

## **TRANSITIONING TO NATIONAL ENERGY SECURITY: BARTICA AS A MODEL GREEN TOWN**



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## Transitioning to National Energy Security in Guyana: Bartica as a Model Green Town

### 1. Background

Bartica is a small community situated on the Essequibo River, 80 km inland from the Atlantic Ocean (**Map 1**). It is perfectly nestled at the confluence of the Essequibo, Cuyuni and Mazaruni rivers bounded north-east by the Essequibo River, south by a forest that begins at Dog Point Road and west by the Mazaruni River.

Before becoming a town Bartica was approximately 12.95 km<sup>2</sup> in land mass. Today, Bartica's Township extends geographically to approximately 168,350 km<sup>2</sup> with most of the new area largely underdeveloped and with low population densities. This community of approximately 15 000 residents, popularly known as the "gateway" to Guyana's interior is economically driven by gold, diamond mining and to a lesser extent the hospitality industries.



The past momentary improved performance of the mining sector and price spikes for precious metals on the world market created sporadic growth in economic and social activities in the local economy, leading to an upswing in consumer activities.

The ensuing promise of jobs and prosperity, among other factors, has made Bartica attractive to many non-Barticians, including multiple migrants, i.e., Brazilians, who have become residents

of convenience. Managing the socio-economic explosion often associated with the upswing in the mining industry and the urban change on the local environment is essential to reducing poverty and environmental degradation, and pursuing a path of development resilience, consistent with the Sustainable Development (SD) goals.

High energy consumption and municipal waste-disposal problems are some common issues exacerbated by increasing population densities and demands on the local urban environments. Once managed, urbanization can become a powerful driver for the achievement of the sustainable development goals, inclusive of creating real opportunities for pursuing a green economy development framework.

Bartica, as a new municipality has already begun work on the “Green Bartica Land Use Development Plan” which is intended to inform and guide Bartica’s orderly economic and social development process. Some of the considerations identified in the plan at the concept stage include areas for manufacturing, agro processing, large scale agriculture, municipal airport, modern sewage system, new road network, tourism parks, a landfill and new housing developments. It would also be reasonable to expect an increased level of migration with this level of development. Common to the success of these proposed activities are a cheap, clean and reliable source of energy, and the opportunity to use energy efficient technologies to achieve the desired objectives.

At present, Bartica relies solely on fossil based fuel oils for both electricity and transportation. Adopting immediate renewable energy and energy efficiency interventions would not only impact the existing status quo but also provide a unique opportunity to stimulate wider energy efficiency and renewable energy uptake in the future development of Bartica new Township, through the creation of the right enabling environment and the pursuant of effective project demonstrations.

## **2. Motivation**

His Excellency President David A. Granger has espoused and sought to encourage the pursuance of Green Economy as a development paradigm for Guyana, since coming to power in May 2015. This trajectory builds on the Low Carbon Development Strategy (LCDS) developed and promoted under the last political Administration, but seeks a more comprehensive outreach in its outlook. Within this framework effective land use planning, energy security, water security, and waste management, inter alia, are delineated.

Bartica, has been designated the model town for Green Initiatives. This project is located within the agenda of the Green Economy Framework in lieu of Guyana’s overarching sustainable development architecture, and hence as a small state subject to the vicissitudes of the global climate and economy, treats environmental security as a key development issue.

Clean energy solutions supported by behavioral changes in Bartica are pivotal to reducing its local energy intensity and promoting economic and social development far beyond the boom-bust cycles associated with the gold mining industry.

The only major supplier of electricity in Bartica is the state-owned Guyana Power and Light (GPL) Company which is also responsible for transmission and distribution. The company operates two diesel generating sets with a name plate capacity of 2.8 megawatts (MW) and a nominal capacity of 2.4 megawatts (MW). On an annualized basis, these sets combined consume a total of approximately 700 000 gallons, injecting approximate 13.745 million pounds of carbon dioxide (CO<sub>2</sub>) into the atmosphere. While Guyana's carbon footprint is miniscule with regards to the global climate budget<sup>1</sup>, it is imperative that under the country's commitment under the Paris Agreement, concomitant with the realization of its National Designated Contributions (NDCs), that these types of initiatives be encouraged, fostered and pursued forthwith. Moreover, with the country spending more than 20% annually of its export earnings on imported fossil fuel, and households more than 15% of their disposal income (Second National Communications, 2015), these are resources that can be used towards building long term development resilience.

In addition, transportation both by road and river are the primary means of mobility in Bartica. However, there still remains a need for accurate and verifiable data in this regard.

Transitioning Bartica from a 100% fossil fuel based economy to more reliance on clean energy generation is highly possible but will largely be dependent in the first instance on accurate baseline data collection and management, capacity building and knowledge transfer of renewable energy information and techniques.

Indeed emerging technological changes offer huge possibilities for modernizing and moving Bartica towards a "Green economy"; encourage a future where technology and society will be familiar to new needs; techniques and innovations, thereby creating new opportunities.

Adopting improved technology and techniques may also stimulate the development of a large leading-edge market for energy, enabled best practices that will foster the competitiveness within these sectoral spaces and create new business opportunities.

Today, because sustainable energy is pervasive to all sectors and business domains, their modern application is expected to register a lasting impact in the future of sustainable development and livelihood for the new Bartica Township.

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<sup>1</sup> Less than 0.01% according to the country's Second National Communications submitted to the UNFCCC.




It is clear that, if Bartica is to succeed and achieve this ambitious objective, the role of sustainable energy as an enabler of sustainable development and sustainable livelihood needs to be fully explored and exploited.

This project is considered critical to the stimulation and wider uptake of the much needed alternative energy solutions alternatives for Bartica, bearing important implications for its new developmental plans and transition towards a model “Green Town”, much for the greater good of a national Green Economy.

### **3. Objectives of the Project**

The primary objective of this project is to establish a reliable point of reference for the existing state of energy use in Bartica from which the data generated will be used for future measurements and predictions for evidence-based decision making and pursuance of projects and programs.

The secondary objectives list below are the first tier interventions that are expected to stimulate and expedite a comprehensive and robust renewable energy uptake program in the New Bartica Township. These are adumbrated as:

-  **The Sensitization and Awareness of the Bartician Populace.** This entails preparation of information materials, including brochures, posters, video documentary, PSAs, to share information on the benefits of energy conservation. The materials produced will also document various measures that can be implemented from low-cost/no-cost to high capital investment. The materials designed will also be aligned in keeping with the objectives of Green Economy pathway, and more specifically, what this project will be doing and is aiming to achieve in pursuit of the green ethos.
  
-  **Conducting household Baseline Study of The Bartica Community:** This will entail collecting critical household data on Bartica. This data should allow the Municipal Government to identify inter alia, energy consumption behavior, appliance usage, time of use, average cost to household of energy consumed, household incomes, and waste generated. In short, a full energy audit of the community will be conducted. This is to be accompanied by a public awareness campaign on household energy efficiency applications and usage, which should include information on appliances energy consumption so that the household can be sensitive to their consumption based on hard evidence.
  
-  **Complete an Energy Audit of public institutions, facilities and street lighting in Bartica,** inclusive of energy efficient solutions that reduces public institutions carbon footprint.







This would be accompanied by energy reduction target setting, an actionable plan of work to achieve such targets, and a budget of indicative cost to achieve the desired results.

- ✚ **Energy Efficiency Pilot implemented with government agency.** The focus here is to adopt recommended measures for energy efficiency as a pilot retrofit with 1-2 government agencies and document the process and benefits of adopting energy efficiency measures within the agencies.
- ✚ **Transportation Sector energy audit.** – This will encompass all major areas of energy consumption/ carbon footprint in the local (Bartica) transport sector. The energy audit/study will investigate and analyze how motorized transport (including river transport) in Bartica use energy, calculate the associated carbon footprint, identify the sources of inefficiency, and developed recommendations (to include land use and transport planning disciplines) on how to address energy savings opportunities in this sector.

#### **4. Technical Description**

**Work Package 1: Sensitization and Awareness:** For the green economy paradigm to be successful in Guyana generally, and Bartica in particular, it is essential that there is buy-in from the various stakeholders. The established fossil fuel driven implements and technologies are well known. The application of renewable and energy efficient technologies are less so. Furthermore, the sensitization and awareness building needs to be encouraged at all levels, from Government Ministries, i.e., Finance, Communities (inclusive of housing and water), Public Infrastructure, Education and Academia, Public Security; to households, all need to be aware of what the development paradigm is. Additionally, Government of Guyana would be important to ensure that the enabling environment is created, whether through tax rebates, concessions or training, to facilitate what would be a transformational shift. The Universities and educational institutions would be critical in ensuring that a cadre of skills is developed to aid with the capacity building that would be vital to sustain this effort. It is therefore within this context that the messages being transmitted would need to be targeted and focused on the particular interest group. Furthermore, it would need to be gender sensitive and contextually relevant for the municipality. And lastly, it would also be important to make the business case in pursuing a green economy development framework versus the traditional fossil fuel driven development. In this way, the rudimentary costs and benefits can be demonstrated and a space created for the involvement of the private sector. The activities that will be undertaken are shown below:

## Estimated Costs - US\$ 200,000

WP and Task	Activities/Tasks	Duration (in months)					
		1	2	3	4	5	6
WP 1	<i>Develop and disseminate content manual for paper and electronic media</i>	X	X	X	X	X	X
	 Television Infomercial	X	X	X	X		
	 News Letters		X	X	X	X	X
	 Social Media	X	X	X	X	X	X
	<i>Host stakeholders workshops</i>		X			X	
	 Municipal and regional and Public Officers		X			X	
	 Business Community and Civil Society		X			X	
	 Schools and Religious Groups		X			x	
Conduct community Fora		X	X	X	X	X	

## Deliverables

1. Content manual produced that can be used to effectively communicate details about project including benefits and plans.
2. Widespread media coverage about the project, using available media of communication achieved.
3. At least two (2) stakeholders' workshops completed and community fora held.
4. Objective feedback and recommendations on the project received.

**Work Package 2: Conduct Household Baseline Survey of the Bartica Community:** The importance of this study will be to gather baseline socio-economic and energy related information at the household level on the Bartica community, taking a representative sample of approximately 1,500 households. While admittedly the last population census of 2012 should be able to supplement this project, the disaggregated data by community and household level is yet to be released. Additionally, before any intervention is made, it is important to have an appreciation of the design framework, energy consumption levels, type of appliances utilised by households, etc to ensure that the project is likely to indeed have an impact. Failing to do so can result in insufficient capacity being installed. Additionally, the baseline conditions are important to capture to allow for comparability during and after the project to assess outcomes and impacts of the project's interventions and develop a theory of change model. It is within this broad context that the project will seek to complete the following tasks under this work package.

## Estimated Costs - US\$90,000

WP and Task	Activities	Duration in months					
		1	2	3	4	5	6
WP 2	Agree on sample, methodology and prepare survey instruments	X					
	Identify and recruit field agents/enumerators and supervisors and conduct training for		X				
	Pretest and finalise research instrument		X				
	Coordinate and conduct field activities			X	X		
	Organize and analyse data, and establish data management platform				X	X	
	Prepare draft report and present findings at Stakeholders Forum						X
	Finalise draft report and complete data package						X

### Deliverables

1. Completed survey instruments
2. Baseline household data set
3. Analysis of various aspects of the data
4. Report on the dynamics of household appliances and energy consumption and use







**Work Package 3: Complete an Energy Audit of public institutions, facilities and street lighting in Bartica:** The ultimate objective of this project is to begin the process of transforming Bartica into a green economy. To achieve this it is necessary that the Government of Guyana set's the example. However, before doing so it will be important to conduct an energy audit of buildings and street light necessary to transform the municipality. As such, the following will be undertaken.

### Estimated Costs - US\$200,000

WP and Task	Activities	Duration in Months						
		1	2	3	4	5	6	7
WP 3	Identify and compile list of all public targets	X						
	Recruit company to conduct audit	X	X	X				
	Complete contract negotiation				X			
	Data Collection and Measurement				X	X	X	
	Data Analyses						X	X
	Presentation of draft and final audit report							X



## Deliverables

1. A report that will, at a minimum, contain the following:
  -  Analysis of peak power and energy consumption of public institutions, facilities (Guyana Water Inc. pump station) and street lights in Bartica.
  -  Analysis (cost and quantity) of fuel Consumption in energy generation
  -  Identify renewable energy options for Bartica Municipal Government to reduce energy bill
  -  Cost Analysis of transitioning to renewable energy options
  -  Energy efficiency plan for public buildings in Bartica and associated cost
  -  Emission estimates in current situation versus carbon neutral situation based on proposed renewable energy and efficiency options

~~**Work Package 4: Energy Efficiency Pilot program for government agency and facilities:** Once the audits are baseline studies are completed, it is the expectation that the municipality will embark upon the implementation of demonstration type renewable energy and energy efficient options that can be pursued in public buildings and in open spaces. It is not the expectation that this will be completed or financed in its entirety under this current funding window. However, some small scale street lighting is expected under this project, with the larger investment being financed by a United States Agency for International Development (USAID) Project for the Eastern and Southern Caribbean. This latter project commenced in July 2016.~~

~~**Estimated Costs – US\$ 3,000,000**~~

WP and Task	Activities	Duration in months											
		1	2	3	4	5	6	7	8	9	10	11	12
WP 4	<del>Detail required list of energy saving technology, best practices and retrofits for public buildings, facilities and street lights as identified in WP3.</del>							X					
	<del>Procurement of some Energy Saving Equipment and Services</del>							X	X	X			
	<del>Retrofitting and Installation of Energy Efficiency technology</del>										X	X	X

## Deliverables

~~A detailed list of energy saving technology and retrofits for public buildings, facilities and street lights as identified in WP3.~~

- ~~✚ Energy savings equipment and services procured~~
- ~~✚ Commencement of retrofitting and installation of Energy Efficiency technology~~

**Work Package 5: Transportation Sector energy audit:** The two (2) main sectors contributing to greenhouse gas (GHG) emissions in Guyana are industry and transportation (SNC, 2015). It is therefore contingent upon the municipality as it aims to pursue the Green Economy paradigm that the focus be on both the built environment and transportation sector. As such, like in WP2, this, the first step to determining targeted interventions is to determine who is doing what, sources of point pollution, type of vehicles, consumption rate of vehicles, etc. As such, a full energy audit will be completed for the municipality, covering the following areas:

**Estimated Cost - US\$70,000**

WP and Task	Activities	Duration in months					
		1	2	3	4	5	6
WP 5	Advertise and recruit energy auditor	X	X				
	Identify and compile list of all targets			X			
	Conduct Data Collection and Measurement exercise			X	X	X	
	Analyse data collected					X	
	Develop work plan to reduce GHG emissions from the transport sector						X
	Complete and submit report on findings						X

### Deliverables

1. Localized study report on energy use in transport sector
2. Recommendations on reduction of inefficiencies in this sector in Bartica

**Work Package 6: Energy Data Management Center:** Once the data from the various audits is captured, it would be necessary to ensure that this information is stored and managed effectively. At the inception, a small energy data management center will be established to ensure that the data is retained and updated going forward. Activities that will be pursued are:

**Estimated Cost – US\$90,000**

WP and Task	Activities	Duration in Months											
		1	2	3	4	5	6	7	8	9	10	11	12
WP 6	Procure data storage, management and tracking technology	X	X	X									
	Establish Data Center and begin data management				X	X	X	X	X	X	X	X	X

## Deliverables

1. Capacity built for data capture, storage, management and analysis
2. Data storage, management and tracking technology procured
3. Energy Data Management Center operationalised

### 5. Strategy for International Support and Co-Funding

The main thrust of this effort is to ensure that Bartica, as a new municipality, follow the green economy development paradigm. In this regard, data capture through various audits, building awareness, and completing demonstration/pilot type activities are critical. In this regard, the assistance being sought under the ***Cooperation on Climate Change Vulnerability, Adaptation and Mitigation***, is intended to largely complete the audits, build the awareness and commence the demonstration type projects. However, it is not the expectation that this project will finance in its entirety the works envisaged under this effort. Additional source of funding are likely to come from the USAID funded project for the Eastern and Southern Caribbean named ***Caribbean Climate Change Adaptation and Risk Reduction Initiative (CCCARRI) project*** and under the Guyana/Norway Cooperation Programme. These will be essential in the short term, but in the longer term, the country will be seeking to access funds from the Green Climate Fund and other international donors to pursue the efforts started under this project.

### 6. Economic and social impact

The emergence of renewable energy schemes is occurring against a backdrop of growth in both energy demand and carbon dioxide (CO<sub>2</sub>) emissions associated with climate change. With what is now known, renewable energy and energy efficiency are crucial for improving security of energy supply and seizing opportunities from the low carbon economy as well as addressing climate change.

The municipality of Bartica, although a relatively new will be seeking to seize the opportunity to lead the response at the local level by encouraging and helping other public entities, residents, businesses and organizations to reduce their energy consumption and transition to clean energy while improving their socio-economic status.

This driver comes at an opportune time where oil prices are unstable, electricity supply in Bartica is not only “dirty”, but also grossly unreliable and expensive.

Exploring clean energy options can provide Barticians with reliable and probable cheaper source of energy. This would not only stimulate growth and socio-economic development, but will do so in a sustainable manner.

Since Bartica is expected to be the model Green Town, there are significant implications for Bartica and Guyana as whole.

Some of the projected Socio-Economic impacts of this project are as follow:

- ✚ Data collected from this pilot project will serve to inform a competitive bid process for large scale renewable energy supply for Bartica. Clean, cheaper and reliable energy can attract large scale direct investment and also has the opportunity to be a net exporter of energy to neighboring communities. The possibilities and trade off in terms of capital flows, increasing the local market for low carbon goods and services, green job creation, technology and skill transfer can be tremendous.
- ✚ Energy conservation can also play a significant role in energy savings; in fact this is regarded as the frontline approach in this process. Sensitization and awareness in energy savings can provide tangible economic and social benefits through behavioral changes and attitudes.
- ✚ The energy efficiency pilot program for public buildings and facilities is expected to result in significant energy and economic savings. The annual payments to the utilities can instead be placed into a renewable energy revolving fund managed by the council from which the program can be sustained. With a clear renewable energy strategy, the council will be in a position to support energy savings initiatives and programs in new public buildings and spaces, including schools, social housing, leisure facilities, civic centers and town halls.
- ✚ Equally important is the street lighting program here. Adequate luminance is necessary for security, safety and late night commerce. Especially where vulnerable women and children are often left alone while their male providers seek employment away in the remote gold fields' areas. It is necessary that single women and children be provided with the necessary public good to support their wellbeing and development.
- ✚ Also, the manufacture and installation of energy efficient equipment and materials is a relatively labor-intensive activity that has the potential to boost local labor markets. However, the skills requirements are often quite specific, so there could be a role for active intervention in providing training to local workforces. A stimulus to employment may also arise as a result of the export potential of energy efficiency activities. This in itself can create additional green jobs and economic returns.
- ✚ The community baseline audit would be a first for Bartica and it would provide a sense of the local baseline energy characteristics and performance. Having this data is crucial to the socio-economic improvement of every citizen. There are clear health benefits, both physical and mental, from providing homes and buildings that are adequately ventilated, cooled and lighted. Improvements will be of particular benefit especially to children. The audit would also help to highlight areas for potential energy and economic

savings, inform them of the interventions necessary to improve their status quo and inform of collective possibilities for the community as a whole. For instance, the audit can suggest that 90% of the existing refrigerators are inefficient, prompting a broad-based community exchange or buyback program for more efficient models.

- ✚ Transportation in Bartica is primarily by road and water. In addition to the economic and environmental benefits of energy efficiency in transport that this program intends support, much recognition must be given to the ensuing co-benefit of reducing pollutants from vehicles and reduce the incidence and severity of respiratory and cardiovascular diseases.

## 7. Description of the Proponents

Participant	Acronym	Institution	Task	Responsible
Ms. Janelle Christian	OCC	Office of Climate Change	WP1 thru 6	Over all responsibility for the project nationally
Mr. Gifford Marshall	MTC	Mayor and Town Council	WP1 thru 6	Is the governing body for the municipality
Mr. Gordon Bradford	RDC	Regional Democratic Council	WP1 thru 5	Is the regional Council within which the municipality falls
Mr. Emil McGarrell	MoC	Ministry of Communities	WP1 thru 6	Ministry responsible for all municipalities and regional organizations. This ministry is also responsible for potable water and housing
Mr. Gary Best	-	Office of the Presidential Advisor on Environment	WP1 thru 6	Responsible for the Bartica Development Plan and over-all project focus
Dr. Mahendra Sharma	GEA	Guyana Energy Agency	Mainly WP3 & 4	Governing Agency responsible for Energy in Guyana
Mr. Renford Homer	GPL	Guyana Power and Light	Mainly WP4	The State-owned power company in charge of energy generation and distribution
Dr. Indarjit Ramdass	EPA	Environmental Protection Agency	WP4	The regulatory body responsible for environmental issuing environmental authorizations, monitoring and managing environmental impacts
Dr. Richard Van West Charles	GWl	Guyana Water Incorporated	WP4	Responsible for governing the provision of potable water in Guyana. Comes under the Ministry of Communities
Dr. Kenrick Leslie	CCCCC	Caribbean Community Climate Change Centre	WP1 thru 6	Responsible for coordinating climate change responses in the Caribbean and implementing entity for the project

## 8. Funding

**Table 1: Funding for Participants**

Participant	Requested Funding (US)
Government of Italy	650,000
Government of Guyana (Project support)	100,000
United States Agency for International Development	3,000,000

**Table 2: Cost Category and Participants**

Participant	Personnel	Travel	Consumable	Durable Equipment	Other Costs	Overhead	Total
Gol	235,000	50,000	50,000	100,000	150,000	65,000	650,000
GoG <sup>2</sup>	30,000				160,000	30,000	220,000
USAID	100,000	100,000	50,000	2,300,000	150,000	300,000	3,000,000
<b>Total</b>	<b>365,000</b>	<b>150,000</b>	<b>100,000</b>	<b>2,400,000</b>	<b>460,000</b>	<b>395,000</b>	<b>3,870,000</b>

## 9. Duration of the Project

The project will be divided into two (2) main phases. In phase one, which is expected to last on average for 12 months, all the energy audits will be completed, public awareness completed and energy data management center established. To the degree possible, some small-scale pilots/demonstrations will commence. In phase 2, the information gathered will be utilised to undertake the demonstration projects and scale up, where possible. These are detailed in the WPs above and are not repeated here for brevity.

## 10. Management Structure

The Ministry of the Presidency will be the Grant recipient and the Executing Agency (EA), with the Caribbean Community Climate Change Centre (5Cs) being the Implementing Entity (IE) for all components of the project. For this project the EA will retain the services of a Project Manager. The 5Cs is a legal entity of the Caribbean Community (CARICOM). The MoP, Office of Climate Change will implement the project under the supervision of the 5Cs.

### Project Administration

The **administration and financial management** of the project will be undertaken by the MoP. All payments will be made by the funder to the recipient who will establish a separate account to receive said funds. The 5Cs will be in charge of project oversight, coordination, maintenance

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<sup>2</sup> These costs will include VAT waivers, duty free concessions on renewable energy equipment and in-kind time of personnel allocated to the project during its development, management and supervision

of institutional networks, and articulation and collaboration with stakeholders. It will work with the MoP and institutions for the successful implementation of the project activities.

**Financial and procurement services** will be provided by the 5Cs Programme Development and Management Unit (PDMU) as requested. The 5Cs has contracted the services of an Internal Auditor to ensure that all financial and procurement protocols are followed at all times. Additionally, all financial records will be audited once annually by an independent auditor, selected from a pool of three (3) applicants.

The OCC will provide the funder and the 5Cs with semi-annual project reports and annual financial report. At the completion of the project there will be an evaluation, documenting successes, challenges and how these challenges were addressed and lessons learnt for future possible projects/programmes.