

SUSTAINABLE ENERGY USE IN KANO METROPOLIS, NIGERIA

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INTRODUCTION

- ▶ Energy challenges in sub-Saharan Africa
- ▶ Social and economic indicator: added value of African products, transport
- ▶ Poor health and education indicators can be greatly improved with the provision of modern energy services.
- ▶ Energy is also needed for the development of small-scale enterprises, which can contribute to the region's economic survival and growth.
- ▶ Access to electricity, a generally accepted indicator for overall socio-economic development of any country or region, is low in sub-Saharan Africa.

INTRODUCTION

- ▶ Energy use pattern in the Nigeria
- ▶ Industrial
- ▶ Transport
- ▶ Commercial
- ▶ Agriculture
- ▶ Household, with household carrying the larger share in use, signifying Nigeria's low level of economic development.
- ▶ In Nigeria, electricity supply has been very limited and erratic,
- ▶ 50% of the population having access to its supply.

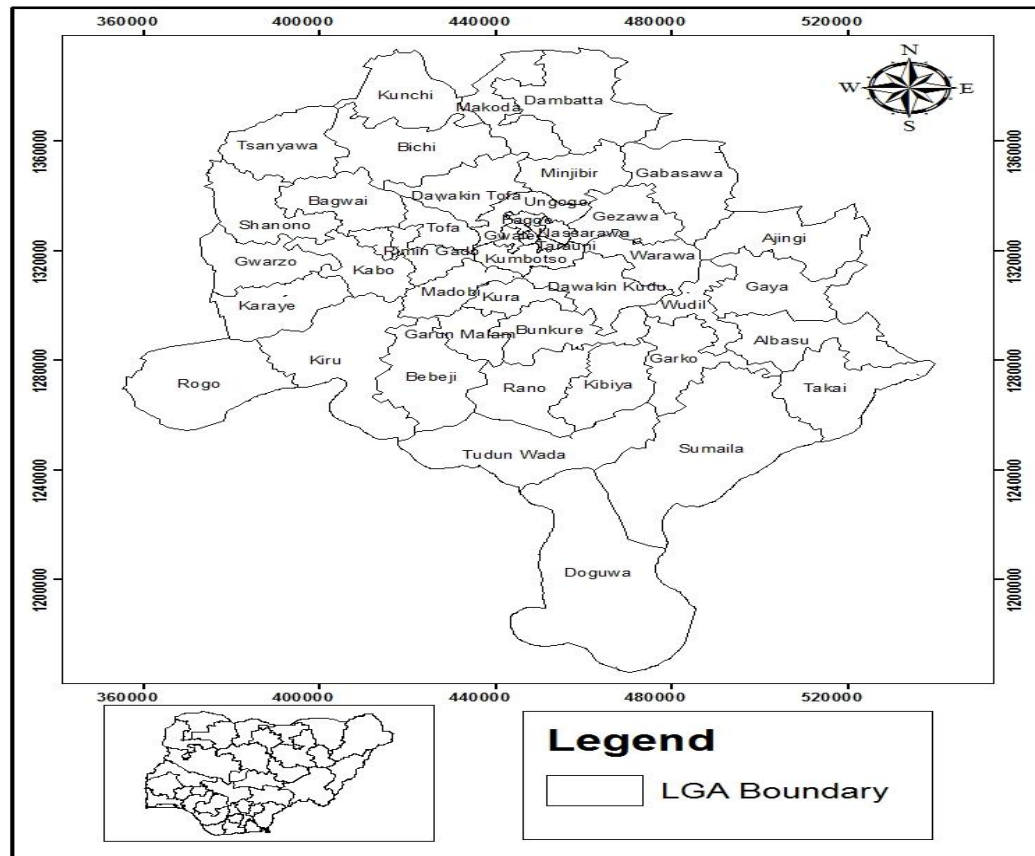
CURRENT STATE OF ENERGY SUPPLY IN KANO

- ▶ Urban areas are the hub of development for any nation, with high demand for energy use.
- ▶ Kano in Nigeria is located in the sunbelt region and is one of the country's largest cities, with a population of over 9,383,682.
- ▶ Kano needs at least 300MW of electricity for stable supply and for all sectors to fully function, it will need as much as 600MW, which will help boost the economy of the state. But its only able to receive a little over 200MW from the national supply grid, which sometimes is not the case especially in recent times where they has been a number of vandalism cases in the oil producing area that supplies the petroleum products used for powering the thermal stations causing more shortages in supply.

GENERAL OBJECTIVES

- ▶ This paper looks at available sustainable energy sources for use in Kano Metropolis

STUDY AREA: KANO



Source: Drawn @ Geography Dept. BUK (2015)

MATERIALS AND METHODS

DATA SOURCE

- ▶ The data for the study was collected from the Nigerian Metrological Agency, MAKIA, Kano and form the work of Daura (2016)
- ▶ The set of data were
 - ❖ Socio-economic characteristics of energy source
 - ❖ Sunshine hours for a period of ten years (2006-2015)
 - ❖ Energy potentials of four major dumpsites in Kano
 - ❖ Household toilet facility for Kano
 - ❖ List of some Dams in Kano and their reservoir capacity.

Table 1: Income level of respondents and source of energy of respondents

		Income level of respondent per month in Naira							
		Less than 5000-5000		5000-10000		11000-30000		30000 and above	
		Number	%	Number	%	Number	%	Number	%
Main energy source	Wood fuel	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	Kerosene	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	Electricity	3	60.0%	0	0.0%	1	20.0%	1	20.0%
	Gas	0	0.0%	1	50.0%	0	0.0%	1	50.0%
	Solar	2	40.0%	0	0.0%	1	20.0%	2	40.0%
	Others	0	0.0%	0	0.0%	0	0.0%	0	0.0%

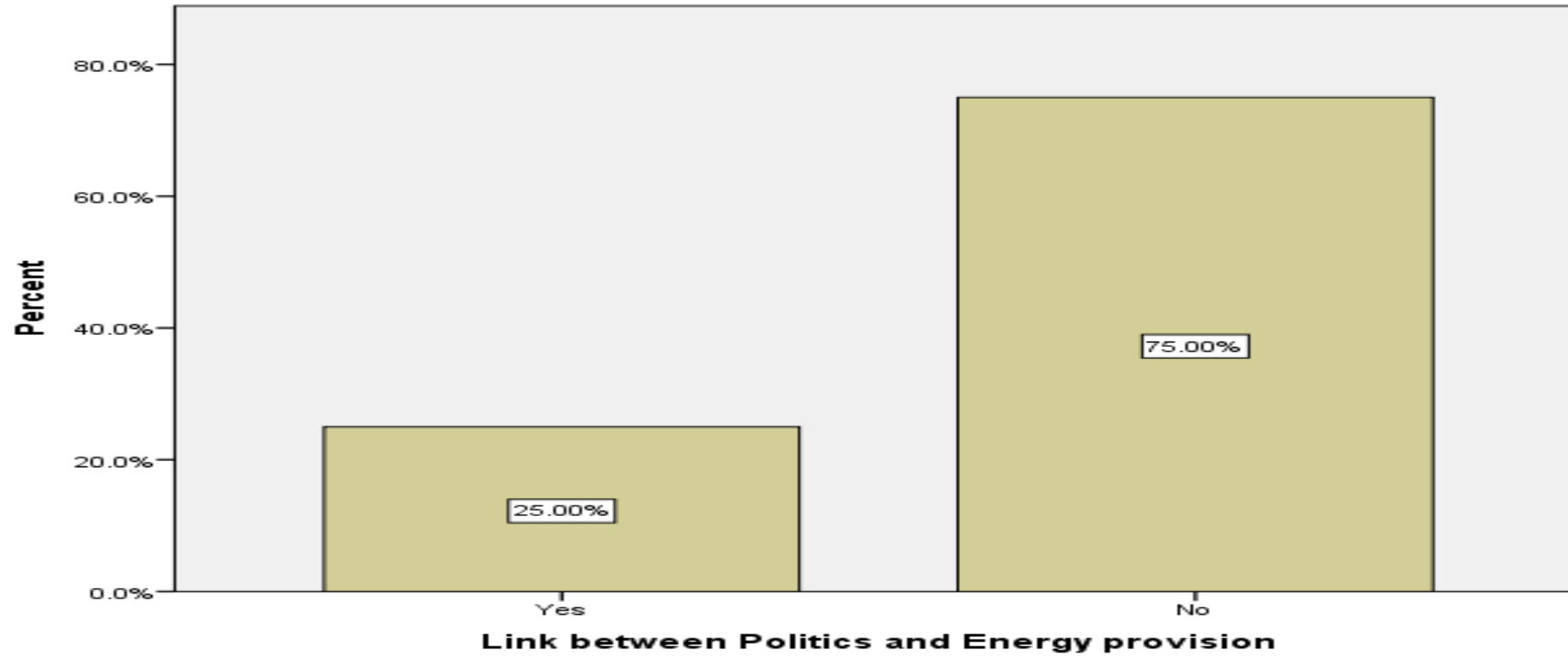
Source: Field work, 2017

Table 1: Income level of respondents and source of energy of respondents

		Respondent Type of Economic activity											
		Shop owner		Welder		Vulcanizer		Restaurant		Water Factory		Others	
		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Respondents Most preferred Energy Source	Wood fuel	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%
	Kerosene	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%
	Electricity	1	4.8%	2	9.5%	1	4.8%	3	14.3%	3	14.3%	11	52.4%
	Gas	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	Solar	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100.0%
	Others	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Source: Field work, 2017

Figure 1: Relationship between Politics and Energy provision



Source: Field work, 2017

FINDINGS

- ▶ From table 1, Findings revealed that income level has a link with the type of energy source used.
- ▶ Electricity is the main source of energy for low income earners compared to high income earners (who can source for alternatives in the absence of electricity).
- ▶ From table 2, it is clear that most socioeconomic activities depend largely on electricity supply from the national grid though solar energy source is gaining popularity of use.
- ▶ From Figure 1, it can be seen that politics does play a major role in the development of the power sector, where 75% of the respondents attribute the lack of success of the sector to poor policies, mismanagement of funds and negligence by the past government administrations

Table 3: Sunshine hours in Kano 2006-2015

YEAR/MONTHS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2006	8.8	7.2	8.3	7.2	7.5	8.5	8.2	6.8	8	8.5	8.2	7.5
2007	8.5	7.6	7.4	9.1	8.4	8.4	7.1	8.2	8.2	7.8	5.1	9.4
2008	8.9	6.1	6.7	7.5	8	7.5	7.4	7.4	7.4	8.1	7.4	7.2
2009	3	8	6.7	7.5	8.9	7.5	7.3	7.5	7.8	6.1	9.1	8.9
2010	6.3	7.4	7.4	6.4	7.4	8.6	6.9	8.4	6.4	5.7	8.5	6
2011	8	6.2	4.8	4.7	8.1	7.4	6.2	8	7.6	6.9	9.1	9.2
2012	8.6	9.3	6.7	8.3	8.1	9.1	7	7.5	7.9	8.7	8.1	6.7
2013	7.2	6.8	6	6.2	7.3	6.4	5.3	6.2	5.8	6	7.1	7
2014	6	7.2	6.8	7.5	7.6	7.4	6.2	6.2	7.3	8.3	9.3	6.7
2015	7.3	5.5	5.6	5.8	6.7	7.3	6.7	8.3	7	7.2	8.3	8

Source: Nigerian Metrological Station, Kano (2017)

FINDINGS

- ▶ Solar/Radiant energy from the sun could also be harnessed to supply households, institutions and small scale production companies and enterprises because the city receives an average of 7- 8 hours of sunlight energy daily.
- ▶ the architectural structure in Kano here comes at an advantage, as the roof tops can be harnessed for the placements of solar panels
- ▶ The roof tops are usually at angle or flat and this is convenient for the arrangement of the panels as they need to be place at angles that would ensure maximum receipt of radiant energy from the sun all through the sunshine hours.
- ▶ A very important aspect of this technology is that it is cheaper to maintain

Table 3: Electricity generation potential of the solid wastes

Dumpsite	Potential Electricity generation (kWh/day)	Potential Electricity generation (kWh/ton)	Potential power generation(Electricity) (kW)
Court road	198,973.68	559.2	8,290.57
Maimalari	215,538.24	545.68	8,980.76
Hajj camp	258,400.56	594.16	10,766.69
Ubagama	132,667.20	619.01	5,527.80
Total	805,579.68		33,565.82

Source: Daura, L. A. (2016)

FINDINGS

- ▶ It was found that the metropolitan solid waste energy content of four major dumpsites could be used to generate a total of 805,579.68 kWh/day of electricity
- ▶ This can power about 70,009 households based on average household consumption of 4200 kWh/year (Daura, 2016).

Table 4: Percentage distribution of household by type of toilet facility by state and sector 2010

State	None	Toilet On Water	Flush To Sewage	Flush To Septic Tank	Bucket	Covered Pit Latrine	Uncovered Pit Latrine	V.I.P Latrine	Other (Specify)
Jigawa	8.4	0.9	2.1	1.1	0.7	62.6	16.7	1.8	5.7
Kaduna	4.4	4.2	0.8	0.8	6.3	53.2	25.7	4.4	0
Kano	3.1	2.9	1.8	1.6	2.9	65.7	19.6	1.6	0.8
Katsina	6.4	0.2	4.4	0.7	0.5	36.7	50.2	0	0.7
Kebbi	5.9	1.2	3.3	1.4	4.1	40.9	36.4	0.4	6.5

National Bureau of Statistics (2012)

FINDINGS

- ▶ The household toilet facility type by sector has 65.7% of households in Kano use covered pit latrines, while 19.6% use uncovered pit latrines. This can be harnessed as an alternative source of energy using the household biogas digester technology.
- ▶ Biogas, the metabolic product of anaerobic digestion, is a mixture of methane and carbon dioxide with small quantities of other gases such as hydrogen sulfide.
- ▶ There are many types of well-known biogas digesters used around the world, such as the fixed dome digester (Chinese model), the floating drum digester (India model), the plastic tubular bio-digester (Taiwan model) (Ba Ho, 2015)

FINDINGS

- ▶ With many households using the pit latrine in Kano, this technology can be used to help provide household cooking and lighting energy by setting up simple biogas digester systems like the floating drum digester model of India, in households.

Table 5: List of some Dams in Kano

Name of Dam	Reservoir Capacity (Mm ³)
Baguada	22.14
Challawa Gorge	969
Guzuguzu	24.6
Jakara	65.2
Karaye	17.2
Magaga	19.7
Ruwan Kanya	22
Tiga	1968
Tomas	60.3
Tudun Wada	20.8
Watari	104

Federal Ministry of Water Resources (2004)

FINDINGS

- ▶ Kano state has the largest concentration of manmade lakes in Nigeria with about 26 reservoirs in the state including Ruwan Kanya, Watari , Tiga, Challawa-Goje, Bagauda, Watari and Jakara dams which range in size from few hectares to 17,000ha
- ▶ It has been estimated that cumulative potential small hydro power generation from two sites in Kano can contribute up to 42.6 MW (UNIDO, 2009)
- ▶ If the potentials of all the others could be established and harnessed, this can power households, hospitals, small scale production, part of the education and health sector as well.

CHALLENGES

- ▶ The greatest challenge for the development of the renewable energy resource sector is in the financial aspect. Huge investments are required, especially for the Solar radiant energy, small scale hydro power and conversion of waste to energy.
- ▶ For the aspect of biogas, there is the need to educate people on the potentials of the resource as simple biogas systems can be set up in homes to provide for their basic energy needs.

SUSTAINABILITY

- ▶ The availability of these renewable sources of energy makes them more reliable as they can be reused and recycled constantly, ensuring stable supply of energy and at the same ensuring the environment remains safe and preserved for future generations to use

CONCLUSION

- ▶ If these are harnessed properly, they would go a long way in solving problems of
 - ❖ Urban poverty through the provision jobs as there would be energy supply for small and medium scale enterprises or business to function
 - ❖ And in the long run, help grow the economy of Kano
 - ❖ At the same time, this would help ensure a cleaner environment as the stress on use of Woodfuel will reduce and this would help provide more carbon sinks for the metropolis.
 - ❖ Also issue of solid waste management enhanced as the waste will be used to generate electricity

RECOMMENDATIONS

- ▶ There should be public enlightenment on the dangers associated with the use of unsustainable sources of energy to encourage the use of more sustainable options
- ▶ The State Government should encourage use of sustainable sources of energy such as the solar for household use by giving incentives to the users



APPRECIATION

THANK YOU FOR YOUR TIME