

# SUSTAINABLE ENERGY STRATEGY

for GA EAST MUNICIPALITY

Dr. Simon Bawakyillenuo | Innocent S.K Agbelie



2015

# **Sustainable Energy Strategy for Ga East Municipality**

**Dr. Simon Bawakyillenuo & Innocent S.K Agbelie**

**(Institute of Statistical Social and Economic Research, ISSER)**

**2015**



**SAMSET**  
Supporting Sub-Saharan Africa's Municipalities  
with Sustainable Energy Transitions



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## **SAMSET Project**

Supporting Sub-Saharan Africa’s Municipalities with Sustainable Energy Transitions (SAMSET) is a 4-year project (2013-2017) supporting sustainable energy transitions in six urban areas in three African countries – Ghana, Uganda and South Africa. A fundamental objective is to improve the “knowledge transfer framework” so as to enhance research and capacity building efforts geared towards this challenging area.

## **SAMSET Ghana**

This document is produced by the Ghana SAMSET team, led by Dr. Simon Bawakyillenuo and Mr. Innocent Komla Agbelie of the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana. Dr. Bawakyillenuo is the country project coordinator (Lead) of the SAMSET project and generally researches on energy and the environment, energy policy, renewable energy, environmental policy, climate change and green economy. Mr. Agbelie is an economist and project assistant on the SAMSET project. His research interest lies in sustainable development, energy and green economy.

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# Foreword



Energy undoubtedly plays a vital role in economic development of the Ga East Municipal Assembly (GEMA). The Assembly's mission to "facilitate improvement in quality of life of the people in the Municipality through the provision of basic social service and the promotion of socio-economic development within the context of good governance" cannot be realistically achieved without efficient sustainable energy demand and supply regime in the Municipality. Through the energy survey carried out in the Municipality under the SAMSET project in 2014, the Assembly has gained valuable knowledge of the

unsustainable forms of energy demanded in the Municipality, as well as the inefficient energy demand practices across all sectors of the Municipality including our very own local government structure (GEMA). With the electricity power shortfall experienced in most cities including our Municipality resulting in productivity undermining load shedding scheme phrased locally as '*Dumsor*' since 2012, though currently reduced due to expansion in the thermal power facilities, there is a need for a shift from "business as usual" energy supply and demand managements so as to ensure energy sufficiency and sustainability in the municipality in the future.

Vibrant local economy, driven by sustainable energy future for the Municipality, will depend on pragmatic and sustainable energy strategies for all energy demand and supply sectors in the municipality. Operating under the SAMSET project umbrella, experts from the Assembly together with other stakeholders from energy demand sectors, Electricity Company of Ghana (ECG), residential, religious and traditional associations and academic institutions (ISSER, University of Ghana) have come out with strategic energy actions with estimated cost components that can guide the Assembly in its sustainable energy transitions.

Notwithstanding the limited resources of the Assembly, coupled with other competing developmental projects outlined in the medium term development plan of the Assembly, the Assembly is ready to demonstrate high level of commitment by committing resources and collaborating with responsible stakeholder, towards the achievement of its strategic actions. Similarly, the Assembly expects a high level of commitment from other stakeholders and we are hopeful that, the next phase of this SAMSET project, which entails implementation of actions, will initiate the identified sustainable energy strategic actions to ensure sustainable energy for the Municipality. We hope the success stories from SAMSET project in Ga East will be emulated by other Municipalities, in Ghana and Africa.

**Hon. John Kwao Sackey**  
**Municipal Chief Executive**  
**Ga East Municipal Assembly**

## 1.0 Introduction

The electricity supply shortfall that gripped Ghana from 2012 until early part of 2015 is a wake call for regarding the unsustainable power supply dynamics in the country, hence, the need for sustainable solutions. Prominent among the actions that were taken by the government to address this power crisis was the creation of a Power Ministry, and was mandated to come out with strategies that will bring an end to the power supply shortfall and the resultant power load shedding problems, popularly referred to by many as ‘*dumsor*’. As part of the national strategies to make Ghana energy self-sufficient in the next decade, the power sub-sector has been projected to be 80% dependent on thermal plants<sup>1</sup> and will be powered by gas supply from the Atuabo Gas plant<sup>2</sup> in Jomoro District in the Western Region of Ghana.

At the Metropolis, Municipal and District Assemblies’ (MMDAs) level, energy supply and demand management planning is non-existent or at best, very limited because energy planning in Ghana is at the national level. Although local governments in Ghana including Ga East Municipality play no direct role in the generation and distribution of electricity and petroleum fuels to their local areas, they can play a crucial role in sustainable energy consumption practices across all sectors in their jurisdictions through the mandate they have planning. Since they are barred from making profits, local government authorities in Ghana are often constrained in carrying out their developmental activities because of the limited cash flow and the delay in the release of the District Assembly Common Fund (DACF). Without innovative ways of sourcing funds, developmental initiatives such as sustainable energy supply and demand management at the MMDAs stand a great risk of not being implemented.

In the midst of the resource constraints Ga East Municipal Assembly (GEMA), together with a sister Assembly<sup>3</sup> in Ghana, have signed onto the SAMSET project, which involves four other cities from South Africa and Uganda, in order to exchange knowledge and build via meetings and trainings in a bid to transition to sustainable energy solutions in these municipalities. To achieve the overarching objective of this project, SAMSET Ghana set out to understand the state of energy supply and demand dynamics in the GEM by carrying out a State of Energy survey. Evidence of inadequate usage of sustainable energy types and practices within the domestic and commercial sectors, coupled with the non-use of renewable energy technologies across all sectors drum home the need for sustainable energy strategies if the municipality is to transition along the sustainable energy pathway in the long term. Having analysed the various future scenarios based on the current state of energy issues, it is imperative to develop sustainable energy strategies for the municipality so as to avert the future negative implications associated with the present unsustainable energy pathway.

The report is structured into five sections. Following the introduction section is the discussion on the approach used in developing the strategies in section two. Section three unpacks the sustainable energy strategies for the different sectors: household, commercial, industry, agriculture, local government and

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<sup>1</sup> Government projects 80% of power plants to be thermal. Available online at: <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/Gov-t-projects-80-of-power-plants-to-be-thermal-430382>

<sup>2</sup> Atuabo Gas is an onshore gas processing plant in Ghana inaugurated in 2015

<sup>3</sup> Awutu Senya East Municipal Assembly



transport. Section four presents the proposed implementation plan of the strategic actions together with the cost of implementing while the final section summarises and concludes the report.

## 2.0 Approach to developing the sustainable energy Strategies

The energy strategy development in GEM was undertaken through stakeholder engagement, who included experts from the energy supply and demand sectors in the municipality. With the help of the SAMSET municipal partners at Ga East Municipal Assembly (GEMA), these stakeholders were identified to partake in the strategy development. A total of 24 participants, representing the household, commercial, industrial, local government and transport sectors as well as the Electricity Company of Ghana (ECG), traditional leaders and market associations took part in the stakeholder engagement exercises in GEM.

The adopted approach in GEM was in different phases. Within the first phase, the research team collated the views of all the stakeholders on the diverse strategies directed at sustainable energy transitions in the municipality after they were through the current state of energy in the municipality and the future implications of the business as usual scenarios. The second phase of engagement involved the validation of the inputs that were made in the first phase. Participants of this second phase of engagement were fewer than the first phase as they comprised of only key stakeholders that took active part in terms of contributions during the first engagement.

The stakeholder engagement approach to the strategy development is extremely important because, it guarantees reliable outcomes since the very active players from the various sectors are already involved in developing various strategies. Through this approach, the embodiments of this strategic document are inclusive and well-tailored towards the energy sustainability pathway of the municipality.

**Plate 1: Participants at the stakeholder consultative workshop in GEM**



## 3.0 Sectoral sustainable energy strategies

The energy demand sectors in GEM for which the sustainable strategies are developed to address include the household, commercial, industrial, agricultural, transportation and local government sectors. These sectors consume the total energy that is imported into the municipality. Instilling sustainability in demand and use practices across these sectors will guarantee a sustainable energy future for the municipality. Strategies for the various sectors are discussed below.

### 3.1 Household energy strategies

The household sector represents the smallest but very important planning unit where a lot of energy of energy consumption activities take place. In GEM, the household sector is the second largest energy consuming sector after the transport sector as it consumed some 682,733.95 GJ quantum of energy in 2013. The snapshot of the current state of energy in the sector and outlined key strategic actions to bring about sustainability are below.

#### 3.1.1 Snapshot of the current state of energy in the household sector

- **Waste management**
  - While 67% of the 385 tons of solid waste generated monthly in GEM are collected and disposed of at the Abokobi waste landfill site, the remaining 33% that is uncollected is disposed of indiscriminately.
- **Energy consumption**
  - Louver blade windows are predominantly used in GEM in dwelling units. However, those who use sliding glazed windows are reported to spend more and consume more energy than louver blade and wooden windows users due to the necessity of ACs in sliding glazed window dwellings.
  - Charcoal and woodfuel constitute about 37% and 8% respectively of the total energy consumed by the household sector in GEM, mostly for cooking needs. Significant portions of second and third class households have indicated their intentions of continual dependency on these energy sources due to their inability to afford modern fuel types like electricity and LPG for cooking.
  - While knowledge of the existence of energy efficient cookstoves exists among households, only about 30% of households on average use the energy efficient cookstove for cooking in GEM.
  - Electricity from national grid constitutes 28% of total energy consumed in GEM, mostly for refrigeration, space cooling, lighting and ironing needs while RETs constitute less than 1% of the total energy used.
  - Less than 1% of households in GEM took part in the Energy Commission's (EC's) Fridge Replacement programme despite high awareness of the programme among households in the municipality.

- **Renewable Energy Technologies (RETs) adoption**

- Low adoption of RETs (which constitute less than 7% of the total energy consumed by the household sector in GEM) and retrofitting technologies in the household sector in GEM.

### 3.1.2 *Future scenarios and implications of the current state of energy*

- **Waste management**

- The unsustainable waste management practices in the municipality has health as well as climate change implications since waste burning is the norm even at the Abokobi Landfill site. The high potential of waste-to-energy resources are highly unexploited in the municipality.

- **Energy consumption**

- The current trend and willingness of households in GEM to adopt the new glazed windows in future will most likely increase energy demand by the building sector in the municipality.
- Future dependence on biomass fuel (charcoal and wood) will lead to further depletion of the forest cover and decrease in the carbon sink. This will lead to high cost of charcoal and wood fuels in the future if demand outstrips supply of these fuel types.
- Unsustainable usage of the biomass fuel results in massive energy wastage and depletion of forest cover. About 50% more of charcoal is needed for cooking when using the ordinary cookstove compared to energy efficient cookstoves.
- Low adoption of energy efficient technologies such as the energy efficient refrigerators as well as other retrofitting technologies increase expenditure and consumption of electricity of the consumer.

- **RETs adoption**

- Low RETs adoption implies more pressure on the limited national grid, which is projected to be 80% dependent on thermal in the next decade. More fossil fuel dependent electricity will result in more carbon emissions.
- Low retrofitting technology adoption in the household sector has cost implications for electricity wastage and high income expenditure on electricity in the future.

### 3.1.3 *Household sector's energy goal*

The all-embracing goal of the household sector is to ensure that all energy end-uses or activities in houses are achieved in a sustainable manner through sustainable energy practices. Specific goals with respect to waste management, energy demand and RETs adoption to ensure desirable and sustainability in the household sector are stated below:

- **Waste management**

- Ensure 100% waste collection in the municipality; and
- Maximisation of waste-to-energy potentials in the municipality.

- **Energy consumption**

- About 80% of all new residential and commercial buildings should be energy and environmentally friendly by 2030;
- Ensure sustainability in supply chain of the charcoal fuel. Promotion of sustainable charcoal production as well as promoting clean alternatives like bamboo charcoal and briquettes usage among households in GEM;
- Promotion of sustainable charcoal and wood fuels consumption. Ensuring that about 80% penetration of efficient cookstoves in GEM by 2030;
- Increase the adoption rate of the efficient refrigerators to 50% by 2030.

- **RETs adoption**

- Promote RETs adoption among households in the municipality to about 30% by 2030

### 3.1.4 Key Strategies

#### 3.1.4.1 Waste management

##### **Strategy 1: Acquire a permanent waste disposal site for the Assembly**

Key actions to be taken under this strategy include:

- *Develop a project proposal to be submitted for private investor interest;*
- *Joint partnership with other districts or lone acquisition of a parcel of land by GEMA from traditional land owners specifically for the waste disposal site in the municipality. Land acquisition is underway jointly with La Nkwantanang Municipality.*

Proposed stakeholders to support implementation of actions

- *Assembly, Traditional leaders, waste contractors, residents' associations, recycling companies, manufacturers, packaging companies, clergy, opinion leaders, media, academia, engineers.*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations, advocacy through national policy fairs.*

##### **Strategy 2: Strengthening relevant units (Environmental Sanitation Unit) at GEMA**

Key actions to be taken under this strategy include:

- *Enhance human capacity, that is, increase the environmental health officers, logistics (Pick-up vehicles) in the Assembly;*
- *GEMA to effectively disseminate bye-laws on environmental sanitation in the municipality;*
- *Strict enforcement of environmental sanitation bye-laws in the municipality;*
- *Monitoring and reviewing of waste contract agreements between the Assembly and contractors as well as regular stakeholder meetings in the municipality.*

Proposed stakeholders to support implementation of actions

- *GEMA and contractors.*

Proposed funding strategies (expected financiers)

- *GEMA's internally generated funds (IGF), DACF.*

### **Strategy 3: Campaign for waste minimisation and waste recycling in the municipality**

Key actions to enforce this strategy include:

- *Effective education and campaign on waste minimisation, waste reuse, waste separation and recycling in the municipality;*
- *Carrying out behavioural change campaigns on indiscriminate waste disposal methods and holding effective education on sustainable internal waste disposal practices for households;*
- *Identification of key demand sector players of sorted waste in the municipality and beyond;*
- *Introducing an incentive mechanism for waste sorting in the municipality in the very short term such as income token for households that sort their waste at the collection point.*

Proposed stakeholders to support implementation of actions

- *GEMA, media, opinion groups, market associations.*

Proposed funding strategies (expected financiers)

- *GEMA, media, writing of proposals to grant awarding organisations.*

### **Strategy 4: Maximise waste –to-energy potentials**

Key actions to be taken under this strategy include:

- *Education on waste separation/sorting for households;*
- *Call for proposals from interested private investors who may want to invest in waste-to-energy project in the municipality. At present, steps have already been taken to identify an interested private investor.*
- *Prepare project document to outline the resource potentials of the waste-to-energy project in the municipality to be used to attract investors in the future.*

Proposed stakeholders to support implementation of actions

- *GEMA, private investors, research institutes including ISSER.*

Proposed funding strategies (expected financiers)

- *PPP, private investors.*

#### **3.1.4.2 Energy consumption**

##### **Strategy 1: Promoting effective educational campaign on environmentally friendly building design and materials**

Key actions to be taken under this strategy include:

- *Sensitization on cost and implications of wrongful applications of glazed windows and doors through actively involving the media and obtaining an airtime on one local FM Station to advance the energy efficient building campaign in the municipality.*
- *Promotion of redesign of glazed windows to allow for some level of energy efficiency in its usage.*

Proposed stakeholders to support implementation of actions

- *GEMA (through its Information Department and Town and Country Planning unit), Ghana Institute of Engineers, architects, Ghana Institute of Housing, Artisan Associations, Real Estate Firms, residents Associations, importers, media, Volta River Authority, ECG, Energy Commission and other support organisations.*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations, GEMA.*

### **Strategy 2: Introduction of persuasive and incentive clause in the building approval process**

Key actions to be taken under this strategy include:

- *Carrying out a thorough evidence based research (to supplement the SoE Report) which reveals the negative effects of glazed windows and doors that can be used to persuade or convince contractors, landowners and individual builders in the municipality about the effects of inefficient building designs;*
- *Creating an incentive such as reduction in building permits fee for individuals who incorporate energy efficient designs in the building plans;*
- *Effective monitoring to ensure energy efficient building plans are well adhered to during the construction phase of the building.*

Proposed stakeholders to support implementation of actions

- *GEMA, landlord associations, traditional leaders, religious leaders, market associations, media, research institutions.*

Proposed funding strategies (expected financiers)

- *GEMA through its IGF and DACF.*

### **Strategy 3: Promote efficient charcoal and wood cookstoves usage as well as cleaner substitutes for charcoal in the municipality**

Key actions to be taken under this strategy include:

- *Effective and practical education and sensitisation on energy efficient cookstoves through the organisation of energy exhibition/fair where wood charcoal, alternative clean sources like briquettes, bamboo charcoal, biogas will be displayed at the exhibition venue in the municipality*

Proposed stakeholders to support implementation of actions

- *Assembly, media, manufacturers, marketers, residents associations (landlord, traditional leaders, religious leaders etc.), market associations, research institutions.*

Proposed funding strategies (expected financiers)

- *GEMA (IGF and DACF), media, proposals writing to grant awarding organisations.*

### **Strategy 4: Promote the use of energy efficient refrigerators and air conditioners among households in GEM**

Key actions to be taken under this strategy include:

- *Effective and strategic education with practical illustrations of the benefits of energy efficient electrical gadgets in the municipality;*
- *Advocacy for policy for all institutions to use energy efficient gadgets.*

Proposed stakeholders to support implementation of actions

- *Assembly, EC, media, research institutions.*

Proposed funding strategies (expected financiers)

- *Individuals and associations through hire purchase.*

### 3.1.4.3 RETs adoption

#### Strategy 1: Promote the adoption of renewable energy and energy efficient technologies among households in GEM

Key actions to be taken under this strategy include:

- *Effective and strategic education on solar, wind and other RETs as well as energy efficient and retrofitting technologies among households in GEM.*

Proposed stakeholders to support implementation of actions

- *Assembly, Energy Commission of Ghana, media etc.*

Proposed funding strategies (expected financiers)

- *Hire purchase on individual and union terms.*

## 3.2 Commercial and Industrial sectors' energy strategy

The commercial and industrial sectors play key roles in the development of Ga East Municipality through employment creation for people living within and out of the municipality. Productivity in these sectors greatly depends on availability of energy, hence sustainable energy planning for these sectors will boost productivity and development of the municipality in the long run. In 2013, the commercial sector in GEM consumed about 69,457.12 GJ of different forms of energy while the industrial sector consumed about 10,215.68 GJ of energy in the municipality. Strategic energy actions proposed for these sectors by the experts during the stakeholder engagement are informed by the current state of energy supply and demand situations in the municipality as highlighted below:

### 3.2.1 Snapshot of the current state of energy in the commercial and industrial sectors

- **Energy consumption**
  - There has been a rapid growth in the number of commercial activities in GEM with informal activities growing at an annual average rate of 21%. Almost all commercial activities in GEM depend on the national grid power supply with less than 5% using solar energy.
  - There is an observed increasing trend in diesel and petrol fuels usage in commercial activities since 2010 through back-up generators, while RETs usage remain constantly low.
  - In the industrial sector, diesel and petrol fuels consumption are similarly on the rise. These two types of fuel constituted about 30% of total fuel consumed by the industrial sector in 2010 but reached 73% in 2013.
- **RE and Energy Efficient technologies (retrofits) adoption**
  - Low adoption of retrofitting technologies such as human sensors in commercial and industrial offices in GEM. Meanwhile, lighting constitutes about 10% and 28% of total energy consumed by the commercial and industrial sectors respectively in the municipality.
  - No RETs in the energy mix of the industrial sector in GEM.

### 3.2.2 *Future scenarios and implications of the current state of energy*

- **Energy consumption**
  - The increasing number of commercial activities will require more energy for production activities in the municipality. Without alternative energy sources, there will be increased pressure on the national grid supply.
  - With the national grid projected to be 80% thermal dependent in the future coupled with the high dependence of commercial and industrial activities on petrol and diesel fuel generators, there is high likelihood of more carbon emissions in the future without sustainable alternatives.
- **RE and Energy Efficient technology (retrofits) adoption**
  - Low adoption of energy efficient technologies results in high level of energy wastage.
  - New renewable resources like the solar and wind are highly unexploited in the midst of electricity shortfall in the municipality.

### 3.2.3 *Commercial and industrial sectors' energy goal*

The general goal of the commercial and industrial sectors is to promote holistic sustainable energy practices in the municipality. The specific objectives with respect to energy consumption and energy efficiency to ensure desirable energy future include:

- **Energy consumption**
  - Self-sufficient sustainable energy supply sources for the commercial sector by 2030 through the promotion of RETs' adoption in the commercial sector, at least 30% adoption in their energy mix by 2030.
  - Promotion of less dependency on diesel/petrol powered generators.
- **Energy efficient (retrofitting) technologies adoption**
  - Increase adoption of retrofitting technologies by commercial sector players especially, formal sector (hotels, hostel, offices, banks, schools) in the municipality

### 3.2.4 *Key Strategies*

#### 3.2.4.1 **Energy consumption in the Commercial and Industrial sectors**

##### **Strategy 1: Promote the adoption of RETs like wind, solar, biogas within the commercial and industrial sectors**

Key actions to be taken under this strategy include:

- *Carry out effective energy audit for different gadgets owned by different commercial and industrial activities in the municipality.*
- *Research into other cheaper and cleaner energy alternatives like biogas especially, for the formal commercial activities in the municipality.*
- *Restructure the informal activities setup in the municipality. Pool of informal activities (i.e. create energy sufficient enclaves in the Dome Market) to generate sufficient energy, for example, biogas from the liquid waste generated by commercial activity players.*
- *Plan properly or future commercial hubs by incorporating sustainable energy generation and use principles.*



- *Effective education and promotion through moral suasion, display of designed components provided by technocrats to convince commercial and industrial activities to buy the idea of RETs adoption.*
- *Carrying out stakeholders' fora in the municipality to advance the adoption of RETs in commercial and industrial sectors in the municipality.*

Proposed stakeholders to support implementation of actions

- *GEMA, ECG, research institute (ISSER), renewable experts (researchers) and technocrats (dealers/suppliers), estate developers, professional associations on built environment, traders associations.*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding institutions, EC, local and international donors (World Bank, UN agencies) embassies (DANIDA, CIDA), through PPP.*

### **3.2.4.2 Energy efficient (retrofitting) technologies adoption**

#### **Strategy 1: Promote the use of retrofitting technologies such as the installation of human sensors in commercial and industrial offices in GEM**

Key actions to be taken under this strategy include:

- *Effective illustrative education.*
- *Stakeholders' fora in the municipality involving most commercial and industrial sector players.*

Proposed stakeholders to support implementation of actions

- *GEMA, research institutes (ISSER), energy efficiency expert (researchers) and technocrats (dealers/suppliers of EE technologies), estate developers, professional associations on built environment, traders associations.*

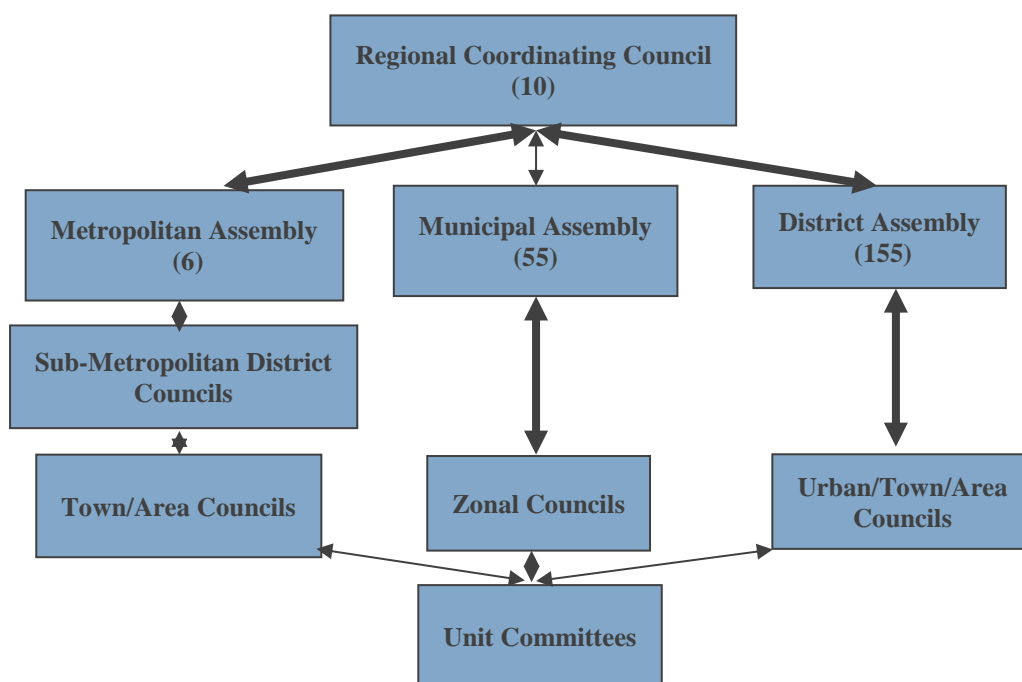
Proposed funding strategies (expected financiers)

- *Donor support, GEMA (IGF and DACF), proposals to grant awarding organisations.*

### **3.3 Local government sector (GEMA)'s energy strategy**

Local government sector activities cut across administration, monitoring and provision of public utilities such as water in the municipality. The structure of GEMA includes its sub-divisions, two zonal councils and a unit committee at the lowest level (as shown in Figure 1) that are tasked with varied responsibilities. All activities of these divisions of GEMA involve the use of energy inside and outside of the office premises and in 2013, GEMA consumed a total of about 11,909.3 GJ of energy according to the 2014 State of Energy survey. Proposed strategies to ensure sustainability in the energy usage by GEMA are informed by the current state of energy supply and demand management as highlighted below.

**Figure 1: Local Government System arrangement in Ghana**



Source: Ministry of Local Government, 2013<sup>4</sup>

### 3.3.1 Snapshot of the current state of energy in GEMA

- **Energy consumption**

- The predominant energy source consumed by GEMA is electricity from the national grid, which constitutes about 82% of the total energy consumed as of 2013, mainly for powering office machines, lighting, space cooling and refrigeration needs.
- No RETs and retrofitting technologies were used in GEMA as of 2013. Meanwhile, lighting constitutes a significant proportion of the Assembly’s total energy consumption.
- Diesel fuel, which constitutes 18% of GEMA's total energy consumption is used in the Assembly's vehicles and back-up generators.

- **Local government control issues**

- GEMA has little control over new developments in the municipality such as residential and commercial buildings, slums development, putting up of temporal structure at unauthorised locations among others. This phenomenon is as a result of the fact that there is high level of informality in the municipality coupled with lack of sufficient resources at the disposal of GEMA to cope with the situation hence development is often ahead of planning in the municipality.

<sup>4</sup> Ministry of Local Government, Ghana 2013. Local Government system in Ghana

### 3.3.2 *Future scenarios and implications of the current state of energy*

- **Energy consumption**
  - The increase dependence of GEMA on the national grid for power supply will add burden to the already pressured national grid source.
  - Unexploited RETs in the midst of electricity power shortfall in the municipality. Wastage of electricity power without retrofitting technologies.
  - Carbon emissions and climate change implications if the dependency on fossil fuel increases further in the future.
- **Local government control issues**
  - Without sufficient control of GEMA over new development in the municipality, there is high likelihood of increased irregular city structures, slum development, irregularities and illegal electricity connections, unaccounted for electricity consumption, energy theft, constraint on energy infrastructure development.

### 3.3.3 *GEMA's energy goal*

The main sustainable energy goal of GEMA is to achieve energy efficiency in all of its activities. Specifically, the Assembly aims to achieve certain objectives by 2030 with regards to energy consumption and local control issues in order to bring about a sustainable energy future for the municipality. These objectives include:

- **Energy consumption**
  - Diversify electricity power sources for the Assembly to include cleaner sources.
  - Total redesign of GEMA office complex to be energy efficient by 2030.
  - Optimal use of Assembly's vehicles to cut down diesel consumption to 50% by 2030.
- **GEMA's local control over new developments in the municipality**
  - Assume full control of GEMA over all new development in the municipality

### 3.3.4 *Key strategies for GEMA*

#### 3.3.4.1 *Energy consumption*

##### **Strategy 1: Adoption of clean alternative sources of energy**

Key actions to be taken under this strategy include:

- *Introduction of solar energy into the energy consumption mix of GEMA. Construction of a solar PV roofed car parking structure at GEMA office complex.*
- *Strategic internal sensitisation exercise among officers of GEMA.*
- *Energy auditing of the all GEMA structures.*

Proposed stakeholders to support implementation of actions

- *GEMA, private sector players.*

Proposed funding strategies (expected financiers)

- *PPP (hire purchase or fee for service), Assembly source (IGF), Donor sources (UDG, DDF), proposal writing, networking.*

## **Strategy 2: Promotion of RETs and EE technologies (human sensors) usage in GEMA**

Key actions to be taken under this strategy include:

- *Installation of human (motion) sensors in all offices in GEMA.*
- *Machine operation pooling, for instance, setting up a centralised networked printing unit at the Assembly.*
- *Architectural redesigns of Assembly structures to incorporate energy efficient systems.*
- *Energy auditing at the Assembly.*

Proposed stakeholders to support implementation of actions

- *GEMA, research institutions (ISSER), technocrats (suppliers).*

Proposed funding strategies (expected financiers)

- *GEMA's IGF and DACF.*

## **Strategy 3: Efficient use of fossil fuel in GEMA**

Key actions to be taken under this strategy include:

- *Construction of waste transfer or collection station at GEM.*
- *Replacement of over aged vehicles with new ones through auctioning s.*

Proposed stakeholders to support implementation of actions

- *GEMA, private waste collectors, Ministry of Local Government and Rural Development.*

Proposed funding strategies (expected financiers)

- *GEMA, proposals writing to grant awarding organisations.*

### **3.3.4.2 GEMA control issues**

#### **Strategy 1: Development of planning schemes, updating of existing planning schemes and rezoning for all parcels of land in GEM**

Key actions to be taken under this strategy include:

- *Adhering to statutory laws of the Assembly and enforcement of planning regulations without fear.*
- *Continual and systematic support for the Town and Country Planning (TCP) unit with allocation of the right resources.*
- *Improve the capacity of the TCP unit.*
- *Effective sensitisation of land owners on land allocation, land schemes and land use.*
- *Secure strong legal advisors to back all legal actions of GEMA.*

Proposed stakeholders to support implementation of actions

- *Estate developers, traditional leaders; residents' association, Assembly members, Ghana Real Estate Developers Association (GREDA).*

Proposed funding strategies (expected financiers)

- *GEMA (IGF and DACF).*

### 3.4 *Transport sector's energy strategies*

The transport sector is the largest energy consuming sector in GEM, having consumed some 8,782,423.8 GJ of energy in 2013 representing about 92% of the total energy consumed in the municipality. The form of energy consumed by the transport sector in GEM is generally fossil fuel, specifically petrol, diesel and Liquefied Petroleum Gas (LPG). The production, supply and distribution of these fuel types are nationally regulated by the Ministry of Energy and Petroleum as well as the Petroleum Commission leaving just a little or no planning role for the local authorities to play. Confirmed during the stakeholder engagement, transport experts from the GEMA and other transport unions expressed the view that the transport sector activities are outside the mandates of the Assembly, and it can only play a supportive role if needed. Therefore, sustainable energy strategies to bring about sustainable fuel consumption by the transport sector in GEM can only come from the national energy agencies.

## 4.0 Strategic action plans and budget

The proposed actions under the various strategies have been assigned cost values with the help of budget experts in the two municipalities who took part in the stakeholder engagement meetings. With the use of appropriate shadow pricing techniques, and keen consideration of all market forces (pricing conditions, inflation, exchange rate, demand and supply condition), realistic cost values have been assigned to the key actions to be undertaken under the various proposed strategies in the municipality. In addition to the costing of the strategic actions, tentative implementation periods have been outlined to guide the sustainable transition process. Summary of the strategic actions costing and implementation periods are presented in Table 1 below.

Players from various institutions to champion the implementation of the different actions have been discussed in the preceding section. Depending on the availability of resources through the proposed funding strategies outlined under the various actions in the preceding section, the strategic actions shall be implemented according to the assigned implementation periods. With the general planned implementation period pegged at 2030, soft and highly prioritised actions have been proposed by the stakeholders to be implemented within the next two to five years (that is, until the end of 2020). Highly capital intensive actions, which will require huge amount of resources have been spread over the entire implementation period to give room for effective ways of sourcing funds for such activities/actions. The amounts assigned to the various actions are estimates based on the prevailing market conditions in Ghana with minimum margins of error. In other words, the real cost values may be adjusted upward or downward at the time of implementation of each action depending on prevailing market conditions.

**Table 1: Summary of strategic action plans and budget**

Sector	Strategy	Actions	Period 2016-2030	Estimated Amt. ('000 GHS)	Remarks/Note
Household	Acquisition of a permanent waste disposal site for the Assembly	<i>Develop a project proposal to be submitted for private investor interest</i>	-	-	Proposal submitted to MoF (PPID)
		<i>Joint partnership with other districts or lone acquisition of a parcel of land by GEMA from traditional land owners specifically for waste disposal in the municipality</i>	2016	-	land acquired by GEMA and LaNMA
	Strengthening of relevant units (Environmental Sanitation Unit) at GEMA	<i>Enhance human capacity, logistics(pick-up vehicles) in the Assembly</i>	2016-2017	250	Cost of Pick-up vehicle, safety tools and training
		<i>Effective dissemination of bye-laws on environmental sanitation in the municipality.</i>	2016-2018	30	Radio airtime, comm. durb
		<i>Enforcement of bye-laws on sanitation</i>	2016-2030	10	Fee for lawyers' services, etc.
		<i>Monitor and review of waste contract agreement between the Assembly and contractors as well, stakeholder meetings for all stakeholder should be held regularly in the municipality</i>	2016-2030	30	Performance review, fixing new rates etc.
	Campaign for waste minimisation and waste recycling in the municipality	<i>Effective education and campaign on waste minimisation, waste reuse, waste separation and recycling in the municipality</i>	2016-2030	50	Cost of community durbars, radio talk-shows; GEMA to take lead responsibility
		<i>Carrying out behavioural change campaigns on indiscriminate waste disposal methods and holding effective education on sustainable internal waste disposal practices for households</i>			
		<i>Identification of key demand sector players of sorted waste</i>	2016-2018	5	Administrative cost
		<i>Introduce an incentive mechanism for waste sorting in the municipality in the very short term such as income token for households that sort their waste at the collection point</i>	2019-20	-	Dependent on the success of preceding action
	Maximise waste –to-energy potentials	<i>Call for proposals from interested private investors who may want to invest in waste-to-energy project in the municipality</i>	2016	-	Private investor identified already
		<i>Prepare project document outlining the resource potentials of the waste-to-energy project in the municipality which can be used to attract future interested investors</i>	2016	-	There is an existing document to that effect

	<b>Promoting effective educational campaign on environmentally friendly building designs and materials</b>	<i>Sensitization on cost and implications of wrongful applications of glaze windows and doors</i>	2016-2020	120	<i>Actively involving the media and obtaining an airtime on one local FM</i>
		<i>Promotion of redesign of glaze windows to allow for some level of energy efficiency in its usage</i>			
	<b>Introduction of persuasive and incentive clause in the building approval process</b>	<i>Creating an incentive such as reduction in building permits fee and approval period for individuals who incorporate energy efficiency designs in the building plans</i>	2016-2030	-	GEMA to take lead responsibility
		<i>Effective monitoring to ensure energy efficient building plans are well adhered to during the construction phase of the building</i>	2016-2030	230	Cost of Pick-up vehicle and other logistics for Development control unit
	<b>Promote efficient charcoal and wood cookstoves as well as cleaner substitutes for charcoal</b>	<i>Effective and practical education and sensitisation on energy efficient cookstoves through organisation of energy exhibition/fairs in the municipality</i>	2016-2020	8	GEMA to take lead responsibility
	<b>Promote the use of energy efficient refrigerators and air conditioners among households in GEM</b>	<i>Effective and strategic education with practical illustrations of the benefits of energy efficiency electrical gadgets in the municipality</i>	2016-2020	200	„
		<i>Advocacy for policy for all institutions to use energy efficient gadgets</i>	2016-2022	5	ISSER to take it up with MLGRD
<b>Promote the adoption of renewable energy and energy efficiency technologies among households in GEM</b>	<i>Effective and strategic education on solar, wind and other RETs as well as energy efficient and retrofitting technologies among households in GEM.</i>	2016-2022	25	GEMA to take lead responsibility	
<b>SUB-TOTAL (A)</b>			<b>GHS 963,000</b>		
<b>Commercial and industry</b>	<b>Promote the adoption of RETs like wind, solar, biogas within the commercial and industrial sectors</b>	<i>Carry out effective energy auditing (for different gadgets owned by different commercial and industrial activities in the municipality</i>	2016-2018	80	„
		<i>Research into other cheaper and cleaner energy alternatives like biogas for especially the formal commercial activities in the municipality</i>			
		<i>Restructuring of informal activities setup in the municipality. Pool of informal activities at the market (i.e create energy sufficient enclaves) to generate sufficient energy, say biogas using waste generated by the commercial activities.</i>	2018-2025	75	Project to be sited at Dome market

		<i>Proper planning and documentation of future commercial hubs to take into effect sustainable energy sources for the commercial activities</i>	2016-2018	250	Cost for land acquisition for commercial activities
		<i>Effective education and promotion through moral suasion, display of design component provided by technocrats to convince commercial and industrial activities to buy the idea of RETs adoption</i>	2016-2019	40	GEMA to take lead responsibility
		<i>Stakeholder fora in the municipality to advance the adoption of RETs in commercial and industrial sectors in the municipality</i>			
	<b>Promote the use of retrofitting technologies such as the installation of human sensors in commercial and industrial offices in GEM</b>	<i>Effective illustrative education</i>			
		<i>Stakeholder fora in the municipality involving most commercial and industrial sector players</i>			
<b>SUB-TOTAL (B)</b>				<b>GHS 445,000</b>	
<b>Local Government (GEMA)</b>	<b>Adoption of clean alternative sources of energy</b>	<i>Introduction of solar energy into the energy mix of GEMA, e.g solar car parking structure at GEMA office ground</i>	2016-2018	350	GEMA to take lead responsibility
		<i>Strategic internal sensitisation exercise among officers of GEMA</i>	2016-2017	8	„
		<i>Energy auditing of the whole GEMA structure from the zonal councils to the Assembly complex</i>	2016-2018	15	„
	<b>Promotion of EE technology (human sensors) usage in GEMA</b>	<i>Installation of human (motion) sensors in all offices in GEMA</i>	2016-2019	10	„
		<i>Machine operation pooling for instance centralised printing</i>	2016-2019	15	„
		<i>Architectural designs to incorporate energy efficient systems, redesign of glazing system of GEMA's office complex</i>	2016-2017	-	„
	<b>Efficient use of fossil fuel in GEMA</b>	<i>Construction of waste collection station at GEM</i>	2016-2030	500	GEMA to collaborate with private waste collectors
		<i>Replacement by auctioning of GEMA's over aged vehicles with new ones. It will still be worthwhile to exchange three old vehicles for one new efficient one</i>	2016-2026	740	GEMA to take lead responsibility
	<b>Development of planning schemes, updating of existing planning schemes and rezoning for all</b>	<i>Adhering to statutory laws of the Assembly and enforcement of planning regulations without fear</i>	2016-2030	-	„
		<i>Continual and systematic support for the Town and Country Planning (TCP) unit with allocation of the right resources</i>	2016-2018	30	Cost for logistics, training etc. for TCP unit



	parcels of land in GEM	<i>Improve the capacity of the TCP unit</i>			
		<i>Effective sensitisation of land owners on land allocation, land schemes and land use</i>	2016-2022	36	GEMA to take lead responsibility
		<i>Secure strong legal advisors to back all legal actions of GEMA</i>	2016-2030	-	GEMA already takes care of legal charges
<b>SUB-TOTAL (C)</b>			<b>GHS 1,704,000</b>		
<b>OVERALL TOTAL (A+B+C)</b>			<b>GHS 3,112,000</b>		

## 5.0 Summary and Conclusion

In supporting GEM with sustainable energy transitions through a knowledge exchange framework, state of energy report for GEM was produced from data gathered in 2014 Energy Survey in GEM and Awutu Senya East Municipality (ASEM) under the SAMSET project to ascertain the energy demand and supply dimensions in the municipalities. The current state of energy in GEM reveals worrying energy demand management and practices across all sectors in the municipality, which will undoubtedly affect future energy demand and the environment at large if concrete plans are not taken presently to avert business as usual energy consumption trend. Consequently, different stakeholders identified from all the energy demand sectors in GEM were engaged in stakeholder fora to brainstorm on sustainable energy strategic actions as well as their corresponding budgets to enable GEM to drive the sustainable energy transitions agenda in the long run.

Different strategies and actions have been proposed, with effective educational campaigns emerging strongly. This points to the lack of in-depth knowledge on a host of energy issues in the municipality. Successful implementation of these actions will require resilient commitment from all proposed stakeholders responsible for the implementation of the actions. In addition, healthy collaboration between GEMA and other implementing stakeholders such as ISSER will be crucial to the successful implementation of these strategic actions. With the limited resources of the Assembly (IGF and DACF) which are also to be used for other competing developmental activities in the municipality, most of the sustainable energy strategic actions are proposed to be financed through proposals writing to grant awarding institutions. Thus, effective collaboration between GEMA and the research institutions like ISSER to produce grant-winning proposals cannot be overemphasised.

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