
Executive Summary

Consultancy on Energy Efficiency measures in Guyana

Elaborated for OLADE

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Acronyms

AC	Air Conditioning
APA	Amerindian Peoples' Association
BAU	Business As Usual
CARICOM	Caribbean Community
CCREE	Caribbean Centre for Renewable Energy and Energy Efficiency
CDB	Caribbean Development Bank
EE	Energy Efficiency
EEF	Energy Efficiency Office
GEA	Guyana Energy Agency
GEAP	Guyana Energy Agency Programme
GFC	Guyana Forestry Commission
GHG	Greenhouse Gas
GIZ/REETA	Renewable Energy and Energy Efficiency Technical Assistance Programme from the German Agency of International Cooperation
GL&SC	Guyana Lands and Survey Commission
GMSSC	Green Multi-Stakeholder Steering Committee
GPL	Guyana Power and Light Inc.
HEC	Hinterland Electrification Company Inc.
IDB	Inter-American Development Bank
MoPI	Ministry of Public Infrastructure
MRV	Measure, Report and Verification
NDC	Nationally Determined Contribution
OCC	Office of Climate Change
OLADE	Latin American Energy Organization
PUC	Public Utilities Commission
PV	Photovoltaic
SDGs	Sustainable Development Goals
UN	United Nations

Introduction

The consultancy assessed the energy audits as well as the implementation of Energy Efficiency (EE) measures in public buildings in Guyana. The assessment of the consultancy regards four mayor impacts of the implementation of such measures. Each of the following four aspects were presented in the form of reports:

1. Assessment of the energy audits that were conducted in public buildings in Guyana under the Energy Efficiency Programme of the Guyana Energy Agency (GEA);
2. Assessment of the impact on energy savings on the GHG emissions scenarios for Guyana;
3. Contribution of the implementation of EE measures to sustainable development;
4. Assessment of the institutional framework and proposal of an MRV system for the implementation of the EE measures.

Objective of the consultancy

The main objective of the consultancy was to suggest a Measure, Report and Verification (MRV) system for the Energy Efficiency measures to be implemented and currently under implementation in public buildings in Guyana. In addition, it was requested to define a roadmap in order to establish the suggested MRV system in Guyana.

In order to reach this objective, it was necessary to assess the conducted energy audits in public buildings in Guyana and further assess the energy efficiency measures recommended by those audits. Furthermore, a research of the impact of energy efficiency measures on future energy demand until 2035 and on the GHG emissions stemming from this demand was required. In addition, the sustainable development contribution of implementing the different EE measures recommended by the energy audits in public buildings in Guyana was assessed. Finally, an assessment of the current institutional framework and its stakeholders for implementing EE measures in public buildings in Guyana was conducted and suggestions on how to improve the institutional framework for energy efficiency were made. A proposal for establishing a MRV system for EE measures, along with a barrier analysis and a roadmap proposal for the implementation of the proposed MRV system was formulated. Estimation of financial cost of the implementation of EE measures and the MRV system as well as the formulation of an initial plausible financial mechanism to fund the implementation of the EE measures as well as the MRV system was presented.

Main results of the consultancy

The energy audit reports conducted in public buildings in Guyana that the Guyana Energy Agency shared with the consultancy team were assessed. Even though the reports show a continuous improvement in comprehension and in complexity of the energy audits analysis, there are differences in the scope of the energy audits as well as differences in the completeness of variables measured, analyses and recommendations. Thus there is a need for a standardized protocol.

The statistical analysis shows that highest potential of energy savings are EE measures targeting AC units in offices, and IT equipment and appliances, suggesting that lighting does not have the highest potential for energy savings. From the assessment of the energy audits indicates that it is necessary to target those buildings and EE measures with the highest savings potential with a prioritisation tool.

Based on different scenarios for future energy demand until 2035, the consultancy finds that demand is most likely to lie around 2,055 GWh in 2035. When EE measures are implemented, this energy demand could be reduced by 115 GWh to 576 GWh. The implementation of all the recommended EE measures in 47 public buildings with energy audits that counted with sufficient data for analysis could only save up to 31,191 kWh. Expanding to the population of 1936 public buildings¹, total savings could increase to 51.56 GWh. The energy scenarios and the demand from public buildings were later translated into GHG emissions. Consequently, GHG emissions in 2035 would amount to 1,010 GgCO₂. The Business as Usual (BAU) scenario that was added and that is based on historical energy demand data presents GHG emissions of 2,001 GgCO₂ by 2035. GHG emissions avoided due to the implementation of EE measures could lie between 57 and 283 GgCO₂. For the public buildings, GHG emissions avoided amount to 0.76 GgCO₂ (for the 47 buildings) and could be increased to 46 GgCO₂. When comparing these potentially GHG emissions avoided to emissions from the BAU scenario, the 46 GgCO₂ represent only 2%. However, depending on the Grid Emissions Factor (GEF) that is used, the GHG emissions that could be avoided could reach up to 45% of the total GHG emission reductions of the scenario that considers the lowest future energy demand and thus the lowest GHG emissions.

In addition to the assessment of the energy audits conducted in public buildings in Guyana and the impact of the implementation of EE measures recommended by those audits on GHG emissions, the consultancy team assessed the contribution of these measures to the sustainable development goals (SDGs) framed by the United Nations (UN). The analysis finds that the recommended EE measures contribute the most to SDGs 12, 7, 17, 8 and 13, with EE measures in lighting, self-generation and AC units showing the highest weights in the contribution. The assessment was made based upon a qualitative approach, due to the fact that there is no quantitative data and indicators in place. This is highly relevant for Guyana to establish its own baseline or base indicator for the different indicators, which entail the 17 SDGs from the UN. The quantification of the contributions of the different programmes and projects implemented in Guyana will bring transparency and clearly determine the impact of the implementation of different actions, that stem from state initiatives, such as the implementation of the EE measures or private initiatives. Establishing a robust and quantitative SDG system with own national indicators would help linking any MRV system and Transparency system required to monitor and measured the progress of the NDC implementation in Guyana to the SDG contribution.

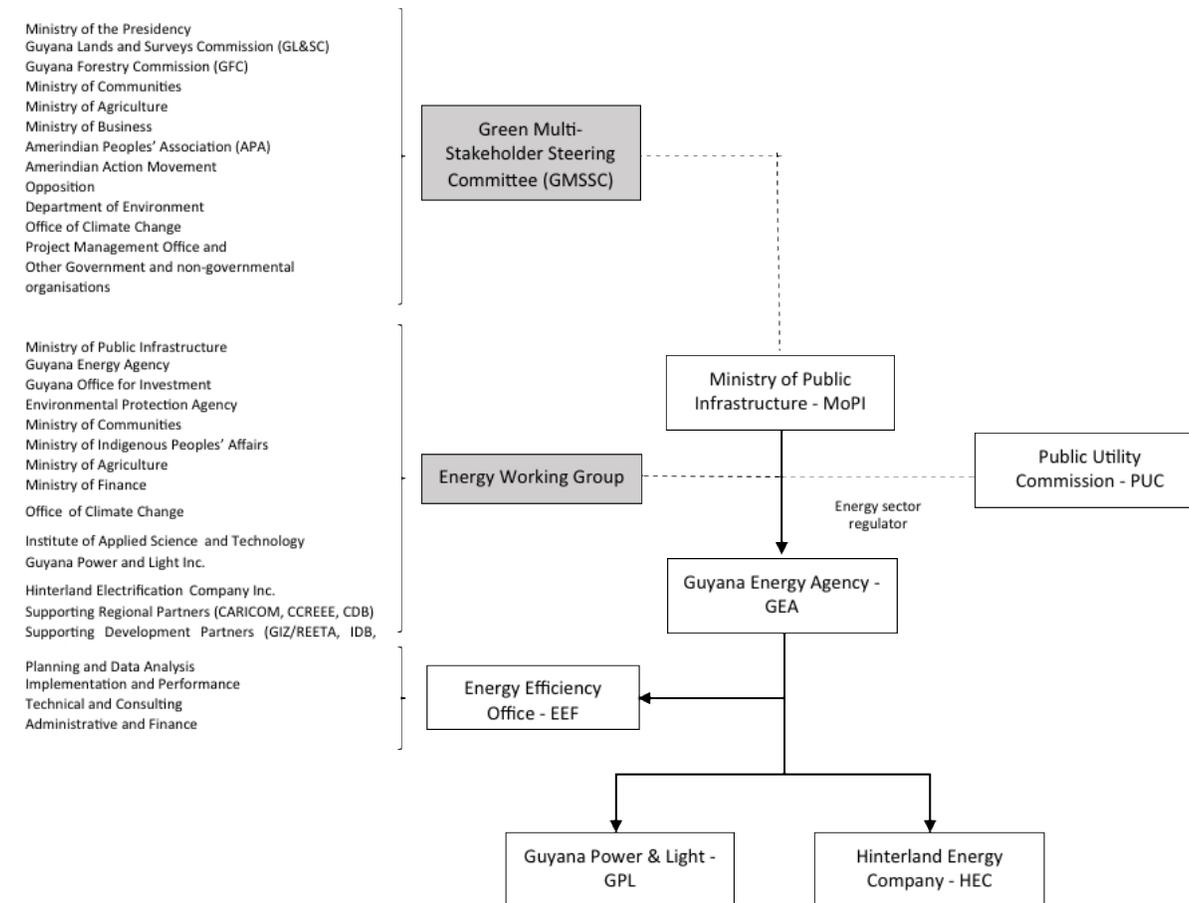
ASSESSMENT OF THE EXISTING INSTITUTIONAL FRAMEWORK AND PROPOSAL OF THE MEASURING, REPORT AND VERIFICATION SYSTEM FOR ENERGY EFFICIENCY IN PUBLIC BUILDINGS IN GUYANA

In order to present a proposal for a MRV system for energy efficiency in public buildings in Guyana, a previous assessment of the existing institutional framework in the energy sector was conducted. The findings show that the current framework is not entirely suitable for the implementation of EE measures. The GEA is the institution responsible for energy planning. Nonetheless it is at the same level as the operators GPL and HEC and the PUC (regulator). This dilutes responsibility along

¹ This number was given by the GEA

the entire framework and does not give the GEA the authority to enforce compliance with the energy plan. Thus, a reformulation of the framework is recommended and presented in Figure 1.

Figure 1: Proposal of institutional framework for implementing EE measures

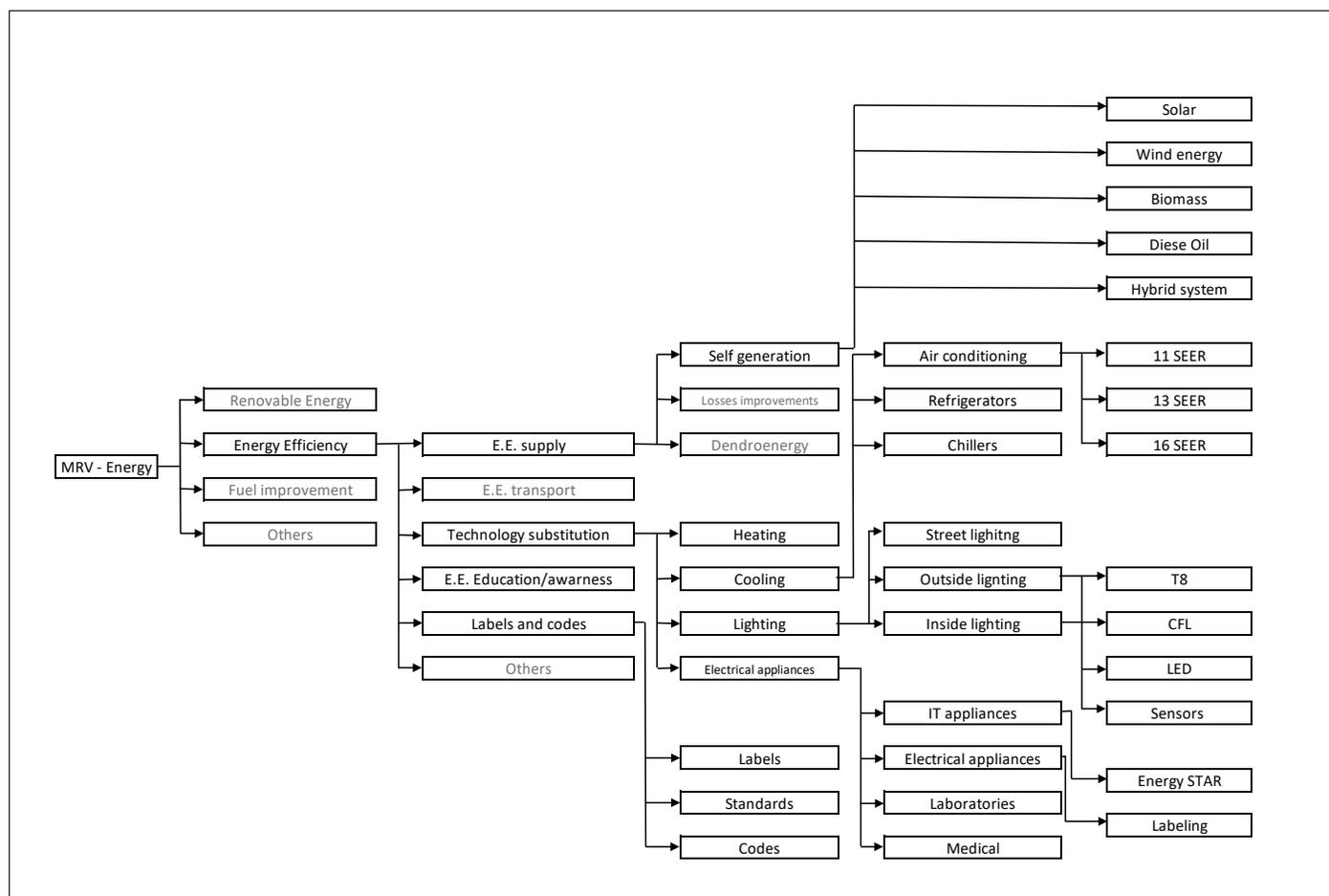


Source: Own elaboration based on OLADE. 2016. *Energy Efficiency Institutional Framework in Guyana; and further interactions with the GEA and the OCC*

The reformulation recommends a change in the hierarchy placing the PUC on a higher level than before so that the regulator has the authority over the GEA and the operators. GPL and HEC are placed below the GEA to ensure the implementation of energy plans. It is recommended, that an EE Office and a working group should be established to strengthen the framework even further. The implementation of the MRV system is conditional upon the reformulation of the current institutional framework.

This MRV system is a climate change instrument applied to the energy sector as a mitigation measure. In order to improve the energy sector and to conduct the follow-up process within the value chain is necessary to include renewable energy programmes, substitution or improvement of fuel oils, energy efficiency and others (see Fig.2).

Figure 2: Option tree for EE measures



Source: Own elaboration based on the Energy Audits and information provided by GEA

In each of these topics, the different measures that are viable to develop considering the territorial specifications, access to technology and economical factors should be incorporated. If the focus is placed specifically on energy efficiency, a range of measures would be available on the supply side: auto-production, improvements to reduce losses, wood energy, as well as on the demand side: EE in transportation, technology substitution, education and awareness, standards and labelling. In turn, each of these measures open up multiple actions and technologies. The list of different measures in the energy sector needs to be adapted, for example with the use of a matrix, to the sector or sub-sector where the measure will be implemented. This could be the energy sector as such (on the supply side) or the residential, industrial, commercial, public and/or transport sector on the demand side.

In the specific case of the energy audits in public buildings and the implementation of recommended EE measures, this option tree can be individualized and adjusted to reduce energy consumption in schools, offices and medical centres. On

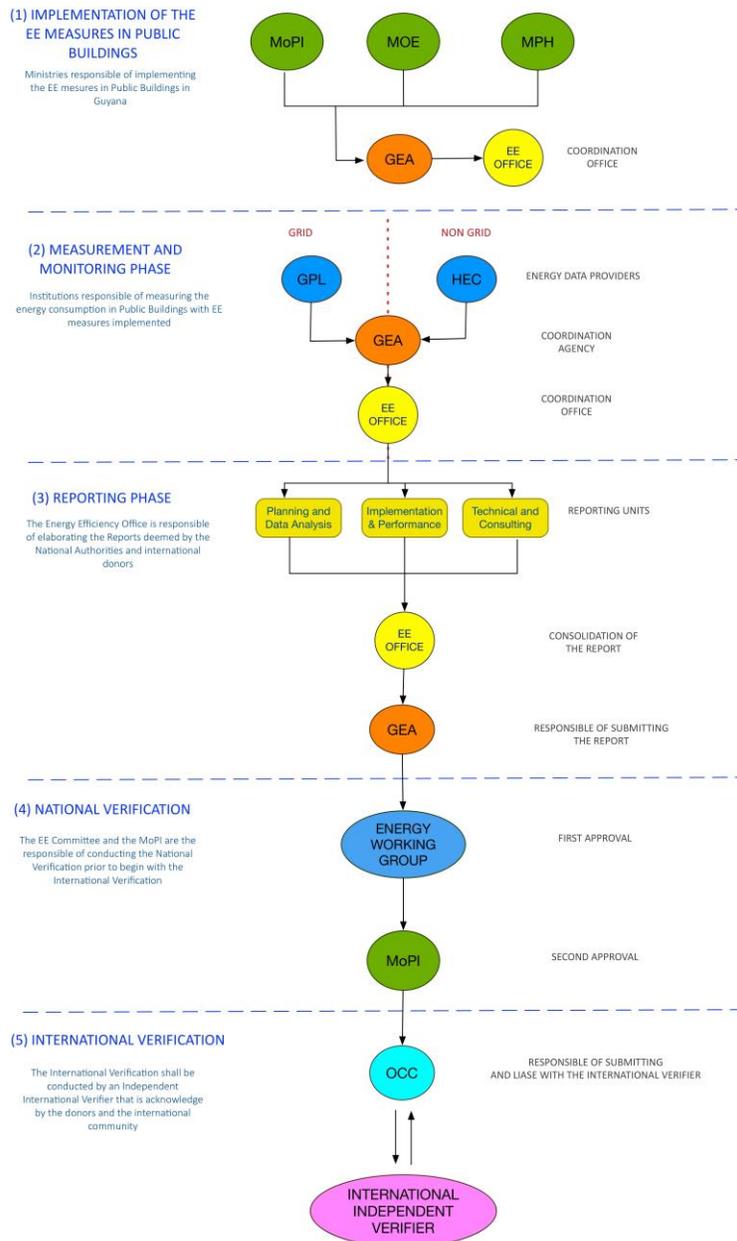
the supply side, the EE measures are restricted to self-generation systems such as PV, diesel or hybrid motors. On the demand side, they are limited to technology substitutions for air conditioning (SEER 11, SEER 12, SEER 16, ...), refrigeration and chiller units. Regarding lighting, a subdivision is made for the interior and exterior illumination ((T8, CFL, LED, occupancy sensors), computer equipment (energy star label), and finally electric appliances and medical equipment (codes, standards, labelling).

The consultancy team suggests a Registry for the energy audits conducted in public buildings. It is suggested that the GPL and HEC should be the responsible institutions for providing the data of energy consumption of the public buildings. The Energy Efficiency Office, to be established within the GEA, would be responsible of sorting the information and administrating the Registry of the data resulting from the energy audits and the number of public buildings, which already had an energy audit. This Registry is essential, due to the fact that the previous step to identifying the suitable EE measures to be implemented in any type of public building is the energy audit itself. Since the overall population of public buildings has not yet been characterized by a statistical sample, the Registry is highly relevant.

One of the most important aspects within the MRV system is the management of information that includes sources of information and timeliness of the information. The flow of information and the data management are two key elements for establishing a solid and transparent MRV system for the EE measures in public buildings.

A key issue of any MRV system is to establish a clear institutional framework for the MRV system. The proposed MRV system is based on the suggested institutional framework. Figure 3 shows the suggested institutional framework for establishing a MRV system for the energy efficiency measures in public buildings in Guyana. The figure shows those institutions that would play a role in the different phases of the MRV system, either in the "implementation of the energy efficiency measures in public buildings", in the "measurement and monitoring phase", in the "reporting phase", in the "national verification" or in the "international verification", if Guyana will receive any type of support for these mitigation actions.

Figure 3: Institutional roles for implementing a MRV system of the EE measures in Public Buildings



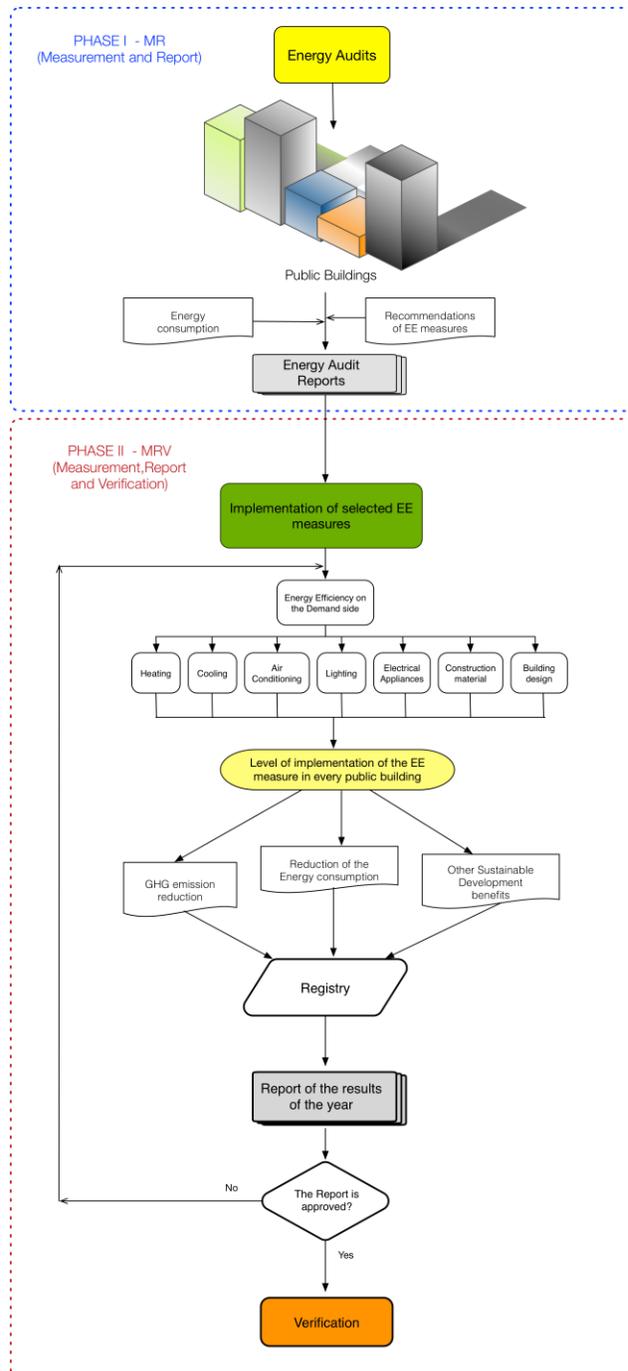
Source: Own elaboration

For the elaboration of a proposal for a MRV system for the EE measures to be implemented in public buildings in Guyana, it was necessary to establish a comprehensive MRV system, which serves to monitor and track the progress in the energy

audits conducted in public buildings as well as to MRV the implementation of the EE measures recommended by the energy audits. Therefore, the MRV system needs to fulfil both objectives. In order to do so, it was necessary to establish a MRV system with two phases. The first phase is solely devoted to measuring and reporting the progress of the energy audits and its outcomes. This phase is crucial for determining what EE measures are the most adequate to be implemented in public buildings and requires establishing a proper monitoring system that allows to track the level of progress in the energy audits. Guyana has established clear goals for conducting energy audits as part of its energy strategy; consequently the need of establishing a clear monitoring and reporting system is fundamental to oversee the energy policy and plan. In addition, it is important to understand that the energy audit is a previous step to choosing the EE measure that will be implemented later in every public building that was audited. Nevertheless, once the EE measures have been selected, the second phase of the MRV system begins. This second phase could be considered as the genuine MRV system, since the objective of the second phase is of measuring, reporting the level of implementation of the EE measures, as well as the reduction in the energy consumption, the GHG emission reductions, and the sustainable development contribution in each public building. Each public building registers all these indicators in the Registry, which initially is central data storage. However, it is advisable to convert it later in an online platform. Once all the selected indicators are registered at the end of each year or biannually (if it is deemed), the report could be elaborated. Once the report is submitted, the corresponding authorities will need to revise it and after some corrections, if any, the Report will be approved and forwarded for a national and international verification (see Fig. 4). It is important, that the contribution to the sustainable development will be improved, once Guyana has clearly established and defined the set of adequate sustainable development indicators to monitor as part of the MRV system for the EE measures in public buildings. For anyone interested in a breakdown of the information of how the data management and the data flow within the MRV system is done, you can visit the full Report 4 of the current consultancy.

In regards to the institutional roles within the MRV system that were explained in the Figure 3, there are some institutional arrangements that need to be done previous to beginning with the proper implementation of the MRV system for EE measures in public buildings.

Figure 4: MRV proposal for implementing EE measures in public buildings



Source: own elaboration

A barrier analyses for both EE measures specifically and for the MRV system as such were also conducted as part of the

consultancy. The analysis is based on literature and a quick assessment of the main barriers that the workshop participants encountered for implementing the MRV system during the final workshop. The quick assessment was made on the basis of the main barriers indicated in the reviewed literature. Two working groups were established and every group identified, characterised and prioritised the main barriers that hinder establishing the suggested MRV system for EE measures in public buildings. Both groups identified in the first set of most relevant barriers: 1) Institutional and Organizational; 2) Policy & Regulatory framework; 3) Economic and Financial, followed by 4) Technical capacities; 5) Information and Public awareness; 6) Market and Network failures; and 7) Others (Fig.5). The main barriers that were repeatedly mentioned are the incorrect data collection and lack of capacities to conduct this process. These barriers need to be overcome in order to guarantee the efficient implementation of EE measures and a well-functioning and transparent MRV system.

Figure 5: Main barriers identified and prioritised by the stakeholders of Guyana

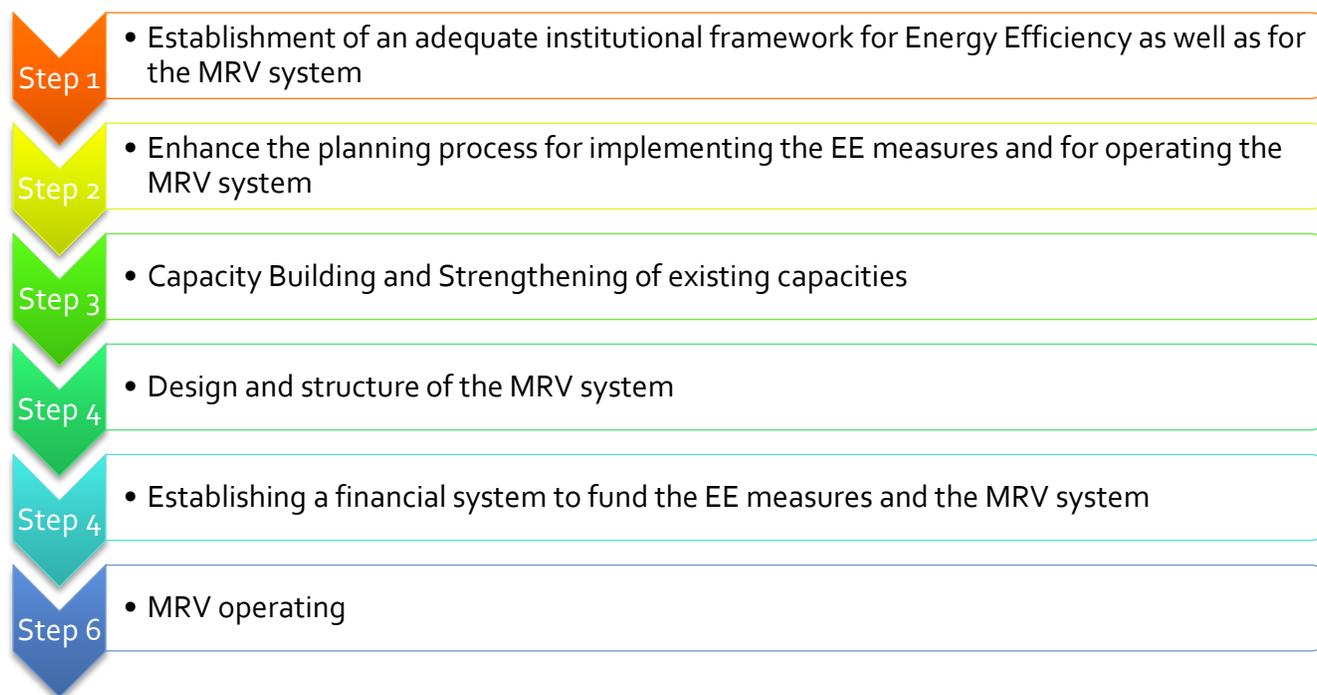


Source: Own elaboration based on the rapid assessment conducted in the final workshop in Guyana

In addition to the proposed MRV system, a suggested roadmap for the implementation of this system was elaborated. In order to establish the roadmap for implementing the MRV system in Guyana, the sequence of steps illustrated in Figure 6 were defined. The final roadmap includes specific activities and a time schedule for the implementation of these activities spanning over a period of 5 years.

Figure 6: Main steps of the suggested roadmap for implementing the MRV system for EE measures in public buildings

in Guyana

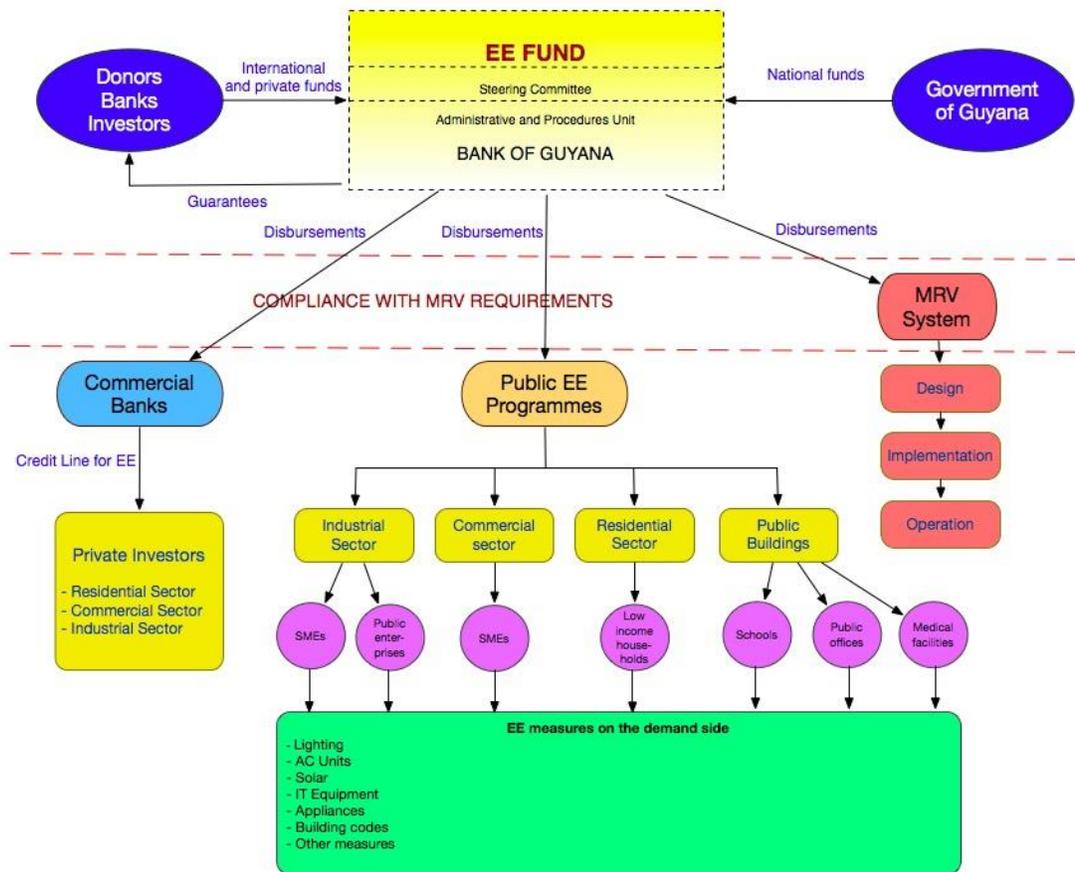


Source: Own elaboration

Implementing the MRV system will have a financial cost. Thus the consultancy closes with an analysis of financial costs and a suggested structure for the flow of financial resources directed at EE measures and the MRV system. The cost of each of the steps of implementation is estimated that are based on the activities from the roadmap. It is estimated that the necessary investment for the implementation of the proposed MRV system lies between approximately 3.5 million and 8 million USD. In addition, the annual operation of the MRV system is estimated to cost around 300 USD.

The suggested structure for the flow of financial resources is presented in Figure 7. It proposes the creation of an EE fund under the responsibility of the Bank of Guyana where national and international funds are pooled. From this EE fund the resources would flow into the establishment and operation of the MRV system, EE programmes funded by the government (mainly public sector and disadvantaged actors of the private sector) and the creation of credit lines within the services offered by commercial banks to motivate the implementation of EE measures in the private sector.

Figure 7: Proposed financial mechanism for EE in Guyana



Source: Own elaboration

In conclusion, the MRV system helps monitoring the implementation progress of the planned actions. The proposal is an integral approach of the MRV system:

- Phase 1: Measuring and Reporting of the GHG emission reductions to be achieved through the implementation of the EE measures
- Phase 2: MRV of the sustainable development benefits resulting of implementing the EE measures

The consultancy suggests to create an institutional framework that supports the implementation of the energy policy in general and the EE measures specifically and to develop an energy efficiency strategy that includes the programme of energy audits in order to standardize, articulate and establish objectives and goals, as well as an evaluation of EE measure and programme prioritisation. Additionally, the need for an analysis and definition of concrete actions that facilitate the achievement of a green economy in Guyana due to the high dependency between the energy matrix of the country and GHG emissions was identified. Finally, it would be necessary to establish a national budget and formulation of financial mechanisms with the objective to increase the impact of energy savings resulting from the implementation of EE

measures. This will be reflected in lower GHG emissions and will contribute to achieve the NDC goals of Guyana.
