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**ASSESSING INFRASTRUCTURE CONSTRAINTS ON
BUSINESS ACTIVITY IN BLANTYRE, MALAWI**

Zaki Raheem

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Editor-in-Chief: Dr. Karl P. Sauvant, Co-Director, Millennium Cities Initiative, and Executive Director, Vale Columbia Center on Sustainable International Investment: karl.sauvant@law.columbia.edu
Editor: Joerg Simon, Senior Investment Advisor, Millennium Cities Initiative: jks2149@columbia.edu
Managing Editor: Paulo Cunha, Coordinator, Millennium Cities Initiative: pmc2105@columbia.edu

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As part of this effort, MCI helps the Cities to create employment, stimulate enterprise development and foster economic growth, especially by stimulating domestic and foreign investment, to eradicate extreme poverty – the first and most fundamental MDG. This effort rests on three pillars: (i) the preparation of various materials to inform foreign investors about the regulatory framework for investment and commercially viable investment opportunities; (ii) the dissemination of the various materials to potential investors, such as through investors’ missions and roundtables, and Millennium Cities Investors’ Guides; and (iii) capacity building in the Cities to attract and work with investors.

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ACRONYMS

AGOA-	-	-	-	-	African Growth and Opportunity Act
EIA	-	-	-	-	Environmental Impact Assessment
ESCOM	-	-	-	-	Electricity Supply Corporation of Malawi
Forex	-	-	-	-	Foreign exchange
MCI	-	-	-	-	Millennium Cities Initiative
MERA	-	-	-	-	Malawi Energy Regulatory Authority
MIPA	-	-	-	-	Malawi Investment Promotion Agency
PPP	-	-	-	-	Public-private partnership
SADC	-	-	-	-	Southern African Development Community
SAPP	-	-	-	-	Southern Africa Power Pool
SME	-	-	-	-	Small and Medium Enterprises
UNIDO	-	-	-	-	United Nations Industrial Development Organization

Assessing Infrastructure Constraints on Business Activity in Blantyre, Malawi

Zaki Raheem¹

EXECUTIVE SUMMARY

Infrastructure is inextricably linked to the wellbeing of a city's commerce and people. Poor roads can delay the supply and delivery of goods to customers, and prevent workers from reaching their jobs. Water interruptions can prevent manufacturing facilities from working at full capacity and mothers from washing children's clothes for school. Electricity shortages can prevent restaurants from operating at night and endanger women walking home from work after dark. Thus, an analysis of infrastructure constraints must account for the political and financial realities placed on businesses and the cultural and socio-economic impact on workers, their families and society at large.

In Blantyre, Malawi, population and economic growth are placing great stress on the city's infrastructure systems. As Malawi's industrial capital, long-term improvements to Blantyre's infrastructure are necessary to generate employment, strengthen rural-urban market linkages, and improve the regional and global competitiveness of the city's industries.

This study shows that the cost and inefficiency of transporting goods internationally is the greatest infrastructure constraint on business activity in Blantyre. As a landlocked country, Malawi faces high transport costs that are a serious impediment to trade. Thus, there is great need to reduce the price and time it takes to transport goods to, from and within Malawi to ensure that the country's main industries (a majority of which have branches or are headquartered in Blantyre) can compete internationally.

The high cost and unreliability of electricity was ranked by the city's businesses as the second most significant infrastructure constraint on business. Smaller businesses located on the outskirts of the city face even greater struggles with respect to electricity.

Along with the cost and reliability of electricity, security ranks as the second largest infrastructure constraint on businesses in Blantyre. Malawi has been relatively politically stable since independence in 1964, and the transition from one-party rule to a multi-party democracy was largely peaceful. In recent years, the country has not experienced any major political instability. However, security concerns, particularly in the form of petty theft, are a major problem for both small and large enterprises throughout Malawi. And because thieves often target transformers, water meters, diesel fuel and warehouse inventory, theft inevitably impacts other infrastructure costs of doing business.

Finally, an unreliable and expensive telecommunications network ranked as the third largest infrastructure constraint to business activity in Blantyre. Most local businesses use both landlines and mobile phones, but find the latter to be more efficient and convenient for business purposes. Half of the businesses surveyed use mobile phones as their main form of communication with suppliers and customers. However, many of the businesses suggested that by allowing greater

¹ The author can be reached at zakiraheem@gmail.com. The author would like to thank The Earth Institute at Columbia University and the Millennium Cities Initiative staff; Umesh Menon; the Malawi Investment Promotion Agency; Ginger Baker; and especially Shalom Konyani for her support and generosity.

competition among cell phone providers, the Government has sacrificed quality and service. Respondents felt that the two major cell phone companies in Blantyre have been allowed to over-subscribe customers, and that the Government should play a greater role in ensuring better service and standards.

In addition, the study highlights the different set of regulatory and investment challenges faced by local and foreign businesses. It provides an overview of several current infrastructure projects and highlights a number of innovative investment opportunities in Blantyre. Finally, the study takes a close look at the additional burdens that smaller businesses face in comparison to their larger competitors. The particular challenges faced by small and medium-sized enterprises must be addressed.

Box 1 – Main Infrastructure Constraints on Businesses in Blantyre, Malawi

Primary

- Cost and inefficiency of transport of goods internationally.

Secondary

- Cost and unreliability of electricity connection.
- Security concerns, particularly regarding frequent petty theft.

Tertiary

- Unreliable and expensive telecommunications network.

Box 2 - Investments and Constraints

Investment Opportunity

- Expansion of electricity capacity:
 - o Upgrade Blantyre electricity grid;
 - o Invest in Lower Fufu Hydropower Plant;
 - o Connect to Southern African Power Pool.
- Improve rail and river transport network from Malawi, through Mozambique to the ports of Beira and Nacala.
- Renewable energy sector:
 - o Expand solar panel manufacturing and/or importation;
 - o Research low-cost biofuel options for improved cooking and lighting technology.
- Renewable water provision:
 - o Invest in rainwater harvesting.
- Recycling business:
 - o Invest in plastics recycling facilities.

Constraint Addressed

- More reliable electricity to meet present and future demand and eliminate load shedding.
- Enhance sustainable energy options that reduce reliability on electricity grid and encourage a shift away from wood/charcoal.
- Ensure more reliable water sources, reduce strain on Blantyre Water Board, and lower electricity demands needed to pump water from Shire River.
- Waste collection could create employment, and generate sustainable returns as a catalyst for further

private investment in recycling.

1. INTRODUCTION & PURPOSE

1.1. MCI Background

In 2000, 189 countries adopted the Millennium Declaration, which established the Millennium Development Goals (MDGs). The Earth Institute's Millennium Cities Initiative (MCI) assists nine mid-sized cities across sub-Saharan Africa in achieving these goals by 2015. The MCI is an urban counterpart to the Millennium Village Project (MVP), which helps strengthen farm-to-market linkages to enable farmers to transition from subsistence farming to commercial agriculture and non-agriculture activities. As part of these efforts, MCI concentrates on impacting foreign direct investment (FDI) to engender a climate in which foreign investment can thrive – creating employment, stimulating domestic enterprise development and fostering economic growth.

MCI also helps the nine Millennium Cities conduct needs assessments in a number of social sectors – health, education, gender, water and sanitation, transportation, energy and infrastructure – in order to generate integrated development strategies for each city.

1.2. Objectives

The primary objective of this study is to assess current infrastructure constraints to business activity in greater Blantyre and to better understand how infrastructure impacts such activity. Greater Blantyre includes the city center, the neighboring commercial sister city of Limbe, and the industrial sites located on the outskirts of town. By understanding the infrastructure costs of doing business, this study seeks to highlight opportunities for infrastructure investment that could enable existing and emerging businesses to expand, generate more employment, enhance rural-urban market linkages, and improve the regional and global competitiveness of businesses located in and around Blantyre.

For the purposes of this study, the definition of infrastructure will include: electricity, other energy sources, water, telecommunications, waste, ground and air transportation, and land.

Besides being the economic and financial center of Malawi, Blantyre is the country's largest city, with a 2008 projected night population of approximately 813,000.² The city's day population reaches more than one million due to people coming to work from the urban fringe areas.. It is also the capital of the country's Southern Region. All major road and rail networks pass through Blantyre. It is the country's southern hub for the import and export of goods to South Africa and the Mozambican ports of Nacala and Beira. Downtown Blantyre hosts a bustling commercial area, a number of prominent hotels and banks, and the Malawi Stock Exchange, which opened in 1996. Industrial sites in the city host a variety of businesses including agro-processors, garment, pharmaceutical, service providers and consumer goods manufactures, as well as breweries and timber companies. Many of the country's largest exporters of tobacco, tea, sugar, cotton and coffee have major branches or headquarters in Blantyre, as do large traders of imported consumer goods and transportation equipment. The expansion of industrial zones on the outskirts of the city

² Malawi National Statistics Office (2006). *Statistical Yearbook 2006, Chapter 2: Population*, http://www.nso.malawi.net/data_on_line/general/yearbook/yearbook_2006/yearbook_2006.html.

highlights the investment opportunities that continue to be exploited by local and foreign entrepreneurs. However, the city’s infrastructure needs vast improvement in order to meet the increasing population and business constraints of the city.

This working paper includes the perspectives of different businesses of varying sizes and backgrounds. The experiences included in this study can be used to assist government agencies, private investors and civil society actors with interest in infrastructure investment in Blantyre.

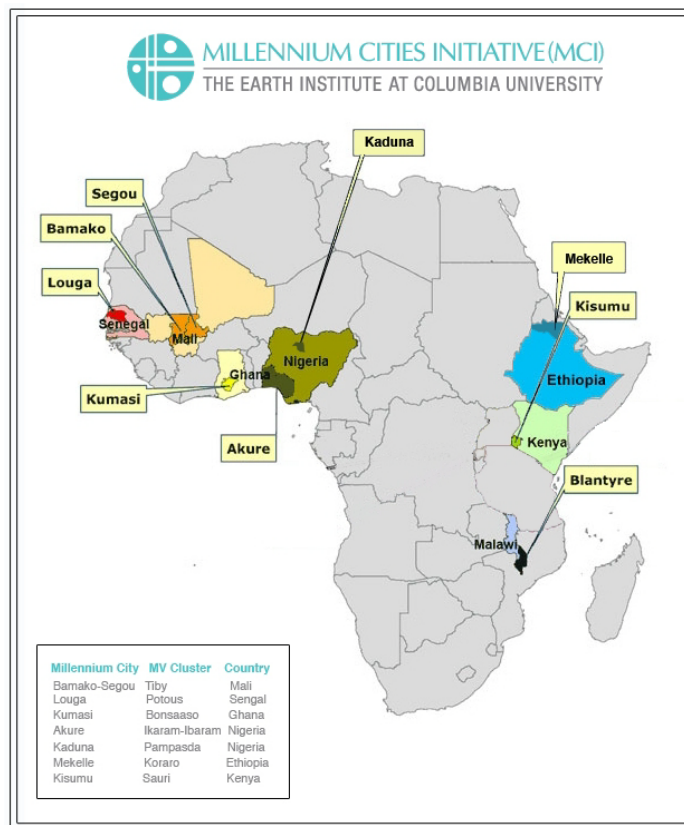
Additionally, this working paper highlights some of the innovative coping strategies used by businesses in Blantyre to deal with infrastructure challenges. These coping mechanisms, often adopted out of necessity, provide input for the recommended investment opportunities.

Map 1: Malawi



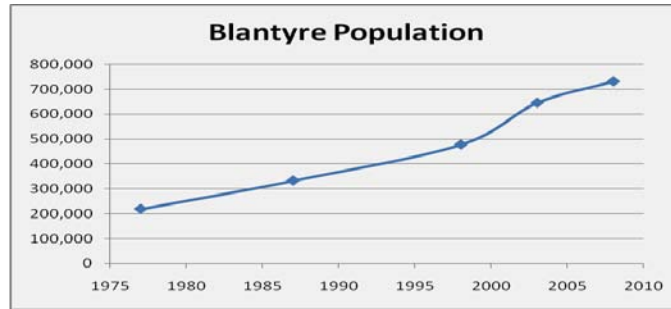
Source: www.vytrak.com

Map 2: Millennium Cities



Source: earth.columbia.edu/mci

Chart 1: Blantyre Population

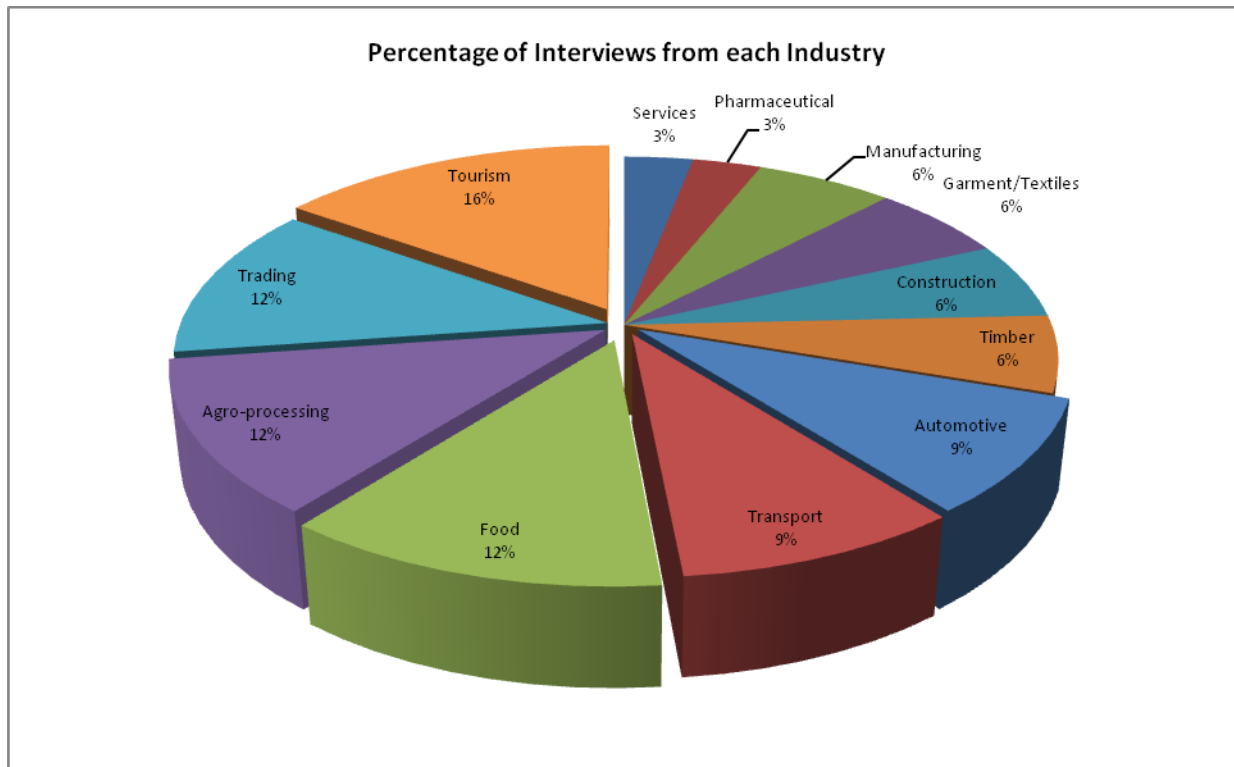


Source: www.malawiproject.org

2. METHODOLOGY

In designing the framework for this study, a diverse number of industries were interviewed to ensure that a broad range of opinions were reflected. Interviews were conducted with 12 smaller businesses (< 30 employees), 10 medium-sized businesses (30 – 100 employees), and 11 larger businesses (> 100 employees).³ The breakdown of industry representation, by percentage, is shown below:

Chart 2 –Interviews by Industry



Source: Author

2.1. Limits to Research

A total of 35 interviews were conducted for this study. However, data from two interviews was discarded because business owners were unwilling or unable to answer the majority of questions.

A second limit to the research was the potential biases resulting from the types of industries that were interviewed. While there were over 30 interviews, the breakdown of industry type did not correlate directly with industry percentages in Blantyre. While an attempt was made to ensure some level of random and representative sampling, more data about the private sector in Blantyre would have been needed to ensure a statistically relevant array of diverse perspectives. For example, both transport and automotive businesses represent nine percent of interviews in this study; however these industries most likely represent a smaller percentage of actual businesses in Blantyre.

³ Categorization of business sizes was done by the researcher and is not an official means of identification.

Therefore, because responses from these interviews tended to focus on infrastructure issues of transport, the overall survey responses tend to be weighted towards such issues.

2.2. Interview Schedule

Table 1– Interview Schedule

Date	Sector	Products/Services	Employees
6-Nov	Agro-processing	Vinegar, sauces, and honey	200
6-Nov	Tourism	Hotel and conferencing	70
7-Nov	Chamber of Commerce		
9-Nov	Wood/Timber	Plywood, palettes, and furniture	100
10-Nov	Agro-processing	Cotton ginnery	150
10-Nov	Garment/Textiles	Clothing for export	2300
10-Nov	Tourism	Hotel and restaurant	50
10-Nov	Manufacturing	Soaps and detergents	500
11-Nov	Pharmaceutical	Pharmaceuticals and detergents	150
11-Nov	Agro-processing	Fortified foods and poultry feed	1500
11-Nov	Trading/Sales	Computer and office products	25
12-Nov	Local organization specializing in low-cost cookers		
12-Nov	Former Chairman of Food Processors Association		
13-Nov	Director, Malawi Investment Promotion Agency		
14-Nov	Local community development organization		
17-Nov	Tourism	Hotel and restaurant	16
17-Nov	Agro-processing	Dairy production	200
17-Nov	Automotive	Automobile sales and spare parts	70
17-Nov	Food	Bakery	115
18-Nov	Wood/Timber	Plywood, furniture and doors	90
18-Nov	Garment/Textiles	Clothing for export	200
18-Nov	Food	Fast food/family restaurant	75
20-Nov	Tourism	Hotel and conferencing	220
20-Nov	Services	Property Management	6
20-Nov	Automotive	Automobile sales and rental	18
20-Nov	Trading	Promotion materials	10
20-Nov	Automotive	Automobile spare parts	8
20-Nov	Transport	Minibus passenger bus service	25
21-Nov	Manufacturing	Nails and steel parts	15
22-Nov	Transport/Logistics	Trucking and warehouse services for exports	70
22-Nov	Transport	Trucking of agricultural export commodities	200
25-Nov	Former consultant, UNDP-Malawi		

26-Nov	Food	Restaurant in Blantyre City Center	60
26-Nov	Food	Restaurant in Blantyre City Center	20
26-Nov	Tourism	Hotel and restaurant	25
26-Nov	Trading/Sales	Local hardware store	6
27-Nov	Construction	Construction and civil engineering contractor	860
27-Nov	Trading	Housing/building materials	12
27-Nov	Construction	Housing construction company	50
28-Nov	ESCOM, Distribution division		
28-Nov	ESCOM, Transmission division		
4-Dec	Blantyre Water Board		

3. RESULTS

Table 2. Greatest Infrastructure Constraint on Businesses in Blantyre

	Number of respondents	Percentage of total respondents
Cost and inefficiency of transportation network	12	36 percent
Electricity connection and reliability	7	21 percent
Security	7	21 percent
Telecommunications network	5	15 percent
Water shortages	2	6 percent
Total number of businesses interviewed	33	100 percent

3.1. Electricity

Supply

Electricity is a major concern for most businesses in Blantyre. However, there are disproportionately greater challenges for small companies and businesses located on the outskirts of the city due to the high cost of electricity generators and the relative lack of political clout among smaller businesses. In this study, both cost and unreliability of electricity connection ranked as the second largest infrastructure constraint among businesses (along with security concerns).

The Electricity Supply Corporation of Malawi (ESCOM) is the only publicly owned and vertically-integrated power company in the country. It generates, transmits, distributes and retails electricity throughout Malawi, providing an estimated total installed capacity of 304.8 megawatts MW, with over 90 percent generated by hydropower. Access to electricity in Malawi is very low at seven percent of the total population. Industrial and commercial customers consume approximately 60 percent of the total.⁴

In interviews with ESCOM, respondents indicated that the company is simply not able to meet the demand for electricity in Blantyre. In particular, it is unable to meet peak demand in the morning between 6:00am-12:00pm or peak demand in the evening between 6:00pm-8:00pm. ESCOM also struggles to meet demand during the peak months of the planting season (September to November). This is the time of the year when large and smallholder farmers need water for irrigation and since water must be pumped up from the Shire River (at 2km below Blantyre), there is greater demand for electricity.

“Everything in our hotel is computerized and we are completely on the grid, so during power outages we have problems with door locks, food storages, lights, etc. I would say that it is actually destroying our business.”
- Hotel owner in Blantyre

As a result of supply shortages, ESCOM commits itself to a well-known countrywide strategy of loadshedding. Loadshedding is a process of minimizing the amount of electricity of a given area through rationing. In times of loadshedding, different districts in and around Blantyre are informed that they will not have electricity during certain times of the day (usually in the evenings after 5:00pm), up to three days in a week. While loadshedding impacts both citizens and the private

⁴ Malawi Investment Promotion Agency (2007). *Investor's Guide to Malawi*. www.malawi-invest.net (see footnote on page 18).

sector, ESCOM routinely publishes its weekly loadshedding schedule in both national newspapers, The Daily Times and The Nation, to inform the public in advance. All businesses interviewed for this study were aware of the schedule and recognized that loadshedding is a reality of doing business in Blantyre.

Figure 1:

SOUTHERN REGION			CENTRAL REGION	
Monday, 24 November 2008			DAY, DATE & TIME	AREAS AFFECTED
Location	Duration	Areas Affected	MONDAY 24-Nov-08 18:00-19:45	Seven Eleven, Crossroads, Area 1, Area 47 sections Salima Town, Senga Bay
SOBO	18:00-20:00	Ndirande, Kadzina, Goliya, Salafico, Ndirande Market, Ndirande Tavern		
Mwapanga	18:00-20:00	Mwapanga, Chiradzulu, Nguzi, Mkwinda, Nkando, Phokombe		
Chipumbe	18:00-20:00	BCA, Raply, Newlands, Namnyingo		
Zomba	18:00-20:00	Zomba Peak, Malosa, Songen, Machinga, Part of Zomba town	TUESDAY 25-Nov-08 18:00-19:45	Area 2, Comberline, Shisile, NCC Centre, N Kasungu, Mumbumba, Maloni, Shayira Car Mbereng, Bus
Tuesday, 25 November 2008				
Location	Duration	Areas Affected		
Chingwi	18:00-20:00	Balaka, Mchiru, Lavonda, Mangochi, Dezza		
Kashe	18:00-20:00	Chidwa, Kadzina, partly Zingwales		
Lindi	18:00-20:00	BCA, Raply, Newlands, Mchira		
Mchiru	18:00-20:00	Namwasa, Chirangwa, Press Village		
Mchiru	18:00-20:00	Cherussa, Mhayanji, Mchiru		
Zomba	18:00-20:00	Chanzol, Jaki, Pimoti, Mkwizi, Gwika, Anang	WEDNESDAY 25-Nov-08 17:45-19:45	Area 25 & Lilongwe TTC Area 30, St Johns, Area 24 & part of No

A typical ESCOM announcement for its loadshedding program found in local newspapers⁵

However, lack of capacity is not the only reason for electricity supply interruptions. Seasonality plays an important role as well. During the rainy season, reservoirs might be full, enabling a hydropower station to have more power. Counterintuitively, however, there are often many more supply shortages in the rainy seasons. Heavy rains can cause trees to fall into rivers and reservoirs, causing damage to power stations. In addition, there is increased siltation of the rivers, which either blocks or destroys equipment. In fact, increased amount of deforestation in Malawi in recent years has caused more siltation and power station damage, resulting in more frequent blackouts. Also, during the dry season – especially during droughts – there is a lack of water in the Shire River, lowering ESCOM's capacity even further and making loadshedding more frequent. As climate change continues to affect Southern and Eastern Africa with more extreme weather patterns, including heavier storms during the wet season and more intense prolonged droughts during the dry season, countries that are heavily dependent on hydropower, like Malawi, will face further power supply challenges.

“Power shortages create tensions with customers, because when the power is out, we cannot communicate via email. Since international phone calls are expensive, especially for a small business, we rely heavily on email for business transactions with international customers.”
 - Small trader selling goods to South Africa

⁵ All photos were taken by the author unless otherwise indicated.

Finally, ESCOM, as well as many of the businesses interviewed, reported that frequent theft was yet another underlying cause of electricity supply interruption. The theft of items such as cables is increasingly common and ESCOM often cannot respond effectively (especially if it has a small inventory of the stolen item). Recently, ESCOM launched a joint countrywide sensitization program with the police to try to respond more effectively to theft. The program provides rewards to people who help catch thieves through a confidential and toll-free hotline. Witnesses or people who have information regarding the incidents are more likely to come forward if they offered a financial incentive. The new program will provide a reward of up to 15 percent of the value of the equipment if a person's information leads to a recovery. This program aims to deter theft and create a sense of community ownership over public goods, in order to minimize electricity supply interruptions.

The research shows that businesses in Blantyre experience an average of 12.45 supply disruptions per month each lasting an average of 2.39 hours. This amounts to approximately 30 hours of disruptions per month. However, the lost productivity is actually much greater, as many companies run their backup generators for additional hours to avoid potentially detrimental electrical fluctuations. Despite having generators, one dairy processor estimated that his business loses at least one percent of productivity due to electricity outages, while a local bakery estimated losing about 1.5 percent in productivity. If businesses do not own generators, the productivity losses are even greater. In addition, it was found that supply interruptions occur between two and five times more frequently for businesses on the outskirts of town, (i.e. not located directly in the city center or in a designated industrial zone such as Mapanga or Chilimba).

Establishing a Connection

New businesses face many hurdles when trying to establish a power connection. For new businesses that need a connection to the electricity grid, ESCOM must install a meter on the premises. Factories require a 3-phase meter for higher levels of electricity use. For non-commercial/residential buildings, ESCOM installs single-phase meters. Many businesses supported by the Malawi Investment Promotion Agency (MIPA) noted that ESCOM is often out of stock of 3-phase meters and that the procurement time to restock can take a long time. As a result, businesses responded that they waited an average of one month to get connected to the grid. However, there are some outliers. For instance, one restaurant owner interviewed stated that he waited four months to receive a connection from ESCOM.

The connection delays are directly linked to ESCOM's procurement process. ESCOM is under-resourced and often runs out of stock of parts that must be imported from South Africa and other countries. In addition, ESCOM outsourced its parts procurement to locally "connected" businesses for many years until a regulation was passed that mandated that all ESCOM procurement had to be subjected to public tender. However, a tender process can be lengthy and inconsistent, and further delay the connection process.

Finally, if a business is not already connected to the grid, then there is the (obvious) added cost of establishing a connection. ESCOM demands some form of capital contribution from businesses that are not connected to the grid, especially those located on the outskirts of the city (i.e. at greater distances from a switchboard). In particular, if a business is able to pay for some parts up front, especially expensive parts such as transformers and switch gears, then the connection can happen much quicker. However, the Blantyre and Limbe businesses interviewed for this study estimated that they paid between 1.5 - 2 million kwacha (\$10,000-\$15,000) to connect to the grid. ESCOM reimburses all businesses for the costs of these parts, although some owners mentioned that this

process can be lengthy, and connection costs must be written off as expenses. For a large company that is expanding its business, such an upfront cost is manageable; however for small and medium-sized enterprises (SMEs), this can be a prohibitively expensive. As a result, these smaller businesses have no choice but to wait for their connection, and sometimes this wait is so long that the business never gets established, and much-needed employment opportunities are lost.

It was repeatedly mentioned that if a business has close ties to ESCOM management or is willing to pay a sufficient bribe to the proper civil servants, the connection process could be expedited. However, it is often the case that SMEs have neither the political nor financial capital to engage in such a transaction.

Cost

The average amount paid to ESCOM each month for electricity varies drastically by size and type of business. For example, a mid-sized hotel in town pays 60,000 - 75,000 kwacha (\$400 - \$500) per month; a 100-person timber processing plant pays 200,000 - 250,000 kwacha (\$1,300 - \$1,700); an auto parts store spends 450,000 kwacha (\$3,000); and a large bakery pays 900,000 kwacha (\$6,000).

The table below shows the 2007 ESCOM tariff structure:

Table 3: ESCOM Tariff Structure

Monthly electricity rates	Malawi Kwacha	US Dollars⁶
For the supply to residential premises	90.94	\$0.66
Fixed charge	1.94	\$0.01
For each unit consumed up to 30 units	2.85	\$0.02
For each unit consumed in excess of 30 units and less than 750 units and less than 750 units	2.85	\$0.02
For each unit consumed in excess of 750 units	4.05	\$0.13
The supply to non-residential premises		
Fixed charge for single phase supply	298.19	\$2.17
Fixed charge for three phase supply	415.66	\$3.03
For each unit consumed	5.35	\$0.04
For three phases supply to a consumer		
Fixed charge	1100.50	\$8.02
For each unit consumed	2.98	\$0.02
On peak maximum demand charge, per kVA	701.07	\$5.11
For the supply to a consumer with a chargeable maximum of 40 kVA or more supplied at 11 kV or 33 kV		
Fixed charge	1061.11	\$7.73
For each unit consumed	2.39	\$0.02
Off peak maximum demand charge, per kWh	655.24	\$4.77

Source: 2007 Investor's Guide to Malawi. Malawi Investment Promotion Agency (MIPA).

⁶ Conversion rate: 1 US Dollar (USD) = 137.269 Malawi Kwacha (MWK). www.oanda.com. (December 2007).

In 2006, a mandatory prepaid facility was established, requiring that a person or business must buy electricity units upfront. Under the previous program, ESCOM had difficulty recovering its money. Businesses would rent space in a location with many other businesses and pay rent and a service charge that covered electricity, water and parking. Before the prepaid system, an individual would receive a bill charging consumption plus a 17.5 percent surtax, as well as the previous month's balance. ESCOM found that it could not retrieve arrears and so it created a system prohibiting businesses from carrying debts. Instead, all bills are pre-paid, eliminating the need to check meters, thus reducing costs.

There is, however, some controversy regarding the peak pricing method. Under this scheme, businesses are required to declare how much kilovolt amperes (kVA) they want to use, which ESCOM provides at maximum constant supply. However, even if a business uses only 75 percent of this reserved amount, for example, it will be charged the full amount based on the rationale that power was not diverted to another business or home. This peak energy usage billing system has come under a lot of scrutiny by customers, who feel such pricing is unfair since they can be charged for electricity they do not use. Therefore, the new system tries to find a middle ground. Instead, businesses pay a percentage of the electricity that they reserve but do not use. This system encourages businesses to demand only what they will actually use.

Coping Mechanisms

When disruptions occurred, 58 percent (19/33) of businesses relied on diesel-powered generators for full or partial generation. However, there was only one business with less than 30 employees that had a generator, while 79 percent (11/14) of the business that did not have generators had less than 30 employees. As a result, it is clear that the high price of a generator is prohibitive for smaller businesses and negatively impacts productivity. Some smaller companies were forced to close during extended power outages; smaller restaurants that lacked generators stopped serving customers after nightfall; and one store would switch to hand written receipts if cash registers ceased to function.

Businesses quoted a variety of prices for generators of different capacities. For example, one owner purchased a 167 KW generator for \$20,000 while a second owner purchased a 45 KW generator for \$15,000. A smaller 5 KW generator imported from India cost between \$600 and \$700. Locally purchased generators in Blantyre are more expensive and, while cheaper models can be purchased abroad, they are faced with import tariffs.

Only one new business had considered solar panels for their business as a coping mechanism to the electricity interruptions and costs of connection. This agri-business is in the process of expanding its facilities on a piece of land on the outskirts of the city. Since the business is not located near the grid and because ESCOM required that it purchase a transformer, management decided to study the feasibility of solar power for their plant. A cost-benefit analysis revealed that solar panels would be more affordable than paying upfront connection costs, and that an investment could be recovered within two years. As land on the outskirts of Limbe continues to be developed, usage of solar panels could become a more viable option in the coming years.

Recent Improvements/Ongoing Projects

ESCOM has several projects planned that could greatly improve electricity reliability and capacity in the coming years. The projected peak demand for 2010, 2015, and 2020 is 324.9 MW, 478 MW and

757 MW, respectively.⁷ As Blantyre continues to grow, there is a great need to ensure that political will and financial resources are mobilized to ensure that these projects are completed.

A) Mozambique-Malawi Interconnection Project

The most ambitious ESCOM project is a \$55 million project to connect Malawi to the Southern African Power Pool (SAPP) via Mozambique. SAPP was established through the Southern African Development Community (SADC) to co-ordinate the interconnection of regional power grids.

In July 2007, the World Bank approved a \$48 million loan to finance the project after the completion of an environmental impact assessment. Presently, ESCOM is waiting for government approval to begin the project. In particular, there are ongoing discussions regarding the reliance on foreign governments for electricity. If approved, the project will take approximately 2 years to complete.

While the project might produce a capacity of 300 MW, there is no guarantee that the Malawian Government will be able to negotiate this amount, and more modest projections estimate that only 50-100 MW can be obtained from the project. In addition, while the 2010 Soccer World Cup in South Africa could bring some tourism and investment to Malawi, there is concern that much of SAPP's power generation will be diverted to South Africa for preparations for the event.

B) Phase Two of the Blantyre Network Rehabilitation Program

Phase One of the Government-initiated Network Rehabilitation Program was completed in 2007, and included improving the capacity of the Blantyre grid by adding additional transformers. ESCOM is seeking funding for Phase Two, which consists of three main components: (1) adding more transformers, (2) extending lines to load centers, and (3) adding more switch gears to ease overall load.⁸ The project would generate 64 MW of electricity and is expected to help meet demand for the next three years.

C) Lower Fufu Falls Project

The African Development Bank has indicated that it will fund a feasibility study by the Malawi Energy Regulatory Authority (MERA) to potentially build a hydroelectric power plant in Lower Fufu Falls. The study will be completed by the end of 2009. Once construction begins, the plant will take three years to build and will help meet increased demand following the upgrades to Phase Two.

3.2. Other Energy Options

Supply

The main liquid fuels used for commercial purposes in Blantyre are light and industrial diesel, which are used mainly to power generators during power outages. All 20 businesses with generators use diesel fuel, and spend an average of 10-15 percent of their monthly electricity costs on it. Petrol is mainly used by businesses to transport managers and supervisors by car, while transporters are dependent on diesel for their trucks. They are often forced to link their costs (and inevitably their profit margins) to the price of diesel.

⁷ *Investor's Guide to Malawi*. Pg 15.

⁸ Interview with ESCOM officials, 2008.

In addition to diesel fuel, businesses also use biomass to meet energy needs. In particular, wood fuel and charcoal are utilized for boilers and cooking. A large agro-processor estimated that the company spends about one percent of its energy expenses on wood.

Cost

In December 2008, diesel fuel was being sold at petrol stations in Blantyre for 234.50 kwacha (\$1.61 US)/Liter and selling at 225.57 kwacha (\$1.54)/Liter wholesale. These prices stayed relatively stable during the last few months of 2008. In December of 2008, petrol was selling at 251.20 kwacha (\$1.73 US)/Liter.

Spending on diesel and wood varied significantly depending on the type of industry and size of business. A large clothing manufacturer spends 40,000 kwacha (\$267)/day on diesel; a large restaurant in the city center spends 8,000 kwacha (\$53)/day; and a timber plant spends 35,000 kwacha (\$240)/month. The timber plants use their own scraps to run wood-burning boilers, and therefore do not account for it directly, while a large agro-processor spends an estimated 45,000 kwacha (\$300)/month on wood.

3.3. Water

Source

The Blantyre Water Board receives its water from the Shire River, which is located 2km south of Blantyre city center. All of the businesses interviewed for this study receive water from the Blantyre Water Board. Several businesses, including a trucking company and three agro-processors, also have at least one water facility located outside of Blantyre that does not have access to piped water. Monthly costs vary depending on the type of business. For example, two different hotels both spend about 100,000 kwacha (\$667)/month, while an agro-processor spends 300,000 kwacha (\$2,000)/month.

Much of Blantyre's aging water infrastructure is nearly 40 years old. In fact, many areas of the city often do not receive constant water supply because of broken or inadequate pipes. However, the Blantyre Water Board states that the city simply does not have the capacity to meet present demand due to leakage and old meters. As a result, Water Board officials state that a large percentage of water is being wasted and that there is urgent need for investment in this sector.

Figure 2:



Water must be pumped from the Shire River, located 2km below Blantyre.

Quality

Most businesses (91 percent of interviewees) felt that the quality of the water in Blantyre was good; however, these same businesses are using water for general cleaning and cooling purposes (and not for drinking). One pharmaceutical company stated that it de-mineralizes all of its water for use in manufacturing generic drugs. To do so, it purchased a de-mineralizing plant from India for \$25,000. The clothing manufacturer triple refines its water using a small on-site water filtration plant which was purchased for 500,000 kwacha (\$3,330). One agro-processor stated that it plans to invest in a water filtration system to be able to meet United States Food and Drug Administration standards and export to the US market.

Cost

Several businesses commented on the high cost of their monthly water bills. In particular, respondents believed that they were being overcharged either because of poor meters, leakage due to old pipes, or inaccurate meter readings by the city. In fact, the Blantyre Water Board confirmed that there is a problem with old and damaged meters that can lead to inaccurate readings. Businesses also face higher water bills due to Blantyre’s elevation, since water must be pumped up from the Shire River at a higher cost. The Water Board states that electricity accounts for 50 percent of its operational costs. Generally, rates in Blantyre are higher than in Lilongwe, as illustrated below:

Table 4: Water Tariffs in Blantyre and Lilongwe

Water Tariff	Malawi Kwacha	US Dollars⁹
<u>Lilongwe</u>		
Residential		
First 10 cubic meters (per cubic meter)	28.60	\$ 0.21
Next 30 cubic meters	43.38	\$ 0.32
Thereafter	61.25	\$ 0.45

⁹ Conversion rate: 1 US Dollar (USD) = 137.269 Malawi Kwacha (MWK). www.oanda.com. (December 2007.)

Minimum charge	286.70	\$ 2.09
Institutional		
Flat Rate	54.64	\$ 0.40
Minimum charge	563.00	\$ 4.10
Commercial and Industry		
First 100 cubic meter	61.25	\$ 0.45
Thereafter	76.78	\$ 0.56
Minimum charge	603.75	\$ 4.40
Central Region Water Board		
Flat rate	19.80	\$ 0.14
Minimum charge	200.00	\$ 1.46
Blantyre		
For the first 10 cubic meters or part thereof	260.00	\$ 1.89
Between 10 cubic meters and 40 cubic meters	52.00	\$ 0.38
Exceeding 40 cubic meters	60.00	\$ 0.44

Source: 2007 Investors Guide to Malawi.

The Blantyre Water Board is not able to recover the costs of its operations, and does not have surplus funds to reinvest in infrastructure upgrading. The Board states that between 2000 and 2005, its monthly bill to ESCOM increased from kwacha 15 million to kwacha 35 million, representing a 133 percent increase in operational costs over the 5-year period. Because access to water is considered to be a human right by many, Parliament did not raise tariffs on water during this period. As a result, the Blantyre Water Board is heavily subsidized and faces severe funding constraints to make necessary improvements. To this end, the agency seeks aid from foreign donors and private investors.

Supply Interruptions and Coping Strategies

Water supply interruptions are a serious problem in Blantyre. This study found that the average business faced water interruptions at least seven days a month, with each interruption lasting an average of six hours. However, four businesses stated that they did not face any interruptions because of their coping strategies, namely using boreholes and/or storage tanks. In fact, some businesses pump water from their boreholes to storage tanks to ensure a constant supply of water at all times. Boreholes cost an average of \$5,000 - \$8,000 to set up, whereas a storage tank of 1000 L costs \$500 - \$600 and pumps cost about \$800.

Despite being illegal, 33 percent (11/33) of the businesses interviewed use at least one borehole. Most businesses claim that because of frequent supply interruptions, they are forced to construct boreholes to maintain productivity. Several businesses suggested that the city makes boreholes illegal to earn revenue from them. However, according to the Blantyre Water Board, boreholes are illegal for safety reasons, since this water is not tested by the city. The city has a running list of businesses that have illegal boreholes and sometimes it cuts off water supply to these entities as a warning (although it does not fine them). A construction firm stated that because the practice is so commonplace, independent drillers will freely come to a business or home and set up a borehole. As

a result, boreholes are used by many businesses throughout Blantyre and Limbe as a coping strategy to deal with water supply interruptions.

The respondents mentioned two other possible coping strategies for water supply interruptions. A transport company based outside the city that does not receive piped water uses a tanker (purchased for \$12,000) that it drives into town to fill up several times a week. In addition, two businesses – a small hotel and a large agro-processor - showed a great deal of interest in experimenting with rainwater harvesting. However, neither of the companies had actually invested in such a system, and none of the respondents were aware of rainwater harvesting being used by any other commercial entity in Malawi.

Current and Future Water Infrastructure Projects

The Blantyre Water Board is working with donors on a number of projects:

The EU/EIB Water Facility Upgrading Project

The EU has allocated €14 million to construct new system pumps at pump stations throughout the city to replace many of the city's old pipes. 50 percent of the project is being financed as a loan and 50 percent as a grant. The project also intends to pipe water through the poorer urban neighborhoods of Blantyre that currently do not have water. However, there is an €8 million financing gap for this portion of the project, and the Blantyre Water Board is seeking additional funding. A service contractor will manage the project, with a tender expected to be awarded in September 2009 and construction beginning in early 2010. The EU Water Facility upgrading project will help to meet city water demand until 2012, after which time the city will need to use additional sources.

World Bank Feasibility Study

Since so much of the Water Board's operational costs are due to the high electricity costs used to pump water to Blantyre from the Shire River, the city is seeking alternative water sources. To this end, the World Bank has allocated funding for a comprehensive feasibility study. The public tender for this study will be awarded in 2009. It is believed that the study will target the watersheds of Mt. Mulanje and Zomba. Both these sites are situated at elevations above Blantyre, allowing for water to flow into the city and neighboring farmlands. Such projects could drastically reduce water costs and expand water capacity, as well as reduce the strain on ESCOM to pump water.

3.4. Waste Disposal

Wastewater

Aside from the two large beverage companies, wastewater treatment was of little concern to the respondents. Of the 33 businesses interviewed for this study, three utilize septic tanks, one dumps wastewater on its premises, and thirty drain water into the public sewage system. One agro-processor and one hotel mentioned that their management teams were considering installing a grey-water system on their facilities. None of the businesses mentioned the need to have any required pre-treatment before feeding industrial effluent into municipal systems.

Solid Waste

The Blantyre City Assembly is mandated to collect trash from businesses throughout the greater Blantyre area two to three times a week. However, facilities on the outskirts of the city do not have access to garbage collection and instead burn or bury their refuse. Several businesses also stated that

they would like trash to be collected more frequently. The City Assembly states that it has an insufficient supply of trucks, and is unable to pick up trash on a regular basis. One large hotel mentioned that because of the large quantity of solid waste that accumulates weekly on site, a special arrangement has been made with the City Assembly to have trash collected daily, at a cost of 30,000 kwacha (\$200) per month. Also, three businesses use septic tanks to store solid waste and pay between 10,000 kwacha - 30,000 kwacha (approximately \$65 – \$200) to have the city clean them each month.

Recycling

There is very little evidence of recycling in Malawi. There appears to be no stringent environmental demands placed on the private sector and very few businesses engage in activities related to recycling. Some automobile and spare parts dealers are involved in the lucrative scrap metal business, which uses recycled auto parts. The pharmaceutical company also reuses poorly processed pills by crushing and reprocessing them. Both timber manufacturers interviewed recycle their sawdust by donating it to local communities (many low-income households use sawdust for cooking). Finally, several businesses mentioned that paper processors in town collect waste paper for recycling. However, in general, there are very few recycling activities in Blantyre and ample opportunities to expand wastepaper recycling, plastic recycling, and other waste-to-energy facilities that reuse solid waste. While the Blantyre City Assembly could engage in such activities with proper financing, there are also opportunities for private sector involvement in such industries.

3.5. Telecommunications

“Blantyre has the best infrastructure in the country, but still there is a lot that needs to be done. There must be regulation – not necessarily control, but regulation. Government must support a market economy, new investments and private sector development, but it must also assure that services actually meet the demand and expectations of individual customers and businesses. This is most clearly noted in the telecommunications sector.”

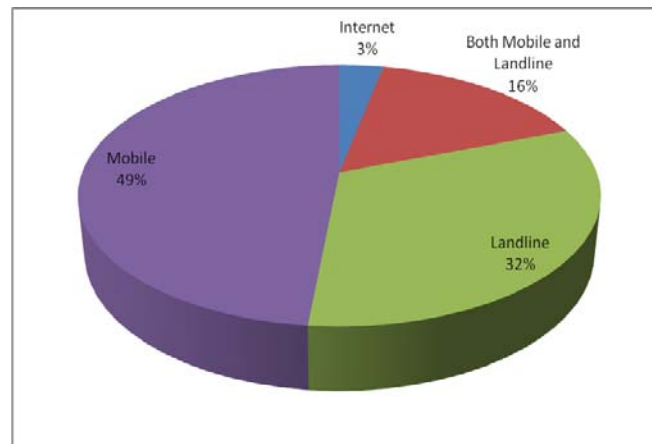
- Representative from the Blantyre Chamber of Commerce

Main form of Communication

Blantyre’s unreliable and expensive telecommunications network was ranked as the third most significant infrastructure constraint among businesses in Blantyre. Many businesses have access to both landlines and mobile phones, but the majority of users found the mobile service to be more efficient and convenient for business purposes. Half of the businesses surveyed use mobile phones as their main form of communication. However, many businesses expressed concern over the fact that the Government has allowed the expansion of cell phone providers to lead to the over-subscription of customers and poor service. Businesses applaud the expansion of choice and competition in the cell phone market, but would also like to see the Government ensure higher quality and standards

Businesses did not express frustration with the amount of time it takes to establish a mobile, landline or internet connection. Mobile connections can be established the same day. Landline connections can be difficult to establish in rural areas and new industrial development sites, but businesses located in Blantyre and Limbe on average receive a landline connection within one to two days.

Chart 3 – Main Form of Business Communication



Source: Author

Mobile: Over the past ten years, the telecommunications sector in Malawi has rapidly expanded, though cell phone usage is still infrequent compared to other African countries. The number of active connections is less than one million people, or about seven percent of the population. The monopoly held by the Government-owned cellular operator Telecom Networks Malawi (TNM) ended in 2001, when the private carrier Celtel Malawi entered the market (though it was recently acquired by the Kuwait-based Zain Group). TNM's market share is said to be approximately 40 percent, while Zain controls 60 percent.¹⁰

Landline: While landline service is significantly cheaper than mobile service, businesses prefer to use mobile phones due to the unreliability of landlines. Malawi has one landline service provider, Malawi Telecommunications Ltd (MTL). The main complaint against the landline service was frequent theft of cables leading to service interruptions. Three businesses mentioned that landline service became so unreliable that they were forced to switch to mobile service – a more expensive but reliable telecommunications option.

Malawi's telecommunication sector could see increased competition in the near future. The Government of Malawi is awarding a license to a third mobile operator. In addition, in 2007 the Malawi Communications Regulatory Authority (MACRA) awarded a second fixed-line license to Access Communications Limited, a consortium of African investors. Malawi is expected to have at least three mobile and two fixed line operators in the next few years.¹¹

Internet: As with cell phones, internet usage also continues to expand in Malawi, particularly among businesses with international suppliers or customers. There are several companies providing web-hosting, web-mail, and wireless services in Malawi including Malawi Net, Globe Internet, Skyband Corporation and MTL-Liberty. Internet service providers (ISPs) have also begun to offer new types of services, such as Wi-Fi hotspots, around Blantyre, Lilongwe and major tourist areas. Due to the

¹⁰ Nakagawa, Sawa et. al (2009). *Foreign Direct Investment in Blantyre: Opportunities and Challenges (Draft)*. Report prepared for the Millennium Cities Initiative and the School of International and Public Affairs, (New York: Columbia University). March 2009.

¹¹ *Ibid.*

increased demand for broadband services, the ISPs have reached a bottleneck due to the lack of capital and access to bandwidth.¹²

Despite the increased interest and usage of the internet in Malawi, only 42 percent of businesses use internet regularly. This is mainly because many domestic suppliers and customers, particularly those located outside of Blantyre and Lilongwe, do not have access to the internet. In addition, frequent electricity supply interruptions, particularly during the rainy season, can cause inconsistent email access. For many small and large businesses, this has strained relationships with international customers. Therefore, a number of requirements – more bandwidth, faster internet connectivity, expanded internet coverage in rural and peri-urban areas, an increased international customer base, and more reliable electricity supply – are needed for the internet to become more widely used by businesses in Blantyre.

Costs

The costs of telecommunications vary drastically by the size and type of business. Respondents generally felt that monthly mobile phone bills were expensive, while landline and internet bills were more manageable. Further, because internet and mobile phone prices have decreased in recent years, many businesses supported the introduction of additional competition in the telecommunications sector to increase efficiency and lower costs further. For example, a timber company spends 40,000 kwacha (\$250) for mobile phone for three managers (about \$150/month per manager), while a transport company spends 500,000 kwacha (\$3000) for its 7-person management team (nearly \$430/month per manager). Most businesses with an internet connection had an established unlimited connection with either Globe or Skyband and paid about 5,000 kwacha (\$35) for the connection set-up and between 13,000 kwacha (\$85) and 15,000 kwacha (\$100) per month for usage.

Coping Mechanisms

To cope with the costs of mobile phone service and the unreliability of landlines, most businesses in Blantyre use both. This is a burden and frustration for many businesspeople. In addition, with over-subscription of both mobile service providers, connections are often not available. As a result, 94 percent of all businesses interviewed carried two mobile phones (one with TNM and one with Zain service) or had a mobile phone with a replaceable SIM card feature so that a phone or card could be switched if one service provider was temporarily unavailable. Such a coping strategy was found to be particularly effective among transport companies that must be in constant contact with their fleets, since some parts of Malawi are only covered by one mobile phone provider.

In addition, two companies interviewed – a construction company and a transport company — use a creative mechanism to cope with telecommunication costs and unreliability: they operate internal 2-way radios (walkie-talkies) to communicate with each other. In fact, the transport company's system has service as far as Johannesburg, allowing them to easily and affordably talk with their South African colleagues, while only paying an initial one-time fee of 30,000 kwacha (\$200) to set up.

¹² *Ibid.*

3.6. Transportation

“Malawi spends over \$200 million on transport to import and export because of its unique landlocked situation. These transport costs eat up about 60 percent of the value of the country’s exports.”

- Malawi Trade and Investors 2007 Quarterly Magazine

The cost and inefficiency of transporting goods is the largest infrastructure constraint for businesses in Blantyre. As a landlocked country, Malawi is faced with high transport costs that can increase the price of moving goods across borders by an average of 30 - 60 percent. This is a serious obstacle to trade. There is a great need to reduce the cost and time of transport of goods to and from Malawi to ensure that local industries (a majority of whom have branches or are headquartered in Blantyre) can compete at the international level.

42 percent of all respondents ranked transport as either the first or second greatest infrastructure constraint to business in Blantyre. Of the twelve businesses that ranked transport as the single greatest constraint, both timber companies noted the poor roads to the forests in the rainy season as their major transport problem. The minibus service company highlighted the number of potholes and the need for frequent repair of roads as the main problem. The other nine businesses didn’t necessarily view the transport system of Malawi as a major constraint. Rather, they identified the road, rail, port, and logistics infrastructure of neighboring countries as major transport barriers. Air transport was not mentioned as a significant form of transport. However, seven businesses mentioned the prospect of improving water transport, in particular through the completion of the Shire-Zambezi Waterway River project, as one way to drastically cut transport costs and import/export time.

3.6.a. Ground Transportation

The most frequently used ports for importing and exporting goods are Nacala and Beira in Mozambique, followed by Durban in South Africa and Dar es Salaam in Tanzania. While each port has its advantages, each faces a number of infrastructure constraints:

Nacala, Mozambique

Malawi maintains a road and a rail system to Nacala, which is the cheapest port to reach for Malawi transporters and approximately 900 km from the Malawi border. However, 36 percent of businesses highlighted the challenges of sending cargo through Nacala. Although the port is conveniently located as a main entry point for Mozambican, Malawian and Zambian goods, it is small and overcrowded. By rail, containers can take up to eight weeks to reach Blantyre from Nacala, and by road, the transport time varies drastically depending on road and vehicle conditions. 50 percent of the road from Nacala to Blantyre remains unpaved, increasing the cost of truck transport by an average of 20 percent. Transport time increases by at least 20 percent during the rainy season for both rail and road due to accidents and delays. There are plans to finish tarring Nacala Road in 2009, which would decrease some of the transport time and cost.

Figure 3: Nacala and Beira Ports



Source: University of California, San Francisco, nurseweb.ucsf.edu

The most frequently cited constraint for businesses that regularly use either the Nacala or Beira port is the lack of transport during the planting season (September – December). During this period, the Government of Malawi often rents most of the country’s available trucks and railcars to import fertilizer and other necessary commodities for farmers. To rent the trucks, the Government will pay transport companies between 30 - 50 percent more than the market price, and as a result, private businesses often cannot afford to rent trucks during this season. In fact, 24 percent of businesses stated that goods have waited at the Nacala or Beira port for up to three months because of insufficient trucks or railcars to transport their goods to Malawi. Such an inefficient and unreliable import/export system can strain a company’s relationship with suppliers and local, regional and international customers.

Beira, Mozambique

Beira is the second most frequently used port for businesses in Blantyre. The port is located approximately 800km from the Malawi border. Much like Nacala, Beira is not able to efficiently meet the high volume of goods passing through the port since it also services Zambia, the DRC and Zimbabwe, in addition to Mozambique and Malawi. In fact, the managing director of a large clothing manufacturer mentioned that the transport time for containers from Beira has not improved since he began his business in 1970. In fact, due to infrastructure and bureaucratic hurdles, a container takes an average of four weeks to arrive in Blantyre once it has been released from the port. Another constraint is that larger vessels cannot dock in Beira port due to draft restrictions (water depth), although there are plans to dredge the port.

Finally, the businesspeople surveyed for this study described different forms of corruption and bureaucracy they face when transporting goods from Beira and through Mozambique in general. For example, without a significant bribe or proper connections, several business people mentioned that consignments can remain in Beira for up to 6 - 12 weeks. In addition, transporters mentioned that Mozambican authorities often impose an “escort fee” of at least \$200, which often results in another 2 to 3 day delay. Clearing customs in Beira can take an average of 15-20 days more than in Durban, South Africa.

Below is a list of transportation rates from international cities to Blantyre via Nacala and Beira. Prices are in US Dollars:

Table 5: Malawi Transport Costs to Nacala and Beira

2007 Transportation rates per container from point of origin to Blantyre via Nacala and Beira (\$US)					
ORIGIN		Via Nacala		Via Beira	
Country	City	20'	40'	20'	40'
CHINA North	Dalien	3,630	6,945	3,705	7,098
	Quindao	3,530	6,765	3,605	6,898
	Xingang	3,555	6,895	3,630	7,048
CHINA	Central Shanghai	3,430	6,645	3,505	6,798
CHINA South	Guangzhou	3,390	6,545	3,455	7,168
	Xiamen	3,430	6,745		
DUBAI		2,734	5,283	2,930	5,708
HONG KONG		2,950	5,680	3,025	5,838
INDIA	Mumbai	2,734	5,283	2,930	5,780
	Calcutta	3,290	5,680		
ITALY	Laspezia	3,100	5,283	3,225	6,338
INDONESIA	Jakarta	3,075	3,580	3,150	6,188
JAPAN		3,530	6,080	3,650	7,098
SOUTH KOREA	Busan	3,100	6,030	3,175	6,138
MALAYSIA	Penang	3,100	6,945	3,175	6,238
NWC (Antwerp/Hamburg/Rotterdam)		3,125	5,980	3,155	6,260
PAKISTAN	Karachi	2,734	5,980	2,930	5,708
SINGAPORE		2,950	6,130	3,025	5,838
THAILAND	Bangkok	3,100	5,283	3,175	6,238
TAIWAN	Keelung	2,950	5,680	3,025	5,838
UK (Tilbury/Felixstowe)		3,125	6,130	3,155	6,280

Source: 2007 Investor's Guide to Malawi. Malawi Investment Promotion Agency (MIPA).

Durban, South Africa

The port in Durban is larger and more modern and efficient than the ports of Mozambique. However, transport costs are higher due to its greater distance from Blantyre. Durban is located over 2,660km from Blantyre, more than three times the distance of both Beira and Nacala. Once a container arrives in Durban, it can take between 3-10 days to clear customs. However, because there is no pre-clearance needed in South Africa, the process is still a great deal shorter than other African ports along the Indian Ocean. None of the businesses specifically complained about the roads to Durban. In fact, one transport company mentioned that while it can spend up to 20 percent of costs on wear and tear from Nacala and Beira, it only spends five percent on Durban-related expenses because of the good condition of the roads. Further, a recent study found that on average a South African exporter can fill a container for an Indian buyer within 48 hours, whereas a Malawian company can take up to 12 days to complete a similar order.¹³

The table below shows international transport costs of goods by road from South Africa to Blantyre and Lilongwe. It is clear that South African prices are restrictively high for many businesses in

¹³ Nakagawa, et al.

Blantyre (especially smaller businesses), despite the obvious advantages of the local infrastructure. A pharmaceutical company explained that it gets all of its raw materials from South Africa, though it can take 45-60 days to arrive at the factory once the order has been placed. The managing director stated that for every \$0.50 the company spends on supplies, it must add an additional \$0.49 for transport.

Table 6: Malawi Transport Costs to South Africa

International Transportation Costs¹⁴				
Road tariff rates from Johannesburg to Blantyre and Lilongwe	BLANTYRE		LILONGWE	
	South African Rand	US Dollars	South African Rand	US Dollars
Full loads (break-bulk 28 tons) per load	28,000	\$4,121.10	30,000	\$4,415.46
1 x 12m container - gross mass 28 tons - net 24 tons	28,000	\$4,121.10	30,000	\$4,415.46
1 x 6m container (up to 14 tons gross)	14,500	\$2,134.14	15,500	\$2,281.32
Part loads per 1000kgs or 2CBM whichever yields greater	1,110	\$163.37	1,550	\$228.13
Minimum per consignment	750	\$110.39	950	\$139.82
Local collection within 30kms radius from our warehouse per 1000kgs or 2CBM - minimum 1 Ton	265	\$39.00	265	\$39.00
Documentation per consignment	265	\$39.00	265	\$39.00

Source: 2007 Investor's Guide to Malawi. Malawi Investment Promotion Agency (MIPA).

Transport in Blantyre and throughout Malawi

The Japanese Government has supported the expansion of the major Blantyre-Limbe road. Despite delays, construction is now underway. Many of the businesses interviewed showed a strong desire to see this project completed in order to reduce transport costs and time. Construction plans for a third lane on the Blantyre-Limbe road may already be in motion.

One former member of the Blantyre Chamber of Commerce took a more cautious position toward the expansion of roads. He stated:

“I believe that you cannot just build new roads if you do not maintain the ones that already exist. M1 roads run North-South (for exports). These are the trunk roads or ‘lifeline’ of the country. Feeder roads are the smaller roads. M1 is full of patches, and has outlived its usual 15-year life. However, there is a lot of construction of new feeder roads, while perhaps investment in upgrading M1 should be prioritized.”

There were divergent concerns regarding domestic transport. A small minibus service company stated that an exorbitant amount of its small profit margin on repairs. Most of the rural and peri-urban roads where the company mostly operates are often full of potholes. The owner of a transport company stated that most of the tires on his company’s fleet should last 50,000 km but usually only last 30,000km, a depreciation rate of 40 percent faster than expected. An export trucking company added that during the rainy season, transport from the fields is difficult. The owner provided tea as a specific example. During the dry season, tea can reach domestic warehouses for export within 2-3 days, while during the rainy season it can take 1-2 weeks because dirt roads get washed away. In

¹⁴ Conversion rate: 1 US Dollar (USD) = 6.79431 South African Rand (ZAR). www.oanda.com. (December 2007).

addition, two hotels stressed the importance of improving the main roads from Blantyre to nearby national parks in order to attract tourism.

3.6.b. Air Transportation

Chileka International Airport in Blantyre has several airlines that fly domestically, regionally and internationally. Air Malawi, the national carrier, is wholly owned by the Government. However, there are discussions of a possible privatization, which could improve efficiency, prices, reliability and customer service. This would appease the business community, which currently has a low approval rating of the airline. Air Malawi flies throughout Southern Africa, with connecting flights to Asia, Europe and the USA via Johannesburg and Nairobi. It flies domestically to all major cities and tourist destinations, and introduced new flights to London and Dubai in 2007. Other airlines servicing Malawi include Ethiopian Airlines, Air Zimbabwe, Kenya Airways, and South African Airways.¹⁵

Most of the businesses interviewed in this study mainly use air transport for business travel. Government statistics show that fewer than 2,000 tons of air freight is handled by the Chileka International Airport annually, as most importers and exporters tend to use the road and rail networks that lead to Nacala and Beira.¹⁶

3.6.c. Port Access and Rail Rehabilitation

Shire-Zambezi Waterway Project: Since the late 1990s, there have been on-going negotiations regarding establishing a new waterway connecting Malawi to the Zambezi River through the Shire River from Nsanje in southern Malawi to the port of Chinde on the Indian Ocean in Mozambique. If fully developed, this waterway would provide Malawi with direct access to the Indian Ocean, facilitating not only Malawi's imports and exports but also those of neighboring countries, at considerably reduced costs.¹⁷

The project would reduce the transport distance of goods to less than 240 km (compared to 800km and 900km to Beira and Nacala, respectively). Malawi would no longer be landlocked. In addition, the project aims to provide Malawi with a transport linkage through the rehabilitation of the rail line from Nsanje through Blantyre to Chipata in Zambia and through Dona Ana to Sena in Mozambique.

The project is estimated to cost nearly \$4 billion over a 5-year period. A memorandum of understanding between Mozambique, Zambia and Malawi was signed in April 2007. The European Union produced a pre-feasibility study which is available to potential investors. MIPA has argued that the project could potentially save the three countries \$250 million annually.

3.6.d. Urban Transport

While most of the working class live outside of Blantyre city center and walk to work, there is an active urban transport system of minibuses and taxis for those who can afford it. Nine percent (3/33) of the businesses stated that they have invested in at least one driver or car service to drive workers home late at night. Twelve percent (4/33) of respondents noted that they make an effort to hire employees that live near the business because of the importance of travel costs and safety.

¹⁵ 2007 Malawi Investment Guide. Pg 17.

¹⁶ *Ibid.*

¹⁷ *Ibid.*

Because of the recent increase in minibus prices, two business owners justified the provision of car service and raises for their employees. They suggested that workers are more productive if they do not have to walk long distances each day to get to work.

Over the past two years, the Blantyre local government has begun to more strictly enforce traffic rules. This includes fining drivers up to 5,000 kwacha (\$35) for driving while talking on a mobile phone, and requiring that minibuses carry a maximum of 14 passengers (instead of the usual 20-25). The Government has declared that the new minibus rule is for the safety of the passengers. However, the significant loss in the number of customers has resulted in minibus companies raising fare prices, significantly burdening workers in Blantyre and Limbe who do not have much expendable income to begin with. As a result, since the fare increase, more workers have begun walking to work.

Table 7: Average Wage Rates in Malawi

	Monthly Wage		Daily Wage (average 26 days/month)	
	Kwacha	US Dollars	Kwacha	US Dollars
Minimum wage for Government employee	3,500.00	\$ 24.04	134.62	\$0.92
Average wage for casual day laborer in Blantyre/Limbe*	6,000.00	\$ 41.21	230.77	\$1.59
Average wage for full time factory worker in Blantyre/Limbe*	12,000 ~ 16,5000	\$82.42 ~ \$113.33	460.00 ~ 635.00	\$3.17 ~ \$4.36

* *Compiled by author during research and does not reflect a formal wage labor study, but general data gathered from businesses.*

The table above shows the monthly and daily wage average for government workers, casual day laborers and full-time factory workers in Blantyre. As of December 2008, the cost of one minibus ride was 70 kwacha (~\$0.50) each way, or 140 kwacha roundtrip. Since many workers live on the outskirts of Blantyre and work in Limbe, they must take two minibuses to get to work, costing a total of 240 kwacha each day. The table clearly shows that these prices are prohibitively expensive for much of the working population in the area. Also, since there are limited street lights in the peri-urban areas and limited minibus service past 7:00pm, many workers must leave work at 5:00pm in order to walk home before sunset, which discourages managers from demanding that workers stay to work overtime. Most managers can afford minibus service or cars, but for the majority of workers, urban transport is a burden.

3.7. Land

A possible constraint for investment in Blantyre is the difficulty in obtaining land for industrial, agricultural and office use. Over one-third of businesses interviewed (12/33) indicated that they own the land on which they operate. The remaining 21 businesses lease or rent land directly from owners.

Land Availability

The greater Blantyre region has several industrial areas on the outskirts of the city, including Mapanga and Chilimba, where available land has yet to be developed. The areas are connected to the city's water, electricity, road and other infrastructure networks. Yet, some of the industrial areas do not have access to sewer lines. In addition, available plots of land in this area are scarce and continue to increase in price every year. Despite this, businesspeople agreed that because space is extremely

limited in Blantyre city center, investing in land outside of the city might be more cost effective for larger agro-processing and industrial projects.

The city maintains a comprehensive management system for dealing with land matters, consisting of policy and legal instruments as well as institutional mechanisms. However, the rapid population growth and urban development of the city, including unplanned settlements, exert enormous pressure on land resources.

Once land has been located, the process of obtaining it can vary depending on the type of business and the level of interest of other parties. For instance, there is a regulation stipulating that to purchase land, foreign investors must advertise the price they are willing to pay in the national newspaper for up to 14 days, and any local Malawian can purchase that land if they have the required capital. The respondents had mixed opinions on this policy. Some local Malawians believe this policy is necessary policy to encourage local investment. However, because the announcement is usually only listed in the newspaper once, many businesses do not learn about the investment opportunity in time to prepare the necessary paperwork. Some foreign businesses criticized the policy because they believe it creates an upward pricing war to ensure that land is obtained, forcing them to pay higher than market prices. The process usually takes two to three months, and all business people interviewed perceived their land to be secure.

Land Prices

Land prices differ quite significantly throughout Limbe and Blantyre. An agro-processor based in the Mapanga industrial area on the outskirts of Limbe pays about 375,000 kwacha (\$2,500) in rent per month per hectare whereas a small electronics store situated in Blantyre city center pays about \$20 per square foot per month. A small hotel in a residential area of Blantyre recently paid 15 million kwacha (\$100,000) for a 1.5-hectare property. Finally, a hotel owner suggested that land prices increased in value from 1,000 to 2,000 percent in the past 10 years.

3.8. Security

Security concerns along with the cost and reliability of electricity rank as the second biggest infrastructure constraint for businesses in Blantyre. Malawi has been relatively politically stable since its independence in 1964, and the transition from one-party rule to a multi-party democracy has been largely peaceful. The country has not experienced any political instability in recent years. However, security issues and, in particular, theft, continue to be a major problem for both small and large enterprises throughout the country. In fact, because transformers, water meters, and diesel fuel are popular with thieves, security concerns inevitably impact other infrastructure costs of doing business.

42 percent (15/33) of the businesses interviewed stated that they had experienced an incident of recent theft. In these cases, 66 percent of the respondents believed that employees were involved to some degree in the theft. Several people interviewed actually suggested that employees were responsible for as much as 90-95 percent of the petty theft. Also, while 88 percent of businesses interviewed (29/33) had security guards, there were cases of guards working with employees to steal goods from warehouses and other facilities. As a result, many business owners believe that security is a real problem, and that it is simply a reality of doing business in Malawi.

For example, the managing director of a large clothing manufacturer stated that his management team is forced to fire approximately 5-10 of his 2,300 workers daily due to petty theft, and that nearly 30,000 garments (or about one percent of inventory) is stolen from the warehouse every year. Further, transporters mentioned that drivers often steal diesel fuel, but because of a shortage of qualified drivers, they choose not to fire them.¹⁸ As a result, many companies budget for a minimum level of theft. Finally, because many employees often use fake identification when applying for jobs (especially in the transport sector), enforcement in the court systems is weak, and bribery of police officers is common. As a result, extended jail time for thieves is rare and theft often goes unpunished.

Security Costs

Security costs can be high for businesses in Blantyre. The largest and most popular security company, G4, can charge up to 56,000 kwacha (\$375) per month for an alarm button call response system and between 50,000 kwacha (\$335) to 100,000 kwacha (\$670) per month for one security guard. However, large businesses with G4 services must pay this amount for every warehouse or facility they own, oftentimes spending well over 1 million kwacha (\$6,700) per month to secure the business. G4 appears to be the only security company in Blantyre with an insurance policy that allows a business to recover the costs of stolen goods. In addition, to purchase and set up hidden video cameras in warehouses to record activity can cost up to \$2,500. Such prices are prohibitively expensive for small businesses. As a result, most businesses hire inexperienced guards without an insurance policy for about 6000 kwacha (\$40) to 12,000 kwacha (\$80) per month.

Coping Mechanisms

The business people interviewed for this study suggested several possible coping mechanisms to deal with theft. The first was to set up a government-sponsored database to keep fingerprints on hand for all security guards. The database would work as a deterrence mechanism against theft. There have been some public discussions about this idea, but no system is in place yet. Second, the managing director of a transport company suggested that drivers should be mandated to complete a nationally-recognized driving course and required to provide more advanced methods of identification, to lower the frequency of false identification. For instance, one transport company has 200 court cases pending against former employees who have stolen items, but because of fake identification, these individuals cannot be tracked. These drivers lie about their residence or purchase a fake driver's license on the black market. To cope with this recurring issue, the management now demands that drivers provide signed guarantee forms from friends or families, stating that they will be legally responsible for stolen goods. However, the company has found that even these guarantees are hard to enforce. Therefore, one trading company, which has had goods stolen in Mozambique, Zimbabwe and South Africa, suggested establishing a SADC regional police force (similar to Interpol) to police against such theft.

Finally, twelve different businesses acknowledged that there is a link between theft and poverty, and suggested that any management strategy to tackle the issue of theft must consider the possible causal effects of low wages, high living costs and the realities of a desperately poor working class (for more information, see Appendix 6.2).

¹⁸ A disproportionately high percentage of the labor force in the transport industry in east and southern Africa have died from HIV/AIDS.

4. OPPORTUNITIES FOR INFRASTRUCTURE INVESTMENT

4.1. Investments in Solar Power

As this report has highlighted, the capacity constraints of both ESCOM and the Blantyre Water Board are inextricably linked, resulting in the poor reliability of electricity reaching businesses in the area. As land becomes scarcer in the city and more businesses continue to develop land outside of greater Blantyre, the costs of connecting to the city's electricity grid will increase. As a result, opportunities exist to expand access to solar power for both urban and rural-based industries in Malawi. However, the industry is stifled by local capacity in manufacturing and the availability of solar power equipment. In fact, none of the businesses interviewed for this study are presently using solar panels, and only four of the businesses (including three hotels) discussed an interest in pursuing solar power research in 2009.

Due to its geographic position, Malawi is a relatively sunny country. One agro-processor building a mill in a rural area outside of Blantyre began investigating solar panels as a possible energy source when ESCOM refused to pay for its connection to the power grid. This company conducted a cost-benefit analysis which found that an investment in solar power is more affordable in the long-term than electricity. Purchasing solar panels allows companies to save money on monthly electricity bills once upfront costs are paid for, over a three- to five-year period. In addition, they help to promote a more environmentally sustainable business, and prevent productivity losses and generator fuel costs associated with frequent power failures. The financial attractiveness of such renewable energy projects can be significantly improved through carbon credits, making them competitive with other forms of power generation, and help to attract local, regional and international investors to such projects.

4.2 Rainwater Harvesting

“In Malawi, despite its potential and the existing infrastructure, rainwater harvesting has not received adequate attention among policy makers, planners and water project engineers or managers. Rainwater harvesting is considered as competing with, rather than [supplementing, the] conventional ground and surface water source. Yet, rainwater harvesting has been shown not only to improve the immediate water situation, but also to improve levels of hygiene, provide water at low costs, increase water security and develop employment opportunities and skills.”

- African Technology Policy Studies Network, 2008¹⁹

Rainwater harvesting refers to the myriad of methods that can be used to gather and store rainwater. It is a process that has been used by urban and rural societies for thousands of years, and there is ample opportunity for investment in this industry in Blantyre. Research shows that rainwater systems are most economical if there is at least 254mm of precipitation in a region in a given year. The southern part of Malawi, with its tropical climate, has an average rainfall of 740mm. The more

¹⁹ Mloza-Banda, Henry Raphael (2008). “Research on Small Scale Rainwater Harvesting for Combating Water Deprivation in a Peri-Urban Area of Lilongwe, Malawi.” <http://www.atpsnet.org/prog/rainwater.html>.

central region of the country, with a more moderate climate, receives an average rainfall of 1,500 to 2,000mm annually, making both regions suitable for rainwater harvesting.²⁰

None of the businesses interviewed in this study are using any form of rainwater harvesting. However, the managing directors of an agro-processing business and a local hotel mentioned that their management team has plans to investigate this option in the coming years. Prices vary depending on size, filtration system, pump equipment needed, transport costs and possible tariffs. However, with frequent water interruptions and many businesses already investing in storage tanks and illegal bore holes, there is a clear willingness for businesses to search for innovative coping mechanisms for Blantyre's water constraints.

Further information can be found through the Southern and Eastern Africa Rainwater Network (<http://www.searnet.org/>) and the Rainwater Harvesting Association of Malawi – RHAM (P/Bag 149, Lilongwe; rham@sdpn.org.mw).

4.3 Low-Cost Biofuel Opportunities

Many urban households in the greater Blantyre region are not connected to the electricity grid and still rely on biomass (wood, charcoal) for cooking and heating water. Research by academic institutions, NGOs and innovative environmental technology companies into low-cost environmentally-friendly bio-fuel options and opportunities could significantly reduce fossil fuel requirements, and reduce the emission of harmful substances associated with the burning of fossil fuels. Such projects, including the biofuel stove and lamp projects discussed below, could be subsidized by carbon credits.

The Blantyre infrastructure investment study highlights two possible bio-fuel projects for consideration by interested donors and investors:

BIOFUEL PROJECT 1 – JANEEMO Project

Contact Information:

Jonah Itai Chimusoro

Entech CEO

jonachimusoro.ez@gmail.com

The Macaulay Institute, in collaboration with Climate Futures, Entech and Environment Africa began a 3-year bio-fuels project in October 2008 with a £340,000 grant from the Scottish Government's International Development Programme, in the Lower Shire district of Chikwawa, south of Blantyre.

Three tree species, Jatropha, Neem and Moringa (collectively known as *JANEEMO*), will be grown by farmers on marginal lands. The trees have multiple uses. Their oil-rich seeds will be processed to produce locally used biofuels for lamps, stoves and generators. The residue from this process will then be used as an agricultural fertilizer. In addition, extracts from the Neem and Moringa trees, which have important nutritional and medicinal uses, will be actively promoted among communities.

A key aim of the *JANEEMO* project is to ensure self-sustaining enterprises beyond the end of grant funding. **Business model options, including micro- and carbon finance, are being evaluated and interested donors and investors are asked to contact the CEO of Entech for further information.**

²⁰ AfricaNet. "Malawi Climate,"

<http://www.tanzaniaodyssey.com/www.africanet.com/africanet/country/malawi/climate.htm>.

JANEEMO trees will be grown primarily as living fences and intercropped on marginal land. Good agricultural and harvesting practices will be promoted, avoiding disruption to food crops. The *JANEEMO* seeds will be pressed and used to develop 'ethical' biofuel, fertilizer and soap. To start, 30 farmers will be trained, and by year three, the project plans to have over 2,000 farmers involved – growing 10,000 *JANEEMO* trees and producing 2,500 liters of biofuel. Priority will be given to meeting household and village fuel needs, such as for lamps and generators. Hand oil presses, used by individuals for biofuel processing, will be distributed widely. Once household needs are met, construction of village-scale processing plants will allow enterprises to flourish. Over time, each district will establish an 'energy center', including a diesel engine, oil expeller, generator and maize mill, which will be managed by a *JANEEMO* growers association.

The project is being led by the Macaulay Institute, one of Europe's leading land use research agencies and a major contributor to Scottish Government policy. It has extensive project experience and partnerships with NGOs in Africa for climate change and development initiatives. It is supported in Scotland by Climate Futures, a multidisciplinary carbon management and climate communication agency.

Environment Africa, an NGO, will deliver the project on the ground, including agricultural training for farmers. It will be assisted by Entech, which will ensure oil-pressing equipment is distributed and used correctly. The department of forestry within the Government of Malawi has offered its support, along with many community and village groups. A collaborative link with a permaculture (herb and nutrition) program will further broaden the program.

BIO FUEL PROJECT 2 – BluWave / SuperBlu Biofuel Stoves

Contact Information:

A Gaffar Jakhura

Gift of the Givers Foundation

Chairman of Malawi Country Office

Tel: +265 (0) 1 842 287 / 654

Mobile: +265 (0) 8 826 417

Fax: +265 (0) 1 842 782

Email: agj@giftofthegivers.org

Web: www.giftofthegivers.org

Bluwave Ltd

P.O. Box 80006,

Maselema, Blantyre 8

Malawi

Tel: +265 (0) 1 642 287 / 873 / 469

Fax: +265 (0) 1 642 782

Email: marko@bluwavemv.com

The SuperBlu Stove (SBS), developed by Bluwave Limited (Malawi) over the last two years, is a specially designed burner that uses ethanol (an alcohol-based fuel) instead of paraffin. The concept of an ethanol-based burner began with the promoter's search for an affordable and safe substitute for biomass (firewood and charcoal). The SBS looks like a conventional stove but has no consumable parts, such as wicks or mantles. It is designed to be versatile and, in cold conditions, converts into a heater by means of a ceramic cylinder, which fits on top of the stove. The cylinder heats up, retains and radiates the heat to warm the surroundings. On top of the cylinder is a space for a kettle to heat water.

SBS's fuel consumption is over 5 times more efficient than a standard stove so that, for example, 50 ml of paraffin will burn for about 9 minutes in a standard paraffin stove, whereas SBS will burn for 45 minutes or more using the equivalent amount of ethanol. More importantly, SBS reaches burn temperatures of 700°C to 800°C compared with paraffin equivalent which burns at up to 450°C. The combined effect makes SBS up to 13 times more efficient, and therefore proportionately cheaper to run, than the standard paraffin stove.

These results are achieved by means of the burner and combustion chamber that effectively converts ethanol into gas which burns at nearly the calorific efficiency of methane gas. Ethanol is easy to produce relative to gas, while being much safer to handle, store and use. In addition, there are no noxious or unpleasant fumes or emissions since the SBS burner emits water vapor and carbon dioxide in the natural and stable state in which they are already found in the atmosphere. Hence, the products are suited for use indoors, unlike wood-based fuels. There is also no residue or waste produced when burning ethanol, thereby reducing the negative environmental impact.

The Gift of the Givers Foundation, a local humanitarian and development NGO based in Blantyre, has been supporting Bluwave research for several years. However, to be commercially viable and to be able to expand production and outreach to low-income communities throughout Malawi, further investment is needed. **Interested donors and investors should contact Bluwave Ltd or the Gift of the Givers Foundation for more details about the viability**

and research behind the product, a free informational CD about the product, and information about investment and partnership opportunities.

4.4 Plastics Recycling Plant

While most businesses mentioned that the garbage collection system in Blantyre operates in a relatively efficient manner, very few businesses mentioned any engaging in recycling. In fact, while spare auto parts are recycled and some wastepaper is reprocessed in town, there are few governmental recycling rules and no large-scale private sector companies involved in the recycling industry. The study highlights possible investments in plastics recycling.

Most plastics in Malawi are imported and therefore investors are already beginning to see the opportunity to produce plastics locally. In addition, as a country with many fresh water resources, Malawi is an attractive investment for mineral water bottling. In fact, MIPA has begun to attract investment into this industry, and there has been an increase in the water bottle market. As a result, plastic bottle waste is expected to increase as well. Other areas of local plastic manufacturing include toothbrushes, house wares, furniture, shoes, as well as materials for the construction industry. With an ever-increasing amount of plastic products being thrown away each year, particularly in urban areas, there are ample investment opportunities for the plastics recycling industry.

This study identified one particular small business – Lakeland Ltd (a subsidiary of Rab Processors) - that is looking for start-up capital for a plastics recycling plant. The innovative social mission, employment generation model, and environmental focus make the project an attractive investment opportunity for both donors and socially responsible commercial investors.

LAKELAND LTD. PLASTIC RECYCLING FACILITY

Contact Information:

Ahmed Sunka

Tel: +265 (0) 1 845 200 / 13

Marketing & Communications Executive

Direct: +265 (0) 1 842 441

Address: PO Box 5338, Limbe, Malawi

Cell: +265 (0) 8 844 411

Email: asunka@rabmw.com; Web: www.rabmw.com

Fax: +265 (0) 1 844 927

Initial Start-up capital needed: \$100,000

Vision: *To create the first for-profit plastic recycling facility in Malawi that provides a livelihood for marginalized urban communities in Blantyre, while reducing the city's environmental footprint by producing low-cost recyclable products targeting the rural poor.*

Rationales:

Rational (1) – Environmental: Expand plastics recycling facilities in Blantyre, by investing in machinery that converts plastics into black sheeting (polypropylene sheets) to be used by smallholder farmers and the rural poor to put under their thatched roofs during the rainy season.

Rationale (2) – Social - targeting poor urban input suppliers: There are hundreds of street children, homeless and destitute people in urban centers such as Blantyre that are in need of income generating activities to survive. Many of these people are the same ones that are looking in garbage bins and trash sites for food or other products that they could use, pick up or potentially sell. The recycling project plans to work with local community organizations to create a grassroots social movement that can mobilize these people to support a plastic recycling campaign that buys plastic bottles and other plastic materials from the poor who collect them.

Rationale (3) Social - targeting poor / BOP rural customers: The recycling collection will be used and converted to polypropylene sheets – and the end products will be black sheeting mainly used by smallholder tobacco farmers and the rural population to cover their roofs during the rainy season. The poor in rural areas are already purchasing imported black sheeting (polypropylene sheets) each year to put under their thatched roofs during the rainy season, and therefore

Lakeland can begin to locally manufacture a much-needed product at a cheaper price. The locally manufactured black sheeting sheets will be affordable and use a base-of-the-pyramid (BOP) marketing, sales, and delivery scheme to target those living on less than a dollar a day, by providing them with an appropriate technology, that itself can be recycled if they tear during or after the rainy season.

In addition, there is a strong safety component in the processing. The product is being reprocessed into a thin plastic sheet that will not be used again for fuel or liquid consumption. The processor will clean the plastic, and because phytosanitary standards do not necessarily apply since the sheeting is only a temporary roof covering, the safety concerns that other recyclable products face is not present in such a project.

Rational 4) A profitable social venture that can act as a catalyst: While a non-profit model for a recycling facility that targets street children and beggars has advantages, Lakeland Ltd. believes that a financially sustainable model will allow the venture to generate more income for more poor people, by ensuring that there is a profit-driven cost-recovery mechanism built into the company's operation. Also, by demonstrating to the business community of Blantyre that recycling facilities can be profitable, the project can act as a catalyst to encourage other entrepreneurs to begin investing in similar industries.

4.5 Waste-To-Energy Project

It is estimated that the average household produces enough waste to meet all of its energy requirements.²¹ A number of major waste streams exist, each with a number of potential technologies, including municipal solid waste such as landfill gas to energy, and gasification and mechanical biological treatment, among others. All of these solutions involve a significant upgrade in the sanitary condition of municipal disposal sites. In addition, wastewater, through biogas reactors, gasification, and other projects which target the development of wastewater treatment facilities, can significantly improve the sanitation of city sewerage systems.²² There is ample opportunity to work with the Blantyre City Assembly and other city and national authorities to invest in various waste-to-energy projects.

In particular, this study highlights one innovative refuse waste project that plans to harness methane gas as way to fuel public transport systems in Blantyre and Limbe:

REFUSE WASTE DERIVED METHANE AS A VEHICLE FUEL IN THE CITY OF BLANTYRE

Contact Information:

Jonah Itai Chimusoro

Entech CEO

jonachimusoro.ez@gmail.com

Motivation Note

Methane is responsible for nearly as much global warming as all other non-CO₂ greenhouse gases put together. Methane is 21 times more powerful a greenhouse gas than CO₂. While atmospheric concentrations of CO₂ have risen by about 31 percent since pre-industrial times, methane concentrations have more than doubled. Whereas human sources of CO₂ amount to just three percent of natural emissions, human sources produce one and a half times as much methane as all natural sources.

Millions of cubic meters of methane in the form of swamp gas or biogas are produced every year by the decomposition of organic matter, both animal and vegetable. It is almost identical to the natural gas pumped out of the ground by the oil companies and used by many of us for heating our houses and cooking our meals.

²¹South Pole: Carbon Asset Management Ltd. "Questionnaire for evaluating CDM opportunities in Africa's Millennium Cities." Pg 4.

²²*Ibid.*

1. Aim of the Project

The aim of the project will be the purification of the biogas produced by the sludge treatment plant in Blantyre – Malawi and its subsequent utilization as a fuel in public transport in the Limbe-Blantyre area. After purification, the gas will be compressed to 350 bars to be used in the modified diesel engines of municipal buses.

2. Introduction

The purpose of the project will be the development of appropriate technologies for the conversion of mini buses so that they can run on methane produced by the sewage biogas plant. The fuel gas will have good energy, with efficiency at costs comparable to current fuel prices, and the project should result in significantly less air pollution generated by public transport services, and provide youth employment, a reduction of methane released into the air and huge savings on foreign exchange.

The objective will be to purify 10 m³ per day of biogas produced in the wastewater treatment market as a substitute for 600 liters of vehicle fuel. The modification of the diesel engines to operate on purified biogas (98 percent dry methane free of H₂S) allows also the utilization of natural gas, which means that it can be used in case there is a problem with the production and supply of the purified biogas. The project was initiated by the consortium of BEE KIND, a Malawian NGO, Entech and the Blantyre Council. Several other companies are expected to join and their expertise will complete all technical aspects of the project. **Interested donors and investors are strongly encouraged to contact Entech for more information on investment opportunities.**

3. Technical Description

The project is based on environmental issues identified in the Malawi National Environmental Action Plan, including Human Habitant degradation, air pollution and climate change. The unit will be designed to comply with environmental constraints, and the methane loss during the scrubbing will be negligible (0.2 percent). The specially designed alloy tanks will be built to cover such possible events as fire or criminal acts.

4. Performance of the Purification Plant & the Buses

Exhaust gases emitted by the gas fuelled buses will be much lower than those of fossil fuels. It is expected that continued innovation on several aspects of the project will result in a significant reduction in gas consumption due to the following reasons:

1. Improved energy-efficiency through the development and improvement of gas purification technology,
2. Reduced weight of the on-board storage gas tanks with the introduction of composite materials. These developments will further improve the energy balance, environmental performance and overall economic viability.

4.6 Ministry of Industry 2008 Project Summaries for Potential Investors

In mid-2008, the Ministry of Industry and Trade published a brief guide of various opportunities in the Malawian economy for potential investors. The Blantyre region infrastructure projects listed in the guide are summarized below. The list highlights opportunities in the transport, energy and ICT sectors and aims to attract long-term investment from interested donors and commercial investors.

**Table 8: Government of Malawi - Ministry of Industry and Trade
2008 Infrastructure Summaries for Potential Investors**

Transport, Aviation & Core Infrastructure Projects									
Project Name	Project Description	Project Location	Economic Sector	Project Promoter	Est. Value (US \$ Millions)	Project Stage	Current Status	Collaboration Sought	Contact Person/ Address
Air Transport Services	Purchase of aircraft for provision of air transport services	Lilongwe, Blantyre, Mzumu	Transport	Ministry of Transport	12	Commencement	Waiting for investment	Public-Private Partnership	Director of Planning
Vessel Operating and Management	Operation of vessels on Lake Malawi for passengers and cargo	Lake Malawi	Transport	Ministry of Transport	15	Detailed information available	Information available	Public-Private Partnership	Ministry of Transport
Rehabilitation of Chileka Airport	Rehabilitation and expansion of infrastructure at Chileka Airport	Chileka, Blantyre	Transport	Ministry of Transport	25	Detailed information available	Feasibility study done	Public-Private Partnership	Ministry of Transport - Lilongwe
Sena Railway Line	Rehabilitation and management of the Malawi side of the Sena Railway line linking Mawali and Mozambique to the Indian Ocean port of Beira	Southern Malawi	Transport	Ministry of Transport	30	Detailed information available	Feasibility study done	Public-Private Partnership	Ministry of Transport
Shire-Zambezi Waterway Project	Purchase of vessels, river barges/ sea going vessels	Nsanje	Transport	Ministry of Transport	80	Feasibility Study	Feasibility study in progress	Public-Private Partnership	Director of Planning

Source: Government of Malawi. Ministry of Industry and Trade. Project Summaries. 2008.

**Table 9: Government of Malawi - Ministry of Industry and Trade
2008 Infrastructure Summaries for Potential Investors
(Continued)**

Project Name	Project Description	Project Location	Economic Sector	Project Promoter	Est. Value (US \$ Millions)	Project Stage	Current Status	Collaboration Sought	Contact Person / Address
Energy Projects									
Kholombidzo Hydro Power (Lower)	Hydropower generation	Southern Malawi	Energy	Department of Energy	312	Detailed information available	Feasibility study done	Equity / Loan	Ministry of Energy & Mines
Kholombidzo Hydro Power (Higher)	Hydropower generation	Southern Malawi	Energy	Department of Energy	330	Detailed information available	Feasibility study done	Equity / Loan	Ministry of Energy & Mines
ICT Projects									
Mobile Virtual Network Operators	Operating of a 4th mobile Company in Malawi	Blantyre	ICT	Depart. of Info. Systems and Tech. Management Services	10	Feasibility Study			Depart. of Info. Systems and Tech. Management Services
Telecommunication Network Infrastructure and Signal Distribution	Telecommunication infrastructure provision	Blantyre	ICT	Depart. of Info. Systems and Tech. Management Services	25	Feasibility Study done	Information available		Depart. of Info. Systems and Tech. Management Services
Fiber Optics Networks	Installation/expansion of new fiber optic cable with connectivity to other countries	Blantyre	ICT	Depart. of Info. Systems and Tech. Management Services	40	Information available	Feasibility Study done		Depart. of Info. Systems and Tech. Management Services

Source: Government of Malawi. Ministry of Industry and Trade. Project Summaries. 2008.

5. CONCLUSION

As the industrial capital of Malawi, Blantyre is a very attractive location for investment. Safe, politically stable, resource-endowed and blessed with great tourist potential, Blantyre offers investors many possibilities for investment. However, this working paper has highlighted some of the infrastructure constraints of doing business that must be addressed if Malawi is to be internationally competitive. There are numerous transport, electricity, security and telecommunications concerns to be addressed. The particular regulatory, financial, logistical and competitive limitations faced by smaller and medium-sized enterprises should also receive particular attention. Finally, investment in human capital and social sectors must complement any infrastructure investment to ensure a skilled workforce and support Blantyre's emerging private sector.

6. APPENDICES

1. Infrastructure Survey

1. Basic Information	
What types of products/services do you provide?	
How many employees do you have?	
What general sector does the business fall under:	
2. Electricity	
2.1. Current options	Are you currently connected to the electricity grid? Do you have your own resources of electricity such as a generator? What is your current monthly electricity demand in watts or kilowatts?
2.2 Quality of supply and interruptions and vendor response	Does the supply keep within the limits of the promised frequency? How frequently is supply interrupted (number of times per week or month)? How long do service interruptions last?
2.3 Coping strategies	What strategies do you use to cope with low quality supply and supply interruptions (generators, closing down, etc.)? Describe type of back-up power supply and equipment. What are the costs associated with back-up power for your business?
2.4. Cost	Do you have a special agreement with the supplier? What is the rate structure?
2.5. Time to establish a connection	Describe how the connection was established and how long it took. What was the contribution of the consumer to establishing the connection?
3. Other Energy Options	
3.1 Current Options	Describe your current non-electricity energy mix (liquid fuels, gases, biomass, etc.) and the services provided by each energy source (i.e. heating/cooling, powering machinery and appliances, cooking, etc.). Describe your current consumption of each energy option (i.e. liters/month). If supplies increased, what would be your peak demand for each fuel?
3.2 Quality of supply and interruptions and vendor response	Does the supply keep up with your current demand? How reliable is the supply? How frequently is supply interrupted?
3.3 Coping strategies	What strategies do you use to cope with low quality supply and supply interruptions?
3.4. Cost	Describe the prices and taxes for each energy source. Do you have a special agreement with the supplier(s)? What is the cost structure? How is

	the payment arranged? Do the rates seem fair? How have prices changed in the last 1, 5, and 10 years?
4. Water	
4.1. Source	Describe your current source of water. Where does the water come from (groundwater, reservoir, etc.)? How far away is the source from your facilities?
4.2. Supply interruptions and vendor response	How frequently is supply interrupted? How long do service interruptions last? Which form of communication is established with the supplier in case of interruptions? Is there any fallback available?
4.3. Quantity	How much water is typically consumed for business purposes in liters/week or month (irrigation, toilets, cooking, livestock, machinery, etc.)?
4.4. Quality	What is your perception of the quality of the water? Have you taken any steps to test the water? Does your firm treat or process water for any purpose? If so, please describe.
4.5. Coping strategies	What strategies do you use to cope with supply interruptions?
4.6. Cost	What is the rate structure? How is the payment arranged? Do the rates seem fair?
4.7. Seasonality	Is there substantial season-to-season variation in quality or reliability of water supply? To what extent is rainwater used for industrial purpose?
5. Wastewater	
5.1. Structure of wastewater treatment	How does your firm dispose of wastewater? Have you outsourced the wastewater treatment?
5.2. Capacity to handle industrial effluent	What pre-treatment is required prior to feeding industrial effluent into municipal systems?
5.3. Regulatory environment	Describe your interactions with the authorities responsible for wastewater treatment.
5.4. Cost	Describe the cost for wastewater treatment.
6. Telecommunication	
6.1. Time to establish landline connection	Does your business rely upon landline or mobile telephone? Describe how the connection was established and how long it took.
6.2. Cost structure	Describe the installation and utilization cost both for landline and cellular connections (local, in-country and calls outside the country). Include also fax services.

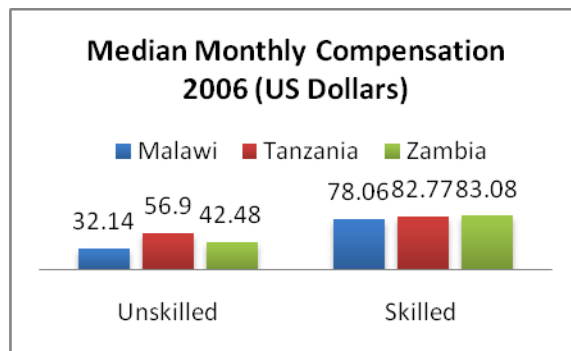
6.3. Internet services	Does your business have access to the internet? Describe the providers and connection options. What is the rate structure? What is the method of connection (dial-up, landline broadband, Wi-Fi, satellite)?
6.4. internet connection speeds	What is the typical connection speed? Do connection speeds inhibit use? How frequently is connection interrupted?
7. Solid waste	
7.1. Availability of solid waste disposal service	What methods are used to dispose of waste (i.e. incineration)? Is there a recycling system (informal, formal) established? Is there any quality management in place? Have you outsourced the solid waste disposal?
7.2. Cost	Describe the rate structure for disposal.
7.3. Industrial waste	What kinds of services and facilities, if any, are available to handle industrial waste?
8. Ground transport	
8.1 Domestic services	Describe how raw materials are transported to your business and how products/services are delivered to your customers domestically. What is the average transport distance for raw materials? What is the average transport time for raw materials?
8.1a Roads	Does the condition of the roads hinder your ability to either receive or ship goods? How much do road conditions add to your business – both in man-hours and money?
8.2. Urban transit	How do workers arrive to work? In your perception, is the state of the transport system a barrier to worker productivity? Have you established your own service to bring workers to the plant? Do you own the direct access road to your plant?
8.3. Main statistical indicators	Miles of paved road/1000 people (urban area only), miles of paved road/1000 people (state or province)
9. Air transport	
9.1. Availability	Does your business make use of air for transporting people or goods?
9.2. Frequency of use?	If so, how often?
9.3. Cost	How much do you pay for air transport on a monthly basis? How have air transport costs changed over the last 5, 10 years?
9.4. Reasons for non-use	If not, why don't you make use of air transport?
10. International freight	
10.1. Availability	Describe the options that your firm regularly considers: Rail? Port? Air

	freight?
10.2. Cost	What is the cost to transport a container to a major European port? What is the preferred method? What is the transit time?
10.3. Storage	Are warehouses, including bonded warehouses, and storages, including cold storages, available? Describe how access to storage facilities, including refrigeration, impedes your business.
11. Access to land	
11.1. Tenure	Does your firm own the land where it does business? If not, why? If so, do you perceive your tenure to be secure? How much did you pay for the land per acre (or hectare)?
11.2. Availability	If you wanted to expand operations, is there a sufficient supply of affordable land available to meet expansion needs? How long would it take you to obtain additional land?
11.3. Zoning	Are there zoning restrictions that limit what you can do on your site?
12. Security	
12.1. Major considerations	Are there security considerations that significantly affect your business?
12.2. Defensive measures	What measures does your firm customarily take to ensure the security of its facilities?
12.3 Cost	What are the costs associated with securing your facilities?
13. General	
	Of all the categories we discussed today, which causes the greatest constraint to your business?

2. Poverty and Theft

Malawi is one of the poorest countries in Africa, with an average wage that is significantly lower than many of its neighboring countries and comparable to many of the low-cost labor centers of Asia. With a stable political system and an abundance of natural resources, Malawi's cheap workforce adds to its attractiveness. However, as living costs, and oil and food prices have increased in recent years, most Malawians, even those working in stable government or industrial manufacturing jobs, have had difficulty meeting the basic needs of their families. Some business owners in Blantyre recognize such realities and believe there is a correlation between poverty and the increase in employee theft in recent years.

Table 10: Comparative Monthly Compensation for Malawi and its Neighbors



Source: 2007 Investment Guide to Malawi.

Table 11 below shows the standard cost of living per month for most working class Malawians against the average wage. The table shows that the average cost of living (excluding health, school fees, etc.) has gone up by nearly 12 percent in the last year, and that even a skilled laborer getting paid nearly four times the minimum government wage struggles to earn enough money to cover two-thirds of his or her family's daily expenses. For example, in 2008 an average Malawian family of four living on the outskirts of Blantyre needed to earn 1,063 kwacha (\$7.09) per day to cover daily expenses. However, unskilled casual day laborers earn about 230 kwacha (\$1.59) per day and full-time factory workers earn on average 635 kwacha (\$4.36) per day. These low wages, which are still significantly higher than the minimum wage, do not cover family expenses.

The local agro-processor factory manager that compiled the research for this table presented his findings at a company board meeting, and used it to justify a wage increase. Many of the Blantyre business people that were interviewed spoke about the link between theft and poverty and expressed that they are often sympathetic to their workers' struggles. As a result, many of these managers try to create more inclusive working environments that properly compensate workers, while maintaining strong security measures.

In addition, the study revealed that many businesses (particularly those owned by Asians and Malawians of Asian descent) do not employ ethnically black Malawians as managers. Some respondents expressed that this creates a lack of ownership or responsibility towards these business among Malawians, which can result in increased rates of theft. Consequently, one restaurant owner described a successful human resource management strategy he employs to limit theft and create

proper incentives. Under his transparent merit-based system, staff are promoted, paid higher wages than many other restaurants and given health benefits and education credits. His system has led to a drastic reduction in theft, he claims.

Table 11: Average Monthly Cost of Living in Blantyre

Standard Average Cost of Living per Month (Kwacha) **					
Consumables (Groceries)	Quantity / Month	2007		2008	
		Cost / Unit	Amount	Cost / Unit	Amount
Beef ration - 1kg	4	478.00	1,912.00	478.00	1,912.00
Bread flour - 1kg	2	290.00	580.00	290.00	580.00
Bread white standard	15	70.00	1,050.00	70.00	1,050.00
Chicken / unit	2	400.00	800.00	800.00	1,600.00
Covo cooking oil 500 ml	2	306.00	612.00	306.00	612.00
Dried beans	4	120.00	480.00	180.00	720.00
Eggs / unit	3	170.00	510.00	170.00	510.00
Floor polish	1	490.00	490.00	490.00	490.00
Lifebuoy hand soap	4	33.00	132.00	33.00	132.00
Maluwa laundry soap	4	13.00	52.00	13.00	52.00
Margarine	3	130.00	390.00	200.00	600.00
Powdered milk	2	695.00	1,390.00	895.00	1,790.00
Rice / kg	2	165.00	330.00	598.00	1,196.00
Salt 1kg	2	83.00	166.00	83.00	166.00
Shoe polish - 100gm	1	278.00	278.00	278.00	278.00
Sugar - 1kg	4	109.00	436.00	130.00	520.00
Surf washing powder - Standard size	4	50.00	200.00	50.00	200.00
Tea 250gms	1	145.00	145.00	430.00	430.00
Tooth paste	1	222.00	222.00	222.00	222.00
Ufa maize meal - 20kg	2	2,550.00	5,100.00	2,550.00	5,100.00
Vaseline - 425g	1	399.00	399.00	399.00	399.00
Vim dishwashing soap	3	47.00	141.00	47.00	141.00
Total Per month (consumables)			15,815.00		18,700.00
Rent			3,500.00		3,500.00
Electricity / (Firewood and candles)			1,000.00		1,000.00
Water			800.00		800.00
Roundtrip bus fare trips / month *	26 (avg 6 days of work/wk)	140 (70 each way)	3,640.00	140 (70 each way)	3,640.00
Cost per month (other items)			8,940.00		8,940.00
Total / month			24,755.00		27,640.00
Average family wage needed per day to meet basic needs			952.12		1,063.08

Source: Compiled by local factory manager as research for company's yearly wage analysis.

* Bus fare is optional. Those outside the city do not use buses but some of those in the city will use two buses a day.

** This index does not include other needs like medicine, school fees, and social responsibilities (weddings, funerals).

Table 12: Average Wage Rates in Malawi

	<u>Monthly Wage</u>		<u>Daily Wage (avg 26 days/month)</u>	
	Kwacha	US Dollars	Kwacha	US Dollars
Minimum wage for government employee	3,500.00	\$ 24.04	134.62	\$0.92
Average wage for casual day laborer in Blantyre/Limbe*	6,000.00	\$ 41.21	230.77	\$1.59
Average wage for full time factory worker in Blantyre/Limbe*	12,000 ~ 16,5000	\$82.42 ~ \$113.33	460.00 ~ 635.00	\$3.17 ~ \$4.36

* Compiled by author during research and does not reflect a formal wage labor study, but general data gathered from businesses.

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