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Final Report

Feasibility Study for the Rwanda-Burundi Oil Products Pipeline Capacity Market Analysis Phase 1

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Figures

EDC	Economic Development Corridor
EIB	European Investment Bank
EDPRS	Economic Development and Poverty Reduction Strategy
FDI	Foreign Direct Investment
Gal	Gallon
GDI	Gross Domestic Income
GDP	Gross Domestic Product
GOB	Government of Burundi
GOR	Government of Rwanda
HIPC	Heavily Indebted Poor Countries
IBRD	International Bank for Reconstruction and Development
ICT	Information and Communications Technology
IDA	International Development Association
IC/GLR	International Conference on the Great Lakes Region
IFC	International Finance Corporation
IMF	International Monetary Fund
ISN	Interim Strategy Note
JKIA	Jomo Kenyatta International Airport
K-B	Kampala to Kigali to Bujumbura pipline
KGL	Kigali Kayibanda Airport
KPC	Kenya Pipeline Corporation
kWh	Kilowatt-hour
LPG	Liquid petroleum gas
M^3	Cubic Meter
Mcf	Thousand cubic feet
MDGs	Millennium Development Goals
MFI	Multilateral funding institution
MIA	Moi International Airport
MMBtu	Million British thermal unit
MMcf	Million cubic feet
MMcf/d	Million cubic feet per day
MMTPA	Million metric tons per annum (i.e., per year)
MW	Megawatt
NG	Natural gas
NGL	Natural gas liquid
NCTA	Northern Corridor Transit Agreement
NCTTCA	Northern Corridor Transit Transport Association
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organization
NURC	National Unity and Reconciliation Commission
OSAA	Office of the Special Adviser on Africa

1.0 Executive Summary

1.1 Study Purpose

The Study is intended to analyze the refined petroleum products market in Rwanda, Burundi, and Southwest Uganda to determine the economic viability of extending the proposed Eldoret to Kampala ("E-K") petroleum products pipeline to Kigali, Rwanda and then on to Bujumbura, Burundi.

1.2 Study Scope

The Study presents bottom up forecasts of potential petroleum products demand in Rwanda, Burundi, and Southwest Uganda. A High Case scenario consists of higher projected economic growth. Potential demand from Northwest Tanzania and the planned Isaka - Kigali railroad are also added in the High Case scenario. A Low Case scenario is determined by the minimum demand required to ensure the economic viability of extension of the E-K pipeline to Kigali. The Study also compares the projected demand levels with historical consumption in other countries to assess the reasonableness of the projections.

Specific steps in the Study include:

1. Develop a likely general pipeline route focusing on reaching major demand centers and avoiding key geographical obstacles.
2. Assessment of macroeconomic conditions such as economic and population growth
3. Surveys of existing and potential distributors and consumers
4. Alternative fuel price scenarios
5. Development of potential market demand scenarios and key factors driving each scenario
6. Comparison of demand scenarios and available capacity on the E-K pipeline to determine the capacity of extensions from Kampala to Kigali to Bujumbura ("K-B").

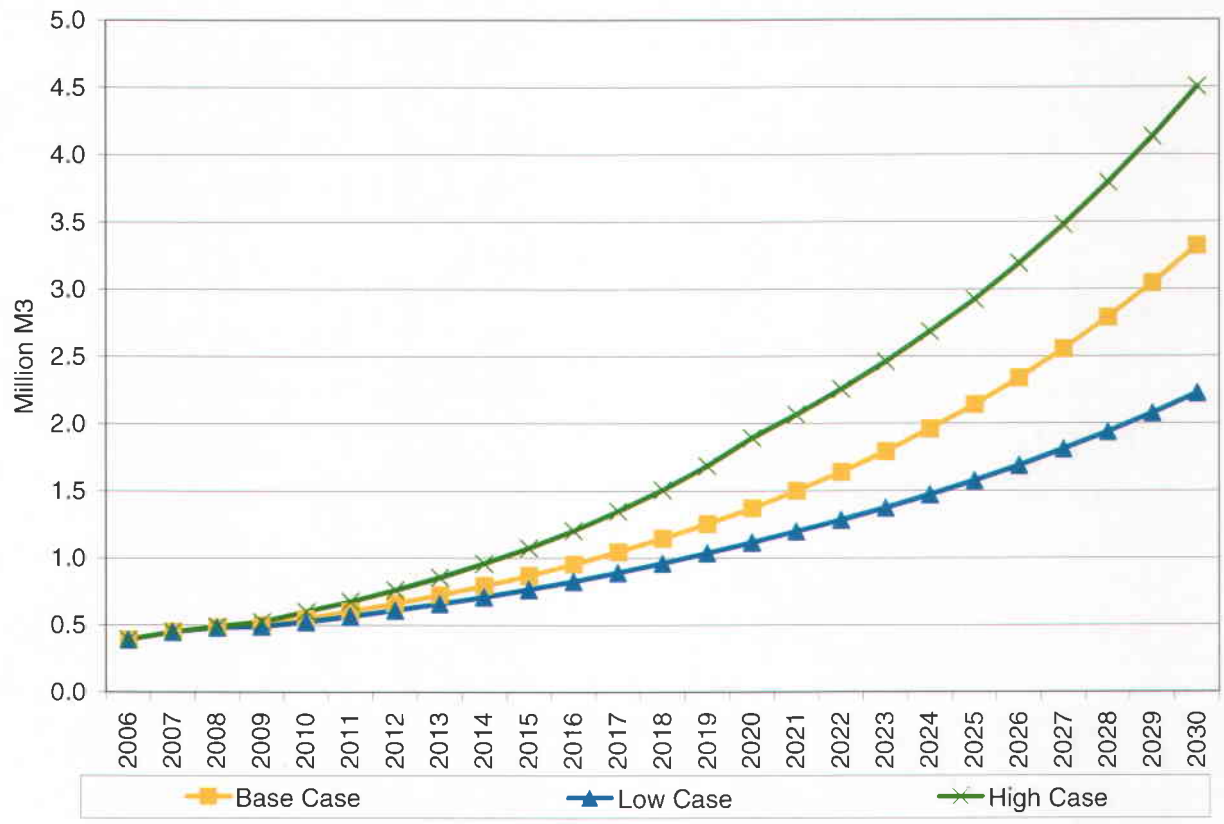
The Study also provides an assessment of the development impact (both direct and indirect, i.e. spin-off benefits) of the pipeline on the exporting and importing countries (Rwanda, Burundi and Uganda). The potential benefits are described and enumerated on infrastructure and industry, market-oriented reforms, human capacity building, technology transfer, and productivity enhancements. Further benefits are identified taking into consideration the current conditions and economic status of the areas through which the pipeline will travel.

A chapter in the study also addresses legal and regulatory analysis requirements for pipeline regulation and international cross border oil trade. Existing legislative and regulatory regimes are analyzed for compliance with international norms and a description of other legal regimes is provided that are geographically and juridically [i.e. civil law jurisdictions] relevant to determine a "Best Practices" case.

1.3 Key Findings

- The proposed K-B petroleum products pipeline is a white oil pipeline, transporting light petroleum products (gasoline, diesel, jet fuel, and kerosene) from western Kampala, through

Figure 1: Base, Low and High Case Demand Forecasts, 2006 – 2030



1.3.2 Kampala to Bujumbura Pipeline Size and Storage

- White oil consumption of 1.4 million M^3 by 2020 would be sufficient to support a 6" - 8" pipeline to Kigali, with flow rates up to 190 M^3/hour. By 2030, the flow rate could be as high as 460 M^3/hour.
- A pipeline extension from Kigali to Bujumbura is economically viable under SAIC's Base Case provided that the pipeline project term is 20 years. In order to make such an extension viable under a 10-year project term, SAIC recommends a phased approach with the Kampala – Kigali section in the first phase and the Kigali – Bujumbura section as the second phase. In the interim, when the pipeline terminates in Kigali, adequate storage can be constructed in Kigali to support the Burundian market via truck from Kigali.
- Based on projected Base Case demand in year 2020 and assuming 14 day storage requirements, the Kampala to Kigali pipeline section would need a total of 63,000 M^3 of storage capacity in Kigali. In order for Kigali to service Burundi via truck or a pipeline extension to Bujumbura, an additional 12,000 M^3 of storage capacity would be needed in Kigali. Additional investments in storage capacity will be needed to meet demands beyond that period.
- Existing storage in Kigali amounts to almost 17,500 M^3, which means that an additional 57,500 M^3 of storage would need to be constructed by 2020 in Kigali to serve both Rwanda

and Burundi. A technical feasibility study should include planning for the construction of this storage capacity in stages.

- Current storage capacity in Kigali consists of the Gatsata storage terminal, which can store over 7,242 M^3 of gasoline, 5,133 M^3 of diesel, and 1,500 M^3 of kerosene and the Kabuye storage terminal, which can store 1,500 M^3 of gasoline and 2,100 M^3 of diesel. In addition, there are regional storage facilities in Rwabuye (Butare), with 1,900 M^3 capacity for each of gasoline and diesel, and Bigogwe (3,000 M^3 of gasoline and 2,000 M^3 of diesel). Both of these storage facilities are in need of rehabilitation.

1.3.3 Petroleum Products Supply

- Petroleum products for the pipeline will be supplied from the new E-K pipeline. This will be an 8" to 10" pipeline with capacity of between 3 and 3.8 million M^3 per year. Through the addition of pumping facilities, capacity could easily be increased to between 4.6 and 5.3 million M^3 per year. This is more than sufficient to meet current demand in Uganda, Rwanda, and Burundi of 1.3 million M^3 per year currently, and expected demand of 2.8 million M^3 per year by 2020 and 5 million M^3 per year by 2030.
- Further upstream, the main Kenya pipeline, from Mombasa to Eldoret should be debottlenecked by the end of 2008 and capacity along the mainline, from Mombasa to Nairobi, will be doubled from 3.8 million M^3 per year to 8 million M^3 per year by that time. A new parallel 10" pipeline is being considered between Nairobi and Eldoret, which would increase capacity from 950,000 M^3 per year currently to around 3.6 million M^3 per year by the end of 2008.[1]
- Another potential source of diesel and kerosene could be a proposed oil topping plant (mini-refinery) in Northwest Uganda, on the shore of Lake Albert.

1.3.4 Pricing

- Since white oil is currently trucked into Rwanda via Uganda and into Burundi via Uganda and Tanzania, motor fuels are very expensive. The cost of trucking fuel from Eldoret to Kampala is around \$45/M^3, while the cost of trucking fuel to Kigali is around \$70-\$90/M^3. The cost of trucking fuel to Bujumbura across the Northern Transportation Corridor from Eldoret is even higher, \$110 - \$130/M^3.
- Based on announced costs to build the E-K pipeline, the tariff to transport product between Eldoret and Kampala along the E-K pipeline is likely to be between \$20 and \$24/M^3.[2]
- A \$194 million (nominal dollars) oil products pipeline from Kampala to Kigali would require a levelized tariff of \$42.44/ M^3 for the 2010-2020 time period, which is significantly lower than the levelized trucking tariff of \$56.89/ M^3.[3] Over the full 2010-2030 time period the required pipeline tariff would be \$22.13/M^3, as compared to the levelized trucking tariff of

[1] Based on discussions with Kenya Pipeline Company (KPC)

[2] Based on submissions of proposals to build the pipeline from Shell Uganda, CPC, and Tamoil.

[3] The levelized truck tariff is forecast of tariffs accounting for inflation over 10 and 20 years assuming that inflation is an annual average of 2.5%.

$66.68/ M^3$. This indicates the pipeline is economically superior to the current transport mode.

- A nominal $54 million oil products pipeline from Kigali to Bujumbura would require a levelized tariff of $55/M^3$, as compared to the levelized trucking cost of $47.41/M^3$ forecast for the 2010-2020 time period. However, over the 2010-2030 time period, the required levelized tariff is $28.88/ M^3$, which is well below the $55.47/ M^3$ levelized tariff projected for trucking.
- The final tariff along the pipeline will be dependent on the type of tariff selected and negotiated between countries. The tariff could be incremental, with each country paying the added cost of added pipeline mileage; postage stamp (a single tariff along the entire pipeline); distance based; zonal (e.g. one zone for SW Uganda, one zone for Rwanda, one zone for Burundi); or entry/exit, with each user paying an entry tariff at receipt points into the pipeline and an exit tariff at delivery points along the pipeline.

1.3.5 Legal/Regulatory

- Any extension of the E-K Pipeline from its terminus, upon completion in Kampala to Rwanda and possibly to Burundi must be viewed as legal union of the Kenya pipeline, the E-K pipeline and the future K-B pipeline into a unified whole from Mombasa to Kigali/ Bujumbura.
- The issue of ownership of the entity which will operate, and most likely also build, own and possibly transfer ("BOOT") the K-B pipeline extension is distinct and different from the issue of the legal and regulatory structure to authorize, finance and supervise construction and operation of the K-B pipeline.
- Ownership of the K-B pipeline entity does not have to be the same as that for the E-K extension entity (Tamoil) any more than Tamoil and Kenya Pipeline Company are the same.
- Private sector participation in the ownership entity is desirable because:
    a. It is already in place in the E-K segment;
    b. It is in accord with international best practices norms; and
    c. It may be expected to impose a degree of market discipline.
- Public participation in the ownership entity is desirable in addition to private ownership since
    a. It would be the same as, or similar to, the public-private structure of the E-K extension; and
    b. It decreases the need for a detailed governmental regulatory scheme, and facilitates resolution of issues such as eminent domain rights, pipeline safety and environmental issues.
- Multilateral governmental cooperation is essential for all cross-border projects, including this one. This is best accomplished by expansion of the existing E-K Joint Coordinating Commission ("JCC") to include Rwanda and Burundi, rather than by creation and use of a series of bi-lateral structures. Each country through which the pipeline passes must have a participant role in the JCC because each has an interest in the entire pipeline, its capacity and its operation, and in order to avoid inconsistent regulation.
- Adjunct or ex-officio status in the JCC for Rwanda and Burundi may be appropriate until their respective segments of the pipeline extension become a reality. Thereafter, each must have full status in the JCC.

- The East African Community (the "EAC") could play an important role in facilitating the structures and activities necessary for project implementation.

1.3.6 Economic Devlopment

- The K-B Pipeline will have immediate beneficial effects on employment and capacity-building. However, the largest impact is expected to come from the contribution of lower fuel costs to reducing transportation costs. Lower transportation costs will enhance the competitiveness of Rwandan products both domestically and for export.
- Around 1,700 people will be required to build the Kampala to Kigali pipeline, including 1,360 Rwandans over a 18-24 month build time. The Kigali to Bujumbura pipeline is expected to require 300 people, including 240 locals over a 12-month build time. The pipeline would be expected to employ about 100 people when operating.
- Further immediate advantage to the countries through which the pipeline will traverse are in the local support staff required – cooks, cleaners, mechanics, drivers, electricians, translators, guides, odd-jobbers, etc..
- There will be advantages to Burundi, Rwanda and Uganda in developing their human capacity as a result of the pipeline. These may result from opportunities for increased skills training through short-term employment in the building of the pipeline and longer-term benefits from the training and employment of personnel to maintain the pipeline after it is commissioned and other associated functions.
- Principal benefits of the projects will accrue to the Governments of Burundi, Rwanda and Uganda through the increased revenues that will result from development of the country's transportation infrastructure and agricultural and mineral export business and assisting them in the development of market driven economies and improving the livelihoods of the population.
- The K-B Pipeline is likely to lower average petroleum product prices by 10% or more depending on the world price of oil. The pipeline would also enhance security of supply, which would all but eliminate price spikes in the market for fuel, and ensure that fuel does not run out.
- The number of long haul fuel trucks on the trunk roads on the Northern and Central Transportation Corridors will be reduced and likely replaced with more trucks distributing fuel locally from supply depots associated with the K-B Pipeline.

2.0 Kenya-Uganda Pipeline & Uganda Exploration

This section discusses the status of the current Kenya to Uganda pipeline and the status of new oil finds in western Uganda along the Lake Albert Rift system. The viability of the Kenya-Uganda pipeline is dependent on the ability to secure sufficient petroleum supplies through Mombassa and transported along the Kenya pipeline to Eldoret, the beginning point for the Kenya – Uganda extension. Therefore, this section also discusses the status of the Kenya pipeline, current problems with sourcing petroleum from it, and investment plans for significant upgrades.

2.1 Key Findings

- The E-K Pipeline will be an 8-10 inch diameter, 320 km long pipeline from Eldoret, Kenya to Kampala, Uganda with an estimated daily capacity of between 350 M^3/hour to 440 M^3/hour. Once completed it will extend the Mombassa to Eldoret pipeline into the suburbs of Western Kampala.
- The E-K pipeline will be a public-private partnership (PPP) with the private investment partner, Tamoil East Africa Ltd, playing a leading role. The Kenyan and Ugandan governments will own 24.5% each of pipeline equity.
- Like the Kenya Pipeline, the Eldoret to Kampala pipeline will only transport white oil (gasoline, diesel, jet fuel, and kerosene). Heavy fuel oil will still have to be trucked into Uganda, Rwanda, and Burundi.
- The source of petroleum for the Eldoret to Kampala pipeline will be Kenya Pipeline Company's (KPC) Mombassa to Eldoret pipeline. The pipeline has a capacity of 440 M^3/hour between Mombassa and Nairobi before telescoping down to 110 M^3/hour at its termination in Eldoret.
- Current operation of the KPC pipeline is affected by its advanced age and frequent power supply interruptions. Consequently, the pipeline is no longer capable of transporting fuel at its installed capacity and is currently only pumping approximately 200 M^3 per hour.
- Significant investment is required in the KPC pipeline to meet growing demand in Kenya and the demands from the proposed E-K pipeline. Proposed upgrades and additions of pumping between Mombassa and Nairobi could double capacity from 440 M^3 / hour to 880 M^3/hour. In addition KPC is planning to lay a new 10" line between Nairobi and Eldoret to increase capacity to feed the new Eldoret to Kampala line.
- Uganda could become a significant producer of crude oil in the near future. Five successful oil wells were drilled in 2006 around the Lake Albert area of Western Uganda. Exploration is also being carried out on the DRC side of Lake Albert. Initial well flow rates are encouraging, with one well (Kingfisher-1) yielding an initial maximum flow rate of 14,000 barrels of oil per day, a world class production rate. More well testing and drilling is occurring in the region.
- The primary operator/producer in Uganda - Tullow Oil - is considering the installation of a local topping plant to extract petroleum products from the crude and a power generation plant to meet local electricity demands. The topping plant would produce approximately 31,000 M^3 per year of diesel and also heavy fuel oil for the power plant. This represents approximately 7 percent of Uganda's current diesel consumption and presents opportunities to operate the entire pipeline system as a grid, with potential savings to consumers.

2.3.1 Ownership Structure.

The project is being promoted as a public-private partnership (PPP) with the private investment partner playing a leading role. The two governments will own 24.5% each of the equity based capital of the project and the private sector will be the majority shareholder owning at least 51% of the equity. The private company selected for the project is Tamoil East Africa Ltd.[4]

The 320- km pipeline will be a build, own, operate and transfer (BOOT) venture, with full equity reverting back to Uganda and Kenya after a period of 20 years.

2.3.2 Current Progress on the E-K Pipeline.

In May 2004, the Joint Coordinating Commission (JCC) invited Expressions of Interest for private sector investment partners, out of which three submitted bids. Bids were received from China Petroleum Pipeline Engineering Corporation, Tamoil East Africa Ltd, and MISA/Shell Uganda. Tamoil East Africa won the bid at a development cost of $78.2 million, with a tariff of $20 / M^3. Second-placed China Petroleum Pipeline Engineering bid at $125 million while MISA/Shell Uganda bid $135 million. The pipeline is expected to be commissioned in August 2007 and be completed in late 2008 or early 2009.

2.3.3 Products Transported

The pipeline will transport white oils, gasoline, diesel, jest fuel, and kerosene. Based on Uganda's current fuel profile, diesel would make up approximately 56% of products transported, gasoline, 26%, jet fuel 12%, and kerosene 6%. The composition of white oil consumption in Rwanda and Burundi is similar to Uganda and the shares would be expected to remain similar once a K-B pipeline extension were built.

2.3.4 Tank Farm Capacity

Storage capacity at Eldoret is 42,000 M^3. A storage tank and terminal will likely by built in Western Kampala, the termination of the pipeline. The Government of Uganda also maintains fuel reserves at Jinja for strategic purposes to which the pipeline could be linked.

As yet, the final plans for storage for the pipeline have not been prepared.

2.3.5 Commercial Contracts

As yet there are no commercial contracts underpinning the E-K pipeline, however major marketers such a Shell, Total, and Chevron can be expected to secure capacity along the pipeline.

2.4 Uganda Exploration and Refining

A number of companies are actively exploring for oil and gas in Western Uganda, which if fruitful could change regional oil supply and demand dynamics. Early signs are that the finds are

[4] US-based private equity firm Colony Capital recently acquired 65% of Tamoil, although Tamoil East Africa will continue to be wholly Libyan owned.

significant based on results from exploration of the Lake Albert Rift Basin, which straddles the border of Western Uganda and the DRC. Companies include a British independent - Tullow Oil and a Canadian independent – Heritage Oil. Tower Resources recently acquired Neptune Petroleum Corporation and is exploring on the Northern edge of the Lake Albert Rift Basin.

Exploration has so far occurred on the Uganda side of Lake Albert, where a total of five successful oil wells were drilled in 2006. The Mputa-1 well tested at 1,100 barrels of oil per day (bopd), the Waraga-1 well yielded a maximum flow rate of 12,000 bopd, and the Kingfisher-1 tested at almost 14,000 bopd. Two other wells, the Mputa-2 and the Nzizi-1 also encountered oil producing strata. In general the crude is a waxy light oil (33-34° API), with a low gas-to-oil ratio.

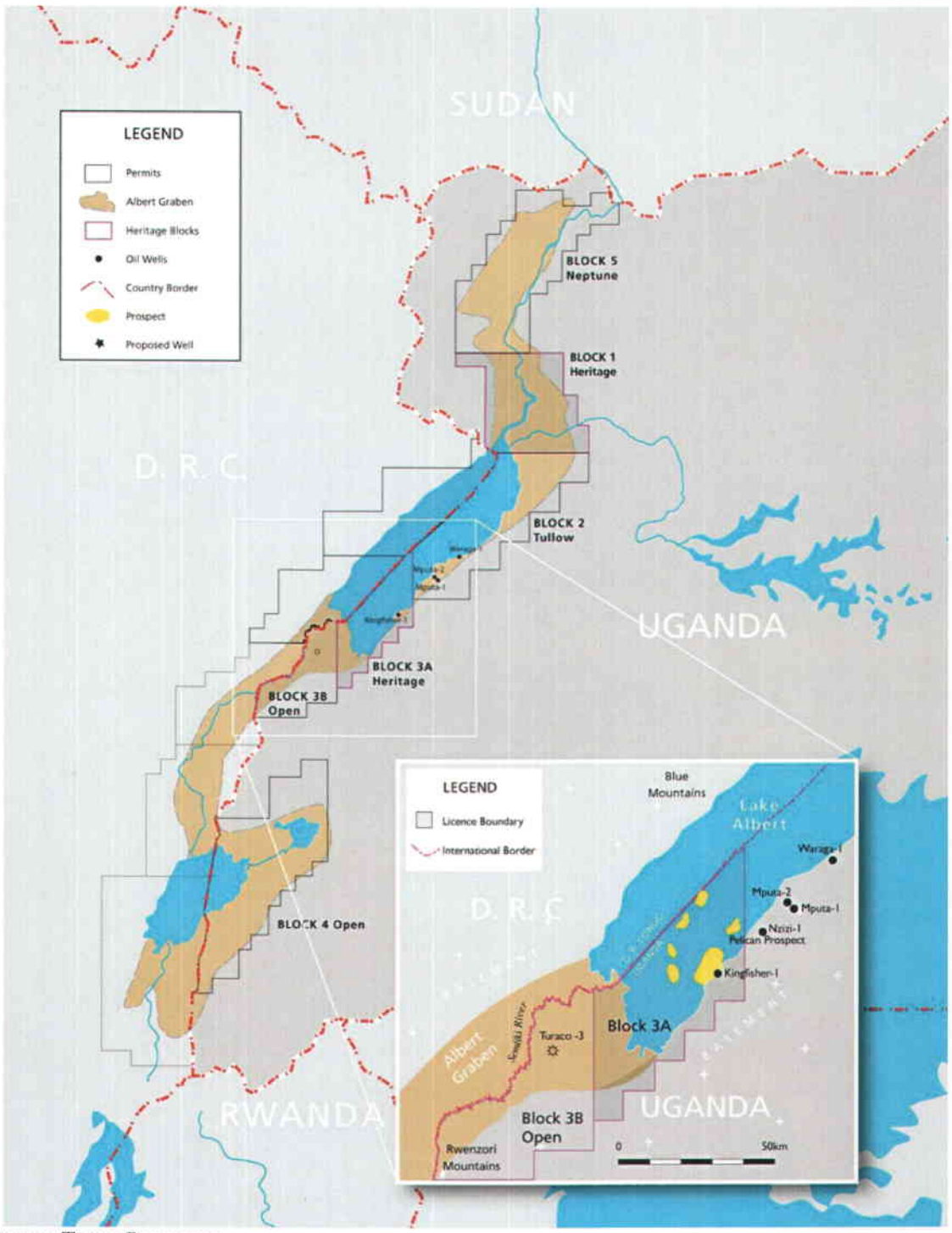
Tullow is conducting further exploration/appraisal drilling across the Lake Albert Rift Basin to prove up additional reserves. Also, to expedite oil production and monetize reserves, Tullow is considering the installation of a local topping plant to extract petroleum products from the crude and a 50 MW power generation plant to meet local electricity demand. The topping plant will produce approximately 10 million liters / year of naphtha, 7 million liters /year of kerosene, 30 million liters /year of diesel, and 185 million liters / year of HFO. All products will be provided locally for Uganda domestic consumption apart from naphtha which may go to the refinery in Mombassa. The power plant will consume approximately 104 million liters per year of HFO, with the rest sold into the local Uganda market (Table 2). Figure 3 shows the location of Uganda's exploration and development activity.

Table 2: Proposed Product Split for Local Topping Plant

	BBls/d	Liters/Year
HFO for power	1,800	657,000
HFO for market	1,380	503,700
Naptha	180	65,700
Diesel	500	182,500
Kerosens	120	43,800
Total Capacity	**4,000**	**1,460,000**

Source: Tullow Oil plc

Figure 3: Map of Uganda Exploration and Development Activity



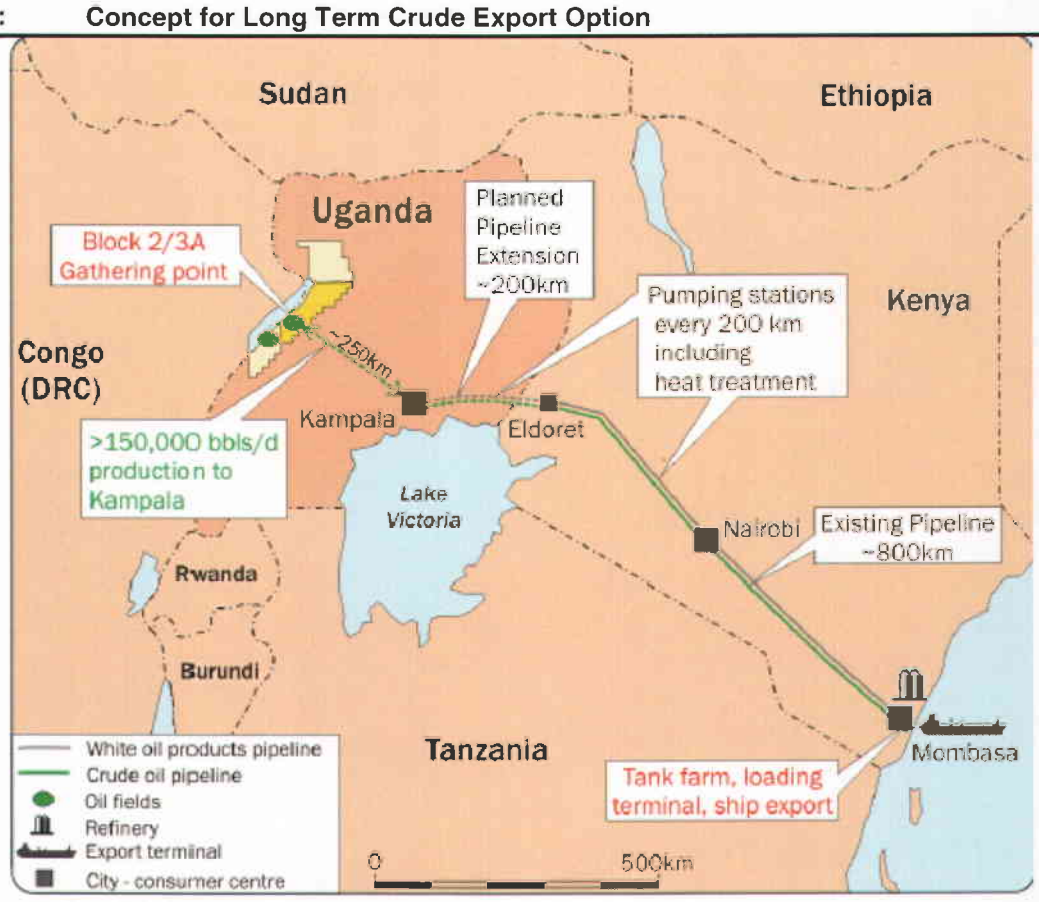
Source: Tower Resources

Diesel production of 30 million liters per year represents approximately 7 percent of Uganda's current diesel consumption and would provide a much needed additional source of diesel to the entire region.

The benefits of this new supply would be a nearby source of fuel for Rwanda and Burundi that could satisfy some of their diesel requirements. The Kampala to Kigali pipeline could be routed through Kasese in Western Uganda where it could interconnect with a pipeline delivering diesel from the Lake Albert mini refinery. The more economic alternative would be for the Kampala to Kigali pipeline to be built as described in this report, with a spur line built from Lake Albert. The diesel would be delivered south to Kigali and Bujumbura and could even be delivered to Kampala and points Northeast via backhaul.

Tullow Oil is also looking at long term oil export options, with the expectation that production from Western Uganda could eventually reach over 300 mmbls. The project would require building a 1,300KM oil export line to Mombasa for refining and export. The earliest oil would flow on this route would be 2014/15 and such a project would have a direct impact on the entire regional oil market and the cost of oil and petroleum products. A Kampala to Kigali to Bujumbura pipeline could benefit greatly from additional supplies if enough topping capacity were built.

Figure 4: Concept for Long Term Crude Export Option



Source: Tullow Oil plc

3.0 Petroleum Demand in SW Uganda, Rwanda & Burundi

3.1 Introduction

SAIC developed white oil demand forecasts for each relevant economic sector in Uganda, Rwanda, and Burundi, and assessed their respective contribution to current and future demand growth for white oil to determine the economic viability of extending the proposed E-K pipeline to Rwanda and Burundi. In order to verify the reasonableness of the aggregated country-level forecasts, SAIC also examined the overall relationship between white oil consumption and per capita GDP and compared projected consumption levels with historical data from other countries.

3.2 Key Findings

- Transportation is the dominant sector with regards to white oil demand in Uganda, Rwanda and Burundi. In all three countries, gasoline and diesel for transportation account for 80% to 90% of white oil consumption. SAIC expects this to remain the case for the foreseeable future and it is demand from this sector that will underpin the pipeline.
- Southwest Uganda, Rwanda, and Burundi consumed approximately 392,000 M^3 of white oil in 2006. In the Base Case, SAIC expects white oil consumption will grow to 1.4 million M^3 by 2020 and to 3.3 million M^3 by 2030 (Figure 1).
- In the High Case, white oil consumption in SW Uganda, Rwanda, and Burundi grows to 1.9 million M^3 by 2020 and 4.5 million M^3 by 2030. The High Case entails accelerated economic growth in the region and the realization of a few large infrastructure projects.
- The Low Case scenario was established as the minimum demand that would support a pipeline to Kigali, with further transportation to Bujumbura going by truck. Under the Low Case, demand in SW Uganda, Rwanda, and Burundi grows from 392,000 M^3 in 2006 to 1.1 million M^3 by 2020 and 2.2 million M^3 by 2030.

3.2.1 Rwanda

- SAIC expects Rwanda's population to grow from 9 million in 2005, to 13 million by 2020 and 15.7 million by 2030. Based on a CAGR of 6.3% in real U.S. dollar GDP from 2005 - 2030, Rwanda's economy should grow to middle income status, from $2.15 billion in 2005 to $5.6 billion by 2020 and $10 billion by 2030, all in real 2005 dollars. Real per capita GDP would grow from $238 in 2005 to $428 by 2020, and $633 by 2030.
- Rwanda's white oil consumption grew an annual rate of 19% between 2004 and 2006, from 124,072 M^3 per year to 172,987 M^3 per year in 2006, excluding jet fuel. Jet fuel consumption in 2006 was 9,201 M^3. Assuming that over the next 25 years, Rwanda's population grows at 2.2 percent annually and real per capita income grows at 6.3%, white oil consumption is projected to grow almost nine fold, to 0.24 million M^3 by 2010, 0.62 million M^3 by 2020 and 1.5 million M^3 by 2030, an annual growth rate of 9.4 percent in the period 2006-2030.
- Diesel and gasoline demand for land transportation will be driven by a growing motor vehicle fleet and increased consumption per capita for transportation, growing from 125,394 M^3 in 2006 to 579,954 M^3 by 2020, and 1,451,584 M^3 by 2030.

- Jet fuel consumption is likely to grow with the construction of a new airport near Kigali. The lower cost of delivered jet fuel via the K-B pipeline is also likely to promote the GOR's plan to turn Rwanda into a regional air freight hub. However, this forecasted jet fuel use has the greatest uncertainty due to multiple opportunities for aircraft to refuel at other regional airports. Jet fuel consumption is expected to grow from 9,201 M^3 in 2006 to 17,300 M^3 by 2020, and 26,758 M^3 by 2030.
- The industrial sector in Rwanda is comparatively small and the industry that does exist currently uses HFO and electricity. This is expected to continue even with greater availability of diesel through a pipeline because even trucked fuel oil is expected to continue to be cheaper than diesel. Moreover, methane gas from Lake Kivu is likely to become available for the two largest industries, Bralirwa and Cimerwa, in Western Rwanda.
- Mining may become a larger industry in Rwanda, but even if small commercial mines are established, they arte not expected to add significant amounts of diesel demand.
- Power generation in Rwanda has required significant amounts of diesel over the last few years as Electrogaz has increased the use of its diesel-fired generators and introduced rented diesel generators in an attempt to ensure adequate electricity supplies. However, the use of diesel for power generation is expected to decline dramatically in 2008 as HFO-fired generators are installed and contracts with the rental power generators are terminated. Moreover, the GOR is aggressively developing mini-hydro projects and the use of Lake Kivu methane gas for power generation. It is also participating in the development of larger regional hydro-power generation projects.
- Potential demand from the proposed Isaka – Kigali railroad and from the proposed Kabanga nickel mine is included in SAIC's High Case, as these projects face significant uncertainties in the future.

3.2.2 Uganda

- SAIC expects Uganda's population to grow from 28.8 million in 2005 to 46.5 million by 2020 and 60.2 million by 2030. Based on a real GDP CAGR of 6.0%, Uganda's economy should grow from $8.7 billion in 2005 to $21.0 billion by 2020 and $37.6 billion by 2030 (real 2005 dollars). Real per capita GDP would grow from $303 in 2005 to $657 by 2020, and $1,162 by 2030.
- Uganda's white oil consumption grew an annual rate of 4.5% between 2000 and 2006, from 0.58 million M^3 per year to 0.75 million M^3 per year in 2006. Assuming that over the next 25 years, Uganda's population grows at 3.0 percent annually and real per capita income grows at 2.9%, white oil consumption in Southwestern Uganda is projected to grow more than 10 times, from an estimated 0.11 million M^3 in 2006 to 1.2 million M^3 per year by 2030, an annual increase of 10.2 percent in the period 2006-2030.
- Diesel and gasoline demand will be driven by a growing motor vehicle fleet. Assuming that Southwestern Uganda accounts for 22% of demand (based on its proportion of Uganda's population), diesel and gasoline demand for land transportation would grow from 105,186 M^3 per year in 2006 to 462,000 M^3 per year by 2020, and over 1 million M^3 per year by 2030.
- Jet fuel consumption is likely to grow with expansion of Entebbe airport, which the Ugandan government would like to make into a regional hub. However, jet fuel consumption in Southwestern Uganda is expected to be negligible and not add demand to the K-B pipeline.

- The industrial sector uses only limited amounts of white oil. The industrial sector in Uganda is comparatively small and the industry that does exist generally uses heavy fuel oil and electricity, with diesel generation for backup. This state of affairs is expected to continue, with industry only supporting relatively small amounts of gasoline and diesel demand.
- For many years, Uganda's power generation capacity was 98% hydro with a small amount of backup diesel generation. In response to drought conditions and diminished hydro capacity, in May 2005 the Government of Uganda introduced 100 MW of emergency diesel powered thermal generators that currently consume 51% of Uganda's diesel consumption. The generators are expected to be converted to burning HFO, significantly reducing Uganda's diesel consumption. Most future generation will likely be met by new hydro projects that are under development, such as the Bujagali project.

3.2.3 Burundi

- SAIC expects Burundi's population to grow from 7.5 million in 2005, to 11.7 million by 2020 and 15.4 million by 2030, catching up with Rwanda. Based on a real GDP growth rate of 6.5% from 2005 - 2030, Burundi's economy should grow from $0.8 billion in 2005 to $2.15 billion by 2020 and $3.8 billion by 2030 (real 2005 dollars). Real per capita GDP would grow from $107 in 2005 to $183 by 2020, and $249 by 2030.
- Burundi's white oil consumption grew at an annual rate of 6.4% between 1997 and 2006, from 0.05 million M^3 per year to 0.09 million M^3 per year. Assuming that over the next 25 years, Burundi's population grows at 2.9 percent annually and real per capita income grows at 6.5%, white oil consumption is projected to grow more than 6.5 times, to 0.62 million M^3 per year by 2030, at an annual growth rate of 8.2 percent in the period 2006-2030.
- Diesel and gasoline demand will be driven by a growing motor vehicle fleet and increased consumption per capita for transportation, growing from an estimated 77,221 M^3 in 2006 to 266,646 M^3 by 2020, and 612,229 M^3 by 2030.
- Jet fuel consumption for civilian use is likely to grow as the economy expands under Burundi's newfound stability. However, Burundi is unlikely to be able to compete with Rwanda or Uganda as a regional air freight hub. Moreover, overall jet fuel consumption is likely to continue to decline as increased regional political stability reduces the amount of jet fuel used for military purposes. Civilian and military jet fuel consumption was 7,746 M^3 in 2006, of which 2,843 M^3, or 37% was estimated to be for civilian use. Some jet fuel is also exported to the DRC. Civilian use jet fuel consumption is expected to grow from 2,843 M^3 in 2006 to 5,964 M^3 by 2020, and 9,033 M^3 by 2030.
- The industrial sector in Burundi is small and the industry that does exist currently uses HFO and electricity. This is expected to continue even with greater availability of diesel through a K-B pipeline because even though it is trucked, HFO is expected to remain cheaper than diesel.
- Power generation in Burundi is dominated by hydro and the country suffers frequent blackouts and brown-outs. While an old diesel-fired generator is expected to be used in 2007, the GOB is negotiating financing with the World Bank for HFO-fired generators to provide thermal generation to Burundi. Hence, diesel for power generation is expected to be negligible.
- Backup power generators are in frequent use in Burundi. As Burundi continues to stabilize, the economy grows and Regideso improves electricity supply, the use of backup generators is

expected to decline significantly. Hence, SAIC projects that diesel for backup generation will decline over the next 10 years and become negligible by 2015.

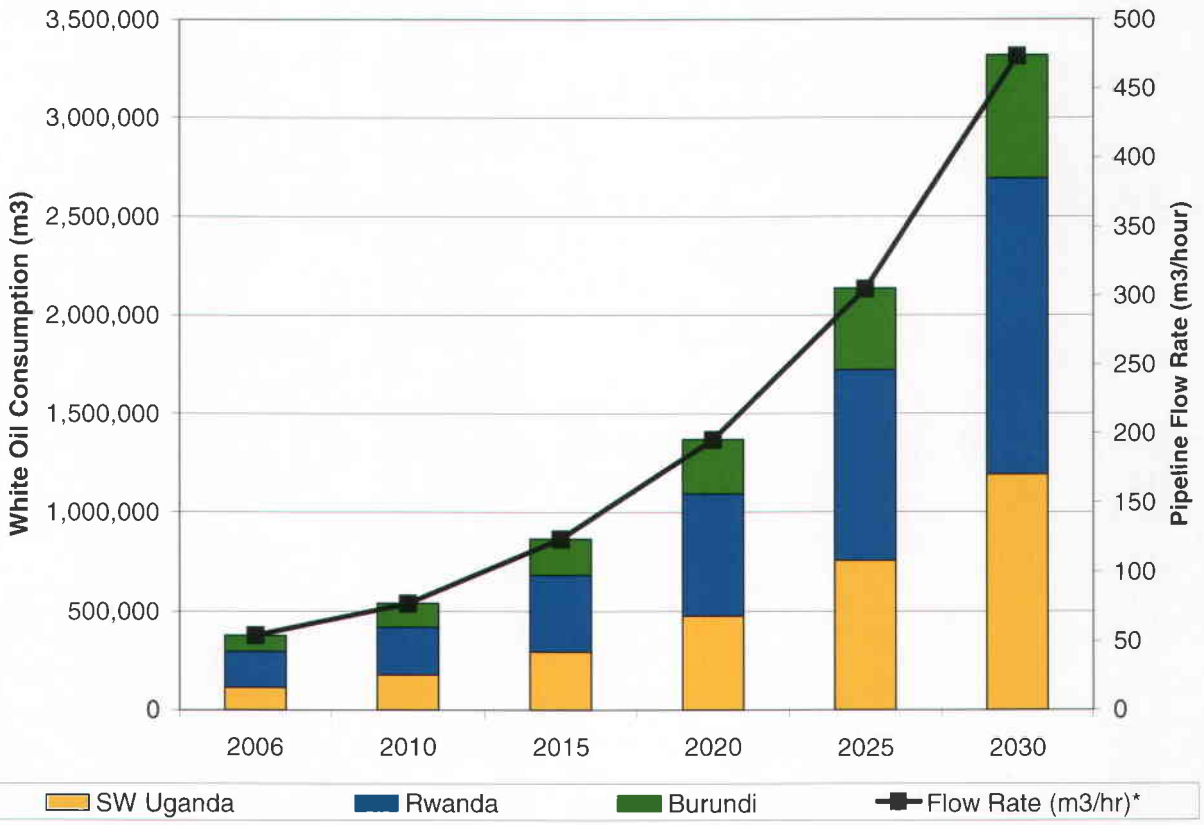
3.3 Assessment of Petroleum Products Demand

The following sections discuss Rwanda, Uganda, and Burundi and include an assessment of future petroleum demand growth based on expectations for future economic growth and sector-specific developments. The sectors assessed include:

- Land Transportation;
- Civil Aviation;
- Power; and
- Industry.

The demand forecasted for each sector was summed to generate the country-level and regional demand forecasts. This provides SAIC's base case projection of regional white oil demand shown in Figure 5.

Figure 5: Base Case Demand Forecast and Flow Rates, 2006 – 2030



* Flow rate assumes a capacity factor of 80%

SAIC also developed two sensitivities around the Base Case, representing High and Low demand primarily based around GDP per capita growth scenarios. In the High Case, white oil consumption in SW Uganda, Rwanda, and Burundi grows to 1.9 million M^3 by 2020 and 4.5

million M^3 by 2030. Also included in the High Case is diesel demand from the proposed Kabanga Mine in NW Tanzania, starting in 2012, and from the proposed Isaka-Kigali railroad, starting in 2020.

The Low Case was established as the minimum demand that would support a pipeline from Kampala to Kigali. Under the Low Case demand in SW Uganda, Rwanda, and Burundi grows from 0.39 million M^3 in 2006 to 1.11 million M^3 by 2020 and 2.22 million M^3 by 2030.

3.4 Rwanda

Table 3 provides a summary of forecasted macroeconomic indicators and petroleum product demand. Since transportation is by far the largest consumer of white oil product, information about vehicle growth is also provided.

Table 3: Rwanda at a Glance, 2007 - 2030

	2007	2020	2030
Population (millions)	9.4	13.0	15.7
Real GDP (Billion $)	2.5	5.6	10.0
Real GDP per Capita	272	428	633
Economy	Predominantly agricultural with small scale industry	Predominantly agriculture with growing service sector	Middle Income
Power	72 MW of installed capacity, over 59% hydro. About 64% of generation from diesel	93 MW. About 60% thermal, mainly methane gas, and 40% hydro. Less than 1% of generation from diesel	<1% diesel generation
Number of Vehicles	50,512	92,681	133,511
Vehicle Ownership Rates per 100,000 people	539	715	850
Petroleum Product Demand ('000 M^3/year)			
Gasoline	78	290	726
Diesel	116	291	727
Jet Fuel	10	17	27
Kerosene	14	19	23
Total White Oil	**218**	**617**	**1,502**

Note: Totals may not add up to the sum of the individual fuels due to rounding

Rwanda has embarked on a path of comprehensive economic development that promises to grow both per capita GDP and white oil consumption significantly over the next 20 years. A "long-term development path for Rwanda", including various targets, was elaborated in 1998 - 2000, and updated in 2004, and is known as VISION 2020. As the Foreword of the VISION 2020

document puts it: "VISION 2020 is a framework for Rwanda's development, presenting the key priorities and providing Rwandans with a guiding tool for the future"[5].

VISION 2020 is made up of six pillars, where the first pillar is good governance and the other five concern economic development. The six pillars as outlined in VISION 2020 are shown in Table 4

Table 4: Rwanda VISION 2020 Objectives

Pillars of the VISION 2020	Cross-cutting areas of VISION 2020
1. Good governance and a capable state	1. Gender equality
2. Human resource development and a knowledge based economy	2. Protection of environment and sustainable natural resource management
3. A private sector-led economy	
4. Infrastructure development	3. Science and technology, including ICT
5. Productive and Market Oriented Agriculture	
6. Regional and International Economic integration.	

Source: Page 14 of *Rwanda Vision 2020*, 2004 Kibuye version.

In economic terms, VISION 2020 aims to increase GDP/capita to $900, in current dollars, by 2020. In 2005, the IMF reports that GDP/capita in Rwanda was $238. In addition, VISION 2020 puts particular emphasis on economic development also leading to poverty reduction. SAIC finds that the goal of $900 in GDP/capita is quite ambitious. SAIC's projection shows a GDP/capita of $623 in 2020, in current dollars.

A total of 47 quantitative targets are specified in VISION 2020. Selected targets of VISION 2020 are outlined in Table 5.

[5] Page 2, paragraph 3 of *Rwanda Vision 2020*, 2004 Kibuye version.

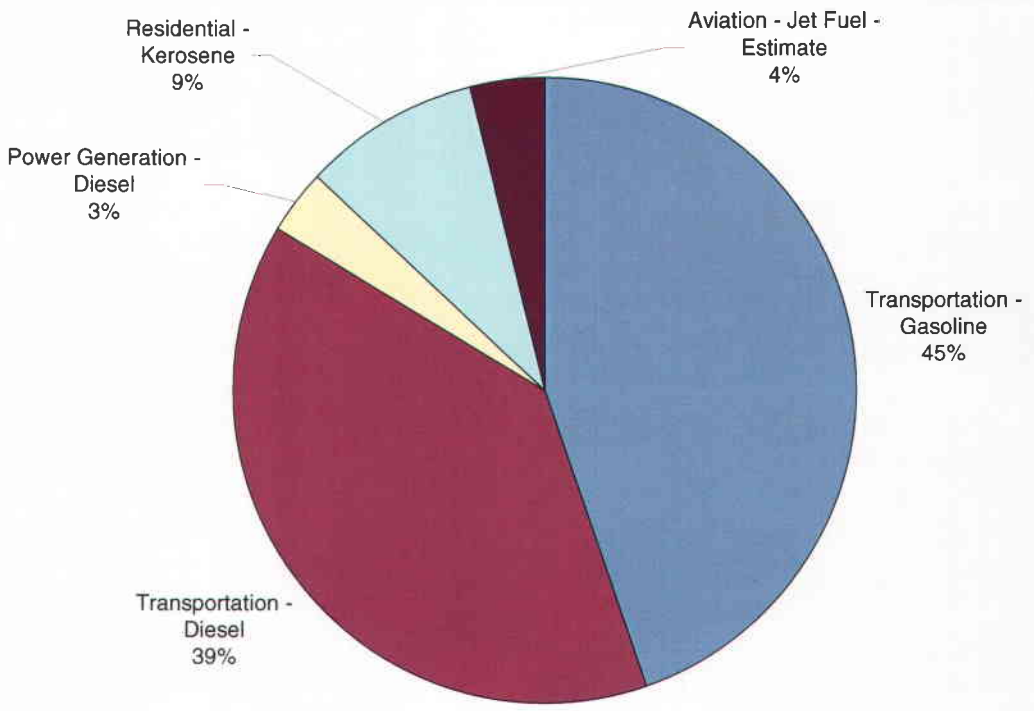
Table 5: Rwanda VISION 2020 – Selected Targets

Indicators	Situation In 2000	Target in 2010	Target in 2020
1. Rwandan population	7,700,000	10,200,000	13,000,000
7. Child Malnutrition (Insufficiency in %)	30	20	10
24. Poverty (%< 1 US $/day)	64	40	30
25. Average GDP growth rate (%)	6.2	8	8
26. Growth rate of the agricultural sector (%)	9	8	6
27. Growth rate of the industry sector (%)	7	9	12
28. Growth rate of the service sector (%)	7	9	11
32. GDP per capita in US $	220	400	900
33. Urban population (%)	10	20	30
41. Road network (km/km2)	0.54	0.56	0.60
42. Annual electricity consumption (Khw/inhabitants)	30	60	100
43. Access to electric energy (% of population.)	2	25	35
46. Wood energy in the national energy consumption (%)	94	50	50
47. Non-agricultural jobs	200.000	500.000	1.400.000

Source: *Rwanda Vision 2020*, 2004 Kibuye version.

SAIC expects that the transportation sector will be the primary demand driver for white oil consumption in Rwanda over the next 20 years. As Rwanda's economy develops, more vehicles will be acquired and utilized both for commercial and passenger traffic, which will increase demand for transportation fuels such as motor gasoline, gasoil/diesel and jet fuel. In 2006, transportation accounted for 84% of total white oil consumption with gasoline accounting for 45% followed by diesel for transportation at 39% (Figure 6). The largest sector following transportation is the residential sector which consumes kerosene for lighting and cooking. It is also likely that some of this kerosene is consumed in the Eastern DRC without showing up in official export statistics.

Figure 6: Rwanda Normalized* White Oil Consumption by Sector, 2006



* Excludes diesel for rented power generation
Sources: Rwanda Minicom, Electrogaz, Fuel suppliers

Key findings for each of the fuels are:

- Diesel and gasoline demand will be driven by a growing motor vehicle fleet as Rwanda's population increases by 2.2% per year from 2005-2030 and real GDP and per capita GDP show positive growth of 6.3% and 4.0% per year, from 2005-2030, respectively.
- Jet fuel consumption is likely to grow with the construction of the new airport near Kigali. The lower cost of delivered jet fuel via a pipeline is also likely to promote the GOR's plan to turn Rwanda into a regional air freight hub. As a result, jet fuel consumption is expected to grow from 9,201 M^3 in 2006 to 26,758 M^3 in 2030.
- The industrial sector in Rwanda is comparatively small and the industry that does exist currently uses heavy fuel oil and electricity. This is expected to continue even with a white oil pipeline.
    - Heavy fuel oil is the process fuel of choice for the brewery, the cement factory and the textile mill as it is cheaper than diesel. Even with a pipeline, trucked fuel oil is expected to be cheaper than diesel for these industries. Moreover, methane gas from Lake Kivu may become available for the cement factory and the brewery.
    - The coffee and tea industries use primarily electricity for its sorting, washing, and roasting equipment.

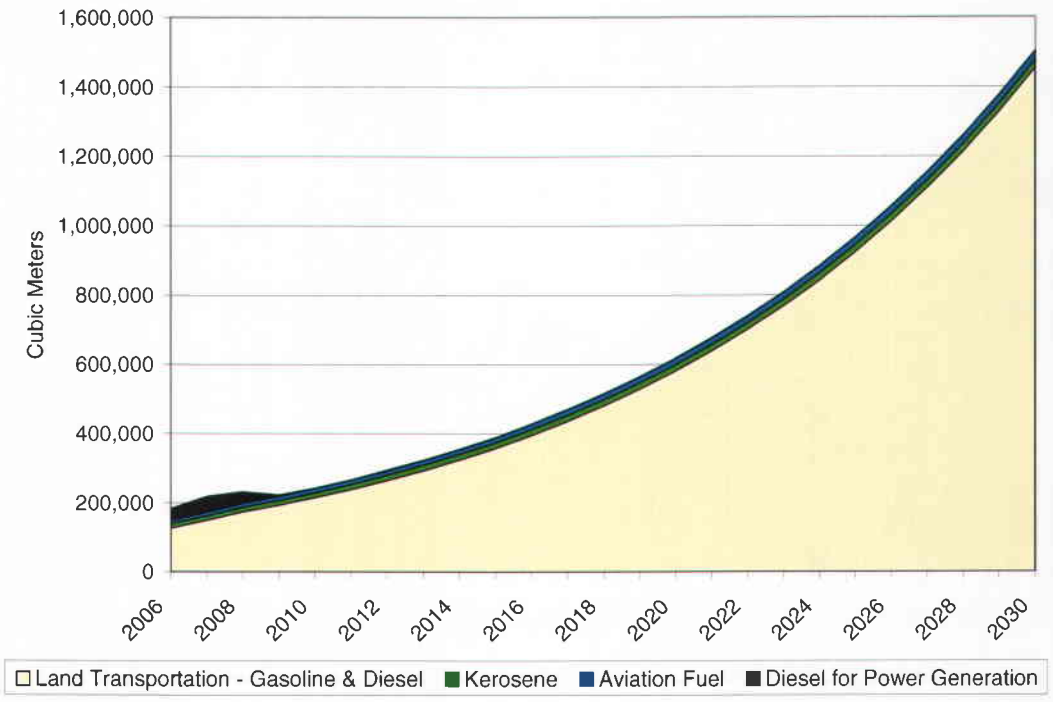
- Backup generators will continue to run on diesel, but are unlikely to be used significantly in the future as the Government of Rwanda continues to implement measures to ensure the availability of electricity on the network.
- Mining may increase its consumption of primarily gasoline and diesel for transportation purposes. However, such consumption is only included in the High Case forecast.

- Power generation in Rwanda has required significant amounts of diesel over the last few years as Electrogaz has increased the use of its diesel-fired generators and introduced rented diesel generators in order to ensure adequate electricity supplies. However, the use of diesel for power generation is expected to decline dramatically in 2008 as
  - HFO-fired generators are installed;
  - Contracts with the rental power generators are terminated; and
  - Mini-hydro and large hydro-power generation projects are aggressively developed.
  - Projects to develop power generation projects up to 100 MW using methane gas from Lake Kivu are being actively developed.

  Diesel generation is not expected to disappear but will be used primarily for peaking purposes and as such will not be a major source of demand for diesel over the next few decades.

SAIC's forecast for total white oil consumption in Rwanda shows an increase from an actual volume of 182,189 M^3 in 2006 to 1,502,203 M^3 in 2030. This is equivalent to per capita white oil consumption in 2030 of 96 liters.

Figure 7: Rwanda Sectoral Demand Forecasts, 2006-2030



The remainder of this section examines the components and methodology of the sectoral forecasts.

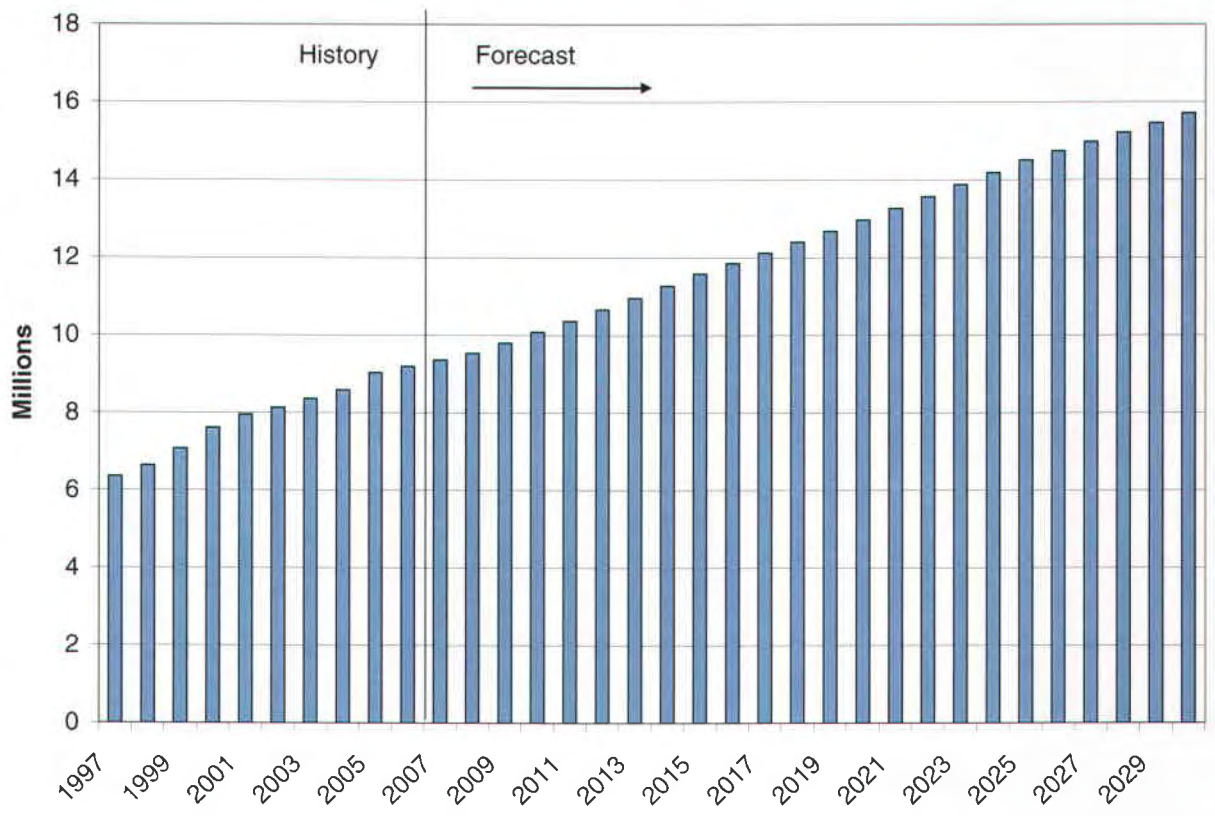
3.4.1 Macroeconomic Analysis

Population

Rwanda's population is approximately 9 million, with major concentrations in and around Kigali and some of the regional centers such as Gitarama and Butare. The city of Kigali and surrounding areas had a population of 1,392,379 people or 17% of total population, according to the latest census in 2003. Virtually all white oil in Rwanda is currently imported to the depots in Kigali and then shipped to the rest of the country. Hence, the pipeline would serve the whole of Rwanda.

Over the period 1997 – 2006, Rwanda's population grew at approximately 4.2% annually. SAIC used the IMF's WEO estimates for the near-term forecasts until 2008 and applied the UN's growth rates for the longer term forecast. The IMF's WEO estimates that Rwanda's population will grow to 9.5 million by 2008 and the UN estimates that the annual population growth rate from 2008 to 2015 will be 2.8%, slowing down to 2.3% between 2016 and 2025, and slowing further to 1.6% starting in 2026. Hence, SAIC estimates that Rwanda's population will be 10.1 million in 2010 and 15.7 million by 2030.

Figure 8: Rwanda's Projected Population

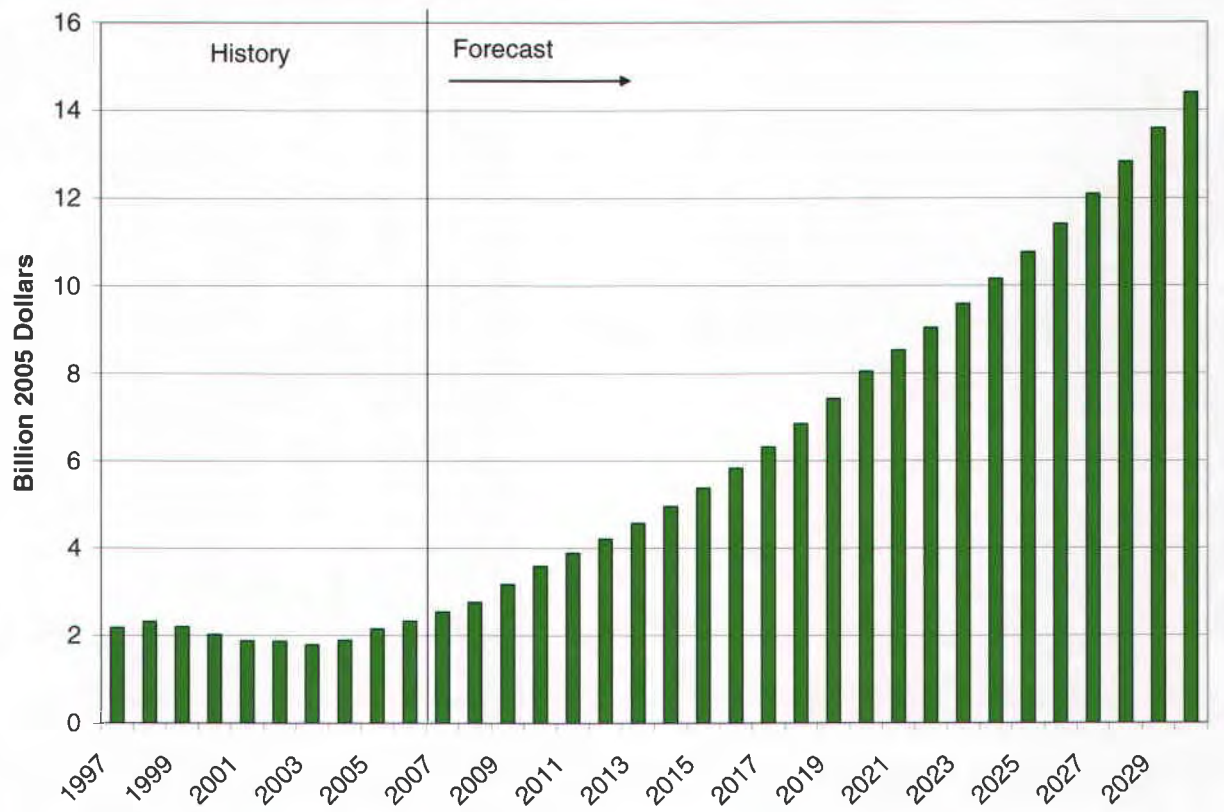


Source: IMF WEO, United Nations, and SAIC

Gross Domestic Product

Rwanda produced approximately $2.3 billion in goods and services in 2006, with a per capita income of $261 (real 2005 dollars). The economy is predominantly agricultural based, contributing about 43% of GDP, while manufacturing contributes about 20% of GDP. The rest of the economy consists of government and services. Based on expected growth rates, real GDP is projected to grow at an average annual rate of 8.9% in the next two years, slowing down to a long-term annual growth rate of 6% in subsequent years. This would grow Rwanda's economy to $5.6 billion by 2010 and $10 billion by 2030 (real 2005 dollars).

Figure 9: Rwanda's Projected Real Dollar GDP



Source: IMF WEO and SAIC

Forecasted real growth of 6% after 2008 assumes that Rwanda continues with its successful economic reforms expanding private sector and providing necessary infrastructure, e.g. road transportation and electricity. Rwanda aims to fulfill the goals of its development strategy as outlined in Vision 2020 (see section above for more details). However, the goals are ambitious and SAIC's Base Case forecast does not achieve the per capita GDP goal set for the year 2020 until 2026.

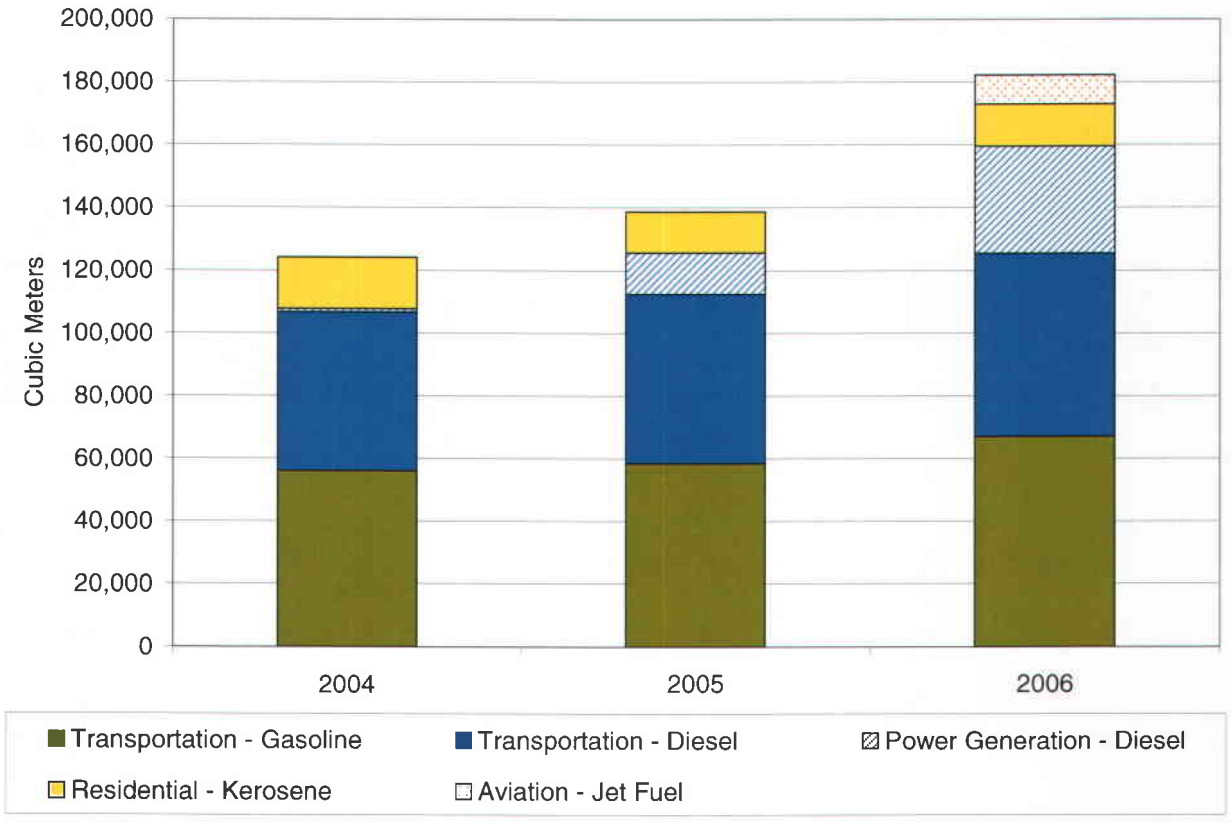
Annual growth in real GDP of 6.3% between 2005 and 2030, coupled with 2.2% annual growth in population should result in per capita income of $308 by 2010 and $633 by 2030 (real 2005 dollars).

3.4.2 Sectoral Analysis

Rwanda's white oil consumption increased significantly in 2005 and 2006 due to the introduction of diesel-fired power generation to alleviate its power supply shortage. Consumption of gasoline, diesel, and kerosene (i.e. excluding jet fuel) increased from 124,072 M^3 in 2004 (the earliest year for which detailed data is available) to 172,987 M^3 in 2006 (Figure 10). Jet fuel consumption in 2006 was 9,201 M^3, the only year for which data was available.

Diesel accounted for the largest consumption growth, increasing from 51,650 M^3 in 2004 to 92,496 M^3 in 2006. However, most of this increase is likely to be temporary as the use of diesel for power generation will be reduced substantially by early 2008. Electrogaz is likely to keep the 12.5 MW of diesel-fired generation it installed in 2004 and 2005, but is planning to operate these generators for peaking purposes only. The large reduction in diesel consumption for power generation will come from the termination of contracts and phasing out of rented diesel-fired generation that has accounted for the bulk of diesel consumption. The rental power will be replaced in early 2008 by reciprocating engine generators purchased by Electrogaz capable of running on both fuel oil and natural/methane gas.

Figure 10: Rwanda White Oil Consumption 2004-2006



Note: Jet fuel consumption numbers were only available for 2006
Source: Rwanda Minicom and Electrogaz

Excluding diesel for power generation and jet fuel, Rwanda's fuel consumption growth over the last few years is still significant, though less dramatic, growing from 123,092 M^3 in 2004 to 138,847 M^3 in 2006, an annual increase of 6.2% (Figure 10).

Civil aviation jet fuel consumption for Rwanda was only available for the year 2006, when consumption was 9,201 M^3. Fuel suppliers interviewed by SAIC indicated that total jet fuel consumption has declined due to lower use by the Rwandan military, though actual military consumption data was not available. Including jet fuel, total white oil consumption in Rwanda in

2006 was 182,189 M^3 and normalized consumption, excluding diesel for power generation, was 148,048 M^3.

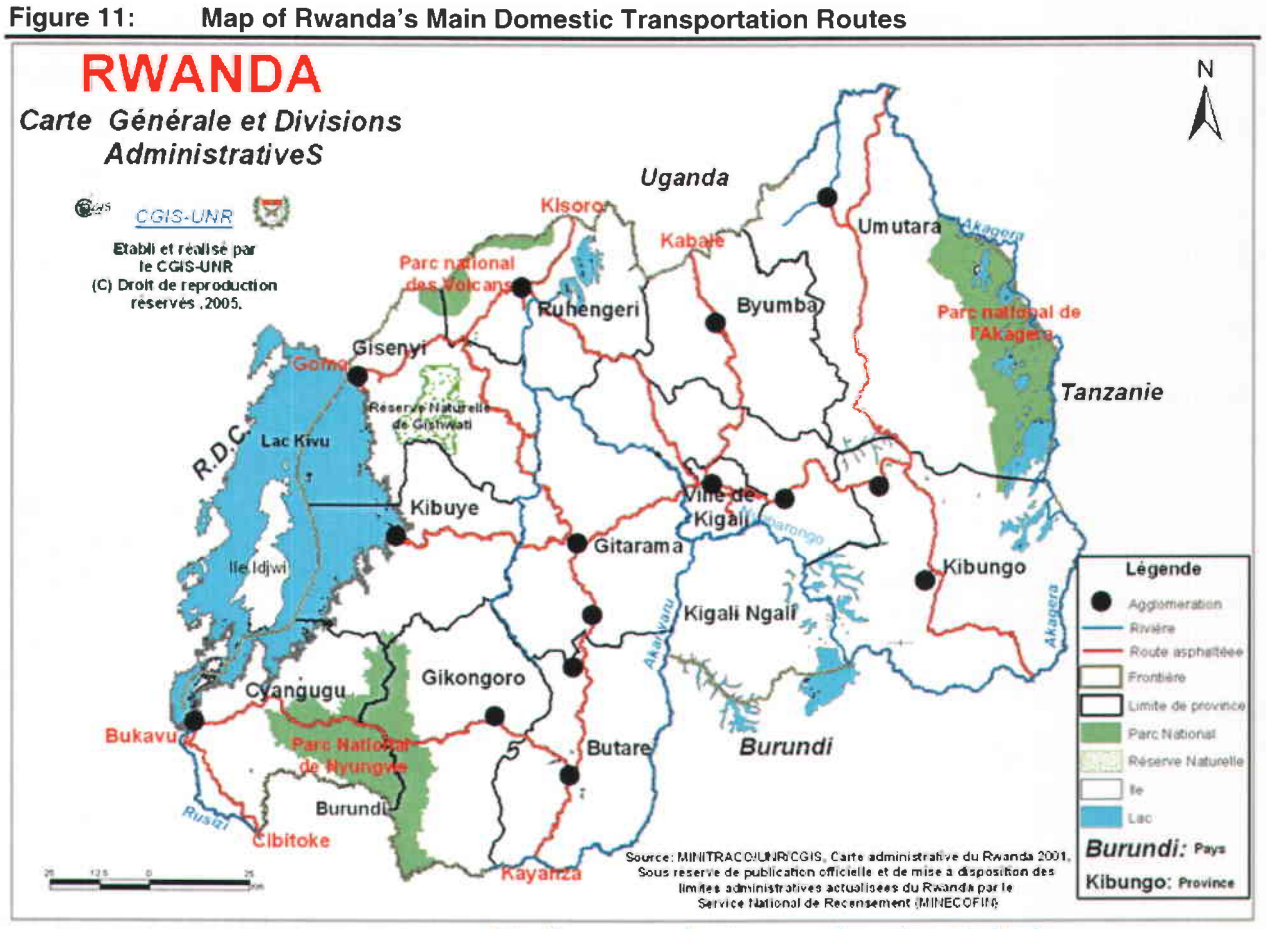
Land Transportation

Road transportation is and will continue to be central to Rwanda's economy and its economic growth prospects. About 90% of domestic passenger and goods transport is by road and about 75% of regional trade is carried by road. Demand for transport is related mainly to foodstuffs, agro-industrial products, products of the brewing and cement industries as well as imported products including final consumer products, capital goods and petroleum products.

Rwanda's road transport network is made up of approximately 14,000 km of roads, where about 5,400 km constitute main road network, including 1,022 km of paved road and the remainder being dirt roads (Figure 11). Of the paved roads, about 67% are in very good or acceptable condition, while about 89% of the dirt roads are in very bad condition.[6] Rwanda has completed some projects, e.g. paving the road from Kigali to Ruhengeri, and others involving hundreds of kilometers of road are underway or being planned. Overall, in addition to rehabilitating the existing road network with donor financing, Rwanda aims to increase its road network density from 0.54 km/km^2 in 2000 to 0.60 km/km^2 in 2020. This would entail expanding the road network by 1,580 km to a total of 15,800 km in 2020.

[6] Politique des Transports du Rwanda et Plan de Mise en Oeuvre, vol 1.

Figure 11: Map of Rwanda's Main Domestic Transportation Routes

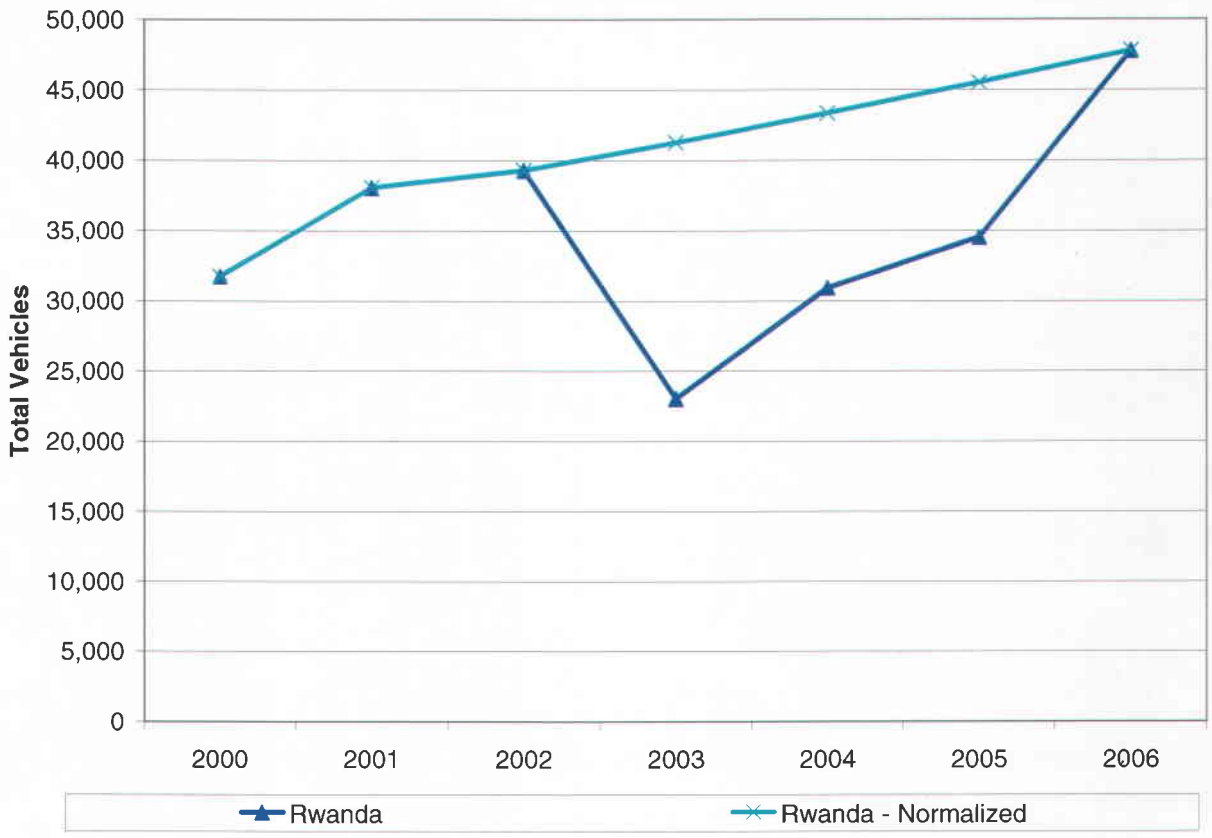


Source: Rwanda Development Gateway, http://www.rwandagateway.org/maps/rwanda.html

Rwanda depends on the Northern Corridor through Uganda and Kenya to reach the port of Mombasa and the Central Transport Corridor through Burundi and Tanzania to reach the port of Dar-es-Salaam. The two ports are where most of Rwanda's exports and imports are shipped since inter-regional trade is very limited.

Rwanda's registered passenger car fleet has increased from 17,452 to 19,286 vehicles from 2000 to 2006, an increase of 2% per year. Meanwhile, Rwanda's commercial vehicle fleet has increased at a slightly faster rate from 10,648 to 13,022 vehicles in the same time frame. Motorcycles have seen explosive growth since 2000 growing in numbers by over 27% per year from 3,624 to 15,444 motorcycles. The current vehicle ownership rate is approximately 519 vehicles per 100,000 persons. However, there are a number of unregistered and informal vehicles that could amount to up to 50% of the registered fleet. These vehicles are generally more than 10 years old and are not available for operation for more than 60% of the time.

Figure 12: Rwanda - Total Number of Vehicles, 2000 – 2006



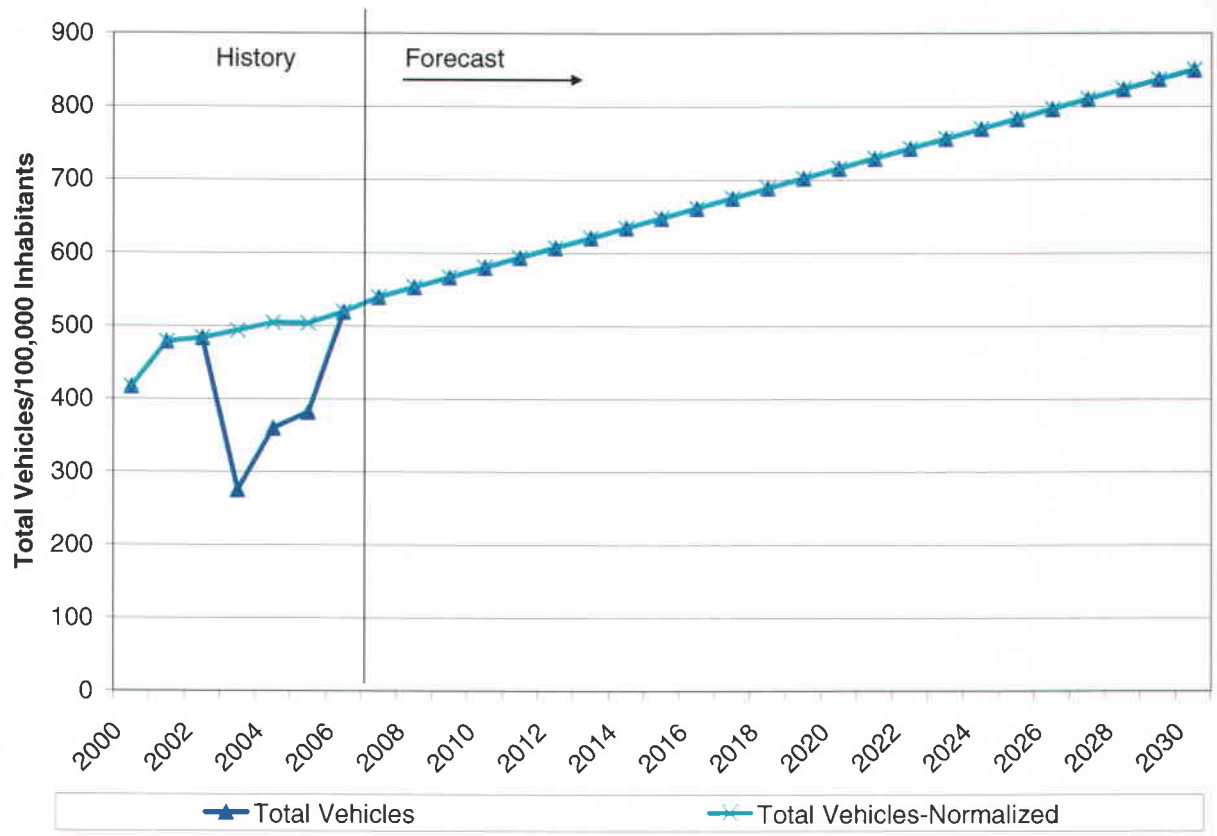
Note: Rwanda's total number of vehicles was normalized for the years 2003-2005 to account for the temporary distortion introduced by the RRA's re-registration drive in 2003.

Source: Rwanda Revenue Authority

The number of vehicles registered in Rwanda declined dramatically in 2003 because the Rwanda Revenue Authority (RRA) implemented a program whereby all vehicles had to be reregistered. As a result a number of scrapped vehicles disappeared from the fleet, but a larger number was taken into neighboring countries until they could be legally imported into the country. Hence, SAIC normalized the total number of vehicles by assuming that the effects of the re-registration drive had dissipated by 2006 and that the number of vehicles in 2006 was back at the trend level.

In 2006, the vehicle ownership rate in Rwanda was approximately 519 per 100,000 inhabitants (Figure 13). Given expected growth in Rwanda's GPD and per capita GDP to middle income status over the next 20-25 years, Rwanda's vehicle ownership rate is projected to reach 715 vehicles per 100,000 inhabitants by 2020 and 850 vehicles per 100,000 inhabitants by 2030, meaning that there would be approximately 92,681 vehicles by 2020 and 133,511 vehicles by 2030.

Figure 13: Vehicle Ownership Rates, 2000 - 2030

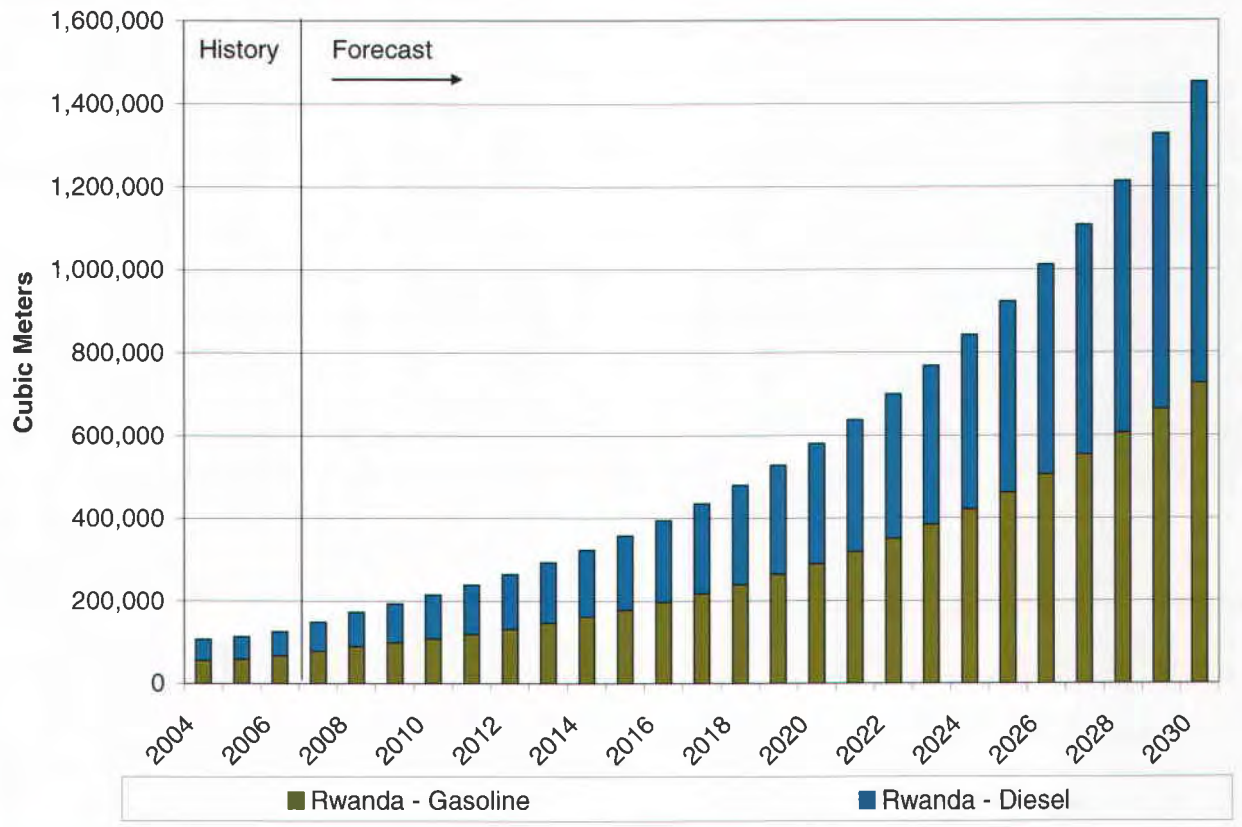


Note: Rwanda's total number of vehicles and consequently the vehicle rate per 100,000 inhabitants was normalized for the years 2003-2005 to account for the temporary distortion introduced by the RRA's re-registration drive in 2003.

Source: Rwanda Revenue Authority and SAIC

With average fuel consumption per vehicle rising from 2.6 M^3/year in 2006 to 10.9 M^3/vehicle in 2030, motor fuel consumption is projected to increase from 125,394 M^3 in 2006 to 579,954 M^3 by 2020 and 1,451,584 M^3 by 2030 (Figure 14).

Figure 14 Rwanda's Projected Motor Fuel Consumption



Source: SAIC

Aviation

The consumption of jet fuel in Rwanda is expected to grow at a CAGR of 4.5% in 2006-2030 from 9,201 M^3 to 26,758 M^3 with the growth in aircraft movements carrying passengers and cargo.

Kigali Kayibanda Airport (KGL) is the principal airport in Rwanda and the primary entry point for international travelers. There are other regional airports in Rwanda but they are either not operational or receive very little traffic. Hence, Kigali is the focus of air traffic.

The GOR is planning to build a new airport 26 km southeast of Kigali as a replacement for the existing airport located 11 km northeast of the city. In order to develop the new airport, the GOR commissioned a Master Plan entitled International Airport at Bugesera District /Eastern Province in Rwanda (the "Airport Study"). The large and comprehensive study was completed in January 2007 and includes air traffic forecasts for the new airport. The aircraft movements forecasted in the study are based on projections of passenger and cargo traffic, which in turn are related to real GDP and population growth. When one examines the relationship between real GDP/capita and aircraft movements, it appears that virtually all the changes in aircraft movements can be explained by the level of real GDP/capita. A linear regression analysis of the forecasted GDP/capita and aircraft movements, 2006 – 2025, yields an r-squared of 0.997. Hence, SAIC forecasted aircraft movements using the resulting function and its forecast of real GDP/capita.

The Airport Study's Base Case forecast of real GDP/capita in 2005 dollars is generally lower than those assumed by SAIC (Table 6).

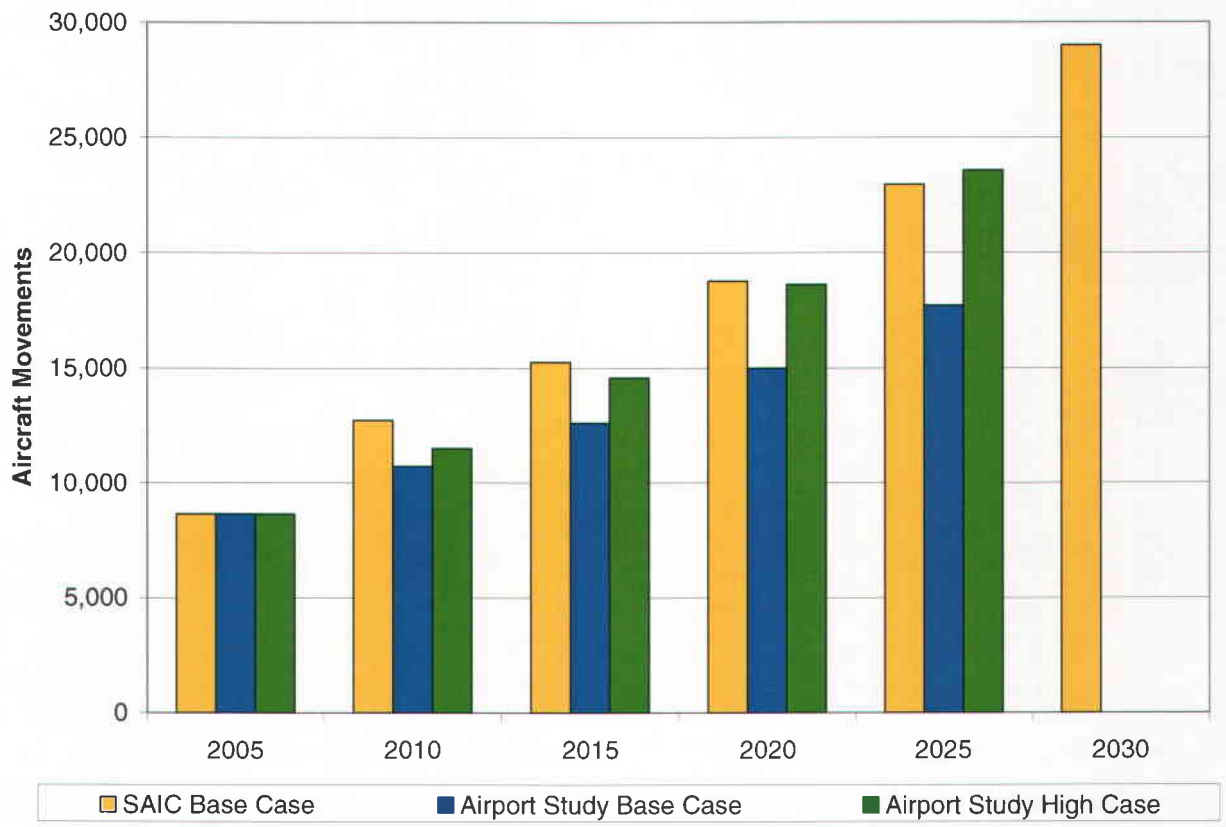
Table 6: SAIC and Airport Study Base Case Assumptions, 2007 - 2025

Year	SAIC Base Case Real GDP/cap	SAIC Base Case Real GDP/cap CAGR	Airport Study Base Case Real GDP/cap	Airport Study Base Case Real GDP/cap CAGR
2007	272		251	
2010	308	4.3%	271	2.5%
2015	358	3.1%	308	2.6%
2020	428	3.6%	353	2.8%
2025	512	3.6%	405	2.8%

Note: GDP/capita in real 2005$. The Airport Study period extends to 2025.
Source: International Airport at Bugesera District /Eastern Province in Rwanda and SAIC

Applying SAIC's projected values of GDP per capita yields projected aircraft movements that are close to the airport study's High Case (Figure 15). The airport study does not provide the GDP/capita values used in its High Case, but the Base Case growth rates seem to be on the low side considering the activity in Rwanda, the relatively low level that Rwanda is starting from as well as the short-term forecasts from the IMF used by SAIC until 2008.

Figure 15: Projected Aircraft Movements, 2005 - 2030



In order to translate aircraft movement into fuel consumption, SAIC applied the annual percentage increase in aircraft movements to the amount of jet fuel consumed starting in 2006. In SAIC's Base Case, this yields an increase in jet fuel consumption from 9,201 M^3 in 2006 to 17,300 M^3 in 2020, 21,170 M^3 in 2025 and 26,758 M^3 in 2030. Applying the same methodology to the Airport Study's Base Case would yield a jet fuel consumption of 16,371 M^3 in 2025, or 77% or SAIC's forecast.

It should be noted that forecasts of jet fuel consumption are probably the most uncertain du to the difficulty of predicting refueling patterns. Planes have a number of options when refueling, including Nairobi, Entebbe, Addis Ababa, and Dar-es-Salaam. This means that actual fuel consumption in Rwanda could be much lower than suggested by projected airport traffic.

Power

Diesel for power generation is unlikely to be a significant demand source for the products pipeline in Rwanda. The power sector in Rwanda has consumed significant amounts of diesel over the last few years as Electrogaz has used purchased and rented diesel-fired generation to meet as much electricity demand as possible. However, recognizing the high cost of diesel, Electrogaz is installing fuel oil-fired generators to provide thermal generation and is planning to use its own diesel generators for peaking purposes.

Current installed capacity in Rwanda is 72.05 MW, with almost 60% being hydroelectric and the remainder diesel-fired power generators (Table 7). However, the proportions are reversed in the case of availability and only 44.1 MW was available in 2006 compared to a peak demand of around 50 MW. Hence, load shedding in Rwanda continued in 2006 and 2007 but to a lesser extent than in 2004 and 2005.

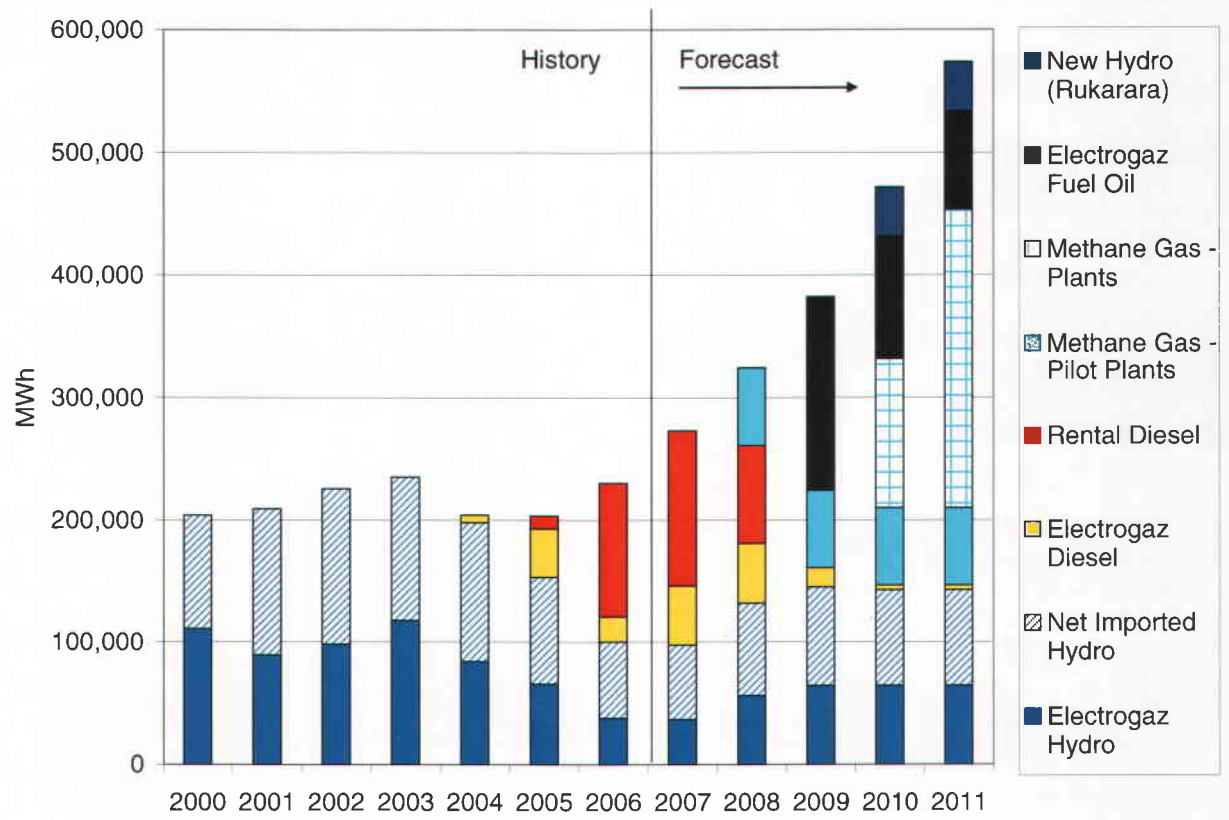
Table 7: Rwanda, Installed and Available Capacity, 2006

	Installed Capacity (MW)	Available Capacity in 2006 (MW)
Hydro	42.8	16.6
Thermal	29.3	27.5
Total	72.1	44.1
	Installed Capacity	**Available Capacity in 2006**
Hydro	59%	38%
Thermal	41%	62%

Rwanda has traditionally relied heavily on hydroelectric power, which led to a power crisis in 2003 - 2005 when droughts reduced the water levels in the lakes throughout the region; droughts from which the lakes have yet to recover. In response to the actual capacity deficit of 12-15 MW in 2004, the Government of Rwanda installed 12.5 MW of diesel-fired thermal generators starting in the fourth quarter of 2004 and rented 15 MW of diesel-fired generation in 2005 with the last rental power unit being installed towards the end of 2005 (also known as "rental power").

The impact of the drought and the important role of thermal power are shown by thermal generation providing 57% of national demand in 2006, up from nothing in 2003 (Figure 16). Since diesel is an expensive fuel, the Government of Rwanda has negotiated funding from the World Bank to purchase 20 MW of HFO-fired generators, which are scheduled to be installed in 2008. Moreover, projects are underway to generate electricity from methane gas extracted from Lake Kivu (see section below for further detail). As the HFO-generators start operating, the rental power agreements will be terminated and diesel-fired generation will only be used for peaking purposes, not base load generation, according to Electrogaz. Electrogaz's Supply Plan for 2007 – 2011 sees the end of rental power in 2008 and the use of Electrogaz's diesel-fired generators, Gatsata and Jabana, will be ramped down so that they provide less than 1% of total demand by 2010.

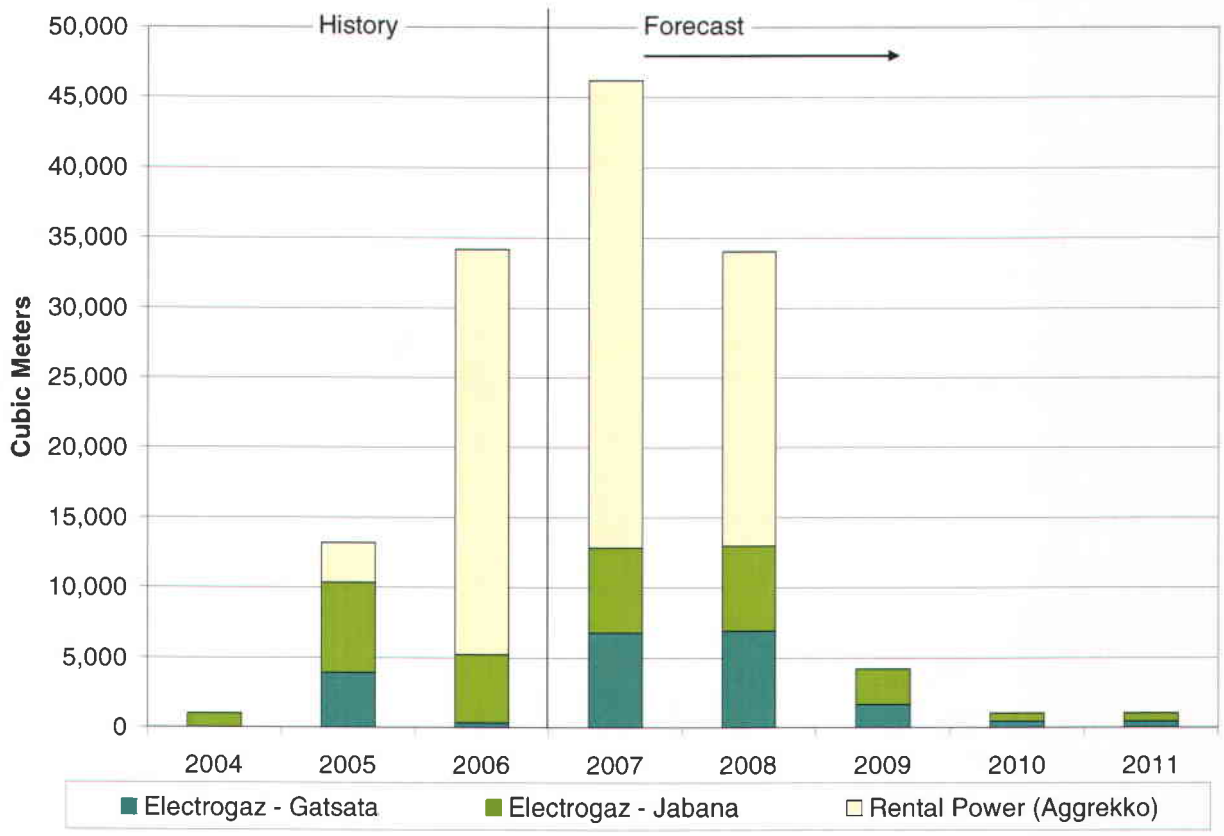
Figure 16: Supply Sources for National Electricity Demand, 2000 - 2006



Source: Electrogaz

As a consequence of the introduction of diesel-fired generation to make up for the lost hydro generation, diesel consumption for power generation increased substantially in 2005 and 2006 amounting to 34,114 M^3 in 2006 (Figure 17). In 2006, rental power accounted for 28,944 M^3 of diesel consumption, or 85% of diesel consumed for power generation. Following Electrogaz's current Supply Plan, the use of diesel-fired generation will be ramped down as methane-fired and fuel oil-fired generation comes on-line. Hence, the resulting diesel consumption for power generation would be only 1,043 M^3 in 2010 and going forward.

Figure 17: Rwanda, Diesel Consumption for Power Generation, 2004 – 2011



Source: Electrogaz

Since Rwanda is actively pursuing replacing diesel-fired generation and that Electrogaz plans to use its diesel-fired generators as little as possible, SAIC assumed that the annual requirements of diesel for power generation required for the years 2010-2030 would be 1,043 M^3, equal Eletrogaz's forecast for 2010 and 2011.

Industry

Industrial fuel usage is centered on heavy fuel oil for process use and for use in industrial boilers generating heat and/or steam. Even though HFO has to be trucked all the way from Mombasa in Kenya, the delivered cost is lower than it is for diesel. SAIC estimates that HFO will still be cheaper than diesel even after a products pipeline reaches Kigali. Moreover, the largest industries, including the cement manufacturer Cimerwa and the Bralirwa brewery, are aiming to switch to methane gas from Lake Kivu once commercial operations commence see above for further details on Rwanda's industry and methane gas from Lake Kivu). Hence, industrial use of white oil is largely limited to transportation, which is captured in the transportation sector analysis and largely driven by population and economic growth. While many industries as well as commercial establishments maintain backup power generators, they are not expected to be used extensively going forward considering the Rwandan government's ongoing efforts to ensure adequate supplies of electricity and to upgrade the transmission and distribution networks.

Mining Sector

A commercial mining sector is potentially a large consumer of white oil, primarily diesel, which is used to run the 50 – 100 ton dump trucks used to haul ore and overburden as well as loaders and other equipment. Even after developing commercial mines, the scale of the Rwandan mining sector is likely to remain relatively small. Consequently, most of the equipment used is likely to use electricity and/or compressed air, the latter of which is also produced using electricity. Hence, SAIC does not project any significant white oil demand from the Rwandan mining sector in addition to what may be included in the general transportation sector.

While commercial level mining existed until the end of the 1980s, the current mining industry in Rwanda is made up of small scale and artisanal mines, which are characterized by the use of hand tools or small machinery. Rwanda is in the process of promoting the development of a formal mining industry by letting mining concessions. Rwanda has significant deposits of the following minerals:

- Cassiterite (tin)
- Wolframite (tungsten),
- Coltan (nobium and tantalum); and
- Tantalite (tantalum); and

There are also deposits of gold and peat. However, gold mining is currently very limited since most of the deposits are within the Nuyngwe Forest Reserve, where mining is prohibited by law. Peat is usually exploited for local consumption.

Artisanal miners currently exploit coltan and cassiterite deposit while the only formal mining company, Pyramides Mining Company, mines tantalum, which is then exported for further processing and extraction of the tantalite. Rwanda's minerals and metals exports are higher than official production due to the relatively large number of informal miners as well as the routing of minerals and metals mined in the Eastern DRC through Rwanda.

Most of the mining concessions for cassiterite, wolframite, and coltan in Rwanda are held by the Regie des Mines du Rwanda (REDEMI), a public company. REDEMI and the GOR are in the process of privatizing the mining concessions and over 60% of existing concessions have been let. The privatization process is expected to be finished by the end of 2007 or early 2008.

The GOR is promoting the development of the mining sector within the framework of the Central Development Corridor[7]. As such, a group of consultants are in the process of devising a

[7] On 14 January 2005, Rwanda and Tanzania signed an Agreement to implement a Central Development Corridor (CDC) Spatial Development Initiative (SDI) program. The corridor covers the geographical area between the Dar es Salaam port in Tanzania and Lake Kivu in Rwanda. The Agreement provides for other countries within the geographical location of the CDC (including Burundi, D.R. Congo and Uganda) to join the initiative. The CDC business case will be anchored by projects in (a) infrastructure, most of which are also priority projects under the NEPAD Short-term action plan (STAP), (b) mining and mineral beneficiation, (c) tourism, (d) agriculture (including livestock, forestry and fisheries) and agro-processing, and (e) manufacturing and industry. (Central Development Corridor Draft Initial Business Plan, dated July 2006).

Central Development Corridor (CDC) Minerals Development & Investment Strategy to support the CDC Spatial Development Initiative and sustainable economic development in the area in general. The mining strategy is one of a number of sector investment strategies currently being prepared under Phase II of the CDC Business Plan. A Draft Interim Report was delivered on March 19, 2007 and is known as the Mining Report.

The Mining Report estimates that the 20 concessions that REDEMI is in the process of letting may yield five commercial scale mines producing non-precious minerals as well as two medium sized gold mines. Combined with continued artisanal mining, Rwanda's mining industry has the potential to grow explosively and reach the production levels shown in Table 8.

Table 8: Mining Production Potential in Rwanda

Mineral	2005 Recorded Production	2005 Exports	Potential Annual Production
Cassiterite	275	4,351	14,951
Wolframite	140	557	6,425
Coltan	16	1,062	346
Gold (kg)		16	720
Other		388	

Source: Pages 11 and 17, Central Development Corridor (CDC) Minerals Development & Investment Strategy, dated March 19, 2007.

As shown in Table 8, Rwanda exports significantly more than recorded production. This is due to unrecorded production as well as traders purchasing unreported mined minerals in Rwanda and from the Eastern DRC for export through Rwanda.

The seven formal mines that the Mining Report believes are likely to be developed in Rwanda are expected to move around 15,000 tons of material per month. However, considering the small scale of the mines, they are likely to use equipment running on electricity and/or compressed air instead of larger diesel-driven equipment. The output of the mines, whether exported or used locally, would require transportation from the mine sites. However, the amount of fuel used for such trucks is relatively small compared to the Rwandan transportations sector as a whole and would be included in the projections for the transportation sector. Hence, SAIC has not included any additional white oil demand from the Rwandan mining sector in its forecasts.

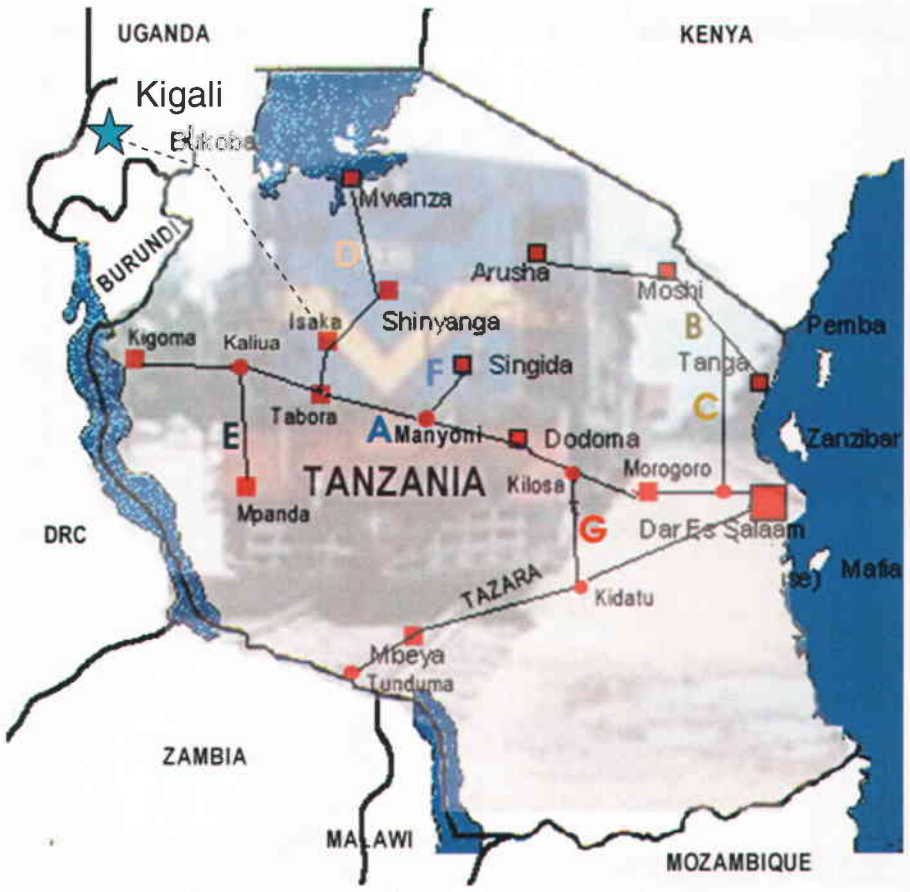
3.4.3 Rail Transportation Demand (Isaka – Kigali Railroad)

The GOR would like to connect Rwanda to Tanzania's rail network via the Isaka – Kigali railroad project (Figure 18) in order to lower transportation costs to and from the East African Coast, which would make imports cheaper and exports more competitive.

SAIC believes that the Isaka-Kigali railroad could add around 11,000 M^3 per year in diesel demand in Kigali starting around the year 2020. The railroad is not likely to be cheaper than the proposed pipeline, but would be a useful alternative import route in case of temporary capacity constraints or disruptions on the petroleum products pipeline. However, due to the project being

in a relatively early development stage the potential demand is only included in SAIC's High Case.

Figure 18: Tanzania Railways Corporation System Map and Isaka-Kigali Route Schematic



Note: Isaka-Kigali route is schematic and not indicative of any actual planned route.
Source: Tanzania Railways Corporation website. Isaka-Kigali planned rail line added by SAIC.

The Isaka – Kigali railroad would provide a direct rail connection between Kigali and Dar-es-Salaam and a feasibility level study was kicked off in June 2007. If constructed, the Isaka-Kigali railroad would add to diesel demand from the Project, though it would also offer an alternative and competing route for importing petroleum products. Nevertheless, a products pipeline could be constructed within the next 3 – 5 years while a rail road is likely to take at least 10 – 15 years until completion, giving the pipeline a significant head start and economic advantage.

The proposed Isaka-Kigali railroad would be 450 km long with 175 km in Rwanda and 275 km in Tanzania. The intended effect of the railroad is to lower the transportation costs of Rwanda's imports and exports since transportation currently accounts for more than 40% of the value of goods traded. The focus is on lowering the cost of transporting containers to and from the East African Coast, i.e. Dar-es-Salaam. This would shift a substantial amount of Rwandan trade away from the Kenyan port of Mombasa and also remove a large number of trucks from the roads in

Kenya, Uganda, and Rwanda. Rwanda is currently in the process of upgrading the dry port of Isaka in Tanzania to be a more efficient multi-modal transfer point.

Phase 1 of a feasibility study of the railroad was awarded in June 2007 to DE Consult, which became DB International in January 2007, the international unit of Deutsche Bahn, with funding from the African Development Bank. Phase 1 is expected to take 13 months and cost around US$2.5 million. Phase 2, which is a detailed design study, is expected to take 8-9 months and cost $2.6 million. Once construction commences it is expected to take 5 – 6 years. Hence, the earliest that the railroad could be finished if everything goes according to plan is in about 8 – 10 years, or 2017. Burundi is also interested in connecting to the proposed railroad but funding for including a spur to Burundi in the feasibility study has not yet been obtained.

One of the key objectives of the feasibility study will be to determine whether there is enough cargo demand to justify constructing the Isaka – Kigali railroad. The Mining Report indicates that as a rule of thumb, 6 – 10 million tons of cargo per year would be required to make the railroad economically feasible.

At the present time, a brief review of potential demand indicates that potential cargo may amount to around 2 – 3 million tons per year. According to African Development Bank estimates in 2005[8], the potential cargo moving through the Central Development Corridor is 225,000 tons per year for Rwanda with an additional 250,000 from Burundi and 240,000 tons from the Eastern DRC. The Mining Report estimates that the Kabanga Nickel Mine in NW Tanzania, which is in the feasibility study stage, would produce around 250,000 tons of concentrate that would be exported in 20 foot containers. Combined with supply imports, the Kabanga mine could provide cargo demand of around 1.2 million tons to 2 million tons per year.

These high level estimates indicate that the economic feasibility of the Isaka – Kigali railroad is not a cut and dried issue. However, the feasibility study has just started and its detailed estimates are likely to provide a clearer picture of the railroad's potential.

In order to estimate potential fuel consumption by the Isaka – Kigali railroad, SAIC assumed that cargo flows would be 6 - 10 million tons per year or an average of 8 million tons. SAIC assumed that approximately equal amounts of tonnage will go each way and that the average diesel consumption will be around 6 M^3/ per million ton-km[9]. Based on these assumptions, the Isaka – Kigali railroad would add 8,100 M^3 to 13,500 M^3 of diesel demand per year in Kigali, or an average of approximately 10,800 M^3 per year. Due to the large uncertainties associated with the economic feasibility of the railroad as well as with the construction of such a large infrastructure project, SAIC has only included this potential demand in its High Case starting in 2020.

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[8] *Establishment of the Central Corridor Transport Facilitation Agency*, Project Identification Document, Task Force, Dar es Salaam, Tanzania, African Development Bank; March 2005.

[9] This is the average fuel consumption for freight traffic in Canada for the years 1996-2005. Canada was used as the locomotives that would be used on the new railroad are likely to be newer and more fuel efficient than what is currently used in Tanzania.

3.4.4 Lake Kivu Methane Gas

Methane gas from Lake Kivu is very unlikely to reduce the demand for petroleum products that would travel on the proposed pipeline. Methane gas competes with HFO in Rwanda, not diesel. The large industries that exist in Rwanda primarily use heavy fuel oil for their process needs and diesel for power generation is being phased out in favor of HFO-fired generators. In fact, the use of methane gas for power generation is more likely to increase the demand for petroleum products as it would provide more reliable low-cost electricity which would promote economic growth.

Methane gas from Lake Kivu has been used for commercial purposes for a number of decades by the Rwandan brewery, Bralirwa near Gisenyi, at the northern end of Lake Kivu until recently. Bralirwa used the methane gas from a pilot plant that was installed in 1963 and only recently switched to using heavy fuel oil as the old pilot plant was shut down. Currently, plans are under way to extract enough methane gas to fuel what may ultimately be two 50 MW power plants as well as provide process fuel for Bralirwa and possibly for the cement manufacturer, Cimerwa.

The SAIC team reviewed past studies of Lake Kivu methane gas, met with relevant parties in the Rwandan government and visited the proposed extraction site for the Bralirwa brewery in Gisenyi (Figure 19).

Figure 19: Lake Kivu Methane Gas Project Under Construction near Gisenyi, April 2007

Demand for Lake Kivu methane gas is expected to come from power generation near Kibuye, Bralirwa in Gisenyi and Cimerwa in Mashyuza southeast of Cyangugu. While Bralirwa and the power generation facilities are located right on Lake Kivu's shores, a gas pipeline would be required to supply Cimerwa. Other possible customers, e.g. the textile mill UTEXRWA, are located in Kigali, which is approximately 126 km from Kibuye. However, the demand from UTEXRWA and other industries in Kigali is so small as to make a pipeline to Kigali economically unfeasible and such a pipeline is not part of the GOR's development priorities.

Current Status

Electrogaz's supply plan counts on two pilot plants of 3 MW and 5 MW to start operating by 2008 and that a full-sized plant would start up in 2010 and supply 40 MW by 2011. Recent developments indicate that more methane gas-fired capacity than expected could come on-line over the next four to five years.

The Rwanda Investment Group ("RIG") is the current concessionaire for generating electricity using methane gas from Lake Kivu. The Government of Rwanda signed a contract with RIG on June 15, 2007, which allows RIG to develop a methane gas-fired power plant that is up to 50

MW to be located near Kibuye, on the Eastern shores of Lake Kivu. RIG is made up of a group of 25-30 businesses, the largest of which is the cement company Cimerwa. Also included in the new development group are the Bralirwa brewery, and Eco Energy of Kenya. The first stage of RIG's project, which is a continuation of Dane & Associates terminated project, is a 4 MW pilot plant that is scheduled to start operating by the end of 2007. The GOR is also in the process of negotiating with a German company, W+S Beteiligungs AG for extraction and use of Lake Kivu methane gas in a gas-fired power plant that would be up to 50 MW.

Reserves, Gas Quality and Price

Total reserves of methane gas in Lake Kivu amount to 55 billion scm. However, most of the gas is found below 270 meters and only 75% of the methane gas content in the water can be recovered making recoverable reserves approximately 29 billion scm.

Methane in Lake Kivu is generated through fermentation of organic materials as well as volcanic reduction of carbon dioxide which generates about 150 million scm/year. Various studies and methane gas experts indicate that safe extraction levels range from 150 – 250 million scm/year. With 100 MW of gas-fired power plants and supplying Bralirwa as well as an expanded Cimerwa, total demand would amount to approximately 185 million scm/year, which appears to be within the margin of safe extraction.

Methane gas in Rwanda used to be priced at a 10% discount to HFO on a heat equivalent basis. However, the pricing in the new contracts are all cost-based, which indicates that methane gas prices may range from $3 - $4/MMBtu, a significant discount to delivered fuel oil prices around $15/MMBtu.

3.5 Uganda

Table 9 provides a summary of forecasted macroeconomic indicators and petroleum product demand. Since transportation is by far the largest consumer of white oil product, information about vehicle growth is also provided.

Table 9: Uganda at a Glance, 2007 - 2030

	2007	2020	2030
Population (millions)	30.9	46.5	60.2
GDP (Billion 2005 $)	$9.9	$21	$37.6
Per Capita GDP (2005$)	$322	$452	$624
Economy	Predominantly agricultural with small scale industry	Predominantly agriculture	Middle Income
Power	303 MW of installed capacity, over 98% hydro		
Number of Vehicles	276,270	503,992	741,750
Vehicle Ownership Rates per 100,000 people	893	1,085	1,232
SW Uganda White Oil Demand ('000 M^3/year			
Gasoline	51	191	486
Diesel	72	271	687
Jet Fuel	n/a	n/a	n/a
Kerosene	10	14	19
Total White Oil	132	476	1,191

Uganda has one of the most dynamic economies in Africa, recording recent annual growth rates of over 8%. The economy is predominantly agricultural based, with little heavy industry. Uganda is endowed with plentiful water resources and power generation is dominated by hydro capacity. Consequently, transportation accounts for most of white oil consumption, with smaller amounts consumed in the industrial, aviation, and power sectors.

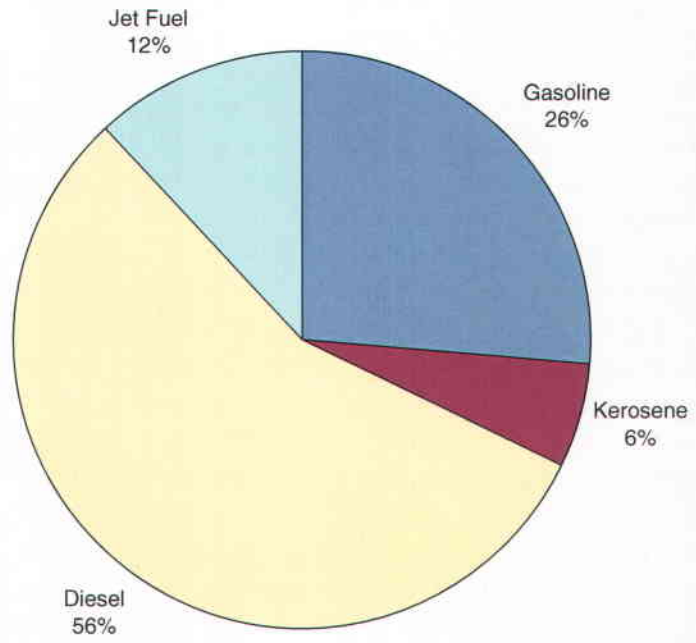
Uganda's white oil consumption grew from 575,734 M^3 in 2000 to 748,466 M^3 in 2006 at an annual rate of 4.5%. The Kampala to Kigali section of the pipeline will transit Southwest Uganda. Based on population and urban areas, Southwest Uganda likely accounts for approximately 22 percent of Uganda's white oil consumption, not including diesel used for national level emergency generation, which is located northeast of Kampala.

Assuming that over the next 25 years, Uganda's population grows at 3.0 percent annually and real per capita income grows at 2.9%, white oil consumption in Southwestern Uganda is

projected to grow more than 10 times, from an estimated 114,623 M^3 in 2006 to 1,191,097 M^3 per year by 2030, an annual rate of 10.2 percent in the period 2006-2030. Consumption in Southwestern Uganda is projected to grow faster than in Rwanda and Burundi due to Uganda already having a vehicle ownership rate almost twice as high as Rwanda and Burundi.

Currently, land transportation sector provides the primary source of demand for white oil, including motor gasoline and diesel for automotive transportation, and jet fuel and kerosene for aircraft. Diesel is primarily used in truck transport and currently for temporary power generation and is responsible for over 56 percent of white oil consumption. Motor gasoline makes up another 26% of the market, followed by jet fuel and kerosene (Figure 20).

Figure 20: Uganda White Oil Consumption, 2006 (M^3/d)



Source: Uganda Ministry of Energy

Uganda's power sector is primarily reliant on hydroelectric generation, with diesel generators used for small amounts of backup and peak capacity. The industrial sector is not large in Uganda, but relies on diesel and gasoline to run some machinery, particularly in the building materials and construction industries. The residential and commercial sectors use some diesel and gasoline for backup generation and kerosene for lighting.

SAIC expects transportation to continue to account for the majority of white oil consumption over the next 20 years. Growth will be driven by population and a general increase in living standards as Uganda approaches middle income status.

Key findings for each of the fuels are:

- **Diesel and gasoline demand will be driven by a growing motor vehicle fleet.** Between 1999 and 2003, the vehicle fleet in Uganda grew at an annual rate of 5% from 186,244 to 226,191 vehicles. There has also been a general shift from petroleum to diesel engines, suggesting that diesel could grow in market share. SAIC expect the number of registered vehicles more than triple to almost 742,000 vehicles by 2030.
- **Jet fuel consumption is likely to grow with the expansion of Entebbe airport though it does not affect demand in Southwest Uganda.** The lower cost of delivered jet fuel via the Eldoret to Kampala pipeline is also likely to promote the Uganda civil Aviation Authority's desire to increase regional air traffic through Uganda.
- **The industrial sector uses only limited amounts of white oil.** The industrial sector in Uganda is comparatively small and the industry that does exist generally uses heavy fuel oil and electricity, with diesel generation for backup. This is expected to continue, with industry only supporting relatively small amounts of gasoline and diesel demand.
    - Heavy fuel oil is the process fuel of choice for local breweries, cement factories and textile mills as it is cheaper than diesel. Even with a pipeline, trucked fuel oil is expected to be cheaper than diesel for these industries.
    - The coffee and tea industries use primarily electricity for its sorting, washing, and roasting equipment.
    - Backup generators will continue to run on diesel, but are unlikely to be used significantly as the Government of Uganda continues to implement measures to ensure the availability of electricity on the network.
    - Construction and mining will likely increase consumption of primarily gasoline and diesel for transportation purposes and to operate heavy machinery.

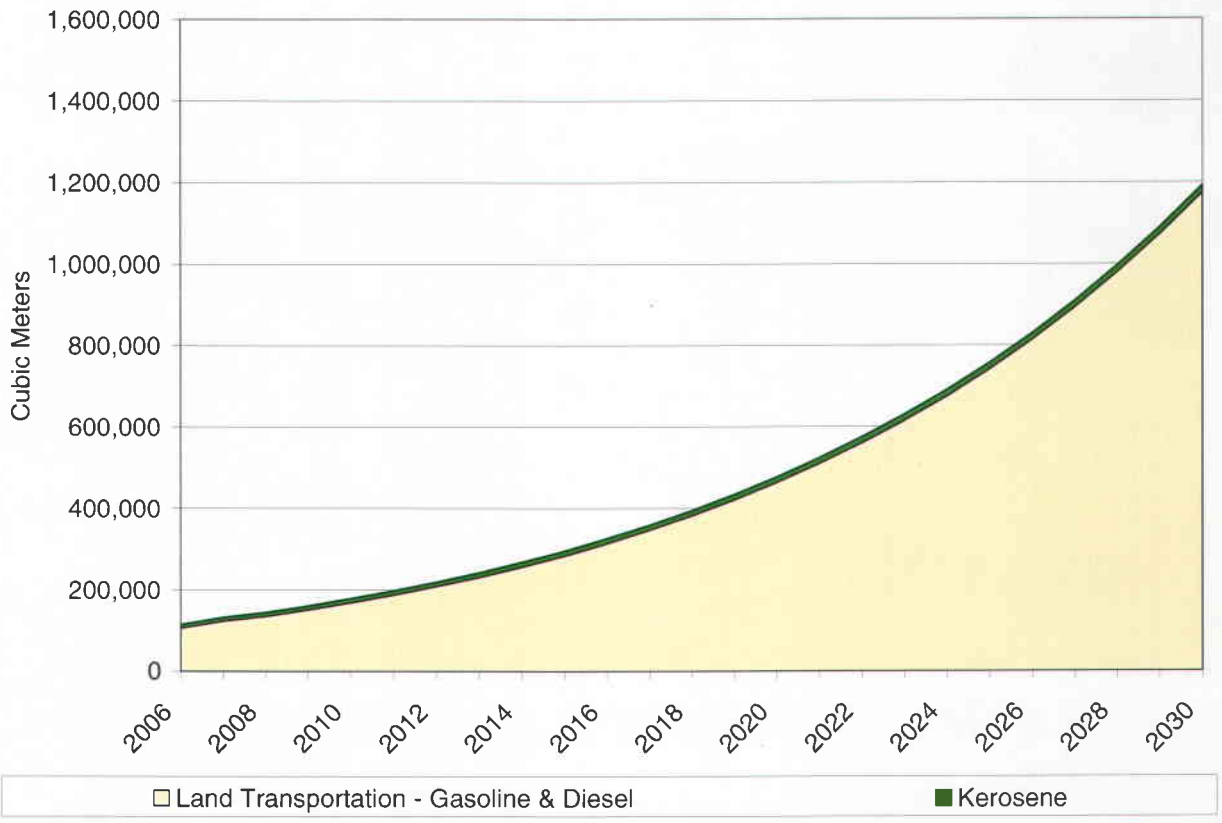
- **The power sector provides limited application for diesel except in emergencies.** For many years, Uganda's power generation capacity was 98 percent hydro, with a small amount of backup diesel generation. In response to drought conditions and diminished hydro capacity, in May 2005 the Government of Uganda introduced 100 MW of emergency diesel powered thermal generators to augment hydro power. The plants are expensive to operate consuming approximately 580 cubic meters of diesel, or 51 percent of Uganda's current diesel consumption of 1,144 M^3/d. The large increase in diesel requirements has contributed to diesel shortages in Uganda, driving prices even higher.
    - Uganda will require 2,000 MW of electricity by 2025. Within 20 years the country must generate an additional 1700MW to meet its demand capacity. Uganda is currently facing a huge electricity supply deficit, as over 90 percent of the country's population is not connected to the national grid.
    - Most future generation will likely be met by new hydro projects and the emergency diesel generators could be retired. Another scenario envisages that the diesel plants could remain as a means to augment the hydro power as electricity demand continued to increase. In its base case, SAIC assumes that the generators remain operational at current levels.

SAIC's forecast for Southwest Uganda is presented in Figure 21. For Southwest Uganda, SAIC assumed that there would be no demand for diesel for power generation, as the diesel-fired

generators are located east of Kampala and no jet fuel demand as Entebbe is located near Kampala and demand from secondary airports is limited.

The Base Case forecast was developed examining the various economic sectors and assessing the respective contribution to current and future demand growth for white oil.

Figure 21: Southwest Uganda White Oil Demand Forecasts by Sector, 2006-2030



Source: SAIC

The remainder of this section examines the components and methodology of the sectoral forecasts.

3.5.1 Macroeconomic Analysis

Population

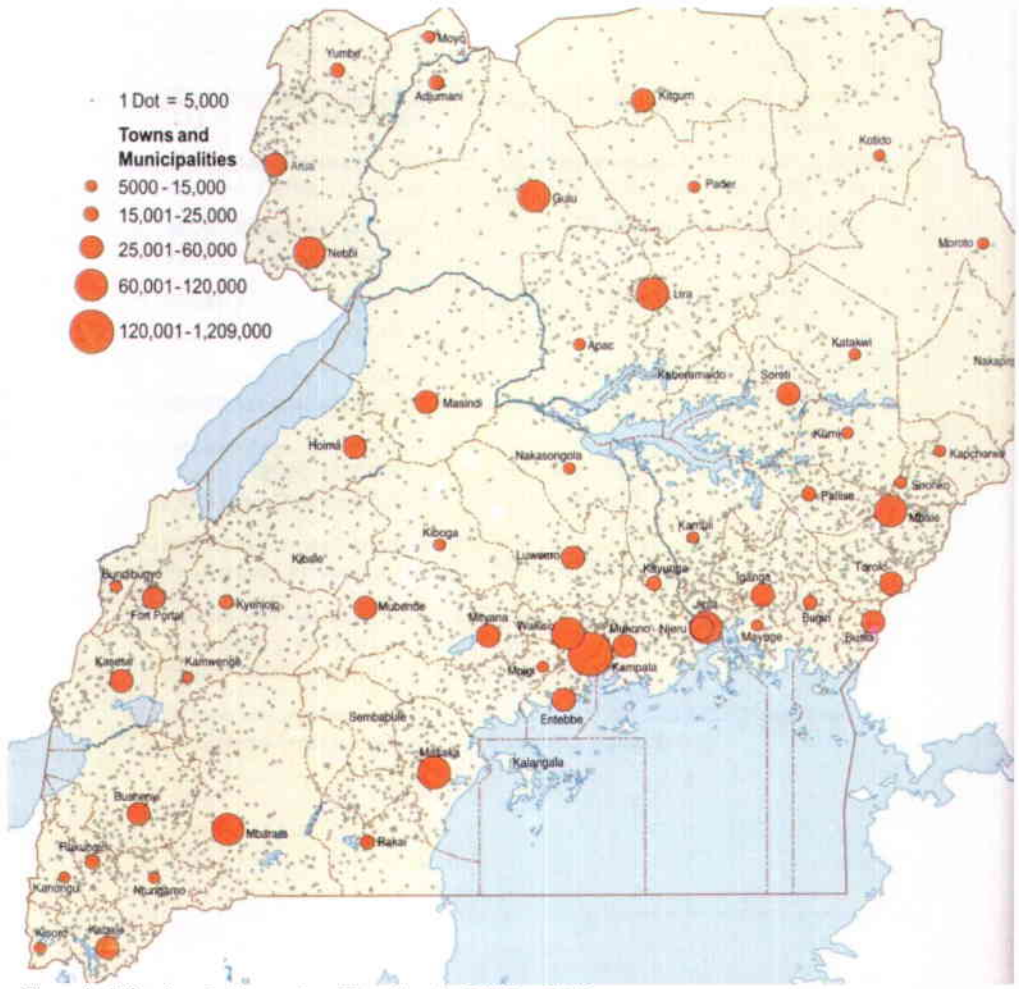
Uganda's population is approximately 31 million, with major concentrations in and around Kampala and in southwest Uganda. The city of Kampala and surrounding suburbs[10] in Central Uganda has a population of approximately 3.3 million. Mbarara and surrounding suburbs in Southwest Uganda has a population of over 1 million. Other population centers in Southwest

[10] Kampala, Entebbe, Wasiko, and Mukono.

Uganda include Masaka (768 thousand), Bushenyi (723, 000), and Kibale (413,000). Altogether, Southwest Uganda has a total population of approximately 6.6 million people within a 50 mile radius of the proposed pipeline.

Given this population density SAIC believes that Southwest Uganda accounts for approximately 22 percent of Uganda's white oil consumption, not including diesel for power generation. Consequently, SAIC expects that white oil consumption in Southwest Uganda will increase from an estimated 114,623 M^3 in 2006 to almost 1,191,097 M^3 by 2030.

Figure 22: Uganda's Population Density



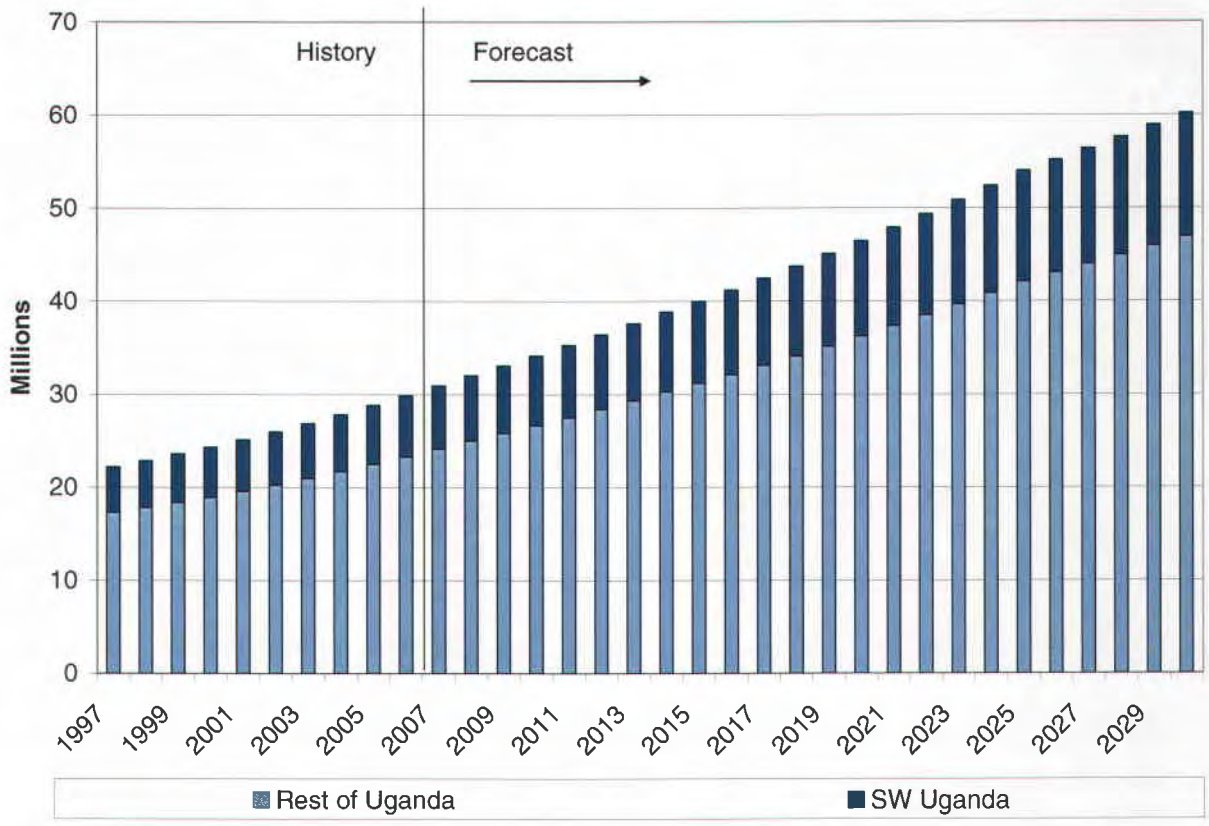
Source: Uganda Districts Information Handbook, 2005 - 2006

Over the period 1997 – 2006, Uganda's population grew at approximately 3.4% annually. SAIC used the IMF's WEO estimates for the near-term forecasts until 2008 and applied the UN's growth rates for the longer term forecast[11]. The IMF's WEO estimates that Uganda's population

[11] http://www.un.org/esa/population/publications/wpp2006/wpp2006.htm

will grow to 32 million by 2008 and the UN estimates that the annual population growth rate from 2008 to 2015 will be 3.3%, slowing down to 3.1% between 2016 and 2025, and slowing further to 2.2% starting in 2026. Hence, SAIC estimates that Uganda's population will be 34.2 million in 2010 and 60.2 million by 2030. Consequently, Southwest Uganda's population is estimated to be 7.5 million in 2010 and 13.2 million by 2030.

Figure 23: Uganda's Projected Population

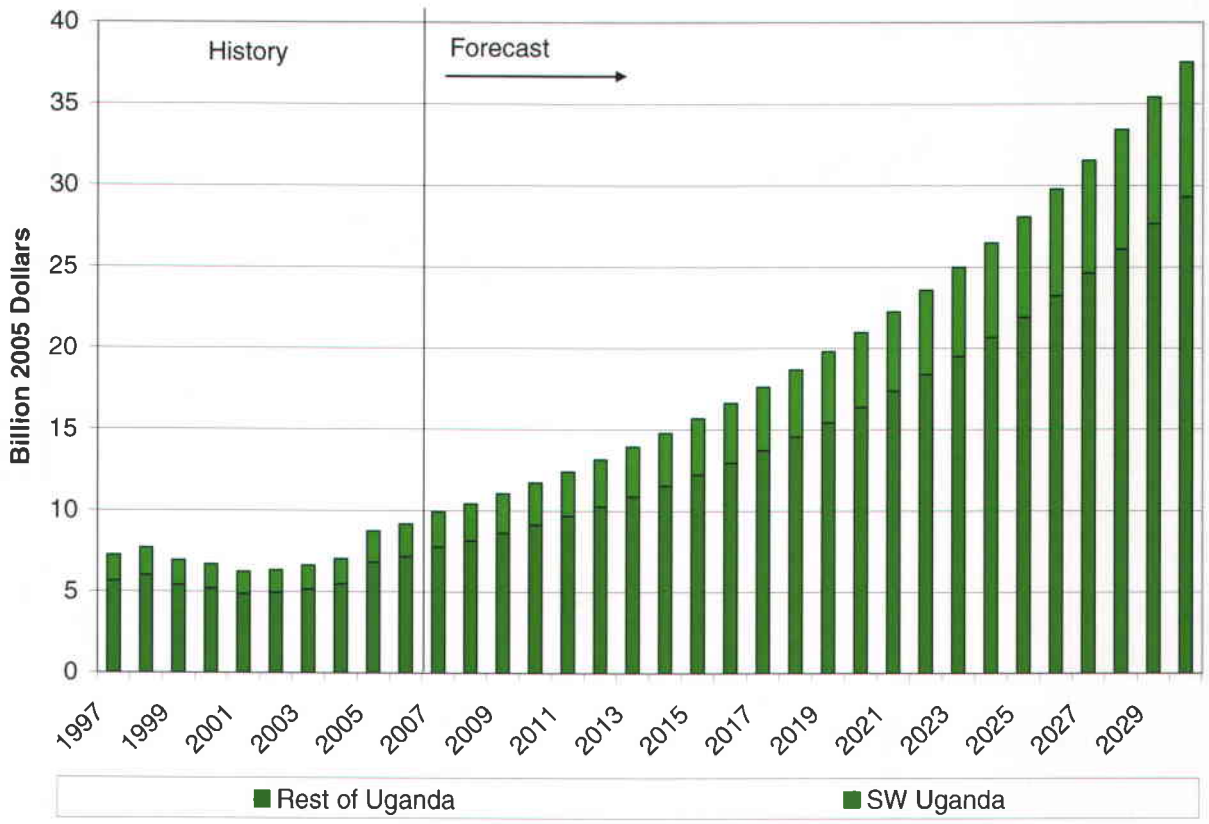


Source: United Nations

Gross Domestic Product

Uganda produced approximately $9.2 billion in goods and services in 2006, with a per capita income of $307 (real 2005 dollars). The economy is predominantly agricultural based, contributing 41% of GDP, while manufacturing contributes only 10% of GDP. The rest of the economy is *government and services.* Based on expected growth rates, real GDP is projected to grow at an average annual rate of 6.0% between 2005 and 2030, to $11.7 billion by 2010 and $37.6 billion by 2030.

Figure 24: Uganda's Projected Real GDP (2005$)



Source: SAIC

Forecasted growth of 6% assumes that Uganda continues with economic reforms that result in an expanding private sector. As part of its overall efforts to create a more business-friendly environment, Uganda has implemented the "Big Push" strategy. The strategy – recommended in UNCTAD's Investment Policy Review of Uganda, 2000 – comprises a set of measures to overcome institutional and structural bottlenecks and focuses on reforms in infrastructure (particularly utilities), the financial sector, commercial law, public procurement, tax administration and the export sector. Features include: creation of an Export Processing Zone and a Free Trade Zone at Entebbe airport to make it a regional trade hub; and reform of the power and railway sectors.

Annual growth in real GDP of 6.0%, coupled with 3.0% annual growth in population should result in per capita income of $343 by 2010 and $624 by 2030 (2005 dollars).

3.5.2 Sectoral Analysis

Uganda is gradually moving away from a predominantly agricultural economy towards one emphasizing manufacturing and services, including trade, tourism and transport. However, agriculture remains the dominant sector, employing 80% of the working population. In recent years, manufacturing, electricity generation, and transport and communications have recorded rates of growth of: 10.3%, 9.2% and 10.4 % respectively. Within the manufacturing sector, the

best-performing industries in 1998–2001 were food processing, beverages, chemicals and soap, bricks and cement, and leather and footwear. The industrial sector, as measured by the index of industrial production, has had an average annual growth of 14.5% per annum since 1990.

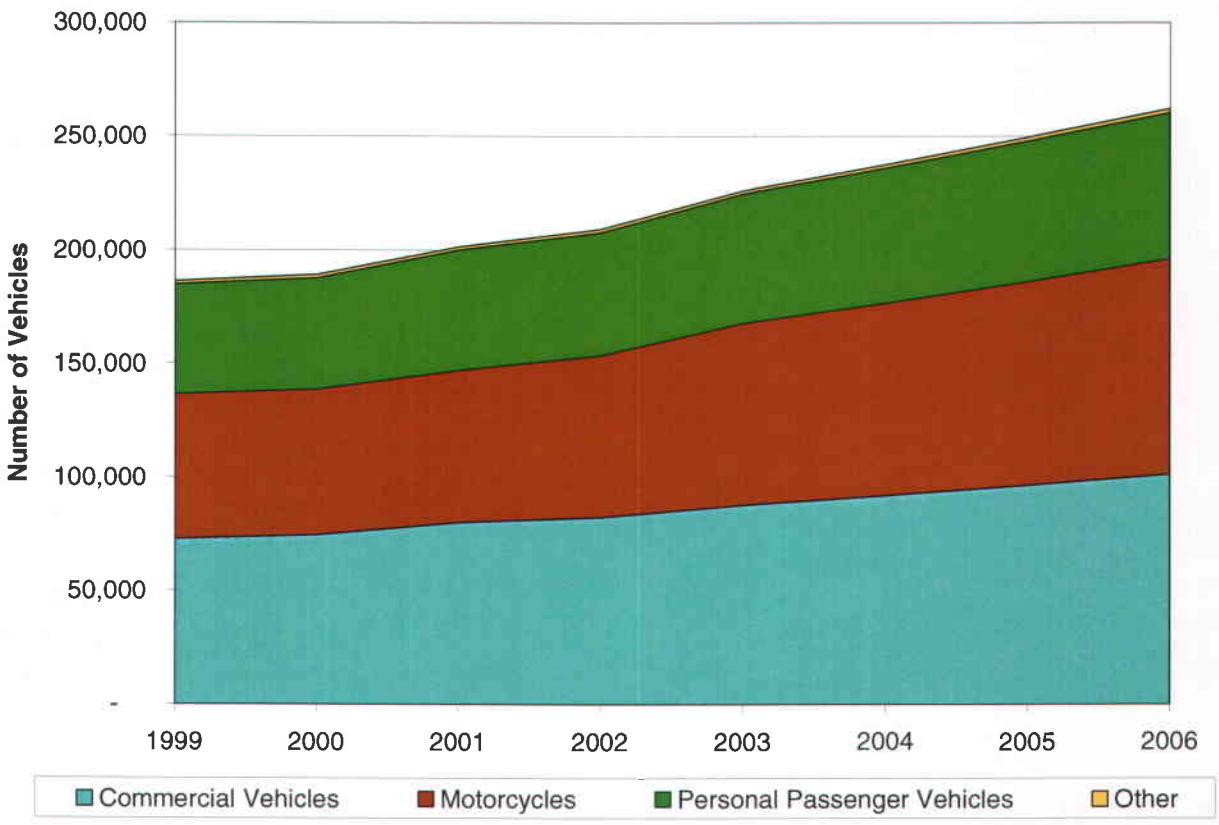
Land Transportation

Uganda is served by 30,000 km of maintained road network, of which approximately 2,600 km is tarmac. More than 3,000 kilometers of new tarmac are to be constructed in the next 10 years. Uganda depends on trunk roads to provide links to neighboring Rwanda, Burundi, Sudan, and the Democratic Republic of Congo.

Uganda depends on road and rail links through Kenya and Tanzania for much of its exports and imports. A railway line connects Uganda to the Indian Ocean port of Mombasa. A rail ferry route on Lake Victoria was established in 1993 to connect the Uganda rail system at Port Bell with the Tanzania system at Mwanza (310 km) and onwards to the Indian ocean port of Dar es salaam.

Uganda's registered vehicle fleet increased from 186,244 to over 226,191 vehicles between 1999 and 2003 (the latest year for which data is available) at an annual rate of 5.0%. Most of the growth was in motorcycles, trucks and mini-buses at annual rates of 5.9%, 5.9% and 6.6%, respectively (Figure 25).

Figure 25: Uganda's Vehicle Fleet, 1999 - 2006

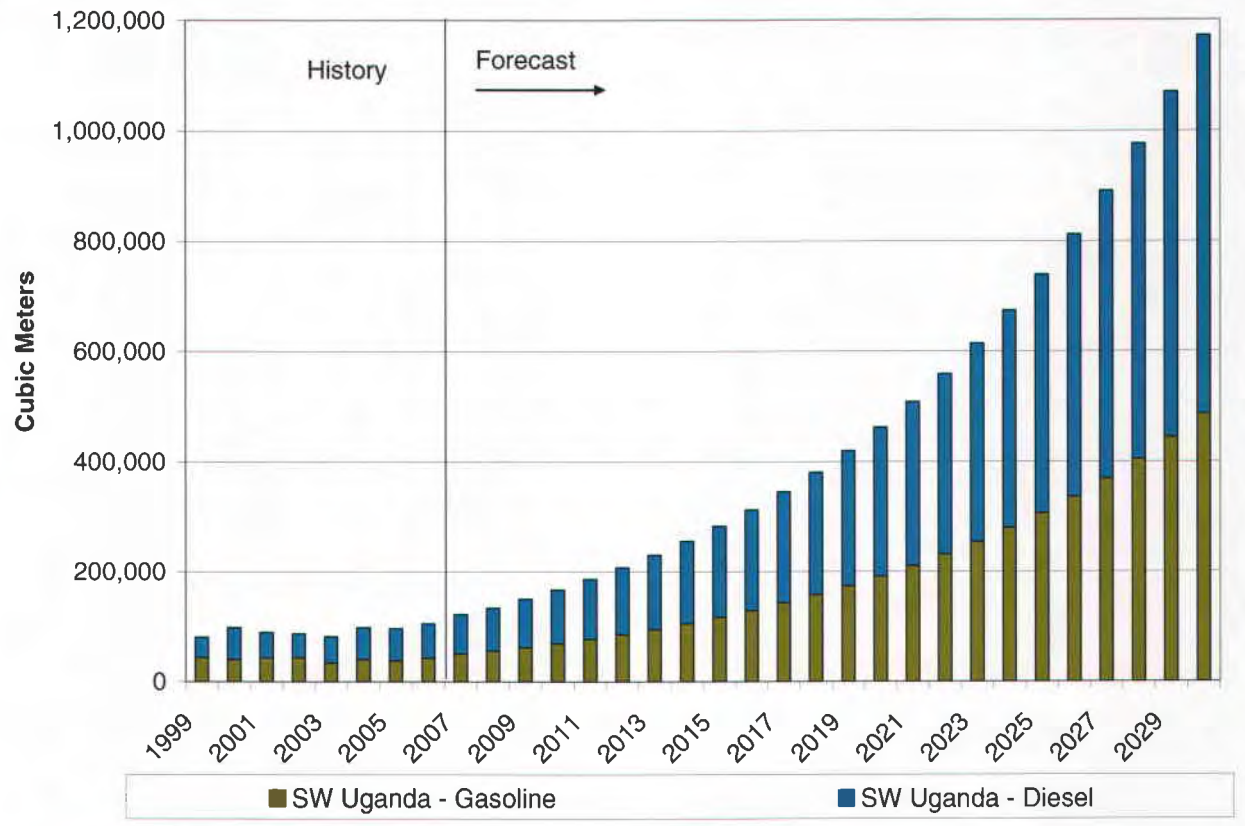


Note: Vehicles for 2004 – 2006 are estimated.
Source: Uganda Bureau of Statistics

In 2003, the vehicle ownership rate in Uganda was approximately 842 per 100,000 inhabitants (). Given expected growth in Uganda's GPD and per capita GDP to middle income status over the next 20-25 years, Uganda's vehicle ownership rate is projected to reach 1,085 vehicles per 100,000 inhabitants by 2020 and 1,232 vehicles per 100,000 inhabitants by 2030, meaning that in Southwest Uganda, there would be approximately 110,878 vehicles by 2020 and 163,185 vehicles by 2030.

With average fuel consumption per vehicle rising from 1.8 M^3/year in 2006 to 7.2 M^3/vehicle in 2030, motor fuel consumption in Southwest Uganda is projected to increase from an estimated 105,186 M^3 in 2006 to 462,071 M^3 by 2020 and 1,172,427 M^3 by 2030 (Figure 26).

Figure 26: Southwest Uganda's Projected Motor Fuel Consumption, 1999 - 2030



Source: SAIC

Aviation

Jet fuel and kerosene are primarily used by commercial and military aircraft, although kerosene is also used as a lighting source. The Uganda Civil Aviation Authority is planning to spend $160 million over the next five years on the expansion of Entebbe International Airport.[12] Assuming these improvements and upgrades occur and Entebbe and regional airports expand to handle increased traffic, jet fuel and kerosene consumption could grow from 425 M^3/day currently to 677 M^3/ day by 2015 and over 1,200 M^3/day by 2025. However, this will primarily affect demand on the Eldoret to Kampala pipeline, not the extension to Rwanda and Burundi.

Industry

Uganda's manufacturing sector is still very small and characterized mainly by the processing of agricultural raw materials and the production of consumer goods. Agro-related industries account for 39% of all manufacturing establishments.

[12] The construction is likely to be done in phases, with the first phase expected to cost US$12 million. Work to be done within the current financial year includes expanding the arrival hall and installing two boarding bridges, upgrading the escalators and elevators in the terminal building, re-equipping the baggage claim area, and expanding the arrivals area. The CAA will work on stabilizing the airport power supply by installing a 4000-kVA automatic voltage stabilizer.

Capital goods industries are few in number. Industrial products include simple consumer goods, including foods, tobacco and beverages, textiles and garments, leather products, soaps and detergents, which are produced by small-scale industries. Some medium- and large scale industries produce capital goods, but the value added is negligible, since the majority are basically assembly plants. Other products are chemicals, plastics, paints, pharmaceuticals, steel and steel products (iron sheets, metal bars, nails), and construction products.

Energy intensive industries include iron and steel, metal and metal products, chemicals and pharmaceuticals, and beverages.

The beverage sub-sector includes: coffee roasting and tea processing, soft drinks, alcoholic beverages. The main alcoholic beverages produced in Uganda are beer and spirits.

The iron and steel sub-sector includes the production of iron and steel, structural steel and other steel products (used mainly in the construction industry), and spare parts for equipment and machinery for the manufacturing sector. There are four firms operating mini steel mills in Uganda, with a combined production capacity of semi finished steel products of about 72,000 tonnes per annum. There are, in addition, 600 metal-working workshop, 30 to 40 foundries and many fabrication workshops.

Uganda is endowed with a wide variety of mineral resources, including copper, cobalt, tin, iron ore, tungsten, beryllium, limestone, phosphates, salt, clays, feldspar, diatomite, silica sand, glass sand, sand gravel, and construction materials such as granites and gneisses. Current mineral production is still too low to meet local demand and significant quantities of cement, salt, refractory bricks, paint, glass etc. are imported. Limestone needed for the production of cement and lime is consumed almost entirely in the domestic market. The production of aggregate gravel and sand is expanding in response to the growth in the building and construction industry. Small quantities of gold, tin and tungsten concentrates are being produced mainly for export.

Some major fuel consuming industries are listed in Table 10.

Table 10: Uganda Fuel Intensive Industries

Company	Activity
Canmin Resources Ltd.	Mining
Crown Beverages Ltd.	Soft Drink s
Hima Cement	Cement & Construction
Kasese Cobalt Company Ltd.	Mining
Nile Breweries Ltd.	Brewing
Roko Construction Ltd.	Manufacturing
Roofings Ltd.	Metals
Tororo Cement Industries	Cement
Uganda Baati Ltd.	Metals
Uganda Breweries Ltd.	Brewing

Source: United Nations, An Investment Guide to Uganda

Tourism

Tourism is the fastest growing economic sector in Uganda. For the past seven years, it has recorded an 18% growth per annum. Visitor arrivals increased from 73,000 in 1995 to 205,000 in 2001. The sector earned $161.7 million in 2001. During the period 1991–1997, total investment in hotels, services apartments, cinemas, lodges, travel agencies, restaurants, tented camps, casinos and whitewater-rafting amounted to $344 million.

Power

The power sector in Uganda is dominated by hydropower, which makes up 98 percent of installed capacity. Most of the new proposed plants are also hydropower, with backup and peaking diesel generation historically providing negligible power. SAIC does not expect significant changes in make up of capacity since proposed capacity plans continue to place overwhelming reliance on hydro capacity.

More recently, drought in Uganda has necessitated the installation of emergency diesel generation. In May 2005 a first diesel plant was installed in Kampala with a capacity of 50MW. The plant consumes approximately 290 M^3 of diesel per day. In 2006, a second emergency 50 MW generator was installed in Jinja. The two generators have added about 580 M^3 per day to diesel consumption. This capacity could be retired as new hydro capacity is built, or the emergency generators are replaced by cheaper HFO.

Just 3-5 percent of Uganda's population has access to electricity and many towns, especially in the North of the country are without electrical power. In the rural areas only about 2 percent have access to electricity, of which less than half is provided through the national grid, the remainder coming from household generators, car batteries or solar photovoltaic (PV) units.

Installed capacity in Uganda is about 303 MW, and over 98 percent of electricity is generated by the hydroelectric plant at Owen Falls (the 180 MW Nalubaale station and the 200 MW Kiira station with five 40 MW units of which three have been installed) on the Victoria Nile. There exists a small hydro power station at Maziba with an installed capacity of about 2 MW and

independent power generation at Kilembe Mines and Kasese Cobalt Ltd with a combined capacity of over 15 MW. There may be another 80 MW of privately installed captive generation capacity at various industries and mines.

Table 11: Uganda Generating Capacity and Generation

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Owen falls - capacity (MW)	177	180	180	180	180	260	260	300	300
Other stations - capacity (MW)	3.4	3	3	3	3	3	3	3	3
TOTAL INSTALLED CAPACITY (MW)	180.4	183	183	183	183	263	263	303	303
Hydro-electric (Million KWh)	1056.3	1129	1217.3	1232.4	1340.5	1533.5	1575.4	1700.5	1755.6
Diesel - generated (Million KWh)	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
TOTAL UNITS GENERATED (Million kWh)	1057.4	1130.1	1218.5	1233.6	1341.7	1534.7	1576.6	1701.7	1756.8
Annual Load Factor (%) (KWh)	70	71	77.9	78.3	58.9	67.4	71.4	80.8	71.9

Source: Uganda Bureau of Statistics

The previously wholly government-owned utility, the Uganda Electricity Board (UEB) is the organization that is responsible for supplying electrical power in Uganda. The UEB is now focusing on identifying available sites that hold micro hydro potential. The UEB had developed two sites of hydropower generation and private developers another two. These sites include Mubuku II (5 MW), Kisizi (0.075 MW) and the 1.25 MW Kikagati station (which has now been decommissioned). Paidha (7.5 MW), and Ishasha (4.5 MW) are in the process of planning.

Available estimates suggest that Uganda will require 2,000 MW of electricity by 2025, requiring investment of more than $3.5 billion.

3.6 Burundi

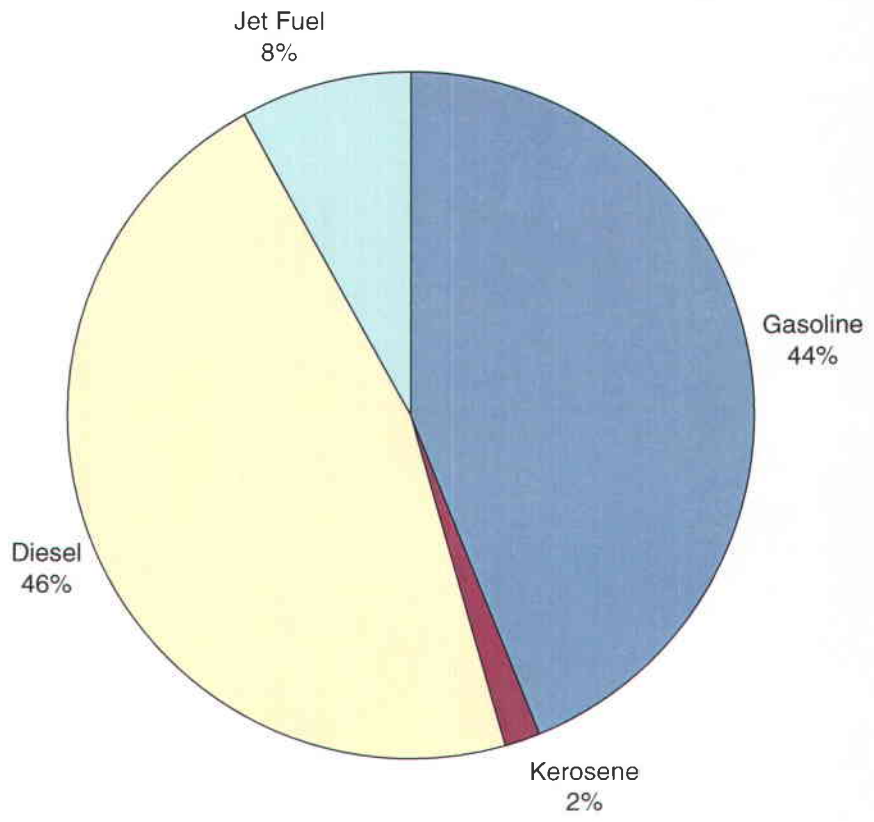
SAIC assumed that all demand for diesel and gasoline in Burundi comes from the transportation sector since diesel-fired power generation is unlikely to be significant over the medium to long term and existing industries use fuel oil for its process requirements. While some diesel is likely used for backup generation, e.g. the U.S. Embassy runs on its own generators and Brarundi, the brewery also has its own diesel-fired generators, the use of these generators should diminish over the long term as Regideso installs additional hydroelectric and fuel oil-fired generating capacity to meet growing demand.

Table 12: Burundi at a Glance, 2007 - 2030

	2007	2020	2030
Population (millions)	7.8	11.7	15.4
Real GDP (Billion $)	0.9	2.1	3.8
Real GDP per Capita	128	266	464
Economy	Predominantly agricultural	Predominantly agriculture with small-scale industry and mining	Predominantly agriculture with small-scale industry and mining
Power	32 MW of installed capacity, over 95% hydro. Possible short-term generation from diesel.	Hydro and fuel oil-fired generation. Less than 1% of generation from diesel	Hydro and fuel oil-fired generation. Less than 1% of generation from diesel
Number of Vehicles	42,911	84,398	130,939
Vehicle Ownership Rates per 100,000 people	551	720	850
Petroleum Product Demand ('000 M^3 per year)			
Gasoline	45	133	306
Diesel	47	133	306
Jet Fuel	7	9	13
Kerosene	1	2	3
Total White Oil	**100**	**278**	**628**

Currently, land transportation provides the primary source of demand for white oil, including motor gasoline and diesel. Diesel is responsible for over 46% of white oil consumption. Motor gasoline makes up another 44% of the market, followed by jet fuel and kerosene (Figure 27). Together, diesel and gasoline make up 90% of Burundi's white oil demand.

Figure 27: Burundi White Oil Demand by Fuel, 2006



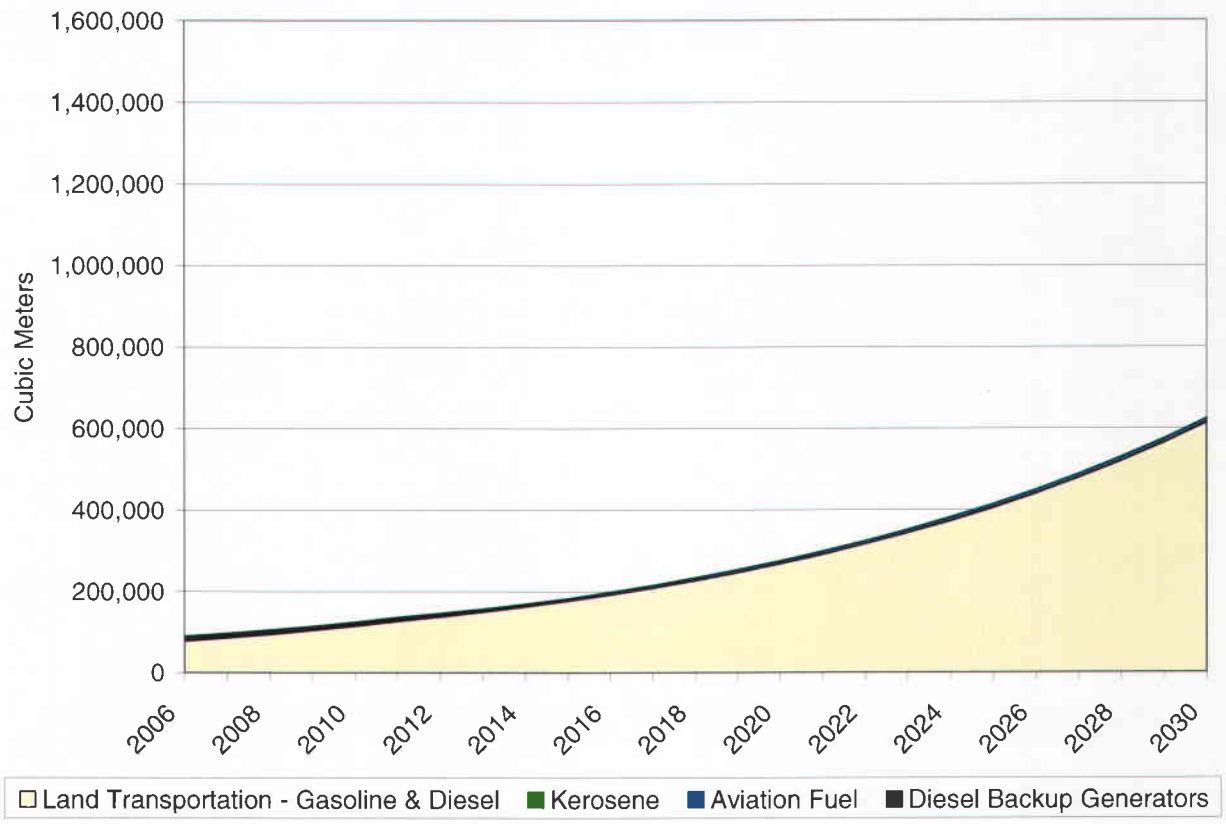
Source: SEP and SAIC

Key findings for each of the fuels are:

- Diesel for power generation is not expected to be a significant source of demand as the existing diesel plant is old and Burundi is negotiating financing with the World Bank to purchase fuel oil fired generators.
- Diesel for backup generation is expected to decline as the power system's supply availability and reliability improves.
- Gasoline and diesel for transportation purposes are projected to make the bulk of Burundi's future white oil consumption.
- Jet fuel consumption has started to decline as a consequence of fewer aircraft movements in and out of Bujumbura airport. This decline is likely to continue as the number of UN and other aid related flights decline with increased political stability. Once aircraft movements reaches a level that is consistent with Burundi's economy, jet fuel consumption is likely to increase along with increases in GDP per capita.

As in Rwanda and Southwest Uganda, Land Transportation is expected to make up the bulk of future white oil demand in Burundi. SAIC's forecast of white oil demand by sector is presented in Figure 28.

Figure 28: Burundi White Oil Consumption Forecast by Sector, 2006 - 2030



3.6.1 Macroeconomic Analysis

Population

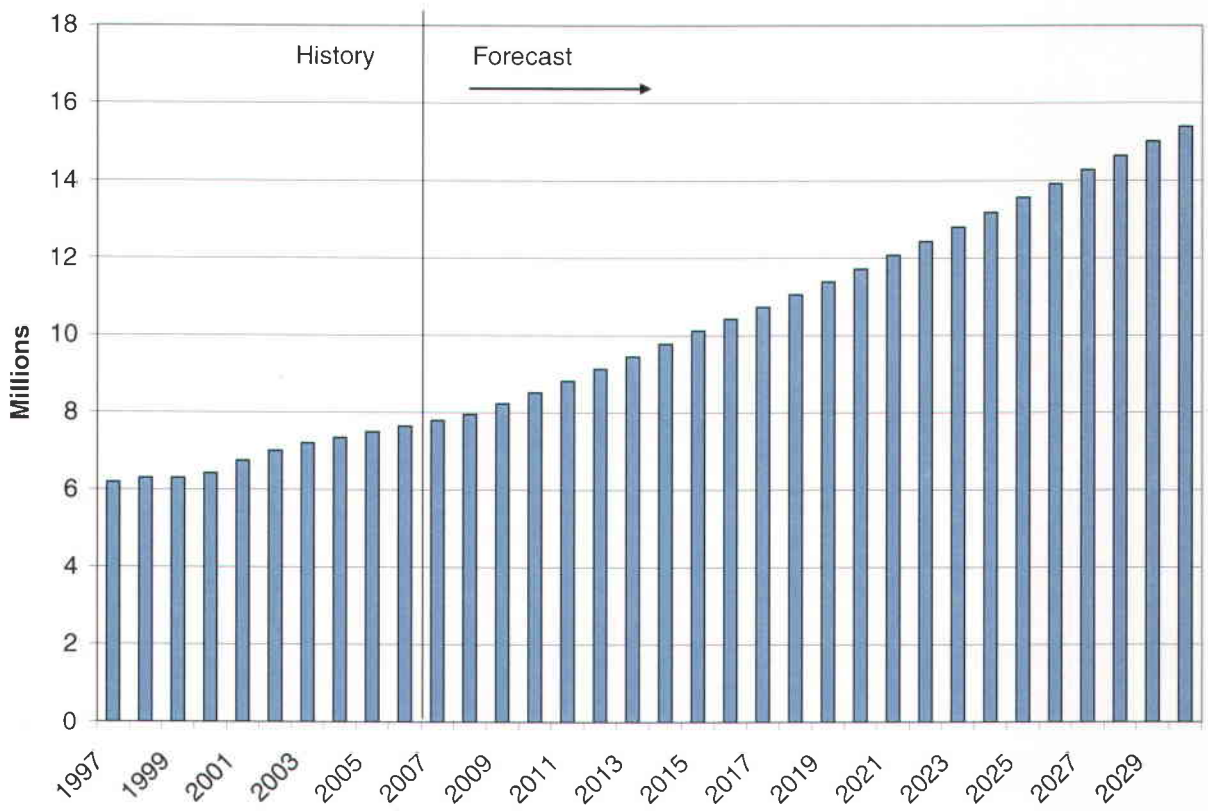
Burundi's population is approximately 7.6 million, with major concentrations in and around Bujumbura and some regional centers such as Gitega. The city of Bujumbura has around 1 million people and the centrally located city of Gitega with around 300,000 people is the second largest in Burundi. About 80% of all white oil in Burundi is received at SEP's depot in Bujumbura, with a smaller depot in Gitega receiving the remainder, and then shipped to the rest of the country. Hence, the pipeline would serve the whole of Burundi. SAIC expects that white oil consumption in Burundi will increase from approximately 94,723 M^3 in 2006 to 624,077 M^3/ by 2030.

Over the period 1997 – 2006, Burundi's population grew at approximately 2.4% annually. SAIC used the IMF's WEO estimates for the near-term forecasts until 2008 and applied the UN's growth rates for the longer term forecast[13]. The IMF's WEO estimates that Burundi's population will grow to [7.9] million by 2008 and the UN estimates that the annual population growth rate

[13] Sources: IMF World Economic Outlook, April 2007 and United Nations' World Population Prospects: The 2006 Revision.

from 2008 to 2015 will be 3.5%, slowing down to 3.0% between 2016 and 2025, and slowing further to 2.6% starting in 2026. Hence, SAIC estimates that Burundi's population will be 8.5 million in 2010 and 15.4 million by 2030.

Figure 29: Burundi's Projected Population

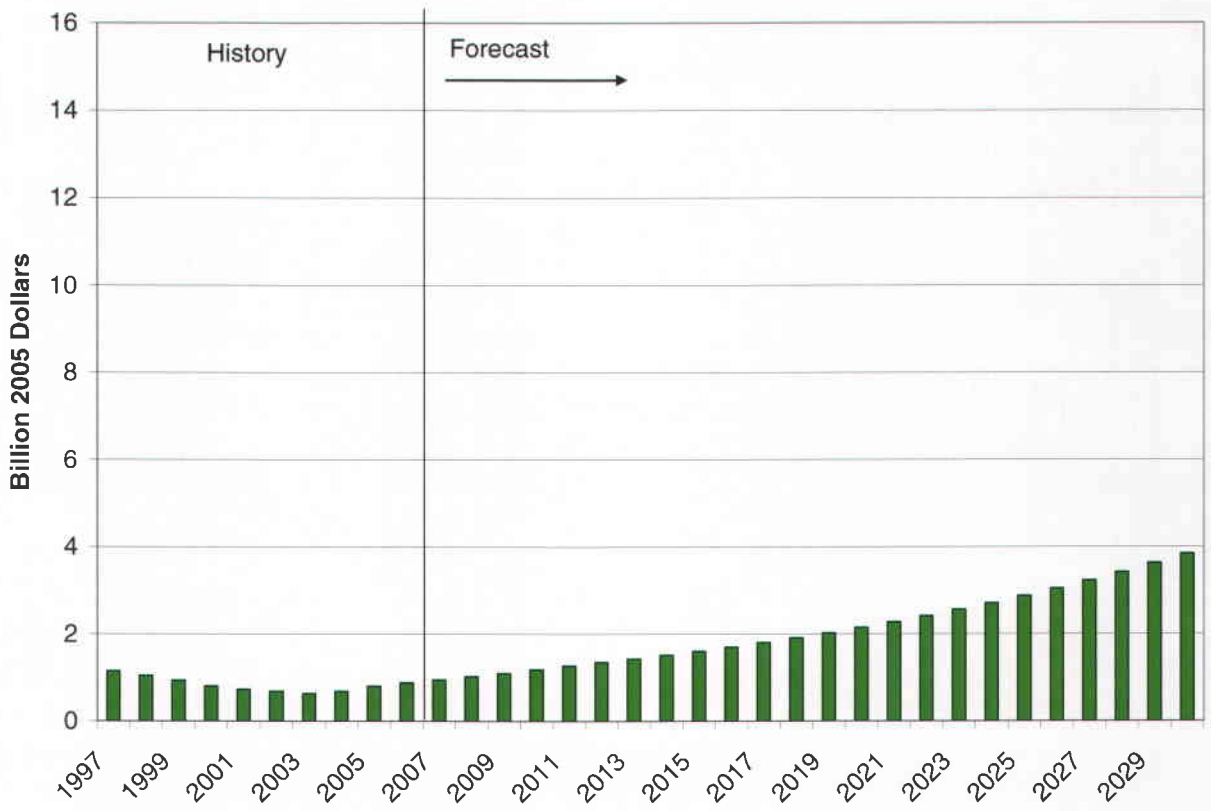


Source: IMF WEO, United Nations, and SAIC

Gross Domestic Product

Burundi produced approximately $0.8 billion in goods and services in 2006, with a per capita income of $107, all in real 2005 dollars. The economy is predominantly agricultural based, contributing about 45% of GDP, while manufacturing contributes about 15% of GDP. The rest of the economy consists of government and services. Real GDP is projected to grow at an average annual rate of 7.6% until 2011 and slowing down to a long-term annual growth rate of 6% in subsequent years. This would grow Burundi's economy to $1.2 billion by 2010 and $3.8 billion by 2030, all in real 2005 dollars.

Figure 30: Burundi's Projected GDP



Source: SAIC

Since Burundi's economy is starting from a very low level, just emerging from the crisis, elevated economic growth rates are to be expected over the next 5 – 10 years. It should also be noted that Burundi was under international economic sanctions in 1996 - 1999. Forecasted real average annual growth of 6% after 2008 assumes that Burundi is successful in enhancing and maintaining political stability and that it continues with economic reforms expanding private sector and provides necessary infrastructure, e.g. road transportation and electricity.

Average annual growth in real GDP of 6.5% between 2005 and 2030, coupled with 2.9% annual growth in population should result in per capita income of $139 by 2010 and $249 by 2030, all in real US dollars.

3.6.2 Sectoral Analysis

There are two main facilities for the receipt of petroleum products in Burundi, SEP's facility in Bujumbura, which receives about 80% of imported volumes according to respondents in the Burundian fuel market interviewed by SAIC. There is also a storage facility in Gitega, which receives some or all of the remaining 20%. Since the start of the civil war, or crisis, in Burundi in 1994, the collection of statistics has not been a high priority for obvious reasons. Moreover, not all imports and exports appear to be reported and registered by Burundian customs. For example, import volumes recorded by the customs service are sometimes higher and sometimes lower than those recorded by the SEP and reported by the Banque du République du Burundi

("BRB")[14]. Finally, statistics reported by the BRB do not include information from the facility in Gitega starting in 2003.

Burundi exports fuel to the Eastern DRC, though these exports are not readily identifiable in official export and other statistics. For example, official export statistics, as reported by the BRB, seem to indicate that Burundian fuel exports to any country are negligible. Moreover, in statistics reported by the BRB, the difference between imports and consumption is accounted for as fuel stocks, not exports. Hence, fuel exports to the Eastern DRC are implicitly included in the Burundian consumption numbers.

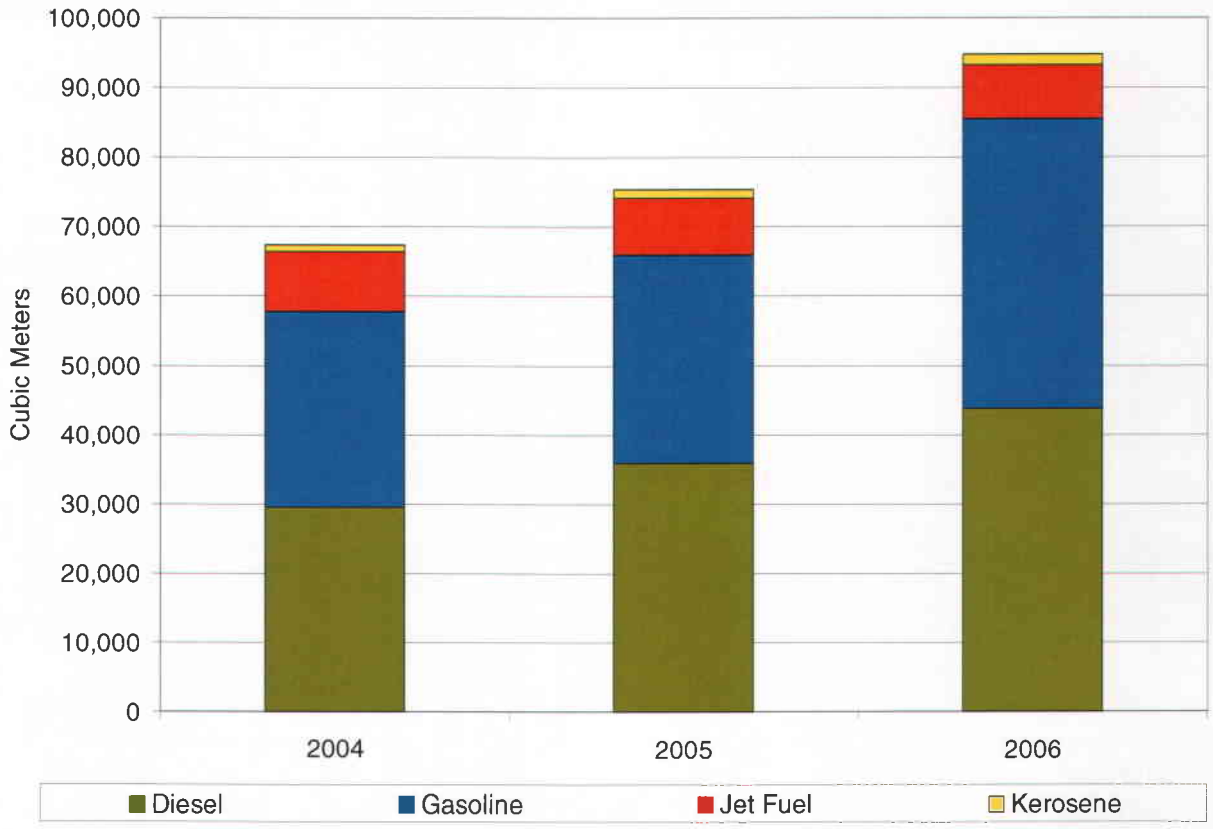
After examining the available statistics, SAIC opted for using the import numbers reported directly by SEP, assuming that they represent 80% of total imports and consumption for each fuel, except for jet fuel since SEP is the only storage facility that receives jet fuel. Hence, SEP's reported numbers for jet fuel are used for total imports and consumption. While not exact, this approach relies on what appears to be the most reliable numbers collected first-hand by the SAIC team. A summary of the assumptions for the historical data is as follows:

- SEP imports represent 80% of imports for gasoline, diesel and kerosene and 100% of imports of jet fuel;
- Imports are treated as consumption data since reliable consumption data is not available;
- Exports to Eastern DRC are included in Burundian consumption numbers.
- The adjusted import/consumption volumes are designated "normalized" in this section.

Burundi's normalized white oil consumption increased significantly between 2004 and 2006 from 67,377 M^3 in 2004 to 94,723 M^3 in 2006, representing a compound annual average growth rate of 19% (Figure 31). It is clear that increased stability in Burundi has brought increased economic growth as well as increased fuel consumption. In 2005, white oil consumption increased by 12%, while in 2006 it increased by 26% with increases spread fairly even over gasoline, diesel and kerosene in percentage terms. At the same time, jet fuel consumption has declined by 5% and 6% in the last few years, respectively, which is also an indication of increased stability as fewer military sorties are flown.

[14] See BRB statistics website http://www.brb.bi/stat.htm for up to date historical statistics for Burundi used in this study.

Figure 31: Burundi Normalized* White Oil Consumption 2004-2006



* Assumes that receipts by SEP represent 80% of total receipts and consumption, except for jet fuel where SEP receipts represent 100% of total imports.

Source: SEP

It should be noted that jet fuel consumption in Burundi is significantly higher than in Rwanda. However, based on an examination of the relatively sparse civilian flight schedule to and from Bujumbura, it is probable that military use accounts for the bulk of jet fuel consumption in Burundi as well as informal exports to the DRC. Some jet fuel is sold to the United Nations operating in Burundi and the Eastern DRC, but only amount to about 30 M^3/month or 360 M^3/year, according to local fuel suppliers interviewed by SAIC.

Land Transportation

Road transportation is central to Burundi's domestic economy while lake transportation is the key route for trade. About 90% of domestic passenger and goods transport is by road. However, approximately 80% of the country's trade is on carried by watercraft on Lake Tanganyika plying primarily two routes:

- Bujumbura-Kigoma (in Tanzania), and
- Bujumbura-Mpunlungu (in Zambia)

Trade with the Eastern DRC is also carried out via the routes Bujumbura-Kalémie and Kalundu. The merchant marine has a capacity of about 10 700 tonnes, but the port of Bujumbura is a major obstacle due to decay of its equipment and silting up of its basin and access channel.

Burundi's road transport network is made up of 12,338 km of roads, where about 5,230 km constitute main road network. Of the total network, about 1,280 km is paved road with the remainder being dirt roads. However, roads in Burundi are generally in a state of disrepair, including in Bujumbura where only some main thoroughfares are paved and in good condition. This is due to a general lack of resources as well as the civil war that started in 1994. However, an extensive rehabilitation program is under way since 2004 using World Bank financing. Using donor financing, Burundi is concentrating its efforts on rehabilitating 1,500 km of its road network over the next 5-10 years.

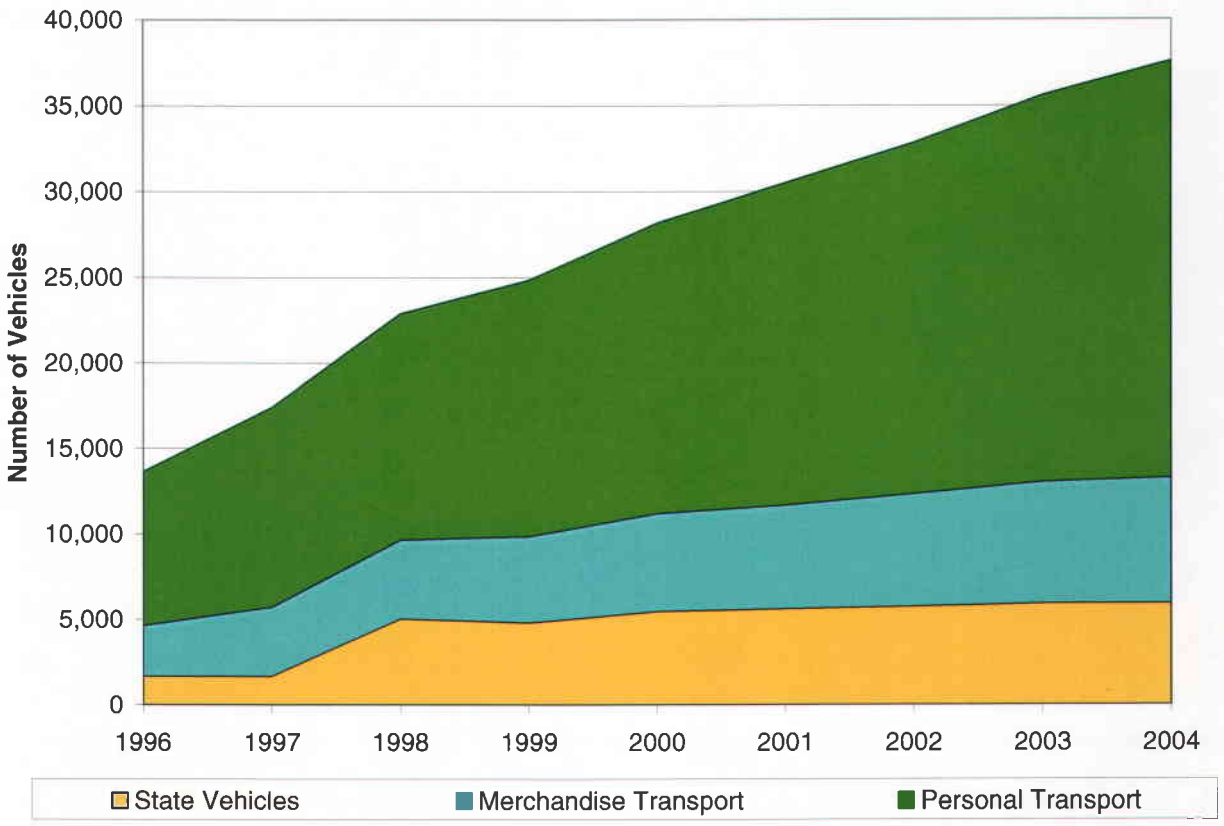
As in Rwanda, demand for transport is related mainly to foodstuffs, agro-industrial products, products of the brewery in Bujumbura as well as imported products including final consumer products, capital goods and petroleum products. Burundi depends on the Northern Corridor through Uganda and Kenya to reach the port of Mombasa and the Central Transport Corridor through Tanzania to reach the port of Dar-es-Salaam. While fuel imports come mainly via the Northern Corridor, most of Burundi's trade goes via the port of Kigoma in Tanzania.

The size of Burundi's registered vehicle fleet is very similar to Rwanda's as is the vehicle ownership rate. However, Burundi's vehicles are used less and consequently consume less fuel than in Rwanda due to the poor state of the road network and lower income levels. The total vehicle fleet increased from 28,139 to 37,565 vehicles from 2000 to 2004[15] at an annual growth rate of 7.5% (Figure 32). Most of the growth came in Burundi's registered passenger car fleet which increased from 16,968 vehicles in 2000 to 24,312 vehicles in 2004 at an annual growth rate of 9.4%. The commercial vehicle fleet increased from 5,714 to 7,341 vehicles in the same time period at an annual growth rate of 6.5%. The state-owned vehicles remained relatively stable increasing from 5,457 to 5,912 vehicles from 2000 to 2004 at an annual growth rate of 2%. The current vehicle ownership rate in 2004 was approximately 512 vehicles per 100,000 persons and was estimated to be 538 in 2006. Growth in vehicles numbers started increasing significantly in 2000 as Burundi was under international economic sanctions from 1996 to 1999, which inhibited vehicle imports.

Moreover, there are a number of unregistered and informal vehicles that could amount to up to 50% of the registered fleet. These vehicles are generally more than 10 years old and are not available for operation for more than 60% of the time.

[15] Vehicle data for Burundi was available up to the year 2004.

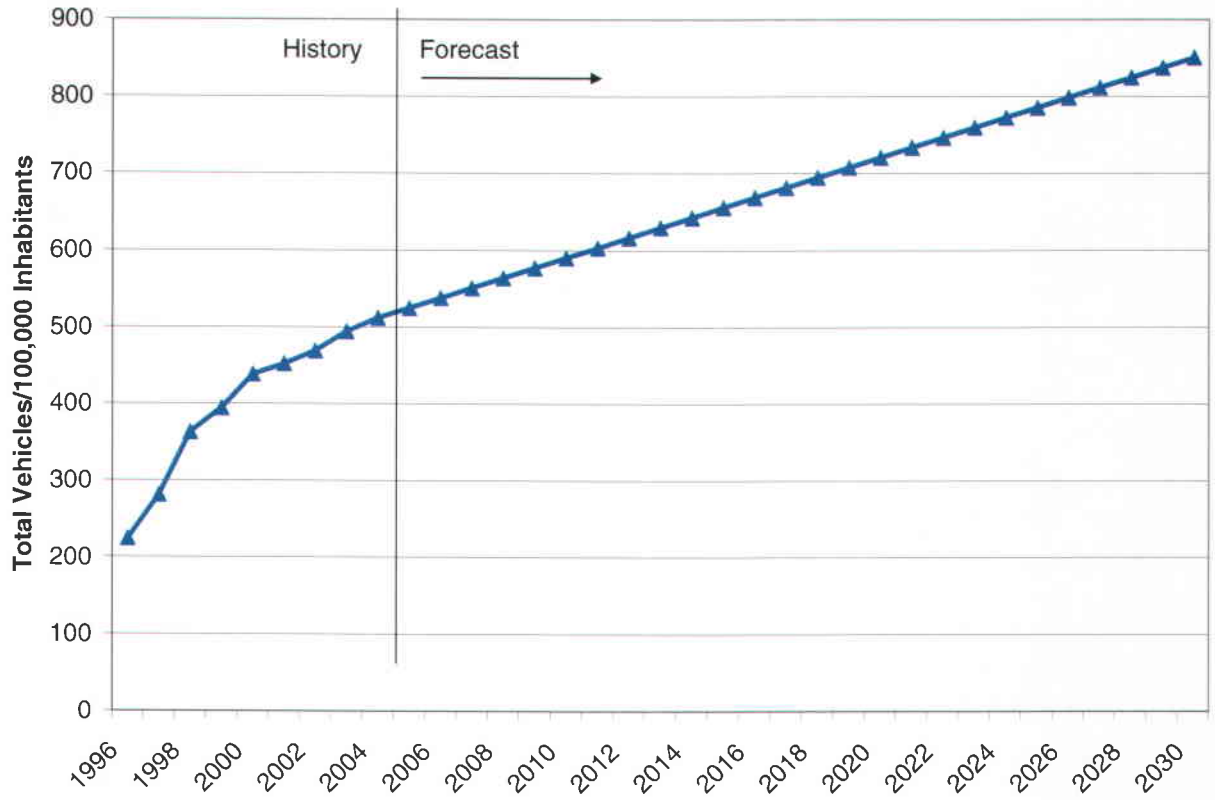
Figure 32: Burundi - Registered Vehicles, 1996 – 2004



Note: Burundi was under international sanctions 1996-1999. Data was available until the year 2004.
Source: Burundi Ministère des Transport, Postes et Télécommunications; Département de Transports

In 2006, the vehicle ownership rate in Burundi was estimated to be approximately 538 vehicles per 100,000 inhabitants (Figure 32). Given expected growth in Burundi's GPD and per capita GDP over the next 20-25 years as well as the existing vehicle stock, Burundi's vehicle ownership rate is projected to reach 720 vehicles per 100,000 inhabitants by 2020 and 850 vehicles per 100,000 inhabitants by 2030, meaning that there would be approximately 84,398 vehicles by 2020 and 130,939 vehicles by 2030.

Figure 33: Vehicle Ownership Rates, 1996 - 2030

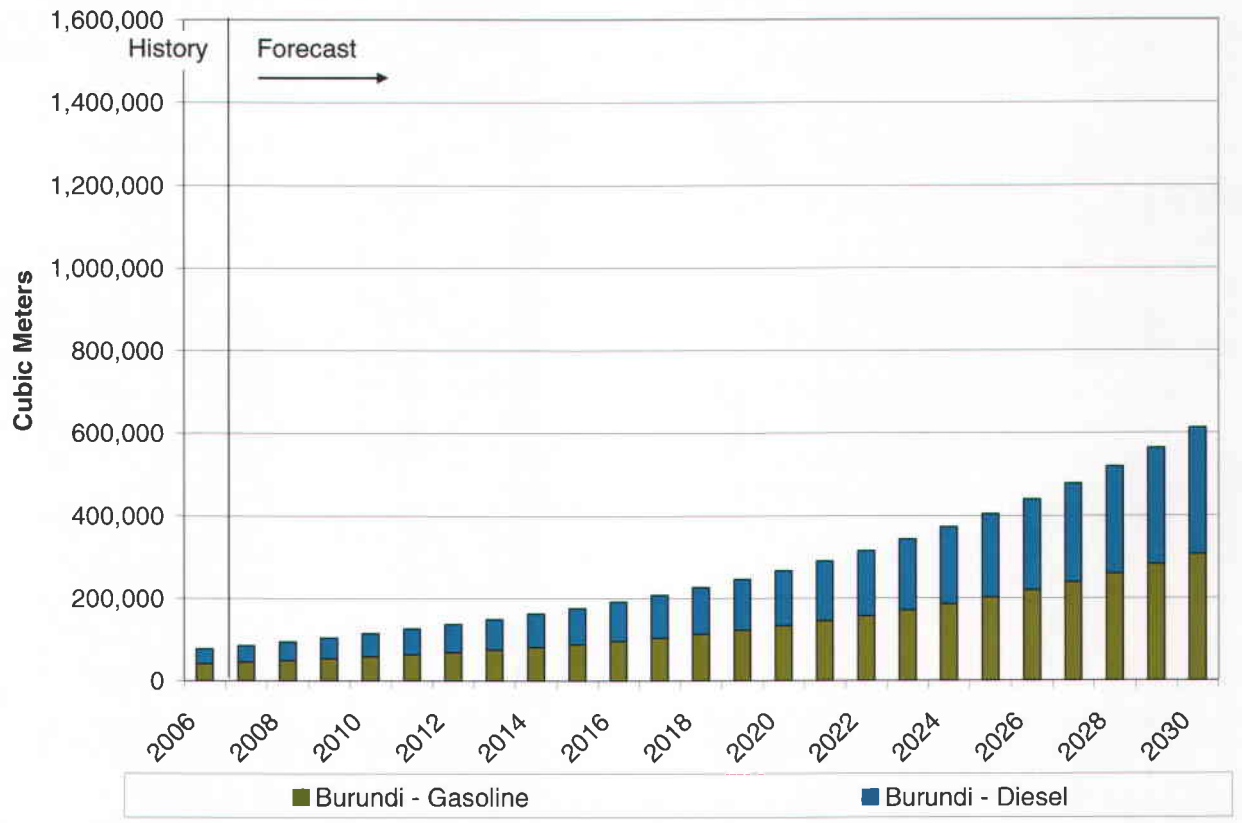


Note: Burundi was under international sanctions 1996-1999. Data was available until the year 2004.

Source: Burundi Ministère des Transport, Postes et Télécommunications; Département de Transports and IMF WEO, April 2007

With average fuel consumption per vehicle rising from an estimated 1.9 M^3/year in 2006 to 4.7 M^3/vehicle in 2030, motor fuel consumption is projected to increase from 77,221 M^3 in 2006 to 266,646 M^3 by 2020 and 612,229 M^3 by 2030 (Figure 14).

Figure 34 Burundi's Projected Motor Fuel Consumption

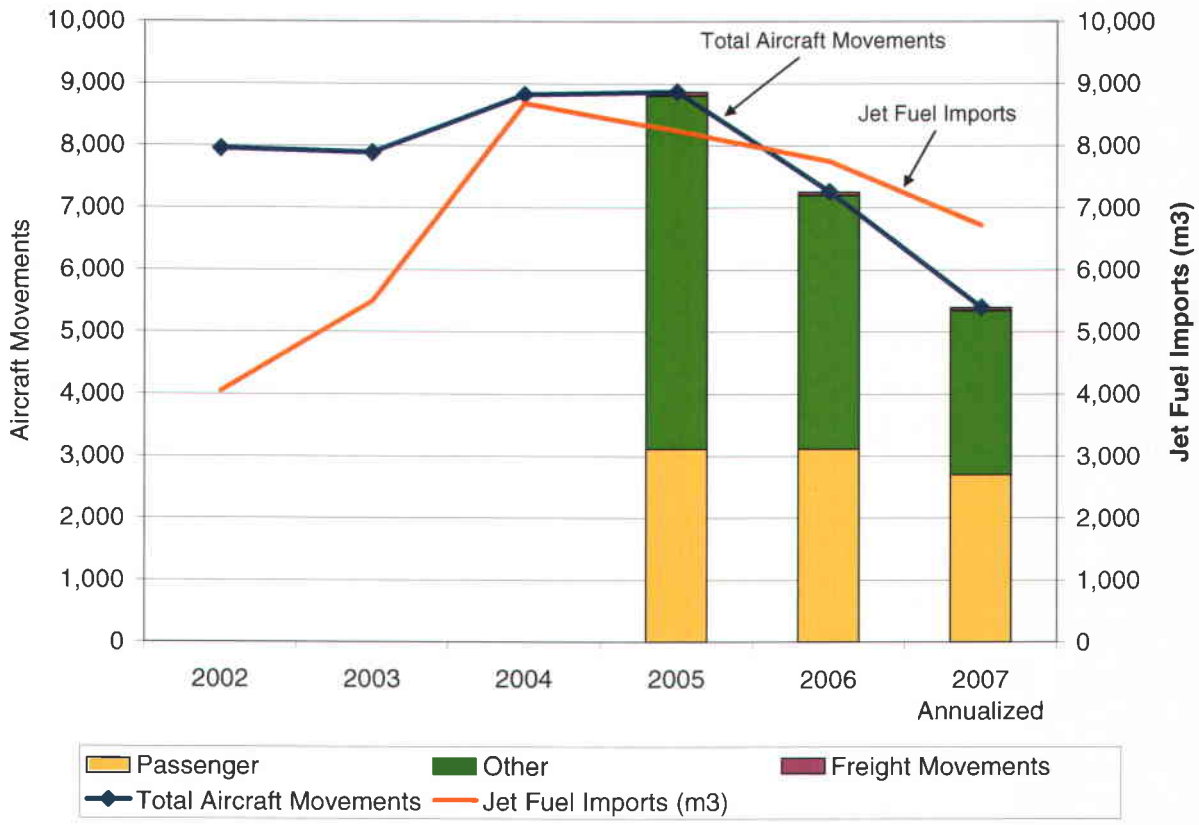


Source: SAIC

Aviation

The consumption of jet fuel in Burundi in 2006 was 7,746 M^3, which is a decline of almost 11% since 2004, the recent peak usage year since the crisis started in 1994. This decline is primarily due to fewer domestic flights by the United Nations and the World Food Program as the country has stabilized as well as Air Burundi ceasing operations. Consequently, jet fuel imports have declined markedly since 2004, a decline that SAIC expects will continue in 2007 (Figure 35). SAIC Base Case forecast projects that jet fuel consumption in Burundi is likely to continue to decline in the short term but reach 8,819 M^3 in 2020 and 12,322 M^3 in 2030.

Figure 35: Bujumbura Aircraft Movements and Burundian Jet Fuel Imports, 2002 - 2007



Note: Aircraft movements for 2007 were annualized using Q1 2007 data. Jet fuel imports for 2007 were annualized using actual import data for Jan – Apr 2007.

Sources: BRB, SEP, and SAIC

The Bujumbura airport is the only international airport in Burundi and the primary one serving the country. There are several secondary aerodromes, e.g. Ngozi, Gitega and Kirundo, which are sparingly used for domestic services. The key drivers of aviation activity in Bujumbura include the following:

- Dramatic rise in the number of passengers traveling to the country;
- Reduction of aid-related flights, which also temporarily reduces the amount of cargo handled;
- Increase in average aircraft size operating out of Bujumbura.

As the country has stabilized, the number of enplaning and deplaning passengers in Bujumbura has increased from almost 83,000 in 2002 to almost 138,000 in 2006[16]. With the suspension of many WFP flights, cargo handled declined from 3,135 tons in 2005 to 2,649 tons in 2006.

[16] All statistics regarding passengers, cargo volumes and total aircraft movements were obtained through the BRB, which reports data provided to the BRB by the Regie de Services Aeronautiques (see footnote 14).

Passenger flights have accounted for less than half of all non-cargo aircraft movements in the last few years as the WFP has flown aid flights to both Burundi and likely to the Eastern DRC as have the United Nations. Hence, total aircraft movements are likely to decrease over the short-term until growth in passenger and cargo flights outpace the decline in Other flights. The Other category includes aid flights such as those by the WFP, UN flights, business flights as well as general aviation.

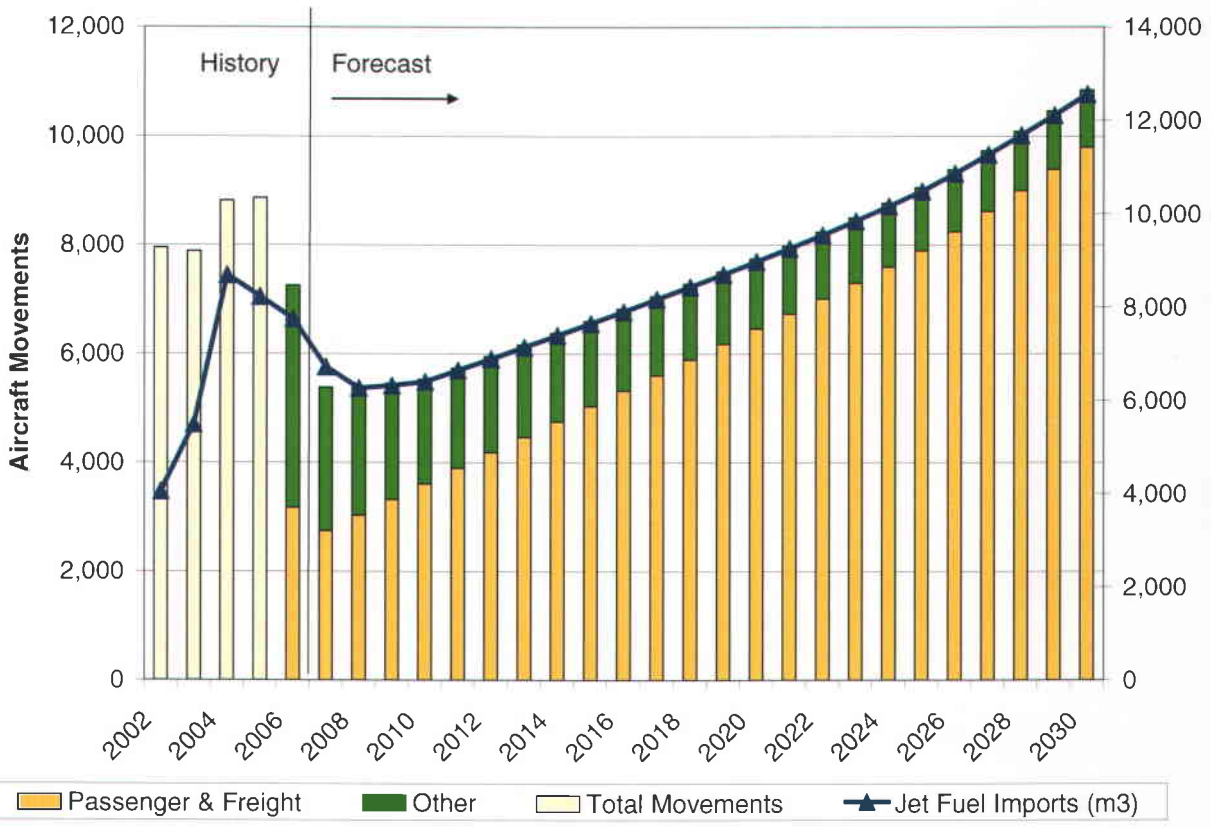
There are three airlines operating direct flights to and from Bujumbura. Kenya Airways and Ethiopian Airlines operate direct flights to Nairobi and Addis Abeba, respectively. Rwandair Express operates short-haul flights to Kigali, as does Ethiopian Airways. Rwandair Express also flies to Johannesburg in South Africa. An analysis of the traffic schedule for 2006 indicates that passenger flights accounted for around 3,120 aircraft movements[17], freight flights accounted for 52 movements and other flights accounted for 4,082 movements. Air Burundi ceased operating in the spring of 2007 and ceased operating flights in 2006 taking out of service its two 19-seater aircraft. Hence, passenger aircraft movements for 2007 are projected to be around 2,704.

While the GOB would like Bujumbura to become a regional air freight hub, similar to Rwanda, Rwanda's head start in terms of political stability and economic growth is likely to give it the upper hand in developing a regional air freight hub.

SAIC forecasted aircraft movements for Bujumbura Airport using the relationship established between GDP per capita and passenger and cargo flights in the Airport Study for Rwanda. Using its Base Case forecast of GDP/capita and the relationships from the Airport Study, passenger and cargo aircraft movements at Bujumbura airport are expected to increase from an estimated 3,120 in 2006 to 6,468 in 2020 and 9,796 in 2030. The category of Other flights is expected to continue to decline as the country grows more prosperous, though at slower rates than in the last few years. Other flights are expected to decline by an average of 10% per year until 2010, slowing to an annual average of -4% until 2020 and -2% after 2020. Hence, the number of Other aircraft movements is expected to decline from an estimated 4,082 in 2006 to 1,279 in 2020 and 1,045 in 2030. Overall, aircraft movements are expected to increase from 7,254 in 2006 to 7,747 in 2020 and 10,841 in 2030. At the same time, in the Base Case, jet fuel imports are projected to decline in the short term but reach 8,966 M^3 in 2020 and 12,548 M^3 in 2030 (Figure 36).

[17] Flights schedules were analyzed based on information provided by OAG Flights.

Figure 36: Burundi Aircraft Movements and Jet Fuel Imports, 2002 - 2030



Source: BRB, SEP, and SAIC

It should be noted that forecasts of jet fuel consumption are probably the most uncertain du to the difficulty of predicting refueling patterns. Planes have a number of options when refueling, including Nairobi, Entebbe, Addis Ababa, and Dar-es-Salaam. Moreover, with a petroleum products pipeline, Kigali would also become an attractive refueling option. This means that actual fuel consumption in Burundi could be lower than suggested by projected airport traffic.

Industry

Industrial consumption of diesel in Burundi for process purposes is minimal. While diesel for emergency and backup generators may disappear over the next 5 – 10 years and is not included in the demand forecast, SAIC estimated current usage in order to correctly estimate the amount of diesel currently used for transportation. If mining projects are realized in Burundi, they would be significant users of diesel. However, SAIC does not include potential volumes from future mining projects in its Base Case.

Burundi has very little industry. Like Rwanda it has a brewery, Brarundi, that is located in Bujumbura and it grows coffee and tea. At the present time, existing industries use fuel oil for their process requirements and are expected to continue doing so in the future. Hence, industrial use of diesel is expected to be minimal.

On the other hand, those residences, companies, and commercial establishments that are connected to the national electricity network (about 25,000 connections in Bujumbura represent 90% of electricity consumption) all have backup or emergency generators as do some wealthier residential customers. Since load shedding is a frequent occurrence in Bujumbura, these generators are likely to consume significant amounts of diesel.

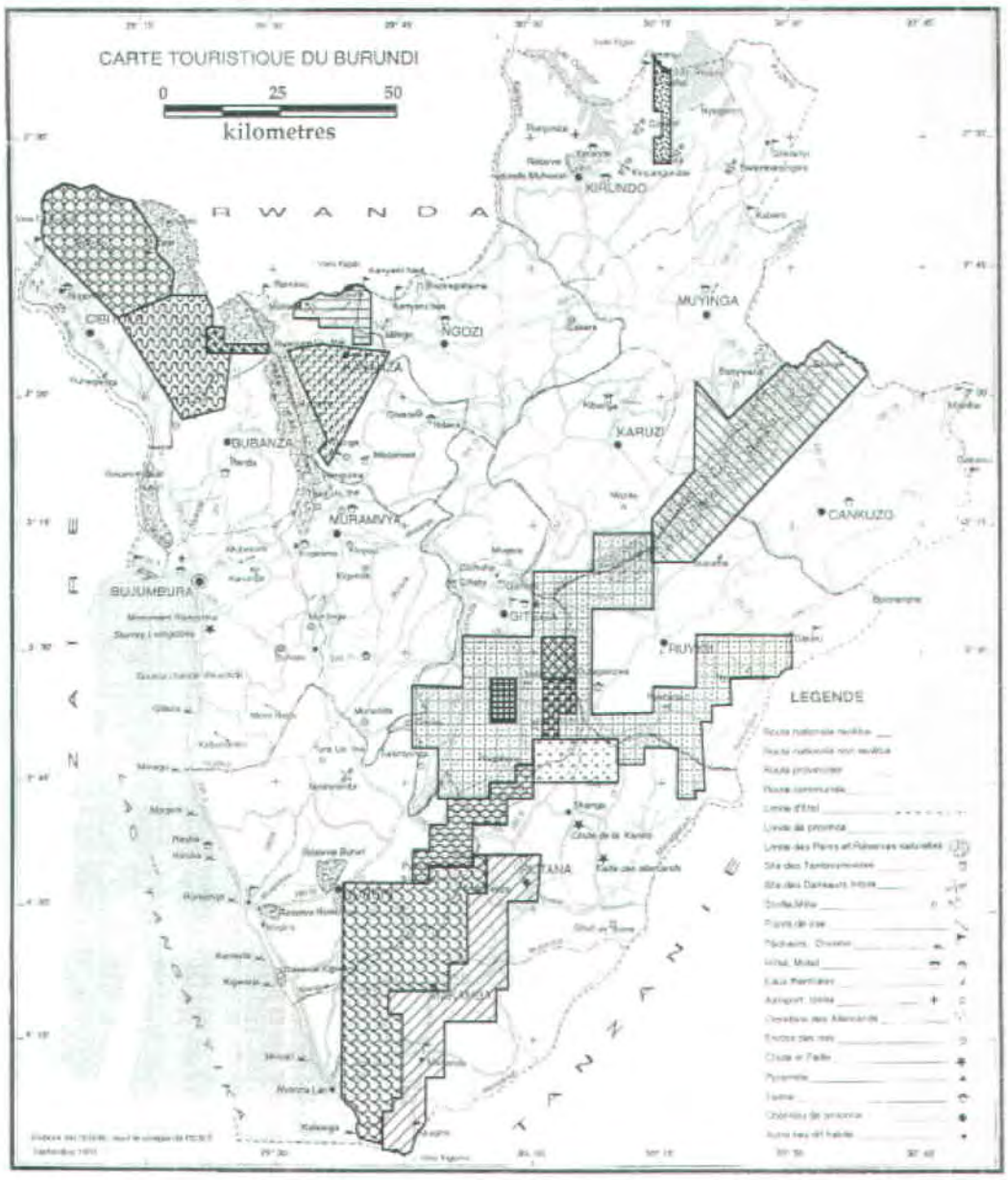
If Burundi continues to stabilize, as seems likely, and the economy shows positive growth over time, it is likely that Regideso will upgrade its generation and transmission systems. This process has already started and may take 5 – 10 years until load shedding is a thing of the past. Hence, diesel for these generators is not included in the demand forecasts for Burundi. Based on average consumption rates of fuel for motor transportation and the electricity supply deficit, SAIC estimates that diesel used for backup generation was up to 8,239 M^3 in 2006, or 19% of total diesel consumption.

Mining

The most promising future industrial developments involve the exploration and production of nickel since Burundi has good quality unexploited nickel resources. The geological belt containing nickel runs northeast to southwest through Burundi and companies conducting active exploration activities on the ground include BHP Billiton, Danyland, and, Mineral Search of Africa (Figure 37). Potential demand from mining projects in Burundi has not been included in SAIC's demand projections for the following reasons:

- A commercial mine takes at least five years to develop and construct provided the entire process goes smoothly. Worldwide experience indicates that rapid mine development is relatively rare. Hence, it is almost impossible to project the timing of the operation of commercial scale mines in Burundi.
- The analysis for Rwanda indicates that most commercial scale mines, except nickel mines, may still be relatively small and not require significant amounts of diesel as most of the equipment would be run on electricity and compressed air, which is generated using electricity.
- If and when large nickel mines are constructed in Burundi, they may be important individual customers for fuel distributors. However, their diesel demand is likely to be small compared to the total flow of white oil to Burundi to significantly affect the economic viability of the pipeline segment from Kigali to Bujumbura. For example, the Kabanga nickel project in Northwest Tanzania (see Section 3.7.1) is expected to require approximately 1,200 M^3/year of diesel when operations start. This represents approximately 1.3% of total white oil demand in Burundi in 2006 and 0.4% of projected white oil demand in 2020. Furthermore, the 35 MW of electricity required by the Kabanga mine will most likely be generated using fuel oil-fired generators (since it is much cheaper than diesel) unless a reliable electricity grid connection were available. SAIC expects future mines in Burundi to do the same.

Figure 37: Burundi – Current Mineral Concession Map



LEGENDE(Délimitation des permis)

ANDOVER RESOURCES NL
- Musongati(Ni, Cu, Co, PGE)

BHP BILLITON
- Mugina-Songa-Nyange(Ni, Cu, Co, PGE)
- Makamba(Ni, Cu, Co, PGE)

CARACAL GOLD
- Cibitoke-Mabayi(Au)
- Matongo-Bandaga(Au)

COMEBU
- Ndora(Sn, coltan)
- Murehe(Sn, coltan, W)
- Kabarore(Sn, coltan)

DANYLAND
- Muremara(Ni, Cu, Co, PGE)

IGEab
- Butara(Au)
- Mukanda(V)

MINERAL SEARCH OF AFRICA 1
- Rutovu(Ni, Cu, Co, PGE)
- Buhoro(Ni, Cu, Co, PGE)
- Bukirasazi(Ni, Cu, Co, PGE)

MINERAL SEARCH OF AFRICA 2
- Centre-Est(Ni, Cu, Co, PGE)

PGE: éléments du groupe de platine

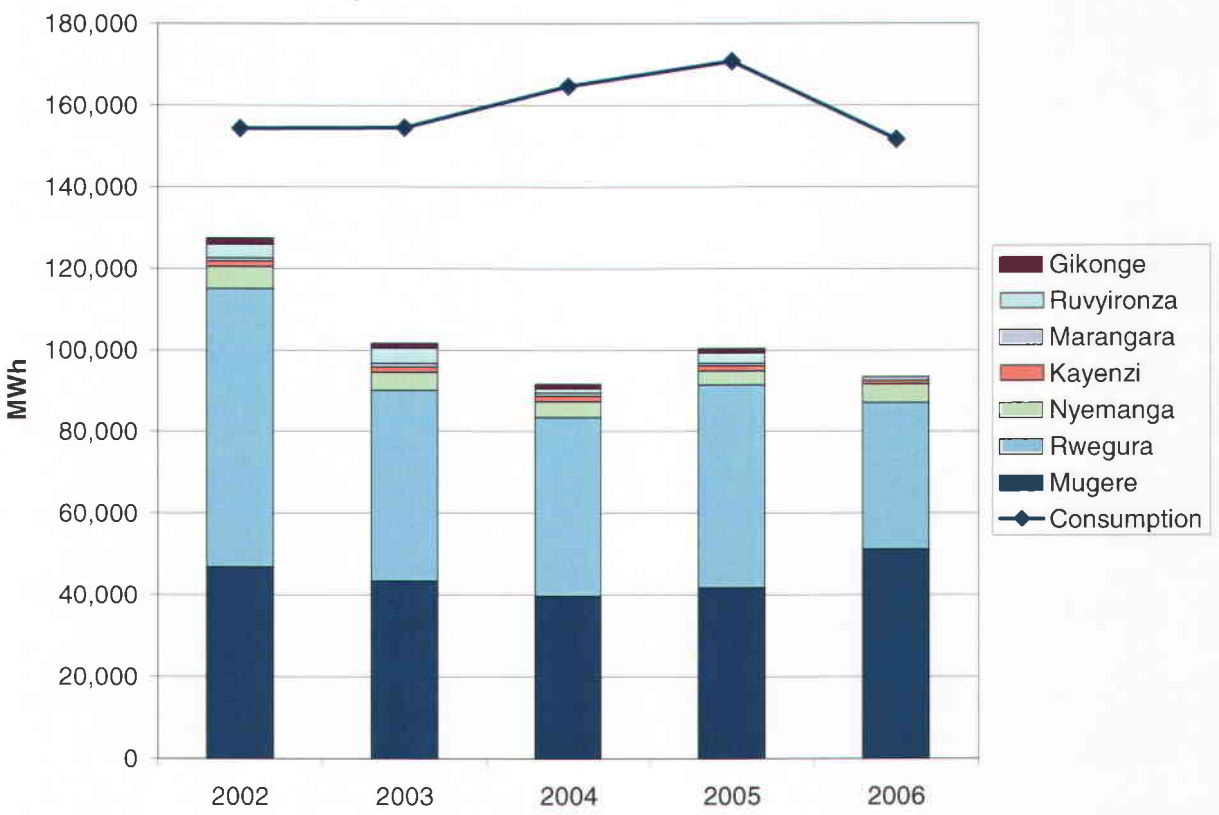
Source: Ministry of Energy and Mines

Power

Diesel-fired power generation is not expected to contribute any demand in Burundi due to the country's reliance on hydroelectric power and its plans for additional hydroelectric power and fuel oil-fired generators to meet future demand growth.

Burundi's power sector is dominated by hydroelectric power. Total installed capacity is around 35 MW – 40 MW. Installed hydroelectric capacity is around 32 MW, with an additional 300 MW of economically exploitable hydroelectric potential. Existing thermal generation capacity consists of one 5.5 MW diesel-fired generator that was mostly idle when Burundi was under international sanctions between 1996 and 1999. Furthermore, no production from the thermal plant was reported by REGIDESO, Burundi's power and water utility in the years 2002 – 2006 as hydro electric production declined from 127,299 MWh to 93,337 MWh (Figure 38). The difference between domestic production and consumption, as shown in Figure 38, is made up by imports.

Figure 38: Burundi – Generation by Hydropower Plant and Consumption, 2002 - 2006



Source: Regideso and BRB

Considering the frequent electricity outages in Bujumbura at the present time, it is likely that recorded consumption declined in 2006 due to load shedding. It should also be noted that both technical and non-technical losses range from 20% – 25%.

The Ministry of Energy indicated in an interview that it intends to run the 5.5 MW diesel plant in 2007. However, it also indicated that it is negotiating financing with the World Bank to purchase fuel oil-fired generators, similar to those purchased by Rwanda, with a total capacity of 7 – 10 MW. Once installed, over the next few years, this fuel oil-fired generation would likely be used instead of the diesel-fired generator.

It should be noted that less than 2% of Burundi's population currently has access to the electricity network and 90% of electricity is consumed in the capital, Bujumbura. Hence, significant demand growth would also entail a substantial investment in electrification of the country as well as Bujumbura. The Burundian Ministry of Energy and Mines has indicated that peak demand is expected to grow to 200 MW in 2020. However, diesel-fired generation is not expected to satisfy these projected requirements as the bulk of future power generation projects are hydroelectric generators.

3.7 Eastern DRC and Northwestern Tanzania

Mining in Eastern DRC and Northwestern ("NW") Tanzania holds the promise of the most significant demand for petroleum products, primarily diesel that could be served by the proposed pipeline. Both Eastern DRC and Tanzania both have significant mineral deposits. However, political instability and civil conflict in Eastern DRC inhibits the development of large scale commercial mines that could be reliable customers of the products pipeline. Tanzania's mining industry is relatively sophisticated with development of formal mining taking off after the country revised its mining code in 1995 allowing foreign investment in mines. However, relatively limited demand volumes and competing transportation modes are likely to keep mining sector demand in NW Tanzania relatively limited.

3.7.1 Northwest Tanzania

There are currently five gold mines and one diamond mine west and south of Lake Victoria with development work under for additional mines. However, petroleum products delivered via pipeline and truck from Kigali are unlikely to be competitive with fuel delivered via a rehabilitated rail system from Dar-es-Salaam. The Kabanga nickel project may be an exception, as it is located near the Rwandan and Burundian borders (Figure 39). If the Kabanaga Nickel Mine is established, it is likely to require around 100 m3 of diesel per month or 1,200 m3 per year, which could be supplied via the Project. If the development of the mine goes smoothly, the mine could be operational by 2012, at the earliest. Due to the uncertainties associated with the development of a large mine, this demand is included in SAIC's High Case starting in 2012. There are also significant mines east of Lake Victoria, whose fuel is provided primarily from Eldoret and Kisumu in Kenya.

Tanzania's mining industry has developed greatly since its mining code was revised in 1995 and foreign direct investment in mining projects has lead to five new mines being constructed in Tanzania in the last 10 years. Currently, companies such as Xstrata/Falconbridge, Barrick Gold, Anglo Gold Ashanti, and De Beers are operating mines and developing new ones. A number of these mines and new developments are located south and west of Lake Victoria. The mining project closest to the K-B pipeline is the Kabanga Nickel project owned by Xstrata, which is located west of Lake Victoria, near the Rwandan and Burundian borders.

Figure 39: Western Tanzania Mines and Mining Projects

Source: Locations from Central Development Corridor (CDC) Minerals Development & Investment Strategy, dated March 19, 2007

The existing mines in Western Tanzania are presently supplied with fuel via rail or road from Dar-es-salaam or via barge and truck from Kisumu in Kenya via Mwanza, but the K-B pipline is unlikely to be competitive in delivering fuel in the future.

Most of the fuel is delivered via truck since rail service is very unreliable and the barges on Lake Victoria are generally also of low quality. Hence, under current circumstances, delivering fuel from Kigali via truck to some of the mines in Western Tanzania could be competitive. However, the rail system in Tanzania is in the process of being rehabilitated after being concessioned to Rites Ltd. of India and it is very possible that the barge system on Lake Victoria would also be rehabilitated under the auspices of various regional development initiatives, including the Central Development Corridor, over the next 20 years. For example, the current rail transportation cost of fuel from Dar-es-Salaam to Kigoma is around \$170/ M^3. Assuming that the transport cost to the cluster of mines south of Lake Victoria would be half of that, rail could bring fuel to the mines for around \$85 - \$100/ M^3, including some limited truck transport for the final distance. Considering that fuel delivered via the proposed pipeline would incur the pipeline transportation

tariffs from Mombasa as well as the cost of 250 km to 400 km of trucking from Kigali, it is unlikely that fuel from the Project will be competitive with a relatively well-functioning Tanzanian railroad.

In addition, there are discussions and plans in Tanzania to build a petroleum products pipeline from Dar-es-Salaam to Dodoma and on to Mwanza. However, such a pipeline has been under discussion for many years and it is not clear how much more development time is required. If constructed some time over the next 25 years, however, the transportation cost would likely be more competitive than going via pipeline from Mombasa to Kigali followed by truck. Hence, such a pipeline would likely supply most of the mines in Western Tanzania.

Finally, it should be noted that the existing mines south and west of Lake Victoria use relatively small amounts of diesel when compared to total demand on the pipeline and would not alter the pipeline economics significantly if served by the Project. For example, the six existing mines in the Lake region consumed around 3,450 M^3 of fuel in 2006[18]. In the same year, Rwanda consumed 58,356 M^3 of diesel (excluding diesel for power generation) while Burundi consumed 43,783 M^3. Hence, demand from all of the existing mines would only represent an addition of 3.4% to current diesel consumption in Rwanda and Burundi alone.

The one possible exception is the Kabanga nickel project that Xstrata is developing in a joint venture with Barrick Gold. The project is in the feasibility stage and if constructed, it would process around 2 million tons of ore per year to produce around 200,000 – 400,000 tons of Nickel concentrate per year. An operation of this size would require approximately 10-12 trucks as well as a similar number of loaders. Hence, monthly diesel consumption is likely to be around 100 M^3 per month or 1,200 M^3 per year. In case a connection to the power grid is not available, the mine would require on-site generation of approximately 35 MW. However, like the Geita Mine in Tanzania, on-site generation is likely to use heavy fuel oil, not diesel.

A feasibility study is currently underway for the Kabanga project with an expected completion date in 2008. Construction is likely to take around three years and could commence in 2009 at the earliest and as such be completed in 2012. Hence, the potential demand from the Kabanga project is included in SAIC's Base Case starting in 2012.

3.7.2 Eastern DRC

Mining of tin, coltan and gold is carried out in the Eastern DRC by artisanal and small scale miners and exported through Uganda and Rwanda. While Eastern DRC has considerable mineral and metal potential, very little of this potential is likely to be realized until peace and security is established in the region.

Since the political situation in Eastern DRC is extremely unstable and will remain so for the foreseeable future, SAIC has not specifically included fuel demand from Eastern DRC in its

[18] This amount was converted from 242 tons per month as indicated on page 21 of the Mining Report.

demand forecasts. Some of the fuel currently imported by Rwanda and Burundi is likely going to Eastern DRC. Once the DRC has stabilized, demand from Eastern DRC is likely to officially replace some of the volumes currently included in the demand forecasts for Rwanda and Burundi. The issue of a pipeline spur to Goma, on the northern shore of Lake Kivu, should be revisited at that time, as it is not reasonable to proceed with such a spur at the present time.

A number of larger mines in the DRC are located in the southern and southwestern parts of the country. In Eastern DRC, most of the mining focuses on minerals and gold (Figure 40).

In anticipation of political stability, gold exploration projects are being carried out in the region. The Mining Report lists three gold exploration projects which include:

- Nord-Kivu - Metal Processing Association (South Africa) has obtained a large number of concessions from the government of the DRC to mine and process cassiterite and also has plans to construct a smelter in the DRC or Rwanda.
- Sud-Kivu - Banro Exploration (Canada) is exploring the Namoyo-Twangiza gold belt and have published findings of 3.7 million ounces of measured and indicated resources with an additional 6.9 million ounces in the inferred category.
- North Eastern Katanga - Anvil Mining (Australia) is exploring for gold near Kilemie, on the shores of Lake Tanganyika.

While these individual mines would consume substantial amounts of diesel, any further development in the Eastern DRC is dependent on a certain amount of regional peace and security, which does not seem likely within the foreseeable future.

Figure 40: Mining Areas in the DRC

Sources: Philippe Rekacewicz, Atlas de la Mondialisation, 2003, http://maps.grida.no/go/graphic/mining-in-the-democratic-republic-of-congo/

3.8 High and Low Demand Scenarios

The High and Low Cases represent different economic futures in the region with the High Case representing exceptional economic growth while the Low Case, which is the minimum required for economic feasibility of the pipeline represents a steady but a relatively low level of growth over the next 25 years[19]. In all three Cases, SAIC utilized the economic projections in IMF's WEO, dated April 2007, until 2008, except for Rwanda where the growth rates in Vision 2020 were utilized.

[19] Annual growth rates are presented in Appendix C.

In the Base Case, economic growth in the region is projected to average 6.1% annually[20] while concomitant population growth would put growth in GDP per capita at a CAGR of 3.2% (Table 13). Burundi is projected to experience a somewhat higher CAGR over the 25 years since it is starting from a significantly lower base than Rwanda and Uganda. However, this is predicated on continued improvement in political and military stability.

Table 13: Summary of Economic Growth Rate Cases, 2005 - 2030

Real GDP Annual Growth Rates, 2005 - 2030	Base Case	High Case	Low Case
Uganda	6.0%	7.0%	4.5%
Rwanda	6.3%	7.9%	4.8%
Burundi	6.5%	7.2%	4.8%
All 3 Countries	**6.1%**	**7.2%**	**4.6%**

Real GDP/capita Annual Growth Rates, 2005 - 2030	Base Case	High Case	Low Case
Uganda	2.9%	3.9%	1.5%
Rwanda	4.0%	5.3%	2.5%
Burundi	3.4%	4.2%	1.8%
All 3 Countries	**3.2%**	**4.2%**	**1.7%**

Source: SAIC

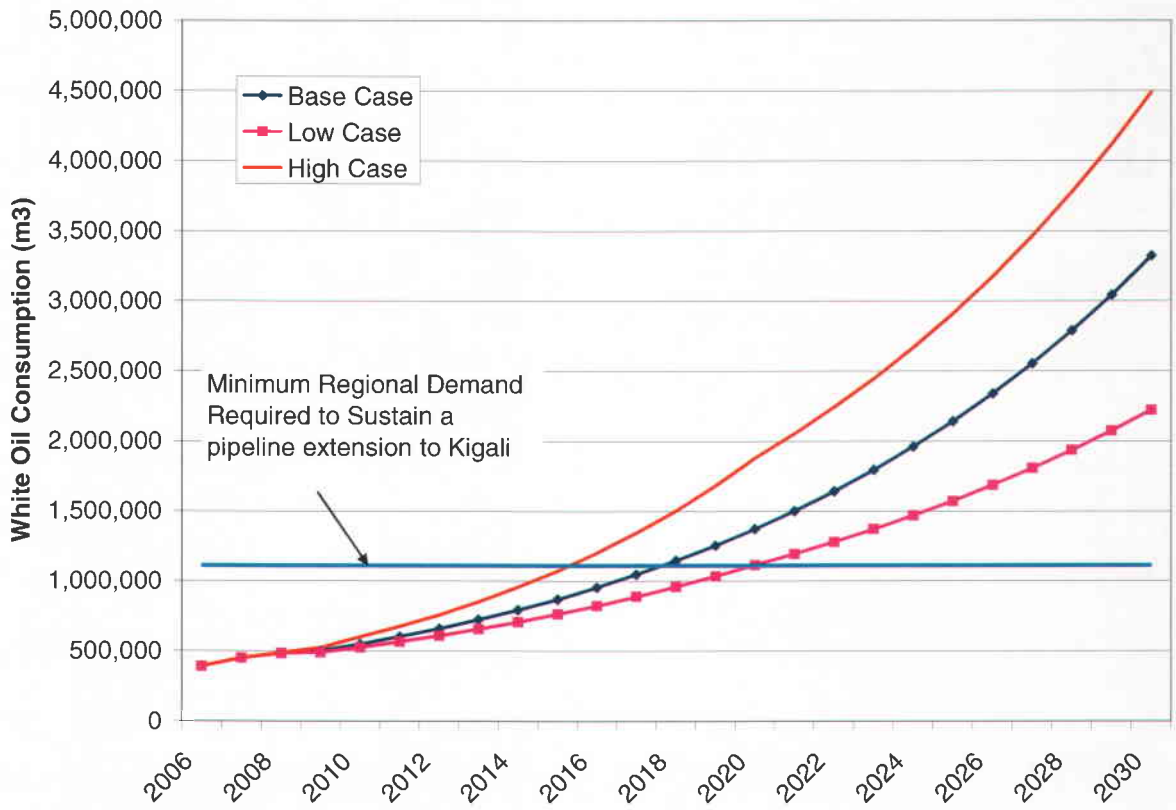
The High Case is loosely modeled on the economic growth rates in Rwanda's Vision 2020, followed by a CAGR of 6% after 2020. In the High Case, the region grows at a CAGR of 7.2% over the next 25 years, a rate which is closer to that achieved by the Asian tigers. GDP per capita in the High Case would grow at a CAGR of 4.2%. This scenario is optimistic and requires continued economic reform in all three countries as well as significantly improving political stability in the region. In the High Case, SAIC also assumes that the proposed Isaka – Kigali railroad will be constructed and start operations in 2020 (see Section 3.4.3 for further details). Average annual diesel demand to run the railroad is estimated at approximately 11,000 M^3. It also assumes that the Kabanga nickel mine will be constructed and start operations in 2012 and that average annual diesel demand will be around 1,200 M^3 (see Section 3.7.1 for further details).

The Low Case assumes that there are some improvements in political stability and that the three economies continue to grow as some economic reforms are carried out and that the programs of privatizations and public-private partnerships are successful in most cases. In the Low Case, the region's economies grow by a CAGR of 4.6% and GDP per capita increases at the relatively slow rate of 1.7% per year.

[20] In other words, CAGR. Actual growth rates are likely to be both above and below the projected averages in the different Cases.

In order to provide benchmarks for monitoring demand growth going forward, SAIC determined that the annual average petroleum product demand required between 2011 and 2030 to make a pipeline terminating in Kigali viable is 1.2 million M^3. This demand level is represented by the blue line in Figure 41. The required average demand level of 1.2 million M^3 is reached in 2022 in the Low Case, in 2019 in the Base Case, and 2016 in the High Case.

Figure 41: High and Low Case Demand Scenarios



Source: SAIC

4.0 Kampala to Kigali to Bujumbura Pipeline Feasibility

4.1 Introduction

Based on forecasted market demand SAIC determined the cost of the proposed pipeline and a levelized pipeline transportation cost per cubic meter of fuel. The cost of pipeline transportation was compared to the cost of trucking fuel to understand the economic viability of the pipeline. Additionally, pipeline costs were also compared to rail transportation costs.

4.2 Key Findings

- Since white oil is currently trucked into Rwanda and Burundi via Uganda, motor fuels are very expensive. The cost of trucking fuel from Eldoret to Kampala is around \$45/ M^3, while the cost of trucking fuel to Kigali is around \$70-\$90/ M^3. The cost of trucking fuel to Bujumbura across the Northern Transportation Corridor is even higher, \$110 - \$130 / M^3 from Eldoret.
- Based on announced costs to build the E-K pipeline, the tariff along the pipeline is likely to be between \$20 and \$24/ M^3 to transport product between Eldoret and Kampala.
- A nominal \$193.6 million oil products pipeline from Kampala to Kigali pipeline would require a levelized tariff of \$42.44/ M^3 for the 2010-2020 time period, which is below the levelized trucking tariff of \$56.89/ M^3. Over the full 2010-2030 time period the required pipeline tariff would be \$22.13 / M^3, as compared to the levelized trucking tariff of \$66.68/ M^3. This indicates the pipeline is economically superior to the current transport mode.
- A nominal \$53.7 million oil products pipeline from Kigali to Bujumbura would require a levelized tariff of \$55/ M^3, as compared to the levelized trucking cost of \$47.41/ M^3 forecast for the 2010-2020 time period. However, over the 2010-2030 time period, the required levelized tariff is \$28.88/ M^3, which is well below the \$55.47/ M^3 levelized tariff projected for trucking.
- The final tariff along the pipeline will be dependent on the type of tariff selected and negotiated between countries. The tariff could be incremental, with each country paying the added cost of added pipeline mileage; postage stamp (a single tariff along the entire pipeline).

4.3 Pipeline Routing

Initial review of major population centers, topography, and existing road networks connecting Kampala to Kigali and then on to Bujumbura indicates that the pipeline could largely follow the existing roads between Kampala, Kigali, and Bujumbura. The pipeline could run southwest from Kampala through Masaka (around 65,000 inhabitants) and Mbarara (around 78,000 inhabitants) and through Kabale (around 50,000 inhabitants), near the border with Rwanda

From Kabale, the pipeline could go south through Byumba in Rwanda and terminate in Kigali (around 603,000 inhabitants). An extension to Bujumbura would likely follow the roads from Kigali to Bujumbura and pass through Gitarama (around 86,000 inhabitants), Nyanza (around 56,000 inhabitants) and Butare (around 77,000 inhabitants) in Rwanda and through Kayanza and possibly Muramvya (around 18,000 inhabitants), depending on demand in Muramvya, and terminate in Bujumbura (around 328,000 inhabitants). Table 14 provides distances between major pipeline segments.

Table 14: Distance for Pipeline Segments

Pipeline Segement	Distance (Km)
Kampala to Masaka	137
Masaka to Mbarara	146
Mbarara to Kabale	147
Kabale to Kigali	90
Kigali to Bujumbura	220

Source: SAIC

Figure 42 and Figure 43 show an overview of a possible pipeline route

Figure 42: Possible Route for Kampala – Kigali Pipeline

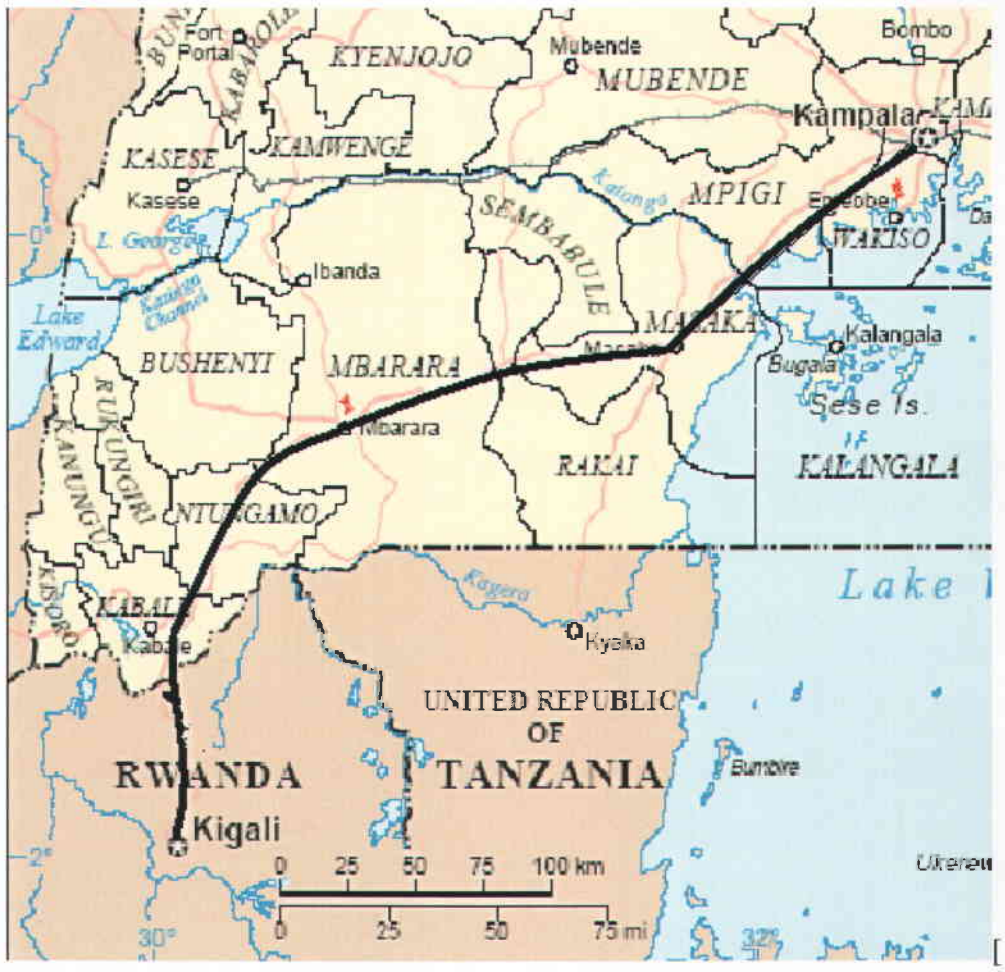
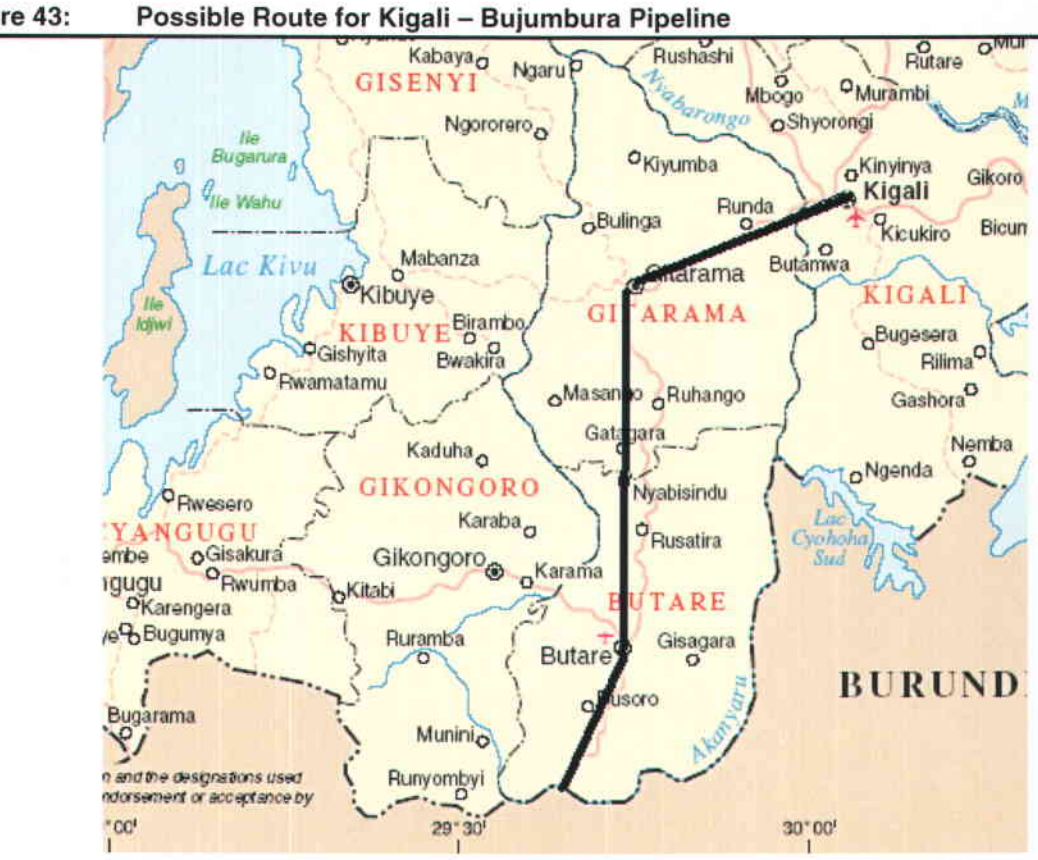


Figure 43: Possible Route for Kigali – Bujumbura Pipeline



Key considerations in pipeline routing include:

- Topography – The main issue is the trade-off between piping length and the terrain – valley vs. mountain routes, accounting for bodies of water, etc.
- Geology – A key consideration here is possible seismic activity and fault lines. While these can be designed around, it may be advantageous to seek alternative routes.
- Proximity to environmentally sensitive areas – Avoid areas identified as high value from an environmental perspective, and that are susceptible to disruptions caused by pipeline construction or operation.
- Land-ownership/land-use – Depending on whether the properties are privately owned or government owned and the type of operation could influence project time and cost.

4.4 Pipeline Capacity Determination

For the purposes of this study it was assumed that the pipeline to be constructed would be in place by the year 2010 and be operational at least through the year 2030. Based on the base case demand scenario this implies a pipeline capable of providing 190 M^3/hr in 2020 and 460 M^3/hr in 2030. While a 6 inch pipeline is capable of handling the demand through the 2020 period an 8 inch diameter pipe is likely a more advantageous choice overall. Additional pumping capacity can be added to meet the increasing demand as needed. However, this size pipeline is only required for the 520 km segment between Kampala to Kigali. In order to meet the needs of Burundi - 36 M^3/hr in 2020 and 85 M^3/hr in 2030 - a 4 inch pipeline traversing the 220 km between Kigali and Bujumbura would be more than sufficient. Ultimately pipeline sizing will need to consider trade-offs in pumping capacity, pipeline diameter, and pipe wall thicknesses based on capital and operating cost considerations.

4.5 Pipeline Capital Costs

Table 15and Table 16 provide an estimate of the costs of constructing the 8 inch Kampala to Kigali pipeline and the 4 inch Kigali to Bujumbura extension, respectively. This information was developed based on a review of comparable projects and data from in-house sources.

Table 15: Capital Costs for Kampala to Kigali 8 Inch Oil Pipeline

Uganda/Rwanda Pipeline Cost	
Cost Element	**Cost (Thousand $)**
Pipe and Valves	$39,287
Wire/Cable	$12,000
Switchgear	$9,000
Instruments/Controls	$7,400
Pump Stations	$28,755
Storage	$7,874
Operations Center	$4,500
Pipeline Construction	$38,812
Engineering/Project Managemer	$14,763
Start Up Expenses	$2,953
Easements/Right of Way	$3,000
Contingency	$25,252
Project Total	**$193,595**

Source: SAIC

Table 16: Capital Costs for Kigali to Bujumbura 4 Inch Oil Pipeline

Rwanda/Burundi Pipeline Cost	
Cost Element	**Cost (Thousand $)**
Pipe and Valves	$9,662
Wire/Cable	$4,800
Switchgear	$3,600
Instruments/Controls	$2,960
Pump Stations	$3,500
Storage	$1,505
Operations Center	$2,475
Pipeline Construction	$8,285
Engineering/Project Managemer	$4,414
Start Up Expenses	$2,472
Easements/Right of Way	$3,000
Contingency	$7,001
Project Total	**$53,674**

Source: SAIC

Key elements of the costs include:

- Pipe and valves –Material costs for piping, coating, fittings, valves, and components. This assumes steel pipe with minimum wall thickness equivalent to Schedule 20.
- Wire and cables – Includes costs for electrical wiring and connections
- Switchgear – Includes costs for interfacing back-up power systems or possible grid interconnection

- Instrument/Controls – Includes costs for the metering and control. This assumes one meter will be required for customs purposes (within the receiving country) plus up to two additional meters.
- Pump Stations – Includes costs for pumps, drives, and auxiliaries. For the Uganda-Rwanda line the capital cost is based on requirements to meet year 2020 demands (about 9,400 HP or 7 MW pump capacity). Additional investments in pumping capacity will be needed in year 2020 to meet year 2030 demands.
- Storage – Includes storage tanks and containment systems. This is based on year 2020 demand assuming 14 day storage. For the Kampala to Kigali portion about 63,000 M^3 would be needed, while for the Kigali to Bujumbura extension, about 12,000 M^3 would be needed. Additional investments in storage capacity will be needed to meet demands beyond that period.
- Operations Center – Includes building and supervisory control and data acquisition (SCADA) system.
- Pipeline Construction – Labor costs for installing pipeline assuming largely underground (typical 1m depth) placement.
- Engineering/Project Management – Design, construction supervision, and inspection (quality control)
- Start Up Expenses – Commissioning of pipeline to ensure it operates per design intent
- Easement/Right of Way – Costs for any land purchases to obtain access for pipeline
- Contingency – Covers uncertainty in cost estimates and risks associated with project delays, changes in pricing, etc. A 15% contingency is assumed.

4.6 Financial Analysis of Pipeline

The key metric in determining the financial viability of the pipeline is the tariff - the levelized cost of owning and operating the pipeline per unit of product delivered ($/$M^3$ of oil). This metric can be compared to the cost of trucking the fuel to determine its economic advantage, if any. Of particular interest is the tariff over the first 10 years of operation, given the uncertainties in the demand scenarios. Therefore, SAIC calculated the levelized cost (referred to as the levelized tariff) for two time periods – 2010 to 2020 and 2010 to 2030. This is the sum of the owning and operating costs over the respective time period divided by the total oil transported over the same time period. Note that this levelized tariff is not necessarily the tariff that would actually be applied, since tariff design must account for other factors discussed under a section on tariff design. Establishing the tariff requires information on capital and operating costs, as well as financing methods and terms, and other basic financial parameters. This assumes certain market conditions and regulatory frameworks are in place.

SAIC developed the tariffs using an in-house pipeline model. Key model financial inputs and assumptions for the base case include:

- Interest Rate (Weighted Average Cost of Capital): 10%
- Discount Rate: 12%
- Term: 10 and 20 years
- Debt/Equity Ratio: 75/25

- Inflation Rate: 2.5%
- Depreciation: Double declining balance
- Tax Rate: 20%
- Private/Government share ratio: 51/49
- Construction Period: 2008-2009
- Operation Begins: 2010
- O&M Cost: 4% of capital costs
- Pumping costs – 0.5% of oil costs

Given the uncertainties in some of the basic assumptions, we performed a sensitivity analysis to determine the impacts of changes in some of the assumptions. The following provides the results of the financial analysis of the proposed pipelines.

4.6.1 Financial Analysis of Uganda to Rwanda Pipeline Extension

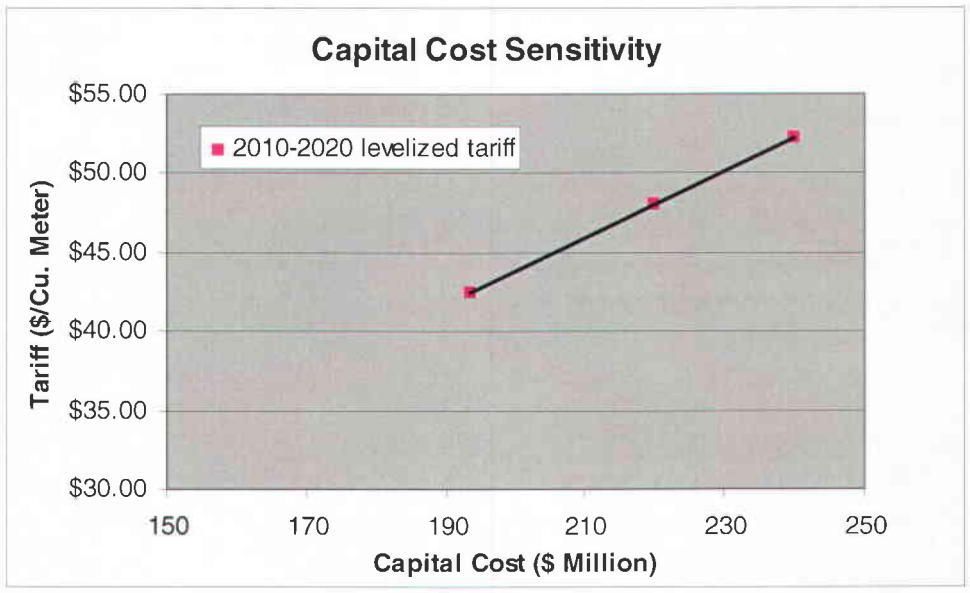
Table 17 summarizes the average annual tariffs required to recover the costs of the nominal $193.6 million Kampala to Kigali pipeline, and compares them to the cost of trucking. For the 2010-2020 period, the levelized tariff is $42.44/ M^3, which is below the current $48/ M^3 trucking cost and substantially below the $56.89/ M^3 levelized trucking costs for the same time-period. This indicates the pipeline is economically superior to the current transport mode. This advantage holds even if the anticipated demand were 25% lower than assumed for the base case for this time period. If we compare the results over the full 20 year period the economic advantage increases considerably due in large measure to the much greater oil throughput based on the demand. Figures 37, 38, and 39 display the sensitivity of the results to changes in assumptions regarding capital cost, O&M cost, and interest rates. For example, if the pipeline capital cost were assumed to be $240 million (24% increase), the year 2010-2030 levelized tariff is $52.20/ M^3. This is still lower than the levelized trucking rate. Similarly, if the O&M rates were assumed to be 6% of capital costs rather than the 4% nominal case, the tariff would still be lower than the trucking rates. The same holds true for interest rates up to 18-19%. Note that the 20 year levelized costs would be considerably below the trucking rates under most scenarios.

Table 17: Uganda-Rwanda Pipeline Tariff

Kampala to Kigali Levelized Costs ($/m^3)		
Period	**Trucking**	**Oil Pipeline**
2007	$48.00	**Not Applicable**
2010-2020	$56.89	$42.44
2010-2030	$66.68	$22.13

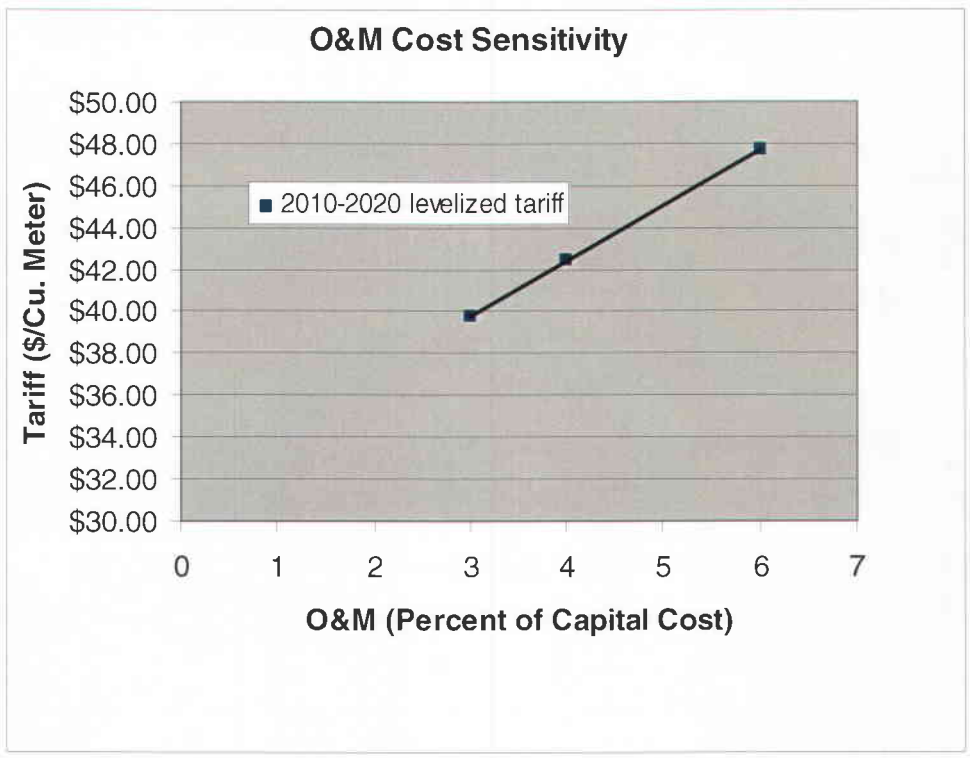
Source: SAIC

Figure 44: Uganda-Rwanda Pipeline Tariff Sensitivity to Capital Cost Increase



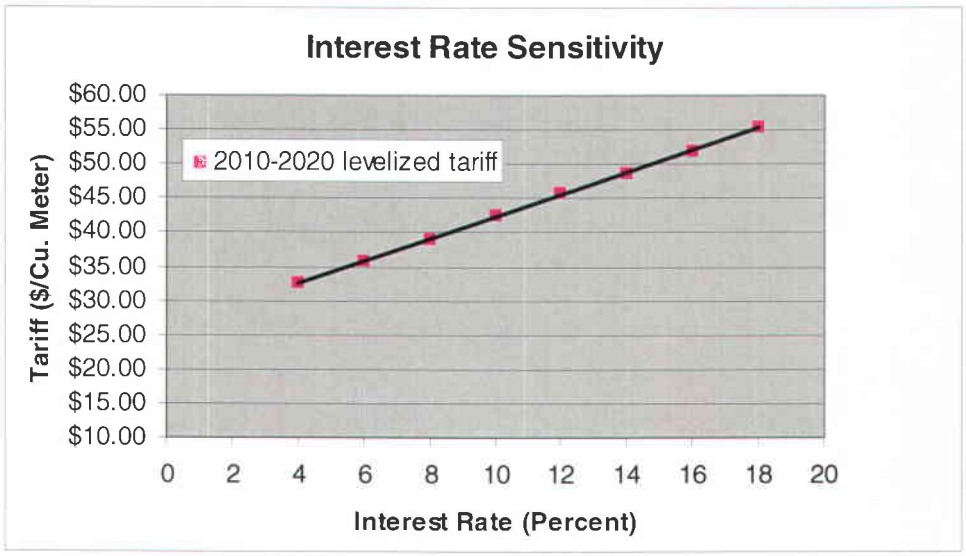
Source: SAIC

Figure 45 Uganda-Rwanda Pipeline Tariff Sensitivity to O&M Costs



Source: SAIC

Figure 46: Uganda-Rwanda Pipeline Tariff Sensitivity to Interest Rates



Source: SAIC

4.6.2 Financial Analysis of Rwanda to Burundi Pipeline Extension

Table 18 displays the annual tariffs required to cover the costs of the nominal $53.7 million Kigali to Bujumbura pipeline, and compares them to the cost of trucking. For the 2010-2020 period, the levelized tariff is $55.00/ M^3, which is above the current $40/ M^3 trucking cost and is also above the $47.41/ M^3 average projected trucking costs for the same time-period. In order for the pipeline to be competitive with trucking, the demand would need to increase by about 16% on average, during the 2010-2020 time period. However, for the full 20 year period the levelized tariff is $28.88/ M^3. Therefore, the judgment as to the economic viability of the pipeline depends on whether one takes a relatively short-term vs. long-term perspective on this investment.

Table 18: Uganda-Rwanda Pipeline Tariff

Kigali to Bujumbura Levelized Costs ($/m^3)		
Period	**Trucking**	**Oil Pipeline**
2007	$40.00	**Not Applicable**
2010-2020	$47.41	$55.00
2010-2030	$55.57	$28.88

Source: SAIC

4.7 Tariff Design

The final tariff along the pipeline will be dependent on the type of tariff design selected and negotiated between countries. The tariff could be incremental, with each country paying the added cost of added pipeline mileage; postage stamp (a single tariff along the entire pipeline), mileage based, or exit/entry based

4.8 Truck Transportation Costs

Current fuel transportation costs set the bar for the petroleum product pipeline in that the levelized 20-year tariff must be lower in order for the pipeline to be competitive. Based on interviews with fuel importers and distributors and review of petroleum product price regulations, SAIC estimated the current fuel transportation prices to beat (Table 19). The pipeline tariff is most likely to be a postage stamp tariff where offtakers in Southwestern Uganda, Rwanda and Burundi each pay a separate tariff related to distance.

Table 19: Maximum Pipeline Tariffs Based on Current Transportation Costs

Rwanda	
Current Truck Cost Eldoret - Kigali	$90
Current Truck Cost Eldoret - Kampala	($42)
Rwanda - Total Maximum Tariff	**$48**
Burundi	
Current Truck Cost Kampala - Kigali	$48
Current Truck Cost Kigali - Bujumbura	$40
Burundi - Total Maximum Tariff	**$88**

Source: SAIC interviews with local petroleum marketers

Most of the petroleum products imported in Uganda, Rwanda and Burundi is supplied by truck via the Northern Corridor originating in Mombasa and western Kenya continuing through Uganda and Rwanda. The Southern Corridor, which originates in Dar-es-Salaam goes through Dodoma and via Kigoma in the case of rail and via northwestern Tanzania in the case of trucks.

Figure 47: Northern and Southern Transport Corridors

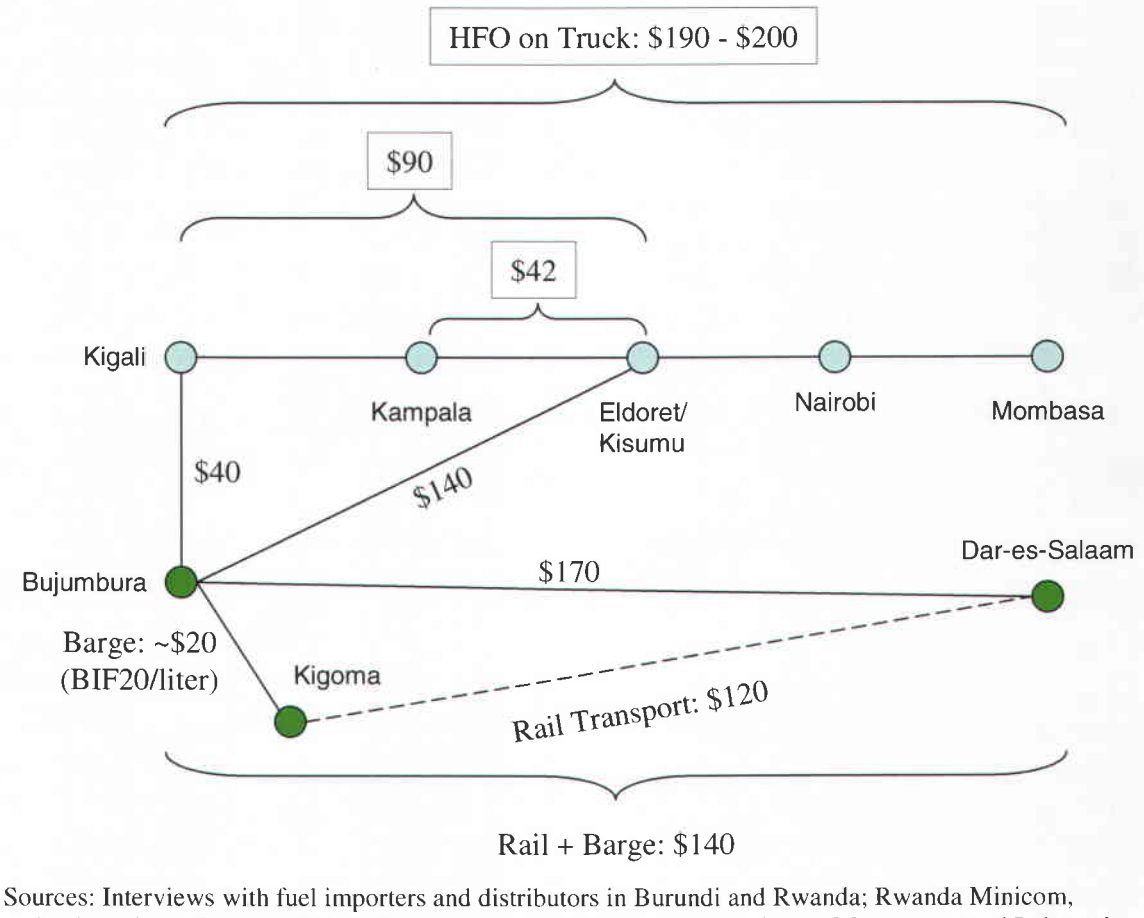
Source: Draft Interim Report of the CDC Minerals Development & Investment Strategy, dated March 19, 2007

Uganda and Rwanda currently receive all of their petroleum products by truck from various points in Kenya. Burundi imports the majority of its petroleum products from Kenya via truck, 72% in 2006, with the remaining 18% coming from Dar-Es-Salaam via truck or via rail to Kigoma and barge from Kigoma to Bujumbura.

In all three countries, there are a number of truck operators willing and able to transport petroleum products, which entails a certain amount of competition. SAIC interviewed a number of fuel importers and distributors in all three countries and examined the latest regulatory documents setting the maximum allowed price in Rwanda and Burundi [UGANDA?].

All Rwandan petroleum products are imported from Kenya. White oils are generally loaded onto trucks in Eldoret and Kisumu, the current termini of the Kenya Pipeline Company's system, and driven via the Northern Corridor to Kigali for storage and distribution. At times of high demand and/or operational problems on KPC's system, trucks sometimes load at Nakuru instead, which is about 150 km southeast of Eldoret. The cost of transporting white oils from Eldoret/Kisumu to Kigali is approximately \$90/ M^3 while the transport cost from Eldoret/Kisumu is around \$42/ M^3. Hence, the petroleum products pipeline tariff from Kampala to Kigali must be lower than \$48/ M^3 (\$90 – \$42 = \$48) for the pipeline to be competitive (Figure 48).

Figure 48: Approximate Current Product Truck Transportation Costs (US$/ M^3)



Sources: Interviews with fuel importers and distributors in Burundi and Rwanda; Rwanda Minicom, Determination of the Theoretical Price Structure, April 2007; Burundi, Ministry of Commerce and Industry's Ministerial "Ordnance" No 750/420, April 29, 2007.

The fuel distributors interviewed by SAIC indicated that rail transport from Kenya was not a feasible option because the railroad ends in western Uganda and because the Kenya-Ugandan railway had been very inefficient, unreliable and expensive in the past. Even though the Kenyan and Ugandan railway systems have been put under joint private management, an extension to Rwanda and Burundi is not planned and the soon to be built Eldoret-Kampala products pipeline will approximately halve the cost of transportation from around $42/M^3$ by truck to 20 – 24/ M^3.

Heavy fuel oil cannot be transported on the KPC's system, as it would contaminate the pipeline. Hence, it is loaded onto trucks in Mombasa, either at the port or at the [refinery] and driven to Rwanda via Nairobi and Uganda. The cost of transporting HFO by truck from Mombasa to Kigali is around $190 - $200/ M^3. For diesel to be competitive with HFO, the pipeline would have to reduce the transportation cost of diesel to compensate for the lower price of HFO in Mombasa. However, this is clearly unreasonable and as such, industry that is currently using HFO are not expected to switch to diesel as a result of a petroleum products pipeline from Kampala to Rwanda.

Burundi imports most of its fuel from Eldoret or Kisumu in Kenya by truck as truck transport from Dar-es-Salaam is more expensive, $170/M^3$ vs. $140/M^3$. Rail and barge transport from Dar-es-Salaam to Bujumbura via Kigoma on the shore of Lake Tanganyika in Tanzania, costs approximately the same as trucking from Kenya. While rail and barge costs are lower than trucking from Dar-es-Salaam, the Tanzania Railway Corporation (TRC) is inefficient and lacks petroleum product wagons in adequate shape to transport larger volumes of products. Moreover, the wagons and barges that are currently used suffer from leakage problems and TRC does not provide a guarantee against losses. Nevertheless, the management of the Tanzanian railway system is in the process of being privatized, but the process has been difficult. TRC was supposed be handed over in the middle of last year to a consortium led by Rail India Technical and Economic Services (Rites) under a 25 year contract. However, the original partner, Gulf Africa Petroleum Corporation (Gapco) Ltd had to be replaced and the process is expected to move forward in the latter half of 2007. While new management of TRC may improve service and lower tariffs, the barge section would still suffer from underinvestment and lack of storage in Kigoma.

To be competitive to Burundi, the Project would have to beat the transportation cost from Kigali, which is $40/M^3$.

5.0 Legal / Regulatory Requirements of the Rwanda-Burundi Oil Products Pipeline

5.1 Key Findings

- Any extension of the E-K Oil Products Pipeline from its terminus (upon completion of the Kenya-Uganda extension) in Kampala to Rwanda and possibly to Burundi must be viewed as legal union of the Kenya pipeline, the E-K pipeline and the future K-B pipeline into a unified whole from Mombasa to Kigali/ Bujumbura.
- The issue of ownership of the entity which will operate, and most likely also build, own and possibly transfer ("BOOT") the K-B pipeline extension is distinct and different from the issue of the legal and regulatory structure to authorize, finance and supervise construction and operation of the K-B pipeline.
- Ownership of the K-B pipeline entity does not have to be the same as that for the E-K extension entity (Tamoil) any more than Tamoil and Kenya Pipeline Company are the same.
- Private sector participation in the ownership entity is desirable because:
    - it is already in place in the E-K segment;
    - it is in accord with international best practices norms; and
    - it may be expected to impose a degree of market discipline.
    - Public participation in the ownership entity is desirable in addition to private ownership since
    - it would be the same as, or similar to, the public-private structure of the E-K extension; and
    - it decreases the need for a detailed governmental regulatory scheme, and facilitates resolution of issues such as eminent domain rights, pipeline safety and environmental issues.
- Multilateral governmental cooperation is essential for all cross-border projects, including this one. This is best accomplished by expansion of the existing E-K Joint Coordinating Commission ("JCC") to include Rwanda and Burundi, rather than by creation and use of a series of bi-lateral structures. Each country through which the pipeline passes must have a participant role in the JCC because each has an interest in the entire pipeline, its capacity and its operation, and in order to avoid inconsistent regulation.
- Adjunct or ex-officio status in the JCC for Rwanda and Burundi may be appropriate until their respective segments of the pipeline extension become a reality. Thereafter, each must have full status in the JCC.
- The East African Community (the "EAC") could play an important role in facilitating the structures and activities necessary for project implementation.

5.2 Legal and Regulatory Framework - Kenya and Uganda

Discussion of the legal and regulatory structure for the K-B pipeline extension must begin with an examination of the legal and regulatory framework relative to the existing petroleum pipeline in Kenya and the extension currently under construction between Kenya and Uganda. Significant aspects to be examined are:

- The existing Kenya Pipeline, in operation for more than 30 years
- The Eldoret to Kampala pipeline expansion, under construction in the summer of 2007

- The statutory and regulatory structures in Kenya and Uganda which impact or influence the pipelines
- The Joint Coordinating Commission ("JCC"), established in 1995 by Kenya and Uganda.

From a geographic and political standpoint, the starting point is the existing Kenya Pipeline Company ("KPC"), government owned and operating the pipeline from Mombasa to Eldoret. KPC has historic importance and experience in pipeline operation.[21] KPC does not have private sector involvement. The Government of Kenya, through the Ministry of Energy, has participated in the operation of the KPC, as well as serving as its regulator, throughout its operating history. Implementation of Kenya's 2006 Energy Act, noted below, will alter the relationship of KPC and the Ministry of Energy.

The Eldoret to Kampala pipeline expansion adds a cross-border, international aspect to what had been a wholly national (domestic Kenya) operation, and it adds significant private sector involvement.[22]

The cross-border aspect of the pipeline extension has already spurred legislative change in Kenya. Previously governmental regulation of KPC was exercised through the Ministry of Energy. Now, The Energy Act of 2006, which became effective in July 2007, creates a broadly powered Energy Regulatory Commission ("ERC"), chaired by a presidential appointee and charged with, among other things, regulating "importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products." With the implementation of this Act, the ERC will replace the Ministry of Energy and the Electricity Regulatory Board as the Kenyan government body charged with regulation of all aspects of the energy sector, including petroleum products, and specifically including petroleum pipelines. The ERC is envisioned as a single sector regulatory agency, with responsibility for economic and technical regulation of both power, renewable energy, and down stream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

With a stated mission to regulate the energy sector in a fair, transparent and predictable manner consistent with government policy and sensitive to stakeholder interests, the ERC mandated to carry out the following functions, among others, to: (1) Regulate the electrical energy, petroleum and related products, renewable energy and other forms of energy; (2) Protect the interests of consumer, investor and other stakeholder interests; (3) Maintain a list of accredited energy auditors as may be prescribed (4) Monitor, ensure implementation of, and the observance

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[21] KPC's official statement of its historical background states "Established by the Kenya Government in 1973, KPC has successfully fulfilled the role it was meant for, to provide the most economical and modern way of transporting and storing petroleum products. The Company, which is wholly owned by the government and operates under the parentage of Ministry of Energy, was mandated to construct, operate and maintain a multi-products pipeline from Mombasa to the hither land.

[22] Tamoil East Africa, Ltd. prevailed in a field of 12 pre-qualified firms and was awarded the tender to construct the Eldoret to Kampala pipeline extension. At the time of the award, Tamoil was a subsidiary of Oilinvest group which is itself wholly owned by the National Oil Corporation of Libya. Ownership and control of Tamoil changed in June, 2007. See discussion *infra*.

of the principles of fair competition in the energy sector, in coordination with other statutory authorities; (5) Provide such information and statistics to the Minister as he may from time to time require; (6) Collect and maintain energy data; (7) Prepare indicative national energy plan; (8) Perform any other function that is incidental or consequential to its functions under the Energy Act or any other written law.

In the summer of 2007, the organization and implementation of the ERC, including the reorganization of the Electricity Regulatory Board to operate within the ERC mandate, was commenced. Accomplishment of its ambitions mission remains to be seen.

The E-K extension has developed a structure acceptable to both countries as well as to local and international investors and to the international community at large.[23] While not controlling as to structure or procedure for future Rwanda and Burundi extensions, the Kenya Uganda structure, and the structure adopted for the future Rwanda and Burundi segments must be compatible.

The Kenya-Uganda experience and structure is also instructive in demonstrating two central tenets of cross-border projects:

1. Neither country can have or maintain legal or regulatory impediments to the construction or operation of the project.
2. Individual countries may have national laws that aid or assist such projects, but the existence of such laws is not essential to the project.

Neither Kenya nor Uganda violates the first tenet.

As to the second tenet, implementation of the provisions of the 2006 Energy Act in Kenya may have relevance for Rwanda and Burundi, as well as Uganda. Although such a comprehensive regulatory scheme may be unnecessary for the current state of the energy sectors in Rwanda and Burundi, future development of those sectors in conjunction with the building and operation of a pipeline extension may make such legislation advisable at or before the time that the pipeline becomes operational.

Cross Border Coordination - Kenya and Uganda

The Eldoret to Kampala pipeline sets an important precedent for the proposed K-B project. Essential to the viability of the E-K structure was the absence of legal and regulatory impediments or constraints in either Kenya or Uganda.

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[23] The USTDA Desk Study for this project, August 31, 2006 states:

"There have been both positive and negative lessons from the Kenya-Uganda Pipeline project. On the positive side, the development of the JCC to work together has to a great extent been a success and the project is at the tendering phase for a private sector partner, albeit delayed. Kenya and Uganda were able to agree on joint financing, a financing structure, and have made decisions on the project together throughout the process. They have also developed many of the base agreements required for this project's implementation -- all of this symbolic of a high level of cooperation between the two parties."

The institutional structures utilized by Kenya and Uganda in developing the E-K Pipeline Project provide the model for Rwanda and Uganda to follow. The 1995 Memorandum of Understanding between the two countries established a Joint Coordinating Commission ("JCC"), chaired by two permanent secretaries, one from the Ministry of Energy in Kenya and the other from the Uganda Ministry of Energy and Mineral Development. This structure reflects the recognition of two essential aspects of the JCC: the need for relative permanence of structure, and need for high level governmental influence within the two constituent countries.

The JCC's 2004 Invitation for Bids for the E-K pipeline extension attracted expressions of interest from 23 potential investment partners, 12 of which were pre-qualified by the JCC.[24] In 2007, the contract was awarded to Tamoil, and the Agreement between the JCC and Tamoil was signed in January 2007.

The ownership structure of the E-K pipeline extension, developed by the JCC and implemented after the public tender won by Tamoil, is a public-private partnership with the two governments each owning 24.5% of the equity capital and Tamoil as the majority shareholder with 51% of the equity. The project is structured as a B-O-O-T (Build, Own, Operate, Transfer).[25]

5.3 Legal and Regulatory Framework - Rwanda

The implementation of the proposed Rwanda-Burundi pipeline extension will be greatly affected by, and to a large extent will be dependent upon, the legal and regulatory environment of each of the countries through which the pipeline will run. The inquiry as to each country is multi-faceted. First, the existing statutes and regulations of each country were examined to determine that they do not prohibit, and will permit implementation of the proposed project.[26]

The legal infrastructure of Rwanda is comparatively undeveloped, and an examination of the Constitution reveals no constitutional impediments. In Rwanda, Law No. 39/201 Establishing an Agency for the Regulation of Public Utilities, which is in the amendment process in July, 2007, does not define an oil products pipeline as a "public utility" and therefore neither the law nor the Rwanda Utilities Regulatory Agency ("RURA") create either an impediment or enabling legislation.

Likewise, the provisions of Law No. 16/2006 Determining the Organization, Functioning and Responsibilities of Rwanda Environment Management Authority neither impede nor assist the Project.

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[24] The 12 pre-qualified firms were Energem Petroleum Corporation Ltd, of Johannesburg South Africa; China Petrolemn Pipeline Engineering Corporation, Hebei, China; Tamoil East Africa. Ltd, Kampala Uganda; Petronet East Africa Consortium, Kampala Uganda; Indian Oil Corporation Ltd, New Delhi India; Zakhem Construction (K) Ltd, Nairobi Kenya; Stone & Webster Management Consultants, Inc, Houston Texas; Asia Petroleum Limited, Karachi Pakistan; Petroleum India International, Mumbai India; Stroytransgaz, Moscow Russia; Misa/Inc/Shell - Kampala, Uganda and East Africa Infrastructure Consortium, Kampala Uganda.

[25] See additional discussion of BOOT financing *infra*.

[26] For purpose of this analysis, the term Project will be used to denote not only the physical planning, construction and operation of the pipeline extension, but its financing, the determination of its tariff rates and operating economics and the investment into and repatriation from the constituent countries of its financing capital and debt.

At the current time, Rwanda's legal and regulatory environment meets the essential pre-condition of absence of legal impediment.

In developing countries such as Rwanda, enabling legislation for infrastructure projects is typically *project-oriented* rather than *infrastructure-oriented*. That is to say, development is facilitated if the structure of a project is fashioned and negotiated with the project participants, and then ratified legislatively (and if necessary, in regulations), rather than fashioning a legal and regulatory regime in a vacuum and trying to fit the project structure into it.

Cross Border Coordination – Uganda, Rwanda, and Burundi

A cross-border pipeline must accommodate and be accommodated by the legal and regulatory regimes of both countries on the border. This has been accomplished between Kenya and Uganda, and similar agreements must be replicated between Uganda and Rwanda, and between Rwanda and Burundi.

Given the substantial delay experienced in implementing the E-K pipeline, consideration of the structure and operation of multi-lateral institutions, involving all affected countries, to accommodate and accomplish Rwanda and Burundi extensions should be undertaken at the earliest feasible time. The same considerations affecting the Kenya-Uganda JCC would appear to apply to Rwanda as well. As discussed below, although the structure could conceivably utilize a series of bi-lateral JCCs, expansion of the existing Kenya-Uganda JCC to include Rwanda and Burundi, would benefit from a multi-lateral format rather than a bi-lateral model.

5.4 Legal and Regulatory Framework - Burundi

As in the case of Rwanda, the legal infrastructure of Burundi is comparatively undeveloped, and an examination of the Constitution and applicable statutes reveals no impediments to the project.

At the current time, Burundi's legal and regulatory environment meets the essential pre-condition of absence of legal impediment.

5.5 Cross Border Coordination - Rwanda and Burundi - International Best Practices and the Existing Kenya-Uganda Pipeline Structure

While the existing domestic legal and regulatory regime in Rwanda and Burundi, as it relates to cross-border petroleum pipeline, amounts to a near vacuum, it does not follow that there are no constraints or precedents in authorizing and implementing such a project. The proposed pipeline will not begin at the Rwanda border; all petroleum products enter the pipeline in Kenya, and must transit Uganda before crossing the Rwanda border. The Rwanda-Burundi extension is therefore wholly dependent upon the already existing pipeline from Mombasa to Eldoret, and the pipeline now under construction from Eldoret to Kampala.

Coordination, cooperation and integration of pipeline operations between the segments of the pipeline are operational necessities. The analysis is not, therefore, what Uganda, Rwanda and Burundi should do to structure a pipeline between countries. Kenya is essential to the process. The analysis must focus upon what the four countries should do to accomplish an extension to

the existing (and under-construction) pipeline and to modify its structure and/or operation in order to accommodate the additional participants. Rather than starting from scratch, the proposed Rwanda - Burundi pipeline must of necessity start with the existing pipeline, its legal and regulatory structure and its operational history. The bi-lateral structure must be expanded to a multi-lateral structure to accommodate all three (or four) countries whose borders the pipeline will cross.

As noted earlier, the E-K structure began with the Kenya Pipeline Company ("KPC"), and the 1995 Kenya - Uganda Memorandum of Understanding, resulting in the formation of the Joint Coordinating Commission ("JCC") in 1996. Administratively the JCC has two permanent secretaries (one from each country) and is under the Ministry of Energy of Kenya and the Uganda Ministry of Energy and Mineral Development.[27] The E-K ownership structure has also been determined by utilizing a public-private partnership with the private entity (Tamoil) owning the majority shares and the public entities owning equal minority shares.[28]

A first consideration for the K-B extension is whether the JCC should be expanded (and when) from two to four countries (or possibly two to three and then to four) or whether a separate Rwanda- Burundi entity should be established and subsequently merged or partnered with the existing JCC.[29] However, since such a separate entity would need to include Uganda as well as Rwanda and Burundi, the second alternative seems unduly duplicative.

In considering the expansion of the existing JCC, we examined its structure, and the BOOT variation of project finance utilized in the Tamoil transaction, as well as other cross- border petroleum pipelines in order to determine whether there exists, or there can be postulated, a "Best Practices" case.

The Tamoil transaction is an example of project finance. "Project finance" is the name given to the structure most often utilized in financing infrastructure projects in lesser developed countries. It involves the formation of a legally independent special purpose entity ("SPE") funded with sufficient equity to support non-recourse (or limited-recourse) debt sufficient to construct and develop the single-purpose asset which must generate cash flow sufficient to service the debt and attract the capital. Project finance in the typical sense limits lender recourse to the SPE and its operating assets, and in the public sector generally involves a concession by the government or governments involved to the SPE which plans, finances, constructs and operates the project. In the case of BOOT financing, the SPE obligates itself to transfer title to the project to the government or governments involved at the end of a specified period, customarily 25 to 30 years.

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[27] It would appear that the enactment of the 2006 Energy Act in Kenya would move jurisdiction regarding the pipeline from the Ministry of Energy to the ERC.

[28] The terms "public" and "private" have a somewhat different meaning in this context. By "public" we mean owned by one or more of the countries in which the project operates. "Private" may mean owned by non-governmental entities such as private shareholders, but it also is defined more broadly as the opposite of "public" that is, not owned by the governments of the countries in which the project operates. Thus Tamoil is considered "private" for this analysis.

[29] There is some indication that Rwanda may have applied for admission to the JCC in 2007.

One of the perceived advantages of the BOOT structure to participating governments, the avoidance or limitation of government responsibility or guaranty of indebtedness, is diminished in the Tamoil transaction since the two governments involved own 49% of the equity of the SPE.

Because project finance relies upon assets, and the cash flow produced by assets, for the repayment of debt, project finance transactions are extremely document-heavy. A typical BOOT transaction requires at least the following major documents:

- **Engineering, Procurement and Construction (EPC) Contract:** - between the SPE and an engineering firm.
- **Operations and Maintenance (O & M) Agreement:** - between an Operations Contractor and the SPE, obligating the Operator to operate and maintain the project.
- **Shareholders Agreement:** - governs the business relationship of the equity participants in the SPE.
- **Inter-creditor Agreement:** - an agreement between lenders or classes of lenders that describes the rights and obligations in the event of default.
- **Supply Agreement:** - agreement between the supplier of a critical key input and the SPE (e.g. the agreement whereby refined petroleum products are delivered to the pipeline's point of origin)
- **Purchase Agreement:** - agreement between the SPE and the major user or users of the output of the project, also called an Offtake Agreement.

Much has been written over the years, in the trade press and in academic and multilateral institution circles, about cross-border petroleum pipelines. Initially, it should be noted that unlike the current refined products project, most of the cross-border pipelines transport natural gas or crude oil. Nevertheless, many, if not most, of the existing and planned international pipelines share many of the same characteristics, problems and proposed solutions. The K-B pipeline extension will benefit greatly from the experience of other countries with similar projects.

In 2003, the Joint UNDP/World Bank Energy Sector Management Assistance Programme published a study entitled "*Cross-Border Oil and Gas Pipelines: Problems and Prospects*". This study, prepared by Professor Paul Stevens of the University of Dundee's Centre for Energy, Petroleum and Mineral Law and Policy, examines 12 case studies[30], to arrive at four overall conditions of best practice:

- The rules are clearly defined and accepted.
- Projects are driven by commercial considerations.

[30] TransMed Line; Trasneft Line; SuMed Pipeline; Iraqi Export Lines; Tapline; Baku Early Oil Project; Maghreb Gas Pipeline; Caspian Pipeline Consortium Project; Express Pipeline - Canada/U.S.; Bolivia-Brazil Gas Pipeline; Baltic Pipeline System; GasAndes Pipeline

- . There are credible threats to deter the obsolescing bargain.[31]
- . There are mechanisms to create a balance of interest, including an internationally recognized mode of dispute resolution.

The study's analysis of the 12 case studies provides a valuable compendium of international project dos and don'ts.

Similarly, although addressing natural gas pipelines rather than petroleum pipelines, another commentator, Robert Pritchard, in "*What Governments Need to Know About Cross-Border Gas Projects*"[32], emphasized the need for "shared vision" between the governments involved.[33]

The term "Best Practices" encompasses all of these: A shared vision, clearly defined and accepted rules, acceptance of commercial considerations as a primary driver, the avoidance of government encroachment of private interests over the life of the project and mechanisms to create a balance of interest. An analysis of the existing JCC structure under these best practices norms will be the best facilitation of the pipeline extension project and the best assurance of its continued economic and political viability.

Possible Facilitation Role for the EAC

With the July 1, 2007 effectiveness of the Accession Treaties for Rwanda and Burundi, the East African Community has among its members all four countries whose concurrence is necessary for the K-B pipeline extension. Moreover this project has important aspects, regional cooperation, economic development and integration and private sector participation, that make it a natural for the EAC to play a role, possibly even a decisive role. Over the next several years, as the relationships develop and achieve form, the role of the EAC as "honest broker" may be a key aspect to bringing any resultant pipeline to reality.

5.6 Lessons Learnt by Other, Similar Developments

Some lessons can be learnt from reviewing other, similar projects. For example, with regard to the recently developed Chad-Cameroon Pipeline the companies involved have ensured in the legal agreements that the project is placed beyond the reach of national laws to reduce some of their risks. They also secured the right that "in case of emergency", they will "have access to any private or public land, whatever its status or location, without prior authorization, and with the possible assistance of the public or private emergency services". The consortium thus has the authority to act as paramilitary power in the event of any resistance to the project. The companies also ensured that a number of national laws in Cameroon do not apply to the pipeline project, including laws on land tenure and forests.

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[31] A model of interaction between a multinational enterprise and a host country government, which initially reach a bargain that favors the enterprise but where, over time as the enterprise's fixed assets in the country increase, the bargaining power shifts to the government.

[32] Resource Law International, November 2006.

[33] Pritchard also emphasized proactive facilitation by governments in collaboration with investors; the need for investment protection through a secure and stable legal framework for investment and the need for certainty as to future environmental regulation.

The Chad-Cameroon Pipeline has resulted in numerous adverse social impacts associated with and the lack of adequate environmental assessment and mitigation. In that case the absence of a functioning judicial framework in both countries through which the pipeline traverses, the widespread corruption in the governments and the lack of political will to introduce institutional reforms, the project is unlikely to further improve economic development and living conditions of the poor. Hence the Rwanda-Burundi pipeline development needs to be developed within a legal framework that will counter such negative impacts.

6.0 Pipeline Funding Options

Over recent years, the private sector has increasingly financed and developed large infrastructure facilities in developing countries. Previously developing countries financed infrastructure projects directly from their own fiscal budget allocations. In an assessment carried out by Ferreira and Khatami it was noted that these countries often lack the institutional and regulatory capacity necessary to facilitate private participation in infrastructure provision. The paper showed how developing countries can meet the growing demand for infrastructure despite limited public financial resources, by allowing private participation in the development, financing and ownership of infrastructure. They provide a theoretical background to the rationale for private sector involvement and cited innovative case examples of where private infrastructure projects have been highly successful. For countries which have begun to explore the potential of Private Participation in Infrastructure (PPI), the document should be a useful supporting tool as they design processes for their specific situations. The question is not whether the private sector should be involved in the provision of public infrastructure, but how best it can be involved.

For large infrastructure development projects private sector investment finance is usually the proffered option, as it may be problematic to attract sufficient multi-lateral or bi-lateral financing for such projects. However, some participation of development institutions may act to stimulate the private sector if initial interest in a project is slow. Increasingly public-private sector partnerships are an effective vehicle for such projects. However, as with most Heavily Indebted Poor Countries (HIPC) sovereign guarantees are usually a pre-requisite. Scenarios such as build-own-operate (BOO) or build-operate-transfer (BOT) should be examined on their financial merits with government involvement in tariff or rate setting should be examined detailing both the overall costs, benefits as well as the risks.

In its VISION 2020 the GOR states that it "*will desist from providing services that the private sector can deliver more efficiently and competitively*", also that "*Major infrastructural investment will be required in the areas of energy, water, telecommunication and transport to reduce costs, whilst increasing their quality and reliability. Improvements in education and health standards will be crucial for providing an efficient and productive workforce*". (Page 12). Hence the Governments of Rwanda and Burundi must examine the options for attracting private investment while safeguarding their own interests.

As well as the multilateral funding institutions (MFIs), e.g. World Bank, UNDP, AfDB etc., a number of unilateral and bilateral funds are pouring funds in to Africa to support economic development (e.g. USAID, DFiD, CIDA, EBRD, SIDA, JICA, etc). MFI's or bi-lateral financing organizations may offer a range of structured finance to support Rwanda and Burundi's government's interests in these projects. The following briefly summarizes the various funding types and possible options to attract funds to support the pipeline development.

The International Development Association (IDA), member of the World Bank Group, classifies low- and middle- income countries based on the per capita income which largely determines a country's ability to borrow on market terms. The three categories are:

1. IDA: Countries that are eligible for IDA resources on the basis of low per capita income and lack of creditworthiness to borrow on market terms
2. Blend: This category is used to classify countries that are eligible for IDA resources on the basis of per capita income but also have limited creditworthiness to borrow from IBRD
3. Non-IDA: Countries that are only eligible to borrow from IBRD based on per capita income

Data in the Private Participation in Infrastructure Projects Database currently uses the 2005 World Bank classification by IDA status of each low- and middle-income country.

Essentially Development Bank Support is financial support that a multilateral institution has given to a project. The main types of financial support are:

1. Equity - multilateral institutions are allowed to invest in equity except for IADB, IBRD & IDA

2. Guarantees - two types of guarantees are covered:
   a. political risk coverage against currency inconvertibility, expropriation, war/civil disturbance and breach of contract
   b. partial credit guarantees, which turn medium-term finance into a longer-term arrangement by guaranteeing longer maturity or offering liquidity guarantees in the form of put options and take-out financing

3. Loan - direct loan using the multilateral institution funds (also referred to as A-loan)

4. Quasi-equity - these products have both debt and equity characteristics and some of them are convertible debt, subordinated loan investments, and preferred stock and income note investments (also referred to as C-loan)

5. Risk management - the risk management products, or derivatives, allow project companies to hedge currency, interest rate, or commodity price exposure. Some of them are currency and interest rate swap, options and forward contracts and derivatives.

6. Syndication - a multilateral institution arranges the financing with the resources of other investors, but the institution is always the lender-of-record (also referred to as B-loan)

Hosting governments generally provide financial support to or reduce the financial risk of a project in a number of ways. The most common forms of government support are:

- Cash subsidy - This is when a government agrees to provide cash subsidy to a project. It can be a total lump sum or a fixed amount per new connection, and payments can be

either in installments or all at once. Cash subsidies are included in the "investments in physical assets" total for projects in which the private party takes some investment risk/decisions: concessions, divestitures and greenfields.

- Payment Guarantee - This is when a government agrees to fulfill the obligations of a purchaser (typically a state-owned-enterprise) with respect to the private entity in the case of non-performance by the purchaser. The most common example of this is when a government guarantees the fixed payment of an off-take agreement (e.g. Power Purchase Agreement (PPA), Water Purchase Agreement (WPA)) between a private entity and the state-owned enterprise.

- Debt Guarantee - This is when a government secures the borrowings of a private entity. That is, a government guarantees repayment to creditors in the case of a default by a private entity.

- Revenue Guarantee - This is when a government sets a minimum variable income for the private operator; typically this income is from user fee payments by end-use customers. This form of guarantee is most common in roads with minimum traffic or revenue set by a government.

- Exchange Rate Guarantee - This is when a government protects a private entity from fluctuations in the value of the local currency. For example, the government will agree to reimburse the private entity for losses on debt services if the value of the local currency dips by, say, 20 percent or greater.

- Construction Cost Guarantee - This is when a government protects a private entity from potential cost overruns in the construction phase of a project.

Sub-Type of Private Participation in Infrastructure for four types of projects are:

Management and Lease Contracts - A private entity takes over the management of a state-owned enterprise for a fixed period while ownership and investment decisions remain with the state. There are two subclasses of management and lease contracts:

- management contract - The government pays a private operator to manage the facility. The operational risk remains with the government.
- lease contract - The government leases the assets to a private operator for a fee. The private operator takes on the operational risk.

Concessions - A private entity takes over the management of a state-owned enterprise for a given period during which it also assumes significant investment risk. The database classifies concessions according to the following categories:

- Rehabilitate, operate, and transfer: A private sponsor rehabilitates an existing facility, then operates and maintains the facility at its own risk for the contract period.
- Rehabilitate, lease or rent, and transfer: A private sponsor rehabilitates an existing facility at its own risk, leases or rents the facility from the government owner, then operates and maintains the facility at its own risk for the contract period.

- Build, rehabilitate, operate, and transfer: A private developer builds an add-on to an existing facility or completes a partially built facility and rehabilitates existing assets, then operates and maintains the facility at its own risk for the contract period.

Greenfield Projects - A private entity or a public-private joint venture builds and operates a new facility for the period specified in the project contract. The facility may return to the public sector at the end of the concession period. The database classifies greenfield projects in four categories:

- Build, lease, and own: A private sponsor builds a new facility largely at its own risk, transfers ownership to the government, leases the facility from the government and operates it at its own risk, then receives full ownership of the facility at the end of the concession period. The government usually provides revenue guarantees through long-term take-or-pay contracts for bulk supply facilities or minimum traffic revenue guarantees.
- Build, own, transfer, or build, own, operate, transfer: A private sponsor builds a new facility at its own risk, owns and operates the facility at its own risk, then transfers ownership of the facility to the government at the end of the concession period. The government usually provides revenue guarantees through long-term take-or-pay contracts for bulk supply facilities or minimum traffic revenue guarantees.
- Build, own, and operate: A private sponsor builds a new facility at its own risk, then owns and operates the facility at its own risk. The government usually provides revenue guarantees through long-term take-or-pay contracts for bulk supply facilities or minimum traffic revenue guarantees.
- Merchant: A private sponsor builds a new facility in a liberalized market in which the government provides no revenue guarantees. The private developer assumes construction, operating, and market risk for the project (for example, a merchant power plant).

Divestitures - A private entity buys an equity stake in a state-owned enterprise through an asset sale, public offering, or mass privatization program. The database classifies divestitures in two categories:

- Full: The government transfers 100% of the equity in the state-owned company to private entities (operator, institutional investors, and the like).
- Partial: The government transfers part of the equity in the state-owned company to private entities (operator, institutional investors, and the like). The private stake may or may not imply private management of the facility[34].

In order to anchor the pipeline's support within Africa, opportunities could be explored for AfDB investment in the pipeline under consideration and/or associated socio-economic developments associated with it.

Founded in 1963, as part of the impetus for the establishment of the Organization of African Unity (OAU), the African Development Bank (AfDB) supports the economic and social

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[34] Private Participation in Infrastructure, The World Bank, http://ppi.worldbank.org/resources/ppi_glossary.aspx#subtypes

development of African states, individually and collectively and promotes regional integration. Among member countries, Libya for example, is a prominent AfDB member country with 3.651% of the institution's voting powers, it ranks as a leading African shareholder of the AfDB, and has a prominent interest in the continent's socio-economic development.

AfDB has financed over 3 250 projects in Africa since 1967, when it started its operational activities, and has now considerable experience in the analysis, study, financing and implementation of economic and social development projects in all its 53 regional member states, as well as several regional integration projects. ADB, has become the principal partner of all the cooperation and regional integration organizations, such as the New Partnership for Africa's Development (NEPAD), the Community of Sahelo-Sahelian States (Cens-Sad) established in 1998 on Libya's initiative and headquartered in Tripoli, the Economic Community of West African States (ECOWAS), the West African Economic and Monetary Union (WAEMU), the Southern African Development Community (SADC), The Common Market of East and Southern African States (COMESA), The Economic Community of Central African States (CEEAC), and the Economic Community of East African States (ECEA).

7.0 Development Impact

7.1 Key Findings

- The K-B Pipeline will have immediate beneficial effects on employment and capacity-building. However, the largest impact is expected to come from the contribution of lower fuel costs to reducing transportation costs. Lower transportation costs will enhance the competitiveness of Rwandan products both domestically and for export.

- Around 1,700 people will be required to build the Kampala to Kigali pipeline, including 1,360 Rwandans over a 18-24 month build time. The Kigali to Bujumbura pipeline is expected to require 300 people, including 240 locals over a 12-month build time. The pipeline would be expected to employ about 100 people when operating.

- Further immediate advantage to the countries through which the pipeline will traverse are in the local support staff required – cooks, cleaners, mechanics, drivers, electricians, translators, guides, odd-jobbers, etc..

- There will be advantages to Burundi, Rwanda and Uganda in developing their human capacity as a result of the pipeline. These may result from opportunities for increased skills training through short-term employment in the building of the pipeline and longer-term benefits from the training and employment of personnel to maintain the pipeline after it is commissioned and other associated functions.

- Principal benefits of the projects will accrue to the Governments of Burundi, Rwanda and Uganda through the increased revenues that will result from development of the country's transportation infrastructure and agricultural and mineral export business and assisting them in the development of market driven economies and improving the livelihoods of the population.

- The K-B Pipeline is likely to lower average petroleum product prices by 10% or more depending on the world price of oil. The pipeline would also enhance security of supply, which would all but eliminate price spikes in the market for fuel, and ensure that fuel does not run out.

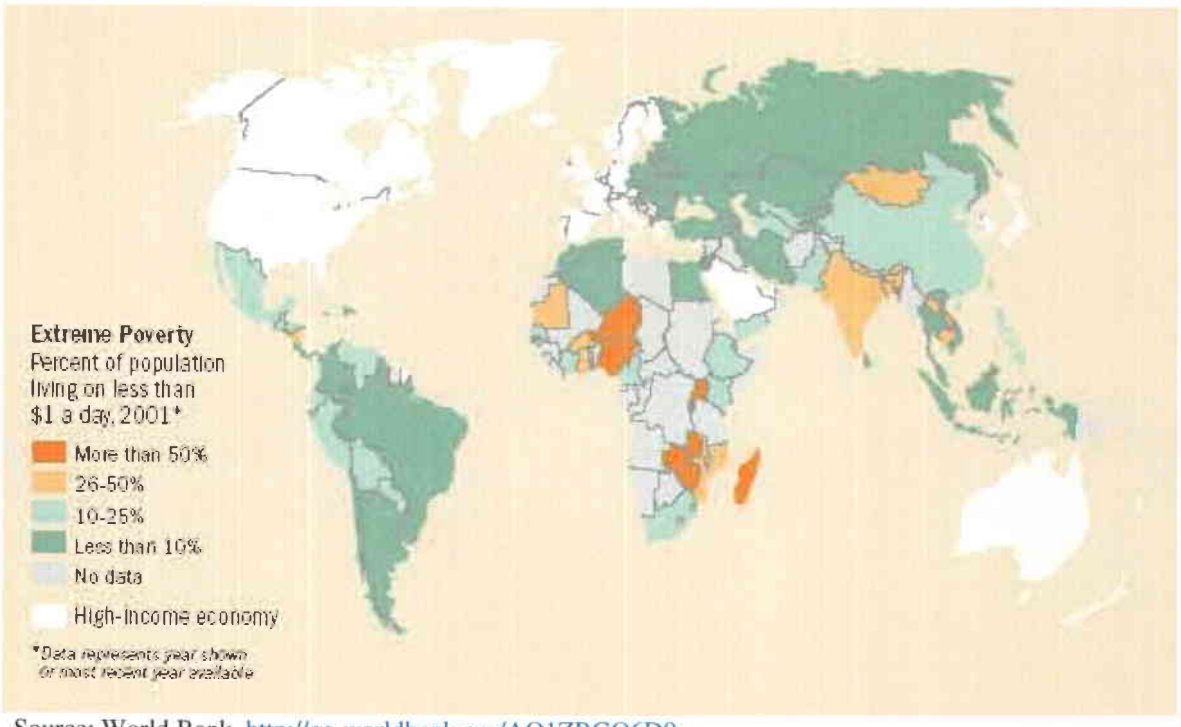
- The number of long haul fuel trucks on the trunk roads on the Northern and Central Transportation Corridors will be reduced and likely replaced with more trucks distributing fuel locally from supply depots associated with the K-B Pipeline.

7.2 Development Goals

Burundi, Rwanda and Uganda are among the world's poorest low-income countries with GDP per capita in 2006 of $119, $260, and $316 in current dollars and more than 50% of the population living on less than $1 per day. There are numerous strategies, targets, and objectives for improving the lot of developing countries, but the most overarching are the Millennium

Development Goals (MDGs). The K-B Pipeline contributes to the achievement of these goals and is part of the development strategies at various levels.

Figure 49: World Bank Poverty Assessment



Source: World Bank, http://go.worldbank.org/AQ1ZBGQ6D0

The MDGs consist of eight goals to be achieved by 2015 reflecting the world's main development challenges and drawn from the actions and targets contained in the Millennium Declaration adopted by 189 nations during the UN Millennium Summit in September 2000. The eight MDGs are:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a Global Partnership for Development

The development impact of the K-B Pipeline will be concentrated in Goal no. 1. Specifically, the K-B Pipeline is expected to:

- Provide immediate employment for up to 1,600 people during construction and 100 individuals during operation;

- Improve competitiveness and boost local economic development by providing adequate supplies of lower priced fuel for transportation;
- Reduce foreign exchange outflows due to reduced costs for imported petroleum products
- Increase the technical skill levels and provide opportunities for the population to benefit from educational opportunities and training.

The MDGs are the general objectives that are guiding most development efforts and may be seen as a relatively recent codification of the world's most important concerns. On the implementation side, the World Bank is at the forefront of providing external support for development using a standardized approach including Poverty Reduction Strategy Papers (PRSPs) and Country Assistance Strategies (CASs). Regional initiatives, including NEPAD and the East African Community serve as development vehicles that were created by sub-Saharan countries themselves which also promote regional trade and cooperation. Finally, there are country-level programs which set out specific targets for development, e.g. Rwanda's Vision 2020.

This section will provide a brief overview of the general objectives of the various organizations, initiatives, and programs listed above as relevant to the K-B Pipeline.

7.2.1 Millennium Development Goals

In 2001 the UN Secretary General published the 'Road Map towards the Implementation of the United Nations Millennium Declaration' from which essentially the MDG's were developed.

The 8 MDGs break down into 18 Targets that are measured by 48 Indicators[35]. By promoting economic development and growth, the K-B Pipeline addresses primarily Target 1 under Goal 1, which is measured using Indicators 1 - 3

- Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day

    1. Proportion of population below $1 (PPP) a day a
       1a. Poverty headcount ratio (percentage of population below national poverty line)
    2. Poverty gap ratio (incidence x depth of poverty)
    3. Share of poorest quintile in national consumption

In 2005, the Secretary-General prepared the first comprehensive five-yearly report on progress toward achieving the MDGs[36]. The report reviews the implementation of decisions taken at the

[35] See the World Bank's site for a full listing, http://devdata.worldbank.org/gmis/mdg/list_of_goals.htm

international conferences and special sessions on the least developed countries, progress on HIV/AIDS and financing for development and sustainable development.

Relevant and provisos of the report pertaining to Rwanda, Burundi and Uganda include in Section II, "Peace, Security and Disarmament" measures that will help promote human security, including:

- For the 49 least developed countries, the next steps are implementing a global version of the European "Everything but arms" trade program; increasing official development assistance; fully implementing the enhanced Heavily Indebted Poor Countries Initiative and pursuing measures to promote the cancellation of official bilateral debt;
- Landlocked and small island developing countries are subject to special vulnerabilities that need to be addressed through support to the Global Framework for Transit-Transport Cooperation between landlocked and transit developing countries and the donor community and through the implementation of the Program of Action for the Sustainable Development of Small Island Developing States;
- Lastly, the Information and Communications Technologies Task Force will take steps to begin the bridging of the digital divide.

Section IV of the Road Map, "Protecting our Common Environment", emphasizes the impact that climate change is having on the Earth and the necessity of a vigilant approach to conservation and stewardship. It is necessary to reverse the growing environmental damage that is occurring because of global warming, deforestation, the decimation of biodiversity, soil erosion and desertification, reduction in water tables and the increase in natural disasters, hence the Pipeline must be developed with as few damaging secondary environmental effects as possible (a full EIA and Mitigation Plan will need to evaluated by each Government and its Agents to ensure this will be the case)

7.2.2 Poverty Reduction Strategy Papers

Poverty Reduction Strategy Papers (PRSPs) are prepared by governments in low-income countries through a participatory process involving domestic stakeholders and external development partners, including the IMF and the World Bank. A PRSP describes the macroeconomic, structural and social policies and programs that a country will pursue over several years to promote broad-based growth and reduce poverty, as well as external financing needs and the associated sources of financing.

The PRSP approach, initiated by the IMF and the World Bank in 1999, results in a comprehensive country-based strategy for poverty reduction. It aims to provide an essential link between national public actions, donor support, and the development outcomes needed to meet

[36] U.N. 'Road Map towards the Implementation of the United Nations Millennium Declaration', Report of the Secretary-General United Nations A/56/326; General Assembly Distr.: General, 6 September 2001 (Follow-up to the outcome of the Millennium Summit, *A/56/150.) A/56/326.

the United Nations' Millennium Development Goals (MDGs), which are centered on halving poverty between 1990 and 2015. PRSPs provide the operational basis for Fund and Bank concessional lending and for debt relief under the Heavily Indebted Poor Countries (HIPC) Initiative.

The five core principles underlie the PRSP approach. Poverty reduction strategies should be:

1. Country-driven, promoting national ownership of strategies through broad-based participation of civil society;
2. Result-oriented and focused on outcomes that will benefit the poor;
3. Comprehensive in recognizing the multidimensional nature of poverty;
4. Partnership-oriented, involving coordinated participation of development partners (government, domestic stakeholders, and external donors);
5. Based on a long-term perspective for poverty reduction.

Key messages from previous reviews include: the importance of country ownership; realism, flexibility, and better prioritization in setting goals and targets; and more open discussion of alternative policy choices. The need for donors to enhance the overall effectiveness of aid by better aligning their support around the priorities articulated in the PRSP, and by harmonizing and simplifying their policies and practices, was also highlighted. The latest in-depth assessment draws lessons regarding the PRS as a model for more effective development cooperation, and identifies best practices and actions that could be taken to strengthen it. It finds progress in making the PRS approach into an operational framework for scaling up efforts to reach the MDGs. The assessment also stresses that PRSs can provide the means to balance different tensions, notably between realism and ambition, and between domestic accountability, closely related to ownership, and external accountability *vis-à-vis* donors and other development partners.

Work to align the programs supported by IMF concessional assistance through the PRGF to the PRSP approach has started. To further improve operations and respond to countries' needs, the Fund's near-term priorities are to:

1. Help countries design realistic, yet flexible, macroeconomic frameworks linked to national strategies and budgets;
2. Increase focus on the sources of, and obstacles to, growth, how policies affect growth, and its distributional impact;
3. Strengthen public expenditure management and poverty and social impact analysis of policy choices;
4. Work with other donors for better-coordinated assistance that will enhance aid effectiveness and rationalize support for PRSP implementation[37].

[37] http://www.imf.org/external/np/exr/facts/prsp.htm

7.2.3 Country Assistance Strategies (CAS's)

The Country Assistance Strategies (CAS's) are tailored to the needs and circumstances of each country and lays down the World Bank Group's development priorities, as well as the level and type of assistance the Bank will provide for a period of three years. The CAS preparation is a participatory process with key elements of this discussed with Governments and the public.

Status of the Country Assistance Strategy (CAS) for Burundi

In 2002 the World Bank and the Government of Burundi finalized a Transitional Support Strategy (TSS) to support the Government's strategy to stabilize the economy and prevent further deterioration of living standards as the peace process progressed. The TSS covered 2003 – 2005[38].

An Interim Strategy Note (ISN)[39] aligned with the country's Interim Poverty Reduction Strategy Paper (I-PRSP) was approved by the Board in May 2005. The ISN covered FY06 and FY07 and its strategic elements were:

1. Security and social service delivery,
2. Economic growth and diversification
3. Governance and institutional strengthening. Its intervention plan aimed to:
   - (i) Maintain the satisfactory implementation status of the existing portfolio,
   - (ii) Help Burundi reach the HIPC Decision point and move towards the Completion point,
   - (iii) Launch selected new lending operations,
   - (iv) Provide non-lending services,
   - (v) Engage other donors
   - (vi) Involve the entire Bank Group.

The Government completed a full PRSP in September 2006 and a Joint Staff Assessment was conducted in March 2007. With the conditions for preparing a new CAS fulfilled, the Bank will prepare for the new Bank strategy for FY08 – FY12 to deliver it to the Board by mid-FY08. The CAS will be fully aligned with the strategic objectives of the country's full PRSP which are:

- (i) Improving governance and security,
- (ii) Promoting sustainable and equitable economic growth,
- (iii) Developing human capital,
- (iv) Combating HIV/AIDS.

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38 http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/BURUNDIEXTN/0,,menuPK:343764~pagePK:141132~piPK:141105~theSitePK:343751,00.html

39 http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2005/05/18/000160016_20050518183535/Rendered/PDF/32018.pdf

Country Assistance Strategy (CAS) Rwanda
The 2002-2006 Country Assistance Strategy (CAS) for Rwanda supported the implementation of the Poverty Reduction Strategy Paper (PRSP) emphasizing revitalizing the rural economy, private sector development and employment creation, and human and social development. These themes reflected the priorities action areas of the PRSP which were: rural development and agricultural transformation, human development, economic infrastructure, good governance, private sector development, and institutional capacity building[40].

In August 2006, an Interim Strategy Note (ISN) was presented to the Board for FY07 and FY08. The ISN bridges the gap between the previous CAS and the next CAS which will cover 2008 – 2012. This is being done to ensure that the 2008 – 2012 CAS is aligned with the country's second PRSP, now called the Economic Development and Poverty Reduction Strategy (EDPRS) which is expected to be completed in May 2007. The 2008 – 2012 CAS will be prepared jointly with DfID and will be presented to the Board in FY08.

The strategic elements of the ISN are:

- Consolidating the results of the CAS by sustaining the gains made in the social sectors and improving public financial management.
- Increasing the focus on economic growth and on capacity building to strengthen preparation and implementation of development and governance programs.
- Further improving coordination and harmonization of development assistance across donors to improve aid effectiveness and reduce transaction costs for the Government.

The key instruments are:

- Support to social service delivery through: the Poverty Reduction Support Grant (PRSG) which will support policy implementation in education, health, energy and water; the MAP supplemental which will continue to focus on prevention of HIV/AIDS while providing care and support to those infected with HIV/AIDS; and PRSG support for reforms in financial management to facilitate improved accountability and transparency.
- Support to capacity building through: planned analytical work to facilitate the preparation and implementation of the EDPRS; strengthening the capacity of public financial management; and support of the E-Rwanda project to strengthen the government's financial management system while increasing the accessibility of information on government programs.

Support to generating growth by easing the main infrastructure constraints to growth in the energy, water, and transport sectors. Here, the Lake Kivu-to-Power Guarantee will facilitate

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40 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2002/12/14/000094946_02120304010763/Rendered/PDF/multi0page.pdf

development of public-private partnerships for the Lake Kivu Gas Methane Project (financed by IFC and other private investors) and the Transport Sector Development project will support the maintenance of the road network. The IFC and the Bank will also provide business development support to SME's.

The FY06 – 08 IDA envelope for Rwanda is US$209 million. The IDA allocation for FY07 is US$84 million and the indicative amount for FY08 is US$50 million. In addition, two projects totaling US$75 million were presented to the Board in FY06: PRSG2 and the Urban Infrastructure and City Management.

7.2.4 New Partnership for Africa's Development (NEPAD)

The New Partnership for Africa's Development (NEPAD) is a framework for economic development. The UN plays a number of key roles in supporting NEPAD in working towards a set of African-driven development priorities requiring the support and involvement of many stakeholders, including the international funding community.

The Office of the Special Adviser on Africa (OSAA) is responsible for the UN's global advocacy in support of NEPAD which involves creating awareness about NEPAD amongst stakeholders, including donors, civil society, and the private sector. OSAA also promotes cooperation between developing countries under a South-South cooperation agreement.

A strategic element in OSAA's advocacy role is to encourage Africa's development partners to expand support in various forms: foreign direct investment, increased aid, trade liberalization, extended debt forgiveness, increasing credit guarantee financing and support for small and medium-scale enterprises.

In 2004, the Secretary-General established an Advisory Panel on International Support for the New Partnership for Africa's Development (SAPIS-NEPAD). The SAPIS-NEPAD report aims to assist the Secretary-General in monitoring international support for NEPAD and outlines a number of recommendations for further action to support the implementation of NEPAD. The Office of the Special Adviser on Africa serves as secretariat for SAPIS-NEPAD. The Advisory Panel addresses the critical need to increase mobilization of financial resources to facilitate and expedite the implementation of the NEPAD programs and priorities.

NEPAD has a number of initiatives and priority areas. One of the most relevant to the K-B Pipeline is the Strategic Development Program (SDP), which consists of a number of Strategic Development Initiatives (SDIs), which are designed to develop infrastructure while sharing best practices during the process, usually along major transport corridors. In the case of Burundi, Rwanda and Uganda, the SDI programs focus on the Northern Transportation Corridor, which connects the landlocked countries to the Port of Mombasa as well as the Central Transportation Corridor, which connects Rwanda and Burundi to the port of Dar-es-Salaam in Tanzania. For example, Rwanda and Tanzania are developing a Minerals Development and Investment Strategy under the auspices of the SDI program and the proposed projects are part of NEPAD's Short-term Action Plan (See Mining section for Rwanda).

The NEPAD Infrastructure Project Preparation Facility contributed financially to the preparation of the E-K pipeline in 2004 and 2005 and is very supportive of the K-B Pipeline. It fits neatly into NEPAD's objectives of promoting economic development, public-private partnerships as well as regional integration. Rwanda's NEPAD coordinator also pointed out that the project is one of Rwanda's five priority infrastructure projects within the NEPAD framework.

There are also additional cooperative efforts underway to improve infrastructure in the region. In the Dar-es-Salaam Declaration, adopted in 2004 the Heads of State and Governments of East Africa committed to "*promote regional cooperation in trade, monetary policies, energy, transport, tourism, culture, environment, Information and Communication Technologies, as well as in telecommunications, with an emphasis on railways, oil pipelines, submarine cables and optic fibre network connections*" (para 45)[41]. The 'Northern Corridor' includes all the infrastructures and facilities serving the landlocked countries signatories of the Northern Corridor Transit Agreement (NCTA) in respect to freight transport to and from the Port of Mombasa in Kenya.[42] [43]

7.2.5 Rwanda's VISION 2020

The six 'priority pillars' and three 'cross-cutting areas' comprising Rwanda development targets are detailed in the GOR's 'VISION 2020'[44] forward plan published in 2000 and updated in 2004. VISION 2020 describes a transition from a predominantly rural subsistence agricultural economy to a knowledge-based economy. To achieve this overall goal, all sectors of economic and capacity building endeavor must advance in parallel, i.e. improvements in education, health, agricultural productivity, infrastructure (water availability, energy, transportation, etc.), food security, etc., must all attract additional resources and attention. The development of the K-B Pipeline is an integral part of this economic transition as it will increase the efficiency with which oil products reach consumers; will be potentially more reliable and cost effective, and should aid the development of better transportation facilities and road infrastructure. (See Rwanda section for specific VISION 2020 targets).

Rwanda's VISION 2020 lays out ambitious targets for the economic development of the country[45]. Access to sufficient and secure supplies of energy and fuel are a basic requirement to fuel this economic development. As outlined above, there is currently an energy deficit in

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[41] Northern Corridor: Programme for Improving Transport Infrastructure and Facilities, March 2006 (amended 30 August 2006), International Conference on the Great Lakes Region, Regional Programme of Action for Economic Development and Regional Integration, Project No. 3.3.1.

[42] The Northern Corridor is the transport corridor linking the Great Lakes countries of Burundi, D. R. Congo, Rwanda and Uganda to the Kenyan sea port of Mombasa. The corridor also serves Northern Tanzania, Southern Sudan and Ethiopia.

[43] The Northern Corridor sub-region constitutes a significant portion of the COMESA region with a combined population of 20 million people, which is about 30% of the COMESA population of 380 million people. The combined GDP of Northern Corridor countries are 18% of COMESA GDP. Meanwhile intra-COMESA trade of Northern Corridor countries constitutes 30% of COMESA imports and 42% of exports in the year 2003.

[44] Republic of Rwanda, Ministry of Finance and Economic Planning, Rwanda VISION 2020, Kigali, July 2000.

[45] Republic of Rwanda, Ministry of Finance and Economic Planning, Rwanda VISION 2020, 2004 Kibuye version.

Burundi and Rwanda which would be largely alleviated by the construction and associated development stimulated by the planned pipeline. In addition, as the GOR has recognized that "*imported petroleum products consume more than 40% of foreign exchange*"[46] developments to reduce this will mean resources can be diverted to other functions such as human capacity building.

Currently there is minimal infrastructure, including transportation. The WB prepared a project description with the Government of Rwanda (GOR) and concluded the priority was to develop alternative modes of road and other transport[47].

7.3 Impact of K-B Pipeline

The K-B Pipeline will have immediate beneficial effects on employment and capacity-building. However, the largest impact is expected to come from the contribution of lower fuel costs to reducing transportation costs. Lower transportation costs will enhance the competitiveness of Rwandan products both domestically and for export.

7.3.1 Employment

The company undertaking the construction of the pipeline will need to complete an analysis of the number and types of skilled and unskilled personnel required to complete the project in conjunction with the total costs and time to complete the project. In the absence of a construction plan it is difficult to assess the number and breakdown per skill type of positions needed to construct and operate the K-B Pipeline.

Nevertheless, there are a number of standard tables used to estimate the numbers of workers required to build pipelines and the skills mix needed. Based on a review of these and introducing factors that make allowances for the situation that may be found in Rwanda and Burundi (namely the lack of certain skilled workers), and based on previous pipeline developments in the region, it was found that around 1,700 people will be required to build the Kampala to Kigali pipeline, including 1,360 Rwandans over a 18-24 month build time. The Kigali to Bujumbura pipeline is expected to require 300 people, including 240 locals over a 12-month build time. The pipeline would be expected to employ about 100 people when operating.

Some of the main job functions in constructing a pipeline include: clearing rights-of-way; ditching; concrete work; pipe laying; pipe lowering; welding; pipeline welding, etc. Further immediate advantage to the countries through which the pipeline will traverse are in the local support staff required – cooks, cleaners, mechanics, drivers, electricians, translators, guides, odd-jobbers, etc. While these are not high level positions, the building of the pipeline will offer increased opportunities for employment and by working for the pipeline developers, opportunities to develop transferable skills.

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[46] VISION 2020, op cit.

[47] Pers. comm.. World Bank, Africa Department.

7.3.2 Capacity-Building and Training

There will be advantages to Burundi, Rwanda and Uganda in developing their human capacity as a result of the pipeline. These may result from opportunities for increased skills training through short-term employment in the building of the pipeline and longer-term benefits from the training and employment of personnel to maintain the pipeline after it is commissioned and other associated functions. Currently, the three countries offer a limited pool of appropriately skilled workers and a certain percentage of engineers and pipeline construction workers will be imported on a temporary basis.

The building of human capacity of both Rwanda and Burundi requires the extension of elementary education to the whole population to higher level skills in technological capabilities. The building of infrastructure such as a pipeline and associated roads, building structures as well as the administrative and planning functions, etc., will offer opportunities to local communities to train and gain competence in transferable skills. Developed country resources, such as those prevalent in the U.S. can be applied as part of the value-added aspects of the project contributing to the education and training of the local population by way of engagement in the developmental and building aspects of the K-B Pipeline.

While the authors of this report are well aware that the transfer of western technology *per se* is not necessarily appropriate or desirable in all development situations, it would be advantageous for the country and its people to utilize projects such as this to help to train and build capabilities. Thus, the development of modern pipelines and associated infrastructure provides the opportunity for local populations to come into contact with, and be engaged in, a range of activities associated with the development. A training, education and capacity building program should be drawn up to leverage the benefits of external western (e.g. U.S.) involvement in the project.

One of the benefits of such projects in human capacity building that such developments bring is the opportunity for training in addition to that of employment. The people who will receive training and the training programs developed associated with the project may depend on a number of factors. In projects in West Africa that the authors have experience of, the number of local workers per skill set were negotiated locally with tribal elders to ensure access to both jobs as well as training . In the same example, the training was largely to be carried out through local technical and industry-specific schools.

Training programs may take the form of apprenticeships with the engineering company (although this may be very limited on a short-term project), brief skills-based courses (e.g. 2-3 weeks, non-certificated courses), extension of courses at local training facilities supported by the company building the pipeline. However, it will be a decision of the construction company in liaison with the local authorities to employ a stated percentage of local staff and to train those in new skills should this be desirable on the part of both parties.

7.3.3 Economic Development

Principal benefits of the projects will accrue to the Governments of Burundi, Rwanda and Uganda through the increased revenues that will result from development of the country's

transportation infrastructure and agricultural and mineral export business and assisting them in the development of market driven economies and improving the livelihoods of the population.

The K-B Pipeline is likely to lower average petroleum product prices by 10% or more depending on the world price of oil. As important, the pipeline would also enhance security of supply, which would all but eliminate price spikes in the market for fuel, and ensure that fuel does not run out. Finally, the number of long haul fuel trucks on the trunk roads on the Northern and Central Transportation Corridors will be reduced and likely replaced with more trucks distributing fuel locally from supply depots associated with the K-B Pipeline.

Currently, both Rwanda and Burundi suffer from intermittent shortages of diesel and gasoline and many gas stations have to ration their sales or shut down completely. In the recent year, the lack of capacity on KPC's pipeline system was a major cause of shortages. As fuel suppliers attempted to source the fuel closer to the port of Mombasa in Kenya, the result was massive traffic jams at key points in Kenya paralyzing fuel deliveries into Uganda, Rwanda and Burundi. The K-B Pipeline would largely eliminate the need for long haul trucking and as such reduce the likelihood of supply interruptions, subject to the ongoing capacity expansions of KPC's pipeline system. A collateral benefit would be reduced wear and tear on the major trunk roads along the Transportation Corridors as well as a reduction in the number of accidents. Finally, taking the trucks off the road would also reduce the environmental hazard of fuel spills from trucks involved in accidents.

The current system of petroleum product price controls in Rwanda and Burundi also leads to fuel shortages as some fuel suppliers try to "game the system" when there is a significant difference between the FOB discharge port price (i.e. in Mombasa or Dar-es-Salaam) and that allowed under the price regulations. The K-B Pipeline is likely to sign long-term contracts with the major fuel suppliers in the affected countries which are also likely to include certain take-or-pay provisions. Hence, it will be more difficult to manipulate the supply of fuel as many fuel suppliers will be forced to receive petroleum products on a regular basis. In fact, the increased transparency entailed by the K-B Pipeline is also likely to facilitate efforts to reform the pricing regime.

Since Burundi, Rwanda, and Uganda are landlocked countries, they depend on long distance transportation for all of their imports and exports. While some trade is done by air, the majority of products moving in and out of these countries go by containers and break-bulk shipments via road. Hence, lower transportation fuel prices and increased security of fuel supply combined with programs of road network improvements, as are underway, are essential components enabling economic growth to continue at a high level.

8.0 Proposed Equipment and Services

This section provides a list of potential equipment and services required for the Pipeline Project including potential US source of supply in accordance with Clause I of Annex II of the Grant Agreement with TDA.

Products and Services	Company
Pipeline Construction	Sheehan Pipe Line Construction Company. 2431 East 61st Street, Suite 700 Tulsa, Oklahoma 74136 (918) 747-3471 Fax: (918) 747-9888 Bechtel Corporation PO Box 2166 Houston, TX 77252-2166 Phone: (713) 235-4491 Fax: (713) 235-3662 U.S. Pipeline, Inc. 11767 Katy Freeway, Suite 100 Houston, TX 77079 Ph: 281-531-6100 Fx: 281-531-6700
Pipeline Supply	Lonestar Steel 15660 N. Dallas Parkway, Suite 500 Dallas, TX 75248 Phone: (972) 770-6338 Fax: (972) 770-6409
Pipeline Engineering	Mustang Engineering, L.P. 16001 Park Ten Place Houston, TX 77084 Phone: (713) 350-7476 Fax: (713) 215-8506 ASRC Energy Services 3900 C Street, Suite 701 Anchorage AK 99503 Phone: (907) 339-6200 Fax: (907) 339-6219
Legal Services	Saul Ewing LLP Mr. William A. Mogel 2600 Virginia Avenue, NW Suite 1000 - The Watergate Washington, D.C. 20037 Tel: (202) 295-6612 Fax: (202) 295-6712 Pierce Atwood

	Ms. Elizabeth Butler One Monument Square Portland, Maine 04101 Phone: (207) 791-1226
Pipe and valves –	Belco Manufacturing Co. Inc. P.O. Box 210 Belton TX 76513-0210 Phone: (800) 251-8265 and (254) 933-9000 Fax: (254) 939-2644 Superior Valve Co. 8730 Lambright Houston, TX 77075-3123 Phone: (713) 991-5353 Fax: (713) 991-0641 Adams Valves - USA 10649 Haddington Dr. #160 Houston, TX 77043 USA Phone: (713) 973-2490 Fax: (713) 973-2788
Wire and cables –	Anixter Wire & Cable Group 1225 North Loop W., Suite 650 Houston, TX 77008 Phone: 713-293-4500, 800-231-8220 (toll free) Fax: 713-293-4501 USA Wire & Cable, Inc. 6301 E. Stassuey Lane, #400 Austin, TX 78744 Phone: 877-443-9473 and 800-880-9473
Switchgear –	Mustang Power Systems 12800 Northwest Fwy. Houston, TX 77040 Phone: 713-460-2000 Fax: 713-329-7724 Cooper Industries 600 Travis St., Suite 5800 Houston, TX 77002-1001 Phone: (713) 209-8400 Fax: (713) 209-8995
Instrument/Controls –	Kor-Lok USA, LLC 15060 West Drive, Suite 100 Houston, Texas 77053 Phone: (877) 456-7565 Ryan Herco

	9360 Wallisville Road Suite 140 Houston, Texas 77013 Toll Free: (800) 848-1141 Fax: (713) 670-0308
Pump Stations	Warren Pumps LLC 82 Bridges Avenue P.O. Box 969 Warren, MA 01083-0969 USA Baker CAC 22001 N. Park Dr. Kingwood, TX 77339 Phone: (281) 348-1000 Fax: (281) 348-1280
Operations Center – (SCADA) system.	Control Systems International, Inc. (USA)* 8040 Nieman Road Lenexa, Kansas 66214-1523 Tel: (913) 599-5010 Fax: (913) 599-5013 Email:
Storage terminals	Eagle Tanks, Inc. 8820 Aumsville Highway SE Salem, OR 97317 USA Matrix Service Company 10701 E. Ute Street Tulsa, OK 74116 Phone: (866) 367-6879 Fax: (918) 838-8810

Appendix A - International Comparison of Projected Consumption Levels

In order to assess the reasonableness of its petroleum product demand forecasts, SAIC evaluated the relationship between fuel consumption, GDP, and population. SAIC examined the relationship between GDP per capita and petroleum product demand in non-OECD countries over the last 10 years.[48] While petroleum product consumption tends to increase with growth in per capita GDP, large variations exist depending on the economic structure of each individual country as well as whether a country produces crude oil. This international comparison indicates that SAIC's Base Case forecast of white oil consumption in Southwestern Uganda, Rwanda and Burundi at the forecasted levels of GDP per capita is conservative. In other words, SAIC projects white oil consumption levels that are low compared to other non OECD countries that do not produce crude oil.

Since Burundi, Rwanda and Uganda do not produce crude oil, SAIC limited the country sample to non-crude producing countries in order to establish a reasonable range of white oil consumption at different current dollar GDP per capita levels.[49] Also, since Burundi, Rwanda and Uganda are all low-income countries, the analysis focused on countries with current dollar per capita GDP of less than $2,000, i.e. data from a particular year was included if the current dollar GDP per capita was below $2,000.[50] SAIC found that the relationship between current dollar GDP per capita and white oil consumption is quite strong, with an r-squared of 0.81. (Figure 50)[51]. Current per capita white oil consumption in Rwanda, Uganda, and Burundi are all towards the lower end of the trend range for their per capita income levels.

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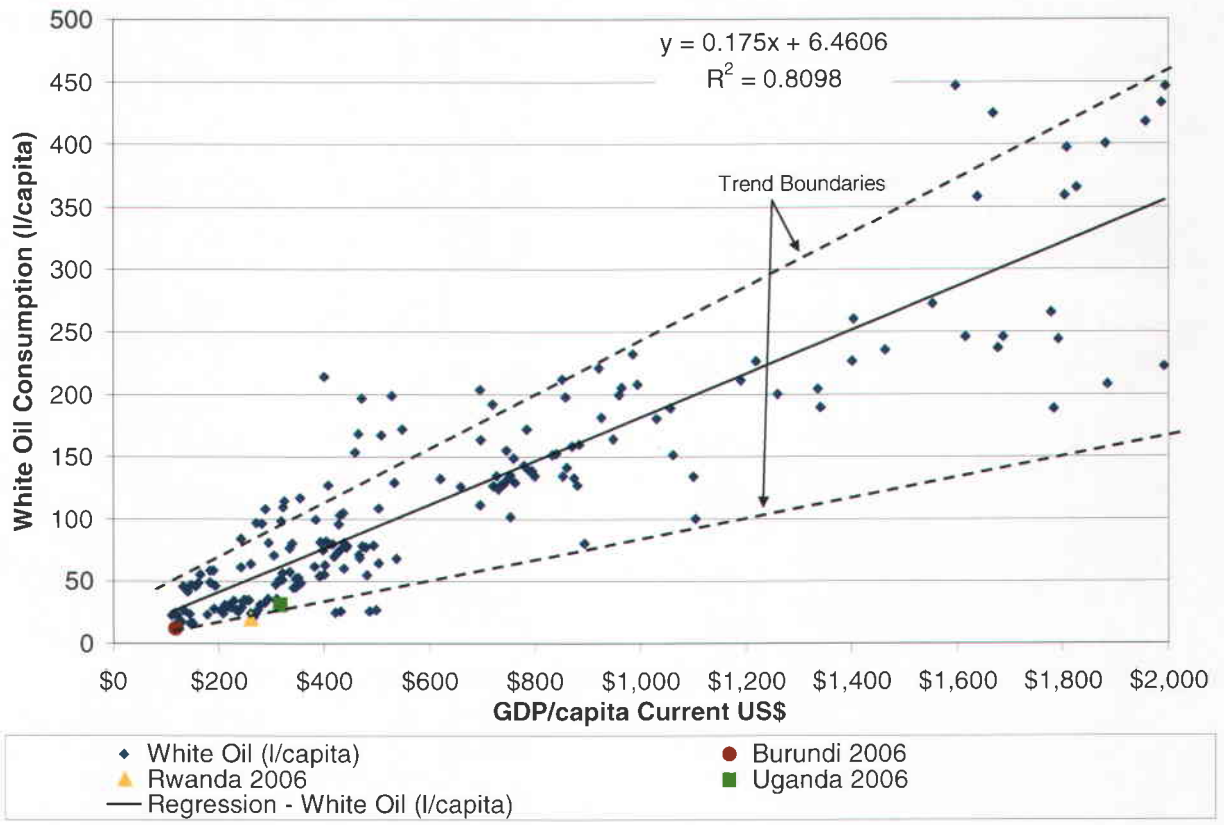
[48] Data from the International Energy Agency on fuel consumption in non-OECD countries and data on GDP and population from the International Monetary Fund's World Economic Outlook Database, April 2007, for the years 1995-2004 (the latest year for which comprehensive data is available).

[49] Uganda is expected to start producing oil from significant new finds around Lake Albert over the next few years. Any increase in white oil consumption due to this development would increase flows on the pipeline and represents a potential upside.

[50] GDP/capita in current U.S. dollars was used since the fuels imported by the three countries are priced in U.S dollars. Moreover, economic growth generally increases demand for fuels, but an appreciating exchange rate also makes these fuels relatively cheaper, which also stimulates demand.

[51] Data from the following countries was included for any year between 1995 and 2004 when current dollar GDP/capita was below $2,000: Armenia, Bosnia and Herzegovina, Dominican Republic, El Salvador, Eritrea, Ethiopia, Ghana, Haiti, Honduras, Kenya, Latvia, Moldova, Mozambique, Namibia, Nepal, Nicaragua, Paraguay, Sri Lanka, Tanzania, Togo, Zambia, Zimbabwe.

Figure 50: Relationship between white oil consumption/capita and GDP/capita, 1995-2004



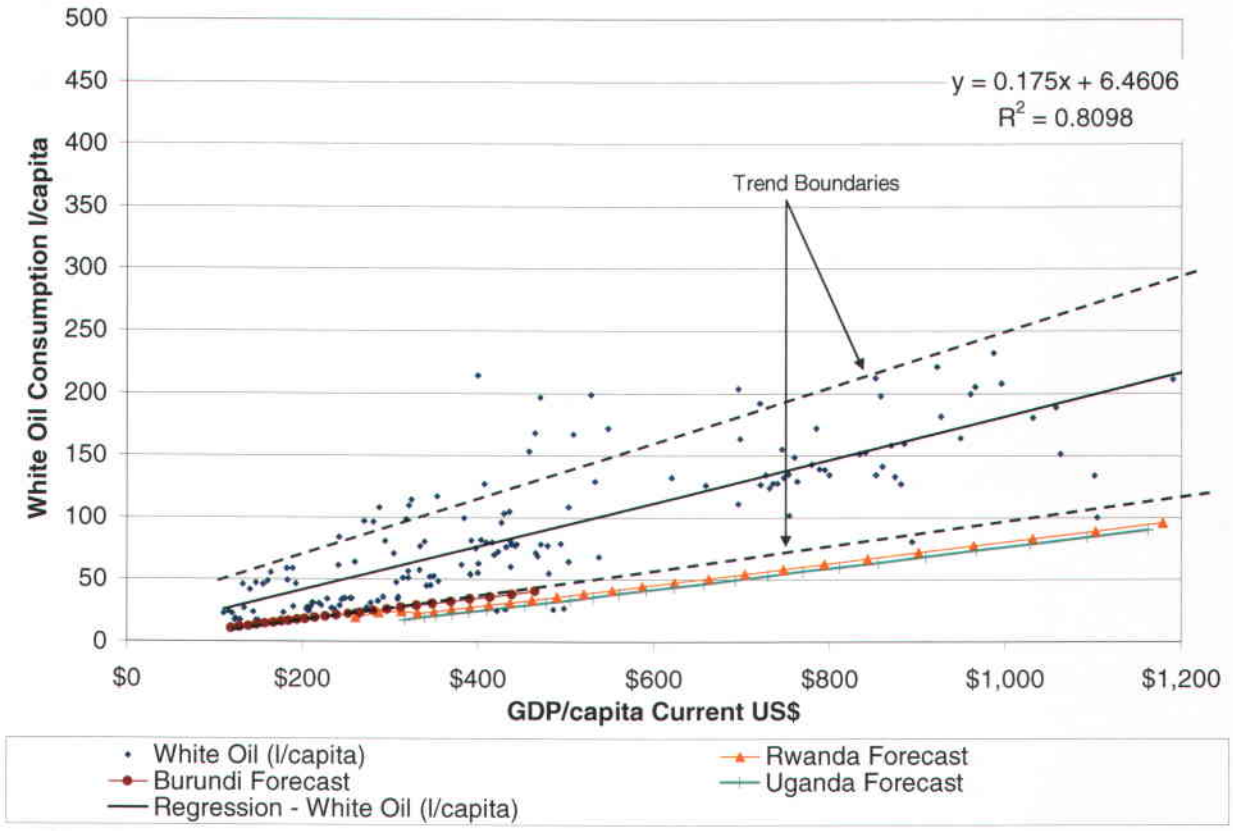
Note: Countries included in the sample above were non-OECD countries that did not produce crude oil in the relevant period.

Sources: IMF World Economic Outlook, April 2007 and IEA's Energy Statistics in non-OECD Countries, 2006 edition.

SAIC's Base Case forecast was assembled from assessments and forecasts for each relevant white oil consuming sector in the region. Figure 51 shows that the Base Case forecast is conservative since all three countries are at or below the lower Boundary at the projected levels of GDP/capita. For example, SAIC's Base Case projects a current dollar GDP per capita of $1,179 in Rwanda in 2030 and an average white oil consumption of 96 liters per capita. Historically, consumption in countries at a similar level of GDP per capita spans a large range. For example, in 2001 Zimbabwe's GDP per capita was $1,104 and white oil consumption was around 100 liters per capita while in Paraguay GDP per capita was $986 in 2003 and white oil consumption was 232 liters per capita.

One should bear in mind that while GDP per capita appears to explain a lot of the variation in white oil consumption levels, it is not the only determinant and consumption levels can vary greatly over time at different GDP per capita, even within a single country. For example, Paraguay's average white oil consumption increased from 211 to 232 liters per capita from 2001 to 2003 while GDP per capita actually decreased somewhat from $1,190 to $986 in the same time period (Figure 51). Hence, SAIC's Base Case forecast has a margin of safety as the forecasted consumption levels are firmly at the low end of the historically observed ranges.

Figure 51: International Comparison of Projected White Oil Consumption Levels



Note: X-axis scale is reduced to a maximum of $1,200 current dollar GDP/capita.

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Appendix B- Forecasted Fuel Demand

BASE CASE

	Land Transportation (m3/year)				Power Sector Diesel	Backup Generation Diesel	Kerosene Demand (m3)				Aviation - Jet Fuel Demand			Total White Oil Demand				
Year	SW Uganda	Rwanda	Burundi	Total	Rwanda	Burundi	SW Uganda	Rwanda	Burundi	Total	Rwanda	Burundi	Total	SW Uganda	Rwanda	Burundi	NW Tanzania	Total
2004	98,398	106,765	66,553	271,716	980		10,855	16,327	921	28,102		8,681		109,252		76,154		
2005	96,895	112,505	73,872	283,272	13,158		8,764	13,036	1,252	23,052		8,228		105,659		83,352		
2006	105,186	125,394	77,221	307,801	34,140	8,239	9,437	13,452	1,516	24,406	9,201	7,746	16,947	114,623	182,189	94,723		391,534
2007	122,350	148,558	85,012	355,920	46,185	7,324	9,592	13,602	1,425	24,618	10,055	6,716	16,772	131,942	218,401	100,476		450,820
2008	134,399	172,983	93,831	401,213	34,015	6,408	9,937	13,848	1,453	25,238	10,885	6,260	17,145	144,336	231,730	107,952		484,018
2009	150,248	192,788	103,550	446,587	4,171	5,493	10,261	14,238	1,504	26,003	11,299	6,316	17,615	160,509	222,497	116,863		499,869
2010	167,605	214,444	114,273	496,323	1,043	4,578	10,595	14,640	1,557	26,791	11,725	6,400	18,125	178,200	241,852	126,808		546,860
2011	186,606	238,113	126,104	550,823	1,043	3,662	10,940	15,052	1,612	27,604	12,165	6,642	18,807	197,546	266,373	138,020		601,939
2012	207,397	263,974	137,050	608,420	1,043	2,747	11,296	15,477	1,669	28,442	12,618	6,888	19,506	218,693	293,112	148,353		660,158
2013	230,137	292,221	148,943	671,301	1,043	1,832	11,664	15,913	1,727	29,305	13,085	7,137	20,222	241,801	322,262	159,640		723,703
2014	255,001	323,063	161,868	739,932	1,043	916	12,044	16,362	1,788	30,194	13,567	7,390	20,957	267,045	354,035	171,962		793,042
2015	282,504	356,730	175,911	815,146	1,043	1	12,395	16,823	1,851	31,069	14,064	7,645	21,709	294,898	388,660	185,409		868,967
2016	312,403	394,016	191,176	897,594	1,043	0	12,774	17,207	1,906	31,887	14,666	7,904	22,569	325,176	426,931	200,986		953,093
2017	345,055	434,673	207,762	987,489	1,043	0	13,164	17,599	1,963	32,726	15,289	8,165	23,455	358,219	468,604	217,890		1,044,713
2018	380,703	478,996	225,784	1,085,484	1,043	0	13,567	18,001	2,021	33,588	15,936	8,430	24,366	394,270	513,976	236,235		1,144,481
2019	419,613	527,307	245,367	1,192,287	1,043	0	13,981	18,411	2,081	34,474	16,606	8,697	25,303	433,594	563,367	256,145		1,253,107
2020	462,071	579,954	266,646	1,308,671	1,043	0	14,409	18,831	2,143	35,383	17,300	8,966	26,267	476,480	617,128	277,755		1,371,363
2021	508,390	637,315	289,766	1,435,471	1,043	0	14,849	19,260	2,207	36,316	18,020	9,249	27,269	523,239	675,639	301,222		1,500,100
2022	558,909	699,802	314,888	1,573,600	1,043	0	15,303	19,700	2,272	37,275	18,766	9,541	28,307	574,213	739,311	326,702		1,640,225
2023	613,999	767,862	342,185	1,724,047	1,043	0	15,771	20,149	2,340	38,260	19,539	9,843	29,382	629,770	808,593	354,369		1,792,732
2024	674,060	841,981	371,845	1,887,886	1,043	0	16,253	20,608	2,409	39,271	20,340	10,156	30,496	690,314	883,972	384,411		1,958,696
2025	739,529	922,686	404,072	2,066,288	1,043	0	16,750	21,078	2,481	40,309	21,170	10,479	31,649	756,280	965,978	417,033		2,139,290
2026	812,019	1,011,414	439,094	2,262,527	1,043	0	17,118	21,415	2,545	41,078	22,195	10,863	33,058	829,137	1,056,067	452,502		2,337,706
2027	890,966	1,107,959	477,146	2,476,072	1,043	0	17,494	21,758	2,610	41,861	23,264	11,262	34,526	908,460	1,154,024	491,018		2,553,502
2028	976,933	1,213,001	518,492	2,708,426	1,043	0	17,877	22,105	2,677	42,660	24,380	11,675	36,055	994,811	1,260,529	532,844		2,788,184
2029	1,070,532	1,327,275	563,416	2,961,224	1,043	0	18,270	22,459	2,745	43,474	25,544	12,104	37,648	1,088,802	1,376,321	578,266		3,043,388
2030	1,172,427	1,451,584	612,229	3,236,239	1,043	0	18,671	22,818	2,816	44,304	26,758	12,548	39,306	1,191,097	1,502,203	627,592		3,320,892

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LOW CASE

Land Transportation (m3/year)					Power Sector Diesel	Backup Generation Diesel	Kerosene Demand (m3)				Aviation - Jet Fuel Demand			Total White Oil Demand				
Year	SW Uganda	Rwanda	Burundi	Total	Rwanda	Burundi	SW Uganda	Rwanda	Burundi	Total	Rwanda	Burundi	Total	SW Uganda	Rwanda	Burundi	NW Tanzania	Total
2004	98,398	106,765	66,553	271,716	980		10,855	16,327	921	28,102		8,681		109,252		76,154		
2005	96,895	112,505	73,872	283,272	13,158		8,764	13,036	1,252	23,052		8,228		105,659		83,352		
2006	105,186	125,394	77,221	307,801	34,140	8,239	9,437	13,452	1,516	24,406	9,201	7,746	16,947	114,623	182,189	94,723		391,534
2007	122,350	148,558	85,012	355,920	46,185	7,324	9,592	13,602	1,425	24,618	10,055	6,716	16,772	131,942	218,401	100,476		450,820
2008	134,399	172,983	93,831	401,213	34,015	6,408	9,937	13,848	1,453	25,238	10,885	6,101	16,986	144,336	231,730	107,793		483,859
2009	146,978	188,852	100,528	436,358	4,171	5,493	10,261	14,238	1,504	26,003	11,104	5,998	17,102	157,238	218,365	113,524		489,127
2010	160,549	205,950	107,703	474,202	1,043	4,578	10,595	14,640	1,557	26,791	11,326	5,923	17,249	171,144	232,958	119,761		523,863
2011	175,187	224,368	115,389	514,945	1,043	3,662	10,940	15,052	1,612	27,604	11,552	6,007	17,558	186,127	252,015	126,670		564,812
2012	190,971	244,202	123,623	558,796	1,043	2,747	11,296	15,477	1,669	28,442	11,781	6,093	17,874	202,268	272,503	134,132		608,902
2013	207,987	265,556	132,443	605,986	1,043	1,832	11,664	15,913	1,727	29,305	12,014	6,184	18,198	219,650	294,526	142,186		656,363
2014	226,324	288,542	141,891	656,756	1,043	916	12,044	16,362	1,788	30,194	12,251	6,277	18,528	238,367	318,198	150,873		707,438
2015	246,407	313,277	152,013	711,697	1,043	1	12,395	16,823	1,851	31,069	12,492	6,374	18,866	258,801	343,635	160,239		762,676
2016	267,893	340,436	162,860	771,189	1,043	0	12,774	17,207	1,906	31,887	12,817	6,474	19,291	280,667	371,502	171,240		823,409
2017	291,029	369,637	174,479	835,145	1,043	0	13,164	17,599	1,963	32,726	13,149	6,576	19,726	304,193	401,428	183,019		888,640
2018	315,935	401,028	186,926	903,889	1,043	0	13,567	18,001	2,021	33,588	13,489	6,682	20,171	329,501	433,561	195,630		958,691
2019	342,741	434,769	200,260	977,770	1,043	0	13,981	18,411	2,081	34,474	13,835	6,790	20,625	356,722	468,059	209,131		1,033,912
2020	371,586	471,029	214,543	1,057,157	1,043	0	14,409	18,831	2,143	35,383	14,190	6,901	21,090	385,994	505,092	223,587		1,114,673
2021	400,132	506,996	228,738	1,135,867	1,043	0	14,849	19,260	2,207	36,316	14,470	6,957	21,427	414,982	541,770	237,902		1,194,653
2022	430,687	545,449	243,872	1,220,007	1,043	0	15,303	19,700	2,272	37,275	14,755	7,014	21,769	445,990	580,946	253,158		1,280,094
2023	463,384	586,553	260,005	1,309,942	1,043	0	15,771	20,149	2,340	38,260	15,045	7,072	22,117	479,155	622,790	269,417		1,371,362
2024	498,370	630,486	277,204	1,406,060	1,043	0	16,253	20,608	2,409	39,271	15,340	7,132	22,472	514,623	667,477	286,746		1,468,846
2025	535,799	677,438	295,540	1,508,777	1,043	0	16,750	21,078	2,481	40,309	15,640	7,194	22,834	552,550	715,199	305,215		1,572,963
2026	576,977	728,473	315,091	1,620,541	1,043	0	17,118	21,415	2,545	41,078	16,068	7,293	23,361	594,095	766,999	324,929		1,686,022
2027	621,000	782,976	335,934	1,739,910	1,043	0	17,494	21,758	2,610	41,861	16,507	7,394	23,901	638,493	822,283	345,938		1,806,715
2028	668,058	841,180	358,154	1,867,392	1,043	0	17,877	22,105	2,677	42,660	16,956	7,498	24,454	685,936	881,284	368,329		1,935,548
2029	718,356	903,329	381,842	2,003,527	1,043	0	18,270	22,459	2,745	43,474	17,415	7,604	25,019	736,626	944,246	392,191		2,073,063
2030	772,110	969,687	407,094	2,148,891	1,043	0	18,671	22,818	2,816	44,304	17,885	7,712	25,598	790,781	1,011,433	417,622		2,219,836

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HIGH CASE

Year	Land Transportation (m3/year) SW Uganda	Rwanda	Burundi	Total	Power Sector Diesel Rwanda	Backup Generation Diesel Burundi	Kerosene Demand (m3) SW Uganda	Rwanda	Burundi	Total	Aviation - Jet Fuel Demand Rwanda	Burundi	Total	Total White Oil Demand SW Uganda	Rwanda	Burundi	NW Tanzania	Total
2004	98,398	106,765	66,553	271,716	980		10,855	16,327	921	28,102		8,681		109,252		76,154		
2005	96,895	112,505	73,872	283,272	13,158		8,764	13,036	1,252	23,052		8,228		105,659		83,352		
2006	105,186	125,394	77,221	307,801	34,140	8,239	9,437	13,452	1,516	24,406	9,201	7,746	16,947	114,623	182,189	94,723	0	391,534
2007	122,350	147,076	85,012	354,438	46,185	7,324	9,592	13,602	1,425	24,618	10,045	6,716	16,761	131,942	216,908	100,476	0	449,327
2008	134,399	176,032	93,831	404,262	34,015	6,408	9,937	13,848	1,453	25,238	10,950	6,419	17,369	144,336	234,844	108,112	0	487,292
2009	154,608	209,234	103,919	467,761	4,171	5,493	10,261	14,238	1,504	26,003	11,920	6,636	18,556	164,869	239,564	117,551	0	521,984
2010	177,170	254,369	115,087	546,626	1,043	4,578	10,595	14,640	1,557	26,791	13,280	6,879	20,159	187,764	283,331	128,101	0	599,197
2011	202,341	290,894	127,453	620,687	1,043	3,662	10,940	15,052	1,612	27,604	14,189	7,281	21,471	213,281	321,178	140,008	0	674,467
2012	230,408	331,679	141,143	703,230	1,043	2,747	11,296	15,477	1,669	28,442	15,152	7,687	22,839	241,704	363,350	153,246	1,200	759,500
2013	261,687	377,203	156,300	795,190	1,043	1,832	11,664	15,913	1,727	29,305	16,170	8,096	24,266	273,351	410,329	167,955	1,200	852,835
2014	296,529	427,997	173,081	897,608	1,043	916	12,044	16,362	1,788	30,194	17,248	8,508	25,756	308,573	462,650	184,294	1,200	956,717
2015	335,648	484,653	191,660	1,011,961	1,043	1	12,395	16,823	1,851	31,069	18,388	8,924	27,311	348,043	520,907	202,436	1,200	1,072,586
2016	379,027	547,827	212,233	1,139,087	1,043	0	12,774	17,207	1,906	31,887	19,594	9,342	28,936	391,801	585,671	223,481	1,200	1,202,153
2017	427,276	618,249	235,009	1,280,534	1,043	0	13,164	17,599	1,963	32,726	20,870	9,763	30,633	440,440	657,761	246,735	1,200	1,346,136
2018	480,922	696,729	260,225	1,437,876	1,043	0	13,567	18,001	2,021	33,588	22,220	10,188	32,408	494,489	737,993	272,433	1,200	1,506,115
2019	540,551	784,169	288,140	1,612,860	1,043	0	13,981	18,411	2,081	34,474	23,649	10,614	34,263	554,532	827,271	300,836	1,200	1,683,839
2020	606,810	881,569	319,045	1,807,424	1,043	0	14,409	18,831	2,143	35,383	25,160	11,044	36,204	621,219	937,567	332,232	1,200	1,892,218
2021	665,649	965,577	346,698	1,977,923	1,043	0	14,849	19,260	2,207	36,316	26,162	11,387	37,550	680,498	1,023,007	360,292	1,200	2,064,997
2022	729,771	1,057,028	376,745	2,163,544	1,043	0	15,303	19,700	2,272	37,275	27,201	11,743	38,944	745,075	1,115,936	390,759	1,200	2,252,970
2023	799,641	1,156,570	409,392	2,365,603	1,043	0	15,771	20,149	2,340	38,260	28,278	12,110	40,387	815,412	1,217,004	423,842	1,200	2,457,457
2024	875,760	1,264,908	444,865	2,585,534	1,043	0	16,253	20,608	2,409	39,271	29,393	12,489	41,882	892,013	1,326,917	459,764	1,200	2,679,894
2025	958,676	1,382,806	483,409	2,824,891	1,043	0	16,750	21,078	2,481	40,309	30,549	12,881	43,430	975,426	1,446,441	498,770	1,200	2,921,838
2026	1,050,122	1,512,025	525,293	3,087,439	1,043	0	17,118	21,415	2,545	41,078	31,977	13,345	45,322	1,067,240	1,577,424	541,183	1,200	3,187,046
2027	1,149,665	1,652,574	570,802	3,373,040	1,043	0	17,494	21,758	2,610	41,861	33,466	13,827	47,293	1,167,158	1,719,804	587,238	1,200	3,475,401
2028	1,258,009	1,805,436	620,249	3,683,694	1,043	0	17,877	22,105	2,677	42,660	35,020	14,326	49,346	1,275,887	1,874,568	637,252	1,200	3,788,907
2029	1,375,921	1,971,680	673,975	4,021,576	1,043	0	18,270	22,459	2,745	43,474	36,640	14,844	51,484	1,394,191	2,042,787	691,564	1,200	4,129,741
2030	1,504,232	2,152,465	732,350	4,389,047	1,043	0	18,671	22,818	2,816	44,304	38,332	15,380	53,711	1,522,902	2,225,622	750,546	1,200	4,500,270

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HIGH CASE

Project Specific Demand - Diesel

Year	NW Tanzania-Kabanga Mine	Isaka-Kigali Railroad	Total
2004			
2005			
2006			
2007			
2008			
2009			
2010			
2011			
2012	1,200		1,200
2013	1,200		1,200
2014	1,200		1,200
2015	1,200		1,200
2016	1,200		1,200
2017	1,200		1,200
2018	1,200		1,200
2019	1,200		1,200
2020	1,200	10,964	12,164
2021	1,200	10,964	12,164
2022	1,200	10,964	12,164
2023	1,200	10,964	12,164
2024	1,200	10,964	12,164
2025	1,200	10,964	12,164
2026	1,200	10,964	12,164
2027	1,200	10,964	12,164
2028	1,200	10,964	12,164
2029	1,200	10,964	12,164
2030	1,200	10,964	12,164

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Appendix C - Projected Annual Economic and Population Growth

Sources for all tables in Appendix C, except Rwanda High Case: For years 2004 – 2008, IMF WEO, April 2007. For years 2009-2030, SAIC. For Rwanda High Case, economic growth rates were derived from Rwanda's Vision 2020 document, 2004, Kabuye version, assuming annual U.S. dollar inflation of 2.5%.

BASE CASE – RWANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	220	1.89	8.6			
2005	238	2.15	9.0	8.2%	13.9%	5.2%
2006	253	2.33	9.2	6.3%	8.2%	1.8%
2007	272	2.54	9.4	7.3%	9.2%	1.8%
2008	290	2.76	9.5	6.6%	8.5%	1.8%
2009	299	2.93	9.8	3.1%	6.0%	2.8%
2010	308	3.10	10.1	3.1%	6.0%	2.8%
2011	317	3.29	10.4	3.1%	6.0%	2.8%
2012	327	3.49	10.7	3.1%	6.0%	2.8%
2013	337	3.70	11.0	3.1%	6.0%	2.8%
2014	348	3.92	11.3	3.1%	6.0%	2.8%
2015	358	4.15	11.6	3.1%	6.0%	2.8%
2016	371	4.40	11.8	3.6%	6.0%	2.3%
2017	385	4.66	12.1	3.6%	6.0%	2.3%
2018	399	4.94	12.4	3.6%	6.0%	2.3%
2019	413	5.24	12.7	3.6%	6.0%	2.3%
2020	428	5.56	13.0	3.6%	6.0%	2.3%
2021	444	5.89	13.3	3.6%	6.0%	2.3%
2022	460	6.24	13.6	3.6%	6.0%	2.3%
2023	477	6.62	13.9	3.6%	6.0%	2.3%
2024	494	7.01	14.2	3.6%	6.0%	2.3%
2025	512	7.44	14.5	3.6%	6.0%	2.3%
2026	534	7.88	14.7	4.3%	6.0%	1.6%
2027	558	8.35	15.0	4.3%	6.0%	1.6%
2028	582	8.86	15.2	4.3%	6.0%	1.6%
2029	607	9.39	15.5	4.3%	6.0%	1.6%
2030	633	9.95	15.7	4.3%	6.0%	1.6%

HIGH CASE – RWANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	220	1.89	8.6			
2005	249	2.15	8.7	13.1%	13.9%	0.7%
2006	260	2.33	8.9	4.7%	8.2%	3.4%
2007	279	2.58	9.2	7.3%	10.9%	3.4%
2008	300	2.86	9.5	7.3%	10.9%	3.4%
2009	322	3.17	9.9	7.3%	10.9%	3.4%
2010	352	3.59	10.2	9.5%	13.2%	3.4%
2011	372	3.89	10.5	5.8%	8.4%	2.5%
2012	394	4.22	10.7	5.8%	8.4%	2.5%
2013	417	4.57	11.0	5.8%	8.4%	2.5%
2014	441	4.96	11.2	5.8%	8.4%	2.5%
2015	467	5.37	11.5	5.8%	8.4%	2.5%
2016	494	5.83	11.8	5.8%	8.4%	2.5%
2017	522	6.32	12.1	5.8%	8.4%	2.5%
2018	553	6.85	12.4	5.8%	8.4%	2.5%
2019	585	7.42	12.7	5.8%	8.4%	2.5%
2020	619	8.04	13.0	5.8%	8.4%	2.5%
2021	641	8.53	13.3	3.6%	6.0%	2.3%
2022	665	9.04	13.6	3.6%	6.0%	2.3%
2023	689	9.58	13.9	3.6%	6.0%	2.3%
2024	714	10.16	14.2	3.6%	6.0%	2.3%
2025	740	10.77	14.6	3.6%	6.0%	2.3%
2026	772	11.41	14.8	4.3%	6.0%	1.6%
2027	805	12.10	15.0	4.3%	6.0%	1.6%
2028	840	12.82	15.3	4.3%	6.0%	1.6%
2029	877	13.59	15.5	4.3%	6.0%	1.6%
2030	915	14.41	15.8	4.3%	6.0%	1.6%

LOW CASE – RWANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	220	1.89	8.6			
2005	238	2.15	9.0	8.2%	13.9%	5.2%
2006	253	2.33	9.2	6.3%	8.2%	1.8%
2007	272	2.54	9.4	7.3%	9.2%	1.8%
2008	290	2.76	9.5	6.6%	8.5%	1.8%
2009	294	2.89	9.8	1.6%	4.5%	2.8%
2010	299	3.02	10.1	1.6%	4.5%	2.8%
2011	304	3.15	10.4	1.6%	4.5%	2.8%
2012	309	3.29	10.7	1.6%	4.5%	2.8%
2013	314	3.44	11.0	1.6%	4.5%	2.8%
2014	319	3.60	11.3	1.6%	4.5%	2.8%
2015	324	3.76	11.6	1.6%	4.5%	2.8%
2016	331	3.93	11.8	2.2%	4.5%	2.3%
2017	339	4.10	12.1	2.2%	4.5%	2.3%
2018	346	4.29	12.4	2.2%	4.5%	2.3%
2019	353	4.48	12.7	2.2%	4.5%	2.3%
2020	361	4.68	13.0	2.2%	4.5%	2.3%
2021	367	4.87	13.3	1.7%	4.0%	2.3%
2022	373	5.06	13.6	1.7%	4.0%	2.3%
2023	380	5.27	13.9	1.7%	4.0%	2.3%
2024	386	5.48	14.2	1.7%	4.0%	2.3%
2025	393	5.70	14.5	1.7%	4.0%	2.3%
2026	402	5.92	14.7	2.4%	4.0%	1.6%
2027	411	6.16	15.0	2.4%	4.0%	1.6%
2028	421	6.41	15.2	2.4%	4.0%	1.6%
2029	431	6.66	15.5	2.4%	4.0%	1.6%
2030	441	6.93	15.7	2.4%	4.0%	1.6%

BASE CASE – UGANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	252	7.02	27.8			
2005	303	8.73	28.8	20.1%	24.4%	3.6%
2006	307	9.17	29.9	1.4%	5.0%	3.6%
2007	322	9.94	30.9	4.6%	8.4%	3.6%
2008	325	10.43	32.0	1.2%	4.8%	3.6%
2009	334	11.05	33.1	2.7%	6.0%	3.3%
2010	343	11.71	34.2	2.7%	6.0%	3.3%
2011	352	12.42	35.3	2.7%	6.0%	3.3%
2012	361	13.16	36.4	2.7%	6.0%	3.3%
2013	371	13.95	37.6	2.7%	6.0%	3.3%
2014	381	14.79	38.8	2.7%	6.0%	3.3%
2015	392	15.68	40.0	3.0%	6.0%	2.9%
2016	403	16.62	41.2	2.9%	6.0%	3.1%
2017	415	17.61	42.4	2.9%	6.0%	3.1%
2018	427	18.67	43.7	2.9%	6.0%	3.1%
2019	439	19.79	45.1	2.9%	6.0%	3.1%
2020	452	20.98	46.5	2.9%	6.0%	3.1%
2021	464	22.24	47.9	2.9%	6.0%	3.1%
2022	478	23.57	49.3	2.9%	6.0%	3.1%
2023	491	24.99	50.9	2.9%	6.0%	3.1%
2024	505	26.49	52.4	2.9%	6.0%	3.1%
2025	520	28.07	54.0	2.9%	6.0%	3.1%
2026	539	29.76	55.2	3.7%	6.0%	2.2%
2027	559	31.54	56.4	3.7%	6.0%	2.2%
2028	580	33.44	57.6	3.7%	6.0%	2.2%
2029	602	35.44	58.9	3.7%	6.0%	2.2%
2030	624	37.57	60.2	3.7%	6.0%	2.2%

HIGH CASE – UGANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	252	7.02	27.8			
2005	303	8.73	28.8	20.1%	24.4%	3.6%
2006	307	9.17	29.9	1.4%	5.0%	3.6%
2007	322	9.94	30.9	4.6%	8.4%	3.6%
2008	325	10.43	32.0	1.2%	4.8%	3.6%
2009	340	11.26	33.1	4.6%	8.0%	3.3%
2010	356	12.16	34.2	4.6%	8.0%	3.3%
2011	372	13.13	35.3	4.6%	8.0%	3.3%
2012	389	14.18	36.4	4.6%	8.0%	3.3%
2013	407	15.32	37.6	4.6%	8.0%	3.3%
2014	426	16.54	38.8	4.6%	8.0%	3.3%
2015	447	17.87	40.0	4.9%	8.0%	2.9%
2016	469	19.30	41.2	4.8%	8.0%	3.1%
2017	491	20.84	42.4	4.8%	8.0%	3.1%
2018	515	22.51	43.7	4.8%	8.0%	3.1%
2019	539	24.31	45.1	4.8%	8.0%	3.1%
2020	565	26.25	46.5	4.8%	8.0%	3.1%
2021	581	27.83	47.9	2.9%	6.0%	3.1%
2022	598	29.50	49.3	2.9%	6.0%	3.1%
2023	615	31.27	50.9	2.9%	6.0%	3.1%
2024	632	33.15	52.4	2.9%	6.0%	3.1%
2025	651	35.13	54.0	2.9%	6.0%	3.1%
2026	675	37.24	55.2	3.7%	6.0%	2.2%
2027	700	39.48	56.4	3.7%	6.0%	2.2%
2028	726	41.85	57.6	3.7%	6.0%	2.2%
2029	753	44.36	58.9	3.7%	6.0%	2.2%
2030	781	47.02	60.2	3.7%	6.0%	2.2%

LOW CASE – UGANDA (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	252	7.02	27.8			
2005	303	8.73	28.8	20.1%	24.4%	3.6%
2006	307	9.17	29.9	1.4%	5.0%	3.6%
2007	322	9.94	30.9	4.6%	8.4%	3.6%
2008	325	10.43	32.0	1.2%	4.8%	3.6%
2009	329	10.90	33.1	1.2%	4.5%	3.3%
2010	333	11.39	34.2	1.2%	4.5%	3.3%
2011	337	11.90	35.3	1.2%	4.5%	3.3%
2012	341	12.43	36.4	1.2%	4.5%	3.3%
2013	345	12.99	37.6	1.2%	4.5%	3.3%
2014	350	13.58	38.8	1.2%	4.5%	3.3%
2015	355	14.19	40.0	1.5%	4.5%	2.9%
2016	360	14.83	41.2	1.4%	4.5%	3.1%
2017	365	15.49	42.4	1.4%	4.5%	3.1%
2018	370	16.19	43.7	1.4%	4.5%	3.1%
2019	375	16.92	45.1	1.4%	4.5%	3.1%
2020	381	17.68	46.5	1.4%	4.5%	3.1%
2021	384	18.39	47.9	0.9%	4.0%	3.1%
2022	388	19.12	49.3	0.9%	4.0%	3.1%
2023	391	19.89	50.9	0.9%	4.0%	3.1%
2024	395	20.68	52.4	0.9%	4.0%	3.1%
2025	398	21.51	54.0	0.9%	4.0%	3.1%
2026	405	22.37	55.2	1.8%	4.0%	2.2%
2027	412	23.27	56.4	1.8%	4.0%	2.2%
2028	420	24.20	57.6	1.8%	4.0%	2.2%
2029	427	25.17	58.9	1.8%	4.0%	2.2%
2030	435	26.17	60.2	1.8%	4.0%	2.2%

BASE CASE – BURUNDI (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	93	0.68	7.3			
2005	107	0.80	7.5	14.8%	17.1%	2.0%
2006	115	0.88	7.6	8.0%	10.1%	2.0%
2007	121	0.95	7.8	5.2%	7.3%	2.0%
2008	128	1.02	7.9	5.5%	7.6%	2.0%
2009	133	1.10	8.2	4.0%	7.6%	3.5%
2010	139	1.18	8.5	4.0%	7.6%	3.5%
2011	144	1.27	8.8	4.0%	7.6%	3.5%
2012	147	1.35	9.1	2.4%	6.0%	3.5%
2013	151	1.43	9.5	2.4%	6.0%	3.5%
2014	155	1.51	9.8	2.4%	6.0%	3.5%
2015	158	1.60	10.1	2.4%	6.0%	3.5%
2016	163	1.70	10.4	2.9%	6.0%	3.0%
2017	168	1.80	10.7	2.9%	6.0%	3.0%
2018	173	1.91	11.1	2.9%	6.0%	3.0%
2019	178	2.02	11.4	2.9%	6.0%	3.0%
2020	183	2.15	11.7	2.9%	6.0%	3.0%
2021	188	2.27	12.1	2.9%	6.0%	3.0%
2022	194	2.41	12.4	2.9%	6.0%	3.0%
2023	200	2.56	12.8	2.9%	6.0%	3.0%
2024	206	2.71	13.2	2.9%	6.0%	3.0%
2025	212	2.87	13.6	2.9%	6.0%	3.0%
2026	219	3.04	13.9	3.4%	6.0%	2.6%
2027	226	3.23	14.3	3.4%	6.0%	2.6%
2028	234	3.42	14.6	3.4%	6.0%	2.6%
2029	241	3.63	15.0	3.4%	6.0%	2.6%
2030	249	3.84	15.4	3.4%	6.0%	2.6%

HIGH CASE – BURUNDI (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	93	0.68	7.3			
2005	107	0.80	7.5	14.8%	17.1%	2.0%
2006	115	0.88	7.6	8.0%	10.1%	2.0%
2007	121	0.95	7.8	5.2%	7.3%	2.0%
2008	128	1.02	7.9	5.5%	7.6%	2.0%
2009	134	1.10	8.2	4.3%	8.0%	3.5%
2010	140	1.19	8.5	4.3%	8.0%	3.5%
2011	146	1.28	8.8	4.3%	8.0%	3.5%
2012	152	1.39	9.1	4.3%	8.0%	3.5%
2013	158	1.50	9.5	4.3%	8.0%	3.5%
2014	165	1.62	9.8	4.3%	8.0%	3.5%
2015	172	1.75	10.1	4.3%	8.0%	3.5%
2016	181	1.89	10.4	4.9%	8.0%	3.0%
2017	190	2.04	10.7	4.9%	8.0%	3.0%
2018	199	2.20	11.1	4.9%	8.0%	3.0%
2019	209	2.38	11.4	4.9%	8.0%	3.0%
2020	219	2.57	11.7	4.9%	8.0%	3.0%
2021	225	2.72	12.1	2.9%	6.0%	3.0%
2022	232	2.88	12.4	2.9%	6.0%	3.0%
2023	239	3.06	12.8	2.9%	6.0%	3.0%
2024	246	3.24	13.2	2.9%	6.0%	3.0%
2025	253	3.43	13.6	2.9%	6.0%	3.0%
2026	261	3.64	13.9	3.4%	6.0%	2.6%
2027	270	3.86	14.3	3.4%	6.0%	2.6%
2028	279	4.09	14.6	3.4%	6.0%	2.6%
2029	289	4.34	15.0	3.4%	6.0%	2.6%
2030	298	4.60	15.4	3.4%	6.0%	2.6%

LOW CASE – BURUNDI (Real 2005$)

Year	GDP/cap $	$ GDP (bn)	Population (million)	GDP/cap Growth %	GDP Growth %	Population Growth %
2004	93	0.68	7.3			
2005	107	0.80	7.5	14.8%	17.1%	2.0%
2006	115	0.88	7.6	8.0%	10.1%	2.0%
2007	121	0.95	7.8	5.2%	7.3%	2.0%
2008	128	1.02	7.9	5.5%	7.6%	2.0%
2009	129	1.06	8.2	0.9%	4.5%	3.5%
2010	131	1.11	8.5	0.9%	4.5%	3.5%
2011	132	1.16	8.8	0.9%	4.5%	3.5%
2012	133	1.22	9.1	0.9%	4.5%	3.5%
2013	134	1.27	9.5	0.9%	4.5%	3.5%
2014	136	1.33	9.8	0.9%	4.5%	3.5%
2015	137	1.39	10.1	0.9%	4.5%	3.5%
2016	139	1.45	10.4	1.5%	4.5%	3.0%
2017	141	1.51	10.7	1.5%	4.5%	3.0%
2018	143	1.58	11.1	1.5%	4.5%	3.0%
2019	145	1.65	11.4	1.5%	4.5%	3.0%
2020	147	1.73	11.7	1.5%	4.5%	3.0%
2021	149	1.80	12.1	1.0%	4.0%	3.0%
2022	150	1.87	12.4	1.0%	4.0%	3.0%
2023	152	1.94	12.8	1.0%	4.0%	3.0%
2024	153	2.02	13.2	1.0%	4.0%	3.0%
2025	155	2.10	13.6	1.0%	4.0%	3.0%
2026	157	2.19	13.9	1.4%	4.0%	2.6%
2027	159	2.27	14.3	1.4%	4.0%	2.6%
2028	162	2.37	14.6	1.4%	4.0%	2.6%
2029	164	2.46	15.0	1.4%	4.0%	2.6%
2030	166	2.56	15.4	1.4%	4.0%	2.6%

Appendix D - Bibliography

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Appendix E - Terms of Reference

Annex I

Terms of Reference

Introduction

The objective of this feasibility study ("Study") is to conduct a Market Analysis for oil products in Rwanda and Burundi ("Host Countries"). To conduct this Study, the Ministry of Infrastructure of Rwanda ("Grantee") would be responsible for forming a Technical Steering Committee ("Steering Committee"), composed of at a minimum, members of the Governments of Uganda, Rwanda, and Burundi, and potentially representatives of the Government of Kenya and the Kenya Pipeline Company. The Rwanda-Burundi Pipeline Capacity Market Analysis Phase I Project ("Project") would form the first part of a possible two-phase feasibility study with the ultimate objective to establish the feasibility of extending an oil pipeline from Kampala to Kigali, and from Kigali to Bujumbura.

Task 1: Project Kick-Off Meeting

The Contractor shall travel to Kigali to meet with the representative government officials of the Steering Committee to review and discuss the basis for the Project. At this time, the Contractor will collect any documentation made available by the Steering Committee required for the market analysis of the Project. The Contractor shall develop a timeline for carrying out the Study with the Steering Committee and provide a schedule for any deliverables.

Task 2: Review Existing Kenya – Uganda Pipeline and Uganda Oil Exploration

The Contractor shall meet with representatives of the Kenya–Uganda Pipeline to gain an understanding of the following:

- Current operation characteristics;
- Products handled;
- Cross country coordination;
- Maintenance practices;
- Tank farm capability;
- Pipeline capacity and utilization;
- Capacity available for Kampala-Kigali Pipeline Extension; and the Kigali-Bujumbura Pipeline Extension;
- Project Financials; and
- Legal/ Regulatory Requirements of the project and related documentation required for project implementation.

The Grantee shall provide all past feasibility studies for pipeline projects in Uganda, Rwanda, and Burundi, existing topographical data (maps, surveys, aerial photos, etc.), soil borings/analysis, and seismic studies.

Annex I-1

The Contractor shall travel to Kampala to review all available reports and data concerning the status of oil exploration in Uganda and potential plans for the Government of Uganda to promote building of an oil refinery there. The Contractor shall assess what impacts, if any, exploitation of Ugandan oil reserves and local refining capacity could have on the market for oils products in Rwanda and Burundi and on the extension of the oil pipeline from Uganda to Rwanda and onwards to Burundi.

Task 3: Pipeline Capacity Determination

The Contractor shall carry out market evaluations and demand forecasts through a survey of existing consumptions patterns and collection of data on the existing market for oil products in Rwanda, Burundi and the surrounding region that would likely serve as the market for the pipeline products, including Southern Uganda, North-West Tanzania, and Eastern Democratic Republic of Congo. The Contractor shall be prepared to conduct an "on-the-ground" market analysis—in Rwanda and Burundi—if formal data is not readily available. Based on the historical data, a 10-year forecast of future demands for the oil products in the region, commensurate with alternative growth scenarios of the economies of the region, shall be prepared. An estimate shall also be made of other current and future alternative sources and transportation routes of these oil products in the region. The forecast quantities shall be compared to the capacity available in the Kenya-Uganda Pipeline. The Contractor shall then recommend an appropriate capacity for the Kampala-Kigali Pipeline and the Kigali-Bujumbura Pipeline. This capacity determination will be used as an input for the Phase II Study, if such Phase II study occurs.

Note: The Contractor is advised that significant uncertainty exists in projecting the demand for oil products in Rwanda. As an example, currently, Cimerwa (cement plant) accounts for a large share of Rwanda's overall oil consumption. Future production plans may double the oil use at Cimerwa. Rwanda is also exploring development of the Lake Kivu methane deposits which if successful could be used in place of oil at Cimerwa. In such instances, the Contractor, through review of relevant documentation and discussion with all interested parties, shall make best efforts to determine the most probable baseline scenario.

Tasks 2 and 3 Deliverable: The Contractor shall provide an interim report to the Steering Committee regarding the Contractor's findings for Tasks 2 and 3. The Steering Committee will provide any comments or suggestions regarding the findings to the Contractor within two (2) weeks of the Contractor's delivery, which the Contractor shall incorporate into the remainder of the Study and the Final Report.

Task 4: Proposed Equipment and Services

The Contractor shall prepare a list of potential equipment and services required for the Project including potential U.S. sources of supply in accordance with Clause I of Annex II of the Grant Agreement. Business name, point of contact, address, telephone, e-mail, and fax numbers shall be included for each source.

Task 5: Development Impact

The Contractor shall report on the potential development impact of the Project in Rwanda, Burundi and Uganda ("Beneficiary Countries"). The Contractor shall focus on what the economic development outcomes will be if the Project is implemented according to the Study recommendations. While specific focus should be paid to the immediate impact of the Project, the Contractor shall include, where appropriate, any additional developmental benefits to the Project, including spin-off and demonstration effects. The Contractor's analysis of potential benefits should be as concrete and detailed as possible. The development impact factors are intended to provide the Project's decision-makers and interested parties with a broader view of the Project's potential effects on the Beneficiary Countries. The Contractor will provide estimates of the Project's potential benefits in the following areas:

(a) Infrastructure / Industry. The Contractor shall provide a statement on the infrastructure impact giving a brief synopsis.

(b) Market-Oriented Reforms. The Contractor shall provide a description of any regulation, laws, or institutional changes that are recommended and the effect they would have if implemented.

(c) Human Capacity Building. The Contractor shall address the number and type of positions that would be needed to construct and operate the proposed Project. The Contractor shall estimate the number of people who will receive training and briefly describe the training program.

(d) Technology Transfer and Productivity Enhancement. The Contractor shall provide a description of any advanced technologies that will be implemented as a result of the Project. A quantitative description of any efficiency that will be gained.

(e) Other. The Contractor shall identify any other developmental benefits of the Project, including any spin-off or demonstration effects.

Task 6: Dissemination Workshop

The Contractor shall travel to Kigali to present the Study findings to the Steering Committee. All attendees will bear their own costs of travel to the workshop. A meeting place and refreshements shall be provided by the Grantee.

Task 7: Final Report

The Contractor shall ensure that the Final Report is submitted in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in the

Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of the Terms of Reference shall form a separate chapter of the Final Report.

The Final Report shall also include a comprehensive list of U.S. suppliers, including potential sources of U.S. equipment and services, relevant to the implementation of each component of the Projects as outlined in the Study.

The Contractor shall submit the Final Report in English. The Contractor shall provide five (5) hard copies and one (1) electronic version of both the confidential and public versions of the Final Report to the Grantee and shall provide copies to USTDA in accordance with Clause 1 of Annex II of the Grant Agreement. In addition, the Contractor shall provide copies to USAID to the Office of Assistant Administrator, Bureau for Africa, and to the Africa Global Competitiveness Initiative (AGCI) Coordinator.

Notes:

1. The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of these Terms of Reference.

2. The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.

3. The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work products that are developed under these Terms of Reference.

Annex I-4