

SUSTAINABLE ENERGY STRATEGY

for AWUTU SENYA EAST MUNICIPALITY

Dr. Simon Bawakyillenuo | Innocent S.K Aghelie



2015

Sustainable Energy Strategy for Awutu Senya East Municipality

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(Institute of Statistical Social and Economic Research, ISSER)

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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



Awutu Senya East Municipal Assembly's (ASEMA's) mission of *“facilitating the improvement in quality of life of the people in close collaboration with the private sector and other development partners in the Municipality through the mobilization and the judicious use of resources and provision of basic socio-economic development within the context of good governance, equity and transparency”* cannot be achieved without sustainable energy supply and demand in the

Municipality. The energy survey carried out in the Municipality under the SAMSET project in 2014, has brought to the attention of the Assembly the unsustainable forms of energy demanded in the Municipality, as well as the inefficient energy demand practices across all sectors of the Municipality including the Assembly. The current challenges facing the energy sector in Ghana resulting in electricity power load shedding across major cities in the country, though reduced in 2016 as a result of expansion in the thermal power facilities, calls for a rethink in energy supply sources as well as demand practices in the municipality and Ghana as a whole. There is a need for a shift from “business as usual” practices to sustainable energy practices to facilitate the energy transition process of Awutu Senya East Municipality.

Accordingly, 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) through stakeholder consultative workshops, have come out with strategic energy actions with estimated cost components as a guidance for the Assembly in its quest for sustainable energy future for the Municipality.

To facilitate the sustainable energy transition process in the Municipality, the Assembly shall do well to commit resources and collaborate effectively with responsible stakeholders towards the achievement of the proposed strategic actions. In similarly vein, the Assembly charges all responsible stakeholders to demonstrate high level of commitment towards the implementation of the proposed strategic actions in the Municipality. Successful implementation of these actions will make the SAMSET project a successful model which other cities and municipalities in Ghana and Sub-Sahara Africa can emulate.

Hon. Dr. Adams Nuhu
Municipal Chief Executive
Awutu Senya East Municipality

1.0 Introduction

Sustainable planning and development in any sector requires an in-depth understanding of the past, present and future scenarios of different activities in that sector. Growing population coupled with rapid urbanisation and alarming urban sprawling in most Ghanaian cities, especially those in close proximity to the capital city, Accra, including Awutu Senya East Municipality, have put enormous pressure on an already limited energy infrastructure in Ghana. Consequently, the entire country has been facing serious energy crises since 2012 due to shortfall in electricity supply to meet growing demands from the household, commercial and industrial sectors.

In the midst of the energy challenges, governments, particularly at the national level has acknowledged the need for pragmatic steps towards sustainable energy supply and demand. Local governments, meanwhile remain under capacitated and powerless in providing sustainable energy services in Ghana. Nevertheless, Awutu Senya East Municipal Assembly, together with a sister Assembly¹ 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 ASEM 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.

Following the introduction section is a discussion on the approach used in developing the strategies in section two. Section three looks at the strategies in terms of the different sectors - household, commercial, industry, agriculture, local government and transport. Section four presents the proposed implementation plan of the strategic actions together with their cost values, while the final section summarises and concludes the report.

2.0 Approach to developing the Sustainable Energy Strategies

The approach adopted to develop the sustainable energy strategies for ASEM was mainly through stakeholder engagement. With the help of the SAMSET municipal partners (focal persons) at ASEMA, at least three stakeholders with proven depth of knowledge and experience in their respective energy supply and demand sectors were identified to participate in the strategy development. In totality, about 23 stakeholders from the household, commercial, industrial, agricultural, transport and local

¹ Ga East Municipal Assembly

government sectors as well as representatives from the Electricity Company of Ghana (ECG), charcoal sellers associations and other market women unions in ASEM took part in the engagement processes.

The stakeholder engagement in ASEM took place in two stages. In the first stage, 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 given an overview of the current state of energy in the municipality and future implications of the business as usual scenarios. The second stage of engagement involved the validation of the inputs that were made in the first stage. Participants of this second stage of engagement were fewer than the first stage 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 an important, if not the best mode that guarantees reliable outcomes since the very active players from the various sectors are already involved in developing the 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 engagement in ASEM



3.0 Sectoral sustainable energy strategies

The energy demand sectors in ASEM 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 sector's energy strategies

The household is the second largest energy demand sector in ASEM and consumes energy from a variety of sources. Key energy strategies for this sector are informed by the current state of energy in the sector coupled with their future implications as discussed in the subsequent sub-sections.

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

- **Waste management:**
 - About 1,414 tons of solid waste is generated monthly in ASEM yet only 30% is collected while 40% and 12% are burnt and dumped in open space respectively. About 40% of the solid waste is organic in content.
 - About 55% of liquid waste generated in ASEM is thrown onto the compound.
- **Energy Consumption:**
 - The household sector consumed about 802,312.58 GJ of energy in 2013
 - There is evidence of a gradual shift from traditional window designs to glazed window designs in ASEM. Predominantly, sliding glazed windows users have higher tendencies to consume more energy than louvre blade and wooden windows users due to the need for AC in glazed window houses.
 - Charcoal and firewood fuels constitute about 42% and 7% of the total energy consumed by the household sector in ASEM, mostly for cooking and water heating. This consumption trend will continue into the future based on affordability issues concerning 2nd and 3rd class households.
 - Only about 30% of households in ASEM use charcoal with the energy efficient cookstove for cooking.
 - Electricity from national grid constitutes 27% of total energy consumed in ASEM, mostly for refrigeration, space cooling, lighting and ironing needs
 - Less than 1% of households in ASEM partook in the EC's Fridge Replacement programme (which ran from the last quarter of 2011 to 2014) despite high awareness of the programme in the municipality.
- **Renewable Energy Technologies (RETs) adoption:**
 - There is low adoption rate (less than 5%) of RETs and retrofitting technologies in ASEM.

3.1.2 *Future scenarios and implications of the current state of energy in the household sector*

- **Waste management:**
 - Unexploited waste to energy potentials in the municipality
 - Unsustainable solid and liquid waste management
- **Energy consumption**
 - Increasing energy demand by the building sector if the trend of adoption of glazed window designs continues at the current rate
 - Current and future dependency on charcoal and woodfuel will result in further depletion of the forest cover thereby decreasing the carbon sink of Ghana. Inability to keep supply at the same level with the demand will turn to increase pressure on the unit price of charcoal and wood fuels in the future in the municipality.
 - About 50% more of charcoal is needed for cooking with the use of the ordinary cookstove compared to the energy efficient cookstoves. Fewer or non-usage of energy efficient cookstoves will result in energy wastage and further depletion of the forest cover.
 - Low usage of energy efficient technologies such as the efficient refrigerators will put more pressure on the limited power supply from the national grid, which is projected to be 80% dependent on thermal energy sources in a decade's time. Inefficient refrigerators increase electricity consumption
- **RETs adoption**
 - Low RETs adoption implies more fossil fuel dependent electricity resulting in more carbon emissions.
 - Low retrofits mean massive electricity wastage and high expenditure on electricity in the household sector in ASEM.

3.1.3 *Household sector's energy goals*

The overarching goal for the household sector in ASEM is to ensure sustainable energy practices in all household consumption activities. The specific goals/objectives are:

- **Waste management**
 - 100% waste collection in the municipality and maximising waste-to-energy potentials.
- **Energy consumption**
 - About 80% of all new residential and commercial buildings are energy friendly.
 - Sustainable charcoal and wood fuels consumption. 80% penetration of efficient cookstoves in ASEM by 2030.
 - Increase the adoption rate of the efficient refrigerators to 50% by 2030
- **RETs adoption**
 - Increase RETs usage in the municipality to 30% by 2030

3.1.4 Key Strategies

3.1.4.1 Waste management

Strategy 1: Improvement in waste collection in the municipality

Key actions to be taken under this strategy include:

- *Establishment of waste transfer station to cut down cost of individual trucks conveying waste to dump sites;*
- *Supply of more immovable receptacle bins at strategic locations in ASEM;*
- *Increase advertisement and number of waste contractors in the municipality;*
- *Improvement in the road network by the assembly to improve accessibility*

Proposed stakeholders to support implementation of actions

- *Private waste collectors; Awutu Senya East Municipal Assembly (ASEMA)*

Proposed funding strategies (expected financiers)

- *Polluter pays principle, ASEMA's internally generated funds (IGF) and District Assembly Common Fund (DACF), writing of proposals to grant awarding organisations*

Strategy 2: Effective educational package

Key actions to be taken under this strategy include:

- *Sensitisation of residents on the importance of waste and waste separation;*
- *Identification of key demand sector players of sorted waste*

Proposed stakeholders to support implementation of actions

- *Residents' Associations; Traditional Leaders; Educational institutes; Landlord associations; ASEMA*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations; Media*

Strategy 3: Development of a waste-to-energy project

Key actions to be taken under this strategy include:

- *Re-engineering of acquired site to be in conformity with waste-to-energy project*

Proposed stakeholders to support implementation of actions

- *Private investor players; research institute; Traditional Leaders; ASEMA*

Proposed funding strategies (expected financiers)

- *Private sector investors; Private public partnership (PPP)*

Strategy 4: Development of a recycling plant

Key actions to be taken under this strategy include:

- *Public sensitisation;*
- *Provision of the appropriate bins to take the different wastes*

Proposed stakeholders to support implementation of actions

- *Private sector players; research institutes; traditional leaders; ASEMA*

Proposed funding strategies (expected financiers)

- *Private sector investors; Private public partnership*

Strategy 5: Enhance biogas development from liquid waste

Key actions to be taken under this strategy include:

- *Building of a liquid waste treatment plant at the disposal site;*
- *Sensitisation and encouragement of the development of a biogas system in houses and institutions;*
- *Data collection on waste (liquid and solid) generated and management in ASEM*

Proposed stakeholders to support implementation of actions

- *Resident associations, donor partners, NGOs, ASEMA, private sector players, research institutes.*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations; Private public partnership*

3.1.4.2 Energy Consumption

Strategy 1: Promote energy efficient buildings in the municipality

Key actions to be taken under this strategy include:

- *Education and sensitisation on the benefits of efficient buildings;*
- *Encouraging window enterprises to re-design glazing windows to be energy efficient;*
- *Stakeholders' fora for estate developers to know the benefits of non-glazing windows;*
- *Improve monitoring of new buildings;*

Proposed stakeholders to support implementation of actions

- *Estate developers, residents' associations, hotel owners, financial institutions, public and private institutions.*

Proposed funding strategies (expected financiers)

- *ASEMA's Internally Generated Funds (IGF); private sector; proposals to grant awarding organisations like the media, Energy Commission of Ghana, Electricity Company of Ghana and donors for grants*

Strategy 2: Promotion of clean alternative energy sources for cooking in the municipality

Key actions to be taken under this strategy include:

- *Promotion of solar cooking stove, biogas (from cow dung, domestic waste), briquettes from saw dust, organic waste and bamboo*

Proposed stakeholders to support implementation of actions

- *Charcoal associations, residents' association, ASEMA, artisans manufacturing 'gyapa', entrepreneurs in alternative cookstoves production, cattle farmers association*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations; Private public partnership*

Strategy 3: Promotion of efficient use of charcoal

Key actions to be taken under this strategy include:

- *Promotion of efficient cookstoves usage in the municipality*
- *Practical demonstration of benefits of efficient cookstoves through engaging the media for sensitisation, mini fairs/exhibition*

Proposed stakeholders to support implementation of actions

- *Charcoal association, residents' associations, ASEMA, artisans manufacturing 'gyapa'*

Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations; Private public partnership*

Strategy 4: Promote the use of renewable energy and energy efficient technologies in the municipality

Key actions to be taken under this strategy include:

- *Sensitisation on the benefits of RETs such as solar and wind energy;*
- *Sensitisation on the use and adoption of energy efficient gadgets like the energy efficient refrigerators*
- *Practical demonstration on the socio-economic and environmental advantages of energy efficient gadgets like the energy efficient refrigerators to various classes of consumers in the municipality.*

Proposed stakeholders to support implementation of actions

- *Private sector, financial institutions, Energy Commission of Ghana (EC), residents' associations*

Proposed funding strategies (expected financiers)

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

3.2 Commercial, Industrial and Agricultural (CIA) energy strategies

The commercial, industrial and agricultural sectors in ASEM consumed about 617,047 GJ, 21,308.85 GJ and 2,678.78 GJ of energy respectively in the municipality in 2013 from various energy carriers including electricity, diesel and petrol fuels. These sectors have been combined because the strategies proposed by the stakeholders to address the sustainability issues within them are similar.

3.2.1 Snapshot of the current state of energy in the CIA sectors

- **State of energy consumption in the CIA sectors**
 - Commercial activities in ASEM are increasing rapidly with informal activities growing annually at 15% on the average. Almost all commercial activities in ASEM depend on the national grid for power supply with less than 5% of these activities using any RETs.
 - There is an increasing trend in diesel and petrol fuels usage in commercial activities since 2010 through back-up generators, while RETs usage remain insignificant.
 - Diesel fuel is predominantly used by industrial activities (diesel fuel constitutes more than 60% of total fuel used by the industrial sector since 2010) in ASEM since 2010.
 - Agricultural activities depend highly on charcoal and electricity for heating and processing of agricultural produce.
- **Renewable energy and energy efficient (EE) technologies adoption in the CIA sectors**
 - Low adoption of EE technologies such as human sensors and others in commercial offices in ASEM. Meanwhile, lighting constitutes about 10% of total energy consumed by the commercial sector in the municipality.

- No RETs in the range of energy types consumed by the industrial sector in ASEM. In addition, retrofitting technologies such as human sensors have not been installed in industrial office complexes in ASEM although lighting consumes about 28% of the total energy used by the industrial sector.
- There is low usage of RETs (less than 1% and specifically, solar lamps) in the agricultural sector in ASEM.

3.2.2 *Future scenarios and implications of the current state of energy in the CIA sectors*

- **Future implications on current state of energy consumption in the CIA sectors**
 - Growing commercial activities imply more energy requirement by these activities for production. There will be increased pressure on the limited national energy supply from the grid, which is projected to be 80% thermally inclined in the next decade.
 - Increasing trend in fossil fuel consumption in the industrial and commercial activities will have negative implications on the carbon footprint of Ghana through more carbon emissions.
 - Unsustainable charcoal production in general and usage specifically by agricultural and informal commercial activities has the propensity to further deplete the rapidly disappearing forest cover in Ghana. Unsustainable usage of charcoal leads to energy wastage.
- **Future implications for low renewable energy and energy efficient technologies adoption in the CIA sectors in ASEM**
 - Unexploited RE resources such as solar and wind that are abundant in the country in the midst of electricity power shortfall in ASEM and Ghana as a whole.
 - Wastage of electricity power without EE and retrofitting technologies will likely result in increasing expenditure on energy by households.

3.2.3 *CIA sectors' energy goals*

The overall goal for the commercial, industrial and agricultural sectors in ASEM is to ensure sustainable energy practices in all activities within these sectors. Specific goals/objectives with respect to each sub-sector are below:

- **Energy consumption in the CIA sectors**
 - Self-sufficiency in energy supply for the commercial sector by 2030 through increased RETs energy supply proportion in the commercial sector, approximately 30% by 2030.
 - Encourage less dependency on diesel/petrol powered generators and shift towards 30% RETs mix in the industrial energy demand by 2030.
 - Encourage the incorporation of RETs in agricultural energy demand to about 20% by 2030.
 - Ensure sustainability in the production and consumption of charcoal by the informal commercial and agricultural activities in the municipality

- **Renewable energy and energy efficient technologies adoption in the CIA sectors**
 - Encourage the adoption of retrofitting technologies by commercial activities especially formal commercial activities (hotels, hostel, offices, banks, schools) and industrial offices in the municipality;
 - Encourage the adoption of RETs in the energy supply mix of commercial, industrial and agricultural sector.

3.2.4 Key Strategies

3.2.4.1 Strategies with respect to energy consumption in the CIA sectors

Strategy 1: Promotion of RETs adoption in the CIA sectors in ASEM (solar, wind, biogas etc.)

Key actions to be taken under this strategy include:

- *Enforcement of bye-laws that compels all commercial activities (especially formal activities) to incorporate 30% clean energy self-production in their business plan/layout. Such a bye-law will be backed by incentives such as reduction in business operation permit (BOP) levy for commercial activities that comply with it.*
- *Promotion of container top PVs for informal activities to be financed through a well-thought out scheme.*
- *Promotion of RETs through an effective practical education (sensitisation, awareness creation) scheme.*
- *Commercial activities and ASEMA linking up with national authorities such as Ghana Standard Authority, Energy Commission to get standard RETs.*
- *Construction of biogas plant at the Abattoir in the municipality (grounds work in progress).*
- *Biogas production at various public toilet facilities to provide power to the facility. Two toilet facilities shall be used as pilot projects in conjunction with the private owners*
- *Development of biogas systems at cattle ranches in the municipality*
- *Promotion of solar PVs for poultry farms and solar home systems and lantern for cattle farms*

Proposed stakeholders to support implementation of actions

- *Formal commercial activities: ASEMA, private sector formal players, NGOs, RET suppliers, research institutes.*
- *Informal commercial activities: Landlords' associations, residents' associations, artisans' associations, research institutes).*
- *Cattle farmers, poultry farmers, other farmers.*

Proposed funding strategies (expected financiers)

- *Hire purchase mechanism for individuals and unions/associations, fee for service, PPP, donor support, proposals writing to grant awarding organisations.*

3.2.4.2 Strategies with respect to energy efficient technologies adoption in CIA sectors

Strategy 1: Promotion of energy efficiency and retrofitting technologies

Key actions to be taken under this strategy include:

- *Effective education and campaigns involving practical demonstration of retrofitting technologies such as human/motion sensors.*
- *Encouraging formal commercial activities to incorporate energy efficient technologies in their structural layouts.*

Proposed stakeholders to support implementation of actions

- *Municipal Assembly, hotelier associations, Ghana Progressive Hotel Association, technology suppliers, educational, financial and formal institutions.*

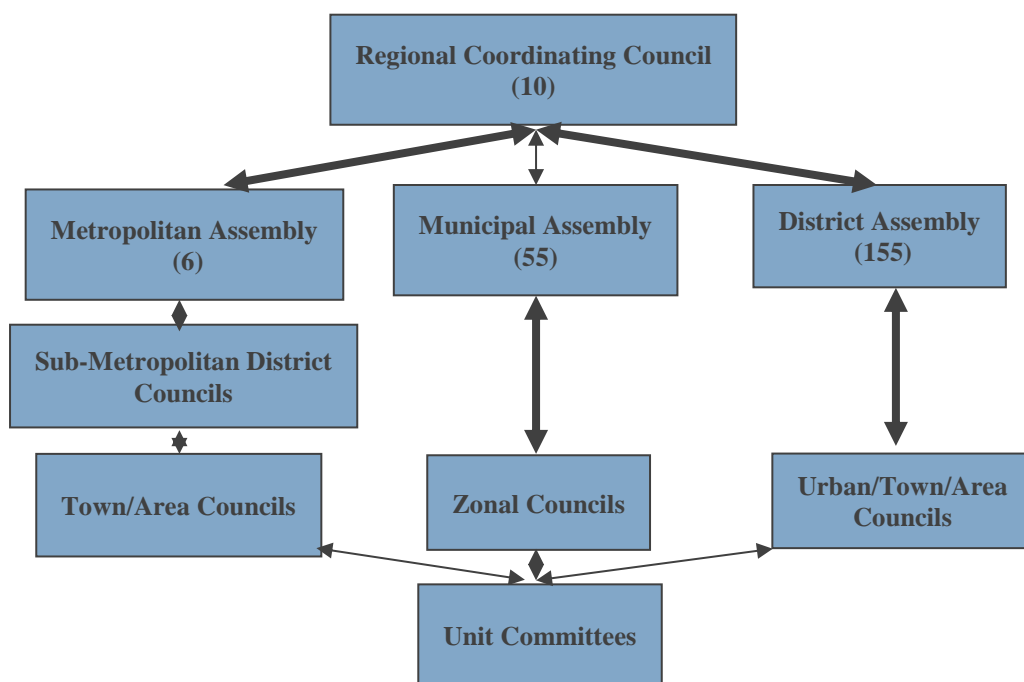
Proposed funding strategies (expected financiers)

- *Proposals writing to grant awarding organisations, hire purchase*

3.3 Local government (ASEMA) energy strategy

The structure of Awutu Senya East Municipal Assembly (ASEMA) as depicted in the local government system’s arrangement of Ghana (Figure 1) has sub-levels/divisions that engage in the provision of different services in the municipality. ASEMA has six (6) zonal councils and unit committee members, whose day-to-day activities involve the use of different types of energy. As of 2013, ASEMA was the second least energy consuming sector in the Awutu Senya East Municipality (ASEM). The sector consumed a total of about 13,485.4 GJ in ASEM in 2013. Proposed sustainable energy strategies for ASEMA are informed by its current energy demand situation.

Figure 1: Local Government System arrangement in Ghana



Source: Ministry of Local Government, 2013²

² Ministry of Local Government, Ghana 2013. Local Government system in Ghana

3.3.1 *Snapshot of the current state of energy in ASEMA*

- **State of energy consumption in ASEMA**
 - The main electricity supply source is the national grid, which powers office machines, lights, space cooling and refrigerators.
 - No RETs and retrofitting technologies while lighting consumes significant proportion of the Assemblies total energy.
 - Diesel fuel is heavily consumed by ASEMA (about 94% of the total energy consumed by ASEMA) mainly by the Assembly's vehicles.
- **State of local government control of ASEMA**
 - ASEMA has little control over new developments in the municipality (residential and commercial buildings, slums, temporal structure erections etc.) owing to the rapid urbanisation and informality in the municipality coupled with lack of sufficient resources at the disposal of ASEMA to cope with the situation hence development is often ahead of planning in the municipality.

3.3.2 *Future scenarios and implications of the current state of energy in ASEMA*

- Future implications of current state of energy consumption by ASEMA
 - Pressure on the already limited power supply from the national grid which has become almost 80% fossil dependent with climate change implications
 - Unexploited RETs in the midst of electricity shortfall. Wastage of electricity supply without retrofitting technologies.
 - Carbon emissions and climate change implications.
- Future implications of the current state of local government control of ASEMA
 - Irregular city structuring, slum development, irregularities and illegal electricity connections unaccounted for, energy theft, difficulty in energy infrastructure development.

3.3.3 *ASEMA energy goals*

The overarching energy goal for ASEMA is to achieve energy self-sufficiency through the introduction of clean energy sources in the energy demand mix of the Assembly. The specific goals/objectives per the various thematic areas are presented as follows:

- **ASEM energy consumption**
 - Diversify electricity consumption sources for the Assembly to include cleaner sources.
 - Lead by example. 40% RETs power supply to the Assembly by 2030. Retrofitting all office buildings of ASEMA by 2020
 - Optimal use of Assembly's vehicles to cut down diesel consumption by 50% by 2030.
- **ASEMA control issues**
 - Take full control of ASEMA over all new development in the municipality

3.3.4 Key strategies

3.3.4.1 ASEMA energy consumption

Strategy 1: Promotion of RETs in the energy mix of ASEMA and energy efficient technologies

Key actions to be taken to enforce this strategy include:

- *Solar car parking lot at the new office complex. Parking lot to serve two purposes - shade for cars and solar PV roof for electric power for the Assembly.*
- *Examine the potential of other clean energy technology.*
- *Education at the Assembly level (management and Assembly members).*
- *Redesign of ASEMA buildings to accommodate energy efficiency designs.*
- *Installation of motion sensors in all offices of the Assembly.*
- *Promotion of energy efficient gadgets usage such as the energy efficient refrigerators and air conditioners at the offices of the Assembly.*
- *Installation of solar PV water pump system at the ASEMA office complex.*
- *Incorporation of RETs in MOUs under the PPP agreement (in the new Kasoa market).*
- *Introduction of RETs in the existing structures at the Kasoa new market.*
- *70% of Kasoa new market street lights to be RE powered.*
- *Effective and practical education on the benefits of RE and EE technologies in ASEMA.*

Proposed stakeholders to support implementation of actions

- *Assembly members, unit committee members, ASEMA administrators, project contractors.*

Proposed funding strategies (expected financiers)

- *Assembly sources (IGF, CF, etc.), proposals writing, market association funding (supports).*

Strategy 2: Promotion of the availability of fuel efficient vehicle fleet in ASEMA

Key actions to be taken under this strategy include:

- *Consistent maintenance of ASEMA's vehicles.*
- *Replacement of over aged vehicles.*
- *Establishment of a waste transfer station to cut down cost of individual trucks conveying waste to dump sites.*

Proposed stakeholders to support implementation of actions

- *Waste contractors, Zoom Lion & Alliance, ASEMA*

Proposed funding strategies (expected financiers)

- *PPP, IGF and CF of ASEMA, private waste companies*

3.3.4.2 ASEMA control issues

Strategy 1: Promotion of effective functioning of the Assembly's sub-structures

Key actions to be taken under this strategy include:

- *Inauguration of the zonal councils*
- *Capacity building (in the form of education on mandates, concepts) for zonal council members, development control.*
- *Education of residents on land development issues. Educational exercise may include distribution of leaflets/flyers, media campaigns among others.*

- *Establishment of client services unit at the Assembly.*
- *Training of statutory planning committee on RETs and EE in the issuance of building permits.*
- *Provision of logistics for the Works Department of the Assembly to effectively carry out their mandates.*

Proposed stakeholder(s) to support implementation of actions

- *ASEMA*

Proposed funding strategies (expected financiers)

- *ASEMA's IGF and District Assembly Common Fund (DACF).*

3.4 Transport sector's energy strategies

The transport sector is the largest energy consuming sector in ASEM, having consumed about 3,372,729.5 GJ of energy in 2013 - constituting about 70% of the total energy consumed in the municipality. The form of energy consumed by the transport sector in ASEM 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. Transport experts from the ASEMA and other transport unions operating in ASEM confirmed during the stakeholder engagement exercises that transport sector activities are outside the jurisdiction and mandates of the Assembly and that the Assembly can only play supportive role if needed. Therefore, sustainable energy strategies to influence sustainable fuel consumption by the transport sector in ASEM 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. Annual budget revision involving budget officers of the ASEMA and other relevant stakeholders shall be carried out in the Assembly to revise the assigned values taking into effect macroeconomic price adjustment indicators such as the interest rate, exchange rate and inflation in the Ghanaian economy.

Table 1: Summary of strategic action plans and budget

Sector	Strategy	Actions	Period 2016-2030	Estimated Amt. ('000 GHS)	Remarks/Note
Household	Improvement in waste collection in the municipality	Waste transfer station to cut down cost of individual tracks conveying waste to dump sites	2016-2018	450	Cost of land and long vehicles
		Supply of more immovable receptacle bins at strategic locations in ASEM	2016-2020	250	ASEMA to take lead responsibility
		Increase advertisement and number of waste contractors in the municipality	2016-2017	6	ASEMA to take lead responsibility
		Improvement in the road network by the assembly to improve accessibility	2016-2030	10,000	ASEMA to liaise with Urban Roads Dept.
	Effective Education and awareness	Sensitisation of residents on importance of waste separation	2016-2018	30	ASEMA to take lead responsibility
		Identification of key demand sector players of sorted waste		5	Administrative expenses
	Waste-to-energy project development	Re-engineering of acquired site to be in conformity with waste-to-energy project	2016-2020	200	ASEMA to begin with expression of interest
	Development of a recycling plant	Public sensitisation		20	
		Provision of the right bins to collect the different types of waste	2016-2020	200	ASEMA to take lead responsibility
	Enhance biogas development from liquid waste	Building of a liquid waste treatment plant at the disposal site	2016-2018	150	''
		Sensitisation and encouragement of the development of a biogas system in every house and institutions in ASEM	2016-2030	40	ASEMA to take lead responsibility
		Data collection on waste (liquid and solid) generated and management in ASEM	2016-2018	80	ASEMA to collaborate with ISSER
	Promote energy efficient buildings in the municipality	Education and sensitisation on the benefits of the efficient buildings	2016-2020	120	Actively involving the media and obtaining an airtime on one local FM
		Encouraging window enterprises to re-design glazing windows to be energy efficient			
		Stakeholder fora for estate developers to know the benefits of non-glazing windows	2016-2018	10	ASEMA to take lead responsibility
		Improve monitoring of new buildings	2016-2030	-	''

	Promotion of clean alternative energy source for cooking in the municipality	<i>Promotion of solar cooking stove, biogas (cow dung, domestic waste), briquettes from saw dust, organic waste and bamboo charcoal</i>	2016-2018	120	<i>Engage the media for sensitisation, mini fairs/exhibition</i>
	Promotion of efficient use of charcoal	<i>Promotion of efficient cookstoves usage in the municipality Practical demonstration of benefits of efficient cookstoves</i>	2016-2022		
	Promote the use of renewable energy and energy efficiency technologies in the municipality	<i>Sensitisation on the benefits of RETs such as solar and wind energy Sensitisation on the use and adoption of energy efficient gadgets like the energy efficient refrigerators</i>	2016-2022	45	ASEMA to take lead responsibility
		<i>Practical demonstration on the socio-economic and environmental advantages of energy efficient gadgets like the energy efficient refrigerators to various classes of consumers in the municipality</i>	2016-2020	200	ASEMA to take lead responsibility
SUB-TOTAL (A)				GHS 11,926,000	
Commercial, Industry and Agriculture	Promotion of RETs adoption in the CIA sectors	<i>Enforcement of by-laws that entreat all commercial activities (especially formal activities) to incorporate 30% clean energy self-production in their business plan/layout</i>	2016-2020	20	ASEMA to take lead responsibility
		<i>Promotion of container top PVs for informal activities to be financed through a well thought out scheme</i>	2016-2019	80	ASEMA to partner solar PV firm
		<i>Promotion of RETs through an effective practical education (sensitisation, awareness creation) scheme</i>	2016-2019	40	„
		<i>Commercial activities and ASEMA linking up with national authorities like Ghana Standard Authority, Energy Commission to get standard RET equipment</i>			ASEMA and ISSER to take lead responsibility
		<i>Construction of biogas plant at the Abattoir in the municipality</i>	2016-2018	45	Work in progress
		<i>Biogas production at various public toilet facilities to provide power to the facility</i>	2017-2022	90	Cost for piloting two facilities
		<i>Development of biogas systems at cattle ranches in the municipality</i>	2017-2018	45	Collaboration with cattle farmers
		<i>Promotion of solar PVs for poultry farms and solar home systems and lantern for cattle farms</i>	2016-2025	80	Collaboration with poultry farmers
	Promotion of energy efficiency and retrofitting technologies	<i>Effective education and campaigns involving practical demonstration of retrofitting technologies such as human sensors</i>	2016-2018	40	ASEMA to take lead responsibility
		<i>Encouraging formal commercial activities to incorporate energy efficiency technologies in their structural layouts</i>			„
SUB-TOTAL (B)				GHS 440,000	


Local government (ASEMA)	Promotion of RETs in the energy mix of ASEMA and energy efficiency technologies	<i>Solar car parking lot at new office complex</i>	2016-2018	350	”	
		<i>Examine the potential of other clean energy technologies</i>	2017-2019	45	”	
		<i>Education at the Assembly level (management and Assembly members)</i>	2016-2017	8	ASEMA to partner solar PV firm	
		<i>Redesign of ASEMA buildings to accommodate energy efficiency designs</i>	2016-2018	120	ASEMA to take lead responsibility	
		<i>Installation of motion sensors in offices</i>	2016-2019	10	”	
		<i>Usage of energy efficient gadgets such as the energy efficient refrigerators in the offices</i>	2016-2018	30	”	
		<i>Installation of solar PV water pump systems at the office complex</i>	2016-2018	20	”	
		<i>Incorporation of RETs in MOUs under the PPP agreement (in the new Kasoa market)</i>	2016-2018	5	”	
		<i>Introduction of RETs in the existing structures at the Kasoa new market</i>	2016-2018	100	”	
		<i>70% of Kasoa new market street lights to be RE powered</i>	2016-2020	40	”	
		<i>Effective and practical education on the benefits of RE and EE technologies in ASEMA</i>	2016-2017	8	ASEMA to partner ISSER and solar firm	
		Promotion of the availability of fuel efficient vehicle fleet in ASEMA	<i>Consistent maintenance of ASEMA’s vehicles</i>	2016-2030	80	ASEMA to take lead responsibility
	<i>Replacement of over aged vehicles of the Assembly</i>		2016-2018	450	Purchasing cost of 3 new pick-up vehicles	
	Promotion of effective functioning of the Assembly's sub-structures	<i>Inauguration of the zonal councils</i>	-	-	Zonal council inaugurated already	
		<i>Capacity building (in the form of education on mandates, concepts) for zonal council members, development control,</i>	2016-2017	50	Cost of personal training and logistics	
		<i>Education of residents on land development issues. Educational exercise may include distribution of leaflets/flyers, media campaigns among others</i>	2016-2020	40	Ground preparation works started	
		<i>Establishment of client services unit</i>	2016-2017	30		
		<i>Training of statutory planning committee on RETs and EE in issuance of building permits</i>	2016-2018	20	ASEMA to take lead responsibility	
		<i>Provision of logistics for the Works department to effectively carry out their mandates</i>	2016-2020	250	Pick-up vehicle and other logistics	
		SUB-TOTAL (C)			GHS 1,656,000	
	OVERALL TOTAL (A+B+C)			GHS 14,022,000		

5.0 Summary and Conclusion

The energy transition process transcends beyond an individual, a sole firm, organisation or local government. The transition path requires collaborative efforts from all relevant parties/stakeholders coupled with strong will on the part of all parties in order to yield sustainable results in the long term. Above all, this strategy documents stands the risk of becoming “just a piece of writing” without any implementation of the actions especially, if they are not aligned properly with the medium term development plans of ASEMA. Without effective mainstreaming of these actions into the planning document of the Assembly, these activities will have a very slim chance of being implemented.

With the limited local resources of ASEMA in terms of the internally generated funds (IGF) and the District Assembly Common Fund (DACF), coupled with other competing developmental projects that are also expected to be financed by the same light-weighted local coffers, little is expected from ASEMA for the implementation of these strategic actions. Majority of these actions are therefore proposed to be financed through donor supports and grant awarding organisations. Therefore a strong collaboration between ASEMA and relevant stakeholders such as ISSER to facilitate sourcing of funds through proposals writing to grant awarding organisations will be in the right direction to shore up the sustainable energy transitions in the municipality.

The implementation plan provides guidance for advancing the implementation procedures with the availability of funds for certain projects. Personal judgements and sentiments on the part of leaders to divert resources meant for specific strategic actions to other projects should be avoided while accountability on the part of project implementers will be key to successful implementation of these actions which ultimately will guarantee sustainable energy transitions in ASEM.



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