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**ASSESSING INFRASTRUCTURE CONSTRAINTS ON
BUSINESS ACTIVITY IN KUMASI, GHANA**

Ginger Baker

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
1. PURPOSE.....	6
2. METHODOLOGY	8
2.1. LIMITS TO RESEARCH.....	8
2.2. INTERVIEW SCHEDULE	10
3. RESULTS.....	11
3.1. ELECTRICITY	11
3.2. ENERGY/LIQUID FUELS	14
3.3. WATER	16
3.4. WASTE DISPOSAL.....	18
3.5. TELECOMMUNICATIONS	20
3.6. TRANSPORTATION	22
3.6.a. <i>Ground Transportation</i>	22
3.6.b. <i>Air Transportation</i>	24
3.6.c. <i>Port Access</i>	25
3.7. LAND.....	25
3.8. SECURITY.....	26
4. OPPORTUNITIES FOR INFRASTRUCTURE INVESTMENT	27
4.1. RENEWABLE ENERGY.....	27
4.2. ROAD & RAILWAY PRIVATIZATION.....	28
4.3. RECYCLING/SCRAP DEALERS	29
5. CONCLUSION	30
6. APPENDIX	31
6.1. INFRASTRUCTURE SURVEY	31
6.2. REFERENCES.....	35

Assessing Infrastructure Constraints on Business Activity in Kumasi, Ghana

Ginger Baker*

EXECUTIVE SUMMARY

The development of urban infrastructure is intimately connected with the process of economic growth. Businesses depend on reliable water and electricity sources, affordable and plentiful land for expansion and modern transportation networks to reach the markets they serve. Inadequate infrastructure can deter investments and lead to a general climate of economic decline.

In the city of Kumasi, Ghana's second largest city, the growing economy and surge in population are placing stress on the infrastructure systems. In 2006, the population of Kumasi grew at 5.5% - almost twice the national average.¹ This rate of growth presents both challenges and opportunities to businesses and economic growth in Kumasi and the Ashanti region.

The primary infrastructure constraint for 43% of the entities interviewed was inconsistent electricity supply and energy costs. This study found that the primary concerns are the erratic supply of electricity, frequent voltage fluctuations, and the high cost of alternative sources of energy. Currently, businesses in Kumasi are experiencing, on average, five power outages a month, lasting approximately three hours each. Although the consistency of the electricity supply and the length of disruptions have improved, companies are still hindered by the uncertainty over power outages. It is common for businesses to take precautions to protect machinery from surges. These actions, coupled with the increased cost of maintaining diesel generators and the loss of production during power outages, place an undue burden on business activity in Kumasi.

Ground transportation was the second most cited constraint with nine of the businesses ranking roads as the most disruptive element of doing business in Kumasi. Road concerns were focused on congestion in the city center (6 out of 9 respondents) and road conditions outside of town that substantially increased the cost of doing business in terms of time, vehicle repairs, inaccessible clients and raw materials, and additional costs of labor due to overtime (3/9).

Water quality and supply were commonly listed as "secondary constraints" but were only considered the most disruptive component of infrastructure in 7% of the interviews. Other areas of concern were related to Information, Communication and Technology (ICT) costs and the proximity of new land for expansion to the existing business site or the complexity of the land acquisition process.

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¹ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*, p. 5.

Box 1 - Infrastructure Constraints on Businesses in Kumasi, Ghana

Primary

- Inconsistent electricity supply

Secondary

- Road congestion (in city center)

Tertiary

- Poor road conditions (primarily on the outskirts of Kumasi)
- High costs of backup electricity and other energy options
- Lengthy process for land acquisition and location of available land

Even in the face of these obstacles, the business climate in Kumasi is optimistic. The businesses interviewed understood the causes of these constraints (growing population, outdated water pipes, decreased rainfall for hydropower) and were fair in their assessments regarding the challenges relating to infrastructure in Kumasi. The recent improvement in the electricity supply has generated hope that expansion projects underway, in both hydropower and Liquefied Petroleum Gas (LPG), will continue to improve the situation in Kumasi. Additionally, evidence of road maintenance and the possibility of developing new railways and an international airport will provide relief to many businesses.

In other areas, Kumasi offers opportunities for investors. The cost and availability of land, a secure work environment, the relatively advanced stage of ICT development compared to other African countries² and the underdeveloped waste management and alternative energy sectors offer opportunities for doing business in Kumasi. It is possible to capitalize on the existing infrastructure in Kumasi while providing solutions to the current constraints. Participants in this study observed opportunities for investment and growth in Kumasi that could provide both profitable enterprise activities and improvements to the local environment for commercial entities. Some specific opportunities for investment (and the constraint they help address) are outlined in Box 2.

Box 2 - Investments and Constraints

Investment Opportunity

Constraint Addressed

Railway network rejuvenation	→	Road congestion, ground transportation
Renewable energy sector	→	Energy availability & cost, waste collection
Private roads	→	Road condition & road congestion
Formal recycling/scrap business	→	Waste collection

² Gillwald, Alison and Stork, Christoph (2006). "Towards an African e-Index: ICT Access and Usage Across 16 African Countries," *ICT Sector Performance Review*, <http://www.researchictafrica.net/images/upload/Cairo.pdf>, p. 11.

1. PURPOSE

The primary objective of this study is to assess current infrastructure in the metropolitan region of Kumasi and to understand better how that infrastructure either helps or hinders commercial activities. The secondary goal of this analysis is to identify key areas of opportunities for infrastructure investment that could enable existing and emerging businesses to thrive.

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

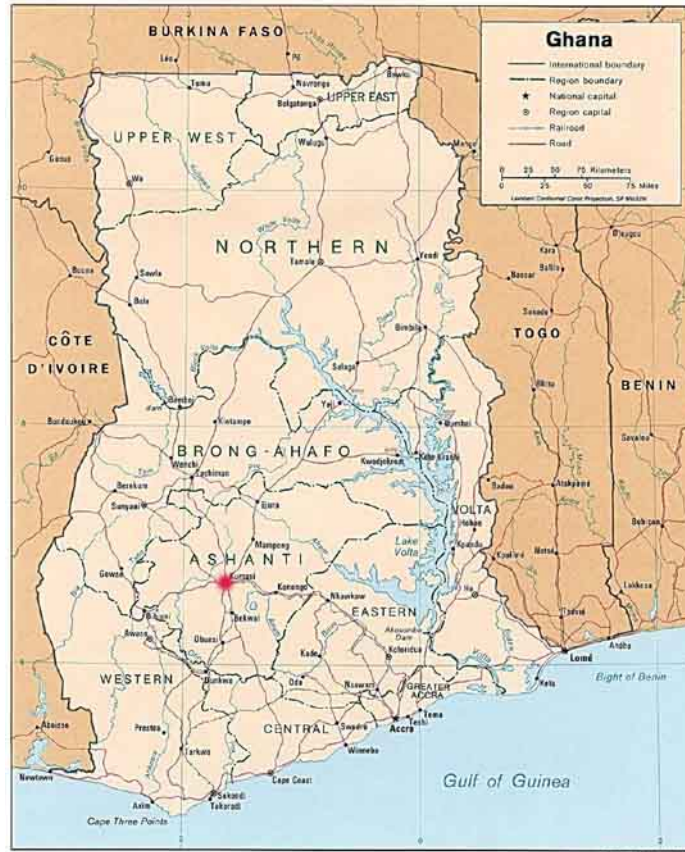
Located 270km north of Accra, Kumasi is the capital of the central Ashanti region and one of Ghana's most important cultural cities. Most major roads from the Ivory Coast, Togo and Burkina Faso connect in Kumasi – either directly or via Tamale, Ghana's third largest city located in the Northern Region. With a population of 1.6m, Kumasi accounts for 33% of the Ashanti region's population and is projected to reach 1.9m by 2009.³ Teak harvesting, breweries and agro-processing dominate the economy of this Millennium City, and the city is teeming with new business ideas and capable entrepreneurs. Kumasi boasts a bustling downtown and marketplace; however, the infrastructure of the city requires upgrading before it can reach its full potential.

As the upgrading and rejuvenation begins, it is imperative to prioritize the development of public works in order of importance to the citizens and businesses residing in the area. A key component of this study is that it includes the perspectives of a variety of businesses that vary in industry, size and potential for growth. These entities have a first-hand understanding of the nuances of business development in Kumasi.

Additionally, this research uncovered creative coping mechanisms used by businesses to deal with infrastructure challenges. These coping mechanisms, often adopted out of necessity, are largely the basis for the recommended investment opportunities – turning simple solutions into profitable business concepts.

³ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*, p. 5.

Map 1 - Ghana



Source: Baden-Powell, R.S.S. (2007). "The Downfall of Prempeh: A Diary of Life with the Native Levy in Ashanti 1895-6," <http://www.pinetreeweb.com/bp-prempeh-large-map.htm>.

2. METHODOLOGY

Data for this analysis were obtained through a series of interviews and site visits with the directors, general managers, engineers or owners of 28 businesses located in Kumasi. This analysis also includes information collected during meetings with officials from the Ghana Water Authority (GWA), the Electrical Company of Ghana (ECG) and the MCI staff working in Kumasi. All interviews were conducted during the period of January 3, 2008 – January 23, 2008.

Care was taken to obtain perspectives from businesses of varying sizes and industries. For this purpose, there is approximately an equal number of smaller businesses (< 30 employees), medium-sized businesses (30 – 75 employees), and larger businesses (> 75 employees) included in the study.⁴ The industries represented in the interview schedule below were chosen because they were considered high-potential industries by the MCI staff, the Kumasi Metropolitan Authority (KMA) or KPMG, which has partnered with the MCI in a number of Millennium Cities, or because these industries are currently concentrated in Kumasi or have been in the past. The breakdown of industry representation includes: agriculture/agro-processing (6), metals & construction (4), pharmaceuticals (3), printing (3), wood/timber (3), tourism (2), beverages (2), garment/textiles (2), general manufacturing (2), and leather working (1).

The interviews were facilitated through local MCI staff with the support of the Association of Ghanaian Industries (AGI) and the Ghana Investment Promotion Center (GIPC). Many of the interviews were conducted in conjunction with Umesh Menon, a consultant from the United Nations Industrial Development Organization (UNIDO), who was in Kumasi interviewing businesses of similar demographics.

These interviews were supplemented by newspaper articles, statistics and background literature about Kumasi and Ghana's development in general. These sources are noted throughout the text and are included in the List of Sources section of the Appendix.

2.1. Limits to Research

The biggest constraint on the research conducted was a lack of clear data from the businesses on the amount of water, fuel and electricity they required to run their businesses. In 60% of the interviews, a portion of the total consumption information was based on estimates taken from monthly bills for these services. The researcher then used the tariff structure provided by the ECG⁵, GWA⁶ and prices of fuel listed at filling stations to calculate monthly demand for the companies. Therefore, since price discounts for bulk purchasing of water and electricity were not revealed, they are not factored into the infrastructure expenses. Additionally, human error in reporting needs to be considered as some business owners used estimates instead of actual data.

⁴ Categorization of business sizes was done by the researcher and is not an official means of identification.

⁵ For tariff structure, see Table 2 on page 12.

⁶ For tariff structure, see Box 3 on page 17.

Given the limited access and availability of statistics on costs and infrastructure use, a thorough analysis of the market demand was inapplicable.

The small sample size is an additional limit of the research. In total, 31 businesses were interviewed for the purposes of this study, but data from three of the interviews will not be analyzed as part of this report because the entity was either too small (fewer than five employees) or the managers interviewed were unable (or unwilling) to answer the majority of the quantitative questions.

Additional constraints included the limited time in which the study was conducted (a 20-day period in January 2008). While this was sufficient time to conduct the interviews, it was not enough time to build relationships with the businesses ensuring comfortable and honest reporting of their infrastructure constraints.

2.2. Interview Schedule

Table 1– Interview Schedule

Date	Sector	Products/Services	Employees
3-Jan	Metals and construction	Cement blocks	15
4-Jan	Wood and timber	Electric poles and lumber	180
7-Jan	Garment and textiles	Uniforms and clothing	40
7-Jan	Metals and construction	Cement blocks	60
7-Jan	Metals and construction	Furniture	25
8-Jan	Leather	Shoes and hand bags	10
9-Jan	Agro-processing	Poultry and livestock feed	62
9-Jan	Agro-processing	Fruit juices	5
10-Jan	Garment and textiles	Kente cloth	46
10-Jan	Printing	Textbooks	30
10-Jan	Printing	Books and toiletries	20
11-Jan	Agriculture	Poultry and citrus farm	150
11-Jan	Agro-processing	Nut and vegetable oil	95
11-Jan	Wood and timber	Wood carvings and crafts	50
13-Jan	Agriculture	Teak, cassava and papaya	100
14-Jan	Metals and construction	Construction	25
14-Jan	Pharmaceutical	Herbal medicine	35
14-Jan	Manufacturing	Laundry soap	15
14-Jan	Wood and timber	Furniture and joinery	52
15-Jan	Electrical Co. of Ghana	n/a	n/a
15-Jan	Ghana Water Authority	n/a	n/a
15-Jan	Manufacturing	Toilet paper and disposable wares	211
16-Jan	Printing	General printing	46
17-Jan	Agro-processing	Soap and palm oil	80
19-Jan	Tourism	Hotel and restaurant	50
21-Jan	Beverage	Soda production and bottling	250 ⁷
21-Jan	Pharmaceutical	Pharmaceuticals and detergents	120
21-Jan	Tourism	Hotel and conferencing	36
22-Jan	Beverage	Brewery	700 ⁸
23-Jan	Pharmaceutical	Pharmaceuticals	60

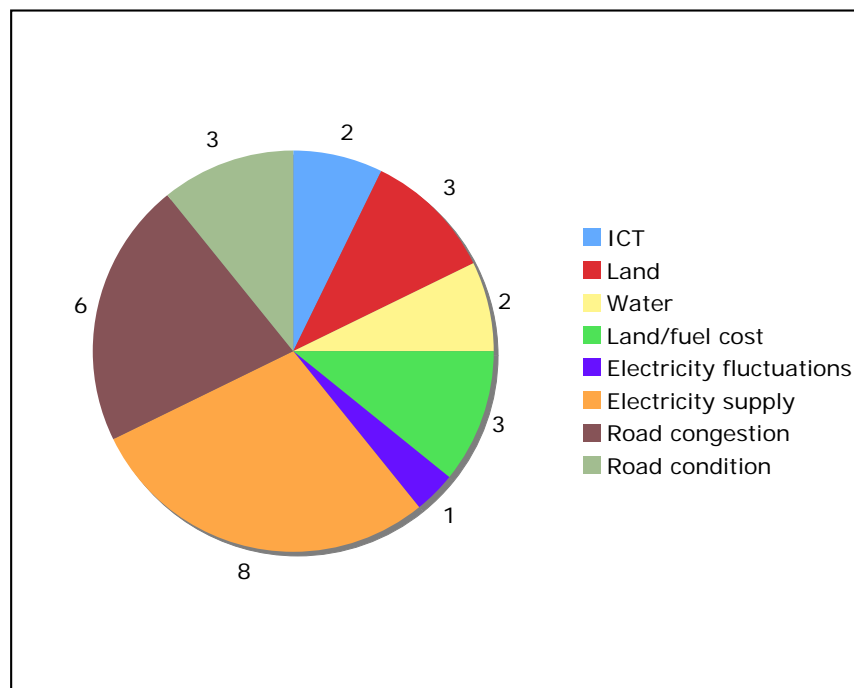
⁷ Best estimate available.

⁸ Best estimate available.

3. RESULTS

Energy-related problems were the primary infrastructure constraint of 43% of entities interviewed. This study found that these concerns were centered on erratic electricity supply and fluctuations (9/28) and expensive backup sources of energy (3/28). Road-related concerns were the second most cited constraint with 32% of businesses ranking roads as the most disruptive element of doing business in Kumasi. Primary road concerns include congestion in the city center (6/28) and road conditions outside of town (3/28). These issues substantially increased the cost of doing business as measured by time, vehicle repairs, inaccessible clients, and raw materials and additional costs of labor due to overtime. Water quality and supply were also commonly mentioned as “secondary constraints,” but were only considered the most disruptive element in 7% of the interviews (2/28). Other areas of concern were related to ICT costs, the unfavorable location of land available for business expansion and the complex process for acquiring that land.

Chart 1 – Most Disruptive Infrastructure Constraint on Businesses in Kumasi



3.1. Electricity

Supply

Electricity is an area of frustration for many of the businesses interviewed in Kumasi. The KMA reports there are five bulk supply points servicing Kumasi with 231km of overhead lines and 140.6km of underground cables.⁹ The current sources of electricity are hydropower via a

⁹ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*.

generation plant at Acosombo and a thermal power plant in Tema, both purchased from the Volta River Authority (VRA).¹⁰

Kumasi experienced an energy crisis during the fall of 2007 due to decreased water levels at the Akosombo reservoir during the dry season.¹¹ While the situation has improved drastically since the beginning of 2008, electricity disruptions and fluctuations are a persistent problem facing businesses in Kumasi. The research showed that businesses experience an average of 5.1 supply disruptions each month that last an average of 3.1 hours, or close to 16 hours each month. However, the lost productivity goes well beyond those 16 hours as many companies run their backup generators for additional hours to avoid potentially detrimental electrical fluctuations.

Cost

The table below shows the tariff structure published by the Electrical Company of Ghana in November 2007. Of the 28 businesses interviewed, two home-based businesses paid domestic rates for electricity, and 21 reported paying the non-residential or “commercial” rates.¹²

Table 2 – Public Approved Electrical Tariff Structure (as of November 1, 2007)

Tariff Category + Units	Current Rates (GH¢)	Previous Rates (GH¢)
<u>Non-Residential</u>		
1 – 300	0.14	0.102
301 – 600	0.17	0.14
600 +	0.195	0.125
Service Charge (/Month)	2.5	
<u>Residential</u>		
1 – 50	0.095	<i>unavailable</i>
1 – 300	0.12	
301 – 600	0.16	
600 +	0.19	
Service Charge (/Month)	0.5	

Source: Electrical Company of Ghana (ECG)

The average amount paid to the Electrical Company of Ghana (ECG) per business is GH¢539 per month for all 28 businesses.¹³ A small-sized cement block manufacturer uses slightly less than 100kWh per month with an average bill of around GH¢22. During long outages the business owner rents a generator in lieu of owning one. A mid-sized printing company uses approximately 2,340kWh and pays GH¢325 per month to the ECG and uses a 43.3KV Diesel Generator to power the facilities during outages. A large bottling facility uses more than 250,000kWh per month and has a fuel expenditure of GH¢875 for the backup diesel generator.

¹⁰ Electrical Company of Ghana, 2008.

¹¹ Ibid.

¹² The additional five businesses were either unsure of their rate or chose not to answer the question – this includes the two largest businesses.

¹³ This figure does not include the average paid by the two largest businesses, which did not respond to this question.

While no company indicated paying the special rate structure offered by the ECG (listed as SLT-LV, SLT-MV and SLT-HV below), the chart is included for reference purposes.

Table 3 – Special Electrical Tariffs, 2007

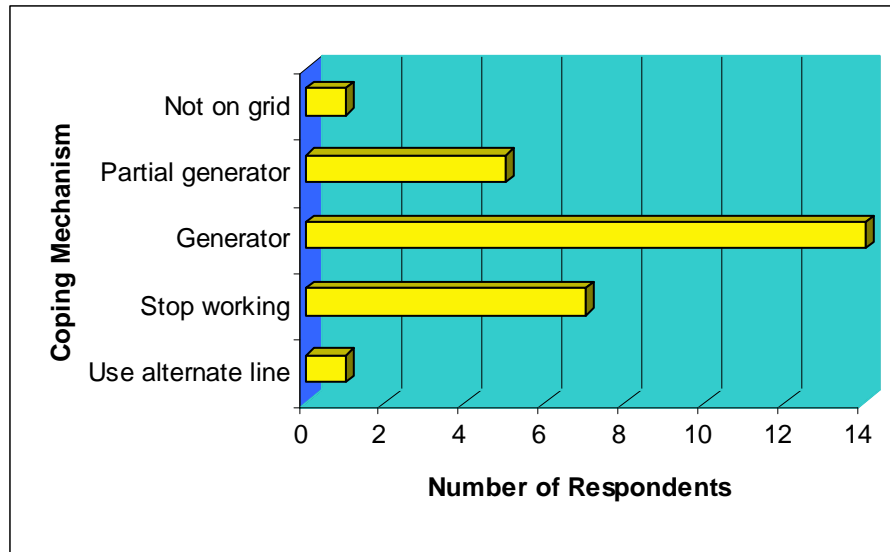
Tariff Category + Units	Rates (in GH¢)
<u>SLT-Low Voltage</u>	
Capacity Charge (kVA/Month)	1.00
Energy Charge (/kWh)	0.16
Service Charge (/Month)	7.50
<u>STL-Medium Voltage</u>	
Capacity Charge (kVA/Month)	9.00
Energy Charge (/kWh)	0.09
Service Charge (/Month)	12.50
<u>STL-High Voltage</u>	
Capacity Charge (kVA/Month)	9.00
Energy Charge (/kWh)	0.09
Service Charge (/Month)	12.50

Source: Electrical Company of Ghana (ECG)

Coping Mechanisms

When disruptions occurred, 19 of the 28 entities relied on diesel-powered generators for full or partial generation. Twenty-five percent (7/28) of the businesses were forced to stop working during the power outages due to an absence of backup options. The leather company interviewed had difficulty with employee retention because of the lost earning potential for employees during these interruptions. Another business owner obtained two separate connections to ECG. During times of electrical failure, the company transitions to the line with the strongest and most consistent current – a creative and cost-effective coping mechanism.

Chart 2 – Methods of Coping with Electricity Supply Disruptions



Recent Improvements

The electricity supply has seen drastic improvement since December 2007, with one company stating that, at their particular location, the number of disruptions had decreased from fifteen per month to, on average, less than four. Another business stated that their costs of backup diesel had dropped substantially with the improvement of the electricity supply.¹⁴ The length of each disruption had also decreased for many companies recently. One entity said that, on average, the disruptions have dropped from 12 hours to 1.5 hours.

3.2. Energy/Liquid Fuels

Cost

The 19 companies using generators for complete or partial coverage during electrical outages spent on average GH¢ 639 per month on diesel fuel for replacement electricity. That represents an average of 13% of electricity costs spent on generator fuel each month for these 19 companies. Given the relatively small sample size, it is important to note that one outlier could skew these statistics. However, the researcher did obtain qualitative information about the price burden and need for backup fuel and estimated that most companies with generators were spending about 10% of total electricity costs on diesel fuel.

Other fuels used by commercial entities in Kumasi include: liquefied petroleum gas (LPG), diesel and gasoline for vehicles, and industrial lubricants and oils for machinery. During January 2008, the cost of LPG was reported as GH¢ 15.4 for a 14kg cylinder. Another company reported paying GH¢7 for a 7kg cylinder. During the same time period, 1 gallon of gasoline cost GH¢ 4.7, and the same quantity of diesel fuel was priced at GH¢ 4.15.

¹⁴ In the span of 2 months, this particular business had decreased generator use from 60% of business hours to around 8%.

Supply

While diesel and gasoline are readily available in the Kumasi Metropolitan Area, LPG is increasingly difficult for businesses to obtain on a consistent basis due to increasing demand in the Kumasi area. Of the four respondents using LPG on a regular basis, three reported that they encountered difficulties with supply. Finding a reliable and consistent supply of LPG was a significant constraint, particularly for hotels and restaurants.

Coping

Although only four entities regularly use LPG, all four keep a backup supply of liquid fuels (both diesel fuel and LPG) on the premises to handle disruptions. This restricts the amount of capital the businesses can utilize in other areas because it is using a disproportionate amount to control unreliable supply. One juice processor uses 60kg of LPG each month and keeps 56kg in reserve at all times to ensure consistent supply. The manager of a 24-room hotel and upscale restaurant uses GH¢600 worth of LPG each month and keeps a “closet full” of LPG in storage on the hotel premises to use when disruptions occur.

Other Energy

In addition to diesel fuel and LPG, businesses reported using biomass for energy needs. In particular, wood fuel, charcoal and animal by-products are used for boilers, cooking and steam generation. One innovative farmer uses methane from animal dung on his farm to cook at home.

Example of biomass/wood fuel being used at a vegetable oil plant in Kumasi^a



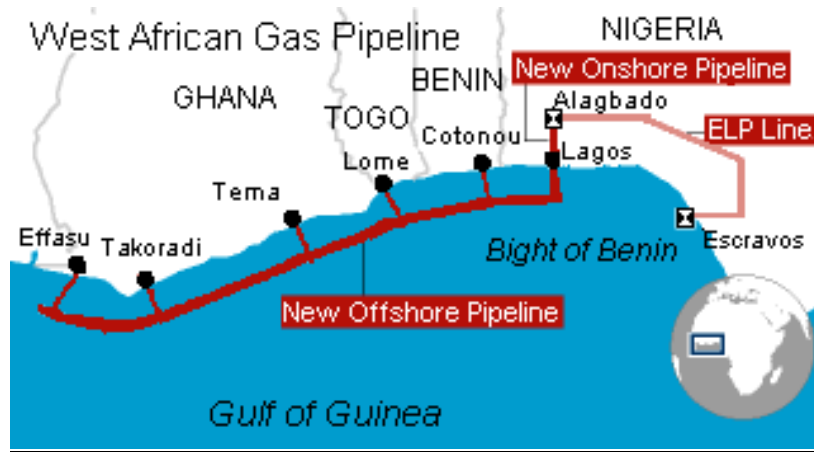
^aPhoto by Umesh Menon

Near Completion: West African Gas Pipeline (WAGP)

An exciting development mentioned by two of the larger businesses interviewed is the completion of the West African Gas Pipeline (WAGP), which runs offshore from Lagos, Nigeria to Effasu, Ghana. The project is expected to supply Ghana with enough Nigerian natural gas to save between 15,000 – 20,000 barrels of crude oil per day. The four primary WAGP partners are ChevronTexaco (36.7%), NNPC (25%), Shell (18%), and the Volta River Authority (16.3%). The main user of the pipeline will be the power plant in Takoradi.¹⁵

¹⁵ United States Department of Energy (2003). Energy Information Administration: West African Gas Pipeline (WAGP) Project, <http://www.eia.doe.gov/cabs/wagp.html>.

Map 2 – West African Gas Pipeline



Source: Energy Information Administration, www.eia.doe.gov

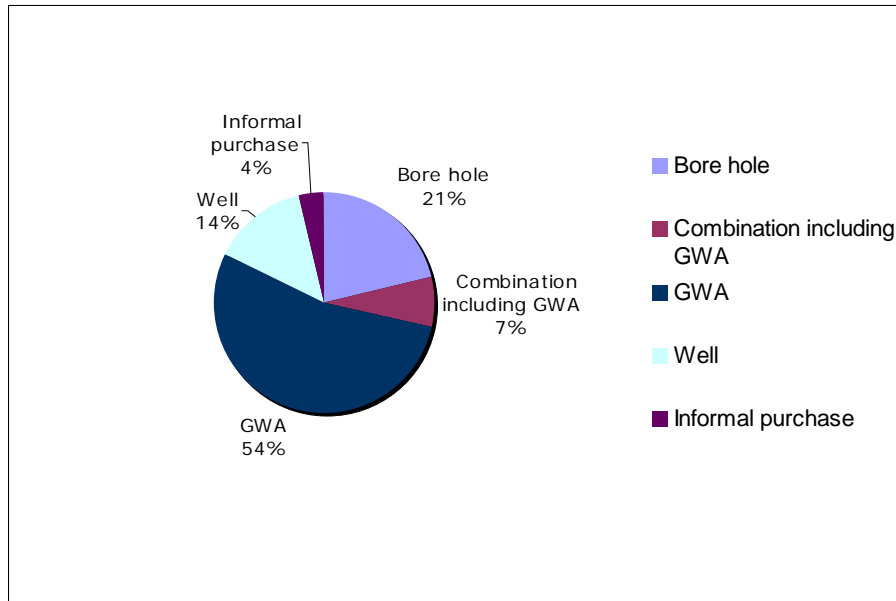
3.3. Water

Source:

The Ghana Water Authority (GWA) receives its water from two treatment plants near the city – one in Owabi (10km from the city) and one in Barekese (16km from the city).¹⁶ A little more than half of the businesses interviewed (15/28) use the water from the GWA as their primary source. The other major source for Kumasi industries is ground water (10/28) coming both from bore holes and wells.

¹⁶ Ghana Water Authority, 2008.

Chart 3 – Sources of Water



Supply:

The disruption of supply is a bigger problem than the overall results would suggest. Eleven businesses overall do not experience any supply disruption. However, of those eleven businesses only half are GWA customers.¹⁷ The users who were solely reliant on GWA experienced an average of 3.2 disruptions per month, each lasting an average of 10.9 hours. The average number of disruptions per month for all of the businesses interviewed was 2.25, and each of those disruptions lasted an average of 22 hours. The long disruptions for the well-water users occurred during the dry season. Two businesses interviewed were consistently without water for an average of four months each year.¹⁸

Coping Mechanisms

Of the 17 businesses that relied either solely or partially on the Ghana Water Authority (GWA) for water supply, four stated that they did not require a backup source as they did not experience supply interruptions or supply interruptions did not impact business. The most popular forms of GWA backup were storage tanks or reservoirs (5/17). Other coping mechanisms for water supply disruption from GWA included rainwater harvesting, wells, purchasing from tanker trucks (supplied by the GWA) and fetching water from nearby streams. Of the ten commercial entities that utilize ground water (i.e. either bore holes or wells) as their primary water source, four stated that backup sources were not required due to consistent water supply. Tanker trucks were the most popular source of additional supply (3/10) and other entities relied on reservoir/storage tanks or nearby streams.

Cost:

Costs associated with bore holes and wells were described to the researcher as a “one-time cost” of drilling. The rate structures for GWA customers can be seen in box 3 below. More than 85%

¹⁷ The remaining businesses rely on well water.

¹⁸ During the dry season, these two businesses rely on backup water supply from tanker trucks.

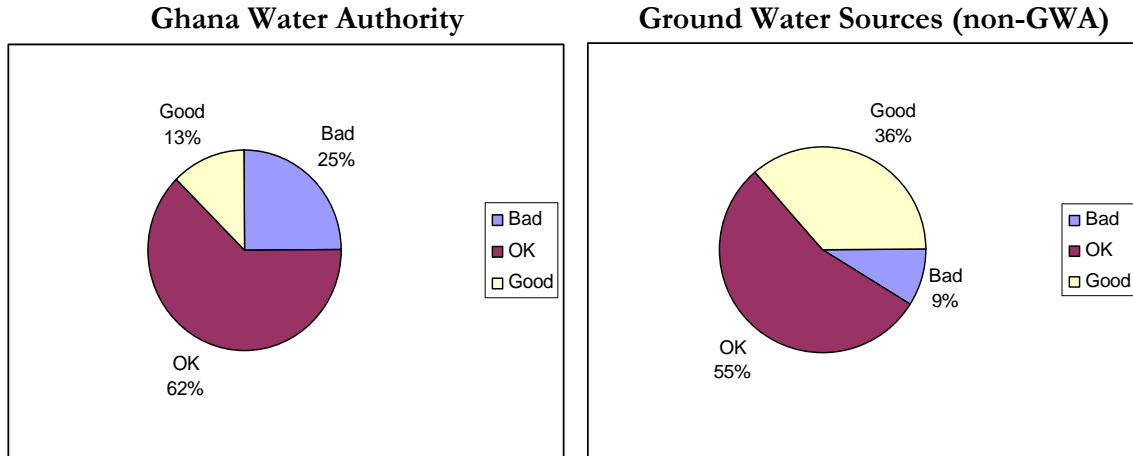
of the businesses interviewed were billed as “commercial/industrial” customers. The two largest businesses interviewed, both of which are heavily reliant on water for industrial use, have arrangements with the water company and do not pay the amounts listed.¹⁹

Box 3. Ghana Water Authority – Rate Structure	
<u>Domestic:</u>	
0 – 20 m ³ /month	GH¢ 0.66 / m ³
21 + m ³ /month	GH¢ 0.91 / m ³
<u>Commercial/Industrial:</u>	
Flat Rate	GH¢ 1.10 / m ³

Quality:

Twelve of the 28 businesses in the study treat their water internally. For the purposes of the study, respondents were asked to rank the water quality as “bad,” “okay” and “good.” The perception of the quality of water in Kumasi varies depending on the source. As demonstrated below, a higher percentage of non-Ghana Water Authority users classify their water as “good” than those that use the GWA as their primary water source.

Chart 4 – Perception of Quality of Water Sources



3.4. Waste Disposal

Wastewater

The researcher was unable to adequately analyze wastewater treatment services, as the companies interviewed did not use outsourced wastewater treatment. Aside from the two large businesses representing the beverage industry, wastewater treatment was of little concern to the entities interviewed. Of the 28 businesses included in this study, ten use septic or storage tanks, four

¹⁹ Details on those contracts are not available.

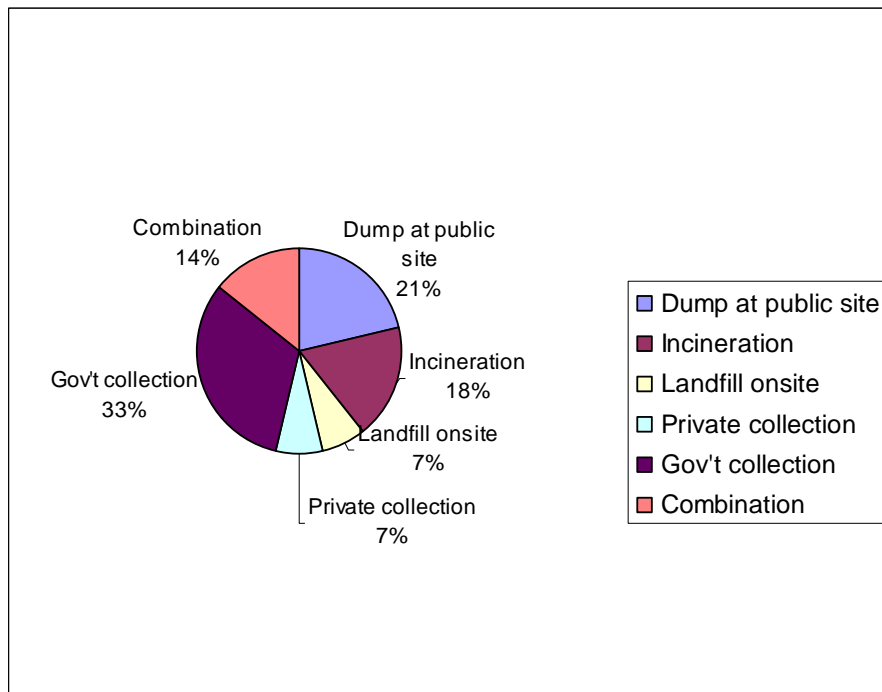
dump wastewater on the premises, three drain the water to the public sewage system, two have treatment facilities onsite and recycle part of the waste, and nine reported that they either did not have wastewater or had no specific strategy for its handling.

Solid Waste

The KMA reports that an estimated 60% of refuse is collected and sent to the landfill site at Oti, while the remaining 40% is dumped in open refuse points or burned by residents and businesses.²⁰ Waste collection is not a constraint for any of the businesses interviewed, but it was viewed as an area that needs improvement for the sake of public health, quality of life and environmental protection.

Eleven respondents (40% of total) outsource their solid waste disposal to government collection (9) or private collection (2). The remaining businesses handle their own solid waste disposal through a variety of methods including dumping at public waste sites (6), incineration (5), onsite landfills (2) and utilizing a combination of disposal methods simultaneously (4).

Chart 5 – Methods for Handling Solid Waste



Cost

Twelve of the 28 businesses interviewed provided cost data for solid waste collection. Eleven of these respondents pay between GH¢8–50 per month for collection. The cost of domestic refuse collection by the municipal government is GH¢30, and the cost of commercial collection is slightly lower at GH¢24.²¹ Given that many entities interviewed paid more than GH¢24 each

²⁰ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*.

²¹ Data provided by Abenaa Akuamo-Boateng, January 2008.

month, more research is needed to decipher the formula for determining cost of refuse collection by the private sector.

Recycling

More than 50% of the commercial entities surveyed (15 of 28) capitalized on some form of either formal or informal recycling. Examples include: a beverage bottling company that recycles broken glass; a palm oil manufacturer that uses palm waste to power a steam generator; a Kente cloth manufacturer and a shoe maker who both use waste scraps to make jewelry, ties, key chains and hair pieces; printing companies that sell scrap paper; lumber companies that sell wood chips; and a poultry farmer who pipes the methane from animal dung for use as gas.

Box 4 - Emerging Development: Waste-to-Energy Project

Private sector participation is being encouraged in Kumasi's power sector. A waste-to-energy plant is being constructed at the KMA landfill site in Ori that will generate between 30 and 52 megawatts of electricity. Kumasi currently generates about 1,000 tons of garbage per day that will help support the plant's 1,600 ton per day capacity. This is an excellent opportunity for private contractors to facilitate the disposal of the estimated 40% of Kumasi's uncollected refuse. Construction and sole financing is managed by Cinergex Solutions Limited of Canada. The company has signed a purchase power agreement with the Electrical Company of Ghana to supplement their current power supply from the Volta River Authority. Construction on the project began in May of 2007 and is expected to be completed in 2009.

Source: Caliph, Mohamed (2008). "Waste to Energy Plant for Kumasi," *The Daily Guide Ghana* (March 23, 2008), <http://www.dailyguideghana.com/portal/modules/news/article.php?storyid=2260>.

3.5. Telecommunications

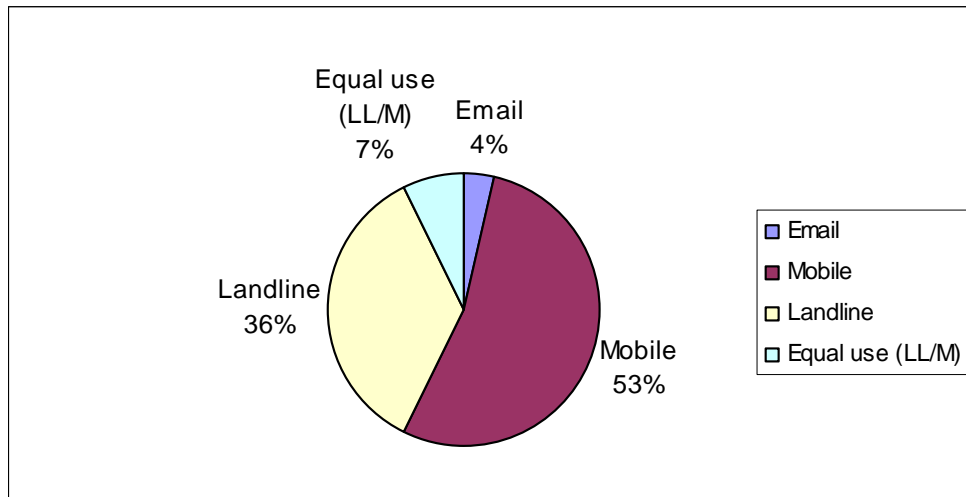
Main Form of Communication

Although it is one of the most important commercial regions in Ghana, in 2005 the Ashanti Region had only 15% of Ghana's landline telephones compared to more than 60% in the greater Accra region.²² Many of the 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. Seven businesses cited landline availability or quality as a major constraint to their business – often preventing the addition of fax or internet services on the business premises.

Of the 28 businesses interviewed, 15 have fax machines available on site and 14 have access to internal internet connections. Six businesses with internet connections on site use Broadband, four use dial-up on phone lines and three use USB/Mobile ports with a satellite connection.

²² Frempong, Godfred K. (2007). "2007 Ghana Telecommunications Sector Performance Review: a supply side of policy outcomes," *Science and Technology Policy Research Institute*, Research ICT Africa, <http://www.researchictafrica.net>.

Chart 6 – Main Form of Business Communication



Costs

Landline: Trunk and local calls via Ghana Telecom cost GH¢0.14 per minute (as of January 2008). The monthly cost of landline telephone usage generally ranges from GH¢20–35, with the average monthly cost of all landline usage per business costing approximately GH¢58.²³ The most commonly referenced payment plan was one in which businesses could prepay for credits on the landline and use them as necessary. This eliminated paying for unused minutes or services.

Mobile: There are four mobile networks servicing the Kumasi area: Tigo, MTN, OneTouch and Kasapa. The survey participants noted that the cost of a cellular minute had decreased recently to between GH¢0.10 and GH¢0.25 per minute. One pharmaceutical company had a cellular plan charging GH¢0.13 per minute for domestic “in network” calls and GH¢0.18 per minute for calls outside the network. Of the 17 companies reporting cellular data, the average monthly expenditure per business on cellular calls was between GH¢124–126.

Internet: Of the 14 businesses reporting internet access onsite, the quality and consistency of service provided varied greatly by the type of connection utilized. The speed of connection varied between 54-512 kb per second. For dial-up connections, most users reported slow connections with frequent disruptions (>1 disruption per 3 hours) and a cost of ~ GH¢0.6 per hour. Only three of the businesses with internet on site were using the USB satellite receivers for a wireless connection. This service obtained the highest connection speeds and greatest reliability, although the cost was significantly higher at GH¢2.5 per hour of use. The average monthly cost for Broadband service was GH¢85.

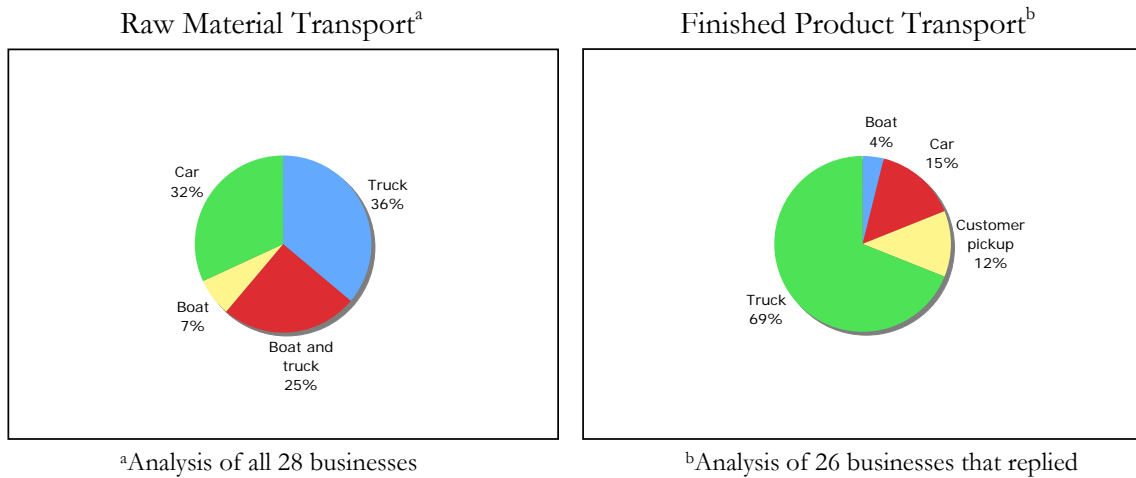
Fax: Fifteen of the 28 commercial entities had access to a fax machine on site; however, many reported that sending a fax over the phone lines was either too expensive or too cumbersome to use on a regular basis.

²³ The higher average cost compared to the median range is due to a high outlier.

3.6. Transportation

Transportation for businesses based in Kumasi is overwhelmingly dependent on ground transportation. Ninety-three percent of respondents identified either trucks or cars as the primary transport mechanism for raw materials. The two businesses that indicated that they primarily used boat/sea transportation for raw materials also required trucks to transport the raw materials from the port at Tema to the business location in Kumasi. Of the nine entities citing cars as their primary mode of transportation, four of them needed access to remote areas for raw materials and often used “motorbike” and “foot transport” in conjunction with cars. Neither air nor rail transport was cited for any significant transportation purposes.

Charts 7 & 8 – Method of Raw Material and Finished Product Transport



3.6.a. Ground Transportation

As the second most frequently cited constraint of doing business in Kumasi, ground transportation – particularly the road network – needs improvement. However, the perception of the road conditions by commercial entities in Kumasi varies widely. While nine of the 28 businesses listed road conditions and congestion as the most challenging infrastructural aspect of doing business in Kumasi, 11 businesses stated that the road system was not a barrier to productivity. Those businesses that cited road conditions as an issue were primarily located near the city center or were dependent on the use of roads for the import of raw materials or the delivery of finished goods to remote areas.

Raw Materials & Finished Product Delivery

Truck/Car - About half of the businesses interviewed obtain raw materials from outside of the Kumasi area and the other half receive their raw materials from the Ashanti region with occasional supplements of machinery from abroad. Of the businesses interviewed, the average transport distance for raw materials via car or truck is 144km, and the average time allotted to receive raw materials via car or truck is 13.6 hours. While travel time between Accra, Tema and Kumasi are fairly consistent, unexpected delays when receiving and delivering goods to and from

the Northern and Volta regions force companies to remain flexible. Additionally, schedules for delivery and receipt of shipments are continually disrupted along the roads to Togo, Burkina Faso and the Ivory Coast.

Many of the businesses commented on the increased time to receive raw materials during the rainy season – sometimes doubling the delivery time. Others have altered shipping schedules in order to avoid the city center of Kumasi during the day and have their trucks start before 5am.

Costs

A vegetable and nut oil producer stated that his cost of shipping via truck in and around Kumasi amounts to GH¢40 for a five ton load to travel approximately 6km.

Although difficult to quantify, businesses indicate that the condition of the roads outside of Kumasi and the congestion in the city center greatly increase their cost of doing business. One small woodworking business estimates that the cost of collecting raw materials increases by 50% during the rainy season when the roads to the north wash away. A mid-sized pharmaceutical company estimated a 15% increase in the cost of doing business due to road congestion based on fuel costs, idle time, overtime pay, truck repairs and time diverted because of other inefficiencies due to sitting in traffic. A building and metals business stated that road conditions outside of the Kumasi central area hinder raw material transport and decrease his vehicle efficiency by 70%.

Road Projects

As of June 2007, the city of Kumasi had a road network of 846km; of those, 271km were asphalted or had a bitumen surface.²⁴ Efforts are being taken to improve the often congested and poor roads.

Railway

An obvious gap in the infrastructure of Kumasi is the absence of a reliable and available railway system. Two of the businesses mentioned that they relied on rail for their business in the past, but that the system is now defunct and no longer an option for Kumasi. Of the 28 businesses interviewed for this study, none use rail transportation; however, 20 of the businesses indicated that they would use rail if it were available, cost effective and reliable. In reviewing the almost desperate traffic situation in Kumasi, a railway would allow businesses to choose among cost effective shipping methods and would perhaps relieve some of the burden on the roads and vehicles.

²⁴ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*.

A major infrastructure gap: the defunct railway system^a



^a Photo taken by author

3.6.b. Air Transportation

The Kumasi Airport (KMS) is located approximately 10km northeast of the city center. Currently there are two airlines servicing Kumasi – Antrak and CityLink – with more than 14 flights per week. The primary destination is Accra, but the airport also serves Sunyani (on CityLink).

The majority of the businesses interviewed (21/28) do not use air transportation for cargo or personnel on a regular basis.²⁵ Ten of the businesses reported using the Kumasi airport once every few months for the transport of executives to Accra on special occasions – generally when there was a time constraint making the 1 hour of air travel preferable to the three to four hour drive to Accra.

Currently, there are no passenger or cargo flights servicing international destinations from the Kumasi Airport. The two businesses requiring international travel services mentioned the need for a more developed local airport to cut down on travel time between Accra and other international destinations, including West African regional hubs. Both hotels interviewed described the desire for a bigger and more international airport in Kumasi to attract tourists.

The cost of a round trip ticket from Kumasi to Accra on either airline is between GH¢160 – 170. Cargo transportation from the Kumasi Airport was not used sufficiently to conduct an analysis of the services offered or price points.

²⁵ “Regular basis” is defined as at least one flight per company per month.

3.6.c. Port Access

One of the benefits of Kumasi's location is its close proximity to the ports of Tema and Takoradi on the southern coast of Ghana. The port of Tema, located 28km east of Accra, handles 80% of the nation's import and export cargo and boasts 14 berths – 12 of which are for public use.²⁶ Although now much smaller than Tema, Takoradi is effectively used for connecting cargo to the middle and northern part of the country, as well as to the countries north of Ghana. Takoradi is located 230km west of Accra.²⁷

In addition to desiring an airport with international destinations, four of the nine businesses that import raw materials or machinery expressed a need for customs clearance at the Kumasi Airport. For a large printing company, one week is added to every shipment from Malaysia because of time spent clearing customs in Tema. Some of the businesses utilizing the ports at Tema must send employees to Accra to work through customs inspections and receive the goods. This adds monetary and time costs to their transactions and has increased the urgency for an inland port. A few businesses mentioned plans for a dry-port in Kumasi that would function as a bonded warehouse and would include all of the formalities that currently occur in Accra. This inland port would alleviate costly trips to Tema and benefit the business community of Kumasi.

International Freight

Nine businesses receive goods via boat. The entities indicated the following shipment times: Asian ports require 5-6 weeks; European ports require 1 – 2.5 months (e.g., The Netherlands = 10 weeks, France = 8 weeks); Egypt and South Africa require 6 weeks. For a large timber company, it takes approximately one month and costs GH¢2000 to ship a 40ft container to a European port.

3.7. Land

Availability

Land is available and affordable in the Ashanti region; 86% of respondents said that there is sufficient land available for expansion. Although 10% of the businesses interviewed (3/28) ranked land as their primary infrastructure constraint, the challenges were related to the proximity of new land to existing business investments and lengthy acquisition and approval processes. The average distance to land available for expansion is 5.1km from the existing business location. This frustrates some businesses that perceive the land outside of town to be unfavorable – particularly businesses that rely on sales of small quantities of goods to many customers. The businesses that sell furniture, agriculture or timber by contract or in bulk did not report disruptions given their distance (6km or more) from the city center.

Ownership

²⁶ Ghana Ports and Harbours (2006), Port of Tema Introduction, <http://www.ghanaports.gov.gh/GPHA/tema/index.html>.

²⁷ Ghana Ports and Harbours (2006), Port of Takoradi Introduction, <http://www.ghanaports.gov.gh/GPHA/takoradi/index.html>.

Of the 28 entities interviewed, 19 own all of the land used for business purposes. Seventeen of those 19 owners consider their tenure secure. The two who expressed concern regarding tenure stated that, as Ghanaian citizens, their tenure was renewable after 99 years but that the decision was up to the discretion of the Chief. Private land for foreign-owned businesses can be secured for 50 years but is subject to the same renewal process with the owning Chief.

Process

Per the KMA, the Kumasi Planning Area is approximately 10km in diameter.²⁸ Of this land, the Chiefs own 60% and the remaining 40% is vested in the government for public interest.²⁹ The land management system – a shared role between the Chiefs who grant the land and the municipal planning unit who approves its intended use – contains redundancies and is a source of frustration for many of the businesses looking to expand. The average length of time needed to navigate the acquisition and approval processes was reported to be 11.4 months.

Cost

The cost per acre was difficult to calculate, as many business managers were not working at the company when the land was acquired. Additionally, those that remembered were quick to note that the purchase prices from the late 1990's would not accurately reflect current prices. Additionally, the cost per acre differs drastically depending on the area of the city in which the land is located. The average cost of an acre of land in Kumasi is GH¢10,000.³⁰ For renters, the average price of an acre is between GH¢150 – 200.

3.8. Security

The physical security of investments and personnel in Kumasi is not a concern or constraint on business activities. Twenty of the 28 businesses interviewed said that security is not a concern for their business. Eight of the entities outsource 100% of their security measures, while 17 provide their own security - most commonly in the form of one or two watchmen.³¹ The average cost of securing a business in Kumasi is GH¢580 per month.³²

²⁸ Kumasi Metropolitan Authority (2007). *A Brief Guide to Kumasi*.

²⁹ Ibid.

³⁰ According to a pharmaceutical company, one acre near the central market in the city's central district can cost as much as GH¢610,000.

³¹ The additional three businesses do not take security precautions.

³² This does not include the high outlier of the group that spends approximately GH¢20,000 per month to guard a large brewing facility. Including that business would increase the average cost to GH¢1273.

4. OPPORTUNITIES FOR INFRASTRUCTURE INVESTMENT

4.1. Renewable Energy

The recent improvement of the electricity supply is due to current energy projects in both hydropower and liquefied petroleum gas (LPG). However, given the rapidly increasing demand, a market for renewable energy is developing. The emerging renewable energy industry in Ghana represents a unique opportunity to simultaneously drive business development and improve the lives of local farmers and small business owners in the Ashanti region while protecting the natural environment. There is already evidence of farmers using animal dung for gas and agro-processors using palm waste as fuel for steam generators, but a more formalized market would greatly benefit the businesses of Kumasi.

Business owners indicated that financing is often the largest hurdle to starting these investments. The Government of Ghana is already subsidizing the price of LPG at approximately 20%.³³ The Government may wish to consider providing subsidies or other support mechanisms to help enable the development of this industry.

Ghanaians use biomass for more than 50% of energy consumed in the residential and commercial sectors.³⁴ Firewood is the primary fuel followed by charcoal - the bulk of which (90% in 2003) is obtained from natural forests.³⁵ Efforts should be made to provide substitutes for these energy sources for economic, environmental and health reasons. Ghana has a President's Special Initiative focusing on palm cultivation. This initiative, coupled with appropriate financing tools, could create an opportunity for lucrative investments in biodiesel. This would be a perfect fit for this generator-dependent market and has potential to be an export commodity as well.

Benefits of a local biofuels industry:

- Higher prices and demand for local crops such as palm and coconut;
- Improved energy security and decreased dependence on oil and natural gas imports;
- Carbon neutrality under the Kyoto protocol;
- Lower pollution and potential decrease in respiratory illness;
- Reduced energy costs and improved energy access for businesses;
- Potential for Clean Development Mechanism credits;
- Development opportunities and job creation.

Availability and cost of energy sources is an important contributor to economic growth in a region where energy costs and reliability are two of the major constraints to business development.

³³ "Petroleum Products Price Build Up, effective March 16, 2008" published by Ghanaian Ministry of Energy.

³⁴ Energy Commission, 2005.

³⁵ Ibid.

Box 5 - Spotlight: Appiah-Menka Complex

Appiah-Menka Complex Ltd. is a large family-run business that produces soap, refined oils, stearin and palm fatty acid. The most challenging parts of the business are the costs of electricity/energy and the difficulty in securing bank loans for long term investment projects. The opportunity to enter the biofuels market is evident to the Appiah-Menka Complex – the company has an abundance of palm oil that could be used for biodiesel production. The company is also looking to acquire more land for palm cultivation through the President’s Special Initiative program. Additionally, Appiah-Menka decided to plant close to 6,000 hectares (~15,000 acres) of palm and expects to reap the rewards after the first fruiting period in 2009. Those hectares are each expected to yield approximately 84,000 fruits in total. An extraction rate of 20% would yield 16,800 tons of crude palm that can be mixed in varying degrees with diesel fuel to power generators, tractors and cars.

The relative ease in launching this line of business for Appiah-Menka Complex is that most of the initial investment in equipment and materials is complete. Appiah-Menka Complex already produces 50 tons of crude palm oil each day on their existing machines; therefore, knowledge and skill transfer will be efficient.

Source: Adapted from conversations with Kwaku Appiah-Menka II, 2008

4.2. Road & Railway Privatization

Evidence of road maintenance and improvements can be seen throughout the city which should provide a relief for many businesses. However, a population growth rate of over 5% will outpace the growth of new roads.³⁶ The road constraint is hugely important to the agriculture sector and agrobusinesses located in Kumasi as they use the feeder roads, often in poor condition or washed away during the rains, for access.

There is an opportunity to develop private toll roads, particularly for use with businesses that regularly need to access areas just outside of central Kumasi. Given the increased costs associated with vehicle usage and raw materials acquisition, the benefits of using private roads would likely outweigh the costs of tolls and would be a healthy investment project.

A dependable and connected railway network would be of huge benefit to the businesses in Kumasi – particularly those that are receiving raw materials from neighboring West African countries. The congestion and condition of the roads has businesses looking for alternatives, particularly for connecting with neighboring countries. The Government has recently signed deals with two private companies to reconstruct the eastern and western railways within Ghana.³⁷ There is also interest in an efficient passenger train to Accra. Although the businesses interviewed rarely utilized the Kumasi airport, when they did, 90% of the time, it was for meetings and business dealings in Accra. A fast commuter train on which they could work, have meetings and avoid traffic and high fuel costs would be a welcome addition to the transportation system.

³⁶ The World Bank initiated a \$45M Urban Transport Project in 2007 to improve mobility in urban areas. This may alleviate transport stress in the coming years.

³⁷ Invest in Ghana: *Focus Kumasi*, 2008.

4.3. Recycling/Scrap Dealers

Kumasi's informal sector of waste collection and recycling is vibrant and resourceful, but formalizing the industry will benefit investors and the city of Kumasi. Forty percent of the refuse in Kumasi is left uncollected.³⁸ Factors that highlight the opportunity for private sector investment in the waste collection industry are: an excess of uncollected refuse (high demand), a new waste-to-energy power plant, and a concentration of industries that depend on recycling services (e.g., bottling and printing).

Currently the private refuse collector, Zoomlion Ghana Ltd,³⁹ has entered the trash collection business in Ghana but has yet to saturate the market and is doing little in the way of recycling.⁴⁰ Many of the businesses interviewed saw recycling not only as environmentally friendly, but also as a smart way of re-using cheap, local materials. Two industries in particular, beverage production/bottling and printing, have expressed a need for more formalized recycling services.

Box 6 - Opportunity: Suame Magazine Industrial Development Organization (SMIDO)

Suame Magazine, the leading cluster industrial area in sub-Saharan Africa, is bursting with potential. The area has a population of over 200,000, including 12,000 shop-owning proprietors.

Most cluster estates in Africa are in the informal sector, but the importance of development in this area should be emphasized. Suame Magazine has strong vertical and bilateral linkages with garages, metal workshops and engineering firms. Fifty-three percent of Suame Magazine workers are involved in some type of vehicular repair, 17% in spare parts retailing, 17% in metal processing, 10% in fabrication and 3% in vehicle assembly. As a result, Suame Magazine plays a crucial role in providing technical and vocational training to young people that have dropped out of formal schooling.

There is plenty of skilled labor in the area. Given these resources and the tradition of recycling scrap metal for profit, the right tools and training could easily transform the area into a recycling center for Kumasi.

Source: Adapted from "SMIDO Industrial Policy Blueprint," 2007.

³⁸ Kumasi Metropolitan Authority: (2007) *A Brief Guide to Kumasi*

³⁹ ZoomLion Ghana Ltd is an affiliate of Zoomlion China.

⁴⁰ As of June 2007, the World Bank's Urban Environmental Sanitation 2 Project still has \$57.9 M to disburse in Ghana, which could relieve urban sanitation issues before the project closes in 2010.

5. CONCLUSION

Kumasi is a city of great potential. Even in the face of the infrastructure challenges outlined in this study, entrepreneurs and business owners find creative solutions to the problems they face. Investors will find Kumasi a welcoming city with an affordable standard of living compared to the more expensive lifestyle of Accra. The tourist sector is growing, contributing to an influx of high-end hotels and restaurants that will be helpful in attracting executive talent to the area. The safety, affordability and growth of the working-age population provide vast opportunities for investors.

6. APPENDIX

6.1. 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 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 in 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 which extent rainwater is 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	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.	
	Of all the categories we discussed today, which causes the greatest constraint to your business?

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