air pollution, and consequently improve health. In this area, there is a need for more support on awareness to increase take-up.
- As commercial demand for electricity increases, energy efficiency is essential. Design standards as part of a wider package on energy efficiency have shown to be effective worldwide, and could prove useful in Uganda. This could facilitate adoption of energy-friendly technologies and the development of green buildings, which could be 52% more efficient than current commercial buildings.



Photo credit: Flickr/World Bank

Supporting industrial diversification

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.07 billion	\$0.1 billion	-8.2%	0.02 million
2040	\$0.05 billion	\$0.6 billion	-8.9%	0.03 million

In 2014, industry made up 22% of Uganda’s economy. However, this share has barely changed in two decades. The process of industrialisation is critical to driving structural transformation – and a stylised fact of historic low-income to middle-income development. It will also serve to increase incomes and the size of the labour force working within the formal sector.





The government has launched a number of strategies to accelerate the industrial sector’s growth, including a National Industrial Policy and a 5-year strategic plan. The main features of the strategies will need to concentrate on market orientation and sector focus, on building capabilities for productivity output, and on where industries are physically located. All of these factors have implications for green growth, and the dynamics of the industrialisation process mean that Uganda will need to be reactive to exploit opportunities as they emerge.

In terms of market orientation, the industrial opportunities are likely to rely on light manufacturing and agroprocessing, using agricultural inputs such as tea, sugarcane and cassava. An import substitution strategy can also drive growth. For example, if boosted by infrastructure investment, the construction sector has the potential to drive demand for products such as bricks and cement, as well as for iron and steel.

Industrialisation typically experienced in other countries has used natural resources and been high-carbon. Traditional routes to industrialisation have involved a trade-off between fossil fuel use and “going green”. It is likely that industrial development in Uganda will also involve an increase in emissions. However, there is an opportunity for Uganda to focus on how to deliver industrial growth while minimising damage to its natural resources base by using resource-efficient technologies and practices. This ambition should be reviewed over time as experience is gained and technologies evolve to minimise environmental damage even further. There is a clear opportunity to opt for “green” processes, but also to exploit manufacturing opportunities in green markets globally. Potential economic gains from investing in green growth interventions in industry are modelled as contributing US\$595 million to GDP in 2040. Specific areas of focus include:

- Overcoming fundamental constraints, including a lack of supporting logistical infrastructure, a lack of access to affordable capital, a skills-capacity gap, low-capacity utilisation, and making-business regulatory challenges.
- Resource-efficient processing of primary agricultural goods, which can add value to exports such as coffee. Developing energy-efficient agroprocessing capabilities for export goods can lead to a number of benefits, including increased income and jobs.
- Investing in and supporting the “greening” of planned industrial parks as a prime driver for sustainable industrialisation. With 15 green industrial parks already being developed, a marginal investment increase of around US\$9 million per park could deliver much greater efficiencies during operation for resident industries.
- Improved water efficiency that reduces costs and vulnerability to future water supply challenges.

Unlocking the power of urbanisation

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$1.0 billion	\$1.7 billion	-3.4%	0.2 million
2040	\$0.7 billion	\$4.3 billion	-6.8%	0.3 million

Led by Kampala, Uganda’s historically low urban population doubled in the decade from 1991 to 2002, with rapid growth continuing today at 5.2% per year. This growth in the urban population has been characterised by low-density, informal sprawl that challenges underserved urban centres with congestion, overcrowding and pollution, creating huge legacy costs. This rapid speed of change presents further challenges to urban authorities’ ability to acquire land for efficient zoning and transport infrastructure, as well as fiscal constraints and difficulties in accessing capital. “Good” growth in Kampala and secondary cities is further constrained by limited capacity to deliver and finance infrastructure and comprehensive land-use planning. This is a consequence of, among other things, a lack of clear property rights, severe shortages in affordable housing, and underinvestment in transport and logistics.

Within this context, this report seeks to analyse the specific interventions and infrastructure investments that can drive green growth at the city level and the wider challenges to successfully manage national urbanisation in line with Uganda’s growth trajectory. This is based on the principles of compact, connected and coordinated cities (the “3 Cs”).

City-level infrastructure investments

A package of eight interventions are expected to contribute US\$4.3 billion to GDP in 2040. Many sustainable transport-related investments within cities (such as bus rapid transit and light rail systems) have high upfront capital costs, but can deliver long-term, positive economic, social and environmental impacts such as better air quality.

Specific green growth considerations for prioritising projects within Uganda’s urban context include:

- The Standard Gauge Railway (SGR), which will link Uganda to other East African countries. This will enhance growth of exports and imports and regional trade competitiveness, while boosting jobs and reducing GHG emissions by displacing freight cargo from roads. Our analysis shows a US\$1.6 billion GDP impact by 2040 from an annual capital investment of around US\$290 million.
- Improved bus systems in Kampala and other growing cities which, alongside improved traffic management, can meet the mobility needs of rapidly growing urban areas, reduce pollution and energy demand, and improve safety and speeds of transport. Implementing a bus system across major cities in Uganda, starting immediately in Kampala, could provide a US\$1.6 billion GDP impact by 2040. Bus Rapid Transit (BRT) systems are a critical component and are aligned with the NDPII.
- Other urban interventions, including a Light Rail Mass Transit system in Kampala, enhanced national vehicle emissions standards, strategic land-use planning and proper zoning to reduce sprawl, developing urban waste management facilities in larger cities, capping landfills and capturing the methane to produce bio-methane fuel, and effective flood risk management that incorporates future climate risk considerations.

- In addition to transport, an essential consideration for existing and new cities in Uganda is the introduction of integrated urban planning. With exponential growth expected in many new urban areas, in order to reap the potential benefits of compact development in urban areas, planning for growth needs to happen early.

Links between urbanisation and economic function

Management of the drivers of urbanisation and growth simultaneously helps to connect economic functions, resources, markets and people. There is an opportunity for Uganda to avoid “empty” urbanisation and to harness the opportunities that urban areas can bring in economic activity, including job creation and new and thriving markets and industrial hubs. For rapid urbanisation to unlock long-term economic benefits and help Uganda achieve middle-income status by 2040, understanding the role of economic geography is an important element of a green growth assessment.

A detailed comparison between a dispersed urban growth scenario (disconnected spatial development) in line with current trends, and a compact, connected urban growth scenario (a coordinated set of cities and

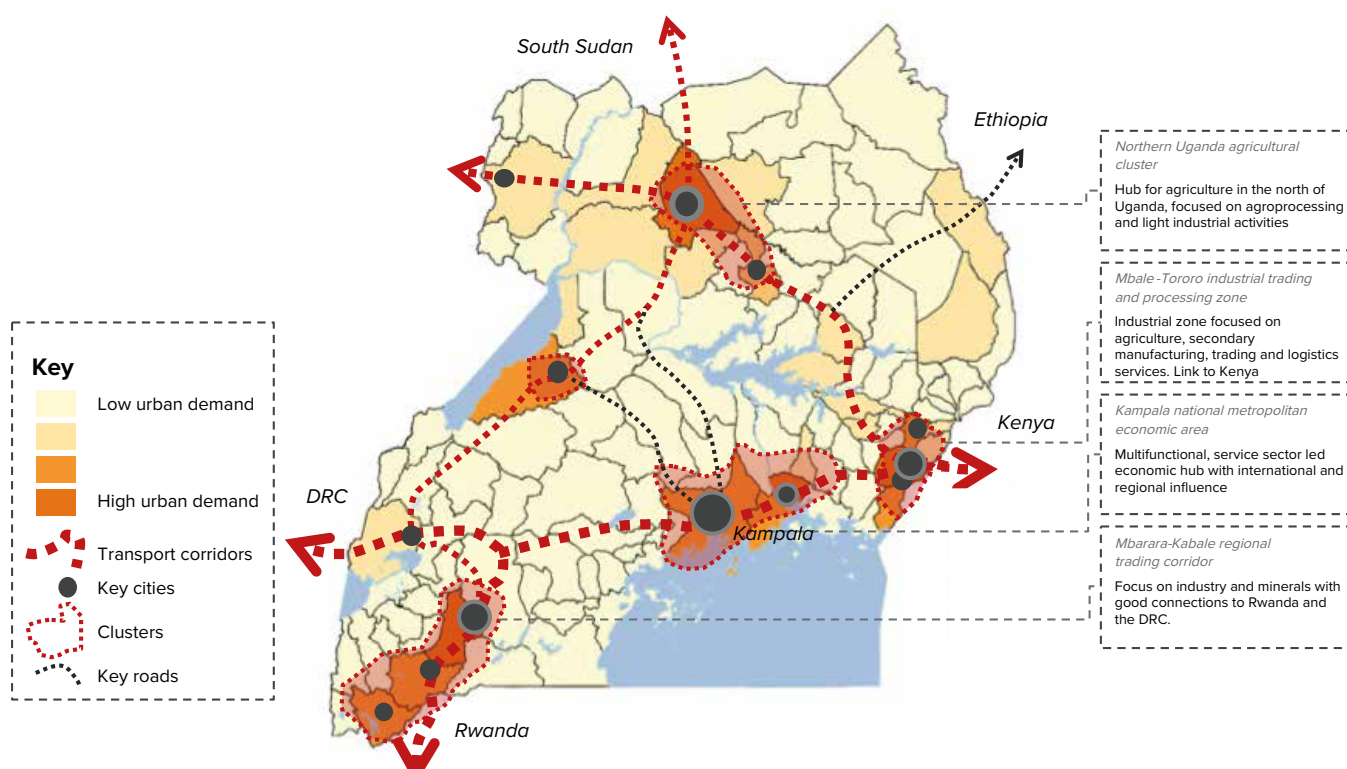
economic corridors) indicates the likely outcomes in each scenario. This comparison is underpinned by an analysis of the spatial distribution of future economic activity at the district level using data from 112 districts across the country. This is connected to an urban demand model that links this distribution of activity to the infrastructure requirements required to support the population of each district, and the current and future economic activities that may take place.

A more compact, connected urban development model could save around 11% in infrastructure costs and improve access to basic services for the population by a third by 2040. This clearly demonstrates the economic and social case for improved and integrated economic and physical planning at the national level, even before the environmental benefits are considered. Urban areas are required to have the building blocks of basic social services, connected public transportation, energy access, housing and land rights.

A depiction of the compact, connected urban growth scenarios is shown in Figure 3. It builds on the following principles:

Figure 3

A depiction of the compact urban growth scenario



Source: NCE modelling

1. **Regional integration:** Uganda's major national and regional trade infrastructure linkages are enhanced and prioritised as essential components of its competitiveness and economic strategy.
2. **Economic densification:** Regions of Uganda that display strong growth potential are focused into regional clusters or corridors that enhance this potential through agglomeration effects and improved efficiency of infrastructure.
3. **Focused secondary city development:** Uganda is developing rapidly in the northern corridor. Through the prioritisation of a number of secondary cities, this enhances competitiveness, provides regionally balanced economic opportunities and releases pressure on Kampala and surrounding areas.
4. **Special treatment of Kampala:** The capital city is required to play a regional and international role. To continue growing and to build the necessary competitiveness to fulfil this role, it needs to revisit its national economic functions, reform its governance and adopt radical new and integrated expansion and planning measures. This builds on positive reform measures already set in motion by municipal authorities.

What are the immediate actions to drive implementation?

Implementing green growth as part of Uganda's core development strategy will require a twin-track strategy and agenda for action. The first track is a continued focus on the fundamentals – defined as preconditions for successful development outcomes – green growth or not. The second track is the transformation of the sectors of agriculture, industry, energy and cities.

Getting the fundamentals right

In terms of getting the fundamentals right, Uganda should continue to focus on reforms to address issues holding back growth based on the outputs of the detailed growth diagnostic. These include macroeconomic stability, improved governance and institutional capacity, land reforms, improving voice and accountability, financial sector reform and investment in human capital.

Additionally, there are also three cross-cutting areas that underpin Uganda's ability to achieve green growth, which should be given prominent attention. These are:

- 1: Mainstreaming green growth into national development planning.
- 2: Financing through public and private investment. This covers:
 - financing green growth through public sources (including international development finance);
 - stimulating private investment; and
 - project preparation.
- 3: Developing capacity and skills.

The transformation of economic systems

The previous sections have outlined the actions required to realise green growth in Uganda and the green growth shifts required in four sectors:

Agriculture: Transform agriculture – by raising productivity to deliver jobs and growth

- Further invest in Uganda's comparative advantage in agriculture to deliver improved performance on growth, employment and inclusion.
- Improve productivity and resilience by scaling climate-smart agriculture practices to create resilient, high-yield and low-emissions food and commodity production.
- Build a sustainable agribusiness and agroprocessing sector.

Energy: Encourage a clean energy transition – by maximising the value of Uganda's renewable resources

- Prepare a comprehensive national energy transition strategy.
- Reform the regulatory and fiscal environment for private energy investment.
- Stimulate an energy-efficiency platform to aid competitive growth.

Industry: Support industrial diversification – by developing competitive industry and higher productivity services

- Prepare a green industrial development policy.
- Support manufacturing and services growth and job creation by capturing and exploiting green market opportunities.
- Drive resource efficiency (including energy and water) as a competitiveness issue for industry.

Urban: Unlock the power of urbanisation – by seizing urbanisation dividend through better cities

- Integrate spatial planning into the national development planning framework to prioritise vital urban infrastructure investments, and boost national and city-level productivity.
- Accelerate identified investments in urban infrastructure, including the Standard Gauge Railway, extending the bus network, introducing Bus Rapid Transit in Kampala and – eventually – other secondary cities, Light Rail Mass Transit, and local production of biomethane from landfill.
- Enhance the technical and financial capacity of all urban institutions, especially at the national level.

Next steps and priority projects

The green growth interventions and supporting recommendations can yield strong and positive development outcomes.

However, Uganda can also start with a small number of fast-track and low-risk investment opportunities to inject early momentum into the green growth process. Based on stakeholder consultation, these areas might include:

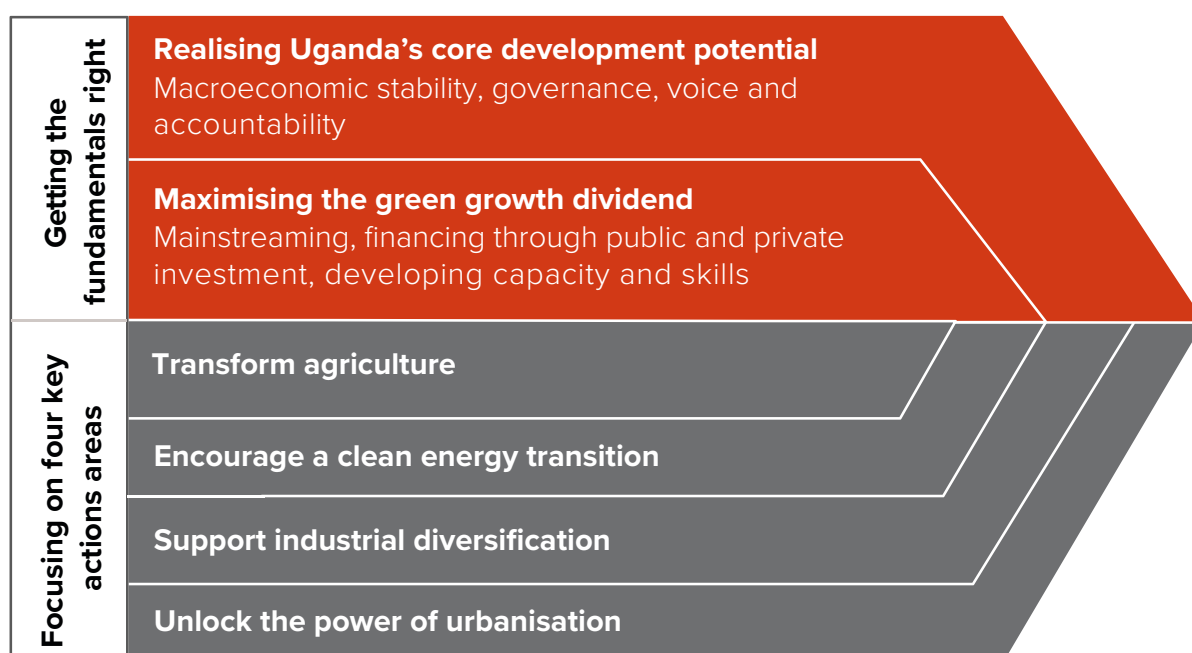
- A package of climate-smart agriculture interventions, implemented as part of the reforms to the national extension system.
- Facilitation of off-grid energy project development led by private investment.
- Scaling up clean cookstoves.
- Industrial resource efficiency programmes.
- Deploying integrated urban planning capacity at scale.

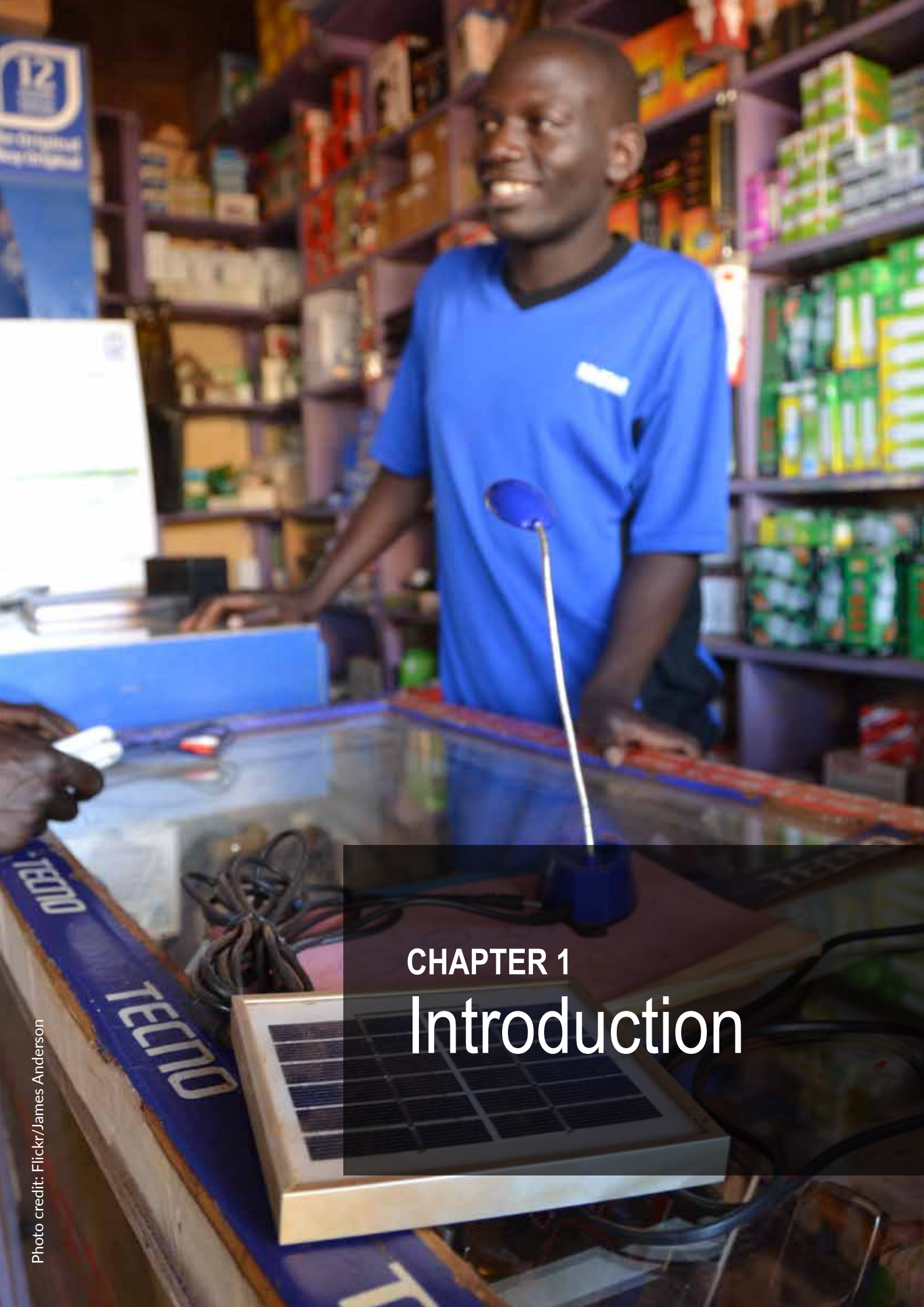
Uganda will not be acting alone on implementation, nor relying only on its own domestic resources (although these will be important). Green growth offers an investment opportunity for the private sector, and the interventions identified should also be discussed as candidates for scaled-up development finance (including climate finance).

The analysis and findings of this study are intended to support the Government of Uganda in finalising its National Ugandan Green Growth Strategy, and to support the successful implementation of the NDPII.

Figure 4

A Ugandan green growth agenda for action





CHAPTER 1

Introduction

Uganda's development vision: building on a solid foundation

In 2010, Uganda's President Yoweri Museveni announced Vision 2040. An ambitious long-term development strategy, Vision 2040 will transform Uganda from a low-income country to a competitive upper-middle income country within 25 years. The 5-year National Development Plan II (NDPII) sets out the detailed medium-term implementation plan for the period 2016-2020. This will guide the first steps towards realising the longer-term Vision 2040. Under Vision 2040, Uganda also aspires to reduce the proportion of the population living below the poverty line to 5%, and to increase access to electricity to 80% and access to water to 100% by 2040.

Uganda has many of the fundamentals required to support growth and poverty reduction. Between 1988 and 2011, real GDP growth averaged 7%, making Uganda one of the fastest growing African countries. Building on this strong growth performance, current GNI per capita stands at US\$670 in 2014.² This strong growth, stimulated in part by good macroeconomic management, was also accompanied by a steady fall in extreme poverty (as measured from the national poverty line) from 56% between 1992-1993 to 20%

between 2012-2013.³ Uganda's development vision builds on these achievements of strong GDP growth and poverty reduction over the past two decades.

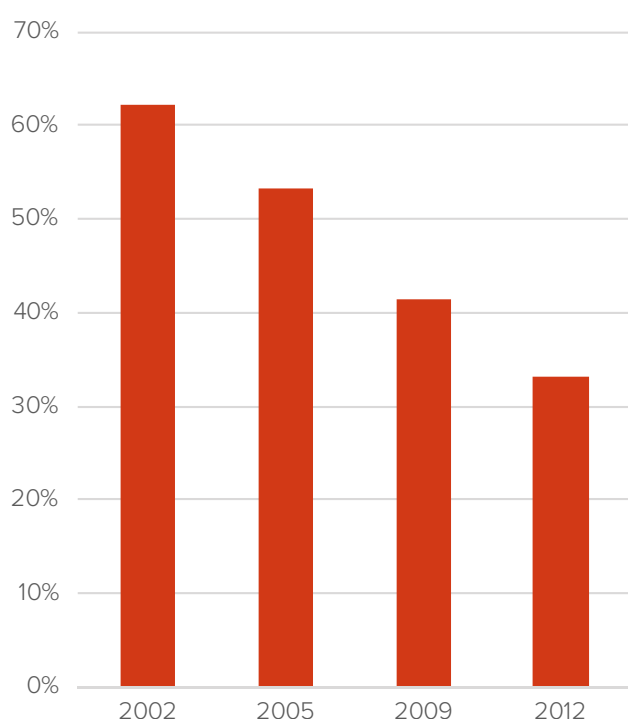
Uganda has also improved its integration into the global economy. Between 2010 and 2015, foreign direct investment (FDI) inflows into Uganda – partly driven by the prospects of the oil industry – amounted to 4.3% of GDP, higher than almost any other country in the East African Community (EAC). Raw commodities such as coffee, tobacco, cotton, maize, sugar, rice and tea still dominate exports. However, trade has begun to increasingly diversify away from these commodities, into both intermediate and consumer goods.⁴

Domestically, development has translated into improved access to basic services. For example, gains include increased access to electricity from 10% of the population in 2010 to around 14% in 2012.⁵

Today, some of the benefits of growth are seen in Uganda's larger cities, in particular in Kampala, which is an increasingly attractive location for investors and job seekers. Uganda currently has a low urbanisation rate of around 19%,⁶ but the urban population's growth rate of 5.2% is one of the highest in the world, with the urban population projected to reach more than 20 million by 2040.⁷ Currently, 35-40% of Uganda's urban population are estimated to live in Kampala,⁸ the majority of whom were born in other parts of the country.⁹ The "Northern Corridor" is where over 70% of the country's manufacturing sector is located. It links Kampala in the west to Rwanda and the Democratic Republic of Congo (DRC), and the east to Kenya and international trade routes.¹⁰

Figure 5

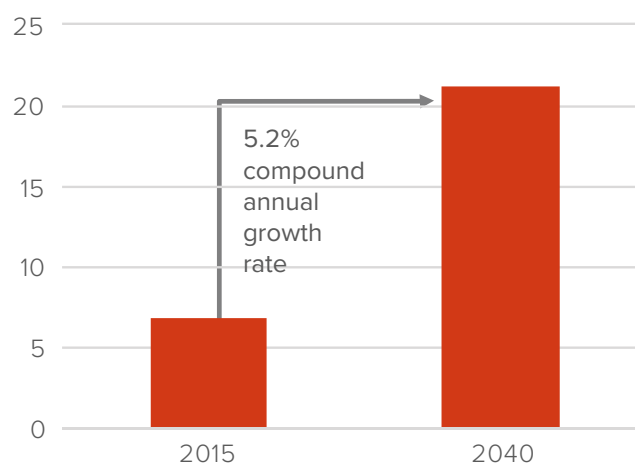
Progress on headcount poverty reduction



Source: World Bank Development Indicators.

Figure 6

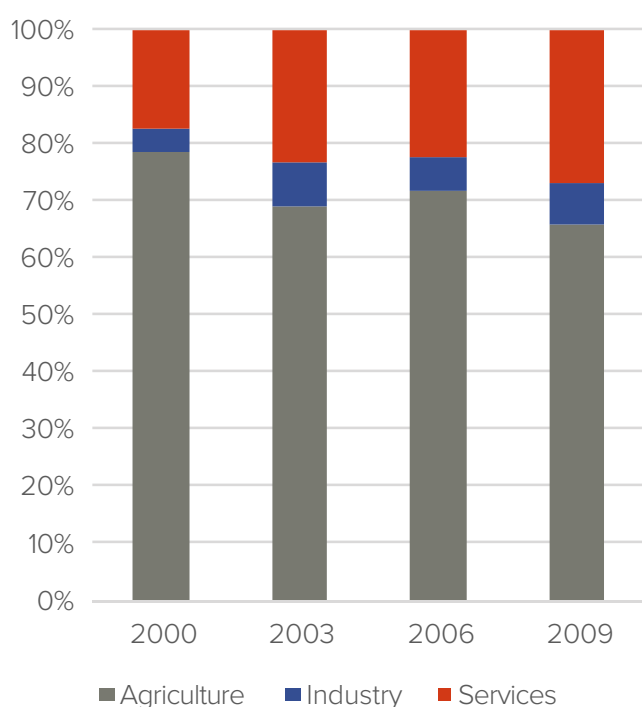
Urban population growth (millions of people)



Source: NCE calculations.

Figure 7

Ugandan workforce structure



Source: World Bank Development Indicators.

However, there are signs that future progress may be difficult to maintain. Despite significant progress on human development, poverty rates are still high relative to the developing country average, and rapid population growth has meant that per capita income growth has been more modest. In addition, economic prosperity has been challenged by tough external conditions due to the secondary effects of the global financial crisis, the volatility in commodity prices, and the exchange rate depreciation. It is a good time for Uganda to reflect on the sources of its future prosperity, and the underlying drivers of economic development that will achieve it.

The growth experienced over the last 15 years has been driven by a number of commodities such as coffee, high-value services such as telecoms, finance, real estate and, to a lesser extent, by industrial production.¹¹ Employment has expanded in low-productivity activities such as subsistence agriculture, retail trade, hospitality, and recreational and personal services.¹²

Yet to date, growth has not been accompanied by an equivalent structural transformation, which would have been evidenced in an observed shift in the share of output and labour towards non-agricultural activities.¹³ There were some gains in the 1990s, when Uganda's output began to shift away from agriculture towards services and industry, with the share of agriculture in GDP declining from a peak of 74% in 1978 to 29% in

2000.¹⁴ However, in recent years between 2000 and 2014, GDP shares in all sectors have been relatively static, with only a slight shift away from agriculture (29% of GDP to 27%) and industry (23% to 22%) towards services (48% to 51%).¹⁵ A similar lack of dynamism is observed in the labour force (see Figure 7).

A growth and climate diagnostic

Vision 2040 acknowledges the need for further structural transformation. Vision 2040 expects the industrial share of the economy to reach 31%, with services rising to 58% and agriculture decreasing to only 10%.¹⁶ Prioritising structural transformation should serve to increase growth and accommodate a rapidly expanding workforce. The achievement of the NDPII ambition is challenged by a number of serious and persistent economic, social, environmental and spatial constraints that are holding back private sector development and overall investment, and hampering development progress.

For this report, a growth diagnostic assessing the main constraints to inclusive growth has been undertaken. It also summarises existing analysis to better understand what has constrained Uganda's transformation process to date, and why those constraints persist.¹⁷ This approach recognises that countries tend to experience episodes of high growth that continue until the economy runs into barriers or constraints brought about by specific factors. The findings indicate the following major constraints to development in Uganda:¹⁸

- **Access to electricity:** Levels of access are low, especially in rural areas, with high connection costs and low quality and low reliability of supply. This constrains business growth and productivity. Demand for electricity will continue to increase and will remain a binding constraint.
- **Access to land:** Conflicting land tenure systems, overlapping rights and a lack of registration result in high incidences of conflict over land. This prevents consolidation and allocation of land for economic activity, urban infrastructure – including transport – and housing in urban areas (see Box 1).
- **Access to finance:** Access to finance is limited due to high interest rates, low access to collateral for business and households, high reliance on informal networks for credit, and limited capacity to provide credit through mobile banking. This limits capacity for productive investment, creating barriers to credit access, which impede small

Box 1

The importance of land reform in Uganda¹⁹

The availability of land underpins the development of the agricultural sector, aids investment in new public infrastructure projects, and provides a wide range of ecosystem services, such as water and flood regulation. A well-functioning and equitable land market which can provide rapid availability of developed land – with secure property rights and adequate environmental provisions and planning controls – is also important for cities, and provides collateral to underpin access to credit.

A complex land tenure system is a major barrier to development and doing business in Uganda. The co-existence of multiple, overlapping systems of land tenure makes the Ugandan legal system one of the most complex regimes in the world. UBOS (2010) findings showed that 37% of land could not be sold, 34% could not be rented, and 44% could not be used as security for a loan. Speculative holding of land is commonplace, effectively removing it from the market and encouraging informal development.

Acquisition of land for public infrastructure where land is privately owned is often expensive, which increases the costs of public infrastructure projects (such as the planned BRT system in Kampala) and delays construction. Under the 1991 Uganda Investment Code Act, foreign investors are permitted to hold leasehold but not freehold land title, another frequent and major barrier to private foreign investment.

JLOS (2008) and Habitat for Humanity point out that currently, over 90% of domestic disputes in Uganda are related to land conflicts. Nearly 5% of households (310,000) are directly affected, and land often changes hands as a result of these conflicts as opposed to through sale of property. Land conflicts disproportionately affect marginalised groups, including women and the poor.

Uganda is unlikely to attract a significant scale up in private investment unless the issue of access to land is addressed (UNDP, 2015). Most of the land is held under customary land tenure. Fortunately, it is well recognised by the government that some type of land reform is urgently required to underpin continued economic, social and environmental prosperity. This is why steps are being taken to rehabilitate land institutions, digitise land information systems, and encourage formal registration of land.

and medium-sized enterprises (SME) and firm creation. The lack of land rights will also continue to restrict the use of land as collateral.

- **Tax and business regulations:** A Complex process for business registrations and the wider taxation system hinder formal SME creation, leading to high levels of informality. There are also cross-border trading difficulties, particularly from import tariffs.
- **Market access and infrastructure:** Costs for transporting goods across Uganda are high due to a poorly developed national transport network. This leads to low levels of rural access, hampering investment as rural areas are not able to access urban markets. Even in Kampala, congestion and commuting costs can lower productivity and reduce investment and trade. Future growth and population growth will put further pressure on the need for improved market access, and is strongly linked to the urban development story.
- **Government and institutional capacity:** Low levels of institutional capacity – resulting in a lack of power to enforce regulation, including at the local government level – lower business confidence and impede Uganda's ability to execute and implement priority policies and projects.
- **Human capital and skills:** Growth in skill-intensive sectors is slow due to a low skilled labour force and a shortage of technical and management skills. This is a constraint as Uganda looks to increase productivity, enter new industries, and take advantage of innovative market opportunities.

Other development considerations

There are a number of additional development challenges and concerns. First, the recent productivity performance has been far below the average in sub-Saharan Africa. The contribution of total factor productivity (TFP) to GDP growth has fallen to near

zero over the last decade, with the agriculture sector showing negative productivity growth.²⁰ Uganda needs to find new sources of productive investment and growth to kick start a second phase of transformation.

Second, the future development trajectory will need to make use of a young and growing population. The annual new labour market entrants will double from the current 700,000 per year to 1.5 million in the 2030s,²¹ resulting in a significant need for job creation. Uganda's future development prospects will be determined by the employment opportunities available to its young labour force. Inclusive and productive jobs will be the means to sustaining economic growth, especially as a greater proportion of these new entrants are expected to have a higher educational qualification.

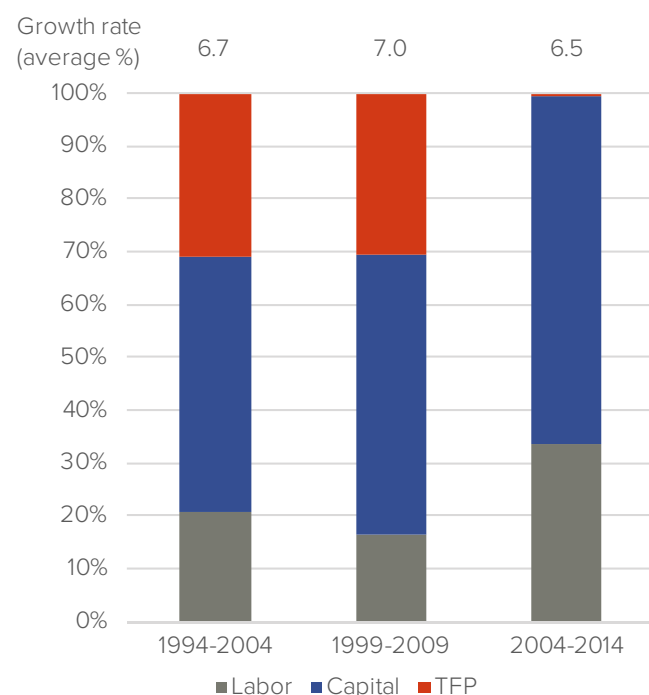
Third, as the drive for electrification and energy access takes place, oil production will form a key tenet of the medium-term economic horizon, for domestic use and exports (see Box 2). Today, with recoverable crude oil reserves of 1.7 billion barrels out of potential reserves of 6.5 billion, oil production is expected to start in FY 2020/21 and will involve a crude export pipeline and a domestic refinery.²² Uganda's economic diversification ambition will be aided by a reinvestment program which looks to deploy the proceeds of future oil revenues in

support of the wider energy transition. There are a number of risks, including managing price volatility (on which global climate action could exert downward pressure), which could influence the business viability of oil exploration through external capital investment, especially in a low oil price global market.

Many of these development impacts are taking place and playing out in Uganda's urban areas. Uganda's cities have the potential to be engines of growth, yet the benefits are not automatic and are currently hampered by a range of "growing pains". The experience of Uganda's rapidly growing cities to date suggests that the informal nature of growth in urban areas is putting infrastructure public resources under pressure. Less than 15% of the country's urbanisation has been planned, which results in a number of challenges.²³ Congestion, informal development of slums, overcrowding, pollution, sprawl, and overwhelmed water and sanitation characterise the urban context of Uganda's cities. Further still, Uganda's urban areas have not been effective at inducing formal wage growth and job creation. If this continues, it will have a significant impact on the quality of urban and economic development in the country.

Figure 8

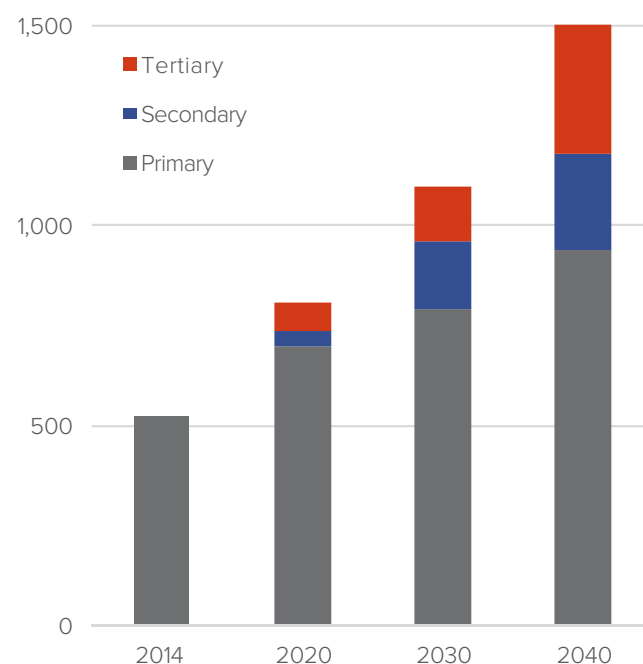
Productivity: 10 year averages for labour, capital and TFP



Source: The Conference Board, 2015; The Conference Board Total Economy Database, May 2015.

Figure 9

Projected annual labour market entrants by level of education



Source: The Conference Board, 2015; The Conference Board Total Economy Database, May 2015.

Box 2

Managing Uganda's oil revenue for green growth²⁴

Uganda's oil reserves are estimated to hold 1.5-3.5 billion recoverable barrels of oil. Production is currently expected to come online in 2021 and the expected revenues promise an opportunity to invest in the country's long-term future. The anticipated potential peak oil production revenues are forecast to account for 10-15% of GDP between 2021-2040.

These resources have been discovered in the Albertine basin of Uganda, where a refinery with 60,000 barrels/day capacity has been tendered at a cost of US\$2.5 billion. The government has already taken early actions to safeguard against the negative effects of both revenue volatility and the "resource curse", which have been a feature of natural resource discovery in the region. These include a proposed Petroleum Fund within the Bank of Uganda, and a number of laws and regulations drafted in 2012, including the Oil and Gas Revenue Management Policy and the Public Finance Bill.

However, there are economic and wider risks that come as part of Uganda's increasing exposure to the oil markets. Uganda will have to account for the economic implications of uncertain and volatile future oil prices, and what this means as part of longer-term trends in fossil fuel markets. The petroleum sector itself provides relatively few and even less inclusive jobs than other sectors and little opportunity for diversification into related sectors, while other African resource producers have had limited success at downstream processing activities.

As a fossil fuel, petroleum exploration and its use in combustion or as fuel contributes to global climate change. Its use in this way is highly likely to increase Uganda's greenhouse gas emissions in both production and domestic use, as well as the emissions of countries to which the oil is being exported.

The role of climate change

We have detailed how climate change and the environment can be a constraint to Uganda's development.²⁵ Uganda's natural environment is under threat from both natural and man-made drivers of change including rapid population growth, unplanned urbanisation, expansion of informal settlements, industrialisation and the impacts of climate change. The food and energy needs of a rapidly rising population are putting biomass resources and soils under pressure. Forest cover is declining sharply as an increasing proportion of land is cultivated for food, with forest coverage shrinking by 28.5% between 2005 and 2010.²⁶ This loss of forest cover exposes the fragile tropical soils to erosion, acting as a drag on agricultural productivity and negatively affecting the livelihoods of some of the poorest in society.

Moreover, a large proportion of the population remains vulnerable to falling back into poverty in the face of environmental shocks. This will also hold back structural transformation. Uganda has suffered from the impacts of extreme weather events including floods and drought.²⁷ Droughts in 2008 and 2011 caused losses of approximately 3% and 16%, respectively, of the annual value of all food and cash crops each year (see Box 3); climate variability is an issue now and action

to deal with the impacts is already a concern. While its exact impacts are uncertain, future climate change is likely to place a continued emphasis on managing risk. Recent evidence suggests that the future effects of climate change could have an economic impact of US\$3-6 billion by 2025, and US\$17-27 billion by 2050. The effects would mainly stem from impact to the water and agriculture sectors, and reduction in energy outputs.²⁸

Although greenhouse gas (GHG) emissions in Uganda are currently some of the lowest in the world, future development could lead to an increase in emissions. Future growth under business as usual (BAU) is likely to lead to an increase in the energy intensity of GDP and in emissions per capita. The government projection is for national emissions to rise to from around 40 MtCO_{2e} (million metric tons of carbon dioxide) today to 77 MtCO_{2e} by 2030 under its BAU pathway.²⁹ Given the expected scale of future investment in energy, transport and housing infrastructure, it will be important to avoid locking in future emissions growth through consideration of low-carbon investment opportunities. This is recognised in Uganda's intended nationally determined contribution (NDC), underpinned by its National Climate Change Policy (NCCP), which makes an international commitment of 22% of emissions reduction in Uganda by 2030 relative to BAU.

Box 3

The impacts of climate change in Uganda³⁰

Uganda is already experiencing the impacts of climate variability and associated economic losses. A drought in 2008 caused losses of approximately 3% of the value of all food and cash crops that year. Two years later, the country suffered economic losses of US\$470 million in food crops, cash crops and livestock as a result of the drought of 2010-2011. These losses equated to roughly 16% of the total annual value of crops in 2011, and illustrate the impact climate risk can have on the livelihoods of the population. Many of those affected are directly reliant upon the level of natural capital within the country for agricultural goods.

The 2014 ND-GAIN index of climate vulnerability and climate readiness places Uganda as the 27th most vulnerable and the 25th least ready of 183 countries. The ND-GAIN Global Adaptation Index summarises a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. Uganda has a great need for investment and innovations to improve readiness coupled with a great urgency for action. Investment, innovation and action will address challenges that include:

- **A major impact on the production of Uganda's leading export crops as a result of climate change impacts.** By 2050, the value of the coffee crop could fall by half due to reduction in land area that can support its production. By contrast, climate change impacts on food crops and livestock are projected to be relatively small – although there are varying impacts from crop to crop.
- **Deforestation.** This is happening at an alarmingly fast rate and is already impacting Uganda's future ability to meet energy demands. Uganda relies largely on biomass energy and by 2050, this is likely to be in even shorter supply.
- **Less potential for hydropower development due to a reduction in rainfall and water availability.** The country will need to develop alternative energy sources to meet future demand. There is a major opportunity to develop low-carbon and climate-resilient energy.

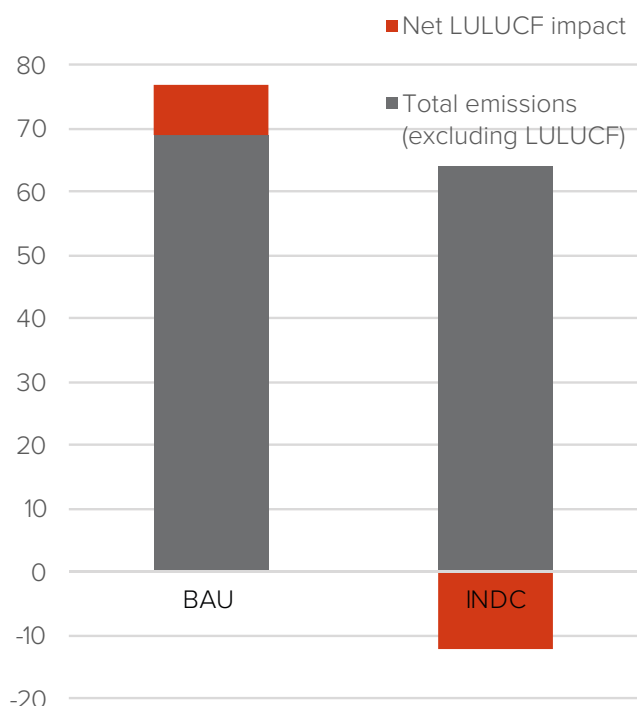
Uganda's infrastructure is already suffering from the effects of extreme weather events. This includes impacts on residential and private buildings; public buildings such as schools, hospitals and government offices; and facilities such as ports, airports, roads, railways and bridges. There are two impacts from climate change on infrastructure: one is lost resilience due to increased temperature and rainfall, and the other is damage caused by extreme events.

A recent study published on behalf of the Government of Uganda provided an economic valuation of climate impacts and mitigation options in Uganda. Its findings included:

- Recent erratic and unseasonal rainfall has already cost over US\$60 million a year in crop losses, affecting crop exports, which accounted for 50% of Ugandan exports in 2013.
- Climate and socioeconomic change will lead to deficits in water supply – without adaptation, a conservative estimate puts losses at US\$5.5 billion.
- Most crops show reductions in total production under almost all future climate scenarios.
- The availability of biomass, which currently accounts for over 80% of energy, is set to decrease.
- Increasing variability of rainfall impacts both agricultural productivity and future energy production capacity.
- Climate change is also likely to increase the pressure on Uganda's financial system and land regulations, as individuals and firms seek to mitigate losses and control arable land.

Figure 10

Uganda's NDC commitment on GHG emission reductions against BAU pathway (MtCO₂e)



Note: LULUCF = land use, land use change, and forestry.

Source: Ministry of Water and Environment.

Realising Vision 2040 through green growth

Achieving Uganda's structural transformation set out in the NDPII and Vision 2040 will require addressing the underlying issues and challenges laid out in the growth and climate diagnostic. These have huge impacts on development outcomes; whether these are economic, environmental or social, the issues are interdependent. Uganda has an important opportunity to use green growth³¹ to achieve positive outcomes across all three dimensions of sustainable development – a so-called “triple transformation”.

- An economic transformation involves improving productivity within sectors and between sectors of the economy. This facilitates diversification into new sectors, from agriculture to industry and from basic to high-value services.³²
- A social transformation can lift the population out of poverty and provide comprehensive access to basic services – including health and education – and the skills to ensure they can capitalise on the expected demographic opportunities for growth related to Uganda's workforce.³³

- An environmental transformation means building long-term prosperity through maintaining and enhancing natural capital (including water and waste), managing carbon emissions, and building climate resilience.³⁴

To be effective, these systemic changes have to be underpinned by an urban transition through well-planned and managed urbanisation.³⁵ No country has ever climbed from low-income to middle-income status without a significant population shift into cities. Urban agglomeration and internal migration is an important driver of long-term growth and poverty reduction induced by linkages between urban and rural areas, and foreign trade.³⁶ Well-designed policies can yield benefits across multiple areas. For example, efforts to increase gender equality directly benefit economic productivity by breaking down the barriers to education.

Therefore, the factors that will determine successful economic transformation and development will also determine Uganda's ability to unlock a green growth model. Based on the review in the growth and climate diagnostic, the economic “systems” most pertinent for Uganda are agriculture, energy, industry, and cities. These support the 2014 report of the Global Commission on the Economy and Climate (GCEC), *Better Growth, Better Climate*, which also identified these areas in its framework analysing drivers of growth and climate action (see Figure 11).

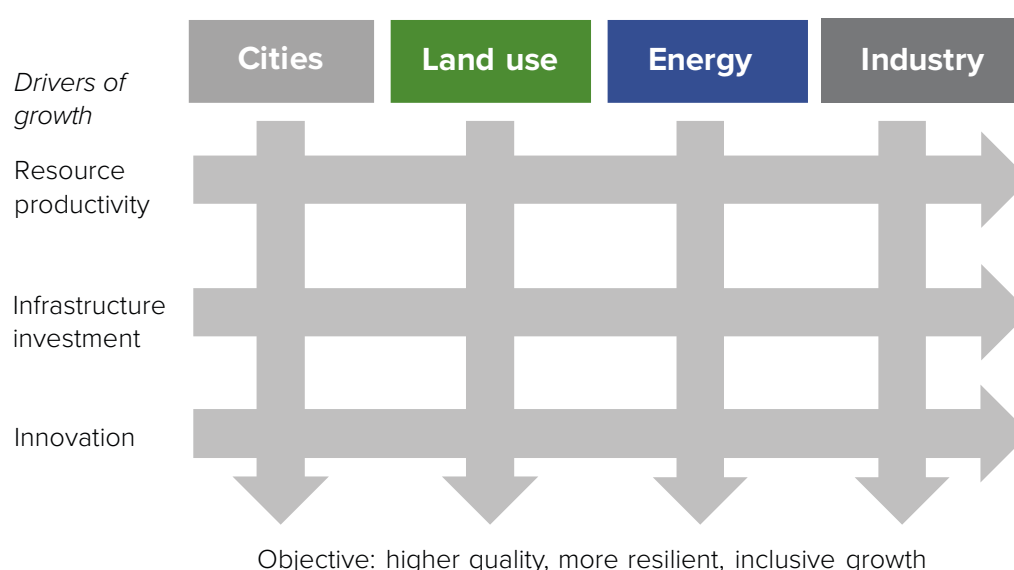
As the work of GCEC has demonstrated, green growth can deliver net benefits in three ways:

1. **Resource productivity.** Enhanced resource productivity improves efficiency, freeing up resources for more productive uses and relieving pressure on natural capital stocks.
2. **Infrastructure investment.** Uganda will invest billions annually in infrastructure. The extent to which this infrastructure investment is efficient, low-carbon and offers basic services will determine the successful outcomes of green growth.
3. **Innovation.** Uganda will need to adapt, adopt or develop its own technologies and innovate to drive growth. This will be another core determinant of green growth in the country.

Green growth investments can deliver on development goals, bringing a range of wider returns such as lower capital investment needs (e.g. avoiding the higher costs of service provision as a result of urban sprawl) and lower cost burdens associated with the externalities of traditional growth patterns (e.g. healthcare costs associated with poor air quality). Growth will have

Figure 11

Drivers of growth and four core economic systems



Source: Adapted from GCEC (2014). Note that cities includes urban transport; agriculture includes forests; and innovation includes economy-wide innovation.

some environmental impacts, and the trade-offs will need to be considered carefully. The opportunities around green growth have been recognised by many countries on the African continent,³⁷ and there is growing evidence of practical examples of green growth in practice.³⁸

Purpose of this report

Against this backdrop, Uganda is now in the process of developing a full national Green Growth Strategy. This report seeks to provide a strong evidence base to support the strategy process, and supports the implementation of the NDPII and Vision 2040. This work will also inform the National Physical Development Plan currently under development.

Based on feedback from the Government of Uganda, the report seeks to answer four questions:

- Is green growth an economic opportunity for Uganda?
- Given the range of urgent development priorities, is green growth affordable?
- What are the key policy shifts required for green growth to support the aims of the NDPII and Vision 2040?
- What are the immediate actions required to drive implementation?

This study fills a number of gaps in existing approaches to national development planning in Uganda. These include:

- An integrated approach focusing on the interdependencies between core development objectives and environmental outcomes.
- An economics-led analysis. The work focuses on quantifying the scale of the net economic, social and environmental interventions that are contextually relevant to Uganda. These are also linked to the relevant drivers of growth and binding constraints that are holding back development.
- Urban and spatial development. This work adds urbanisation into the analytical framework, with a view to harnessing the urbanisation dividend associated with better planning and management of both infrastructure and cities.
- Mainstreaming green growth into government strategy. Current planned policy should be reinforced to amplify benefits, but this analysis also identifies where there are new and additional interventions.
- Action-focused. This report identifies initial priority projects for investment that offer easy wins. They will also have the twin benefit of delivering economic, social, and environmental benefits at scale while locking in a better, sustainable development pathway.

This report complements a number of valuable pieces of work that will also serve as inputs to the national Green Growth Strategy. First, UNDP has contributed a technical study looking specifically at the emissions reduction potential of Uganda's development pathway across all sectors. They look, in detail, at emissions savings from livestock, forestry, and waste management which are not covered in detail here.³⁹ Second, the Ministry of Water and Environment has undertaken analysis into the economic impacts of climate change in Uganda.⁴⁰ This report does not attempt to recreate the analysis covered by the Ministry of Water and Environment. Instead, it draws on a number of important bodies of work such as the World Bank's studies on urbanisation, which are better aligned with this report's focus.

The rest of the report is structured as follows: Section 2 presents the approach overall findings of the analysis; Section 3 presents detailed sector-by-sector results; Section 4 shows the output of the "deep dive" on urbanisation; and Section 5 concludes, setting out a suggested action plan for the way forward.

Photo credit: Flickr/J J



Solar Power

Mobile Phone Charger



POWER SWITCH

Indicator Lights

Mobile Input



Working



Full



Charging

CHAPTER 2

Approach and Key Findings

To answer the core questions of the study the following steps were taken:

- Growth scenarios and modelling:** A detailed assessment of what will be the outcome of future economic development in Uganda using the leading Ugandan macroeconomic growth model. This gives a view of the likely growth trajectory of Uganda based on the current ambition and likely scenario of the NDP II, and its impact on the natural environment.
- Opportunities assessment:** Quantitative and qualitative estimates of how a green growth pathway can accelerate and enhance the government’s planned development trajectory. This is conducted through detailed assessment of four sectors (agriculture, energy, industry and cities). This includes analysis of constraints and policy recommendations.
- Spatial analysis:** A detailed analysis of the role of urbanisation, with estimates of the net benefits of well-managed urban development based on the outputs and opportunities of the growth scenarios.
- Implementation readiness:** This provides an agenda for action, and includes identifying the priority projects for support and next steps to take forward the findings of this report.

Figure 12 is a brief overview of the analytical framework of the first four steps. This is followed by a presentation of the key findings of the analysis.⁴¹

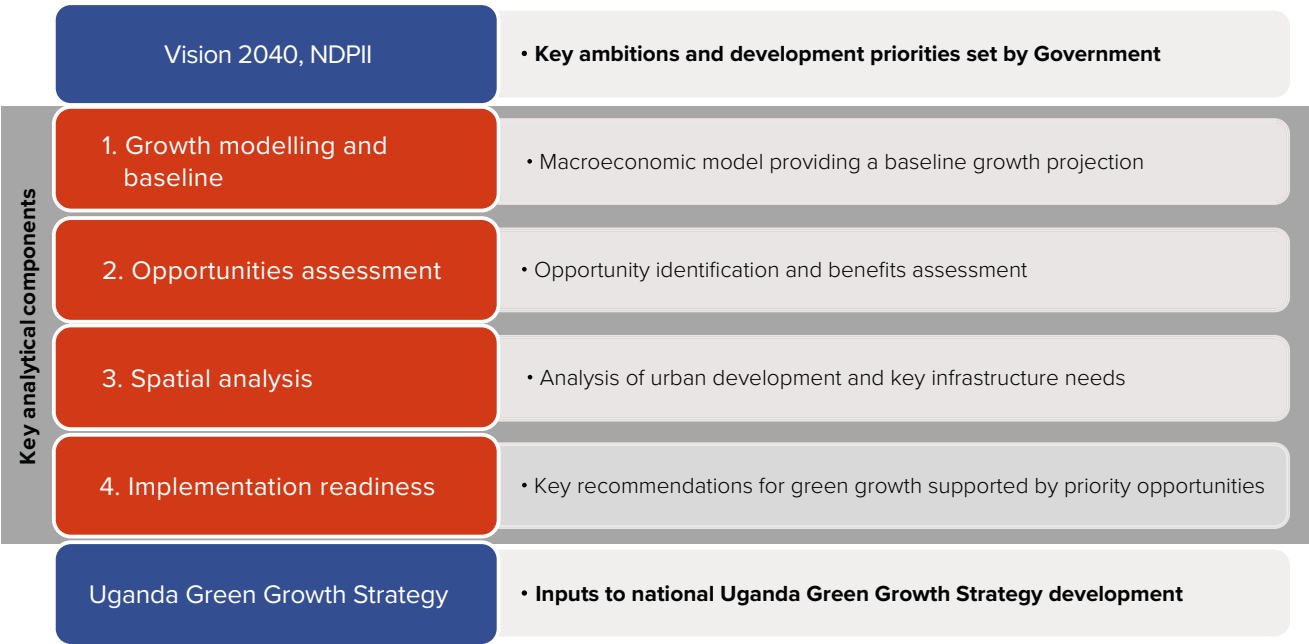
Growth scenarios and modelling

The study assesses the likely outcomes in the Ugandan economy, under a feasible growth path based on current growth drivers. It uses a BAU scenario. This is the starting point from which to measure and compare the impact of a range of green growth interventions.

The study extends an existing Computable General Equilibrium (CGE) macroeconomic model of the Ugandan economy – Maquette for MDG Simulations (MAMS). The MAMS CGE model was also used to simulate the impacts of NDP II by the National Planning Authority and the Ministry of Finance in 2015. Therefore, this study is strongly aligned with current government economic modelling and planning approaches, including the committed projects under NDP II.

Initially developed by the World Bank, the model was primarily used to create a single macroeconomic reference case that represents the BAU pathway, or “reference scenario” pathway, which shows what is likely to happen in Uganda based on current development drivers and the likely impact of the NDP II, but without the impact of green growth. This offers a realistic prediction of the structural transformation Uganda should expect. It offers a baseline from which to measure and compare benefits from a range of green growth interventions. The MAMS model provides a consistent set of projected macroeconomic data for all three pathways, including the future composition of

Figure 12
Analytical framework



GDP by sector and expenditure categories, employment (broken down by skilled and unskilled employment) and a set of budgetary indicators.

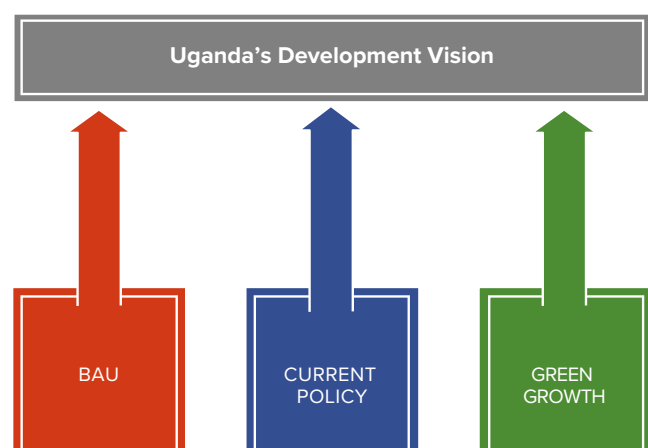
The GDP and employment projections are included in the core model, while the GHG and jobs projections were created using model extensions (including an estimate of job creation by gender). The jobs data was taken from the International Labour Organization's Ugandan market surveys, including ILOSTAT. The GHGs were compiled at the sector level from a range of data, including Uganda's Second National Communication on Climate Change and Uganda's nationally determined contributions (NDC).

Within four sector models, and using a bottom-up assessment approach, each of the green growth interventions (detailed in the next section) have been quantified to determine their potential contribution to GDP, associated job creation potential and GHG savings. Each green growth opportunity has been assessed against a counterfactual, and cross-checked against existing government plans in the NDPII to determine if they are part of current policy (the planned policy scenario) or are new and additional (the green growth scenario).

These interventions are not assessed for their impact on likely second order effects resulting from their implementation. Rather, they should be understood as interventions to enhance and accelerate planned sectoral shifts, rather than leading to a significant change in sector compositions. The analysis does not attempt to unpick the fundamental development strategy (e.g. by considering growth models with lower aggregate environmental impacts), which may imply economic and social trade-offs. This could be the focus of further research.⁴²

Figure 13

Analytical framework



BAU estimates an annual growth rate of 6.1%, with GDP compositions in 2020 and 2040 as shown in Table 3. This is based on implementation of the NDPII in the period to 2020 (without green growth interventions), and then the growth rate under the NDPII period staying constant until 2040, with fiscal and monetary policy remaining unchanged.

Table 3

GDP sector shares in 2020 and 2040 under BAU

Sector	2015	2020	2040
Agriculture	28%	26%	17%
Industry	24%	25%	29%
Services	48%	49%	54%

Source: NCE modelling based on MAMS.

The associated GDP per capita in 2040 is US\$1,850. This demonstrates that under BAU, there will be continued structural transformation and a shift in sectoral shares from agriculture to non-agricultural sectors. This includes the development of the oil and gas sectors as well as other important sectors, such as mineral development.⁴³

Relative to 2015, this BAU pathway raises GHG emissions by 25% in 2020, and 150% in 2040. This indicates that Uganda's growth path will involve the use of natural capital and associated GHG emissions as it builds infrastructure, develops industry and expands and intensifies agricultural development. It is important to note that Uganda's development over the next 25 years will require the management of environmental issues related to competing pressure for resources, and consumption of Uganda's natural resource base. For example, resource stresses from competing demands (e.g. through water) and the pollution impacts of industry could, unchecked, become significant issues.

Opportunities assessment

The report's analysis highlights areas which promote economic and social development while also reducing the impact on the natural environment. As an output of the growth and climate diagnostic, the focus of the analysis is on four economic systems, most pertinent to driving growth through improvements in resource productivity, investment, and innovation. These economic systems are agriculture, energy, industry and cities.

Through consultation, literature review and expert input, 126 green growth “opportunities” were identified. These were then prioritised and filtered through a list of 23 core interventions based on the following criteria:

- Relevance to Uganda
- Alignment with drivers of growth
- Scale of potential benefits
- Ability to respond to core development priorities and sector constraints (drawing on a review of aggregate and sector constraints to growth)
- Missing or enhancing existing evidence.

Assumptions from the MAMS model are fed into four “sector models” for each of the sectors, in which the 23 green growth interventions are assessed quantitatively in terms of their net impact. Four main quantitative outputs are derived: GDP contribution, job creation potential, GHG emissions savings, and the associated investment requirements. The assumptions underpinning the assessment of impact for each opportunity are outlined in Chapter 3.

This quantitative analysis is then considered in the context of a wider multi-criteria analysis (MCA), which also considers – alongside these quantitative indicators – the qualitative impacts of each opportunity. This introduces five additional qualitative indicators to measure the broader net benefits of interventions.

The analysis of the investment needs of the green growth scenario is developed through estimates of the investment requirements and, where relevant, the implementation costs of each opportunity. The scale of investment required is estimated by assumptions about the level of deployment that is likely to be possible during the study period and the associated costs. This is then compared with government plans to assess the level of public versus private investment required to finance green growth.

Spatial analysis

The impact of better planned urbanisation complements this analysis with a different analytical approach connected by the MAMS economic model. To better understand the potential spatial implications of future growth, the MAMS GDP projections for all sectors are connected to a district-level geospatial model – covering 112 districts – that uses Uganda’s business enterprise survey.

This economic “demand” data is combined with “supply” side data, based on a range of geographical, natural resource, population, natural hazard and infrastructure data layers, which determine the suitability of each district to support urban growth. Two future spatial scenarios are developed:

- **Business as usual:** A development pattern characterised by continued growth in urban sprawl (dispersed development) and low transport connectivity.
- **Compact, connected urban growth:** A scenario where economic and infrastructure densification takes place in a smaller number of locations with high “urban demand”, connected by world class transit systems.

Analysis of the two spatial scenarios is based on two measures: access to basic services, and the cost of infrastructure provision.

Key findings

This section highlights key findings from the analysis detailed above.

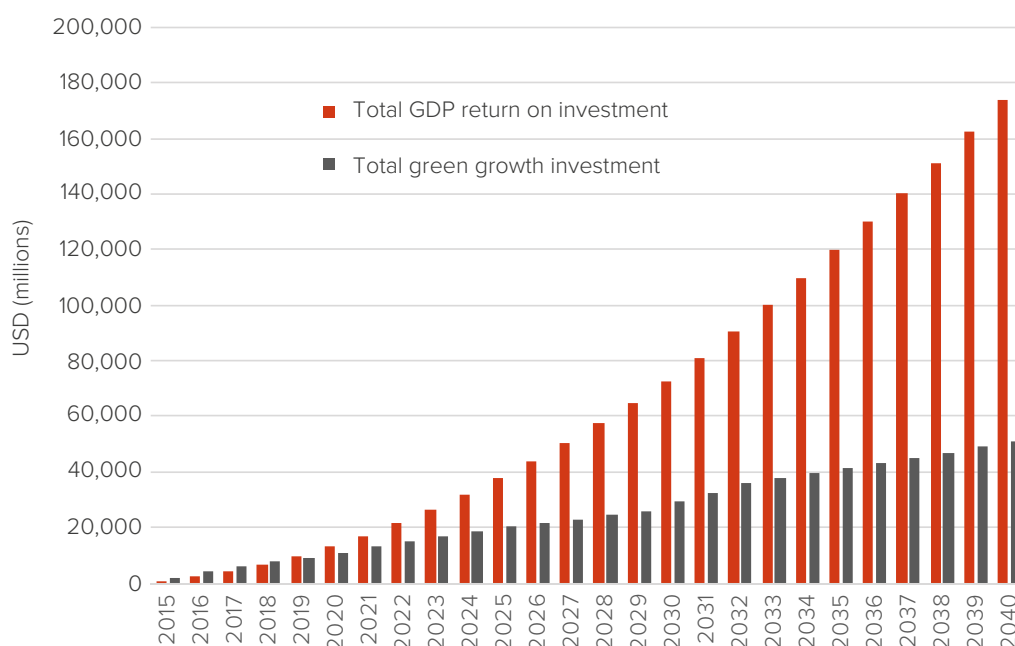
FINDING 1: There is a strong economic rationale for green growth in Uganda to enhance and accelerate Uganda’s planned structural transformation.

Fully implementing the 23 new and planned green growth interventions could enhance Uganda’s GDP by around 10% by 2040. Each sector would have its part to play in delivering this impact, and all the interventions have merit whatever the different sectoral compositions of growth that leads Uganda to realising its Vision 2040. There are significant triple wins for the economy, society (jobs), and the environment (GHG savings). These benefits fall across a number of sectors:

- Urban interventions make the highest total GDP contribution of the four sectors (from both planned and new opportunities) with US\$4.3 billion in benefits by 2040. This is achieved through planned large-scale investments, like the Standard Gauge Railway (SGR), Bus Rapid Transit (BRT) and Light Rail Transit (LRT), which will contribute US\$2.5 billion of GDP in 2040.
- The urban sector is followed closely by energy, which could deliver a US\$3.4 billion boost to GDP through reducing both energy production and consumption costs.

Figure 14

Cumulative GDP return on investment



Source: NCE modelling.

- Despite a declining share in GDP, agriculture is also a significant GDP contributor at US\$2.8 billion, driven by higher crop yields and incomes via climate-smart agricultural practices such as agroforestry and drip irrigation.
- Industry – at just under US\$600 million – provides a smaller aggregate contribution, but its contribution grows rapidly, increasing five-fold between 2020-2040. Industry is central to achieving green growth as part of Uganda's structural transformation, but it is important to recognise that the sector is starting from a low base. Existing government plans for efficient industrial development are ambitious, and future net impacts are mostly generated from resource efficiency.⁴⁴

This aggregate investment package could deliver a boost of 0.5% to Uganda's GDP growth rate from 6.1% to 6.6% over the period 2015-2040. This is equivalent to US\$3.4 billion in 2020, rising to US\$11.5 billion in 2040. Fully realising a green growth scenario will deliver a GDP per capita of US\$2,039 in 2040.

The aggregate economic benefits across all sectors associated with this programme of investment would outstrip the investment required, and bring wider benefits (see Finding 5 and Figure 14). It shows that the aggregate investment programme – if fully implemented – would cost an average of around US\$2 billion per annum, with a cumulative benefit cost ratio

in terms of cost to GDP of 3:1 in 2040. This excludes the wider non-monetised benefits, such as the economic and health benefits of improved air quality.

FINDING 2: Many green growth interventions are already planned under the NDPII and should be prioritised. A number of new interventions have been identified which could benefit the economy by US\$6.9 billion in 2040.

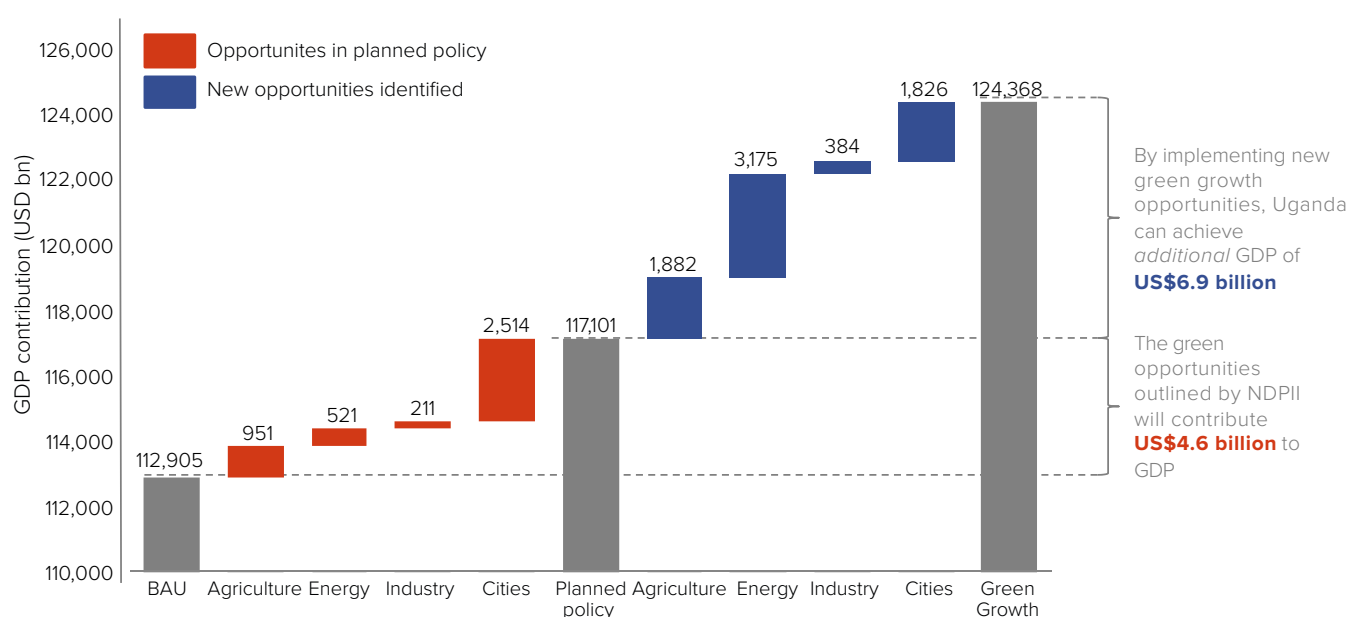
Many of the identified interventions are already being planned by the government, either in full or in part by the NDPII. This analysis suggests that these planned interventions and policies should continue to be a priority for government. Analysis of the interventions included in the NDPII demonstrates their value to be in the region of US\$1.6 billion in 2020, and US\$4.6 billion in 2040.

There are also a number of new interventions identified which are additional to existing policy commitments, or indications of where existing interventions need to be scaled up. Implementation of these interventions would provide a boost to GDP of US\$6.9 billion in 2040. This provides a strong rationale to enhance efforts under the NDP which could boost growth, and develop new support programmes for those measures not included under the NDPII.

Figure 15 shows the sector contributions to GDP for both interventions in the planned policy scenario and those in the green growth scenario.

Figure 15

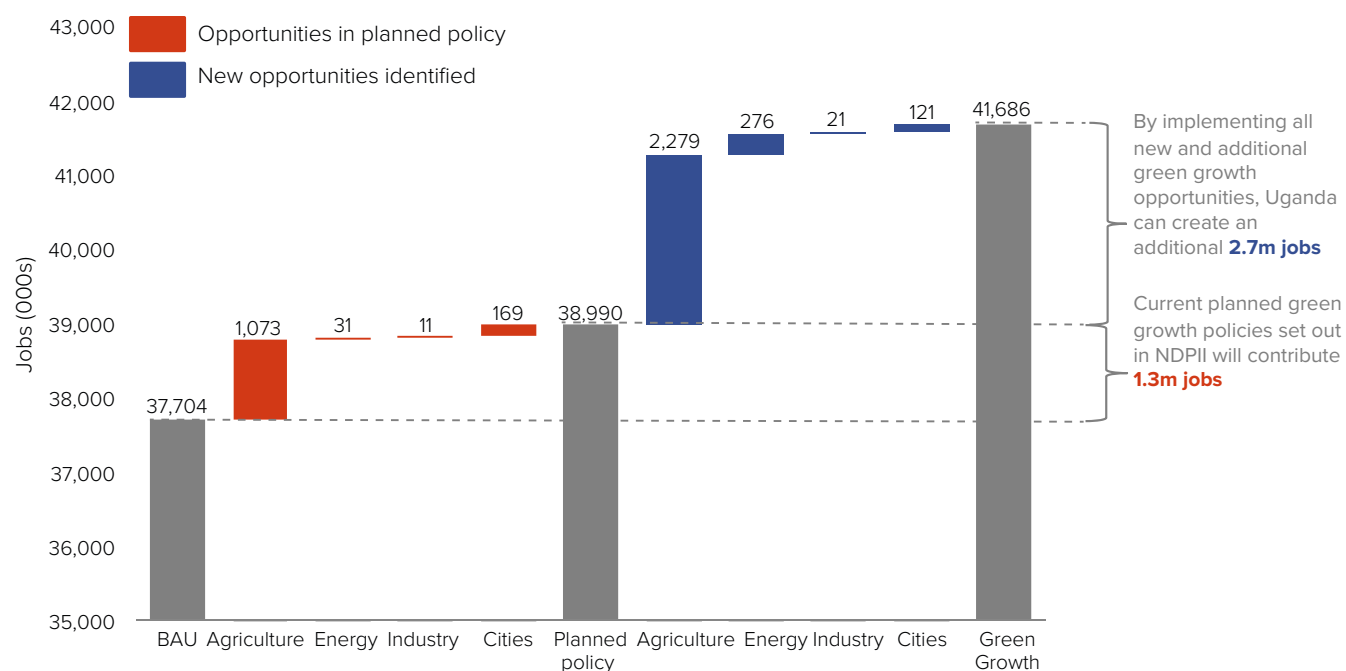
Green growth interventions versus BAU planned policy scenario: contribution to GDP in 2040



Source: NCE modelling.

Figure 16

Green growth scenario versus BAU planned policy scenario: contribution to employment in 2040



Source: NCE modelling.

FINDING 3: The green growth scenario could generate 1.3 million jobs by 2020, rising to around 4 million in 2040.

Most of the jobs would be generated through higher productivity agriculture. The large proportion of employment gains in agriculture and urban sector interventions stems from their potential in generating further upstream and downstream jobs that comes from more productive agriculture yields, and delivery of more efficient transport in cities. Of the jobs created, the analysis estimates that 45% are likely to be “youth jobs” and 51% will be “more accessible” to women.

There are two important caveats to these aggregate estimates for job creation. First, the changing employment structure resulting from economic development will create winners and losers. As an example, enhancing productivity in the agriculture sector from mechanisation and commercialisation could result in job shedding in some parts of the sector. The results here reflect the gross job increases; the net impacts on employment cannot be determined through the models used as part of this study, and should be carefully considered to allow proactive management of the distributional aspects of growth.

Second, the indirect job impacts of some of these measures are likely to underestimate the job-creating power of an individual opportunity. For example, direct employment from the SGR has far less intensive employment needs than highlighted agricultural interventions, so the job creation impacts are lower. However, the induced jobs impact from these projects

could be significant as the infrastructure underpins growth across all sectors. These wider impacts are also not fully considered here.

Therefore, to estimate the aggregate net job creation potential associated with the investment programme would require a fuller understanding of factors not fully modelled here.

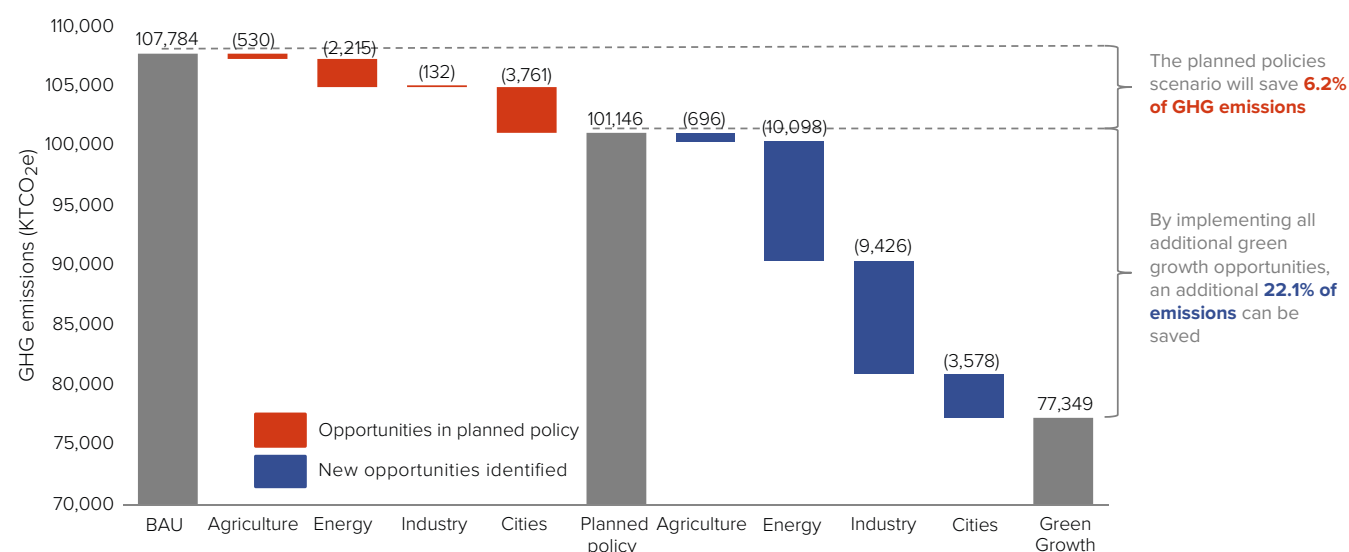
FINDING 4: Under the green growth scenario, future GHG emissions avoided could actually exceed Uganda’s current NDC.

The green growth scenario provides strong opportunities for Uganda, over time, to strengthen its emissions reduction commitment as part of its NDC. Based on the analysis, under the green growth scenario, emissions could be 21% lower in 2020, 28% lower in 2030 and 28% lower in 2040 relative to the BAU scenario. This exceeds the commitment made in the NDC of a 22% reduction against BAU emissions growth in 2030.

The vast majority of emission reductions come from new interventions that are additional to planned policy measures in the NDPII. However, it is recognised that Uganda’s NDC – published after the NDPII – contains an additional range of mitigation actions not addressed by this study (e.g. interventions to reduce deforestation and those from livestock). This suggests that – irrespective of the different approaches used – Uganda has a number of options through which to meet its existing NDC target, and robust options to pursue

Figure 17

Green growth interventions versus BAU growth: Contribution to GHG reductions in 2040



Source: NCE modelling.

greater ambition over time. This will be necessary to meet the long-term climate goal of keeping average temperature increase well below 2°C.

It is important to acknowledge that managing the impact of Uganda’s development trajectory on the natural environment will be needed under any scenario or investment programme. Even in the green growth scenario, by 2040 GHG emissions will still approximately double relative to today. However, it should be noted that this doubling will originate from a low base and at a much slower rate than if green growth measures were not implemented. This will also happen in the context of an almost doubling of Uganda’s population to over 60 million by 2040. This may require Uganda’s policy makers to consider measures to increase their emissions reduction ambition over time as new capacities are built through learning and discovery, and as technologies evolve. Uganda’s per capita GHG emissions are currently around 1.2 tonnes, compared with a global average of around 8 tonnes per capita. The green growth scenario considered in this report will reduce the GHG intensity of GDP by around 35%, and Uganda’s GHG emissions will be predicted to flatline at around 1.3 tonnes per capita in 2040.

The existing dominance of low-carbon energy sources and planned expansion of renewable capacity in Uganda means that GHG emissions savings in the green growth scenario are driven mainly through other sectors (e.g. industrial fuel and transport interventions in agriculture, urban infrastructure and planning), rather than large-scale shifts away from fossil fuel energy supply technologies. The largest saving comes from improved cooking solutions, which would reduce the use of traditional biomass.

Energy efficiency in buildings and industry could be a significant area of opportunity for future GHG savings, which would also avoid significant growth in aggregate energy costs and associated emissions. Given Uganda’s warm and consistent climate, there are also important interventions to maximise the potential of leading building design techniques for residential and commercial buildings, as well as avoiding air conditioning and space and water heating costs.

FINDING 5: The green growth interventions identified have wider benefits, beyond GDP, jobs and GHG reductions.

A benefit-cost ratio of GDP to investment costs should not be the only criteria for understanding the impacts of interventions. There is potential to miss a number of issues which are difficult to quantify in monetary terms alone.⁴⁵ A multi-criteria analysis (MCA) has been

used to make a qualitative assessment of the wider contribution of each of the 23 identified measures to Uganda’s development priorities.

Table 4 provides an overview of the top 10 projects contributing most strongly to the nexus of economic, social and environmental impacts. The final list of 10 interventions represents those with a clear “win-win” potential for government; these “nexus” interventions are most likely to combine a positive financial case for public and private sector investment with wider long-term social and environmental benefits, including the increased participation of youth and women.

As an example, integrated urban planning makes a large GDP contribution due to efficiency gains from reduction of negative sprawl impacts. It also brings high GHG emissions reduction potential because of emissions mitigation as a result of the introduction of sustainable transport options, which lead to lower rates of private vehicle use. Other agriculture, energy and industry interventions within the list of ten also have similar features; examples of improved intercropping in agriculture and improved cookstoves in energy demonstrate potential investments that can yield positive GDP gains, and also inclusive and resilient growth.

There are 13 further interventions each with their own impact, profiled in Chapter 3 – any of which can also play an important role in Uganda’s green growth strategy.

Table 4
Interventions with most significant aggregate benefits

Rank	Intervention
1	Integrated urban planning
2	Improved intercropping
3	Improved cookstoves
4	Improved agricultural knowledge
5	Solar irrigation
6	Off-grid renewables
7	Industrial energy efficiency
8	Green industrial parks
9	Soil fertility enhancement
10	Building energy efficiency

FINDING 6: To 2020, there would be an additional annual cost to the public sector of US\$200 million above existing expected investment, representing an uplift of 3% to the public sector budget.

The annual average investment requirement from 2015 to 2040 is around US\$1.8 billion. The NDPII sets out a detailed capital investment profile between 2016 and 2020 which already covers 75% (US\$1.35 billion annually) of the investment needs of the green growth interventions identified. This is split between US\$0.75 billion and US\$0.6 billion for the public and private sector respectively, and builds off existing climate change investments in Uganda.⁴⁶

The implication for the domestic public sector side is ensuring that earmarked funding is actually channelled to the interventions highlighted. For private sector investment, the challenge is to attract and leverage

the identified amounts, either through FDI or credit provisions for local businesses. Any shortfall in public and private sector investment will reduce the scale of benefits.

The incremental annual investment requirements for additional green growth projects is US\$450 million per annum, of which we estimate around US\$250 million can be leveraged from private sources, and US\$200 million from the public sector. This represents a 4% uplift in total spending, and an increase of public sector spending by 3%. Ideally, public investment in additional green growth interventions can be catalytic as they build on current NDPII budgetary plans and leverage the private sector. This appears to be within the range of a reasonable increase, in the context of the government's current fiscal programme.

Table 5

Total annual public versus private investment needs during NDPII budget, 2016-2020

	Total annual average investment (USD billions)	Total annual private investment (USD billions)	Total annual public spending (USD billions)
NDPII average budget figure	11.70	4.94	6.76
Total investment needs of green growth pathway	1.80	1.00	0.80
Green growth investment already within NDPII	1.35	0.75	0.60
New and additional green growth investment needs	0.45	0.25	0.20

Source: NCE modelling.

Table 6

Total annual average investment needs, 2015-2040 (USD millions)

	Total annual investment (USD billions)	Total annual government spending (USD billions)	Total annual private investment (USD billions)
Agriculture	0.55	0.24	0.30
Energy	0.69	0.07	0.62
Industry	0.05	0.02	0.03
Urban	0.67	0.41	0.26
Total	1.69	0.74	1.223

Source: NCE modelling.

These new interventions represent strong candidates for development finance (including climate finance), therefore potentially reducing the public sector investment requirement further. It seems to represent a reasonable uplift on the around US\$1.6 billion of aid that Uganda receives annually.⁴⁷ For those investments with high upfront costs and which suffer from a range of market failures typically associated with sustainable infrastructure, climate and other development finance could be used to improve the short-term commerciality of the investments by offering concessional rates of debt, or providing other financing instruments. Capital grants and technical assistance may also be available from development partners to support project preparation, and public–private partnership (PPP) structuring for implementation.

The expected investment by the public and private sector is not uniform across all sectors, with a higher proportion of public investment directed towards urban interventions, and a higher proportion of private investment directed towards the energy sector (see Table 6). This is in recognition of the number of governance and market barriers that typically hinder greater involvement of private capital in urban investments.⁴⁸

FINDING 7: There are some trade-offs between green growth investments that need to be carefully managed.

The analysis does not suggest that all aspects are simple “win-wins”, and there will be a number of trade-offs that should be considered.

First, there are trade-offs between identified interventions in terms of the eventual outcomes. Each intervention brings a unique contribution to Uganda. Each of the 23 interventions have been selected out of a long list of 126 interventions because they offer opportunities for economic growth *and* they make a wider contribution to environmental and social objectives. However, not all interventions deliver equal contributions to Uganda’s development objectives. For example, some deliver a significant GDP contribution but their direct employment gains are limited in comparison (e.g. improved cookstoves); others have high GHG emissions reduction returns but without the equivalent GDP contribution to match (e.g. green industrial parks). Because interventions make these distinct contributions, investment plans need to be optimised. They should combine complementary interventions as part of a balanced portfolio of investment that can achieve multiple benefits. Figure 18 depicts some of these trade-offs.

Second, there is a trade-off in terms of the timing of costs and benefits. Some interventions will incur more in upfront costs than their alternative, with the majority of benefits accruing in the future. Making investment decisions based on the long-term net benefits is a principle of public policy guidance of the Ministry of Finance, Planning and Economic Development. In addition, there is a global public good argument for international public finance to support green growth interventions, as there is a benefit to countries outside of Uganda of reducing emissions. For example, the sequencing of the SGR is critical for Uganda’s long-term development, but in the short term, it is capital intensive to place large demands on public resources. It also involves negotiating complex, coordinated action with neighbouring countries. Similarly, the capital requirements of energy efficiency measures are higher in aggregate terms than not installing them, and the benefits accrue in the longer term, predominantly to private individuals.

Third, the location of investment and balancing the benefits of growth is an important trade-off. Urban concentration as part of Uganda’s infrastructure investment will bring prosperity and spillover benefits to particular regions of Uganda (e.g. the Northern Corridor). Creating these more focused economic concentrations will mean that some locations will experience a lower level of investment. This brings a risk that successful urban centres will leave rural areas behind economically. The need to facilitate balanced access to and benefit sharing with these “growth poles” will be a particular challenge, despite the overall gains in average economic performance and reduced infrastructure costs. Strengthening rural urban linkages is a policy area for further exploration.

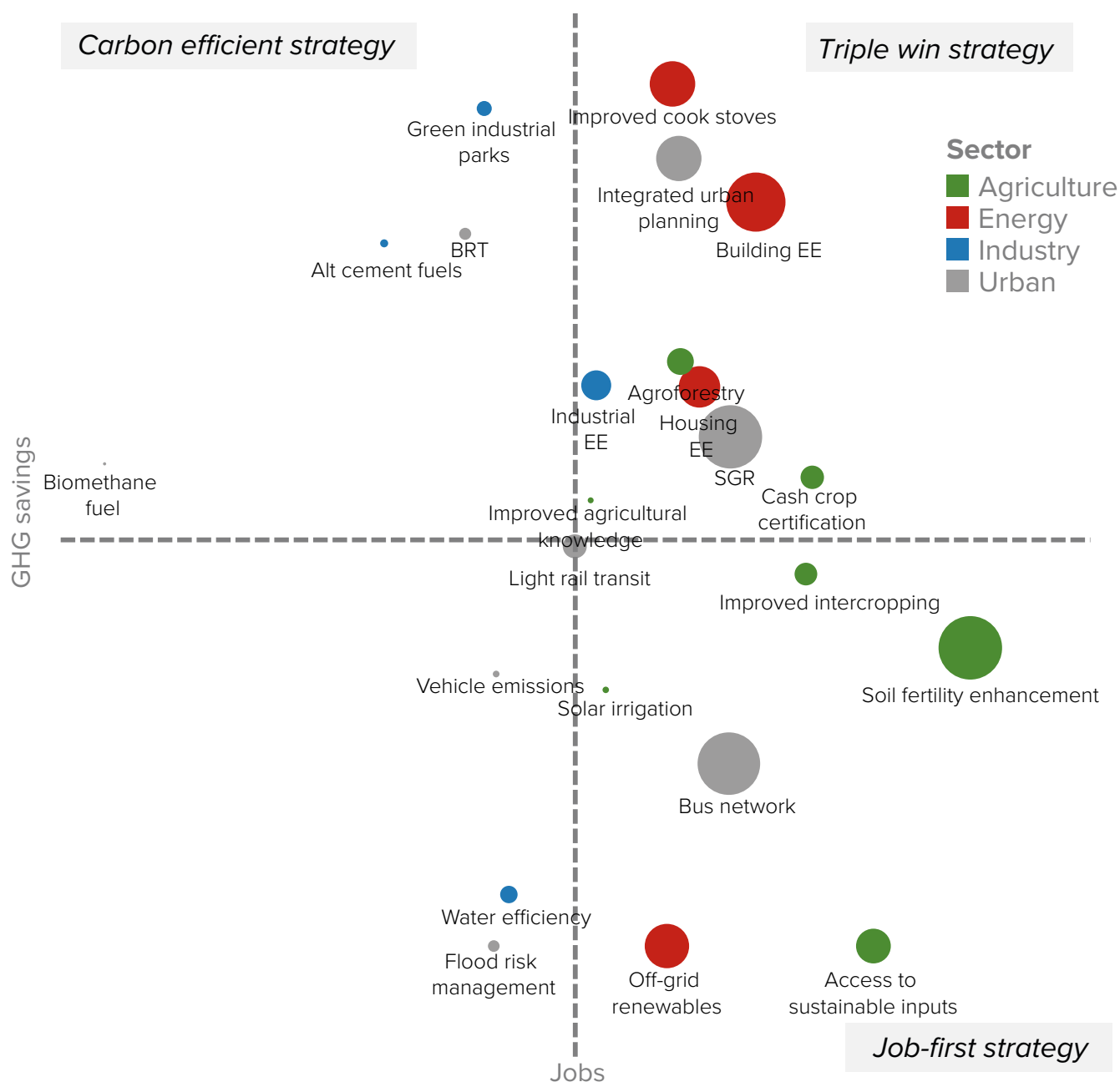
Lastly, there will be trade-offs as new economic opportunities replace others. Some activities create new jobs, some displace and recreate jobs, while others will reduce jobs. Although economic growth can increase the overall amount of employment, certain activities might be displaced. As an example, a commitment to those climate-smart agricultural practices that are more labour intensive may not be fully consistent with a mechanisation and commercialisation strategy for national agricultural development, which could reduce employment overall.

Trade-offs are therefore an important part of determining the right investment strategy, and targeted public intervention plays a role in this. However, the important point is not for Uganda to avoid activities which have clear trade-offs, but to consider a balanced portfolio of opportunities which can maximise aggregate development impact in the context of its national development vision grounded in societal values. Overall returns from green growth are high, but

privatising these returns on investment is only possible in some cases. Public investment therefore plays two roles: first to secure the most important triple wins and catalytic investment that lock in a green growth pathway; and second, to catalyse large-scale private investment opportunities through regulation and incentives.

Figure 18

Trade-offs between GDP, GHGs and jobs across 23 green growth interventions



Source: NCE modelling.

Note: The size of each bubble indicates the scale of GDP benefits (a larger bubble indicates a higher contribution to GDP). Placement in the quadrant depends on whether the intervention provides relatively more GHG savings, growth or job benefits. The colour represents the four sectors analysed.

FINDING 8: Well-managed urbanisation could increase access to basic services by a third and reduce aggregate infrastructure investment costs by 11% by 2040.

Uganda has the opportunity to unlock the power of its urbanisation process for improved economic, social, and environmental outcomes, while avoiding locking in the disadvantages of dysfunctional, unplanned urbanisation. There is an opportunity to develop Uganda's cities and a national network of urban centres which are compact, connected, and coordinated (the 3Cs model). This approach can enhance growth, productivity and competitiveness while reducing infrastructure costs and increasing access to services through agglomeration and better distribution of activity (helping to achieve the SDGs, such as SDG 7 around access to energy). International evidence also suggests compact, connected urban development can be more inclusive, resilient, cleaner, quieter and safer, if undertaken in the right way.

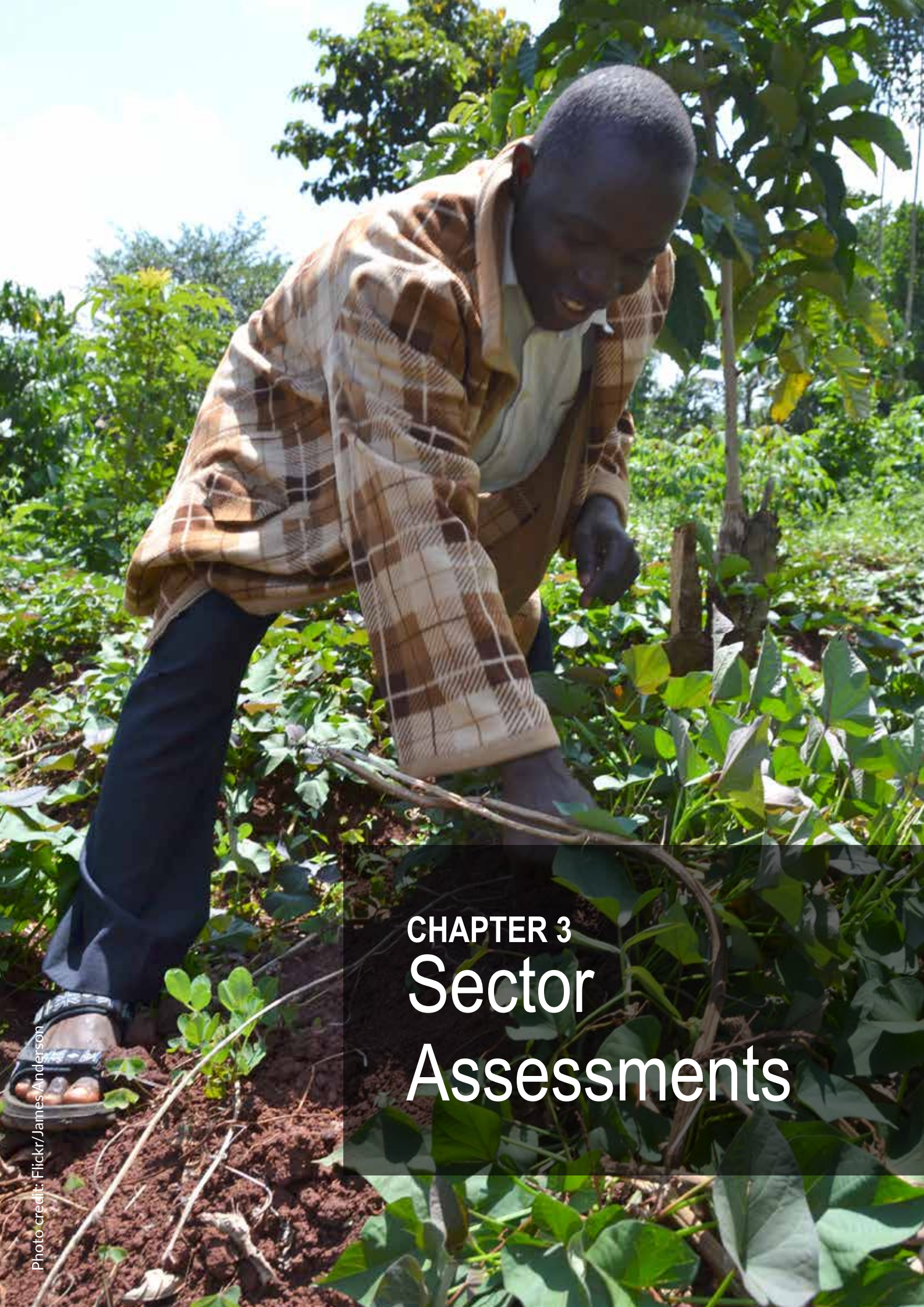
Despite strong economic progress to date, Uganda risks creating a sprawling and uncompetitive urban structure with high infrastructure costs. This work suggests in the pursuit of “urbanisation dividend” over the coming decades, the following should be considered:

1. Regional integration of infrastructure for enhanced trading with its neighbours, through investment in transport infrastructure.
2. Secondary city development in four strategic economic corridors that is focused on both economic specialisation and regional balance, reducing the current pressure on Kampala.
3. A focus on enhanced productivity and formal job creation within urban centres.
4. Improving Kampala's competitiveness as Uganda's largest urban centre for growth and jobs, and connecting it to other growing cities.

Through urban-focused green growth interventions, important urban infrastructure investments can deliver more compact, connected urban development. These can improve growth by delivering public transport and building more efficient buildings and high-quality housing stock.

However, these specific interventions exist as part of a national hierarchy of urban centres, or a “national system of cities”, that should be considered as part of an integrated strategy for unlocking a Ugandan “urban dividend.” This is the spatial element of the national economic development process and should be fully embedded in national planning processes. This includes considering how to plan, design, and invest in specific cities, but also how to plan and connect these different urban centres as part of a unified economic development strategy. In turn, this can improve the economic, social and environmental performance and efficiency of the economy as a whole. To help achieve these goals are a number of blocks of infrastructure which promote connectivity between urban centres (e.g. the SGR).

The major aspects of urban infrastructure investment are analysed, but this reports also makes an assessment of the aggregate nationwide net benefits related to well-planned and well-managed urbanisation. This coordinated approach is facilitated by investment in integrated urban planning at both the city and national level. The implementation of interventions highlighted in this work suggest that it can provide over US\$4 billion of economic benefit by 2040. Moreover, it could boost access to urban services by around one third of Uganda's population and reduce infrastructure delivery costs by around 11%.



CHAPTER 3

Sector Assessments

Underpinning the findings in Chapter 2 is detailed analysis of the four systems, or “sectors”, analysed as a result of the output of the growth and climate diagnostic:

- **Agriculture:** With employment dominated by agriculture in Uganda, investment in this sector will deliver high poverty reduction and substantial gains in living standards. Interventions here should focus on improving yields and resilience in the face of the impacts of climate change.
- **Energy:** As a vital enabler of growth, interventions for improving energy systems cover both the generation of new energy and the efficient use of energy across sectors. The approach here also distinguishes between on- and off-grid solutions.
- **Industry:** Industrialisation is still at an early stage in Uganda but will be fundamental for future prosperity and has the potential to provide highly productive jobs.
- **Cities:** There is a need to managing the risks and exploiting opportunities related to urbanisation, especially with a rapidly growing urban population.

The sector analysis includes (i) an overview of context in each sector; (ii) the constraints that are currently holding back the sector based on existing literature and expert consultations; and (iii) the major interventions to overcome these constraints, including a summary of the quantitative and qualitative impacts. It also includes discussion of current government policy – why some measures have not already been taken, and which measures are vital to address. The interventions analysed here support the drivers of economic growth outlined in Chapter 1 as the “entry point”, as well as having potential societal and environmental gains.⁴⁹

This chapter is structured as follows: an overview of both the quantitative and qualitative outputs for each of the 23 interventions across all sectors; and then detailed sector summaries.

Summary of sector results

Quantitative analysis

The full summary list of interventions analysed is presented in Figure 19. It demonstrates the comparative benefits of each opportunity covering:

1. Annual average investment needs, 2015-2040
2. Annual GDP contribution in 2040
3. Annual employment contribution in 2040
4. Annual GHGs reduced or avoided in 2040
5. A benefit-cost ratio (BCR) score provided for each opportunity, to indicate its investment performance in terms of narrow GDP return to investment costs
6. An assessment if the measure is captured in current planning under the NDPII.

Each intervention is compared with a “counterfactual” in the BAU scenario to which the assessments are made relative. These counterfactuals are covered at the end of each sector summary section.

Qualitative analysis

Results from the BCR analysis show the investment returns primarily in terms of GDP. As a result, those investments with low investment requirements tend to perform better. The BCRs alone can be a narrow way to assess the overall economic, social and environmental contribution of interventions. Choosing projects, for example, that lock in benefits for a long time or set a foundation for future benefits to accrue is an important additional consideration. Moreover, information on the scale, timing, phasing and combination of interventions is essential to form a realistic and effective green growth strategy.

Hence, multi-criteria analysis (MCA) is used to augment this quantitative analysis. An MCA can provide a more holistic assessment of the aggregate contribution of each opportunity to Uganda’s economic and wider development priorities.

Therefore, in addition to the quantitative output indicators used to measure the green growth interventions (GDP contribution, job creation and GHG savings), the MCA incorporates five additional qualitative indicators: productivity gains, poverty and social inclusion benefits, climate resilience, upfront capital requirements and “lock in” potential.

Together, these quantitative and qualitative indicators fit into an evaluation framework for green growth:

Accelerated growth

- **Quantitative:** Contribution to GDP – the economic contribution interventions make through new economic activity or cost savings.
- **Qualitative:** The potential for other indirect and productivity gains an opportunity might deliver (e.g. through supply chains or market efficiency).

Inclusive growth

- **Quantitative:** Employment – the gross number of jobs (disaggregated for women and young people) created through the increased economic activity in the given sector.
- **Qualitative:** The wider poverty and social inclusion benefits (including aspects of access and reach) of the opportunity.

Resilient growth

- **Quantitative:** GHG emissions either reduced or avoided by green growth interventions.
- **Qualitative:** The environmental impact and climate resilience contribution of the opportunity

Efficient growth

- **Quantitative:** The total investment from public and private actors required to implement the opportunity.
- **Qualitative:** The propensity for the investment to “lock-in” long-term benefits or gain traction towards a green growth pathway or avoid “path dependency”.

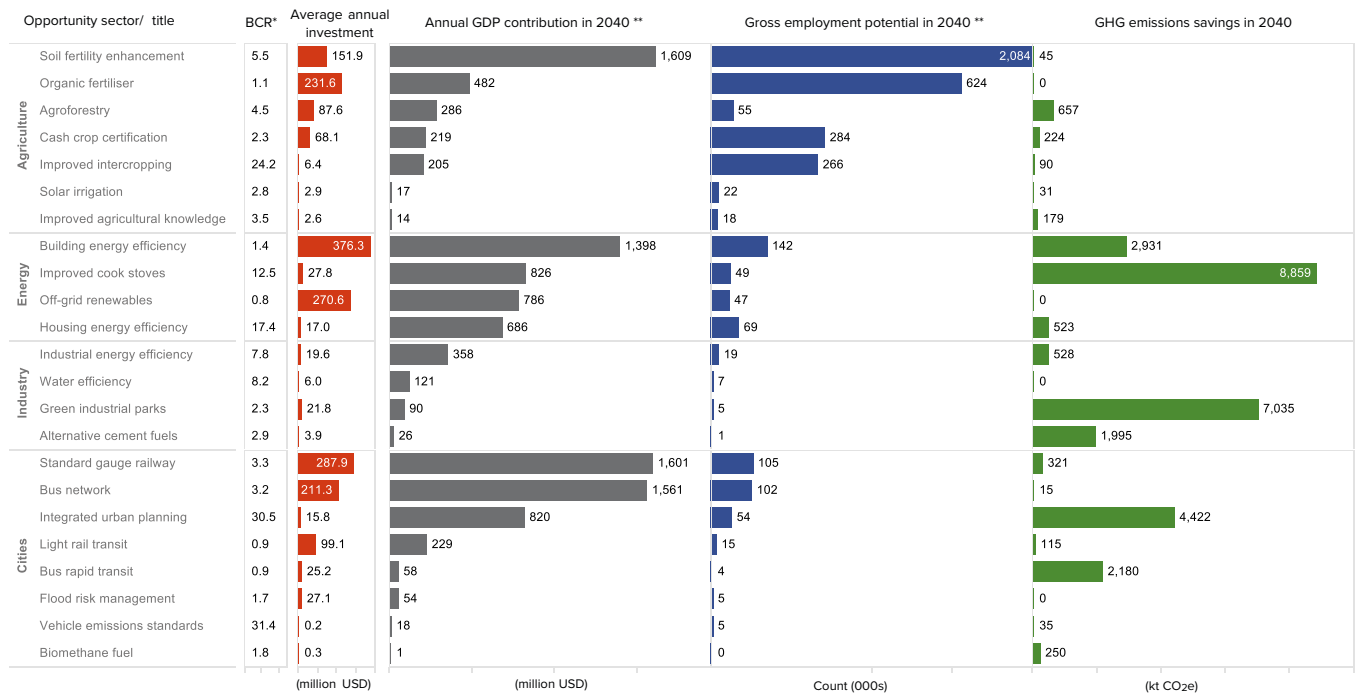
The four quantitative indicators are normalised and categorised into a simple scale of 1 to 5. Scores for the qualitative indicators are based on expert input and existing literature sources, and each opportunity is given a score between 1 and 5. Using these scores, each intervention can be ranked.

The results of this weighted MCA are presented for each opportunity in Figure 20. The MCA does not address other complexities of implementation including issues such as political feasibility, land acquisition requirement, and institutional coordination requirements. This MCA approach is therefore intended for guidance only, and other factors will need to be considered in decision making.

Understanding the impact of the numbers requires an understanding of the counterfactual which is detailed for each sector in the sector summary tables below. For example, off-grid renewables present a low emissions savings figure – this is because the counterfactual is largely low-carbon energy; therefore, this option, while low-carbon, has only modest savings incrementally.

Figure 19

Detailed summary of impact of each green growth opportunity versus BAU against four quantitative indicators in 2040



Source: NCE modelling.

Note: BCR = present value of GDP contribution divided by present value of investment from 2015 to 2040, discounted using a 3.5% discount rate. GDP and employment axis do not show full bar for building energy efficiency and climate-smart agriculture respectively. This chart shows the incremental savings between the BAU scenario and the green growth scenario. Therefore, this figure does not show the total investment, GDP, employment, or GHG emissions impacts of NDPII which is included in the BAU scenario.

Figure 20

Multi-criteria analysis of detailed green growth interventions

Sector	Intervention	Green growth criteria								MCA score	MCA ranking
		Accelerated growth		Inclusive growth		Resilient growth		Efficient growth			
		GDP contribution	Productivity gains	Job creation	Inclusiveness	GHG impact	Climate Resilience	Up front investment	Lock in		
Agriculture	Improved agricultural knowledge	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.6	4
	Improved intercropping	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	4.0	2
	Soil fertility enhancement	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.2	9
	Increased access to sustainable inputs	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.4	22
	Cash crop certification	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.0	23
	Solar irrigation	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.6	5
	Agroforestry	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.8	16
Energy	Improved cook stoves	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.8	3
	Off-grid renewables	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.3	8
	Building energy efficiency	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.1	10
	Housing energy efficiency	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.0	13
Industry	Industrial energy efficiency	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.3	6
	Water efficiency	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.7	18
	Alternative cement fuels	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.9	15
	Green industrial parks	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.3	7
Urban	Bus network	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.0	14
	Bus rapid transit	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.1	11
	Light rail transit	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.7	19
	Standard gauge railway	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	3.1	12
	Integrated urban planning	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	4.1	1
	Flood risk management	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.6	20
	Biomethane fuel	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.8	17
	Vehicle emissions standards	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	2.5	21

Source: NCE modelling.

Agriculture





Interventions in agriculture

Increase productivity by scaling climate-smart agriculture practices to create resilient, high yield and low emissions food and commodity production.

Supporting policy principle

Improve rural land rights for farmers, increasing the amount of registered land and enabling the use of land as collateral for farm investments.

Quantifying green growth outcomes

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.3 billion	\$0.9 billion	-2.2%	1.0 million
2040	\$0.6 billion	\$2.8 billion	-1.1%	3.4 million

Sector context

Agriculture is vital to the livelihoods of Ugandans, with 76% of households earning income from agricultural production.⁵⁰ The majority of these are those living in rural areas, where absolute poverty rates are higher than in urban areas. Central export crops are coffee and tea (making up 24% of exports in 2014).⁵¹

Increasing agricultural incomes contributed 77% to the poverty reduction seen between 2010-2013, in spite of very low productivity gains. The increase in agricultural incomes were a result of:

- Expansion of the area under cultivation
- Higher crop prices
- Increased access to growing local, urban and regional markets (e.g. Kenya, Rwanda, Congo and South Sudan) from improved infrastructure
- Increasing cultivation of higher-value cash crops
- Significant growth in agroprocessing activities.

However, population increases place growing pressure on land, which lead to poor agricultural practices and soil degradation. This highlights the sustainability risks of the sector and potential effects for the livelihoods of many of the rural poor, reliant on agriculture. Some signs of stress already exist with food security issues prevalent with a large amount of regional variation.⁵²

A reliance on basic agricultural techniques and slow uptake of new technologies has led to low yields. The average productivity of an agricultural worker was US\$581 GDP in 2012-2013, compared to US\$2,441 for those workers within the services sector and US\$5,106 for workers within industry. This means that agricultural productivity in Uganda is among the lowest in sub-Saharan Africa, and productivity growth has been in decline in the last 5 years (falling on average 0.4% per annum between 2008-2012).⁵³ One reason for this differential is that investment in advanced practices is low, with only 8% of farmers using draft animal labour, and only 2% using tractors.⁵⁴ The use of improved crop varieties in Uganda is also low, with estimates ranging between 13% and 22%. Currently, Ugandan farmers apply an average of less than 1.5 kg/ha (kilograms per hectare) of fertiliser, far below the MAAIF 2020 target of 50 kg/ha.⁵⁵

Variability in rainfall and more extreme weather events and climate impacts are also having a detrimental effect, causing significant crop losses.⁵⁶ Only 40% of irrigable land is currently being used, and this percentage is even lower in land further from water bodies.⁵⁷ Much of food production is currently rain-fed.

Furthermore, natural capital is being depleted. Almost 46% of all land is being severely degraded and soil erosion is averaging over 5 tonnes per hectare per year.⁵⁸ Between 1990 and 2005, Uganda lost 26.3% of its forest cover, and deforestation continues today at a rate of 2.2% per year. Continued deforestation – forest cover has reduced from 13.1% to 10.4% over the last four years – and poor agricultural practices lead to soil erosion, nutrient depletion (current depletion rates are over 80 kg/ha per year)⁵⁹ and less biodiverse ecosystems.

There is limited value addition to agricultural products, due to a lack of industrial presence. It is difficult for farmers to add value to primary products as food processing is still in the early stages of development. Demand for goods for processing is predominantly from the export market, resulting in additional transport costs and increased losses.

Current plans and targets

Agriculture is a priority area in both Uganda's NDPII and Vision 2040. It is important for poverty reduction and to also act as the pre-cursor for structural transformation. Plans include the following:

- The government has a target of increasing marketed output by 50% by 2025 through the adoption of climate-smart agriculture by 1 million households by 2025, increasing access to farm inputs, improving agricultural markets, and increasing value addition through certification and increased processing capabilities. To achieve this, under the Comprehensive Africa Agriculture Development Programme (CAADP) the government has committed to increasing spending to 10% from around 3% of the national budget for the previous 5 years. There is also a move towards more commercialised agriculture.
- Uganda's INDC aims to increase forest cover to 21% in 2030, prioritising a reverse in deforestation and reducing emissions.⁶⁰
- The Agriculture Sector Strategic Plan (ASSP) is a 5-year strategy for the Ministry of Agriculture, Animal Industry and Fisheries for the period 2015-2016 to 2019-2020. It defines the priorities and interventions to be implemented over the 5-year period. The outlined aim is to describe the priorities, strategies and interventions that will allow Uganda to meet agricultural targets set within NDPII.
- The National Irrigation Master Plan identifies a strategy for increasing irrigation in land that is close to surface water resources, where agricultural water can be managed without the need for storage ("type A" land), but with less focus on where there is no easy access to rivers or large bodies of water ("type B" land). Overall, irrigation will increase to around 250,000 hectares by 2035.⁶¹

Constraints to green growth

The analysis has highlighted five core constraints:

First, land rights reduce investment in the agriculture sector and beyond. As a result, productivity suffers from the lack of investment in farmers' land due to unclear ownership. Further, the land rights and its lower productivity value reduce its role as collateral for investments beyond the agricultural sector. Combined with high interest rates, this means Ugandan farmers have limited access to credit for agricultural or other investments.

Second, low uptake of improved seeds and crop varieties has prevented smallholders from benefitting from new technologies. Communication of, and access to, the benefits of improved technology has been limited.

Third, as in the energy sector, agricultural producers are constrained by limited road networks. The rural poor need access to competitive markets not just for their produce but also for inputs, assets and technology, consumer goods, credit and labour. Inefficient markets result in high transaction costs, contributing to both the low use of inputs and the low uptake of technology.

Fourth, poor market access in part exacerbates another serious problem of high post-harvest losses, which, in Uganda, offers significant scope for improvement.⁶²

Fourth, irrigation is also underdeveloped. A lack of irrigation will directly result in lower yields and reduced food security of farmers. Uganda needs to become more efficient with its water use to be resilient to climate impacts of the coming decades. The Irrigation Master Plan should increase its support where there is no easy access to rivers or large bodies of water ("type B" land).

High input prices result from a number of these constraints, and compound the productivity problem.

Opportunities for green growth

To overcome these constraints, a number of different options are available.⁶³

Climate-smart agriculture (CSA) aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible. This study has examined three specific CSA practices:

1. Improved agricultural knowledge can be achieved through participation in farmer field schools, usually of around 20 farmers to a trainer. Sessions will address different practices throughout the season and build farmers' knowledge over time. Where possible, these sessions will include visits to model farms to show the potential benefits. The benefits to incomes will come through increased yields for farmers, based on practices such as improved use of seeds, efficient weeding, regular pruning and informed planting of crops depending on land type and environmental conditions. These practices will result in increased environmental resilience, with farmers learning about techniques that will preserve the fertility of the land in the future. Improved knowledge is also likely to have social benefits, with knowledge on the dangers of

improper practices being publicised, for example in the case of harmful agrochemicals. The interventions aim to target smallholder farms in Uganda.

2. Improved intercropping is designed to achieve benefits beyond the current practices common in Uganda. Rather than focusing on achieving the greatest amount of produce from a piece of land by planting multiple crops, intercropping uses knowledge on the benefits of different crops to improve their productivity and increase resilience and sustainability. The benefits of intercropping are modelled on the ability to control pests and reduce losses, improve agricultural yields and provide fodder for livestock with intercropped foliage, although managing the negative impacts of intercropping is required.⁶⁴ This increases output, but also aids in improving biodiversity, while reducing the need for harmful pesticides.
3. Soil fertility enhancement gives farmers the ability to enhance the fertility of their soil without having to resort to inorganic fertiliser. Soil fertility in Uganda is falling, and farmers are often unable to access or afford fertiliser. However, by planting nitrogen-fixing bushes around crop areas, farmers can both improve the fertility of their soil and reduce soil degradation. Once these bushes are grown, farmers are able to cut them and provide mulch for their crops, further enhancing the fertility of their soil and the yield of their land. GDP growth is seen in the increased output from agriculture, and can be applied to a wide range of different crops.

A number of other specific options can also provide benefits.

Increasing the use of organic fertiliser by Ugandan small holders is likely to improve the productivity in agriculture, as outlined in the National Fertiliser Strategy (although there will likely be a balance of organic and chemical fertilisers).⁶⁵ Ugandan farmers currently apply an average of less than 1.5 kg/ha of fertiliser, far below the MAAIF 2020 target of 50 kg/ha. Uptake of improved crop varieties is also slow, and progress is in part hampered by inefficient markets. Formal distribution centres will ensure that genuine inputs are available for farmers to use, and that farmers are aware of how these should be applied and maintained.

Cash crop certification for improved agricultural practices (e.g. Rainforest Alliance or UTZ certification) can achieve a premium on world markets and therefore help to raise farmer incomes, while addressing

sustainability and often increasing yields. Provision is also pro-poor, as many of the poorest in Uganda are subsistence farmers who could benefit from increased knowledge of agricultural best practices.

Certification involves costs associated with training and audits. Training takes the form of farmer field schools, as with CSA practices. The training is normally supported by certification bodies or manufacturers looking to source certified goods, which means private investment can be a primary source of finance. Certification is predominantly required in cash crop markets.

As part of a wider effort on irrigation, low-cost technology interventions such as small-scale solar photovoltaic (PV) drip irrigation have high potential, especially in addressing the needs of those without easy access to main infrastructure and most vulnerable to climate change. This reflects a greater focus of NDP II on “type B” land. This scale of irrigation can be powered by stand-alone, off-grid solar technology designed for remote areas. Job creation is small; however, it would be increased if production of systems could be brought within Uganda alongside local training of technical engineers.

Agroforestry presents an opportunity for farmers to supplement their income from food crops with additional income streams, improve soil fertility and reduce soil erosion. Trees or shrubs are grown around or among crops to create more diverse and productive systems. This enhances the long-term sustainability of agricultural land, and increases biodiversity and carbon sequestration. Interventions aim to develop the viability of markets in communities, ensuring inputs and techniques are available and that there is demand for produce once trees are mature. By intercropping with trees, farmers can improve the soil fertility for the long term, and start to replenish some of the forest levels within Uganda.

A potential option (which has not been costed) that is important for green growth is the use of cooperatives. These can improve the functionality of local markets and provide greater access to organic inputs for rural smallholders, establishing localised formal collection and distribution centres. There are a number of promising existing efforts led by the Uganda Co-operative Alliance. Cooperatives and coordinated production can also serve to reduce post-harvest losses. These provide an opportunity to aggregate subsequent agricultural produce from groups of farmers, reducing individual costs.⁶⁶

Quantifying the opportunity for green growth

Agriculture has the ability to improve natural capital, reduce poverty and offer food security. The interventions in Table 7 quantify the potential benefits of green growth in the agriculture sector.

Table 7

Quantifying green growth interventions in the agriculture sector

		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Improved agricultural knowledge (P)	<ul style="list-style-type: none"> Targets 1% of smallholder land (104,000 hectares) per year <p>BAU counterfactual: No improvement in agricultural knowledge and continuation of current traditional agricultural trends</p>	3	3	6	14	8	18	179	179
Improved intercropping (P)	<ul style="list-style-type: none"> Targets 0.5% of smallholder land (52,000 hectares) per year <p>BAU counterfactual: Continued current trends of traditional agriculture without introduction of intercropping with increased soil degradation and low yields</p>	8	6	123	205	167	266	90	90
Soil fertility enhancement (P)	<ul style="list-style-type: none"> Targets 0.25% of smallholder land (26,000 hectares) per year <p>BAU counterfactual: Continued current trends of traditional agriculture without introduction of soil fertility enhancement techniques with increased soil degradation and low yields</p>	39	152	371	1,609	503	2,084	45	45
Increased access to sustainable inputs (organic fertiliser) (P)	<ul style="list-style-type: none"> Targets 1% of land per year, with 26% of land reached by 2040 Benefits come from increased access to fertiliser and benefits of using organic fertiliser <p>BAU counterfactual: Continued current trends of traditional agriculture with increased use of inorganic fertiliser with increased soil degradation and low yields</p>	60	232	111	482	150	624	0	0

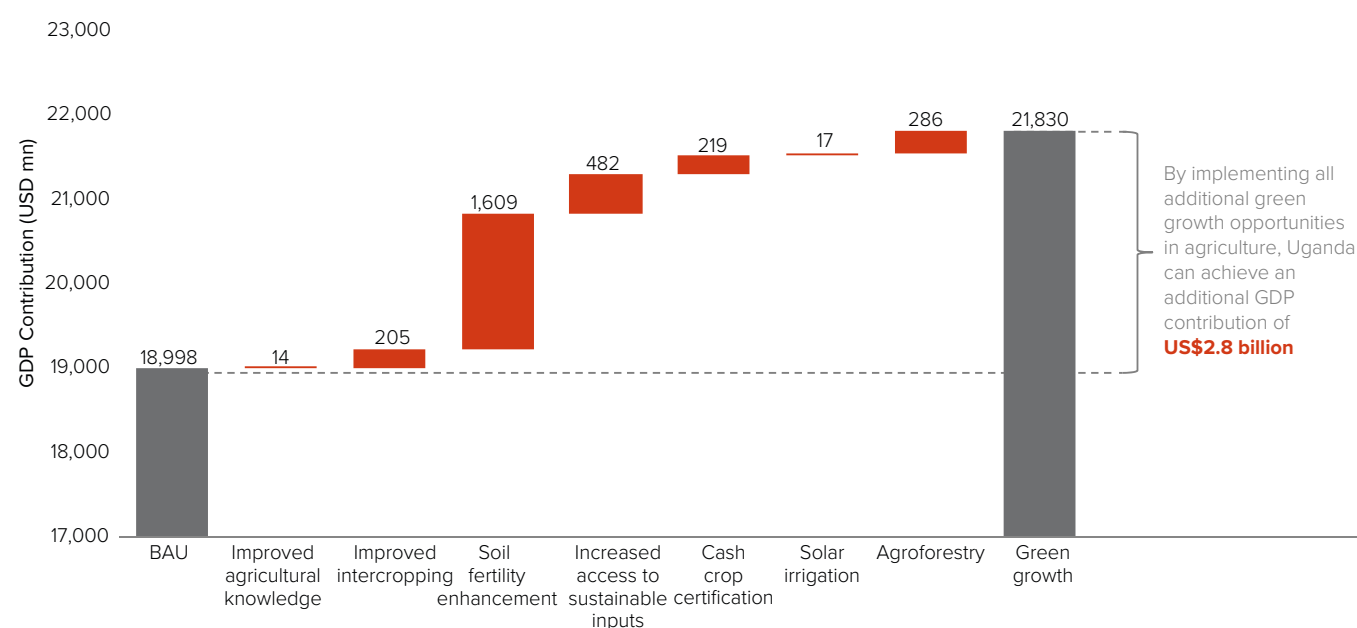
		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Cash crop certification (P)	<ul style="list-style-type: none"> Only applied to the cash crop market 10% of those currently producing cash crops achieve certification BAU counterfactual: Continued sales of cash crops to standard markets without organic certification	118	68	131	219	178	284	224	224
Solar irrigation (N)	<ul style="list-style-type: none"> Targets a total of 82,000 hectares over the period to 2040 Solar displaces diesel generators, reducing carbon emissions BAU counterfactual: Type B land continues to be without irrigation as not addressed in master irrigation plan	2	3	3	17	5	22	6	31
Agroforestry (P)	<ul style="list-style-type: none"> Targets 10,500 hectares of agricultural land per year Increases in direct employment is achieved through a larger market for agroforestry products BAU counterfactual: Continued current trends of traditional agriculture without introduction of agroforestry with increased soil degradation and low yields	37	88	245	286	39	55	657	657

Source: NCE modelling.

Note: The interventions have been assessed according to the extent they appear in NDPII. (E) signifies the inclusion in NDPII and existing policy; (P) signifies partial inclusion in the NDPII and existing policy; and (N) signifies a new opportunity not in existing policy.

Figure 21

Summary of long-term green growth opportunity: annualised net benefit in 2040 (US\$ millions)



Source: NCE modelling.

Energy

Interventions in energy

- Maximise the value of Uganda's renewable energy resources for clean, inclusive and competitive growth.
- Support energy-efficient design standards, and facilitate adoption of energy-friendly technologies and the development of green buildings.
- Use efficient cookstoves to alleviate pressure on biomass resources, reduce costs, reduce air pollution and improve health.

Supporting policy principle

- Increase innovative finance vehicles and financial institutions for sustainable and diversified on- and off-grid energy.

Quantifying green growth outcomes

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.6 billion	\$0.6 billion	-6.7%	0.08 million
2040	\$0.7 billion	\$3.7 billion	-11.4%	0.3 million

Sector context

Energy and electricity demand is growing rapidly in Uganda, but supply reaches a small proportion of the country. The demand for commercial offices, warehouses, retail space and other buildings will see considerable increases with urbanisation. Access to grid electricity is also very low, at 15% nationally and 7% in rural areas, well below the sub-Saharan average.⁶⁷ This means that despite electricity demand growing by an average of 9% a year between 2005 and 2015, energy consumption per capita was among the lowest in the world at 3.7 kWh (kilowatt hour) in 2014.⁶⁸

Energy demand in households and industry is dominated by biomass, but supply is increasingly fragile. Biomass is used for cooking in households and supplies 89% of total energy required in industry. The prediction is that there will be a huge deficit of biomass in the 2020s and beyond, with a plausible loss of 5% to 10% of domestic wood between 2020 and 2050.⁶⁹

Solar and battery-based electricity in off-grid sites is small in absolute terms but important. It provides thousands of remote consumers with affordable, entry-level electricity services. Though actual numbers of off-grid solar PV systems in Uganda are not known, there is an active over-the-counter and private company-driven market in place that includes mobile phone charging and other pico-solar systems.⁷⁰

Current on-grid electricity generation capacity is already largely renewable, with hydroelectric and biomass cogeneration plants contributing 96% of Uganda's electricity portfolio in 2014. Climate change is expected to have an increasing impact on energy sources. Generation from hydropower could potentially decrease due to a reduction in precipitation caused by climate change. Previous instances of droughts have reduced capacity and caused power outages. It has been estimated that the fall in output could be as much as 26% by 2050.

The discovery of oil and gas also presents opportunities for Uganda to reduce its imports and improve its balance of payments, and develop a strong reinvestment strategy (see Box 1 in Chapter 1).

Current plans and targets

Under Vision 2040, the Government of Uganda plans to expand national access to 30% in 2020 and 80% by 2040. The Rural Electrification Strategy and Plan (RESP) includes the Rural Electrification Agency's (REA) plans to *"undertake an aggressive programme that will render low-cost mobile solar PV devices accessible to every rural Ugandan family within the next 20 years"*. Assuming a population of 61.5 million (12 million households) in 2030, an average of 720,000 new connections are needed per year, presenting a huge increase on the current rate of below 100,000 per year.

A range of new renewable energy generation projects are under construction or being planned in the period out to 2020. These include large and small hydro, wind, Solar PV, solar CSP and geothermal as part of the NDP implementation agenda, the national power sector investment plan and the Rural Electrification Strategy.

Constraints to green growth

We have highlighted 5 constraints to green growth.

First, the current legal and regulatory framework and process for licensing and permissions could be strengthened to crowd in investment. There is a need for more support for existing institutions to prepare Environmental Impact Assessments, and a need to address low profitability in the sector and ongoing, ill-defined land tenure rules.

Second, there is limited practical experience of large and small scale renewable energy technologies, with the exception of hydropower. There are opportunities for the manufacturing sector to create auxiliary services and businesses in an area that is currently underdeveloped.

Third, there is a need for enhanced coordination and planning capacity around specific renewables. Acceleration of small scale off-grid solutions presents a major coordination challenge between government, private sector and donors. Green public procurement plans are also low and the government will need enhanced capacity to support energy efficient appliances and awareness campaigns.

Fourth, energy sector projects struggle to be profitable. As a result of high interest rates, which drive up generation costs, Uganda has some of the highest electricity tariffs in the world. This, combined with low access rates, results in a lack of electricity demand and insufficient returns for private sector investments. This is also exacerbated by a lack of small scale, innovative financing models, limiting the uptake of cost-effective energy technologies by rural, household and small businesses. Unaffordable and unreliable electricity constrains new business formation and growth in Uganda, impacting on job creation and poverty reduction.

Fifth, there is limited monitoring and reporting of energy consumption. This presents a barrier to designing and implementing effective policy, as well as to demonstrating the benefits of interventions to encourage further uptake.

Opportunities for green growth

Uganda has abundant renewable energy potential. Given estimates of commercially viable biomass, hydro, solar and geothermal resources, Uganda could position itself as a regional leader with an energy system based wholly on renewable energy sources by 2050. The assumption in the study is that on-grid electricity production remains largely renewable (although risks from climate impacts and water remain important).⁷¹ Therefore, green growth interventions are focused on cookstoves, off-grid renewables and energy efficiency.

Efficient cookstoves⁷² have the potential to impact a large proportion of the Ugandan population who cook and consume energy using biomass. Cookstoves in households and small businesses such as restaurants, bakeries and schools currently use wood and charcoal. Efficient cookstoves and fuels have the potential to reduce deaths from smoke-related illnesses, lower air pollution and mitigate climate change. The efficient cooking programme can replace traditional units after their 2-3-year lifetime with either more efficient stoves that reduce wood energy consumption by up to half, or with LPG or biogas fuelled units that would provide a number of social and environmental benefits.⁷³

There is also opportunity to supplement a focus on the grid with enhanced focus on off-grid renewables, even in cities. This would increase off-grid energy access through PV mini-grids and standalone renewables. Options include solar PV, solar thermal, wind and mini-hydro. Depending on the size of settlement and energy needs, these technologies can be supplied as standalone or connected to mini/micro-grids. Under the green growth pathway, large-scale on-grid solar, hydro and thermal energy projects are supplemented by other technologies, including:

- Mini-grids involve small-scale electricity generation (10 kW to 10 MW), which serve a limited number of consumers via a localised distribution grid.
- Micro-grids are similar to mini-grids but operate at a smaller size and generation capacity (1-10 kW).
- Standalone systems rely on very small individual production and include solar home systems (SHS), pico-hydro systems (PHS), or wind home systems (WHS).

Off-grid energy can be faster to implement because it is generally small-scale and avoids the costs involved in major infrastructure planning and development. It also reduces the transmission and distribution losses associated with grid-based energy and can be cheaper per MW when distribution costs are accounted for. The connection costs on the consumer side of the meter tend to be lower with mini-grids, and there are a range of mobile payment innovations that increase affordability for rural populations.

Alongside expansion of energy supply, management of future energy demand is also an important consideration. Energy efficiency in buildings would best be delivered through standards that reduce growth in electricity consumption in the business sector, or by fiscal measures and incentives that encourage the development of green buildings.⁷⁴ Continued growth in the size of Uganda's economy and population means that the demand for commercial offices, warehouses, retail space and other buildings will see considerable growth over the coming decades.

Household energy efficiency through energy efficient light bulbs (LEDs) and solar thermal heating can target the increased demand for energy as Uganda's population continues to grow. New green value chains could also be created in the installation and maintenance of these technologies; analysis of the global value of the energy efficiency market is shown to be substantial.⁷⁵

Quantifying the opportunity for green growth

These interventions have the potential to greatly improve the productivity of workers and unlock the development of new industries in Uganda. The potential quantified benefits of these interventions are outlined in Table 8.

Table 8

Quantifying green growth interventions in the energy sector

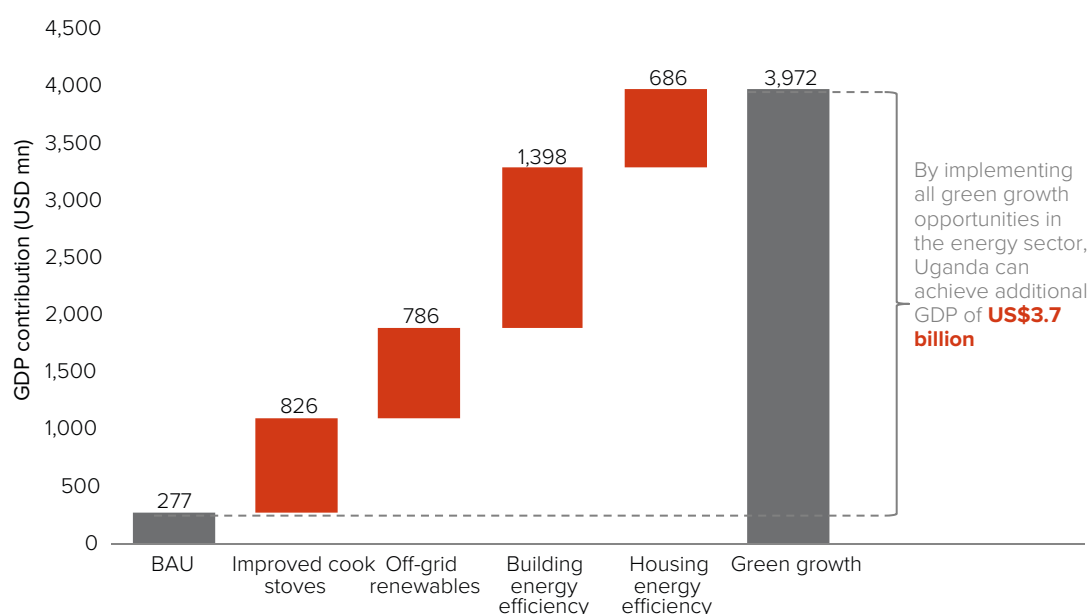
		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Improved cookstoves (P)	<ul style="list-style-type: none"> Target full penetration of charcoal use of 2.890 kilotons (kt) per year⁷⁶ Incremental benefits from annual charcoal savings BAU counterfactual: Higher, more fuel intensive cookstoves used across the country	120	28	295	826	27	49	3,164	8,859
Off-grid renewables (P)	<ul style="list-style-type: none"> 33% added off-grid capacity by 2030⁷⁷ GDP benefit is derived from small businesses and reduced operational costs from switching from on to off-grid BAU counterfactual: Predominantly on-grid renewables to supply electricity across Uganda	235	271	49	786	4	47	0	0
Building energy efficiency (N)	<ul style="list-style-type: none"> 52% improvement in the energy efficiency of all new commercial buildings GDP benefit is derived from savings in energy BAU counterfactual: High energy use and cost in buildings across all urban areas	181	376	156	1,398	28	142	326	2,931
Housing energy efficiency (N)	<ul style="list-style-type: none"> Adopted by 1 million households by 2040 Cost of US\$14.6 million per annum GDP benefit is derived from savings in energy BAU counterfactual: Continuation of current housing energy trends with energy intensive housing	15	17	137	686	24	69	105	523

Source: NCE modelling.

Note: The interventions have been assessed according to the extent they appear in the NDP II. (E) signifies the inclusion in the NDP II and existing policy; (P) signifies partial inclusion in the NDP II and existing policy; and (N) signifies a new opportunity not in existing policy.

Figure 22

Summary of long term green growth opportunity: annualised net benefit in 2040 (US\$ millions)



Source: NCE modelling.

Industry

Interventions in industry

- Promote energy and resource efficiency, which will lower production costs and increase competitiveness.
- Encourage green industrial development through green industrial parks, which provide manufacturing hubs. Businesses can begin to operate more efficiently and collaboratively, with lower environmental impacts.

Supporting policy principle

- Enable easier firm creation and improve the ability of firms to make investments, expand and innovate.
- Invest in skills and capacity to increase the number of Ugandans in high productivity jobs

Quantifying green growth outcomes

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.07 billion	\$0.1 billion	-8.2%	0.02 million
2040	\$0.05 billion	\$0.6 billion	-8.9%	0.03 million

Sector context

Uganda's current industrial growth base is reliant on imported inputs and relatively low value exports. This leaves domestic manufacturers vulnerable to global markets. Strong competition from imported products also puts pressure on domestic producers, which tend to be less efficient.⁷⁸

The bulk of manufacturing firms in Uganda operate on a small scale, employing on average four people. Uganda's industrial sector is characterised by low capacity utilisation, standing at an estimated 50% of installed capacity.⁷⁹ Both the small scale and low capacity of manufacturing in Uganda are concerns. There are clear benefits to a viable manufacturing base in driving private investment and innovation that will also support broader-based growth in other sectors.

Formal businesses suffer from complex regulation that can serve to incentivise informal practices and reduce innovation. To register any business within Uganda, there are 15 procedures that take an average of 32 days to complete. In comparison, in Rwanda, registering a business takes 2 procedures, and can be completed in 2 days.⁸⁰

Uganda is becoming an increasingly attractive destination for foreign investment. FDI inflows into the industrial sector represented 45% of FDI that came into Uganda between 1991 and 2009. This shows the attractiveness of the growth and productivity potential

in Uganda. Accelerating FDI and local private sector investment will continue to improve the business environment within Uganda. According to the World Bank's 'Doing Business' report, Uganda was ranked 122 out of 189 countries in 2016, an improvement from 135 in 2015.⁸¹

Current plans and targets

Uganda's National Industrial Policy aims to build a modern, competitive, and dynamic industrial sector that is fully integrated into domestic, regional and global economies. Strategic priorities in the 5-year National Industrial Sector Strategic Plan include:⁸²

- Exploiting and developing natural resource-based industries.
- Promoting agroprocessing for value addition in niche markets.
- Supporting engineering for capital goods, agricultural implements, construction materials and fabrication operations.
- Developing domestic resource based industries such as petrol, cement and fertilisers using local raw materials where possible.

Constraints to green growth

We highlight the 5 major constraints to industrial development.⁸³

First, a lack of supporting infrastructure is a cross-cutting constraint particularly relevant to manufacturing. As in the agricultural sector, Uganda currently lacks logistical hubs such as dry ports, industrial parks, storage facilities and ancillary services. This slows down the movement of goods, which could drive the expansion of the industrial sector. In addition, intermittent power supply, high electricity tariffs and high fuel costs dampen efficiency and profitability.

Second, lack of domestic heavy transport fuels and poor road conditions further increase the cost of logistics for trade.

Third, finance is hard to access and expensive to service, particularly for the majority of Uganda's small-sized firms. There is a limited support for the micro, small and medium enterprises (MSMEs) that make up the majority of Uganda's industry. Most manufacturing firms are not listed and therefore struggle to raise capital through conventional capital markets.

Fourth, there is a human capital skills gap limiting the potential industries in Uganda. There is a shortage of scientists, engineers and technicians to cascade innovative technologies to industry players across the country. This leads to missed opportunities, low productivity and high costs of hiring expatriate workers.⁸⁴

Fifth, business regulations will aid the formalisation and growth of firms within Uganda. The high degree of informality and low average size of firms directly inhibits growth of the sector. There is a need to better enable new businesses to join the formal market.

Opportunities for green growth

Fundamentally, the development of Uganda's industrial sector must be based on principles of effective industrial policy, which should stem from a sound analytical base and evidence where industrial policy has been shown to be effective.⁸⁵ Part of this sound analytical base is a growing body of research that demonstrates how to unlock a greener industrialisation model in African economies.⁸⁶

For green industrialisation, three distinct areas require attention: first, the "greening" of traditional sectors to ensure efficiency and productivity gains; second, tapping into new, green markets, which should expand as there is a global transition to low carbon; and third, the spatial aspects of industrial development will impact resource use (e.g. the use of industrial parks for agroprocessing will offer different opportunities to the development of urban industry).

In terms of market orientation, the industrial opportunities will likely rely on light manufacturing and agroprocessing using agricultural inputs such as tea, sugarcane and cassava. An import substitution strategy can also drive growth; for example, the construction sector, if boosted by infrastructure investment, has the potential to drive demand for products such as bricks and cement as well as for iron and steel.

There is a trade-off in industry to going green. Typically, industrialisation has, in other countries, used natural resources and relied on being high carbon. However, Uganda must tackle the delivery of its industrialisation priorities while minimising damage to its natural resource base. This can incorporate resource-efficient technologies and practices. The options presented focus on the "greening" of industry. Here, energy efficiency in the industrial sector should serve to reduce production costs and may allow industries to increase gross operating surplus or output.⁸⁷

Traditional industry is water intensive and vulnerable to water availability, which could be negatively impacted by climate change. Water efficiency is a preventative step needed to address future water supply issues. Water demand is likely to outstrip supply as Uganda continues to develop, and this will be exacerbated by the impacts of climate change; total unmet demand could rise from 3.7 MCM/y (million cubic metres per year) to 1,651 MCM/y by 2050 as a result of climate change.⁸⁸ The industry sector can consider low- or no-cost measures, such as staff awareness programmes to improve water efficiency on industrial sites, leading to cost savings and reduced environmental impact.

Alternative fuels in cement processing can support lower carbon growth in the construction sector, which grew 9.6% between 2013-2014. This is currently largely reliant on burning costly, GHG-intensive diesel oil in generators. An opportunity exists in cement processing to use waste materials for energy generation. This will improve waste management in areas while also reducing exposure to price fluctuations of fossil fuels and lowering GHGs.

Industrial parks are an important strand of industrialisation. Networks of manufacturing and service businesses create economic hubs, while also improving the ability of firms to collaborate in addressing environmental and resource issues so they can be “green”. This intervention marries with the Government of Uganda’s target of a minimum of 22 industrial parks and 15 green industrial parks, at an investment of US\$9.15 million per park.

Quantifying the opportunity for green growth

Industrialisation can materially increase GDP growth and labour productivity within Uganda. The potential quantified benefits of these interventions are outlined in Table 9.

Photo credit: Flickr/USAID



Table 9

Quantifying green growth interventions in the industry sector

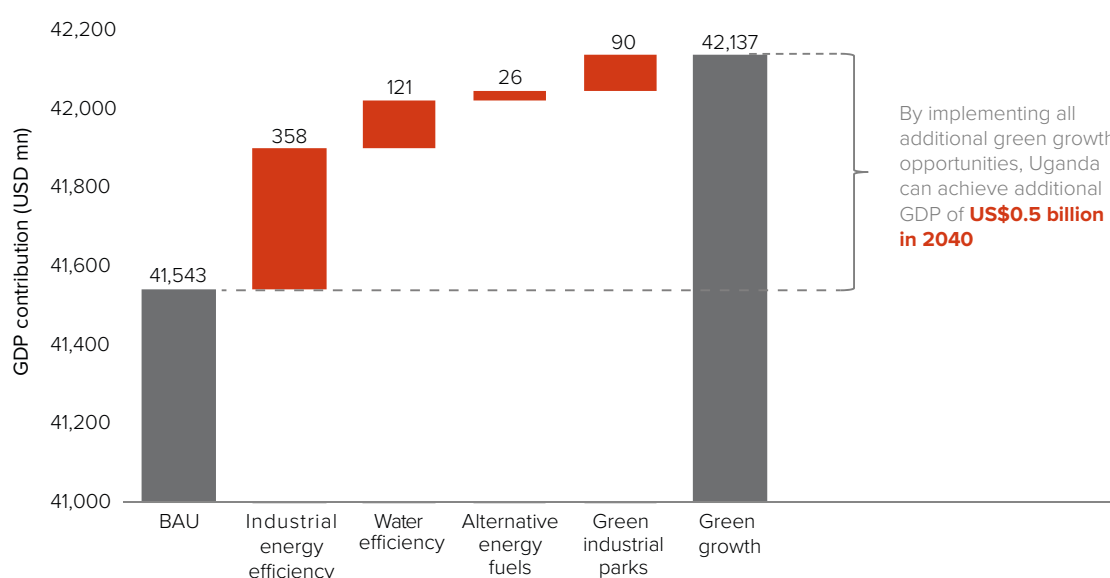
		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Industrial energy efficiency (P)	<ul style="list-style-type: none"> Scaling based on increases in industrial energy demand tracking industrial sector growth rates Energy efficiency savings to reach 20% by 2040 BAU counterfactual: Energy and resource intensive in equipment use and processing, and use of heavy oil fuel for energy supply	2	20	35	358	6	19	51	528
Water efficiency (E)	<ul style="list-style-type: none"> Benefits are accrued by saving an average of 30% of water BAU counterfactual: Water intensive processes in industrial development	1	6	20	121	3	7	0	0
Alternative cement fuels (N)	<ul style="list-style-type: none"> Benefit comes through the revenue seen by the alternative cement producers and GHGs saved by a more climate friendly production technique BAU counterfactual: Conventional cement fuels used for industrial development	4	4	8	26	1	1	616	1,995
Green industrial parks (N)	<ul style="list-style-type: none"> 15 industrial parks being created by 2040 GDP benefits from reduced energy use BAU counterfactual: Traditional industrial parks with resource and energy intensive usage	66	22	48	90	8	5	3,752	7,035

Source: NCE modelling.

Note: The interventions have been assessed according to the extent they appear in the NDPII. (E) signifies the inclusion in the NDPII and existing policy; (P) signifies partial inclusion in the NDPII and existing policy; and (N) signifies a new opportunity not in existing policy.

Figure 23

Summary of long-term green growth opportunity: annualised net benefit in 2040 (US\$ millions)



Source: NCE modelling.

Cities




Interventions in cities

- Invest in developing the capabilities for integrated urban planning at the national and city level.
- Accelerate identified investments in priority urban infrastructure including the Standard Gauge Railway, extending the bus network, introducing Bus Rapid Transport in Kampala and eventually other secondary cities.

Supporting policy principle

- Continue to devolve authority to encourage tailored city and town solutions.
- Early, integrated planning will reap the potential benefits of better urban development.
- Integrating spatial planning into the national development planning framework

Quantifying green growth outcomes

	 Investment	 GDP contribution	 GHG impact	 Jobs impact
2020	\$0.3 billion	\$0.9 billion	-2.2%	1.0 million
2040	\$0.6 billion	\$2.8 billion	-1.1%	3.4 million

This section provides an overview of green growth opportunities at the city level. However, these investments should be seen in the context of supporting the development of a “national system of cities” which is more compact, connected and coordinated. This includes not only considering how to plan, design and invest in specific cities, but also how to connect these different urban centres across the country as part of a unified economic development strategy. This broader picture of Uganda’s future urban transition is covered further in the next chapter, which summarises a separate background paper to this report.⁸⁹

Sector context

Uganda’s urban population is highly concentrated in Kampala. The city is experiencing the highest urban growth pressure of anywhere in the country, driven by rural-urban migration. The urban population doubled in a decade, from 1.65 million in 1991 to 3 million in 2002 (the total population of Uganda in 2002 was 24.2 million).⁹⁰ The Greater Kampala area has a daytime population of about 3.5 million, rising at the rate of about 5% per annum. At this growth rate, pressure is being exerted on the existing unregulated public transport system, which is characterised by high and fluctuating fares as well as slow and unreliable transportation with unfixed routes.⁹¹

Box 4

Waste management⁹²

Within urban areas, poor waste management practices already exist and are commonplace. This is exacerbated by unprecedented amounts of waste from urbanisation that puts pressure on local authorities. Integrated solid waste management interventions are necessary to build the national capacity for proper waste management schemes and policy. These focus on preventing waste generation in the first place.

An important intervention is the establishment of recycling industries and the related provision of jobs, which draw in youths and women who are currently collecting recyclable items in conditions that expose them to health hazards. There is a national objective to ensure 100% of urban areas have solid waste recycling systems and implement sorting at household level. By 2050, all types of generated solid wastes should be collected, reused, recycled and treated by modern, environmentally-friendly technologies, and the land filled waste will be minimised. The National Environment Management Authority is coordinating a solid waste management composting project in 12 municipalities.

Another option is to develop a multi-function waste management facility. This can integrate a range of technologies, including a waste-to-energy (WtE) plant, a modern sanitary landfill, a material sorting facility, a bottom ash processing and recovery installation, along with anaerobic digestion plants producing compost from organic waste. These technologies, implemented together, will reduce GHG emissions and encourage economic activity around industries based on recycled products. This hi-tech development will also generate employment, reduce health and safety issues around scavenging for recycled materials.

Accompanying this urbanisation trend are issues such as congestion, overcrowding, pollution and sprawl. Uganda does not currently have large enough supporting secondary cities that can take the pressure off Kampala. The next most populous cities are Mbarara, Mbale and Gulu.

There is a lack of good quality national, regional and city-level transport options. The infrastructure deficit is evident through international trade barriers, weak inter-city connections and strained municipal road and public transit arrangements.⁹³

There is also a severe housing shortage across Uganda, with a deficit of around 1.6 million dwellings. The typical low-income housing unit in Uganda is a temporary, one-room unserviced structure built from timber and corrugated iron. These houses are unsafe and lack basic sanitation.⁹⁴

Urban areas have lower rates of poverty and higher consumption levels in comparison with rural areas. Positive spillovers are evident in rural areas closer to big cities.⁹⁵

Current plans and targets

The Ministry of Lands, Housing and Urban Development has launched the draft National Urban Policy (NUP) in 2013. The plan is currently awaiting approval by parliament, and a detailed implementation framework has yet to be developed. There are a number of additional policies and regulations influencing the urban agenda, which set out the approach to city-level and broader land use planning. These include:

- The National Land Use Policy
- The Uganda National Land Policy
- The National Land Policy Implementation Action Plan
- The Physical Planning Act
- The Uganda Land Act
- The Local Government Act
- The Kampala Capital City Authority (KCCA) Strategic Plan
- The KCCA Act
- The Kampala Climate Change Action Plan

Constraints to green growth

There are three main constraints at the city level.⁹⁶

First, investment levels in transport and logistics struggle to keep pace with the demand from economic actors and the population. For example, Kampala frequently experiences severe congestion with a high incidence of traffic accidents.

Second, a lack of clear property rights in Uganda has removed a large proportion of land from the market. The current system has resulted in poorly functioning land markets, which prevent land consolidation and allocation. This has negative effects in business competitiveness and urban infrastructure investment in cities; coupled with the housing shortage, this has pushed house prices up.

Third, there is also a need for enhanced capacity for managing urban planning and projects. This would strengthen infrastructure planning processes, and allow for the design of effective planning regulations. Highly centralised decision making on the selection and preparation of nationally significant projects can also hinder infrastructure development in Uganda. In addition, given the complex nature of urban projects, covering many different types of infrastructure, there is a need for coordinated project feasibility assessments and a prioritisation process. The absence of these can lead to delays and poor quality implementation. This is particularly true in Kampala, where KCCA's mandate requires large coordination with existing bodies for urban and infrastructure development.

A fuller assessment of constraints is provided in the next chapter.

Opportunities for green growth

Integrated urban planning is fundamental to the successful implementation of urban interventions. It will aid the development of compact, connected cities. This, in turn, will enable economic and social activity to be concentrated, creating dynamic markets and reducing the unit cost of service delivery. To date, economic growth and city development in Uganda has tended to lack internal connection and planning cohesion that enables the efficient movement of people and goods. This results in increasing distance between people and work, and increasing cost of service delivery.⁹⁷

Through integrated urban planning, the following 7 infrastructure investments are important for green growth:

First, an extensive and well-serviced public transport system ensures access to basic services. It can also help to integrate the peri-urban communities in growing cities. An improved bus system can meet the mobility needs of a rapidly growing urban area and displace car use, which has a positive impact on pollution and energy demand. Clean, or electric buses can be introduced to Kampala and other growing cities when there is sufficient population density and agglomeration effects, to function alongside existing *matatu* networks. Larger buses can provide greater speeds and safety where there is high demand, thereby relieving congestion in Kampala. Complementary approaches to improve roadways and traffic management practices can further increase the benefits.

Second, once a network of buses has been introduced, a BRT system can improve mobility through the provision of segregated right-of-way infrastructure in urban areas, with rapid and frequent operations. This serves to incentivise bus use (displacing private vehicles) and can reduce travel times for passengers, reducing congestion, traffic fatalities, with additional positive environmental impacts. It is also in line with the country's NDPs, the Kampala City Council's vision and other policies to improve sustainable transportation infrastructure. Availability of a BRT system can also help increase coverage and access to other forms of public transport.

Third, an LRT system implemented in Kampala should provide greater accessibility to the Greater Kampala Metropolitan area. It will link the central business district with neighbouring Wakiso, Mukono and Mpigi districts.

Fourth, in terms of inter city transport, a SGR with high capacity will link Uganda to other East African countries, while also enhancing effective trade logistics and regional competitiveness. The SGR network will link Kampala to the port of Mombasa in Kenya, as well as Rwanda and the Democratic Republic of Congo. There will also be a link from Bukasa port on Lake Victoria to Musoma (Tanzania) and Kisumu (Kenya), linking to Tanzania and Kenya railway networks respectively. A high speed rail can reduce costs of moving goods within and outside of the country, making trade easier and more competitive. The SGR railway is estimated to require high upfront investment, but will result in large positive GDP impact in the long run. Our analysis indicates that GHG emissions will reduce as a result of displaced freight cargo transported by road to rail. The goal is for 80% of freight cargo to be transported via rail by 2040.

Fifth, flood risk management is required for Kampala (and also a host of other flood-prone cities such as Soroti and Katakwi), which is built on former wetlands and swampy ground. Flooding is a concern for its residents, which disproportionately affects the urban poor who live in flood-prone areas. Climate change is expected to aggravate these flooding problems. Effective flood risk management will require continued focus on Uganda's water sector, and on dam safety and reservoir regulation instruments, equipment for flood prevention, and the development of early warning systems and reservoir operation.

Sixth, bio methane fuel from landfill gas generated from unlined and uncapped urban landfills, could significantly reduce GHGs in providing fuel for vehicles. This will also lead to economic benefits since locally produced fuels boost stability in fuel supply, meaning lower prices at the pump. There is high potential to scale this intervention, particularly on new landfill gas sites, which will be required as the population grows. There are also wider opportunities from using waste for energy, and practices for waste management and there are some promising projects underway in Uganda, though these are yet to be quantified (see Box 4).⁹⁸

Finally, more fuel efficient vehicles can be achieved through vehicle emissions standards that ensure new cars on the road are less polluting and have high potential to reduce GHGs. Uganda's ageing vehicle fleet is a significant contributor to GHG emissions, and this also leads to localised air pollution. Updating vehicle emissions standards in the form of a tax or incentive policy could improve urban air quality while also generating end-user benefits in the form of fuel cost savings.

Quantifying the opportunity for green growth

The city interventions that will enable Uganda to unlock future green growth benefits are outlined in Table 10.

Photo credit: Flickr/US Army Africa



Table 10

Quantifying green growth interventions in cities

		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Bus network (P)	<ul style="list-style-type: none"> Implemented across major cities in Uganda, starting in Kampala immediately and as other major cities grow in size 3% urban population use buses as primary modes of transport BAU counterfactual: No sustainable public transport option in cities with high rates of private vehicle use	153	211	312	1,561	33	102	3	15
Bus rapid transport (E)	<ul style="list-style-type: none"> BRT system will be introduced in Kampala in 2020 3 strategic secondary cities (Mbarara, Mbale and Gulu) will also begin planning for BRT systems towards 2040 BAU counterfactual: No sustainable public transport option in cities with high rates of private vehicle use	14	25	7	58	1	4	224	2,180
Light rail transit (E)	<ul style="list-style-type: none"> LRT will be implemented in 2025 in Kampala, reaching the greater metropolitan population of approximately 6 million by 2040 BAU counterfactual: No sustainable public transport option in cities with high rates of private vehicle use	0	99	0	229	0	15	0	115
Standard gauge railway (E)	<ul style="list-style-type: none"> Full implementation of all planned SGR lines GDP benefits from time and cost savings on goods transported BAU counterfactual: Heavy reliance of road instead of rail for national passenger and freight transport	749	288	961	1,601	103	105	16	321

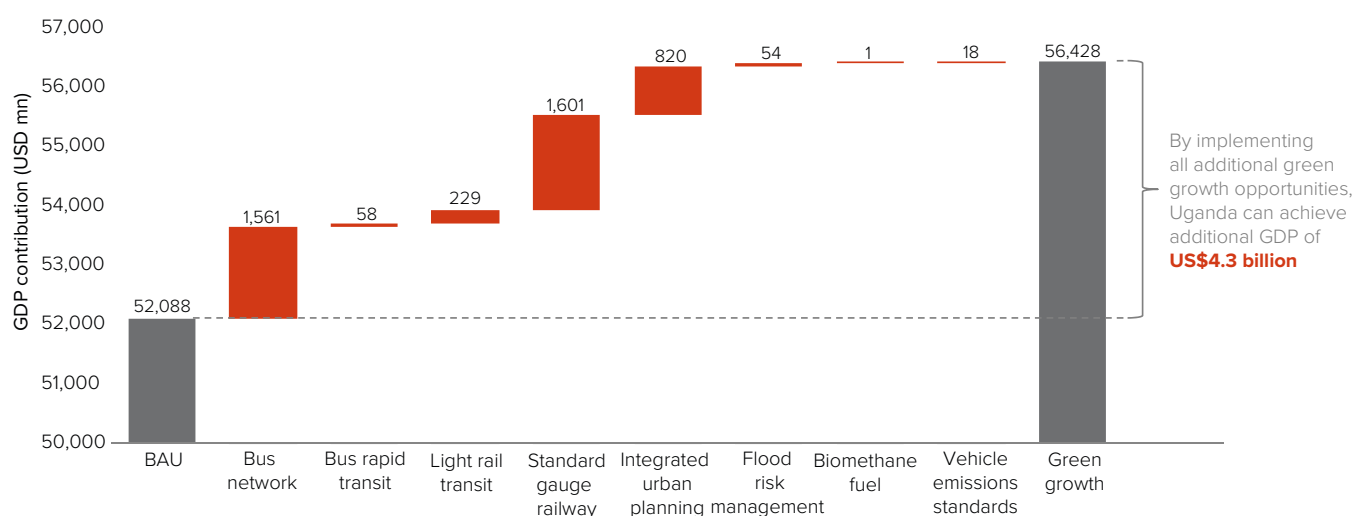
		Cumulative investment (US\$ millions, 2015)		Annualised net benefit (US\$ millions, 2015)		Number of jobs (thousands)		GHG emissions savings (ktCO ₂ e)	
Intervention	Assumptions	2020	2040	2020	2040	2020	2040	2020	2040
Integrated urban planning (P)	<ul style="list-style-type: none"> Reduction of sprawl can decrease the distance between people and work and decrease the cost of service delivery GHG savings of 30% BAU counterfactual: Inefficient land use leading to sprawl and congestion in major cities	17	16	377	820	40	54	1,303	4,422
Flood risk management (P)	<ul style="list-style-type: none"> Infrastructure-related interventions to mitigate flood risk, including sustainable building codes, climate proofing paved roads and railroads, and water catchment protection BAU counterfactual: No investments in infrastructure-related flood risk mitigation	27	27	23	54	4	5	0	0
Biomethane fuel (N)	<ul style="list-style-type: none"> Use of biomethane leads to a 23% reduction of GHG emissions compared to conventional fuels 3 urban areas are of suitable scale to build a biomethane plant over a landfill and infrastructure required for use as transport fuel BAU counterfactual: Continued use of conventional fuels	1	0	1	1	0	0	250	250
Vehicle emissions standards (E)	<ul style="list-style-type: none"> New vehicles comply with the emissions standards Replaced proportion of total passenger fleet grows from 1% in the year to 10% in the 20th year BAU counterfactual: No change in vehicle regulation to lower emissions standards	1	0	7	18	3	5	13	35

Source: NCE modelling.

Note: The interventions have been assessed according to the extent they appear in the NDPII. (E) signifies the inclusion in the NDPII and existing policy; (P) signifies partial inclusion in the NDPII and existing policy; and (N) signifies a new opportunity not in existing policy.

Figure 24

Summary of long-term green growth opportunity: annualised net benefit in 2040 (US\$ millions)



Source: NCE modelling.



CHAPTER 4

Managing Uganda's Urbanisation

Making the most of green growth opportunities in the urbanisation transition will be important to Uganda's development trajectory. This chapter builds on the catalytic urban-related investments identified in the last chapter to offer a wider explanation of the national opportunity of well-planned and managed urbanisation in Uganda. Further detail on the opportunity presented by urbanisation in Uganda can be found in the accompanying technical working paper.

Most of Uganda's cities and infrastructure is yet to be built. There is an opportunity now to shape it. Taking into account the existing challenges and constraints of Uganda's urban context, this chapter sets out a spatial framework for compact and connected urban growth, and the guiding principles for more sustainable and productive cities.⁹⁹

A diagnostic of Uganda's urbanisation opportunities and constraints

The last chapter touched on three constraints holding back cities (lack of investment, land policy, and lack of integrated planning). In this chapter, we expand on this to look at a number of other major cross-cutting factors impacting urban areas. Uganda is a compact and landlocked country. This affects its ability to competitively access international trading markets for high volume goods (which are typically delivered through ground transport). Uganda is, however, well positioned to trade with other nations in East Africa. If Uganda can capitalise on its central and strategic regional location on the Northern Corridor by connecting with its neighbours (Rwanda, Kenya, Tanzania, South Sudan, and the DRC) then there is great potential for East African economic integration.

Without effective planning and management, the urbanisation transition is likely to be reactive to the challenges that are starting to emerge. In Uganda, what has been observed is urbanisation but without accompanying productivity increases (including in wage growth and increases in formal employment). Without well planned and proactive policy, this could result in a range of costly and intractable challenges that will act as a drag on growth and prosperity. In particular, the need to manage the informal economy will be an ongoing challenge.¹⁰⁰ An assessment of Uganda's urban situation revealed the following constraints:¹⁰¹

- Lack of strategy linking economic functions with the future direction of Uganda's spatial development and urban structure.
- Lack of a national infrastructure plan to coordinate and prioritise specific investment for development and urban challenges.
- Overreliance on Kampala as the only major city and the focus for the majority of economic activity.
- Underdeveloped secondary cities with low competitiveness and specialisation, limiting the opportunities for rural populations to benefit from economic growth driven by cities; a need for enhanced links with rural areas.
- Low connectivity between cities and markets due to limited national infrastructure investments, hindering trade potential.
- Rapidly increasing private vehicle use causing congestion in Kampala; a need for further public transport options.
- Limited urban land acquisition, along with limited capture of development and value constraining the ability of municipal bodies and regional government to steer and shape urban growth.¹⁰²
- Increased demand for housing and other basic services which negatively impact the urban poor.
- Majority of urban economic activity in the low-productivity, "non-tradable" service sector, predominantly in the informal economy.

Better urbanisation: compact, connected and coordinated growth in Uganda

Given the long lifetime of cities, a small number of decisions over the next five to ten years will positively shape and lock in Uganda's urban future for the decades to come.

The opportunity for Uganda is to act early and avoid locking in unplanned urban sprawl that leads to huge legacy infrastructure costs.

In its inaugural 2014 report, The Global Commission on the Economy and Climate set out a '3Cs' model for sustainable urban growth to address challenges faced by many countries across the world.¹⁰³ It suggested that cities will perform best (see Box 5) when incorporating elements of:

- **Compact** urban growth: through managed expansion and/or urban retrofitting that encourages higher densities, socially mixed neighbourhoods, walkable and human-scale local urban environments, the redevelopment of existing brownfield sites, and provision of green spaces.
- **Connected** infrastructure: through investment in innovative urban infrastructure and technology such as BRT, cycle superhighways, electric vehicles, smart grids, energy-efficient buildings and essential water, sanitation and waste services.
- **Coordinated** governance: through effective and accountable institutions to support the coordinated planning and implementation of urban development programmes. These programmes involve activity and investment across public and private sectors and civil society, particularly for land-use change and transport.

Building on the global evidence, our report explores the following three questions for Uganda's urbanisation challenge:

- How do the 3Cs apply to national scale planning in Uganda? This takes into account the economic geography of the country, clusters, economic corridors and urban hierarchy, rather than only focusing on the form and function of existing cities.
- How can Uganda, as a landlocked country, best exploit the 3Cs model to facilitate green growth, trade and regional integration?
- What are the most important decisions to prioritise, which lock in long-term potential for compact and connected urban development within, and between cities in Uganda?

Box 5

The benefits of compact, connected urban development¹⁰⁴

International evidence suggests the following net benefits associated with more compact, connected urban growth:

- Infrastructure unit costs are 30-50% lower due to better asset utilisation and shorter transmission lengths.
- Compact growth can provide the necessary demand for mass transit and connective infrastructure that enables citizens and firms to move rapidly, while lowering barriers to trade goods and services.
- National level urbanisation, and particularly compact urbanisation, improves labour-land ratios in rural areas. This can encourage commercial agriculture development, allowing incomes to converge.
- It can support low-carbon development due to reduced private vehicle use, increased viability of public transport and lower construction materials and building energy use.
- Unit housing costs have been shown to be 8% lower when optimal density units are constructed.
- Economies of scale in social infrastructure service delivery of healthcare and education. The delivery of these can enable more socially inclusive and gender equitable access to services.
- Improved accessibility, investment and scale-up potential for MSMEs by co-locating business inputs to benefit from agglomeration economies.
- Resilient development model with a compact and high-density urban footprint increases shading, reducing overheating and exposure to natural hazards.

A comparative analysis of the compact and connected patterns of urbanisation

Using the 3Cs model, two scenarios for Uganda have been constructed using a current, ‘dispersed’ projection and an alternative compact and connected projection of future urban demand. The dispersed growth scenario shows a realistic projection of a BAU spatial growth broadly expected under NDPII implementation. The compact and connected urban growth scenario includes dedicated government policy to encourage targeted consolidation along economic corridors combined with strategic growth “poles” linked to economic infrastructure investments such as road building.

Spatial analysis, using a district-level Geographic Information System (GIS) model linked to macroeconomic data, has been used to provide a measure of “urban demand” across 112 districts in Uganda. The economic output data from the MAMS model used in the wider green growth analysis is disaggregated by sector and split by districts to show how economic activity will play out spatially. This is used to measure urban and infrastructure demand by combining economic activity with population, natural resources and existing infrastructure (around 20 layers of data were used to build up a picture).

The analysis builds up these economic, demographic, environmental and natural resource data layers into a “final urban demand” output. This demonstrates where urban development is most likely to occur and be required in the future, under both scenarios.

The dispersed urban growth scenario

Under the dispersed urban growth scenario, it is assumed that the secondary cities identified in the NDPII and Vision 2040 will all grow at the same historical rate, with Kampala growing at a faster rate building on existing agglomeration effects and continuing to be the single dominant urban area in Uganda in 2040. The main features of the dispersed urban growth scenario:

- Kampala contains the most competitive businesses and universities attracting a large proportion of foreign investment.
- Kampala provides a huge draw for job seekers from across the country.

- Rapid rural-urban migration to Kampala contributes to sprawl in informal settlements as infrastructure such as housing and roads struggle to keep up.
- Kampala’s role as the primary city is encouraged, with the capital likely to perform all national government, commercial and industrial functions.
- A large number of secondary cities emerge, but all perform similar functions with low-productivity activity and without specialisation, therefore failing to release pressure on Kampala.
- High and unsustainable infrastructure costs because of the need to service a large dispersed population across numerous secondary cities.
- Inequality likely to be exacerbated within the country between rural-urban populations.
- High consumption, emissions and pollution due to sprawl, additional transport needs, private vehicle use, less efficient freight and production networks, and larger requirement for road building.

The scenario is depicted in Figure 25 with the underlying urban demand annotated with the expected infrastructure investments. The dispersed urban growth scenario represents a “reactive approach” to urbanisation, using isolated local drivers for informing investment decisions rather than long-term integrated strategic planning (which was highlighted as an intervention in the previous chapter). This will result in three problematic issues, which are already beginning to manifest themselves:

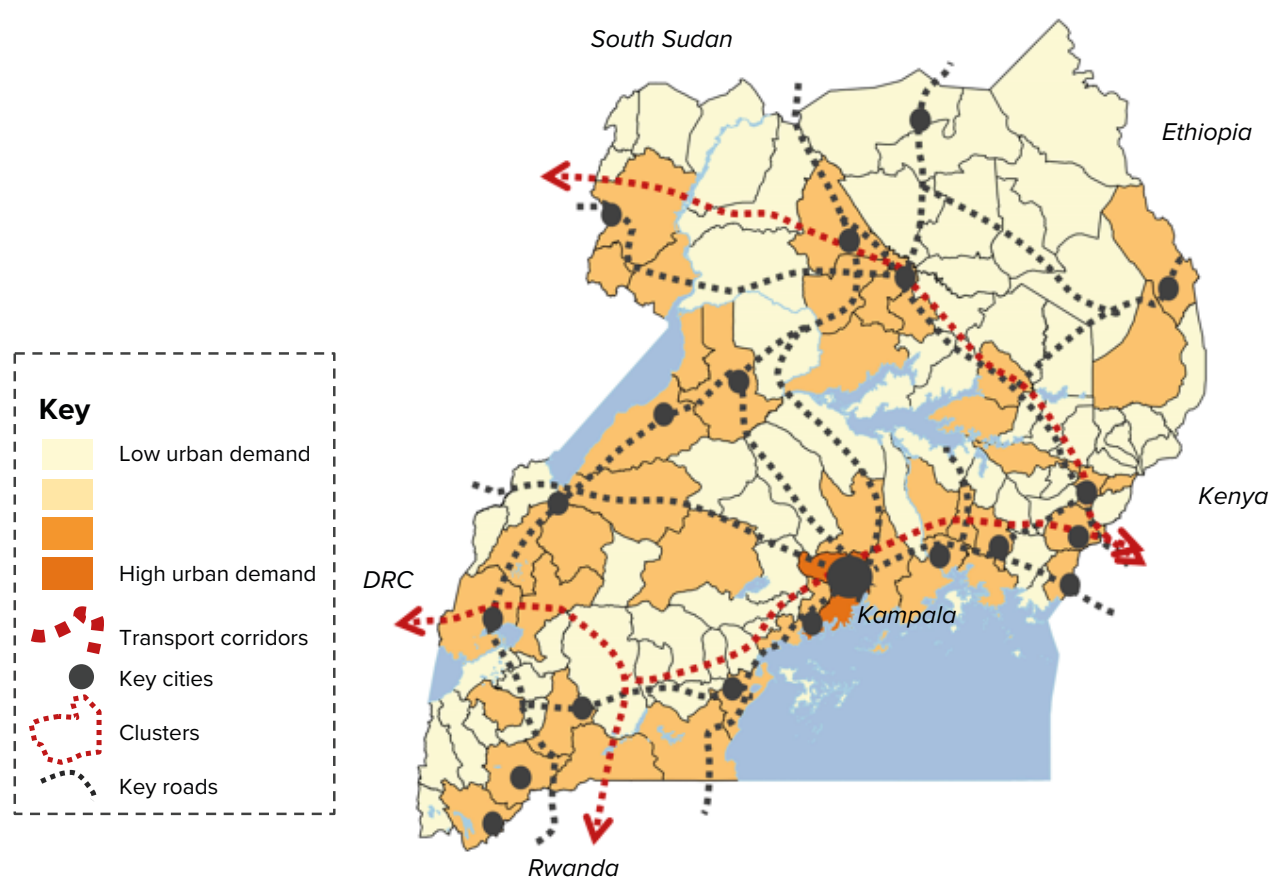
First, individual cities and the system of cities is less coherent and less competitive. Fewer and low-capacity regional connections are made, which reduces trade volumes and increases the cost of transporting goods to neighbouring countries.

Second, greater investment in infrastructure and services is required to connect urban centres and locations for industrial and trade activity. As a result, economic activity and transport and logistics is dispersed and these infrastructure investments are underutilised. They become difficult to finance and create a cost burden for government.

Third, sprawl within cities results in more private vehicle use, resulting in congestion and air quality costs and impacts.

Figure 25

A dispersed future urban growth scenario for Uganda



Source: NCE modelling.

The compact and connected urban growth scenario

So does a better alternative exist for Uganda? The analysis of urban demand that is compact and connected suggests that one does. With an urban population concentrated into a smaller number of larger cities and economic corridors, there is the potential to reduce the infrastructure cost and delivery needs and increase access to basic and added value services, while reducing environmental impacts (such as land conversion, air quality and GHG emissions).

The recommended spatial strategy builds on the following four principles to drive better patterns of urbanisation in Uganda:

- 1. Regional integration:** Uganda's major national and regional trade infrastructure linkages are enhanced and prioritised, as essential components of its competitiveness and economic strategy. This will include a fast and efficient network of transport corridors developed to link Kampala to secondary cities, supported by rail and other transport infrastructure.
- 2. Economic densification:** Regions of Uganda that display strong growth potential are focused into regional clusters or corridors that enhance this potential through agglomeration effect, and improved efficiency of infrastructure.
- 3. Focused secondary city development:** Uganda's rapid development in the Northern Corridor offers a counterbalance to the pressure on Kampala. This enhances competitiveness but also serves to release pressure on Kampala and the surrounding areas. A network of strategic secondary cities and economic corridors and clusters can provide an alternative to Kampala. It is assumed that dedicated secondary cities and their surrounding "economic corridors" will have higher growth rates and develop to form larger regional hubs across the country, which will allow for the consolidated economic activities.
- 4. Special treatment of Kampala:** The capital city is required to play a regional and international role. To continue growing and building on the necessary competitiveness to fulfil this important role, Uganda will need to review Kampala's national

economic functions, reform its governance and adopt new and integrated expansion and planning measures, including the potential for creating a number of different “centres” to release pressures on areas like central Kampala. Kampala should retain national and political administrative duties and remain the largest urban area in the country, but be relieved of the negative pressure from which it is beginning to suffer.

Benefits of the compact and connected urban growth scenario

The compact and connected urban growth scenario offers a number of benefits. These include:

- Accelerated growth via agglomeration effects and economies of scale from the co-location of firms, talent and markets.
- High levels of intra- and inter-city connectivity through the co-location of social and economic activities.
- A green growth development model that reduces resource and environmental impacts due to a higher-density urban footprint that complements public transport. This reduces urban sprawl and the direct impacts on the natural environment by limiting development to pre-defined areas that are compatible with supporting urban populations and intensities.

These benefits are compounded by two issues, which will be explored in turn:

1. Access to services as measured by proximity to a major urban centre. The compact, connected urban growth scenario allows more effective distribution of social infrastructure and services such as healthcare and education.
2. Assessment of the comparative overall unit cost of infrastructure. The compact and connected urban growth scenario lowers the costs of urban investment and management by making better use of space, transport, utilities and public services.

Through the analytical approach described above, it is possible to quantify these two benefits. The “access to services” analysis combines the underlying district-level urban demand with travel time “halos” mapped across large and smaller cities (referred in the literature as Tier 1 and Tier 2 cities). The analysis is clear that in the 2040 compact and connected scenario, over a third more Ugandans will live within a reasonable travel time of high-value public and urban services.

A comparison of the scenarios shows that the dispersed urban growth scenario has a significantly higher number of secondary cities, representing the organic nature of the outcome from unplanned and uncoordinated urban growth. This results in a need to spread government effort in providing services across the country, resulting in a lower level of quality of service provision per capita and a higher cost of provision.

Under the compact and connected urban growth scenario, Uganda would strategically encourage high growth of Mbale, Mbarara and Gulu so they take on characteristics of top-tier cities by 2040. This would relieve the pressure on Kampala and help it grow more sustainably. Larger urban areas are assumed to be able to provide a wider range of social, economic and infrastructure services to the population that they support. These “tertiary” services include complex health services, higher education and training, a more diverse market and business environment, access to national or regional governance functions and cultural services. If Kampala remains the only top-tier city in Uganda, then much of the country’s population will not have access to these tertiary services. As larger cities develop, they become the focal point for investment and development of the industrial and service sectors. They also agglomerate top-tier medical and education facilities. Equitable access to these facilities supports more balanced and inclusive development, even if they are not needed on a regular basis.

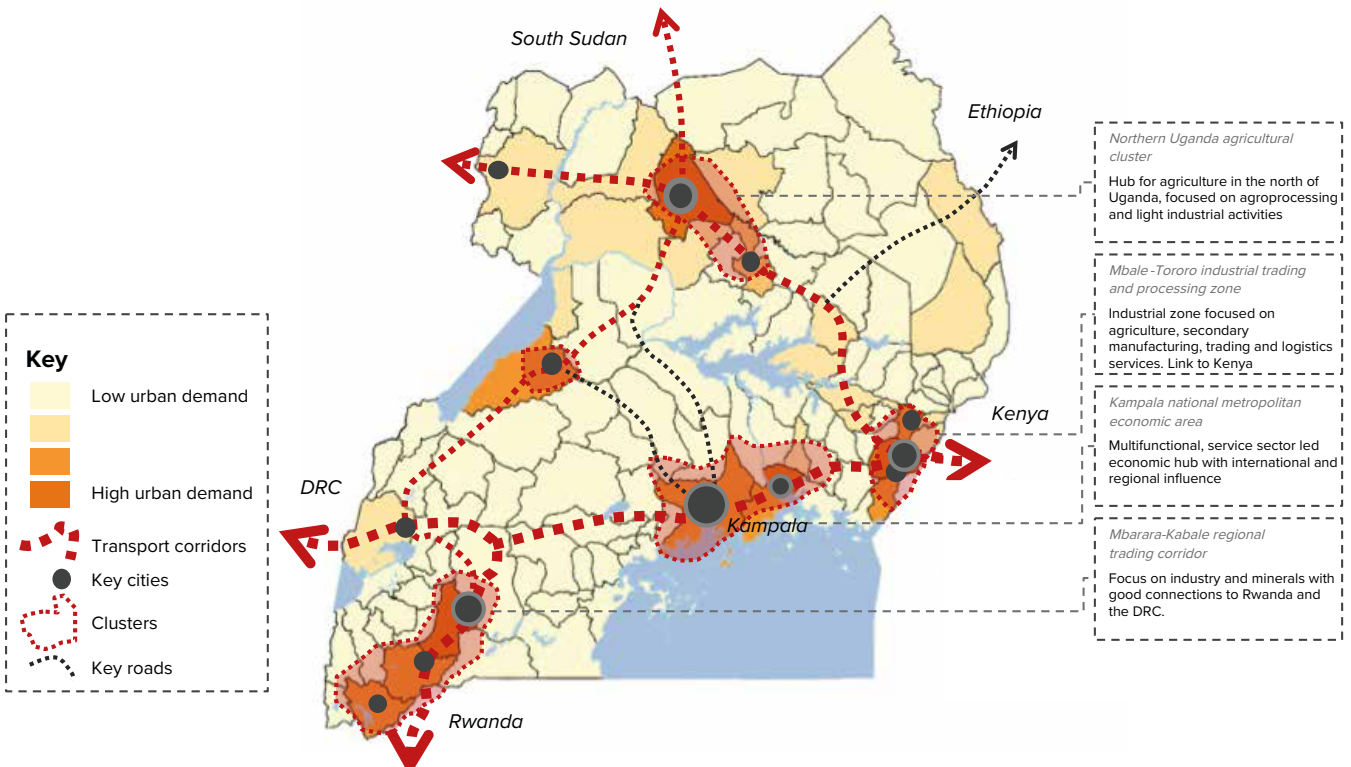
As a result of higher levels of economic densification and greater regional integration, a compact and connected urban growth scenario will spread out the development of Uganda’s core functions into a greater number of large cities, rather than concentrating only on Kampala. The compact and connected scenario creates more balanced and accessible growth, with 65% of the population having access to a major urban centre, compared to only 33% coverage with dispersed growth.

In addition, it is estimated that compact development could result in an 11% reduction in future capital infrastructure costs. Calculations estimating future population density under the compact and connected growth scenario shows better matching between areas with a high supply of capital infrastructure and high density population. The cost reduction is achieved because there is a greater proportion of better planned, higher density areas, which has the effect of reducing the unit cost of infrastructure provision (because it is better utilised in compact areas).¹⁰⁵

Since compact and connected national urban planning leads to higher population coverage in urban areas, the case for investing in these places is more financially attractive for private investment. Therefore, it should be easier to attract and harness external financing for infrastructure projects where demand and supply are better aligned.

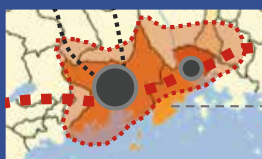
The compact and connected development scenario is presented in Figure 26 and Box 6.

Figure 26
A future compact urban growth scenario for Uganda



Source: NCE modelling.

Potential regional clusters



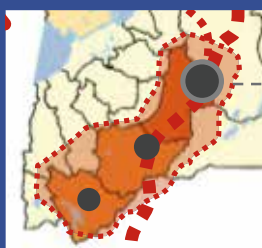
Kampala national metropolitan area

Overview: Establishment of an urban cluster centered on Kampala, building on its current dominant status as core urban centre in Uganda and continuing its role as a regional centre in East Africa.

Core cities and towns: Comprised of the Kampala metropolitan area, including the growing cities of Jinja, Entebbe and Mukono.

Economic focus: It will be the country's most competitive area, focusing primarily high value-added services sector activity in the central Kampala region, with some industrial and manufacturing sector activity, with an emphasis on government and public services.

Function of economic corridor: Pivotal connecting node between the east and west of Uganda linked by phase 1 of SGR investment. Within the cluster, there is efficient mass transit, such as a BRT and bus systems.



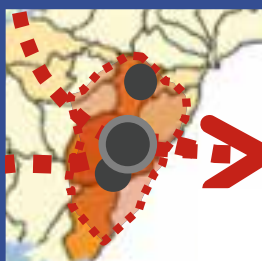
Mbarara-Kabale regional trading corridor

Overview: Around the western region of the country near the border to Rwanda and the DRC, this corridor will become a link to encourage and further trade with Uganda's western neighbours.

Core cities and towns: Mbarara and Kabale, linked by Ntungamo

Economic focus: With more than 50% of current Uganda exports going to Common Market for Eastern and Southern Africa (COMESA) countries, this regional trading corridor will focus on developing a manufacturing base for core export products, including agricultural goods processing, light industrial as well as steel and iron ore located in surrounding districts.

Function of economic corridor: This corridor will be linked by the SGR's western branch into Rwanda and the DRC, eventually connecting to the regional cities of Kigali and Kisangani.



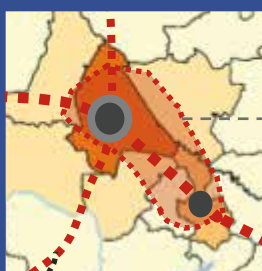
Mbale-Tororo industrial trading and processing zone

Overview: As a landlocked country, Uganda has prioritised establishing trade link-ages with neighbouring countries. The Mbale-Tororo industrial trading zone at the border with Kenya will serve as a gateway to accessing the port of Mombasa.

Core cities and towns: Mbale and Tororo

Economic focus: Industrial activity around secondary manufacturing, trading and logistics services and storage facilities, focused around management of agroprocessing and other manufacturing, such as phosphates.

Function of economic corridor: This trading zone will need to be linked with priority infrastructure to facilitate its function as a trading zone. The two planned standard gauge railway routes linking the north and the west of the country will connect and join in Tororo. This zone will also be linked via a primary and secondary road network.



Northern Uganda agricultural cluster

Overview: The northern Uganda agricultural cluster will provide a regional hub for the growing economic activity in the north.

Core cities and towns: Gulu, supported by Lira and surrounding towns.

Economic focus: The emerging regional city of Gulu will service the large rural population located in the north of the country. It will become a hub for agricultural outputs to assemble for agroprocessing of maize, beans, cassava and other cash crops, as well as other light manufacturing.

Function of economic corridor: The northern Uganda agricultural cluster will link the agricultural-focused north to the rest of the country, and East Africa region via rail and road connections.



CHAPTER 5

An Agenda for Action

Uganda has a strong commitment to development as set out in the NDPII and Vision 2040. Green growth – successfully implemented – presents an opportunity to simultaneously achieve economic, social and environmental goals. To move from high level aspirations to implementation will require strong leadership and significant policy reform to achieve outcomes in agriculture, energy, industry and in cities.

To move towards action and mainstream green growth aspects into government processes will require action on two fronts:

- **Getting the fundamentals right:** both to support Uganda’s core development, and for green growth.
- **Accelerating shifts in four economic systems:** agriculture, industry, cities and energy.

The National Green Growth Steering Committee has been established to oversee efforts to create an adequate enabling environment, which includes the necessary institutions and planning processes to deliver success. Their mandate is to prepare a green growth strategy for Uganda. The “agenda for action” set out in this chapter outlines a core set of issues which are recommended to be considered as part of the full strategy development process.

Getting the fundamentals right

Building on the success of recent decades, it is important that Uganda continues to focus on getting the “fundamentals” of its development right through delivering the NDPII. These fundamentals are

important preconditions for successful development – green growth or not. This will require a continued focus on macroeconomic stability, good governance, voice and accountability, and security and stability – all of which have been demonstrated to be important for economic development gains in African economies over the last two decades. These issues are not explored in detail here.¹⁰⁶

As set out in Chapter 1, unlocking constraints to Uganda’s growth (and therefore green growth) as identified in the growth and climate diagnostic is essential. However, there are a number of cross-cutting issues that will hinder progress in several areas, which will require emphasis for policy action on the following: access to electricity, land rights, access to finance, reforming land tenure, improving the wider regulatory and fiscal landscape for “doing business”, accelerating infrastructure delivery for market access, and improving human capital and institutional capacity.

To overcome these constraints, there are three cross-cutting principles which are relevant to all of them:

Area 1: Mainstreaming green growth into national development planning

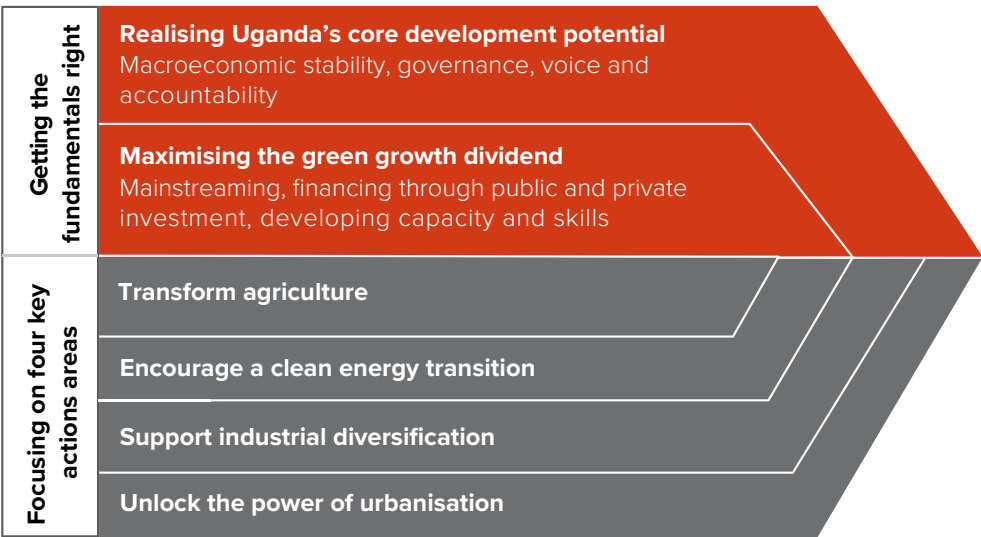
Area 2: Financing through public and private investment. This covers:

- Financing green growth through public sources
- Stimulating private investment
- Project preparation

Area 3: Developing capacity and skills

Figure 27

A Ugandan green growth agenda for action



Area 1: Mainstreaming green growth into national development planning

To ensure effective implementation, Uganda's Green Growth Strategy will need to be supported by institutions and processes that are able to effectively plan, implement and monitor cross-cutting measures, and specific investment projects and programmes. These should not be separate units and processes, given that green growth is a core economic development issue and form an holistic part of existing policy processes.

To achieve this, the government is also likely to need to enhance its expertise to plan, design, fund and deliver green growth interventions and investment projects. However, the change required will involve a broad spectrum of institutions and coordinating institutions such as the Ministry of Water and Environment and the National Planning Authority (NPA). These institutions will ensure national green growth priorities are reflected in sectoral strategies and in national planning processes.

Implementing green growth may also require a certain amount of regulatory change within sectors. Setting the right regulatory and fiscal framework for infrastructure provision, for example, is particularly

important. Energy, water, transport and finance are all regulated markets in which participation and pricing are influenced by government policy.

Part of effective mainstreaming is the identification and management of trade-offs around the green growth pathway as they become more apparent and as they happen. The green growth interventions highlighted offer a balanced portfolio of interventions which can maximise aggregate development impact. However, any negative economic, social and environmental consequences of Uganda's development trajectory need to be constantly assessed, and where possible, managed flexibly. For example, understanding resource stresses from competing demands (e.g. through water) and the pollution impacts of industry could – unchecked – become significant issues.

Given this context, there are three areas of focus:

- **Strategy and planning:** Finalising a Ugandan Green Growth Strategy and Action Plan
- **Implementation:** Embedding green growth into line ministry mandates for policy reform
- **Results:** Ensuring results can be tracked

Table 11

Mainstreaming green growth – actions

Priority	Implementing actions
Strategy and planning: Finalise a Ugandan Green Growth Strategy and Action Plan	<ul style="list-style-type: none"> • Prepare and finalise a national green growth strategy • Align the strategy and action plan with the Medium Term Expenditure Framework • Support the development of a legal framework for action on green growth in Uganda
Implementation: Embedding green growth into line ministry mandates for policy reform	<ul style="list-style-type: none"> • Develop guidelines and provide accompanying support for mainstreaming green growth into sector plans, including the role of analytical methods • Review appropriate national and regional frameworks including national procurement policy, public financial management to embed green growth principles • Develop the role of the national green growth leadership group at both cabinet and senior civil servant level, to track both implantation success and manage any challenges. Clearly define roles and responsibilities for ministries for implementation and coordination
Results: Ensuring results can be tracked	<ul style="list-style-type: none"> • Ensure that green accounting techniques are used to track natural capital and contribution to GDP • Establish monitoring and evaluation framework to track green growth results and outcomes which is linked to the government's own monitoring of development results, and where possible ensures compliance with requirements for development finance (including climate finance), and for monitoring performance of and compliance with green growth related legislation • Identify challenges and trade-offs related to green growth in Uganda and ensure they are monitored and managed

Area 2: Financing through public and private investment

Financing green growth through public financing

The investment requirements for the 23 green growth interventions highlighted show a strong role for public sector investment. Part of the story is about domestic fiscal policy and prioritisation of projects using domestic financing within wider public financial management and budgeting processes.

There is also the need for additional public sector expenditure. However, Uganda's current fiscal position and future borrowing constraints mean that there is limited appetite for significant additional government borrowing. Given this, wider external development finance (including climate finance) offer Uganda opportunities to bridge any investment gap by providing long-term concessional finance.

Uganda's status as a low-income country makes it eligible for the most attractive forms of grant, debt and even equity finance associated with development finance. For wider development finance, green growth is increasingly relevant as multilateral development banks and bilateral donors begin to require mainstreaming green growth-related investments throughout their development spend. These include finance for infrastructure and economic development. Bodies include the World Bank, African Development Bank, New Partnerships for Africa's Development, International Fund for Agricultural Development, and UN agencies, which already have a presence and active programmes in Uganda. The Department for International Development (UK), Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, United States Agency for International Development, Japan International Cooperation Agency and Korea International Cooperation Agency also have established programmes of work related to the objectives of this study.

There is also a role to play for climate finance, including both mitigation and adaptation finance which is looking for climate and wider green growth benefits. However, for Uganda and across Africa, this has not been as forthcoming as expected. This is, in part, due to the huge complexity of requirements in accessing funding requiring a high level of internal capacity.¹⁰⁷

Therefore, climate finance will only be part of a broader solution to financing. There is a need to be "ready" to make use of international climate finance while continuing to focus on tapping into multiple sources,

supported by a focus on high quality project preparation (see discussion below). Promising funds include the Green Climate Fund and the wider Climate Investment Funds, to which Ugandan public institutions are already connected.

To manage some of these issues collectively, and increase autonomy over fund allocation, Uganda may consider creating a finance fund to assist with financing individual green growth projects and aggregating investment risks. This finance fund will also allow for greater flexibility to meet a range of funder needs – though it is recommended be tied to Uganda's own budgeting process, and could be through strengthening of the local financial sector. While an option, it may not prove prudent to set up a separate special purpose vehicle, the options that augment and enhance existing funding vehicles may be preferred instead.

In terms of public investment, a general priority is the management of future oil revenues and how to use this to support development outcomes through possible re-investment. Here, the learning from the management of natural resource revenues both within Africa and elsewhere (Norway provides a good non-African example) demonstrate the need to use these proceeds wisely to support the ambition of Vision 2040.¹⁰⁸ Table 12 provides a range of measures which could be considered.

Stimulating private investment in green growth

Stimulating private sector investment is identified in the NDPII and Vision 2040. The investment analysis in Chapter 2 highlights that around half of total green growth investment can come from the private sector. However structural barriers related to private sector development, such as the cost of capital, regulatory and fiscal reform, and a limited pipeline of well developed "bankable" projects need to be addressed to allow an effective market for investment and project finance to prosper. Uganda is already following many programmes and support mechanisms to realise efforts - many orchestrated by the Private Sector Development Foundation (PSFU), a body promoting business and government dialogue in Uganda.

Green growth will be dependent on building on these existing efforts. There are then specific interventions to ensure that private sector investment supports green growth. There is an important role for the government to improve the regulatory and fiscal environment to incentivise green growth investment from the private sector. Possible examples that have been used internationally are environmental taxes, green tax

breaks, incentive payments and subsidies, feed-in tariffs, efficiency and emissions standards and removal of fossil fuel subsidies, support for innovation and R&D and demonstration, support for skills development and training for new technologies, and direct capital for PPP or business development support. The applicability of these approaches need to be carefully explored in the Ugandan context

Similarly, with households, there is international experience which Uganda could learn from. Options that could be explored as part of an action plan to implement green growth include: direct payments, fiscal incentives, community grant and subsidy systems, or providing households with vouchers that can be redeemed for green goods.

Table 12

Financing green growth – actions

Priority	Implementing actions
Prioritise green growth interventions as part of existing development spend	<ul style="list-style-type: none"> • Ensure that green growth interventions are prioritised as part of national fiscal processes and are tracked and accountable according to normal Government of Uganda processes • Undertake assessment of which interventions are currently being supported by existing development efforts and where there are gaps
Highlight routes of additional public financial support for green growth	<ul style="list-style-type: none"> • Map sources of development finance and donor interests in Uganda, as well as the green growth areas and specific interventions • Create a channel and simplify investment from a range of development partners, including the access of funds such as the GCF. Where possible, it is recommended to be linked to the national Ugandan fiscal framework and budgeting process • Demonstrate scrutiny and compliance with international investment principles, environmental and social standards and safeguards, and development/climate MRV guidelines and implementation
Explore a reinvestment strategy from oil revenues	<ul style="list-style-type: none"> • Identify risks from the management of resource revenues to inform the strategy around the use of Ugandan oil and gas resources for economic development • Clearly articulate a strategy for the management of oil revenue. As part of this strategy, look to link the reinvestment of revenues to fund green growth interventions

Table 13

Stimulating private investment – actions

Priority	Implementing actions
Continue to focus on a stable business and investment climate for growth	<ul style="list-style-type: none"> • Continue to focus on fundamental issues allied to catalysing private investment including macroeconomic stability, and the quality and competitiveness of trade and logistics sector • Enhance business confidence and investment by providing clear long-term policy signals on economic development which incorporates green growth issues (building on NDPII and existing green growth commitments) • Enhance and reduce costs of business establishment and related legislation that hampers growth
Introduce targeted policies and incentives that stimulate private sector action	<ul style="list-style-type: none"> • Review efficiency and attractiveness of national and sector level regulatory and taxation frameworks for green growth (including the investment code) • Provide a clear national policy framework to support the spread of infrastructure, particularly mobile infrastructure, energy connectivity and inclusive finance and payment systems • Support the environment for innovation, R&D and deployment of green growth solutions
Create specific investment support that target green growth	<ul style="list-style-type: none"> • Consider establishing a “revolving fund” to encourage business uptake and reduce the upfront costs of green growth investments • Strengthen and adapt PPP structures to blend risk and investment for private investment, and utilise innovative financing mechanisms that include convertible grants, concessional loans, mezzanine debt, and equity funding • Implement mechanisms for the development of local SMEs to invest in green growth

However, the focus on environmental support is less important than the general economic environment in Uganda which will stimulate the private investment needed for growth. Therefore, the continued emphasis on the level of import and export tariffs, policy targets and stability, and the rules for FDI will influence the access to the technologies, skills and investment in green growth. Table 13 provides a range of measures which could be considered.

Project preparation and investment pipeline development

For the public and private investment highlighted above, there is a need to ensure a pipeline of projects for green growth investment that are “bankable” to attract investment to Uganda. The government can support this process.

The government has recently established a PPP unit to bring forward focused project development and private investment. The government is also engaged in establishing a “Delivery Unit” to help monitor and deliver investments under the NDPII.

An enhanced approach to pipeline, project and deal structuring will help to accelerate project delivery and bring forward greater volumes of private and international investment. It is important that green growth considerations are embedded into this and mainstreamed into infrastructure PPPs.⁴

The establishment of a specific project preparation facility could be an important priority to consider, and one which Uganda’s development partners could be well positioned to support. For example, the multi-donor NEPAD infrastructure project preparation facility and the UK-funded Nigerian Infrastructure Advisory Facility (NIAF) support Nigerian ministries with capacity and technical issues, resulting in major and successful reforms of the energy sector in recent years. Again, careful consideration should be given to building on existing mechanisms where possible. Table 14 provides a range of measures which could be considered.

Area 3: Support the development of capacity and skills for green growth

Developing a skills base to overcome the employment challenges in Uganda is urgently required. This includes creating underlying skills and institutional capacity across government to implement effective public policy, as well as those skills required by the workforce for productive employment. We focus here on the latter, but acknowledge ongoing efforts on the former are a prerequisite for the implementation of the policy reforms discussed in this chapter.

Uganda has recently reformed its skills delivery system under the new Skilling Uganda Task Force. This has set up a number of Sector Skills Councils to enable government and private sector to work together in

Table 14

Project pipeline and development – actions

Priority	Implementing actions
Refresh project and investment evaluation frameworks	<ul style="list-style-type: none"> Review and enhance the approaches to investment appraisal to include economic and wider development benefits Create improved national datasets and monitoring and evaluation systems for green growth indicators that can be used consistently in data sets (e.g. a green jobs definition and dataset)
Support improved project planning and pipeline development	<ul style="list-style-type: none"> Support NDPII implementation by creating a clearly accountable unit for project prioritisation, planning, preparation, structuring, delivery and monitoring – this may be integrated into existing institutions or be a function of the green growth support unit Mainstream green growth into traditional project development to improve performance of all major investments Support feasibility studies for green growth measures, including new business models, local entrepreneurs and technology implementation
Develop strong relationships with potential investors and international organisations	<ul style="list-style-type: none"> Coordinate support from different development partners and programmes in Uganda (e.g. GGGI, CDKN, UNDP, World Bank, BMU/GIZ, USAID, JICA) Develop concrete green growth investment plans or portfolios profiling their investment and wider benefits that target the range of potential investors with interests in green growth Partner with donor institutions to provide technical assistance with green growth project preparation, incubation and implementation

identifying training needs and reform training curricula. This is an ideal opportunity to integrate consideration of relevant green growth initiatives into the vocational and technical training system, and to undertake a skills gap assessment for green jobs in Uganda. Ideally, this would involve the participation of the Ugandan Green Growth Steering Group in the Sector Skills Councils to help identify emerging skills shortages.

It is important that individuals are able to take advantage of the employment opportunities presented by green growth. Of the green growth interventions identified in this study, a proportion of the job creation will provide opportunities for low and semi-skilled workers but some (up to 10% of total jobs) will potentially need new skills that are not commonplace in the Ugandan labour market (e.g. energy auditors, renewable energy technicians and urban/transport planners). The employment impacts and related skills dimension can be seen in the context of the following:

- Structural changes will lead to increased demand for some occupations and decreases for others.
- New economic activity will create new occupations and there will be a need for new skills profiles and qualification and training frameworks.
- Many existing occupations and industries will experience changes to tasks within their jobs, and this will require adjustments to the current training and qualifications.

As new green jobs are created and existing jobs are transformed, many workers will need additional training. Reskilling and upskilling the existing labour

force therefore requires a good level of information about the labour market, and active dialogue with the private sector to anticipate and be flexible to skills development needs.

Green growth presents the potential to create new business sectors based on the manufacturing or commercialisation of new technologies and solutions.

In addition, green growth will need green specialists and the broader labour force to develop a number of cross-cutting skills, from finance, law, economics, engineering, ICT, marketing and accounting. These are skills which are required for mainstream economic development – green or otherwise. Moreover, complementary basic awareness of sustainability issues, climate change, climate resilience and health and safety will also benefit the implementation of Uganda's green growth agenda.

Table 15 provides a range of measures which could be considered.

Green growth implementation – 4 critical shifts

Chapter 3 highlighted the four sectors which are the most critical in terms of unlocking opportunities for green growth in Uganda. Each require specific policy reforms to realise the potential from green growth. The recommendations here focus on how to overcome the constraints to action in each sector, but also how to deliver the interventions. Also highlighted are the top interventions identified by Ugandan stakeholders

Table 15

Skills development – actions

Priority	Implementing actions
Deliver a full green growth employment demand and profile analysis	<ul style="list-style-type: none"> • Provide a detailed assessment of employment demand and potential by sector including direct, indirect and induced job creation plus mapping of supply chain linkages • Working with newly established skills taskforce and skills councils, identify the skills gaps for green growth including the identification of technical and vocational skills and associated reforms • Include an assessment of the skills needs for the Uganda civil service
Expand training and skills base for implementing new green growth activities	<ul style="list-style-type: none"> • Introduce elements of green growth into the core national curriculum and professional development (e.g. law, finance, advisory, engineering, technology) • Capitalise on transferrable skills from lower value sectors with similar complexity and competencies • Create short and affordable vocational courses that fill gaps or adapt existing skills for lower skilled jobs associated with green growth activities • Create highly specialised training and qualifications for high value-high skilled jobs in engineering and technology • Enable training for rural workers, including farmer field schools

through public consultation, which offer a number of priorities to build momentum behind a national green growth strategy.

Shift 1: Transforming agriculture – raising productivity for jobs and growth

Agriculture remains the bedrock of Uganda's development. The sector is challenged by low productivity which is exacerbated by land rights and tenure issues, low uptake of improved seeds, poor market access and infrastructure, large post-harvest losses and a lack of modern technology including basic irrigation techniques. Climate variability and climate change is also a core threat to success in this sector. These challenges are well understood and green growth interventions include the uptake of best practices, including climate-smart agricultural practices and knowledge.

Priority intervention: Climate-smart agriculture.

Shift 2: Encouraging a clean energy transition – maximising the value of Uganda's renewable resources

The provision of reliable, affordable energy for Uganda is vital for the future. There are a number of factors holding back energy sector development. These include the legal and regulatory framework, limited experience of renewable energy investment, a lack of coordination around sector development, financing, and the need to better track energy use. Existing policy interventions, such as the Global Energy Transfer for Feed in Tariffs (GETFiT) and the Scaling-up Renewable Energy Program (SREP), are a good start to encouraging private investment for off- and on-grid clean energy. The opportunity for green growth in the sector includes efficient cookstoves, the promotion and prioritisation of off-grid solutions, and energy efficiency. In addition, the oil and gas sector offers opportunities for more efficient growth if re-investment is directed towards sustainable energy.

Priority project: Off-grid renewables and clean cookstoves.

Shift 3: Supporting industrial diversification – developing competitive industry and higher productivity services

To fulfil the ambitions set out within the NDPII and Vision 2040, the government needs continued focus on supporting growth in diversified industrial sectors, and higher value services. There are a number of constraints holding back development, including a lack of supporting infrastructure, the need for improved trade logistics, a lack of investment and skills, and the need for improved regulation for business creation. Industrial development across the world has historically been reliant on fossil fuels, but there are a number of options for Uganda to undertake “green industrialisation”. These include energy efficient industrial processes, water efficiency, green industrial parks and the use of alternative cement fuels.

Priority intervention: Industrial energy efficiency.

Shift 4: Unlocking the power of urbanisation – seizing the urbanisation dividend through better cities

Better urbanisation is at the heart of successful green growth. Cities will play a distinctive role in Uganda's development trajectory. The effective development of Uganda's economic geography and infrastructure assets will support domestic and export-led growth and avoid large infrastructure and legacy costs. Current challenges to this include a lack of investment in major infrastructure (particularly transport), the land tenure system, and a lack of effective urban planning. There are a number of opportunities to shape the overall urban transition through compact, connected, and coordinated urban development – supported by good planning and investment in infrastructure.

Priority intervention: Integrated urban planning.

Table 16 summarises recommendations that support these four shifts.

Table 16

Policy recommendations to support green growth implementation

POLICY SHIFTS	RECOMMENDATIONS	POSSIBLE SUPPORTING POLICY ACTIONS
TRANSFORM AGRICULTURE: Raising productivity, to deliver jobs and growth	1.1 Further invest in Uganda's comparative advantage in agriculture	<ul style="list-style-type: none"> • Increase total government spending on agriculture to the 10% CAADP target • Invest in rural infrastructure to provide improved storage to reduce post-harvest losses, enhance efficiency and provide access to markets • Reform rural land rights for farmers, increasing the amount of registered land and enabling the use of land as collateral for investment • Improve competitiveness of Ugandan agriculture by supporting agricultural extension and technology services • Support increased participation of women and youth in the workforce
	1.2 Scale climate-smart agriculture practices to create resilient, high yield and low emissions food and commodity production	<ul style="list-style-type: none"> • Integrate modern and climate smart agricultural practices identified (intercropping, irrigation, agroforestry, soil fertility and knowledge services) into reformed extension systems • Invest in productivity and adaptation win-win technologies such as solar irrigation and adaptive seed technologies • Support financial inclusion for rural communities and enable access to micro-credit and micro-insurance schemes to support investment in climate-smart agriculture practices, seeds and equipment • Support skills and capacity building programmes for farmers to implement climate-smart agriculture practices • Invest in data and soil maps to improve the understanding of soil fertility and for better land management
	1.3 Build a sustainable agribusiness and agroprocessing sector	<ul style="list-style-type: none"> • Invest in strategic infrastructure to connect productive and value added agricultural activity to regional (for high value products/ cash crops) and international markets • Invest in the business climate and private enterprise in support of agroprocessing industries • Explore the use of cooperatives to link smallholders into the agricultural value chain
ENCOURAGE A CLEAN ENERGY TRANSITION: Maximising the value of Uganda's renewable resources	2.1 Prepare a comprehensive national energy transition strategy	<ul style="list-style-type: none"> • Integrate renewable energy, access, distribution and efficiency policies into a comprehensive strategy for energy transition, including electrification targets and an integrated national energy access plan • Scale off-grid energy markets and solutions that reduce and displace the cost of grid extension and provide clean and renewable household access to modern electricity • Facilitate access to sustainable and modern cooking facilities in rural and urban areas
	2.2 Reform the regulatory environment for energy investment	<ul style="list-style-type: none"> • Support fiscal incentives for clean technologies such as optimising licensing and expanding feed-in-tariff incentives to engage private investment • Establish reliable, affordable and attractive grid access technical standards and commercial agreements • Support for mobile payment infrastructure, customer driven affordable pay-as-you-go payment systems, and new entrant business models • Invest in skills, training and qualification of locals around technology and infrastructure, including installation, repairs and maintenance

POLICY SHIFTS	RECOMMENDATIONS	POSSIBLE SUPPORTING POLICY ACTIONS
	2.3 Stimulate an energy efficiency platform	<ul style="list-style-type: none"> • Incentivise uptake and market development of energy efficiency equipment and products for industry and buildings • Revise domestic, commercial and public building codes and design standards to incorporate energy efficiency, curtail growth in air conditioning and encourage use of local materials • Set out a framework for monitoring and reporting of energy use for the purpose of policy design and information for consumers
SUPPORT INDUSTRIAL DIVERSIFICATION: Developing competitive industry and higher productivity services	3.1 Prepare a green industrial development policy	<ul style="list-style-type: none"> • Create an industrial strategy that specifically targets sectors for green growth, focusing on greening existing sectors and tapping into new green markets • As part of a broader national spatial framework to improve trade logistics, explore policies that induces agglomeration (where appropriate) and better infrastructure utilisation
	3.2 Capturing the domestic market for environmental goods and services	<ul style="list-style-type: none"> • Create favourable fiscal and regulatory environment for green manufacturing and environmental services (e.g. small scale renewable energy equipment, improved cookstoves, pollution control equipment, environmental services and clean technology) • Increase the proportion of formal businesses by reducing barriers to firms registering as formal enterprises • Support financing of industrial growth for small firms
	3.3 Drive resource efficiency as a competitiveness issue for manufacturing and industry	<ul style="list-style-type: none"> • Implement clear and affordable buildings and products standards for industrial energy and resource efficiency • Introduce a shared resource programme platform to raise awareness of and match industrial resource inputs and outputs between industries • Implement incentives such as reduced import duties and tax breaks for investment into energy and water efficient equipment • Ensure industrial parks undertake green growth principles that provide shared and sustainable infrastructure solutions such as combined heat and power solutions
UNLOCK THE POWER OF URBANISATION: Seizing the urbanisation dividend through better cities	4.1 Integrate economic and spatial planning to prioritise infrastructure investments	<ul style="list-style-type: none"> • Create a cross-sector urban development group to coordinate around urban and spatial issues, particularly how the land tenure system and related reforms can promote investment • Ensure ongoing activities implementing the NDP and the Strategic Sector Investment Plan incorporates green growth approaches, indicating priority growth areas, corridors and national infrastructure needs • Design and implement a national urban hierarchy that details the core function of each major city in terms of its administrative and economic functions
	4.2 Target investments for improved city development	<ul style="list-style-type: none"> • Review existing metropolitan governance structures to ensure coordinated and enhanced urban planning. • Prepare detailed and integrated land use and transport plans for all major cities including zoning and planning of future expansion • Invest in low cost public transport infrastructure solutions such as BRT “lite”, walkable street patterns and private regulated concessions for bus systems
	4.3 Enhance the technical and financial capacity of all urban institutions	<ul style="list-style-type: none"> • Raise the creditworthiness of cities to enhance borrowing capacity and debt raising • Transform the revenue generating potential and fiscal autonomy of Kampala – and secondary cities • Deploy multi-disciplinary urban planning teams into each major city to adopt and deliver on physical and local economic development planning • Support PPP development and structuring

ENDNOTES

- ¹ Green growth is economic growth which delivers social welfare benefits, while at the same time protecting natural capital, and building resilience to climate change and other environmental shocks.
- ² Based on data from World Bank Development Indicators.
- ³ Based on data from World Bank Development Indicators.
- ⁴ NCE analysis based on data from Observatory of Economic Complexity and complexity. Available at: <http://atlas.media.mit.edu/en/profile/country/uga/>
- ⁵ Republic of Uganda (2015). Second National Development Plan (NDPII) 2015-16-2019-20. Available at: <http://npa.ug/wp-content/themes/npatheme/documents/vision2040.pdf>.
- ⁶ UBOS (2016). 'The Uganda Bureau of Statistics defines urban population as the population of gazetted city, municipalities and towns' in *The National Population and Housing Census 2014 – Main Report*.
- ⁷ World Bank (2015). *The Growth Challenge: Can Uganda's Cities get to Work. Uganda Economic Update*. 5th Edition. Available at: <http://www.worldbank.org/content/dam/Worldbank/document/Africa/Uganda/Report/uganda-economic-update-march-2015.pdf>.
- ⁸ Werikhe, M. n.d. 'Rapid Urbanisation and the Challenge for Secondary Cities'. Presentation by Hon. Michael Werikhe, Minister of State for Housing. Available at: http://www.citiesalliance.org/sites/citiesalliance.org/files/CA_Images/1%20-%20Uganda%20-%20Rapid%20Urbanization%20and%20its%20Challenge%20for%20Secondary%20Cities.pdf.
- ⁹ World Bank (2011). Integrating leading and lagging areas – A strategy for making prosperity for all a reality. Inclusive Policy Note 3. Available at: [http://siteresources.worldbank.org/INTUGANDA/Resources/uganda-leading-lagging-areas-full-policy-note\(jan-2012\).pdf](http://siteresources.worldbank.org/INTUGANDA/Resources/uganda-leading-lagging-areas-full-policy-note(jan-2012).pdf).
- ¹⁰ World Bank (2012). 'The Northern Corridor is a regional definition and primarily transects the southern districts of Uganda' in *Uganda – Promoting Inclusive Growth*. Available at: <http://siteresources.worldbank.org/INTUGANDA/Resources/uganda-promoting-inclusive-growth-synthesis-report.pdf>.
- ¹¹ African Development Bank Group (2014). Eastern Africa's Manufacturing Sector Promoting Technology, Innovation, Productivity And Linkages, Uganda Country Report. Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Eastern_Africa's_Manufacturing_Sector_-_Promoting_Technology_Uganda_country_report_November_2014.pdf.
- ¹² UBOS (2013). National Labour Force Survey Report; and MFPED (2014). Uganda's employment challenge – an evaluation of Government's Strategy. Available at: <http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1184090646382/Rep-of-Uganda-2014-Ugandas-Employment-Challenge.pdf>.
- ¹³ For an overview and benchmarking of structural transformation stylised facts see: Dabla-Norris, E., Thomas, A. H., Garcia-Verdu, R., and Chen, Y. (2013) in *Benchmarking structural transformation across the world*. International Monetary Fund. Available at: <https://www.imf.org/external/pubs/cat/longres.aspx?sk=40847.0>.
- ¹⁴ Based on data from World Bank Development Indicators.
- ¹⁵ Based on data from World Bank Development Indicators.
- ¹⁶ Republic of Uganda (2013). *Uganda Vision 2040*. Available at: <http://npa.ug/wp-content/themes/npatheme/documents/vision2040.pdf>.
- ¹⁷ The framework draws on: Rodrik, D., Hausmann, R., and Velasco, A. (2005) 'Growth diagnostics'. Harvard University; Hausmann, R., and Klinger, B. (2008) *Doing Growth Diagnostics in Practice: A Mindbook*. Harvard University; Gable, S., Lofgren, H., and Osorio-Rodarte, I. (2014) 'The Post-2015 Global Agenda: A Framework for Country Diagnostics' World Bank Development Prospects Group; DFID's inclusive growth diagnostics approach; and Hausmann, R., Cunningham, B., Matovu, J. M., Osire, R., and Wyett, K. (2014) 'How should Uganda grow?' available at: <https://research.hks.harvard.edu/publications/getFile.aspx?Id=1021>.
- ¹⁸ The primary sources for this diagnostic are: World Bank (2015). *Uganda - Boosting inclusive growth and accelerating poverty reduction: systematic country diagnostic*. Available at: <http://documents.worldbank.org/curated/en/401861467998756667/Uganda-Boosting-inclusive-growth-and-accelerating-poverty-reduction-systematic-country-diagnostic>; World Bank (2007) *Uganda country Economic Memorandum: Uganda – moving beyond recovery: Investment and behaviour change for growth*. Available at: http://www.worldbank.org/en/region/afr/whats-new?docty_exact=Country+Economic+Memorandum&qterm=&lang_exact=English&country_exact=Uganda; World Bank and Government of Uganda. (2015). *Uganda Country Economic Memorandum: Economic Diversification and Growth in the Era of Oil and Volatility*. Available at: <https://openknowledge.worldbank.org>.

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¹⁹ This box draws on: Justice, Law and Order Sector (2008). *Transitional Justice in Northern, Eastern Uganda and some parts of West Nile region*; UNDP. (2015). *Human Development Report: Unlocking the Development Potential of Northern Uganda*; UBOS (2010), *Ugandan National Household Survey*; and Habitat for Humanity (2013). *Uganda Housing Market Mapping and Value Chain Analysis*.

²⁰ International Food Policy Research Institute (2015). *Global Food Policy Report 2014-15*. Available at: <http://www.ifpri.org/publication/2014-2015-global-food-policy-report>.

²¹ UBOS (2013). National Labour Force Survey Report; and MFPED (2014). *Uganda's employment challenge – an evaluation of Government's Strategy*.

²² Republic of Uganda (2015). Second National Development Plan (NDP II) 2015-16–2019-20. Available at: <http://npa.ug/wp-content/themes/npatheme/documents/vision2040.pdf>.

²³ Brown, A. (2012). Uganda's new urban policy: participation, poverty, and sustainability; and World Bank (2015). *The Growth Challenge: Can Uganda's Cities get to Work*. *Uganda Economic Update*. 5th Edition.

²⁴ Republic of Uganda (2014). National Oil and Gas Policy for Uganda. Available at: <http://www.eisourcebook.org/cms/January%202016/Uganda%20National%20Oil%20and%20Gas%20Policy%202014.pdf>; MFPED (2012). Oil and Gas Revenue Management Policy. Available at: <http://www.eisourcebook.org/cms/Dec%202012/Uganda%20Oil%20&%20Gas%20Revenue%20Management%20Policy.pdf>.

²⁵ The analysis undertaken for this study also draws heavily on Brahmabhatt, M., Bishop R., Zhao, X., Lemma, A., Granoff, I., Godfrey, N., and D.W. te Velde., (2016 - forthcoming). *Africa's New Climate Economy: Economic Transformation and Social and Environmental Change in Sub-Saharan Africa*. New Climate Economy and Overseas Development Institute. Available at: <http://newclimateeconomy.report/misc/working-papers/>.

²⁶ UBOS (2015). *Statistical Abstract*. Available at: http://www.ubos.org/onlinefiles/uploads/ubos/statistical_abstracts/Statistical%20Abstract%202015.pdf.

²⁷ World Bank (2015). *Uganda - Boosting inclusive growth and accelerating poverty reduction: systematic country diagnostic*.

²⁸ Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*. Available at: http://cdkn.org/wp-content/uploads/2015/12/Uganda_CC-economics_Final-Report2.pdf.

²⁹ Ministry of Water and Environment (2015). *Uganda's Intended Nationally Determined Contribution (INDC)*. Available at: <http://www4.unfccc.int/Submissions/INDC/Published%20Documents/Uganda/1/INDC%20Uganda%20final%20%202014%20October%20%202015,%20minor%20correction,28.10.15.pdf>.

³⁰ This box draws on: Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*. Available at: http://cdkn.org/wp-content/uploads/2015/12/Uganda_CC-economics_Final-Report2.pdf and ND-Gain Data accessed from <http://index.gain.org/ranking>.

³¹ Green growth in its standard version is defined as economic growth which delivers social welfare benefits while at the same time protecting natural capital and building resilience to climate change and other environmental shocks. A “strong” version of green growth shows that environmental policy can be a strong driver for growth. For a good overview of what green growth is, how it relates to notions of sustainable development and how the political discourse around green growth has transpired, see Jacobs, M., (2012) *Green Growth: Economic Theory and Political Discourse*. Centre for Climate Change Economics and Policy Working Paper No 108.

³² See general overviews on economic transformation such as Leipziger, D., (2015) *Economic Transformation Lessons from Large Developing Countries*; and Worrall, L., Vrolijk, K., Mason, C., and Balchin, N., (2016). (2015) *Baseline on Economic Transformation – Review of the international, regional and domestic literature on economic transformation*. Supporting Economic Transformation.

³³ Here an important interaction is the responsiveness of poverty reduction to growth – the poverty elasticity of growth – as indicator beyond income that shows that growth is “pro-poor”. For a discussion of poverty elasticity and wider notions of inclusive growth in Uganda see World Bank (2012). *Uganda: Promoting Inclusive Growth*; and UNDP. (2015). *Human Development Report: Unlocking the Development Potential of Northern Uganda*.

³⁴ For an overview, see Brahmabhatt, M., Bishop R., Zhao, X., Lemma, A., Granoff, I., Godfrey, N., and te Velde, D.W., 2016. *Africa's New Climate Economy: Economic Transformation and Social and Environmental Change*. New Climate Economy and Overseas Development Institute. London and Washington, DC. Available at: <http://newclimateeconomy.report/workingpapers/>.

³⁵ Urbanisation done well can lead to more productive, efficient infrastructure and cities that reduce the costs and issues of rapid economic growth that include pollution, unproductive urban expansion, low-levels of access to basic services, crime, and poor economic and social connectivity. See Gouldson, A. P., Colenbrander, S., Sudmant, A., Godfrey, N., Millward-Hopkins, J., Fang, W., and Zhao, X. (2015). *Accelerating Low Carbon Development in the World's Cities*. New Climate Economy.

³⁶ See, for example AfDB//UNDP (2016) *African Economic Outlook 2016: Sustainable Cities and Structural Transformation*, OECD Publishing, Paris; for an assessment in Uganda see Dorosh, P., and Thurlow, J. (2014) Can cities or towns drive African development? Economy-wide analysis for Ethiopia and Uganda, *World Development*, 63, 113-123.

³⁷ Two recent surveys are UNEP (2015). *Building Inclusive Green Economies in Africa – Experiences and Lessons Learned 2010-2015*; and Hamdok, A., (2015). The green economy and Africa's economic transformation: a balancing act. *Journal of African Transformation (Reflections on Policy and Practice Volume)*. Volume 1, No. 1, 85-100.

³⁸ For examples of green growth in practice see GCEC (2014). *Better Growth Better Climate – the New Climate Economy Report*; GCEC (2015). *Seizing the Global Opportunity – Partnerships for Better Growth and a Better Climate*; and GGBP (2014) *Green Growth in Practice – Lessons from Country Experiences*.

³⁹ This work is unpublished.

⁴⁰ Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*.

⁴¹ Further detail on the study's methodology, assumptions, limitations and theoretical underpinnings can be found accompanying technical working papers.

⁴² A forthcoming paper from New Climate Economy (see Brahmabhatt, M., et al (2016, mimeo)) explores the links between economic transformation, and social and environmental change in sub-Saharan Africa. It demonstrates that the inclusiveness and environmental performance of economic growth depends on the pattern of economic transformation i.e. the distribution of economic activity between agriculture, industry, and services, and how this evolves over time. To understand this issue, this report assumes the expected structural transformation that is likely to occur under NDPII and Vision 2040 based on the outputs of the MAMS model. This follows a structural development pathway typically followed by most of today's developed countries i.e. at first, most employment and output is in agriculture, a sector with relatively low labour productivity. As an economy develops, agriculture's relative importance declines, typically to less than 5% of jobs and GDP. This is then accompanied by a rise and then, at a more advanced stage of development, a decline in the share of manufacturing, in an "inverted U" pattern. Within this transformation, this report focuses on major green growth interventions that can support improved economic, social, and environmental performance. It does not focus on closer consideration of the implications of more profound structural sector shifts within the green growth scenario which of course would have significant implications for energy demand, GHG emissions, and other related environmental issues, as well as economic and social outcomes. This is a significant global research gap and a possible issue for further study in Uganda.

⁴³ For a discussion on the future directions for Uganda's growth path see: Hausmann, R., Cunningham, B., Matovu, J. M., Osire, R., and Wyett, K. (2014). *How should Uganda grow?*. Center for International Development – Harvard University.

⁴⁴ An opportunity not accounted for in this work, is the growth of the Environmental Goods and Services (EGS) sector, which could produce environmental technology and services in Uganda. If this market were to develop then it could match or even outstrip some of the other sectors.

⁴⁵ For an assessment "beyond GDP" measurement approaches see Stiglitz, J., Sen, A. K., & Fitoussi, J. P. (2009). *The measurement of economic performance and social progress revisited: reflections and overview*. Centre de recherche en économie de Sciences Po.

⁴⁶ See the following assessments on climate related spend in historic public sector investment: Bird, N., et al. (2016). *Public spending on climate change in Africa: Experiences from Ethiopia, Ghana, Tanzania and Uganda*. Overseas Development Institute; and Tumushabe, N., et al (2013). *Uganda National Climate Change Finance Analysis*. Overseas Development Institute.

⁴⁷ Data is net official development assistance and official aid received (current US\$) taken from OECD data sourced here: <http://data.worldbank.org/indicator/DT.ODA.ALLD.CD?locations=UG>

⁴⁸ See Godfrey and Zhao (2016, mimeo), *Urban Financing: Better Finance, Better Cities*, Coalition for Urban Transitions and New Climate Economy.

⁴⁹ Uganda's INDC, the economics of climate change analysis, and UNDP's recent green growth project that targeted the Paris COP21 negotiations include a wider range of interventions. However, some of these are not included here given the focus on interventions likely to have a significant economic impact alongside other impacts. This explains why important climate action interventions such as livestock feed management and climate change resilience measures in the water and land use sectors – while important – are not fully considered here.

⁵⁰ UBOS (2013), *Ugandan National Household Survey*. Available at: http://www.ubos.org/onlinefiles/uploads/ubos/UNHS_12_13/2012_13%20UNHS%20Final%20Report.pdf

⁵¹ MAAIF (2016). *Agriculture Sector Strategic Plan*.

- ⁵² The World Food Program monitor food security issues in Uganda through its Uganda Vulnerability and Mapping Tool. For more information, see: http://vam.wfp.org/CountryPage_overview.aspx?iso3=UGA&_ga=1.81574738.495359481.1472113909
- ⁵³ Republic of Uganda (2015). *Second National Development Plan (NDP II) 2015-16-2019-20*.
- ⁵⁴ MAAIF (2016). *Agriculture Sector Strategic Plan*.
- ⁵⁵ MAAIF (2016). *National Fertiliser Sub-Sector Development Strategy and Investment Plan*.
- ⁵⁶ See Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*.
- ⁵⁷ Ministry of Water and Environment (2011). *A National Irrigation Master Plan for Uganda 2010-2035*.
- ⁵⁸ World Bank (2015). *Uganda - Boosting inclusive growth and accelerating poverty reduction: systematic country diagnostic*.
- ⁵⁹ World Bank (2015). *Uganda - Boosting inclusive growth and accelerating poverty reduction: systematic country diagnostic*.
- ⁶⁰ Ministry of Water and Environment (2015). *Uganda's Intended Nationally Determined Contribution (INDC)*.
- ⁶¹ Ministry of Water and Environment (2011). *A National Irrigation Masterplan for Uganda (2010-2025)*.
- ⁶² Costa, S., (2015). *Taking it to scale: Post-Harvest Loss Eradication in Uganda 2014-2015*.
- ⁶³ There are a number of opportunities around the reduction of deforestation and livestock practices which will have significant impact on GHG emissions. These options have been well covered by other studies and have not been included here, but should be considered as part of the production of a full green growth strategy.
- ⁶⁴ See Mobasser, H.R., Vazirimehr, M.R. and Rigi, K., (2015). Effect of intercropping on resources use, weed management and forage quality.
- ⁶⁵ Chen, J.H., (2006) The combined use of chemical and organic fertilizers and/or biofertilizer for crop growth and soil fertility. *International Workshop on Sustained Management of the soil-rhizosphere system for efficient crop production and fertilizer use*. Vol. 16. Land Development Department Bangkok, Thailand.
- ⁶⁶ Kwamong, N. A., and Korugyendo, P. L. (2010). Revival of agricultural cooperatives in Uganda. *International Food Policy Research Institute Policy Note*, (10).
- ⁶⁷ Based on data from World Bank Development Indicators.
- ⁶⁸ MEMD (2015). *Scaling-up Renewable Energy Program Investment Plan*.
- ⁶⁹ Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*.
- ⁷⁰ MEMD (2015). *Uganda's Sustainable Energy for All (SE4ALL) Action Agenda*.
- ⁷¹ See Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*.
- ⁷² We use the term efficient cookstoves throughout the paper but also acknowledge wider clean cooking solutions involving fuel switching which will also be relevant. These alternative options have not been explicitly modeled but should be considered in the implementation phase.
- ⁷³ See a general overview of the benefits of efficient cookstoves see: Grieshop, A. P., Marshall, J. D., & Kandlikar, M. (2011). Health and climate benefits of cookstove replacement options. *Energy Policy*, 39(12), 7530-7542.
- ⁷⁴ Bishop, R., (2015). *Raising Energy Efficiency Standards to the Global Best*.
- ⁷⁵ See IEA (2014). *Energy Efficiency Market Report 2014 – Market Trends and Medium Term Prospects*.
- ⁷⁶ MEMD (2015). *Uganda's Sustainable Energy for All (SE4ALL) Action Agenda*.
- ⁷⁷ MEMD (2015). *Uganda's Sustainable Energy for All (SE4ALL) Action Agenda*.
- ⁷⁸ For an excellent overview of the history of industrial development in Uganda, see Obwona, M., Shinyekwa, I., Kiiza, J., & Hisali, E., (2014). The evolution of industry in Uganda. *UNU-WIDER Working Paper*, 21.
- ⁷⁹ Republic of Uganda (2010). *National Development Plan (NDP I) 2010-11-2014-15*.
- ⁸⁰ World Bank (2013). *Doing business in the East African Community 2013: smarter regulation for small and medium size enterprises - comparing business regulation for domestic firms in the East African community and with 185 economies*.
- ⁸¹ World Bank (2015). *Doing Business Economy profile 2016: Uganda*.

- ⁸² See Ainebyona, D., (2014). National Industrial Policy for Uganda - A Framework for Uganda's Transformation, competitiveness and prosperity. Presentation available here: <http://www.fes-kenya.org/media/publications/National%20Industrial%20Policy%20For%20Uganda%20by%20Denis%20Ainebyona.pdf>.
- ⁸³ See Obwona, M., Shinyekwa, I., Kiiza, J., & Hisali, E., (2014). The evolution of industry in Uganda. UNU-WIDER Working Paper, 21. Ishengoma, E. K., & Kappel, R. (2011). Business environment and growth potential of micro and small manufacturing enterprises in Uganda. *African Development Review*, 23(3), 352-365.
- ⁸⁴ Ministry of Education and Sports (2011). *Skilling Uganda: BTVET Strategic Plan 2010-2019/20*; and the Directorate of Industrial Training (2011). *Strategic Plan 2011/12-2015/16*.
- ⁸⁵ See UNECA (2016). *Greening Africa's Industrialization* and Newman et al., (2016). *Made in Africa: Learning to Compete in Industry*.
- ⁸⁶ See UNECA (2016). *Greening Africa's Industrialization* and Newman et al., (2016). *Made in Africa: Learning to Compete in Industry*.
- ⁸⁷ It is important to note that the benefits of energy efficiency can be limited, to different degrees, by the "rebound effect", where the savings from improved energy efficiency lead to some increased demand for energy services. IEA (2014), *Capturing the Multiple Benefits of Energy Efficiency*, states that direct rebound effects can range from 0% to 65%, with most estimates falling in the range of 10% and 30%.
- ⁸⁸ Ministry of Water and Environment (2015). *Economic assessment of the impacts of climate change in Uganda*.
- ⁸⁹ New Climate Economy (2016, mimeo) *Uganda: National Urban Transitions Assessment – Preliminary Analysis*. This is a supporting paper for this report.
- ⁹⁰ Based on data from World Bank Development Indicators.
- ⁹¹ Republic of Uganda (2015). Standard Gauge Railway Project. Information note available at: <http://www.sgr.go.ug/wp-content/uploads/2015/11/GKMA-LRT-Project-Brochure.pdf>
- ⁹² This box has used information from SWITCH Africa Green project – UNEP 2015.
- ⁹³ World Bank (2012). *Planning for Uganda's urbanization*. Inclusive growth policy note; no. 4.
- ⁹⁴ CME Consult Group (2013). *Uganda National Urban Policy – Draft 1*. Unpublished.
- ⁹⁵ Malumba, D., and Olema, W., (2009). *Policy Analysis Report: Mapping Migration in Uganda*.
- ⁹⁶ This section draws on World Bank (2015). *The Growth Challenge: Can Uganda's Cities get to Work*. Uganda Economic Update. 5th Edition.
- ⁹⁷ Floater, G., Rode, P., Robert, A., Kennedy, C., Hoornweg, D., Slavcheva, R. and Godfrey, N. (2014). *Cities and the New Climate Economy: the transformative role of global urban growth*. New Climate Economy Cities Paper 01. LSE Cities. London School of Economics and Political Science.
- ⁹⁸ See Karaimu, K., (2015). Bio-Innovate project helps Uganda slaughterhouse turn waste into electricity for a 'green' future. ILRI Clippings.
- ⁹⁹ New Climate Economy (2016). *Better Growth, Better Cities: Achieving Uganda's Development Ambition*.
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- ¹⁰³ See Floater, G., Rode, P., Robert, A., Kennedy, C., Hoornweg, D., Slavcheva, R. and Godfrey, N. (2014): *Cities and the New Climate Economy: the transformative role of global urban growth*. New Climate Economy Cities Paper 01.

¹⁰⁴ Litman, T., (2015). *Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl*. Victoria Transport Policy Institute.

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¹⁰⁸ For the case of Norway see Larsen, E., (2004). *Escaping the resource curse and the Dutch Disease?: when and why Norway caught up with and forged ahead of its neighbors*.

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