

Regional dialogue and training workshop on energy efficiency
and renewable energy initiatives in the Caribbean
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**REPORT OF THE REGIONAL DIALOGUE AND TRAINING WORKSHOP
ON ENERGY EFFICIENCY AND RENEWABLE ENERGY INITIATIVES
IN THE CARIBBEAN**

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A. SUMMARY OF RECOMMENDATIONS

1. The meeting recommended the following:
 - There is urgent need to diversify the energy mix in the Caribbean, particularly given its high proven geothermal, wind and solar potential;
 - With respect to barriers to energy efficiency (EE) and renewable energy (RE), there is need to promote the development and certification of EE companies which can identify energy savings that are beneficial to both the consumer and company;
 - It is important to include micro-entrepreneurial projects and non-governmental organizations (NGOs) in implementing EE and RE projects;
 - There is need for the establishment of research in the region for EE and RE, as well as sustained awareness programmes in RE and EE;
 - It is important to examine and link EE and RE issues to the social (education, youth unemployment, gender) and environmental (climate change) side especially in the context of implementing the Sustainable Development Goals;
 - It is necessary to strengthen the regulatory and policy framework for the implementation of EE and RE policies in the subregion.

B. ATTENDANCE AND ORGANIZATION OF WORK

1. Place and date

2. The Economic Commission for Latin America and the Caribbean (ECLAC) in collaboration with German Cooperation (GIZ) convened a Regional dialogue and training workshop on energy efficiency and renewable energy initiatives in the Caribbean at the Kapok Hotel in Port of Spain, Trinidad and Tobago from 17 to 18 May 2016. The Regional dialogue took place on the first day of the meeting, and involved policy makers and other stakeholders in discussing regional policy issues. The training workshop took place on the second day of the meeting.

2. Attendance

3. Delegates from six countries and representatives from regional and international organizations were in attendance. Among the country delegates were representatives from Antigua and Barbuda, Cayman Islands, Grenada, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. Two participants attended from the Embassy of the Federal Republic of Germany in Trinidad and Tobago, while representatives from the following organizations were also in attendance: the Inter-American Development Bank (IDB); Organization of Eastern Caribbean States Commission (OECS Commission), the Economic Development Advisory Board, Trinidad and Tobago, VSL Consultants Limited, Association of Caribbean States (ACS), the Tobago House of Assembly (THA), the GIZ Renewable Energy and Energy Efficiency Project (REETA), the Caribbean Community (CARICOM), the United Nations Development Programme (UNDP), the International Labour Organization (ILO), the Food and Agriculture Organization (FAO), and staff of the Economic Commission for Latin America and the Caribbean (ECLAC).

C. SUMMARY OF PROCEEDINGS: REGIONAL DIALOGUE

1. Opening of meeting

4. Welcome and opening remarks were delivered by the Deputy Director, Economic Commission for Latin America and the Caribbean (ECLAC), subregional headquarters for the Caribbean. He identified the main objectives of the meeting as firstly to foster dialogue through shared experiences in an effort to boost efforts in energy security, energy efficiency and renewable energy as strategies towards a regional climate change response, and secondly, to deliver training to participants on the methodologies for evaluating energy efficiency and renewable energy projects. The meeting was hosted as an output of the GIZ/ECLAC project titled: “Sustainable Energy in the Caribbean: Reducing the Carbon footprint in the Caribbean through the promotion of energy efficiency and the use of renewable energy technologies”. This project represents a continuation of long and rewarding collaboration between ECLAC and the Government of the Federal Republic of Germany in promoting energy security for the region.

5. He noted that the meeting was also taking place in the context of a global energy transition in which the Caribbean region is also making a contribution, albeit on a smaller scale. This transition is reflected in statistics from the International Renewable Energy Agency (IRENA) which showed the increased generation of renewable energy by as much as 85 per cent over the last 10 years. This increased capacity was accompanied by a sustained decrease in the cost of such technology by 70 per cent. Global investment in energy efficiency (EE) and renewable energy (RE) was also increasing rapidly. Despite these advances however, the region remained largely dependent on fossil fuels.

6. He indicated that the meeting was expected to provide a forum for the region to share experiences for fostering more sustainable energy policies and strategies, and an opportunity to build on the efforts of regional partners such as CARICOM, Caribbean Development Bank (CDB), and the OECS. In this regard, ECLAC was willing and available to engage more substantially with partners in supporting the region’s energy transition, by examining the macroeconomic issues, and potential fiscal and monetary challenges that will affect the economic landscape and the vulnerable groups throughout the region as SIDS.

7. In his remarks the Ambassador of the Federal Republic of Germany in Trinidad and Tobago and CARICOM highlighted two notable ongoing events namely, the meeting of climate change negotiators taking place in Bonn to trace the map from COP21 to COP22; and the launch of the Blue Week 2016 and Investment Conference taking place in Grenada. With respect to the latter, he noted that the conference brought together a range of stakeholders from 10 Caribbean countries, representing a range of sectors including government, the banking sector and business community, who are involved in and support the Caribbean challenge initiative. He further noted that while the investment conference focused primarily on coastal protection and climate change, related issues such as energy efficiency and energy conservation were expected to feature prominently during the discussions and deliberations.

8. In reflecting on the global energy shift in relation to Trinidad and Tobago, fossil fuels were identified as a cornerstone of bilateral relations with Germany in the past 25 years. Relevant initiatives in this regard included the downstream petrochemical project (for the production of methanol from gas) and establishment of the Trinidad Generation Unlimited (TGU) power plant in La Brea as two of the most sizeable German investments in the Caribbean and, by extension, the Americas. These projects gave emphasis to energy efficiency issues not only to renewable energy but also to efficiency in the generation of traditional forms of energy.

9. The experience of Germany in promoting the energy shift suggested the need to provide incentives to citizens to use energy resources more efficiently as a key principle for enabling any shift to sustainable energy. Such incentives should be embedded in the country’s national policy and adapted to

the national framework. The regional dialogue on energy was cited as a good contributor to the development of a sustainable energy policy for the Caribbean region.

10. The Energy Advisor, Renewable Energy and Energy Efficiency Technical Assistance (REETA) of CARICOM also delivered remarks on behalf of GIZ, noting many valuable examples of collaboration across the Latin America and the Caribbean. These included the Renewable Energy and Energy Efficiency Technical Assistance based in Guyana, which aimed to examine innovative and highly political issues related to the design of instruments to implement structural reforms with special emphasis on EE and RE.

11. Increasing energy demand in the region, and production and consumption relying mainly on conventional resources has resulted in high per capita emissions in the Caribbean. Promoting the development of EE and RE was identified as a key strategy to address this problem. The experience of Germany was considered to be highly valuable in this regard. It was noted, for example, that RE represented one of the most important sectors of Germany's power supply. In terms of investment, in 2013 Germany was considered the third largest economy in green energy in the world after China and the United States of America. This success could be attributed to the implementation of the German Renewable Energy Act which entered into force in 2000 and whose last reform dates from 2014. This act promotes the expansion of RE especially through fixed feed-in tariffs, and with necessary investment security and guarantee, there exists the potential to double the country's energy production from RE within a few years thereby creating a highly innovative energy sector. Evidence suggests that already, this Act has resulted in a doubling of the share of RE in gross electricity consumption, as well as a significant increase in the application of photovoltaic technology in electricity production. But increasing EE and RE still posed challenges, especially in the articulation of financing EE measure and RE policies. In the case of the Caribbean, it was observed that ECLAC is best placed to serve as the appropriate platform for innovation in all countries. The regional energy policy dialogue meeting was therefore considered to be important and timely.

12. The Minister of Energy of Trinidad and Tobago also offered remarks, noting the complementarities between renewable energy and energy efficiency strategies that simultaneously contribute to increasing the sustainability of energy resources and mitigating threats posed by climate change in the region. She applauded the role and support of ECLAC and GIZ in advancing energy efficiency and renewable energy within the region, singling out the ongoing project as a mechanism for engaging countries and energy stakeholders and strengthening their national capacities for securing financing for renewable energy projects and developing policy frameworks for improvement of the energy sector.

13. The links between climate change and the high dependence of countries on fossil fuel were identified, in making the case for Caribbean countries to seek more sustainable strategies for the use of energy as a way to mitigate the severe impacts of climate change. Such impacts included increasing air and water temperatures; decreasing water availability, increased intensity and frequency of storm events and flooding and rising sea levels. In this regard, the importance of fulfilling international climate change commitments was noted, and the role of RE and EE in meeting the climate change challenge was shown to be fully recognized among Caribbean governments. This was reflected in the two notable initiatives undertaken by CARICOM to advance the sustainable energy agenda, namely the development and adoption of the regional energy policy in 2013 and the formulation of the Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS). The inauguration of the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREE) in 2015 and the establishment of regional energy codes and minimum energy performance standards for public buildings were also lauded.

14. At the national level, Trinidad and Tobago's commitment to supporting energy efficiency and renewable energy efforts was also highlighted, and several concrete actions that had been taken to reinforce these commitments were identified. Among these were the adoption and ratification of key international agreements such as the milestone COP21 Agreement, Intended Nationally Determined Contributions (INDC); the efforts to reduce public transportation emissions by 30 per cent by 2030; and the establishment of a new target of producing 10 per cent of energy from renewable energy sources by 2021.

15. The Minister underscored the government's use of a top-down approach in promoting the use of renewable forms of energy among the general population. She highlighted the central role of education and advocacy for securing the buy-in of the populace and identified several of the initiatives that had been undertaken to increase awareness about using renewable energy, some of which included the conduct of pilot project in schools and community centres, the installation of a solar house at the University of Trinidad and Tobago campus. She outlined some of the future activities to be undertaken including amending national legislation to include articles on renewable energy, a wind resource assessment programme, the feasibility of a local solar voltaic manufacturing facility and the prospect of waste energy plants and wind farms. She concluded by reiterating the commitment of the government to lead by example to promote and implement measures for improving energy efficiency in public buildings.

2. Policy review –Energy policy in the Caribbean

16. This agenda item addressed a review of energy policy in the Caribbean, and was presented by the Lead Oil and Gas Specialist of the Inter-American Development Bank. The review focussed on energy flows, primary production and final consumption by sectors in four Caribbean countries namely, the Dominican Republic, Haiti, Jamaica, and Trinidad and Tobago. Based on the analysis, notable differences in the primary sources of energy (measured in barrels of oil equivalent per day) were observed across the countries. This fact notwithstanding, in almost all cases, up to 50 per cent of the energy produced was used in the transportation sector. This high reliance on oil products for transportation poses a challenge for implementing any shift from the use of those traditional forms of energy.

17. In addition, the presentation featured a number of energy matrices that provided overviews of the final energy consumption by sector and energy source (e.g. coal, gas, crude oil, electricity, hydroelectric etc.), as well as electricity matrices that captured a breakdown of energy inputs for electricity production, quantity of electricity produced, energy lost in the production and transformation process and the final outputs in terms of final consumer. An analysis of the sources of electricity production across selected Latin American and Caribbean countries revealed that for all countries except Trinidad and Tobago, electricity was generated primarily from imported fossil fuels. Furthermore, in terms of the cost of electricity, there were notable variations in the prices paid for electricity across the countries, with rates ranging from approximately US\$ 5 cents per kilowatt per hour to US\$ 35 cents per kilowatt-hour in Trinidad and Tobago and Haiti respectively.

18. In the ensuing discussions, potential social and health effects related to various energy sources in the energy mix were raised. For instance, it was observed that a high dependence on burning wood as an energy source in residential areas held the potential to provoke health problems especially among women and children. Other economic implications observed with respect to the prevailing energy matrix in the Caribbean related to the high level of energy inefficiency in residential and commercial buildings (hotels and restaurants), and the tendency to use high grade energy (e.g. electricity) to do low grade work.

19. Another issue raised from the discussion was the need to diversify the energy mix in the Caribbean, particularly given its high proven geothermal, wind and solar potential. Noting the high geothermal potential given the region's prevalence of volcanoes, geothermal energy was identified as a particularly good energy source.

20. Discussions also focussed on the options available to Caribbean countries to transition from fossil to renewable energy. While some participants agreed that an interim transition from diesel to natural gas was a feasible pathway, the investment in the necessary infrastructure was considered to be an expensive proposition. At best it was suggested that this approach could be undertaken under public-private partnerships, with support from multilateral funders. This type of investment would also require the identification of credible targets and long enough periods in investment recovery. Even so, the transfer from diesel to natural gas was not considered to be a shift to renewable energy, and its feasibility should also be determined based on comparison with investments in renewable energy sources.

21. The issue of energy efficiency in the Caribbean was also discussed, and the meeting noted that there were real gains to be achieved in not only in electricity generation but also in transmission. This was identified as an area that is currently being supported under the GIZ-REETA project.

22. Based on the data presented, it was observed that the islands mainly use energy for residential consumption purposes. It is therefore useful to assess how feasible it will be to look into decentralized energy production given that centralized production may not be sustainable.

23. The discussions also highlighted the work of UNDP in Aruba in respect of renewable energy and energy efficiency. It was noted that for such a small country, Aruba had managed to increase its renewables within its grid system quite significantly, and that this was an experience from which other SIDS could learn. The country had also managed to find a system where its demand and supply could be balanced in such a way that the inefficiencies were reduced. UNDP has therefore developed a project to help with this transfer of knowledge and there will be a launch event in September.

24. The question also arose on how to determine a strategy for the deployment of natural gas in countries with issues related to population density and small markets. This was regarded as a scale issue which required several policy strategies in order to be overcome.

25. Further discussions gave consideration to a more sustainable energy use through energy ties, which can result in significant savings on the energy demand side.

26. Moreover, issues explored at the COP 21, together with country commitments and available financing opportunities could help drive energy efficiency in a way that could not have been done before. In this regard, the IDB expressed its interest in financing projects in the areas of energy sustainability and efficiency over the next couple of years.

27. A final issue discussed related to the stronghold of the state owned utility companies in the Caribbean countries and their willingness to facilitate that transition to more efficient and renewable energy. It was considered that this required a broad-based policy discussion with the utilities, supported by the requisite political will in order to arrive at the tough decisions which will allow for greater flexibility of the subregional energy matrix.

3. Barriers to implementing energy efficiency and renewable energy projects in the Caribbean

28. In presenting on barriers to implementing EE and RE projects in the Caribbean, the Principal Consultant of VSL Consultants Ltd. expressed his belief that the focus should shift from the barriers to implementation to the potential of RE and EE in the region. Reflecting on the fact that currently RE was greatly underused in the region, he was convinced the Caribbean could be the world's first totally RE region. Upon exploring the current status of RE in CARICOM it was evident that Belize had the highest RE use in the region followed by Suriname. In contrast, Trinidad and Tobago was the lowest user of RE

in the subregion. An examination of the types of RE utilized revealed that hydro had the largest share, followed by solar and wind which were expected to grow significantly over time.

29. He observed that in the subregion, in matters of RE and EE, attention was usually focussed on the demand side of the energy equation rather than on the supply side. Energy wins on the supply side were more apparent and appreciated, however, since most utilities are state owned there was little or no incentive to embrace EE. Additionally, the high initial costs associated with this technology were most times prohibitive. The study identified four main barriers to RE, these being: (i) regulatory framework and policies, (ii) informal institutions, (iii) costs and financing, and (iv) market barriers.

30. Despite these constraints, a number of recommendations were proposed to promote EE and RE among them being the promotion of EE companies which can identify energy savings that are beneficial to both the consumer and company; the implementation of micro projects; the inclusion of non-governmental organizations (NGOs); the engagement of a wider pool of energy stakeholders; the implementation of a certification system for e-companies; the establishment of research in the region for EE and RE, sustained awareness programmes, training professionals in EE and RE skills; and the seeking of champions across the region to drive the process forward.

31. The presenter also gave focus to the power generation sector noting that this sector must be considered in making the shift to incorporate RE and EE policies. This was because many electricity utilities in the Caribbean were fully integrated and legally protected monopolies. The electricity service was therefore a bundled service and very few Caribbean utilities operated under legislation which allowed for independent power producers (IPPs). Regulations and tariffs were not implemented to facilitate off grid generation and feed back into the grid. As a result of a lack of institutional capacity transaction costs were high in for instance in Jamaica, whereas direct and indirect subsidies were constraints in Trinidad and Tobago. The incoherent policy positions in the business of power, reflect strong political issues. Additionally the typically fixed political time practiced in the Caribbean compromises the adoption of long term commitments. He concluded that he believed that the region could make the transition from a natural monopoly to an open market arrangement with respect to its energy sector development.

32. Initial discussions in response to the presentation noted that the barriers presented were not new, and that several of them were previously identified as much as ten years ago under previous energy initiatives in the subregion. Questions were raised as to why over time there appeared to be no diminution of these barriers in order to facilitate a more widespread adoption of EE and RE. Several possible factors in this regard were identified including the identification of appropriate EE and RE technology, suitable legislative framework; clearly demarked roles for the private sector and civil society; and suitable regulatory, fiscal and investment framework.

33. In further discussions however, an alternate view emerged that there was in fact some transformation taking place in respect of EE and RE because of innovation. Some examples cited included the introduction of electric vehicles to the region, as well as some early installations of solar photovoltaic and wind energy. In light of these developments, it was observed that the time had come to begin examining the macroeconomic implications of these developments in the economies of the subregion.

34. Questions were also raised regarding the reasons that Trinidad and Tobago showed such a low potential to RE and EE. The consultant noted that it was probably due to the lack of data or work in the area. Trinidad and Tobago was often not considered because the country was less interested in exploring EE and RE potential resulting in little relevant data for Trinidad and Tobago.

35. Consideration of barriers to EE and RE also led to questions about the role of the human psyche in sustaining such barriers. The conclusion was that people should be made aware of not only the cost of energy but also that public awareness should be raised on the day to day impact of the cost of energy on their lives.

36. Questions were also raised regarding the likelihood that the lack of information was in fact a barrier to the adoption of EE and RE in Caribbean economies especially given the number of public education and awareness building programmes undertaken at the national and regional levels by agencies such as CARICOM and the National Institute of Higher Education, Research, Science and Technology (NIHERST). Instead, it was suggested that behavioural change could be more effectively achieved by encouraging compliance with new EE standards rather than a voluntary approach. This could be led by the commercial sector (hotels and industry), and then subsequently translated to households.

37. Further discussions revolved around the issue of the rebound effect - the term used for examining the link between energy, energy culture, demand, use and psychology. It was noted that the interaction among these factors ultimately reveals and informs people's choices.

38. The need to examine and link EE and RE issues to the social and environmental side especially considering the Sustainable Development Goals 2030 was also raised in the discussions. For example, understanding how these developments played out in the labour market and what were the new opportunities particularly for young adults entering the workforce were deemed to be key issues. Moreover, a curriculum which incorporates health, gender and climate change issues was identified as necessary in order to support the subregion's transition to a green economy.

39. Other key issues raised in the discussions included the dearth of indigenous human resources to support the EE and RE transition. It was noted that while the region received much extra-regional technical advice, it was equally important for it to develop domestic capacity to facilitate and support local innovation. A holistic view of the role, function and cost of energy in supporting economic activity was also encouraged. In that context, EE should be treated as a third source of energy. Issues such as efficient building design, public sector procurement policy, energy data gathering; and enhanced regulatory capacity were thus identified as key prerequisites for developing EE and RE in the Caribbean.

40. Finally, participants noted the importance of information sharing on EE and RE issues as an important precondition for facilitating both domestic and foreign direct investment in the energy subsector. Availability of relevant information was also considered to be critical in shaping consumer behaviour with respect to energy. In this regard, the meeting suggested that ECLAC pursue research at the macro level with a view to informing consumer and investor decisions, and ultimately impacting National Energy Policy.

4. Energy efficiency strategy for green public buildings

41. A presentation on energy efficiency strategy for green public buildings was delivered by the Energy Advisor, Renewable Energy and Energy Efficiency Technical Assistance (REETA), German Cooperation (GIZ). He noted the need for the Caribbean subregion to explore new business models for energy service provision to deal with the current challenges that ranged from cost; uncompetitive economies; importation of primary energy; and balance of payments and credit issues.

42. He presented an analysis of the energy intensity measured as the ratio of energy use in British Thermal Units (BTU) per US dollar of GDP for the Caribbean region, which showed a high degree of variability in the International Energy Agency (IEA) data compared to the CARICOM data (for example the case of Guyana and Haiti). This brought into question the reason behind the disparity in data for

energy indicators in the region. It also implied that policymaking based on data could be quite difficult. Despite this challenge, the information presented suggested that Caribbean economies were inefficient from an energy standpoint. Their energy intensities were affected by the structure of the economies, and by the manner in which final energy was being used in the economy.

43. Still, the analysis showed that there were opportunities that the Caribbean could take advantage of by investing in energy efficiency and renewable energy to ease economic pressure, and that countries could use their resources of domestic primary energy to further strengthen their economies and energy sectors, thus leading to enhanced institutional and human capacities.

44. The presenter also explained that the REETA initiative was a GIZ response to CARICOM to provide policy support and develop building energy codes and performance standards. REETA was shown to have worked with CARICOM on a regional activity called the BEEP Approach since 2014, with a mandate to enhance energy savings and reinvestment of financial savings to accelerate energy benefits. The REETA role was shown to provide technical assistance to support management commitments to improved utilization of energy.

45. Questions were raised about the scope of the Building Energy Efficiency Project (BEEP) initiative with respect to the development of a building energy code, and whether this was being done in conjunction with other national or regional efforts. It was pointed out that the BEEP was initiated under the CARICOM Regional Office for Standards and Quality (CROSQ) – a regional body for standards and quality, and was being implemented with all the 15 bureaux of standards in the region. This was being done with the hope of developing a regional standard by CROSQ which would then be adopted by the national bureaux across the region specifically the CARICOM. These could then be used in each national context as a code for implementation for mandatory approvals. GIZ was hopeful that the member States would implement the BEEP. The example of the lead standard for buildings and its application under the BEEP was also discussed in relation to the promotion of green building councils in the Caribbean subregion.

5. Review of country case studies

46. In this session, delegates from five countries (Antigua and Barbuda, Dominica, Grenada, Saint Lucia, Saint Vincent and the Grenadines, and the Cayman Islands) shared information on their country's current national energy and current or proposed initiatives with respect to the development of energy efficiency (EE), and renewable energy (RE).

Antigua and Barbuda

47. The Research Officer in the Ministry of Tourism, Economic Development, Investment and Energy stated that the Government of Antigua and Barbuda noted that there were currently four main policy national policies elements which guided the use of energy resources in Antigua and Barbuda. These were: (i) 1973 Public Utility Act; (ii) 2011 National Energy Policy – (which is to be revised); (iii) 2011 Utility Interconnection Policy – (to be revised); (iv) and the 2015 Renewable Energy Act.

48. The 1973 Public Utilities Act outlines the framework governing the rights, powers and duties of Antigua Public Utilities Authority (APUA) with respect to generation, distribution and supply of electricity in Antigua and Barbuda and to perform services incidental thereto. The act also regulates the generation, and distribution of electricity, thereby according the APUA the status of a legal monopoly. Subsequent policy provisions however suggest that the country is now seeking to dismantle this arrangement by adjusting this framework to accommodate independent power producers.

49. The 2011 National Energy Policy, which is being revised, aims to reduce the cost of energy through the implementation of targeted efficiency and conservation measures designed to reduce the overall energy intensity of the economy by 10 per cent below a 2010 baseline within 10 years. The policy also seeks to make more efficient use of energy through the diversification of energy sources, which includes revision of the existing market framework and mandated targets to achieve 15 per cent renewable energy in the electricity supply by 2030. Ultimately, this policy provision aims to create a more sustainable energy sector. In order to foster economic growth it also seeks to stimulate new economic opportunities through incentives and market mechanisms to create an enabling environment for private investment in renewable energy and energy efficiency measures, including support for education and training. This policy further seeks to improve the reliability of electricity supply through regulatory reform designed to protect consumer interest and improve the quality of electricity supply. There is also an element of environmental protection through legislation and regulations which ensure that environmental considerations are an integral part of the energy permit process and in the planning and execution of energy related projects.

50. The 2011 Antigua Public Utilities Authority (APUA) Utility Interconnection Policy, which is also to be revised, outlines the governance framework for the APUA. In this respect, the Utility supplies a 15 per cent penetration of renewables into the national grid. It has changed its metering policy from net-metering to net billing and its systems from 0 – 5kW (net billing excess), and all systems above 5kW (net billing “buy all sell all”). This policy gives focus to distributed renewable energy systems with limits of up to 50kW per customer.

51. The 2015 Renewable energy Act establishes the governance framework for the accelerated development and advancement of renewable energy resources. Aspects of this legislation are contained in the national development plan to 2020 which includes provision for a 20 per cent penetration of renewables; 20 per cent reduction in energy demand as a result of energy efficiency; and 20 per cent carbon footprint reduction by the year 2020.

52. As part of the energy transition process in Antigua and Barbuda, a number of other initiatives are being undertaken, including projects that are already implemented to diversify sources of energy. These initiatives give focus to more indigenous energy resources such as solar, wind, waste to energy, and geothermal. In the latter case, discussions have focussed on the use of geothermal energy from neighbouring islands which have volcanoes.

53. Other initiatives include support for on-grid electricity with discussions on a new tariff mechanism currently ongoing; the creation of a renewable energy fund to be used for development of a 10MW PV photovoltaic project; and another project to install 10MW of Solar for distribution among Antigua and Barbuda (3MW at the V. C. Bird International Airport, 1MW in Barbuda and the balance on government facilities in Antigua).

54. Adjustments have also been made with respect to the incentive framework for EE and RE. These include the following:

- Exemption of registered project resources from import duty on the actual plants, machinery and parts thereof imported for renewable energy generation;
- Waiver of customs duties;
- Relief from the payment of corporate tax in favour of registered projects
- Exemption from Antigua and Barbuda sales tax.

55. Additionally, a number of studies have been undertaken by various stakeholders in support of the development of EE and RE in Antigua and Barbuda. The studies include the following:

- Antigua and Barbuda energy balance;
- Renewable Readiness Assessment (International Renewable Energy Agency (IRENA));
- Grid-stability study (IRENA);
- Impacts of increased RE penetration in Antigua (World Bank).

56. In terms of current projects, the following seven initiatives were identified:

- (i) 10MW Solar project (noted above) - is being implemented in four phases in different locations throughout the twin island state as follows:
 Phase 1: 3MW to be installed at Airport;
 Phase 2: 4MW at Bethesda;
 Phase 3: 2MW on the rooftops of all government buildings;
 Phase 4: 1MW in Barbuda with storage.

The system will offset 16.5 GWh of energy annually (< 5 per cent of Antigua and Barbuda's energy demand).

- (ii) The Caribbean Energy Efficiency Lighting Project (CEELP) – is being implemented in partnership with UNDP, and includes the installation of 100 LED lights to replace existing high pressure sodium lights on the Friarshill Main Road, with a projected energy savings of 65 per cent.
- (iii) The solar lighting project is sponsored by the Republic of China and included the installation of 2000 solar LED lights procured by the government of Antigua and Barbuda. These lights will replace some existing lamps and others are to be installed in new locations which require lighting.
- (iv) The energy auditing in government buildings is being implemented in partnership with CARICOM, REETA and the Ministry of Energy with the objective of conducting energy audits of highest consumers within the public sector. It is accessing grant financing from the REEETA project, which will incorporate capacity building component to develop a cadre of individuals with the requisite skills for conducting energy audits.
- (v) Lighting Retrofit Project in the government complex and schools is being implemented by the Ministry of Energy and Petrocaribe (PDV CAB) and is designed to retrofit all lights within the government complex and selected schools with their LED equivalent. It is anticipated that this project will result in a reduction of 14,600 kWh per 100 lamps, 788 IG of HFO per 100 lamps and the reduction in CO₂ of 1.18 tons per 100 lamps
- (vi) The project aimed at the streamlining of concessions procedures for the private sector is awaiting cabinet decision on unbundling APUA procedures to allow for simpler importation procedures of RE components.
- (vii) The proposals for the project regarding renewal energy tariff rate setting seeks to introduce changes in the methodology for determining a fair RE rate for domestic and commercial systems. Two rates methods proposed are the value based method and the cost based method.

Saint Vincent and the Grenadines

57. The status of EE and RE development on Saint Vincent and the Grenadines was presented by the Director of the Energy Unit. The presentation provided substantial details on policies and project proposals for energy efficiency and renewable energy in Saint Vincent and the Grenadines. The substantive guiding principles of the current National Energy Policy were established in March 2009 and are designed to guarantee a clean, reliable and affordable energy supply to customers; reduce the dependence on import of energy through continued and expanded exploitation of indigenous resources; improve energy efficiency and/or conservation of energy use; and stabilize and possibly reduce the energy consumption per capita in the medium and long term.

58. The current energy situation in Saint Vincent and the Grenadines is one where the cost of electricity was among the world's highest at a cost of US\$ 0.43/kWh (2014), with 99 per cent access to electricity from the national grid. However Saint Vincent and the Grenadines is currently heavily dependent on imported petroleum products for its energy requirements, with the annual petroleum import expense amounting to the equivalent of approximately 19 per cent of its GDP. The electricity sector in Saint Vincent and the Grenadines currently had an installed capacity (firm capacity) of 39.272 MW, with peak demand approximating 25.65 MW for the whole country, of which the main island Saint Vincent accounted for 21.12 MW.

59. The path to energy security for the country was described as one where there was a drastic reduction in the use of diesel as a source of energy to an 80 per cent use of renewable energy resources which is likely to come from the use of geothermal (60 per cent) and hydro (20 per cent) energy.

In the case of geothermal energy development, the following challenges were identified for the country:

- Lack of scientific evidence;
- Lack of legal framework;
- Public acceptance;
- Low load demand;
- High infrastructure cost;
- Low political will;
- Inability to attract development partners;
- Small fiscal budget; and
- High upfront cost.

60. These notwithstanding, over a period of two decades, Saint Vincent and the Grenadines was able to access grant funding to undertake a number of studies on the feasibility of introducing geothermal energy. Many of these studies produced contradictory results with many concluding that it was too expensive to develop geothermal energy in Saint Vincent and the Grenadines because of the geographic terrain. By way of example, a 1991 Geothermica Italiana study on the "Exploration for Geothermal Resource in the Eastern Caribbean" revealed that Saint Vincent was not a primary geothermal development area and further suggested the islands of Nevis, Montserrat and Dominica were most favourable for geothermal development.

61. Other studies undertaken during the period included Hutterer (1996); Dames and Moore (1998); Brophy and Haizlip (2003); GeothermEx (2011); National Renewable Energy Laboratory (NREL) (2012); and Reykjavík Geothermal (2014). The latter study proved the feasibility of geothermal energy for Saint Vincent and the Grenadines, and resulted in the establishment of the Saint Vincent and the Grenadines Geothermal Company which is a public private partnership (PPP). The use of the PPP approach was considered more appropriate, since it involved a private partner who had a vested interest in

the research project. As a result Light & Power Holdings and Reykjavik Geothermal (RG) entered into an agreement with the Government of Saint Vincent and the Grenadines in January 2013 to evaluate the potential of a geothermal plant with a capacity in the range of 5 -15 MW. The agreement includes the identification and development of the technical, economic, financial, regulatory, and other requirements that would be necessary to achieve development of the project.

62. The result of the 2014 study found that the Soufriere area was host to a geothermal reservoir >240°C. Extensive geothermal exploration revealed conditions comparable to those of productive fields worldwide. A number of drilling sites were identified on the Windward side of the island and a detailed infrastructural assessment was undertaken which determined that the Port facilities are adequate for offloading the heavy equipment and that the Windward highway is adequate for the transportation of equipment.

63. The cost of upgrading necessary roads to the site together with additional civil works will be approximately US\$ 4M. This led to the formation of the Geothermal Development Project between the Government of Saint Vincent and the Grenadines, Reykjavik Geothermal, and Emera Caribbean which aims to deliver a 10-15 MW geothermal power plant to Saint Vincent and the Grenadines. The project costs are estimated at US\$ 83 million. The business plan assumes that the project will be financed by 40 per cent equity and 60 per cent debt. It is proposed that the three parties will fund the drilling phase of the project, which inherently carries greater investment risk than the other phases of the project. Concessional funding, where available, will help to reduce the project costs and the ultimate cost to electricity consumers. Grid interconnection is estimated to cost US\$ 9.5 million (approximately US\$ 1.5 cents/kWh).

64. The Saint Vincent Electricity Services Limited (VINLEC), which has the exclusive license to provide the public with electricity until 2033, has indicated its preference to own – finance, construct – and operate the transmission interconnection. This is to be confirmed.

65. To facilitate the necessary legislative and governance framework for the project, the Geothermal Resources Development Act was enacted on 18 August 2015 and the Saint Vincent Geothermal Company incorporated on 8 December 2015. A number of bilateral agreements have been entered into, for example, IRENA and the Abu Dhabi Fund for Development (ADFD) have allocated US\$ 15 million in concessional loans to the project, with interest rates between 1-2 per cent per year over a period of 20 years. The British Development Fund for International Development (DFID) provided a 5.5 million grant and the Caribbean Development Bank (CDB) provided a 10 million contingent loan at 1.75 per cent. It is expected that the major financial outlay will take place during the drilling phase of the project.

66. In terms of project implementation, the company – Environmental Resources Management, was contracted to conduct the environmental and social impact assessment. This was presented to the Government on 8 April 2016 for review and distribution to all stakeholders. Soil and water testing recently completed at the prospective drilling sites proved optimistic for geothermal development. A drilling contractor has been selected with drilling scheduled to commence by November 2016, and civil works will commence in July 2016.

67. It is expected that the benefits of the project will make a transformational shift for energy, moving Saint Vincent and the Grenadines from dependency on diesel fuel to a sustainable energy path based on an indigenous, stable and affordable resource capable of providing baseload power. Upon completion, the project should:

- Lower the high price of electricity on a sustainable basis;
- Create the opportunity to attract new industry and higher-energy consumers to the region;

- Alleviate energy poverty, enables local businesses in sectors like tourism and agriculture, and generates sustainable livelihoods;
- Increase the energy mix to 80 per cent renewables by 2018;
- Generate geothermal power as a globally significant model that can be replicated in the Caribbean and beyond.

68. An update was also provided with respect to other energy projects currently under consideration in Saint Vincent and the Grenadines. In this respect, the United Nations Development Programme/ Global Environment Facility (UNDP/GEF) sponsored two projects: (i) Promoting Access to Clean Energy Services in Saint Vincent and the Grenadines (PACES) and (ii) the Energy for Sustainable Development in the Caribbean (ESD-Caraibes).

69. The PACES project with an estimated cost of US\$ 1.7 million aims to reduce GHG emissions from fossil fuel-based power generation by exploiting the renewable energy resources for electricity generation in Saint Vincent and the Grenadines. The partners in this project are the Energy Unit; VINLEC; and the Ministry of Health, Wellness and the Environment. This project is geared towards the reduction of the annual growth rate of GHG emissions from fossil fuel-fired generation in Saint Vincent and the Grenadines through the establishment of a clean energy enabling policy framework, clean energy capacity development and the clean energy RE-based generation demonstration projects.

70. The implementation of project activities to date, include the conduct of workshops on renewable energy (RE) throughout the country, with the objective of educating residents on the different forms of RE used in Saint Vincent and the Grenadines ; a website was developed to showcase the work of the Energy Unit and all energy projects being within the domain of government; contracts are being issued for the installation of 50 kW solar photovoltaic (PV) at the Belle Isle Correctional Facility, and 105 kW for the newly constructed Argyle International Airport; discussions were held with a representative from the Technical College to discuss the possibility of incorporating a PV installation course into the College's curriculum.

71. A pilot project, namely the electric vehicle demonstration project is currently underway with respect to the introduction of electrical vehicles with a hybrid to establish how they will respond to the geographic terrain before their full introduction. An electric vehicle was procured and a 5 kW solar car port was constructed at the Administrative Building in Kingstown.

72. Project activities include the conduct of a certified integrated micro-electronics workshop which was held in in Grenada to train mechanics on the repair and maintenance of electric vehicles. In an effort to build local capacity, two participants from the Technical College and the Buildings, Roads and General Services Authority were in attendance. The GIZ/CARICOM in collaboration with the PACES project team is also expected to conduct a workshop on electric mobility. Performance assessment of the electric vehicle is an activity within the work plan. This activity will consist of the development of various test parameters that would be used for data collection. The Project will collaborate with Star Garage Ltd on the use of their Toyota Hybrid Prius Vehicle. These data will be used as a basis for the introduction of incentives for the importation of similar vehicles.

73. The goal of the ESD-Caraibes project is essentially to develop and implement measures for promoting sustainable energy development within the building sector, reduce GHG emissions and create a more efficient energy sector while increasing the use of renewable energy technologies. This project represents the first regional attempt at piloting energy efficiency improvements in the economy of CARICOM member States and is expected to:

- Expand the local market for renewable energy technology application for power generation and productive uses;
- Increase and enhance the local capacity to design, implement and monitor energy projects for sustainable development;
- Create increased awareness and knowledge among stakeholders;
- Enable availability and accessibility of financing energy efficiency and renewable energy projects.

The proposed project activities were outlined as follows:

- Establishment of an assessment and monitoring system for energy efficiency and renewable energy interventions in buildings
- Strengthening of the national capacity for energy efficiency and renewable energy
- Development of training workshops and seminars on sustainable energy use for buildings to target all personnel involved in the building sector to promote energy efficiency and renewable energy interventions.
- Demonstration programme for sustainable energy
- Construction of a 'green' office building to showcase the various technologies and measures that can be used to reduce energy consumption in buildings.
- The installation of solar photovoltaic system at the Argyle International Airport. A contract is being issued together with the UNDP PACES project for the installation 75 kW solar PV for the newly constructed Argyle International Airport.

74. The CDB, having executed a blended grant-loan facility through six countries of the Eastern Caribbean called the Sustainable Energy for the Eastern Caribbean Programme to support the improvement of energy efficiency as well as the implementation of renewable energy options in Government buildings which will support project investments in energy efficiency and renewable energy technologies; capacity building; and regulatory and legislative framework. A Sustainable Energy Consultant was contracted to conduct level III audits on twenty Government buildings. This will provide an assessment of feasible sustainable energy options for priority buildings in Saint Vincent and the Grenadines in an effort to establish a package of EE and RE investments funded under the SEEC programme.

75. Finally details were presented on a solar PV demonstration and scale-up project, which is funded by the Energy Sector Management Assistance Programme (ESMAP) and the Small Island Developing States Sustainable Energy Initiative (SIDS DOCK) Trust Fund in the sum of US\$ 600,000. The goal of this project is to install a 200 kW roof mounted solar PV system on a/several government buildings and to provide technical assistance to develop appropriate financial mechanisms. It is sponsored by the Energy Unit; World Bank; Ministry of Health, Wellness and the Environment; and VINLEC. The project activities include two components: (i) pilot projects to demonstrate three commercial scale PV systems; one each in Grenada, Saint Lucia, and Saint Vincent and the Grenadines; and (ii) transaction support and business model reporting to support PV system replication in the Eastern Caribbean.

Discussion

76. Representatives at the meeting raised a number of questions. The representative from Saint Lucia questioned the capacity of government to install the necessary lines for the geothermal project. The Director of the Energy Unit in Saint Vincent and the Grenadines in his response explained that this work is being contracted out both for the feasibility study and for implementation. UNDP questioned the reporting requirements given the number of partners participating in the various projects. He explained that the loan from Abu Dhabi Fund was a sovereign guaranteed loan, while the DFID and IADB funds were channelled through the CDB, therefore they will report only to the CDB for these funds.

Grenada

77. The Senior Energy Officer, Ministry of Finance, Planning, Economic Development, Trade Energy and Cooperatives, Government of Grenada shared details of the country's current initiatives in EE and RE development. By way of introduction, it was noted that energy is an essential requirement for human growth and development. Within this context the Government of Grenada recognizes the importance of establishing an energy development strategy to foster the sustainable development of Grenada. In this regard, the vision of the Government of Grenada was to ensure access to affordable, equitable, and reliable energy sources and services to drive and secure national development, and to improve the quality of life for all of its citizens.

78. The Government of Grenada was committed to facilitation of the integration of renewable energy sources into the national energy mix. The 2010 National Energy Policy, therefore sought to guarantee the judicious development of the island's indigenous hydrocarbon resources, to guarantee social inclusiveness and equity to access to energy, and to build a more competitive, productive economy. It also aimed to create an appropriate, enabling and dynamic incentive regime, both regulatory and institutional to achieve a more diversified and sustainable energy sector. A major aspect of the policy was to place energy sector management and development within the framework and principles of sustainable development to facilitate the transition to sustainable energy production and use, and to use energy as a tool for sustainable development and to build resilience into a newly restructured economy to guarantee its citizens a sustainable quality of life as well as equity to access to energy in an effort to build a more competitive, productive economy.

79. The guiding principles of the National Energy Policy includes a focus on (i) institutional issues, aimed at building and establishing the adequate human capacity and institutional regime to guarantee the appropriate allocation and management of resources to achieve the energy policy goals; (ii) the legal and regulatory frameworks which are designed to establish an appropriate and enabling legal architecture on which the policy can rest and be implemented to achieve the government's national development policy objectives and creating the climate to materialize the long-term vision of achieving a sustainable energy development; (iii) initiatives to exploit indigenous hydrocarbon resources in the most efficient way as part of a long-term transition vision; using such resources as export commodities for revenue generation and the allocation of financial resources to the achieve National Energy Policy goals; (iv) the policy with respect to the use of renewable and alternative energy is to achieve 20 per cent of all domestic energy usage (electricity and transport) will originate from renewable and alternative energy sources by 2020; and (v) energy efficiency and energy conservation which aims to maximize the efficient use of energy resources and ensuring significant energy conservation in the production and end-use of energy in all sectors of the Grenadian economy by adopting best practices in energy efficiency and conservation.

80. Broad mandates as contained in the policy were also outlined for the various sectors with the electricity/power sector having the goal of transiting to an efficient low-carbon national electricity generation and interconnection network that ensures safe, efficient, affordable and environmentally friendly energy services. With respect to the transport sector the goal is to establish an affordable and reliable public transport sector and increased use of more efficient public and private vehicles, and transport alternatives, to reduce energy consumption. Since the overarching goal of this energy policy is to contribute towards the sustainable development of Grenada, it is prudent to place this energy policy within the framework and principles of sustainable energy development and the St. Georges' Declaration of Principles for Environmental Sustainability in the OECS.

81. Accordingly, the National Energy Policy of Grenada is guided by the following objectives:

- Energy Security – To ensure affordable and reliable supply of energy sources to sustain long-term socioeconomic development;

- Energy independence – Achieve reduced national reliance on imported energy sources;
- Energy efficiency – Maximize the efficient use of energy resources;
- Energy conservation – Ensure significant energy conservation in the production and end-use of energy, in particular the consumption per capita;
- Environmental sustainability – Prioritize clean and sustainable energy technologies to transition to a lower carbon economy and reduce potential environmental or public health effects associated with energy production and consumption;
- Resource exploitation – Avoid the irresponsible exploitation of energy resources beyond the regeneration capacity;
- Energy prices – Ensure rational and effective market conditions and energy services to lower energy prices for the consumer; and
- Energy equity and solidarity - Ensure that all sectors of society have access to affordable and reliable energy services. This also entails securing and leaving enough energy resources for the next generations to satisfy their future needs.

82. With respect to new policies and programmes, a number of energy efficient projects which were implemented within the public sector during the period of April 2013 and August 2014 were identified, including the LED Lighting Retrofitting Project being undertaken in most OECS countries. This project aims to retrofit all lighting in government buildings with more energy efficient resources, which involved the Telescope Bulbs Exchange Program supported by the Latin American Energy Organization (OLADE). In addition air conditioning units were installed in schools, health clinics and government departments and stoves and 20 lbs LPG cylinders were distributed to qualified families who previously used wood as their main fuel source for cooking. In addition, a programme has been implemented which targets persons living in rural areas involved in cottage industries to provide them with solar energy for the production of their products. Project funding for this programme is provided by the Korean Government.

83. During the period 2014-2016, the following projects were also implemented, namely the LED Lighting Street Light Pilot Programme undertaken by the government and the Grenada Electricity Company (GRENLEC), as well as the installation of solar PV systems to power reverse osmosis distillation plants. There are a number of pilot projects aimed at using solar powered street lights around public buildings such as hospitals and schools. This will extend to rural areas where there are no poles for electricity rather than extending the electricity grid.

84. In terms of renewable and alternative energy projects, a Wind Farm Project on the island of Carriacou was being revisited in collaboration with the government and GRENLEC with a 2 MW capacity to replace the 60 per cent of electricity demand on the island. The use of biomass technology is also being undertaken in collaboration with the poultry/livestock farmers and the Clarks Court rum distillery. There is also a Solar PV Demonstration Project with support from the World Bank.

85. Reference was also made to a project that was implemented by GRENLEC two years ago to demonstrate the use of electrical vehicles in Grenada. Training was provided in the maintenance of the vehicles. In addition to these energy efficient programmes the government has also embarked on the development of national geothermal resources, with financial and other support from the Government of Japan, the CDB Geo-Smart Fund, and the Government of New Zealand which will be used to provide technical/financial assistance, including feasibility studies in support of Grenada's geothermal development.

86. In the conclusion, it was emphasized that the ultimate goal of Grenada's National Energy Policy is to ensure access and provide affordable, equitable, reliable, clean and sustainable energy sources and services to drive and secure national development, and improve the quality of life for all of its citizens.

Further, the overarching objective is that the policy should have a distinctive Grenadian signature and character. It should be able to deliver a sustainable low carbon approach to development which will cause Grenada to be a model amongst small island developing States.

Discussion

87. Discussion centred on three main thematics, these being 1) the experience of countries in enforcing their energy policies particularly when such policies impacted diverse stakeholders such as utilities and PPPs; 2) the implementation of mechanisms by countries to monitor gains from RE and EE investments; and 3) the availability of the required skills sets in the countries to support the implementation of RE and EE.

88. In response to the first issue the meeting noted that strong regulation is required. In the Caribbean control of utility companies is difficult and they have become a barrier to the implementation of more energy efficient policies. There is therefore need for the installation of robust independent regulatory bodies supported by strong political will. Additionally, there are theoretically renewable energy mandates in the Caribbean. Hence therefore fines and penalties should be put in place to control the private utility companies to comply with these mandates. Despite this however, it was observed that utility companies were keen to continue using fossil fuels, notwithstanding efforts to get them to move to more renewable sources. Indeed, even when there is a strong regulatory body the utility companies operate contrary to what is contained in national energy policies.

89. With respect to mechanisms for monitoring the gains from EE and RE, the meeting concluded that these benefits were positive, and were measureable to the extent that an appropriate baseline is established before implementing EE and RE initiatives. Some examples identified included gains from the retrofitting of government buildings, as well as benefits from the promotion of consumer behavioural change in respect of household energy.

90. Finally, considering the availability of necessary skills for supporting RE and EE, the meeting concluded that in some areas, and in some countries, the required skills were available. However, opportunities should always be explored to secure continued training of regional persons to support the energy transition.

Saint Lucia

91. The Legal Officer IV, Ministry of Sustainable Development, Energy Science and Technology, Government of Saint Lucia shared on the status of energy development for that country. She noted that all of the OECS countries had similar energy policies with similar government commitments. The National Energy Policy of Saint Lucia which came into force in 2010 outlines the commitment of the government to 35 per cent renewable energy penetration by 2020 and 20 per cent reduction in public energy consumption by 2020. The guiding objective of the National Energy Policy is to ensure the development of new and renewable energy sources in realization of the goal of establishing Saint Lucia as a sustainable development energy country.

92. She advised that for the first time Saint Lucia has electricity regulation with the formation of the independent National Utilities Regulatory Commission by Act No. 3 of 2016 and Electricity Supply (Amendment) Act No. 2 of 2016. The Commission has responsibility for the generation, transmission and distribution of electricity at national level and is the regulator for the electricity sector.

93. The government has also been in dialogue with the Saint Lucia Electricity Services Limited (LUCELEC) to work towards the unbundling of the generation of electricity to include renewable energy.

A number of other energy sector reforms were also reported including: reform of the electricity sector with the drafting of the new Electricity Supply Services Bill and related regulations (wiring, network licensing, interconnection etc.) - Eastern Caribbean Energy Regulatory Authority (ECERA) Project Phase A in conjunction with Grenada; Development of a new Independent Power Producers (IPP)/Public Partnership Agreement (PPA) regime with a licensing framework under the National Utilities Regulatory Commission

94. Saint Lucia was also receiving assistance from the Clinton Climate Initiative/Carbon War Room/Rocky Mountain Institute to conduct various studies in collaboration with the Government and the utility provider (LUCELEC).

95. In terms of renewable energy projects, the following were currently proposed for Saint Lucia:

- Solar – 3MW
- Vieux Fort: LUCELEC - Request for proposals to be published
- Wind – 12MW
- Dennery: Windtex-Test Tower erected (wind data being collected)
- Geothermal – 15MW – there has been a number of studies on the geothermal capacity, which provides estimates of the national geothermal potential. There are plans to develop resources in the Soufriere (Sulphur Springs) region. Surface reconnaissance has been completed, i.e. Geophysical, Geochemical and Geological surveys and studies.

96. Saint Lucia was also implementing a number of incentives for energy efficiency and for renewable energy projects at the private and public levels. Incentives were previously provided for the installation of solar water heaters. Among the other incentives is the exemption of duties and consumption taxes for the importation of electric vehicles and sustainable fuel vehicles and for renewable energy systems and technologies.

97. As in other OECS countries, the government of Saint Lucia has also embarked on project to retrofit lighting systems in public buildings. Projects completed include the General Post Office and the High Court. The National Emergency Management Organization (NEMO) and the National Mental Wellness Centre (NMWC) will be retrofitted with 25 kW PV systems. Ongoing lighting retrofit of the Ministry of Infrastructure and the Greaham Louisy Building is currently being implemented and plans are in train to retrofit the Dennery Hospital, Vieux Fort Police Station, parts of Sir Arthur Lewis Community College and to install five (5) 25 kW systems on public buildings.

98. With respect to the energy efficiency framework, a Bureau of Standards Bill was introduced to establish minimum standards of operations for electrical equipment, lighting and power systems. As a result, the Saint Lucia Bureau of Standards has commenced development of standards for energy efficiency in compact fluorescent bulbs, energy efficiency labelling on refrigerators (and some domestic electric appliances) - Caribbean Renewable Energy Development Programme (CREDP)/GIZ.

99. An energy efficiency legal framework is being developed with bills and regulations to provide for an energy efficiency strategy, minimum equipment performance standards, energy management systems, energy audits, energy efficiency labelling, accreditation and certification.

The Cayman Islands

100. The situation with respect to energy in the Cayman Islands was presented by the Senior Policy Analyst, Ministry of Planning, Lands, Agriculture, Housing and Infrastructure of the Cayman Islands. He began his presentation with an overview of the three islands that together comprise the Cayman Islands. The Senior Policy Analyst explained that for the past four years government has been in the process of

drafting a National Energy Policy, which was completed in 2014. However there was a change in administration therefore the Bill remained outstanding. Nonetheless the new government was now trying to get the Bill expedited.

101. With respect to the current energy mix, there is no wind or geothermal potential in the three islands which are very flat and the availability of land for solar is limited. He stated that almost all power generation in the Cayman Islands relies on imported diesel. On Grand Cayman, the main electric utility is Caribbean Utilities Company (CUC) who has an exclusive licence for transmission and distribution and a non-exclusive licence for electricity generation. On the other two islands Cayman Brac and Little Cayman the main electric utility is Cayman Brac Power & Light (CBP&L) which bears a similar license. As a result the Cayman Islands have one of the highest costs for electricity in the region, which is about US\$ 0.40 cents per KW. The use of air conditioning units consumed most of the electricity as well as water heaters however the government was trying to encourage the move towards the use of solar water heaters.

102. Although the Utility Company was privately owned, there was a regulatory framework which manages electricity services. The key energy metrics for the Caymans was outlined as follows:

Peak demand by island:

- Grand Cayman – 100 MW
- Cayman Brac – 3.5 MW
- Little Cayman – 870 kW

Generation Costs (per kWh sold)

- Grand Cayman: US\$0.20/kWh Diesel
- Cayman Brac: US\$0.27/kWh
- Little Cayman – US\$0.34/kWh

103. It was pointed out that it was extremely difficult for the Cayman Islands to attract funding because of their non-independent status. Still a number of programmes were currently being undertaken with respect to renewable energy and energy efficiency. These include the following:

- 5 MW solar PV (utility scale);
- Regulator - Electricity Regulatory Authority (ERA) recently approved;
- A 5MW solar power purchase agreement (PPA) between an independent power producer and CUC which is scheduled to be grid connected by 2016.

104. The public partnership agreement is expected to provide renewable energy at a competitive initial price of CI 14.2 cents per kilowatt hour (kWh). The levelized cost of this energy has been evaluated to be approximately 16 C.I. cents per kWh over 25 years. A feed-in-tariff for a consumer owned renewable energy (CORE) programme is available with a current capacity limit of 6MW split evenly between residential and commercial developments on Grand Cayman. The feed-in-tariff contract agreement is for 25 years and allows the owners of the renewable energy system to recover their capital investment with an assured reasonable return on their investment. The maximum permitted size of the individual renewable energy systems will be the lesser of the customer's peak demand for existing systems measured over a period of up to twelve months, where that information is available or estimated peak demand for new connections, with a maximum of 20 kW for residential systems and 100 kW for commercial systems.

105. The CORE customers are billed monthly at the normal retail rate for their total energy consumption and are credited monthly at the feed-in-tariff rate for the total output of their renewable energy generation system to the grid. At the end of each calendar quarter, the utility (CUC) makes a payment to the CORE participant for any accumulated feed-in-tariff credit balance on their account.

106. In terms of energy efficient programmes being implemented a street lighting project is being undertaken by the Electricity Regulator Authority (ERA) to replace all street lights with LED (to be undertaken by CUC). This project is expected to commence in 2016. The LED project is expected to increase base rates for street lighting but decrease the fuel consumption significantly and produce a significant net decrease in rates paid by the National Roads Authority (NRA)/Government and other street lighting consumers.

107. There are also plans to develop a cost effective design and to construct a commercial ocean thermal energy conversion projects in the Cayman Islands. The concept of the floating power facility has been tested in Hawaii and if the developers are successful the plant will be the first commercial project of this type to come online. The OTEC International's floating power plant would be a low-profile platform moored off the north coast of Grand Cayman and connected to the power grid through an on-land substation. The project is an innovative step to providing energy supply diversity and renewable power to the small islands State portfolio allowing it to become less fossil fuel dependent. The developer expects to provide 6.25 MW in its first tranche of power to CUC the Grand Cayman utility.

108. With respect to the National Energy Policy, drafting of the said policy began in 2010 with a committee of local experts. In 2012 the government hired a consultant to shape the policy and in March 2013, the final product was received. The National Energy Policy establishes the vision, goals, objectives and supporting policies for energy. Policies were drafted under the following headings:

- Electricity;
- Transportation;
- Fuel products;
- Land use;
- Public awareness and education.

109. While an implementation strategy and plan was drafted, there has been no execution because of a change in administration. The National Energy Policy project concluded in March 2013 and the draft policy was presented to the Legislative Assembly. The approval of the policy "slipped" with change in government and reordering of priorities.

110. Among the key policy statements are the National Energy Policy vision and goals. The vision is to be an efficient, diversified energy sector, supported by informed public behaviour within the Cayman Islands, which provides secure, reliable, and affordable energy in an environmentally sustainable manner. The goals of the policy are to decrease the cost of energy for the Cayman Islands as a whole, as a priority; to increase the environmental sustainability of the Cayman Islands' energy sector; Increase energy security (the ability to access energy resources in sufficient quantities, reliably, and at prices that are reasonably stable, to support economic welfare and growth) for the Cayman Islands; and to contribute to economic development of the energy industry in the Cayman Islands.

111. The objectives of the National Energy Policy are set in 2013 but are developed to 2030 and include a number of targets as follows:

- To realise a 21 per cent overall savings in energy use from all sectors;

- Savings of 27 per cent savings in the use of electricity;
- Reduction of 20 per cent in water use ;
- A reduction of 16.5 per cent of fuel use for transportation (a result of 20 percent increase in overall fuel efficiency, and 5 percent of additional fuel conservation);
- Eight percent of electricity displaced, thanks to increased penetration of solar water heaters;
- No change in stationary uses ;
- 13.5 per cent of electricity sold generated from renewable energy sources (9 percent of all energy consumed);
- 5 MW of waste to energy in Grand Cayman ;
- 8 MW of utility scale wind energy in Grand Cayman;
- 18.8 MW of solar PV energy (9 MW utility scale and 8 MW distributed scale on Grand Cayman; 1.3 MW in Cayman Brac; and 0.5 MW in Little Cayman); and
- 19 percent overall reduction in emissions of CO₂ (3.5 million CO₂ abated).

112. Among the renewable energy programmes being considered by the government is the restriction placed on wind energy i.e. exclusion zones: namely at the Airport. A Doppler radar was recently installed near the Airport which is an exclusion zone. This reflected the scarcity of land space which was a barrier, and which restricted wider implementation of some renewables on the islands. There was however opportunity for enhanced use of solar water heaters, if the necessary public education of consumers was undertaken.

113. In this respect, it is the intention of the Government to work in collaboration with the Regulator and with the CUC to support the reduction of energy demand, conservation by consumers, time of use billing; and strategies to expand the uptake of renewables.

114. In terms of next steps, a National Energy Policy review committee has been recently appointed by the Cabinet and issued terms of reference to review and make recommendations for the policy's (adoption) passage into law. In addition, a private members motion which was recently accepted by Parliament will influence the shape of the policy review with emphasis on the implementation of the Sustainable Development Goal (7) and to reduce reliance on fossil fuel. This is on a fast track with the expectation that it will be adopted by year end.

D. SUMMARY OF PROCEEDINGS: TRAINING WORKSHOP

1. Introduction to the training workshop

115. The purpose of the training workshop was to introduce participants to elements of financial analysis of energy projects. It is expected that this exposure will allow for a deeper appreciation of the key decision variables to be considered in the planning and design of energy projects. Discussions on the policy context for financing energy efficiency, as well as the roles and impacts of energy services in buildings and their related management systems were undertaken after relevant presentations were made. Participants were also introduced to the Regional Building Energy Efficiency Project (BEEP) initiative, and the work of this project in the Caribbean to date was highlighted as case studies.

2. Policy context for financing energy efficiency and renewable energy projects in the Caribbean

116. This agenda item included contributions from the Adjunct Professor, Pontificia Universidad Católica de Ecuador (in place of Lead Oil and Gas Specialist, IDB). He noted the challenges of achieving

energy efficiency among economic stakeholders who may not have the appropriate property rights to engage in energy saving activities.

117. He observed that in the case of energy efficiency for public spaces such as government buildings, the benefits may redound to persons who do not bear the cost of improving energy efficiency, so that there may be reluctance to adopt energy efficiency standards.

3. Energy in buildings

118. The presenter explained that the provision of energy services is considered to be a complex activity involving a wide range of physical assets and organizational activities that routinely overlap with other ‘non-energy’ assets and activities. Energy services are categorized into two types of systems: (i) external systems which include technologies and infrastructures for extracting, distributing, converting and delivering marketable energy commodities such as gas and oil and (ii) internal systems which include primary conversion equipment such as boilers and CHP plants; secondary conversion equipment such as radiators and light bulbs; equipment for distributing energy throughout the site, such as pipe-work and transmission lines; and manual or electronic controls.

119. Energy Management Systems (EMS) are used to monitor, control, and optimize the performance of generation and transmission systems. It is designed to reduce energy consumption, improve the utilization of the system, increase reliability, predict electrical system performance, and as well as optimize energy usage to reduce cost. It uses real-time data such as frequency, actual generation, tie-line load flows, and plant units’ controller status to provide system changes. Demand side management is a set of interconnected and flexible programmes which allow customers a greater control in shifting their own demand for electricity during peak periods; and reducing their overall energy consumption. This demand side management can contribute to approximately US\$ 59 billion by 2019 in savings (cutting costs for commercial customers, saving money for household and allowing utilities to operate more efficiently by reducing CO₂ emissions).

120. Building energy management systems are computer-based control systems that control and monitor a building’s mechanical and electrical equipment such as heating, ventilation, lighting, power systems and so on. Building energy management systems are critical to managing energy demand as they connect the building services to a central computer to allow control of on/off times, and adjustment of temperatures and so on. Software provides control functions, monitoring, alarms and allows the operators to optimize building performance.

121. Building energy use is driven by factors such as population size; economic growth; the size of the building and service demands and real energy prices. Buildings account for over a third of world total energy use and associated greenhouse gas emissions; and more than half of the electricity produced is consumed by buildings. Typically 10 per cent to 20 per cent (depending on building type) of the total life-cycle energy consumed is used for the manufacturing and assembly of building materials, construction, maintenance, refurbishment and demolition; 80 per cent to 90 per cent is used, over the life of the building, for heating, cooling, lighting and ventilation, house appliances, etc. Given the variety of cultures, business activities and the associated economic development, various societies have developed lifestyles that involve different patterns of energy use. The fact that energy use is very much tied to culture makes it quite difficult to control.

122. In concluding, it was noted that the Caribbean’s policy framework for achieving overall energy efficiency – including energy efficiency in buildings has been elaborated in the CARICOM regional energy planning and management and implementation framework called the Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS). This framework aims to expedite the implementation of

renewable energy and energy efficiency dimensions of the CARICOM energy policy, and includes a set of minimum efficiency standards that require electric utility and electricity producers to decommission inefficient generating equipment and conduct demand side management programmes. There has also been the establishment of a regional collaboration mechanism with the CARICOM Regional Organisation for Standards and Quality (CROSQ) for the creation and implementation of standards and labelling for energy consuming equipment.

Discussion

123. In his intervention, the Senior Energy Officer, Grenada, commented on the contribution of internal and external loads to energy use in buildings. He emphasized that internal loads such as plug loads and equipment with high inductive properties (e.g. transformers) account for a significant share of building energy consumption. He further noted that a major share of the energy is used when the appliances and equipment are in standby and/ or remote control mode. On the subject of control systems for regulating energy use in commercial and industrial buildings, he noted that energy demand is driven primarily by the behaviours of the persons using those buildings, even though in the end those users are not responsible for bearing the cost of the energy consumed. For that reason, he stated that there was a need for increased advocacy and awareness building among the populace. He also spoke about the ongoing collaboration between the European parliament and manufacturers of electrical equipment to support the design of more energy-efficient equipment by reducing the waiting period in stand-by mode from 20 watts to 1 watt. The Energy Officer stressed that there are several opportunities for energy conservation, highlighting the use of control systems including the use of guestroom controls in hotels (that ensure air conditioning units and lights are automatically turned off room when the guests are not in the room); and the use of modern eye lighting controls in commercial buildings.

124. The representative of the ACS flagged the figure (US\$ 59 billion by 2019) which was quoted in the presentation as the global estimated savings to be derived through the use of demand side management techniques and enquired about the possibility of scaling down the figure to cover just CARICOM countries.

125. In response, the representative of CARICOM highlighted some of the ongoing work being undertaken with the support of a consultant to determine minimum energy performance standards in buildings. She stated that as a first step, the consultant would establish a commercial business stock and calculate the building stock's energy use. On the basis of this information, the consultant would then calculate the energy-saving potentials and identify ways to achieve this. In addition, she noted that CARICOM has established Memorandum of Understandings (MOUs) with utility companies through the Caribbean Electric Utility Services Corporation (CARILEC) and under this arrangement the Secretariat intends to engage the utility companies in assessing how they can improve their systems from demand management standpoint. The data collected through this process is expected to facilitate a better analysis of the economic gains that CARICOM countries can derive from implementing MEPs and energy efficiency building codes.

126. With regard to the promotion of appropriate building designs as an energy efficiency tool, the representative of CARICOM explained that following a review of the energy efficiency building codes available for CARICOM member States and internationally, the consultant would be expected to prepare a first draft that can be further developed and later ratified by CARICOM member States within the next two years. In terms of the minimum energy performance standards, CARICOM plans to undertake a review of existing standards for both buildings and appliances and then perform a comparison with global standards. The outcomes of this analysis would then be used to derive a benchmark for what constitutes an energy efficient building as well as the minimum energy performance standard in a building. This

information would be available for use by prospective builders for determining whether or not the building or office space being developed can be deemed energy efficient.

127. On a related note, the representative of the ACS noted the changes to the façades of buildings over time and sought clarification on the extent to which those issues have been integrated into the work being undertaken by CARICOM.

128. In response, the CARICOM representative indicated that while building design was a critical issue that could not be overlooked, it would not be addressed in the ongoing work. She noted that immediate outcome of the work on minimum energy performance standards would be the development of model houses. Building design is an important issue that requires a more technical approach as well as collaboration from agencies with the kind of expertise needed to address those issues. She expressed the hope that that would be tackled at a later stage on when national standards and baselines have been set, and the work on energy performance standards is at a more advanced stage.

129. The Business Unit Manager, Research and Policy, Economic Development Advisory Board of Ministry of Planning and Development of Trinidad and Tobago noted the high carbon and energy intensity reported for Trinidad and Tobago and the efforts that had been initiated to explore the implementation of programmes to transform behaviours of the populace. He mentioned some applications and programmes that had been introduced in different countries across the region for inculcating a culture of conservation. He highlighted applications such as the “Welectricity” app developed by the Vincentian Herbert (Haz) Samuel for measuring electricity use per month and the VIN electronic keycards used by hotels. He sought the views and recommendations of the CARICOM Secretariat on the use of those programmes or similar for realizing those behavioural changes in Trinidad and Tobago.

130. In response, the CARICOM representative singled out the CARICOM and OECS BEEP as two programmes that have been effective in implementing energy efficiency behaviours. She lamented that while the CARICOM BEEP has not allowed for the implementation of energy management systems for monitoring energy use, it has been successful in realizing savings of approximately US\$ 5000 as a result of more energy efficient behaviours such as switching off lights when not in use, replacing old air conditioning systems with more efficient ones. As a next step, CARICOM is looking to implement an energy management system that would monitor impacts and energy consumption on an hourly basis. At a national level, she noted the interest of some countries in the programme and mentioned the intention of the Secretariat to continue rolling out those programmes in the near future.

131. On the issue of model buildings in the Caribbean, the Programme Assistant, Energy, Environment and Disaster Management of UNDP identified the Savannah East building which was recently constructed in Trinidad and Tobago as one example of an energy efficient building. The building was constructed by a private company, and is due for completion in 2016. It is also silver and LEED certified. Some of the key features of the building were a computerized system that tracks energy savings from the building, manages water in building and controls the air system. To aid with greater sensitization and improved understanding of the role of energy efficiency, monitors displaying the amount of energy used and saved by the building would be placed at the entrance of the building. It was also noted that though the upfront construction costs for the building were up to 10-15 per cent higher, in the long term, large savings to be achieved because of the lower maintenance costs.

132. The Economic Affairs Officer, Sustainable Development and Disaster Unit, ECLAC, challenged participants to consider why national governments have not considered investing in the construction of buildings like Savannah East which was built by a private developer. He further questioned why the good

practices that are known and proven to be effective and beneficial are not actually practiced and queried to whom would the benefits accrue.

133. In his intervention, the Senior Energy Officer, Ministry of Finance, Planning, Economic Development, Trade Energy and Cooperatives of Grenada reflected on the experience of the Government with implementing an energy conservation programme, to illustrate the extent to which the information on energy efficiency has been used to improve the behaviour of the population/ consumers. He stressed the importance of complementing any advocacy or awareness building programmes at the national level with sound practical examples that clearly demonstrate how the implementation of such energy efficient practices/behaviours actually lead to energy savings. He further stressed the need to educate not only the consumers but to also influence and advocate for changes at higher levels.

134. The Senior Policy Analyst, Ministry of Planning, Lands, Agriculture, Housing and Infrastructure of the Cayman Islands identified the recently constructed government building as a further example of an energy efficient building. The building which was constructed in 2011 is silver and LEED certified. He highlighted some of the features of the building that contributed to annual savings of US\$ 75,000. Some of those features included the use renewable sources of energy (solar, geothermal) for providing its energy needs as well as the use of foam blocks in its construction.

135. The Programme Officer of the OECS identified the low investment in energy efficiency as one of the key impediments to reducing energy consumption. She noted that there was a significant difference in the level and type of investment needed for promoting energy efficiency compared to renewable energy. Renewable energy requires a one-time financial investment. Energy efficiency, on the other hand, requires an investment in capacity and commitment/ effort, and unless the benefits to be accrued from this investment are immediately evident there is little incentive for making shift energy efficient programmes. She spoke of her experience with developing an energy efficiency measure for the public sector in Saint Lucia and the various challenges encountered in the process with obtaining basic information for creating baselines or compiling estimates of energy consumption.

136. The representative of CARICOM highlighted the pre-paid metering service offered by the local utility company in Guyana as an innovative scheme for improving energy use and reducing wastage. She noted that the service had been useful in helping consumers monitor their energy consumption and thus fostered a better culture of efficient energy use and reduced wastage.

137. The representative of GIZ/CARICOM applauded the contributions made by the discussants and emphasized the importance of identifying where key opportunities exist. He highlighted the focus of GIZ in providing practical options for implementing energy efficiency measures that would ultimately help countries turn their visions and commitment into tangible outcomes. He highlighted the OECS and CARICOM BEEP programmes as two such tools available to member States.

138. The Sustainable Energy Analyst, Energy Research and Planning Division, Ministry of Energy and Energy Industries of Trinidad and Tobago stated that while the development of national policies and frameworks is critical for advancing the renewable energy agenda, it was equally important to examine the different ways of transmitting the key messages of renewable energy and energy efficiency to the wider populace. He stated that the traditional public service announcements had limited reach and instead suggested the use of other forms of mass media and social media that could prove more effective for influencing behavioural change. He also proposed the use of national icons as champions.

139. The representative of the ACS invited participants to consider and explore a number of critical issues: What are the factors that have hindered national governments from driving and influencing the transformation process to using energy efficient buildings, and how can this be addressed? She suggested

the development of guidelines for governments on the rental of buildings and called on regional organizations such as CARICOM for their inputs in that area. How to encourage greater investment and promote energy efficiency in buildings?

4. The Regional Building Energy Efficiency Project (BEEP) Initiative

140. The CARICOM representative also presented on the progress of the CARICOM BEEP to date. In this report, she noted that the system could facilitate the overall measurement of energy usage, and expressed the wish that the CARICOM BEEP could serve as a best practice for the region in the future. She showed the impact of the BEEP on energy consumption to have been significantly reduced by as much as 26 per cent from December 2014 to January 2015. In reviewing the CARICOM Secretariat's energy consumption from 2013 to 2014, it was found that the bulk of the energy loss was attributed to the air conditioning units. However, with the implementation of the Energy Management Plan the system became more efficient. She identified the five main elements of CARICOM-BEEP as:

- (i) Implementation of and energy management system;
- (ii) Implementation of EE applications;
- (iii) Implementation of alternative – RE production;
- (iv) Capacity building;
- (v) Use of project outputs as examples to highlight EE measures and RE technologies in the region.

She concluded that with an investment of US\$ 4,500, the CARICOM BEEP contributed a total savings of US\$ 55,000 within the 12 months of 2015.

Discussion

141. The Business Unit Manager, Research and Policy, Economic Development Advisory Board, Ministry of Planning and Development of Trinidad and Tobago highlighted the significant quantity of the energy used for air conditioning which was revealed in the CARICOM BEEP project. He noted that the recommended thermostat settings for air conditioning units were based on a study conducted in Europe to measure the minimum amount of clothing required to be comfortable. He enquired about the possibility of evaluating the dress codes in offices in the Caribbean region and establishing a new standard that was more appropriate for our tropical climate.

142. The Programme Assistant, Energy, Environment and Disaster Management, UNDP, enquired whether the data collected through the project had been disaggregated by month to determine areas for further saving.

143. In response the representative of CARICOM stated that a more detailed analysis would be conducted on the temperature readings received from the Hydromet office. In addition, she outlined some of the complementary planned undertakings which included: the installation of meters at strategic points in the building for the purposes of monitoring energy use; the implementation of a log book to record the number of times the rooms in the buildings are kept on as well as other relevant information; and engaging security guards and other staff to switch off lights and air condition units in areas that are not in use. She reiterated that while the BEEP project focusses primarily on behavioural change, it was important to also engage in some form of systematic monitoring.

144. The representative of OECS commended the level of savings realized since the project had been implemented and enquired if any rebound effect had been observed and what strategies would have been used to maintain high levels of enthusiasm and commitment among staff and sustain the initiative.

145. The representative of CARICOM concurred that savings were indeed realized and agreed that some form of effective monitoring would be needed to ensure the continued success of the project. She also indicated the intention to convene a meeting with the staff and management to decide on how the savings realized as a result of the behavioural changes.

146. The Energy Advisor (GIZ-CARICOM) reiterated REETA's support to the CARICOM Energy Unit with the implementation of the regional BEEP initiative. He remarked that the project aims to provide organizations (using public buildings) with real and practical tools for capturing the monetary value of savings accrued from implementing energy efficiency projects and identifying ways in which those savings can be reinvested.

147. He further stated that the vision of GIZ was to implement 15 similar BEEP projects in CARICOM member States to derived aggregate savings for the region. He noted that Antigua and Barbuda, Suriname and the Caribbean Public Health Agency (CARPHA) have indicated an interest in participating programme. He urged countries which shared an interest in the project and were willing to make the commitment as champions for the initiative to submit written requests to GIZ.

5. Introduction to case study

148. The representative of the OECS Commission provided an overview of the progress achieved through the implementation of the OECS BEEP project. She noted that the project which was initiated in the first quarter of 2015 was preceded by an energy audit in 2014. The energy audit revealed that the cooling of 5 buildings occupied by the Commission constituted a considerable portion (over 60 per cent) of the energy consumption. The audit also made a series of recommendations, one of which included the development of an Energy Management Policy and Programme. She highlighted several of the parallel initiatives and actions undertaken to promote the BEEP project and incentivize staff to participate and contribute to its intended objectives. She noted that within 8 months of implementation of the project, the Commission was able to realize savings of EC\$ 28,000.00.

6. Introduction to the GIZ tool for financial analysis of energy projects

149. The Energy Advisor (GIZ/CDB) gave a general account of the financial calculations to analyze the viability of energy projects. While noting that there were different costs over the life of a project, he pointed out that most times the focus was on upfront costs (investment costs) – i.e. the capital expenditure, and not on the project/life cycle costs (inclusive of investment and operational costs). The calculation of the life cycle cost facilitated the assessment of energy projects through two levels of calculation of profitability using either the static or dynamic methods. The static method is used for short-term projects which are not capital intensive. Conversely the dynamic method is used for long-term capital intensive projects.

150. He explained that the three components required to determine savings development or project profitability over a five year period were: (i) remaining costs, (ii) revenue of investor/energy savings Company; and (iii) revenues of customers. Under the dynamic method there were four aspects of the analysis which included: the customer, the investor/service provider, general setting, financing. He reviewed how the savings for each aspect would be determined. Key performance indicators were used in both approaches, and all calculations were based on real cost flows.

151. He pointed out that from the analysis, the important results from the perspective of the consumer or user was comfort; for the investor it was profit. In conducting the analysis, general data requirements included energy prices, subsidies, operating expenses for a project and level of financing. In the latter case, the most important was the equity available to accommodate RE. It was evident that such

calculations were necessary, in order to determine whether any support for the project was required to enhance performance.

152. The calculations showed when the optimal payment period, as well as the project period over which a profit was generated. This process could be done for different types of equipment for comparison across the project. If the key parameters were subject to sensitivity analysis the energy savings in projects would be realized.

153. He acknowledged that financing was one of the main barriers that prevented project implementation, since most banks assessed the liabilities when considering the debt service ratio. These loan ratios were usually set to 1.2 – 1.5 and investments which do not meet these ratios are not typically feasible. He therefore recommended that such loans should have incentive schemes, for example a grace period before repayment begins, or payment of the interest and not the principal. In approximately 70-80 per cent of cases, the projects do not generate enough to repay the loans in the first year.

Discussion

154. The ECLAC representative wondered why there weren't more energy-efficient buildings in the region, were they just too expensive, what are the perceptions? Did society prefer constructing non-efficient buildings to having none at all? The Energy Advisor (GIZ/CDB) stated that organizations preferred to spend the money elsewhere rather than reinvesting in their buildings to make them more energy efficient.

7. Working examples of financial analysis of energy efficiency and renewable energy projects

155. The Energy Advisor (GIZ/CDB) then gave a hands-on demonstration of the GIZ financial analysis tool. He emphasized that GIZ provided training on dynamic grid with small groups, for example government agencies. The training usually takes the following structure:

- (i) Introduction to the project cycle;
- (ii) Economic financial and banking language;
- (iii) Detailed introduction to a comprehensive investment grade;
- (iv) Enable you to start calculating own EE/EPC projects;
- (v) Discuss results of risks and sensitivity analysis.

Discussion

156. The GIZ Energy Advisor offered the CARICOM BEEP as an option for realizing substantial green benefits to Caribbean economies in the future. He agreed and suggested that the savings could be reinvested. However, the meeting learned from the GIZ Energy Advisor that so far, neither the CARICOM nor the OECS BEEP had yet decided to reinvest. Seeking the services of an Energy Service Company (ESCO) – a company which facilitates the implementation of energy efficiency programmes for clients - was identified as an alternative that both organizations could explore to develop a project proposal for funding in the future.

8. Working session exercises

Discussion

157. Workshop participants were asked to suggest how their country would embark on implementation of renewable energy policy interventions such as the BEEP project, and their perspective on the likely challenges that would have to be taken into account.

158. The representative of Saint Lucia indicated that her government has been demonstrating its commitment to energy efficiency by seeking to minimize the unnecessary cost incurred by using inefficient lighting. Funding is currently being procured from the CDB for a street lighting project where street lamps are being replaced by more energy efficient bulbs. It is anticipated that some of the savings from this effort will be used to broaden the scope of energy efficient initiatives applied to other buildings. The participant however was uncertain whether the commercial ESCO could be done in Saint Lucia, given the limited human resource capacity.

159. The representative of Antigua and Barbuda noted as a major concern the absence of demonstrated commitment to initiatives promoting energy efficiency on the part of leaders and decision makers. He also noted the difficulty in monitoring energy consumption in the government and ministry buildings, since these are not equipped with meters. This contributes to the challenge in getting baseline figures on consumption. He also lamented that there little incentive to turn off the lights or to install meters to routinely monitor how much energy is being consumed. He expressed the view that policy intervention in Antigua and Barbuda towards embracing energy efficient strategies would likely be a challenge in the prevailing environment any policy intervention at present since the country has to literally “start from scratch”.

160. The Trinidad and Tobago representative also indicated that convincing the government of the value of EE would be a challenge. Noting that his country consumed mostly natural gas, he identified subsidized energy prices as a key limitation in this regard. In order to effect a paradigm shift he suggested that the active involvement of more leaders would be necessary. This view was endorsed by the representative of the Tobago House of Assembly (THA), who also acknowledged the difficulty in selling EE. In his opinion the THA needed a champion to promote the idea. He also recommended the establishment of an Energy Unit to advance the entire energy agenda and move the work forward.

161. Grenada’s representative noted that while there were a number of solar and wind energy initiatives, there were almost no energy efficiency initiatives in that country. He therefore suggested that there was need to explore strategies to introduce energy efficiency and energy conservation which should include efforts to demonstrate to the population the positive impact of such initiatives. The representative of Grenada also shared his experience with an ESCO service where he was involved in the design and management of the retrofitting of Light Emitting Diode (LED) lighting in his Ministry during April 2013 to August 2014. He noted that he had built in a provision in the negotiations with the ESCO for the development of a local cadre of professionals. He sought in particular to have established a training package on electrical installation with a view to creating a cadre of professionals in this area.

162. The Cayman Islands representative observed that implementing the BEEP project in the Cayman Islands may be challenging. From his perspective, convincing the government to embark on energy efficiency projects at this time would not likely be an easy sell given that EE is not currently very high on their list of priorities. Furthermore, the Cayman Islands are unable take on any new borrowing for an ESCO at this time.

163. The representative from GIZ informed the meeting that it is currently working with CARICOM and the initiative on REETA. Countries were invited to indicate their interest by contacting CARICOM. He further noted that as GIZ builds on energy management projects, there will be workshops for member States to benefit from in the near future. The Energy Advisor GIZ also indicated that countries could implement EE strategies domestically, and that already, the OECS and CARICOM, since they lacked the resources to implement these strategies, had approached the Renewable Energy Efficiency Technical Assistance (REETA) project for support. Given that previous GIZ projects conducted energy audits, REETA was able to follow up with these organizations. He acknowledged that there were concrete innovative developments with the OECS BEEP, and that there was the potential for other partners to become involved. Looking towards the future, the GIZ representative suggested that an ESCO could

manifest from within the existing utilities, and offer the necessary audits that will guide the company towards reaping the benefits of EE. With such a development, a company could explore energy saving options like lighting options and do this in-house. Another option could be to engage an external ESCO for funding or bundling, for which a key challenge would be to determine the optimal modes of implementation.

164. Finally ECLAC noted that its objective in undertaking the initiatives in EE and RE was to create awareness raising on the options available to Member States and the public agencies to become more energy efficient. It was noted that the workshop brought to light some of the barriers to deploying renewable energy in the context of SIDS and identified possible solution options like BEEP and REETA. ECLAC encouraged countries to maintain dialogue with the partners at this forum. Finally, the Economic Affairs Officer, Sustainable Development and Disaster Unit, ECLAC, suggested that countries consider the feasibility of implementing these projects in their countries.

165. The meeting also received notification from the Representative of the Division of Natural Resources and Infrastructure of ECLAC Santiago, on the proposed launch of another energy initiative which seeks to support countries in building a database on energy efficiency indicators (Base de Datos de Indicadores de Energia Eficiencia - BIEE). This programme which has been in existence for the past four years and was now being extended to the Caribbean would provide support for developing a database for energy and EE in the region. Meeting participants were invited to take note of the project, and to consider preparing their countries to participate.

E. Closure of the meeting

166. The Energy Advisor (GIZ/CARICOM) commented on the usefulness of the discussion over the two days, as he offered feedback from GIZ REETA perspective. He was pleased that the organization was able to engage in the sessions. He welcomed participation in the BEEP from the countries, mentioning their expressed willingness to participate in the two, five-day workshops. Country applications for these workshops could be submitted to CARICOM. He noted that there was another training session in the pipelines; a three-day ISO5001 training which would cover the management and productivity aspects of undertaking EE projects.

167. The Energy Advisor (GIZ/CDB) confirmed that this training would be focused on financing EE projects under the REETA, which will be working with the Caribbean Development Bank (CDB) towards this end. He nevertheless indicated that there was a growing opportunity for regional technicians to become involved in the financial assessments of EE projects. In this regard, he noted that trainees graduating from these sessions could utilize their newly acquired skills to support national agencies in implementing EE projects, even in partnerships with local energy utilities.

168. The Economic Affairs Officer, Sustainable Development and Disaster Unit, ECLAC, reflected on the day's discussion and identified an unexpected objective with respect to awareness building trainings that ECLAC could organize in support of the countries. He noted that the past two days the discussions were focused on the how to overcome barriers to the implementation of RE and EE. He thanked the GIZ experts as they agreed to synergise their training efforts with ECLAC. In closing he thanked all presenters, delegates, and ECLAC staff.

Annex I**LIST OF PARTICIPANTS – DAY 1**

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Annex II

AGENDA – DAY 1

1. Opening of the meeting
2. Policy review – Energy policy in the Caribbean
3. Barriers to implementing energy efficiency and renewable energy projects in the Caribbean
4. Energy efficiency strategy for green public buildings
5. Review of country case studies
6. Closure of meeting

AGENDA – DAY 2

1. Introduction to training workshop
2. Policy context for financing energy efficiency and renewable energy projects in the Caribbean
3. Energy in buildings
4. The Regional Building Energy Efficiency Project (BEEP)
5. Introduction to case study
6. Introduction to the GIZ tool for financial analysis of energy projects
7. Working examples of financial analysis of energy efficiency and renewable energy investments
8. Working session exercises
9. Workshop conclusion
10. End of workshop