TOOLKIT FOR THE GREEN BUILDINGS PROCUREMENT MANUAL – POLICIES AND PROCEDURES FOR PUBLIC MANAGERS (VERSION 1)

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Abstract

This Toolkit is the companion of the Green Buildings Procurement Manual – Policies and Procedures for Public Managers (Version 1). This Toolkit surveys national frameworks for procurement which would allow form easy comparison across five CARICOM Member States.

This Toolkit also presents the life cycle analysis methods, online software tools, benchmark product pricing databases, and product specifications that would allow national technical staff to support procurement officials as they implement the recommendations of the Manual.

Contents

1 Introduction

This Toolkit supports the Green Buildings Procurement Manual developed for the Caribbean Community Climate Centre (CCCCC) in Belize. The effort was financed by the Global Environment Facility through United Nations Environmental Programme (UNEP) under the ***"Energy for Sustainable Development in Caribbean Buildings (ESD) Project"*** which was financed by a US$4, 859,000 GEF grant. The Toolkit first reviews the current state of the art represented in the Manual. The purpose is to provide a quick reference for comparison among Member States. Next, the Toolkit presents the operational definition of Green Building

Procurement as develop in the Manual. This is followed by a detail explanation of the concept of Life Cycle Cost analysis as a decision framework for choosing the best projects. Two software tools are recommended for energy analysis as well as two benchmarks for product prices. Finally, the same Specification Tables in the Manual are reproduced here in the Toolkit.

2 Overview of Procurement by Country

The general procurement processes as well as any green procurement policies of the five pilot countries are reviewed. The countries are: Antigua and Barbuda, Belize, Grenada, Saint Lucia and Saint Vincent and the Grenadines. The review is structured as: The Institutional Framework for Green Procurement; National Policy including Laws Governing Public Procurement and Major Institutions; Handbooks and Guidelines; and Baseline for Green Procurement.

2.1 Antigua and Barbuda

This section gives a review of both green procurement and general public sector procurement of Antigua and Barbuda. The focus is on the local institutional framework, national energy policy, environmental policy, and procurement policy, and the operationalization of public procurement.

2.1.1 Institutional Framework for Green Procurement

The National Focal Point for Green Procurement in Antigua and Barbuda is as follows:

- Antigua and Barbuda - Antigua Bureau of Standards - https://abbs.gov.ag
- Antigua and Barbuda - Ministry of Health and the Environment, Environment Division - https://ab.gov.ag/detail_page.php?page=29

2.1.2 National Policy

The Approved Procurement Policy of Antigua and Barbuda is as follows:

- Department of Environment Procurement Policy – https://www.environment.gov.ag/assets/uploads/attachments/78ae5-approvedprocurement-policy.pdf

  This short policy documents embodies many of the principles of green procurement but does not mention the term "green" specifically. For example, the principles include:

  - *Transparency: To ensure transparency, Bid documents shall provide all the necessary information to facilitate submission of appropriate and competitive tenders. All Contracts in which the Bid Documents were advertised publically are published every quarter.*
  - *Fairness: The DOE shall treat all bidders with fairness and ensure that they are given the same level of information when preparing quotations or bids. The DOE ensures that there are provisions for non-discrimination and equal treatment of all candidates.*
  - *Efficiency: The DOE shall carry out it procurement procedures in the most efficient manner possible.*
  - *Effectiveness: The DOE shall ensure that its methods of advertising bids to the public, its procurement procedures and its handling of public matters are carried out in the most effective way possible.*
  - *Accountability: The DOE shall publish its Financial Statements on an annual basis.*
  - *Value for money: All Bids shall be evaluated not only on competitiveness in pricing but also factors such as the quality of the products/services and track records of the bidders.*

    Additionally, through the adoption of social safeguards that are cognizant of the peculiar situations within SIDS like Antigua and Barbuda the procurement practices of the DOE shall be nondiscriminatory to gender and other vulnerable groupings and communities.

- Department of Environment Antigua and Barbuda - https://www.environment.gov.ag/en/.

  - GOVERNMENT OF ANTIGUA AND BARBUDA DEPARTMENT OF ENVIRONMENT DOE PROCUREMENT POLICY - https://www.environment.gov.ag/assets/uploads/attachments/78ae5approved-procurement-policy.pdf.

    - Pg.2: The Procurement Policy of the Department of Environment

The Department of Environment which is within the Ministry of Health and the Environment of the Government of Antigua and Barbuda uses public money, either contributed by the Government or by national, regional or international Donors towards the effective implementation of the Environmental Protection and Management Act. 2015, as well as achieving actions to mitigate and adapt to climate change and promoting the principles of environmental sustainability and sustainable development. Therefore, the purpose of this policy is to provide guidance as to how the Department will carry out its procurement procedures with respect to the procurement of goods, services and consultancies.

The Procurement Procedures specified in the DOE Procurement Manual shall ensure that the Department, its staff, project beneficiaries, consultants, and partner agencies who undertake programmes, projects or actions on behalf of, funded by or funded through the DOE obey the principles of:

Transparency: To ensure transparency, Bid documents shall provide all the necessary information to facilitate submission of appropriate and competitive tenders. All Contracts in which the Bid Documents were advertised publically are published every quarter.

Fairness: The DOE shall treat all bidders with fairness and ensure that they are given the same level of information when preparing quotations or bids. The DOE ensures that there are provisions for non-discrimination and equal treatment of all candidates. · Efficiency: The DOE shall carry out it procurement procedures in the most efficient manner possible.

Effectiveness: The DOE shall ensure that its methods of advertising bids to the public, its procurement procedures and its handling of public matters are carried out in the most effective way possible.

Accountability: The DOE shall publish its Financial Statements on an annual basis. · Value for money: All Bids shall be evaluated not only on competitiveness in pricing but also factors such as the quality of the products/services and track records of the bidders.

Additionally, through the adoption of social safeguards that are cognizant of the peculiar situations within SIDS like Antigua and Barbuda the procurement practices of the DOE shall be non discriminatory to gender and other vulnerable groupings and communities.

These principles above shall ensure that all procurement meet the highest international fiduciary standards as well as adhere to the government's finance, procurement and audit procedures.

The DOE shall have the services of a Procurement Officer who will prepare the Annual Procurement Plan, oversee Procurement Procedures, Prepare Procurement Reports, update the Procurement Manual at regular intervals

and provide procurement advice to Project Coordinators, Project Management Unit, the Technical Advisory Committee and the Project Management Committee as is necessary. Additionally, the Procurement Officer will provide training annually to the Operations Unit and the Project Coordinators on Procurement Procedures. The Procurement Officer will also ensure that all Procurement control measures are in place and routinely verified. This Policy will became effective on January 19th 2017 and it will be revised every five years.

Procurement policy in Antigua and Barbuda is also captured in the following documents:

- Medium-Term Development Strategy 2016 to 2020 - https://www.environment.gov.ag/assets/uploads/attachments/c8a8e-goabmedium-term-development-strategy-sept-2015.pdf.
    - Pg.79:Expenditure Management

      The strategies to improve expenditure management and reduce Government spending include:

      - *9. Continue to implement a public financial management reform project with particular emphasis on:*
      - *(a) procurement and contract administration: Government will enact new procurement legislation and regulations and improve the institutional arrangements for procurement in the public sector.*

    - *Pg.128: 12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities*

- Antigua and Barbuda Draft Sustainable Energy Plan March 2013 - https://www.environment.gov.ag/assets/uploads/attachments/d4eb5-b38f1sustainable_energy_action_plan_anb.pdf

  Pg.23: Implement a targeted energy efficiency programme in the public sector, focussing on government buildings, vehicles and the procurement of energy-efficient equipment;

  PG.26: 4.2: Energy efficiency programme in the public sector ○ *4.2.2. Develop and implement a programme for the mandatory procurement of energy efficient and environmentally friendly equipment and materials by the public sector. Energy consuming products should correspond to the highest energy efficiency class defined in energy labels and to internationally recognized endorsement marks (like Energy Star®)*

Pg.45: II4.2: Diversify energy sources by type and geographical location

- *Procurement Guidelines to secure best terms and conditions for longterm contracts for energy supply developed and implemented.*

- Antigua and Barbuda's Second National Communication on Climate Change - https://www.climateandforests-undp.org/sites/default/files/downloads/antigua__barbuda_second_national_communication.pdf.

  Pg.223: During Hurricane Luis damage to buildings was mainly due to inappropriate design, weak connections of light-weight roofing and siding materials, impact damage from flying objects, inadequate windows and external doors and water damage from the torrential rains. There were also examples of catastrophic collapse of entire buildings due to unsound structural practices. In many instances, including several government owned buildings, the lack of maintenance of building components contributed significantly to the damage. In the cases of structures not associated with buildings (e.g. telecommunication towers and transmission systems) inadequate specification of performance criteria at the procurement and design stages was an important factor in the failures.

- Environmental Social Impact Assessment & Management Plan - https://www.environment.gov.ag/assets/uploads/attachments/85b0f-gcf-fp_antiguaand-barbuda_build_annex-06_esiamp_clean_18-may-2020.pdf .

  Pg.7: The Environmental and Social Management Plan identifies mitigation measures, including:

  - *A project Sustainable Procurement Plan to ensure that building aggregates are sustainably sourced.*

2.1.3 Laws Governing Public Procurement

Public Procurement is governed by the Procurement Board - http://www.tendersboard.gov.ag/. The Procurement Board is responsible for implementing the following legislation:

- THE PROCUREMENT AND CONTRACT ADMINISTRATION ACT, 2011 – http://www.oas.org/en/sla/dlc/mesicic/docs/mesicic5_atg_procurementact20111_annex33.pdf

Other relevant legislation are:

- The Standards Act 2017 - http://laws.gov.ag/wp-content/uploads/2019/02/No.-24-of2017-THE-STANDARDS-ACT-2017-1.pdf

2.1.4 Major National Institutions

The major national institutions in Antigua and Barbuda are:

- The Procurement Board – http://www.tendersboard.gov.ag/

  The Procurement Board operates under The Tenders Board Act that was enacted in 1991 and amended in 2002, (collectively "Tenders Board Act"), provides oversight and regulation for public procurement across the public service in Antigua and Barbuda. In order to streamline the public procurement process and fully engage the local private sector, the Procurement and Contract Management Act of 2011 ("2011 Act") was enacted to replace the Tenders Board Act.

2.1.5 National Online Portal

Research did not reveal any national online portals for public procurement in Antigua and Barbuda.

2.1.6 National Handbook and Guidelines

There is a reference to a Procurement Guidelines/Manual on the website of the Procurement Board. However, there is no document available for download.

- Procurement Guidelines and Manual - http://www.tendersboard.gov.ag/# (not downloadable)
  - Vendor Code of Conduct – http://www.tendersboard.gov.ag/wpcontent/uploads/2016/11/Code-of-Conduct-for-Vendors.pdf
  - Ethical Standards - http://www.tendersboard.gov.ag/wpcontent/uploads/2016/11/Ethical-Standards.pdf

Other relevant documents include:

- Modernizing and strengthening of Public Procurement in Antigua – http://www.oas.org/en/sla/dlc/mesicic/docs/mesicic5_atg_finalreportmodernpubproc_annex30.pdf

2.2 Belize

This section gives a review of both green procurement and general public sector procurement of Belize. The focus is on the local institutional framework, national energy policy, environmental policy, and procurement policy, and the operationalization of public procurement.

2.2.1 Institutional Framework for Green Procurement

The National Focal Point for Green Procurement in Belize is:

- Ministry of Public Service, Energy and Public Utilities

Belize is also a signatory to the Caribbean Community (CARICOM) Protocol on Public Procurement.

- Public Procurement: Securing Value for Public Funds, CARICOM Protocol on Public Procurement- https://www.dgft.gov.bz/public-procurement-securing-value-for-public-funds/

2.2.2 National Policy

The National Energy Policy of Belize is as follows:

- Ministry of Energy, Science & Technology and Public Utilities Strategic Plan 2012-2017 - http://www.publicservice.gov.bz/jdownloads/Strategic%20Plans/MESTPU_Strategic_Plan_-_2012-2017.pdf

  Pg. 8: 2.0 NEED FOR A NATIONAL SUSTAINABLE ENERGY STRATEGY
  The Sustainable Energy Strategy is needed to

  Pg. 11: 3.1 Strategic Element #1: Improve energy efficiency and conservation by at least 30 per cent by 2033, using energy utilization and GDP generated in 2011 as the baseline.

  Goal #2: Reduce consumption of electricity by 50 per cent, from USD 6.8 million to USD 3.4 million, for the provision of cooling and lighting services to public sector buildings
    - *Develop new procurement rules for acquisition of appliances and equipment in the public sector and new tariffs system based on degree of energy efficiency;*
    - *Development of revised building code to maximize internal lighting from the sun but also minimize the need for cooling — green designs to be introduced; banks and other financial institutions to become part of the planning and implementation.*

Goal #3: Increase electricity consumption efficiency by 30 per cent in commercial buildings

- *Revise tariffs on the importation of energy efficiency appliances and lighting through policy adjustments and changes that provide incentives to owners and occupants of commercial buildings;*
- *Revise building codes to promote the use of more energy efficient structures that minimize the use of electricity for lighting and cooling;*

- Belize National Energy Policy Framework: http://www.publicservice.gov.bz/index.php/8news/56-belize-national-energy-policy-framework
  The Proposed Goals and Strategies for Belize's Energy Sector:

  - *Pg 24: Buildings, Lighting & Cooling*

  Stimulate (consumer) investment in energy efficient homes and buildings
    - *Update Building Codes to reflect Mandatory Energy Efficiency Provisions*
    - *Establish a Mandatory Green Building Certification Program for Domestic and Commercial Buildings to encourage a shift towards low-carbon, zero-energy or even energy-plus buildings.*

  - *Pg 25: The certification rating awarded could be based on a building's score in a number of categories, including: provision for day-lighting and natural light sensors in lighting systems, incorporation of occupancy sensors in lighting systems, use of solar lighting technologies, provisions for passive cooling using natural ventilation, provision of energy-efficient window glazing and frames, insulation of roofs and walls, air-tightness of the building envelope, provisions for use of geothermal cooling and solar cooling technologies, provisions for use of solar water heating technologies, use of indigenous materials, adequacy of internal electrical wiring, provisions for water conservation, and proximity to urban centers.*
    - *Require New Government Buildings to be Zero-Energy or Energy-Plus Buildings*
    - *Promote Green Building Certification to Lending Institutions as a part of Lending Criteria for Home and Commercial Building Mortgages*
    - *Require that Property and Property Sale Taxes be tied to Green Building Certification Rating*
    - *Introduce a Voluntary Energy Efficiency Improvement Program for Commercial & Services Sector*
    - *Encourage Provision for Vents in Rural Households where Wood Fuel Cooking is done Stimulate (consumer) investment in energy efficient appliances*
    - *Implement a Country-wide Project to Change-over from Electric Incandescent to Solar and Electric Fluorescent and LED Lamps*
    - *Implement a Country-wide Project to Change-over to Hybrid Solar-Electric Street Lights*

- *Lower Import Duties on Solar and Electric Fluorescent and LED Lamps relative to Incandescent Lamps*
- *Introduce Energy Labeling of Appliances*
  - *The intention is to increase consumer's awareness of the real energy use of household appliances at the point of purchase through a liable and clear labeling.*
  - *Pg. 26: Introduce Recommended and Minimum Appliance Energy Efficiency Standards*
- *Require that Appliance Import Duties be tied to the Recommended Appliance Efficiency Standard*
- *Require that Permission for Appliance Importation be tied to the Minimum*
  - *Appliance Energy Efficiency Standard*
- *Require Mandatory Use of Solar Water Heaters*
  - *Government should mandate that all water heating used in residential and commercial buildings should be provided by solar technology. The importation of electric-only water heaters should be halted immediately.*
- *Encourage Participation in Voluntary Certification Programs for Energy Efficiency Improvement*
  - *Introduce Voluntary Target-Setting Agreements for Energy Efficiency Improvements*
    - *The GOB should setup a Voluntary Energy Efficiency Improvement Program whereby an individual industrial company can voluntarily enter into an agreement with the GOB to achieve certain energy efficiency targets within a certain time frame, in return for receiving technical and financial support and other economic incentives such as tax breaks and import duty reductions.*

3.2.3 Laws Governing Public Procurement

The Laws of Belize governing public procurement are as follows:

- Financial and Audit (Reform) Act of 2005 (No. 12 of 2005) [more particularly Part IV – Government Procurement and Sale Contracts] – http://procurement.gov.bz/wpcontent/uploads/2020/02/Finance_Audit_Act_2005.pdf
- Finance and Audit (Reform) (Amendment) Act, 2010 – http://procurement.gov.bz/wp-content/uploads/2020/02/FARA_Amendment_2010.pdf
- Financial Orders (FO) of 1965 – (British Honduras Stores Orders 1968 – https://www.audit.gov.bz/wp-content/uploads/2018/06/Stores-Orders.pdf)
- Stores Orders (SO) of 1968 Circular No. 8 of 1992
- Amendment to Stores Orders #13 [thresholds] – http://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex34.pdf

- Legal Framework - http://procurement.gov.bz/legal-framework/
- Belize Contractor General Act Chapter 6 – http://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex37.pdf

    - G.O.B. Amends Contractor General Legislation to Remove Limitation - https://edition.channel5belize.com/archives/192179

2.2.3 Major National Institutions

Online research did not yield the major national institutions.

2.2.4 National Online Portal

Belize has a national online portal as follows:

- The Government of Belize's Procurement Information Portal, under the auspices of the Ministry of Finance – http://procurement.gov.bz/

2.2.5 National Handbooks and Guidelines

Belize has published the following handbooks and guidelines:

- Belize Pubic Procedures handbook – http://procurement.gov.bz/public-procurementprocedures-handbook/
    - PUBLIC PROCUREMENT PROCEDURES HANDBOOK VOLUME I STANDARDISED PROCUREMENT PROCEDURES First Edition – January 2013 - http://procurement.gov.bz/wp-content/uploads/2020/02/HanbookPartIPublicSector.pdf
    - Guidelines for the Private Sector – http://procurement.gov.bz/wpcontent/uploads/2020/02/HanbookPartIIPrivateSector.pdf
- Government of Belize Public Procurement Procedures Handbook Draft 03 July 2012 – http://www.oas.org/juridico/PDFs/mesicic5_blz_annex27.pdf

2.3 Grenada

This section gives a review of both green procurement and general public sector procurement of Grenada. The focus is on the local institutional framework, national energy policy, environmental policy, and procurement policy, and the operationalization of public procurement.

2.3.1 Institutional Framework for Green Procurement

The National Focal Point for Green Procurement for Grenada is:

- Ministry of Climate Resilience, the Environment, Forestry, Fisheries, Disaster Management and Information Ministerial Complex, Botanical Gardens, Tanteen, St. George's , Grenada.
- Ministry of Infrastructure Development, Public Utilities, Energy, Transport & Implementation

2.3.2 National Policy

The relevant national polices of Grenada are as follows:

- National Climate Change Policy for Grenada, Carriacou and Petite Martinique (20172021) - https://www.gov.gd/sites/mocr/files/docs/Documents/Climate%20Change%20Policy%202017%20%E2%80%93%202021.pdf.

  Pg. 20: Principles — The principles which guide the development and delivery of climate resilience, adaptation and low carbon development in Grenada are as follows:

- THE NATIONAL ENERGY POLICY OF GRENADA :https://www.gov.gd/sites/default/files/docs/Documents/others/GNEP_Final_Nov_23_2011.pdf
  - *Pg.1: THE GOVERNMENT OF GRENADA RECOGNIZES THE IMPORTANCE OF establishing an energy development strategy to foster the sustainable development of Grenada. The Government's vision is 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.*
  - *Pg.10: 3.5 ENERGY EFFICIENCY AND CONSERVATION*

  Maximizing 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 and society is critical to relieve the continued need and pressure to secure supply of energy and production capacity expansion and related costs

Policies:

- *Provide comprehensive fiscal incentives to encourage the import and use of energy efficient appliances, vehicles, technology in power generation and manufacturing, and other sectors;*
- *Encourage appliance suppliers to import energy efficient appliances and to properly label them;*
- *Adopt appropriate standards for energy efficient building codes that will inform the design, construction and outfitting of buildings in Grenada;*
- *Make such standards to be mandatory for all new public sector/statutory construction;*
- *Establish efficiency standard for commercial and industrial activities;*
- *Provide tax relief/rebates to companies meeting the energy efficiency standards set by government (e.g. complying to "cradle to cradle" manufacturing processes);*
- *Provide incentives to re-use and recycle as an integral part of companies' operations and support cradle to cradle practices as an energy efficiency tool;*
- *Facilitate the delivery of the above by drafting, reviewing, finalising and enacting an Energy Efficiency Act based on the foregoing principles.*

- Pg.13: 3.9 HOTEL AND COMMERCIAL SECTOR

  The hotel and commercial sectors are vital to the country's ability to earn foreign exchange. Nonetheless, it is recognised that they both are significant consumers of energy, water and other resources. The GoG aims to ensure that these sectors lead the national thrust for sustainable energy use, green procurement, and protection of natural resources from rapid consumption and depletion. Compliance will be secured through the creation of such incentive and regulatory regimes as may be appropriate for various sectors of the market.

  Policies:

  - *Recognise and promote the greening efforts of such businesses to make them models of best practice which other local entities can emulate;*
  - *Evaluate the mandatory use of solar water heating in all new hotel construction;*
  - *Provide incentives for small hotels to become certified by internationally recognized certification standards; and*
  - *Conduct inspections to ensure compliance with policy objectives*

- Draft Generation Expansion Planning and Competitive Procurement Regulations - https://www.gov.gd/sites/default/files/docs/Documents/PURC/PURC's%20Draft%20Generation%20Expansion%20Planning%20and%20Competitive%20Procurement%20Regulations.pdf

2.3.3 Laws Governing Public Procurement

The laws of Grenada that govern public procurement are as follows:

- Public Procurement and Disposal of Public Property Act 2014 – https://www.procurement.gd/index.php/about-us/legislation/public-procurement-anddisposal-of-public-property-act-2014/download

- Public Procurement and Disposal of Public Property (Amendment) – https://www.procurement.gd/index.php/about-us/legislation/act-1-of-2018-publicprocurement-and-disposal-of-public-property-amendment/download

- Public Property Disposal Committee Regulations - https://www.procurement.gd/index.php/about-us/legislation/public-property-disposalcommittee-regulations/download

- Public Procurement and Disposal of Public Property Regulations 2015 – https://www.procurement.gd/index.php/about-us/legislation/public-procurement-anddisposal-of-public-property-regulations-2015/download

- Public Procurement Review Commission Regulations 2015 – https://www.procurement.gd/index.php/about-us/legislation/public-procurementreview-commission-regulations-2015/download

- Government of Grenada PPP Policy July 2014 - https://www.finance.gd/images/GrenadaPPPPolicy.pdf

- Integrated Resource Planning Procurement Regulations - http://www.gov.gd/sites/default/files/docs/Documents/legislations/es-integratedresource-planning-procurement-regulations.pdf

2.3.4 Major National Institutions

The major national institutions in Grenada in respect to public procurement are as follows:

- The Public Procurement Board - https://procurement.gd/index.php/about-us/thepublic-procurement-board

- Public Procurement Information - http://grenadagov.info/Public-procurement.html

2.3.5 National Online Portal

Grenada has an online portal for public procurement as follows:

- Office of Public Procurement Government of Grenada – https://www.procurement.gd/index.php/about-us/legislation

2.3.6 National Handbooks and Guidelines

Online research did not yield any national handbooks or guidelines.

2.4 Saint Lucia

This section gives a review of both green procurement and general public sector procurement of Saint Lucia. The focus is on the local institutional framework, national energy policy, environmental policy, and procurement policy, and the operationalization of public procurement.

2.4.1 Institutional Framework for Green Procurement

The National Focal Point of Saint Lucia are:

- Sustainable Development and Environment Division, Department of Sustainable Development, Caribbean Cinemas Building, Choc Estate, Castries, Saint Lucia
- Department of Infrastructure, Ports and Energy

Public procurement is the responsibility of the Department of Finance. https://www.finance.gov.lc/departments/view/72

2.4.2 National Policy

The Saint Lucia National Energy Transition Strategy makes no explicit reference to procurement or green procurement. - http://www.govt.lc/media.govt.lc/www/resources/publications/saint-lucia-netsexecutive-summary-final.pdf

2.4.3 Laws Governing Public Procurement

Public procurement is governed by the following laws:

- Public Procurement and Asset Disposal Act – http://slugovprintery.com/template/files/document_for_sale/laws/3625/Act19%20of%202015.pdf

2.4.4 Major National Institutions

Online research did not yield the major national institutions involved with public procurement in Saint Lucia.

2.4.5 National Online Portal

Online research did not reveal a national online portal.

2.4.6 National Handbook and Guidelines

Government of St Lucia – Guidelines for Procurement – https://www.finance.gov.lc/resources/download/2024

- Public Procurement Bill conditions – http://www.govt.lc/news/public-procurementbill-conditions
- Senate on Public Procurement Bill – http://www.govt.lc/news/senate-on-publicprocurement-bill
- Public procurement training- http://www.govt.lc/news/public-procurement-training

2.5 Saint Vincent and the Grenadines

This section gives a review of both green procurement and general public sector procurement of Saint Vincent and the Grenadines. The focus is on the local institutional framework, national energy policy, environmental policy, and procurement policy, and the operationalization of public procurement.

2.5.1 Institutional Framework for Green Procurement

The National Focal Point for Saint Vincent and the Grenadines are:

- Ministry of Economic Planning, Sustainable Development, 1st Floor Administrative Building (Financial Complex), Kingstown, Saint Vincent & Grenadines
- Ministry of National Security, Air & Sea Port Development

2.5.2 National Policy

Online research did not yield the national energy policy for Saint Vincent and the Grenadines.

2.5.3 Laws Governing Public Procurement

The Laws of Saint Vincent and the Grenadines that govern public procurement are as follows:

- Purchases and Tenders and Procedures - http://www.oas.org/es/sla/dlc/mesicic/docs/mesicic5_svg_annex11.pdf

- Procurement and Contract Administration Bill 2007 - http://www.oas.org/juridico/spanish/mesicic2_svg_procurement_contract_adm_bill_07.pdf

2.5.4 Major National Institutions

Online research did not yield the major national institutions of saint Vincent and the Grenadines.

2.5.5 National Online Portal

Online research did you yield a national portal for Saint Vincent and the Grenadines.

2.5.6 National Handbook and Guideline

The following handbooks and guidelines help to define public procurement processes for Saint Vincent and the Grenadines.

- Government of St. Vincent And The Grenadines Annual Report Of The Central Supplies Tenders Board – 2018 - http://finance.gov.vc/finance/images/PDF/Annual_Report_CSTB_2018.pdf

- Government Of St. Vincent And The Grenadines Annual Report Of The Central Supplies Tenders Board – 2019 - http://finance.gov.vc/finance/images/PDF/CSTB_Annual_Report_2019.pdf

2.6 CARICOM

The website of the CARICOM Secretariat makes no reference to green procurement.

Procurement of the Secretariat is govern by the Guideline and Procedures Manual - https://caricom.org/wp-content/uploads/Revised-GPM2015-20-March-2015.pdf

The Principles and Standards governing procurement at the Secretariat are stated as follows:

> *The procurement process shall be governed by the principles of best value for money, transparency, non-discrimination, and equal treatment, not withstanding that regional suppliers/contractors, either alone or in combination with international suppliers/contractors, are preferred.*

The Secretariat is also developing CARICOM Protocol on Public Procurement as defined in the following documents

- CARICOM Protocol of Public Procurement - http://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex23.pdf
- CARICOM Protocol of Public Procurement - http://www.oas.org/juridico/PDFs/mesicic5_blz_annex29.pdf
- CARICOM Protocol on Public Procurement - https://www.cepal.org/sites/default/files/events/files/presentacion_philip_mcclauren_caricom.pdf
- Declaration of Intent to Provisionally Apply the Protocol on Public Procurement for the Caribbean Community - Antigua and Barbuda, Belize - http://www.oas.org/juridico/PDFs/mesicic5_blz_resp_annex23.pdf

2.7 CROSQ

The Caribbean Regional Organisation for Standards has published a limited edition CARICOM Regional Energy Efficiency Building Code (CREEBC). This limited edition allows single page viewing in nonmachine readable format. The full version in hard copy is available for sale. See the CARICOM Renewable Energy Efficiency Building Code (CREEBC) - https://codes.iccsafe.org/content/document/1335

3 Definition of Green Building Procurement

For the purposes of the Green Building Procurement Manual developed for the Caribbean Community Climate Change Centre in Belize, the scope of application of Green Public procurement (GPP) is narrowed to "green buildings". The Manual offers a an operational definition of "Green Building Procurement" as follows:

> "**The energy, product safety, and recyclability aspects of the public procurement process for sustainable energy systems in buildings which achieve the goal of 'value for money' on a life cycle basis**".

4 Measurement of Performance Impacts

The definition of Green Buildings Procurement prescribes that performance impacts be measured on a life cycle basis as per Section 3 above. This Toolkit therefore presents the details of this basis using Life Cycle Analysis (LCA) within the context of energy efficiency and conservation projects.

4.1 Life Cycle Analysis

There are several approaches to explicitly addressing the life cycle impacts and their associated criteria within the context of the green building procurement process. The implementation of these approaches varies in the level of ambition and difficulty. This Green Buildings Procurement Manual considers two approaches to measuring performance impacts: (a) Simple Payback Analysis; and (b) Life Cycle Cost Analysis. The details of these are as follows:

4.1.1 Simple Payback for Renewable Energy and Energy Saving Product and Services.

The energy industry uses the concept "simple" payback method to calculate the payback of an energy efficiency or renewable energy measure. The formula is given as:

Simple Payback (in Years) = Incremental installed cost / first year energy savings

Where:

Incremental installed cost – cost difference between doing the base line measure versus doing the energy efficient measure or renewable energy measure.

While the Simple Payback Method is quite intuitive and easy to compute, due care must be taken in its application. There are several technical issues that should be considered and addressed. The most important are:

(a) The Simple Payback Method does not take into account the lifetime energy saving impacts of the measure, or the discounting of those future financial savings.

(b) Simple payback periods should not exceed the lifetime of the equipment;

(c) Simple payback periods should be relatively short. However an “acceptable” payback policy would depend on the type of energy saving measure under consideration. For example, a low cost measure should have a payback of less than one year. That way, the beneficiary building would free-up some of their annual budget for energy expenses within that first year. The surplus could then be reinvested to additional energy saving measures all before the end of the current the budget year. On the other hand, some energy saving measures will have simple payback periods of more than one year. A simple payback of say five (5) years is “roughly” a twenty (20) percent return on investment. That is well above the typical discount rates used by governments.

(d) Simple payback periods must also be considered within the context to the prevailing market conditions. For example, supply chains would necessarily be specific to whether the market is large versus small, urban versus rural, continental versus small island, competitive vs oligopoly or monopoly, and local fiscal policy and the existence of market based incentives, etc. Each of the five CARICOM jurisdictions targeted by this Manual would treat to their own unique market realities. Only local market research aimed could treat to these market conditions, and this further defines the role of The Committee.

(e) In some specialised instances, decisions based on simple payback are not relevant to all energy technology interventions, e.g. an energy efficient air conditioner or chiller installed for use in a hospital operating theatre is not really an "energy" decision, but rather a "health" or "medical" decision. Within this context, air-conditioners are required by code to designed to be of the “once through” type, where 100 percent of the conditioned air is ejected to the outdoor. That means that there is no recycling of conditioned air as an energy saving measure as is typical with office buildings. At most the ejected cooled air could be used to pre-cool fresh intake air using fully isolated heat exchangers. This would minimise chiller energy. These hospital theatre systems would therefore have long payback periods from an energy perspective, perhaps upwards of fifteen (15) years. However, the energy based simple payback analysis is somewhat irrelevant given the special context even though it could still be used as a guide to help choose one chiller over another; and

4.1.2 Life Cycle Assessment (LCA)

This section presents: (a) The Stanford University approach to life cycle cost impacts of energy savings projects; and (b) The Harvard University Calculator. These are two examples of real world applications of Life Cycle Analysis (LCA). The key aspects of these two examples are reproduced below in *italics*.

4.1.2.1 Stanford University

The Life Cycle Cost Assessment (LCCA) performance method requires bidders to evaluate the life cycle impacts of their products and services.

One method is the Stanford University approach to life cycle cost assessment. See - https://sustainable.stanford.edu/sites/default/files/Guidelines_for_Life_Cycle_Cost_Analysis.pdf. This reference is used throughput the discussion below.

This method prescribes that the best option is simply that with the lowest life cycle cost (LCC) or the highest net present value as computed by the formula:

$$LCC = C + PV_{RECURRING} - PV_{RESIDUAL\text{-}VALUE}$$

Where:

LCC is the life cycle cost
C is the Year 0 construction cost (hard and soft costs)
$PV_{RECURRING}$ is the present value of all recurring costs (utilities, maintenance, replacements, service, etc.)

$PV_{RESIDUAL\text{-}VALUE}$ is the present value of the residual value at the end of the study life (note: these guidelines recommend this to be $0)

Fundamental Concepts

A number of basic concepts underlie LCCA.

- *Time Value of Money*

  The value of money today and money that will be spent in the future are not equal. This concept is referred to as the "time value of money."

  The time value of money results from two factors:

  (1) inflation, which is erosion in the value of money over time, and

(2) opportunity cost. For cash or existing capital, opportunity cost is equivalent to the benefit the cash could have achieved had it been spent differently or invested. For borrowed money, opportunity cost is the cost of borrowing that money (e.g., the loan rate).

- *Inflation*

  Inflation reduces the value or purchasing power of money over time. It is a result of the gradual increase in the cost of goods and services due to economic activity.

  By eliminating inflation from all escalation and discount rates, estimates of future costs can be made in current dollars and then returned to present value with the proper formulas. An estimate of the future behavior of inflation rates can be avoided.

  The following formula factors inflation out of any nominal rate:

$$REAL = \frac{1 + NOMINAL}{1 + INFLATION} - 1$$

  Where:

  REAL is the real rate

  NOMINAL is the nominal rate

  INFLATION is the inflation rate

- *<u>Discount</u>*

  Project costs that occur at different points in the life of a building cannot be compared directly due to the varying time value of money. They must be discounted back to their present value through the appropriate equations. The discount rate is defined in terms of opportunity cost.

  The basic discount equation is as follows:

$$PV = \frac{F_Y}{(1 + DISC)^Y}$$

Where:

PV is the present value (in Year 0 dollars)
F_Y is the value in the future (in Year Y dollars)
DISC is the discount rate
Y is the number of years in the future

- *Escalation*

  Most goods and services do not have prices that change at exactly the same rate as inflation. On average over time, however, the rate of change for established commodities is close to the rate of inflation.

  Like discount rates, escalation rates are adjusted to remove the effects of inflation. The Escalation Rates table under Life Cycle Cost Parameters below lists the "real" escalation rates of various types of goods and services. Where the real escalation rate is close to zero or zero, the escalation rate for that category is essentially the same as the inflation rate.

  The formula for calculating the future cost of an item with a known cost today and a known escalation rate is:

$$COST_{YEAR-Y} = COST_{YEAR-0}(1+ESC)^{Y}$$

Where:

$COST_{YEAR-Y}$ is the cost at Y years into the future
$COST_{YEAR-0}$ is today's cost (at Year 0)
ESC is the escalation rate
Y is the number of years into the future

- *Study Life*

  The study life in LCCA is the period over which the costs of a project will be examined and will influence LCCA decisions. The study life may not be the same as the building life but may be the same as that of the longest-lived subsystem option under review. To make LCCA comparisons valid, the study life must be the same for all alternatives.

LCCA Calculation Method

LCCA properly weights money spent today versus money spent in the future. All costs should be converted to common, current dollars and then summed to

develop a total cost in present dollars for each alternative. This quantity is sometimes referred to as the net present value or the total cost in today's dollars.

With the net present value calculated for each alternative, comparisons are simple because units are consistent. The best option is simply the alternative with the lowest life cycle cost or net present value.

Assumptions in LCCA Calculations

Many assumptions need to be made over the course of an LCCA study in order to generate enough data to produce results. These assumptions will strongly affect the results.

All assumptions used in LCCA must be clearly stated and documented so that appropriate members of the Project Team can validate them through the design process as costs, goals, and budgets change.

LIFE CYCLE COST PARAMETERS

To provide a reference for users and allow for periodic updates, all of the values for parameters in the Stanford LCCA procedure are presented below. For each parameter, a responsible office is indicated so that users can obtain updated information or determine appropriate values for a specific project.

Study Life

Description	***Value Range***	***Authority***
New Construction Projects	*30 years*	*Project Manager*
Retrofit or Renovation Projects	*15 years*	*Project Manager*
Labs or High-Tech Buildings	*10 years*	*Project Manager*

Campus Time-Value-of-Money Rates

The following rates were appropriate at the time these guidelines were published. See the Land and Buildings website

(http://landbuildings.stanford.edu) for a listing of updated rates to be used in the future. Verify the rates used with the Project Manager.

Description	***Near-Term Value (Years 0 – 5)***	***Long-Term Value (Years 6+)***	***Authority [at Stanford]***
"Nominal" Stanford Discount Rate	*6%*	*7%*	*Land and Buildings*
Inflation	*1.5%*	*3.0%*	*Land and Buildings*
"Real" Stanford Discount Rate(adjusted to take out inflation)	*4.4%*	*3.9%*	*(calculated)*

Escalation Rates

The following rates were appropriate at the time these guidelines were published. See the Land and Buildings website (http://landbuildings.stanford.edu) for a listing of updated rates to be used in the future. Verify the rates used with the Project Manager.

Description (All rates here are "real" – they have been adjusted to take out inflation)	***Near-Term Value (Years 0 – 5)***	***Long-Term Value (Years 6+)***	***Authority [at Stanford]***
Maintenance, Labor, and Materials	*0%*	*1%*	*Facilities Operations*
Energy and Water Utilities	*0.5%*	*1%*	*Utilities*

4.1.2.2 Harvard University Life Cycle Calculator

The Harvard University Life Cycle Calculator is a useful tool for conducting life cycle cost assessments anywhere in the world. The calculator considers both energy savings and greenhouse gas reductions. While this tool is designed for the specific context of Harvard University within the State of Massachusetts in the United States of America, this downloadable Microsoft Excel software tool is permitted limited but reasonable tailoring to other local jurisdictions. For example, input prices for energy and water services from the local utilities may be substituted in the software. However, the period for life cycle analysis is fixed at 20 years (i.e. the study period). This presumes that energy saving equipment with shorter life will be replaced over the lifetime of the period, and some equipment may have a residual value (or an end of life value) at the end of the life cycle analysis period. The tool also presumes that a prior energy audit of the facility has been conducted and the details of the energy conservation measure (ECM) is readily available. The website has a good introductory video which explains the tool and the concepts behind the tool.

See an introduction to the tool at - https://green.harvard.edu/tools-resources/how/lifecycle-calculator.

Download the tool and view the training video at - https://green.harvard.edu/topics/greenbuildings/life-cycle-costing.

5 Recommended Software Tools for Energy Analysis

Recommended software tools for energy analysis in buildings are as follows:

- eQuest. See - http://www.doe2.com/equest. This tool is good for whole building simulation and analysis, especially for new construction. In the case of new construction, the results of the simulation should be calibrated against actual operating experience after at least one year of operations. This tool was originally developed by the United States Department of Energy and was called the DOE II model. It has now evolved through the private sector and has a variety of new names. eQuest is one such name.
- RETScreen Expert. See - https://www.nrcan.gc.ca/maps-toolspublications/tools/data-analysis-software-modelling/retscreen/7465. This tool is good for both energy conservation and efficiency measures (ECM's) in buildings as well renewable energy projects. Renewable energy projects may be stand-alone projects such as wind farms, or they may be building located such as roof top solar.

6 Benchmarks of Product Prices

It is recommended that CARICOM procurement officials utilise a reliable source of product prices that are used by energy industry and construction industry professionals. There are two recommended sources:

- RSMeans. See – www.rsmeans.com. This product pricing database is used routinely by the Energy Service Companies (ESCo's) for energy efficiency projects in North America. The pricing data should be used as a guide for CARICOM procurement officials. Overtime, a correlation between the RSMeans catalog prices and local prices can be deciphered.
- Grainger. See – www.grainger.com. This catalog is widely used by professionals and facilities managers. It is used in the Caribbean at present.

7 Specifications for Energy Efficiency and Energy Conservation Products

The following tables map baseline energy requirements taken from the 2018 CARICOM Regional Energy Efficiency Building Code to energy efficiency products listed by ENERGY STAR. The purpose is three fold: (a) to provide procurement officials with a reference to quickly find product specifications for ENERGY STAR equipment that could be included in tender documents; (b) to map the ENERGY STAR products to the Building Code; (c) to provide the basis for the determination of energy savings potential and the performance of these purchase decisions. This potential should be combined with run hours to get a total picture about the difference in energy consumption in the base case versus energy consumption in the energy efficient case. Energy saving performance would simply be a matter of subtracting these two numbers. Simple payback would then be computed by determining the incremental cost of the energy efficiency case over the base case. Incremental cost is simply the difference in cost between what would have been purchase normally in the base case, versus the expected higher costs of the energy efficient product. These two sets of cost numbers would come from existing records and the bids of the prospective suppliers and vendors.

The first column (to the left) in the tables below are the baseline data as prescribed by the 2018 CARICOM Regional Energy Efficiency Building Code. The Building Code prescribes minimum performance standards only. The remaining columns to the right, give links to the energy efficient products to be found on the ENERGY STAR website. This website is where to find the technical specifications that procurement official would need to include in their tender documents.

Specification Tables

Table 1

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search Section 402 Building Envelope Requirements – ENERGY STAR Recommendation	
Table C402.1.3 Building Envelope Requirements for Tropical Climate Zones (pg. C21) Units of Measure: U in W/m^2K or Btu/h•ft^2•°F; R-Value in m^2•K/W or h•ft•f/Btu NB: U = 1/R, i.e. U is the reciprocal of R) Table C402.1.4.1 Effective R-Values for Steel Stud Wall Assemblies (pg. C-22) Units of Measure: U in W/m^2K or Btu/h•ft^2•°F; R-Value in m^2•K/W or h•ft•f/Btu NB: U = 1/R, i.e. U is the reciprocal of R) Table C402.1.4 Opaque Thermal Envelope Assembly Maximum Requirements, UFactor Method (pg. C-23) Units of Measure: U in W/m^2K or Btu/h•ft^2•°F; R-Value in m^2•K/W or h•ft•f/Btu NB: U = 1/R, i.e. U is the reciprocal of R)	No ENERGY STAR specs found for commercial buildings.	(ENERGY STAR Recommended Home Insulation R–Values – Attics & Floors) (R-Value for Residential Buildings. Given for guidance only. Residences in Zone 1 [i.e. Florida, Hawaii, Puerto Rico, Guam, US Virgin Islands]: Attic – Uninsulated = R30 to R49 Attic with 3 to 4 ins of existing insulation = R25 to R30 Floor = R13) **Recommendation**: CARICOM Procurement Officials should seek to purchase thermal insulation with higher R-Values subject to budget considerations and space limitations.

Table C402.3 Minimum Roof Reflectance and Emittance Options (pg. C-25) Units of Measure: R_{aged} = Solar Reflectance Index (aged) (dimensionless); $R_{initial}$ = Solar Reflectance Index (initial)(dimensionless))	Roof Products	ENERGY STAR Roof Products Key Product Criteria and ENERGY STAR® Program Requirements Product Specification for Roof Products Eligibility Criteria Version 3.0 Reflectance: Low Slope roofs must have an initial solar reflectance of >= 0.65. After 3 years, the solar reflectance must be >= 0.50. Steep Slope roofs must have an initial solar reflectance of >= 0.25. After 3 years, the solar reflectance must be >= 0.15. **Recommendation**: CARICOM Procurement Officials should seek to purchase roof materials and finishes that have higher Solar Reflectance Index subject to budget considerations
Table C402.4 Building Envelope fenestration Maximum UFactor and SHGC Requirements (pg. C-26) Units of Measure: U in W/m^2K or Btu/h•ft^2•^{o}F; SHGC = Solar Heat Gain Coefficient (dimensionless))	No ENERGY STAR specs found for commercial buildings.	(ENERGY STAR Residential Windows, Doors and Skylights) (U & SHGC for residences only. Given for guidance only. Residences in Southern Zone 1 [i.e. Florida and similar] Windows: U-Factor ≤ 0.40 SHGC ≤ 0.25 Skylights: U-Factor ≤ 0.60 Btu/h•ft2•oF SHGC ≤ 0.28 NB: At Air leakage ≤ 0.3 cfm/ft^2

<table>
<tr>
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<td>Doors:
<table>
<tr><th colspan="4">DOORS</th></tr>
<tr><th>GLAZING LEVEL</th><th>U-FACTOR[1]</th><th colspan="2">SHGC[2]</th></tr>
<tr><td>Opaque</td><td>≤ 0.17</td><td colspan="2">No Rating</td></tr>
<tr><td>≤ ½-Lite</td><td>≤ 0.25</td><td colspan="2">≤ 0.25</td></tr>
<tr><td rowspan="2">> ½-Lite</td><td rowspan="2">≤ 0.30</td><td>Northern North-Central</td><td>≤ 0.40</td></tr>
<tr><td>Southern South-Central</td><td>≤ 0.25</td></tr>
</table>
Air Leakage for Sliding Doors ≤ 0.3 cfm/ft²
Air Leakage for Swinging Doors ≤ 0.5 cfm/ft²
Southern Climate [includes Florida])

<u>Recommendation</u>: CARICOM Procurement Officials should seek to purchase windows, doors and skylights with <u>lower</u> U-Factors, SHGC's and Air Leakage subject to budget considerations.</td>
</tr>
<tr>
<td>Table C402.5.2 Maximum Air Leakage Rate for Fenestration Assemblies (pg. C-29)

Units of Measure:
Leakage in L/s or CFM/FT$^{2)}$)

NB: Unit Conversion: For SI units – 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m^3</td>
<td>No ENERGY STAR specs found for commercial buildings.</td>
<td>(ENERGY STAR Residential Windows, Doors and Skylights)

Windows:
No spec given at this URL

Skylights:
Air leakage ≤ 0.3 cfm/ft^2

<u>Recommendation</u>: CARICOM Procurement Officials should seek to purchase windows, doors and skylights with <u>lower</u> Air Leakage subject to budget considerations.</td>
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Table 2

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search	
	Section C403 Building Mechanical Systems – ENERGY STAR Recommendations	
Table C403.3.2 (1). Minimum Efficiency Requirements: Electrically Operated Unitary Air Conditioner and Condensing Units (pg. C-32 & C33) Units of Measure: kW = kilowatts; $SCOP_c$ = Sensible Coefficient of Performance (cooling); COP_c = Coefficient of Performance (cooling); $ICOP_c$ = Integrated Coefficient of Performance (cooling) NB: Single phase, air-cooled air conditioners less than 19 kW (65,000 Btu/h) are regulated by NAECA. SEER values are those set by NAECA. NAECA = National Compliance Energy Conservation Act (USA) SEER = Seasonal Energy Efficiency Ratio (USA) NB: Unit Conversion: For 1 KW = 3,412 Btu/h	Air Conditioners, Central	ENERGY STAR Air-Source Heat Pumps and Central Air Conditioners Key Product Criteria Central Air Conditioners: ≥15 SEER/ ≥12.5 EER for split systems Where: EER = Energy Efficiency Ratio SEER = Seasonal Energy Efficiency Ratio Unit Conversion: EER = 3.41214 × COP, or COP = EER / 3.41214 **Recommendation**: CARICOM Procurement Officials should seek to purchase Central Air Conditioners with higher EER's or COP's specifications subject to budget considerations
Table C404.3.2 (2) Minimum Efficiency Requirements: Electrically Operated Unitary and Applied Heat Pumps (pg. C34 & C-35) Units of Measure: kW = kilowatts; $SCOP_C$ = Sensible Coefficient of Performance (cooling); COP_C = Coefficient of Performance (cooling); $ICOP_C$ = Integrated Coefficient of Performance (cooling))	(Heat Pumps)	(ENERGY STAR Air-Source Heat Pumps and Central Air Conditioners Key Product Criteria) Air-Source Heat Pumps: ≥ 8.2 HSPF ≥15 SEER/ ≥12 EER for single package equipment including gas/electric package units

$SCOP_H$ = Sensible Coefficient of Performance (heating); COP_H = Coefficient of Performance (heating); NB: Unit Conversion: For 1 KW = 3,412 Btu/h)		SEER = Seasonal Energy Efficiency Ratio EER = Energy Efficiency Ratio NB: Unitary = Single Package Unit Conversion: EER = 3.41214 × COP, or COP = EER / 3.41214 **Recommendation #1**: CARICOM Procurement Officials should seek to purchase Heat Pumps with higher EER's or COP's specifications subject to budget considerations. **Recommendation #2**: CARICOM Procurement Officials should seek to purchase HVAC equipment with copper coils and fins. While these are more expensive, copper withstand the climatic and saline atmospheric conditions of the Caribbean must better than other materials. Further, they are easier to clean and maintain.

Table C403.3.2 (3) Minimum Efficiency Requirements: Electrically Operated Packaged Terminal Air Conditioners, Package Terminal Heat, Single-Package Vertical Air Conditioners, Single Vertical Heat Pumps, Room Air Conditioners and Room Air Conditioner Heat Pumps (pg. C36 and C-37) Units of Measure: kW = kilowatts; $SCOP_C$ = Sensible Coefficient of Performance (cooling); COP_C = Coefficient of Performance (cooling);	Air Conditioner, Room	ENERGY STAR Room Air Conditioners Key Product Criteria See Tables at URL for room air conditioners over a range of sizes Unit Conversion: EER = 3.41214 × COP, or COP = EER / 3.41214 CEER - Combined Energy Efficiency Ratio:
$ICOP_C$ = Integrated Coefficient of Performance (cooling)) $SCOP_H$ = Sensible Coefficient of Performance (heating); COP_H = Coefficient of Performance (heating); NB: Unit Conversion: For 1 KW = 3,412 Btu/h		The ratio of measured cooling output (in BTU per hour) to measured average electrical energy input (in Watts) and measured standby/off-mode power consumption (in Watts.) **Recommendation #1**: CARICOM Procurement Officials should seek to purchase Room Air Conditioners with higher EER's or COP's specifications subject to budget considerations **Recommendation #2**: CARICOM Procurement Officials should seek to purchase HVAC equipment with copper coils and fins. While these are more expensive, copper withstand the climatic and saline atmospheric conditions of the Caribbean must better than other materials. Further, they are easier to clean and maintain.

Table 3

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search Section C403 Building Mechanical Systems – ENERGY STAR Recommendations	
Table C403.3.2 (5) Minimum Efficiency Requirements: Gas- and Oil-Fired Boilers (pg. C-38) Units of Measure: kW = kilowatts; AFUE = Annual Fuel Utilization Efficiency expressed as a percentage (dimensionless) E_t = Thermal Efficiency expressed as a percentage (dimensionless) E_c = Combustion Efficiency expressed as a percentage (dimensionless) NB: Unit Conversion: For 1 KW = 3,412 Btu/h)	Boilers	ENERGY STAR Boiler Specs and/or ENERGY STAR® Program Requirements Product Specification for Boilers Eligibility Criteria Version 3.0 ENERGY STAR certified gas boilers have annual fuel utilization efficiency (AFUE) ratings of 90% ENERGY STAR certified oil boilers have annual fuel utilization efficiency (AFUE) ratings of 87% **Recommendation**: CARICOM Procurement Officials should seek to purchase Boilers (Residential) with higher annual fuel utilization efficiency (AFUE) specifications subject to budget considerations
Table C403.3.2 (5) Minimum Efficiency Requirements: Gas- and Oil-Fired Boilers (pg. C-38) Units of Measure: kW = kilowatts; AFUE = Annual Fuel Utilization Efficiency expressed as a percentage (dimensionless) E_t = Thermal Efficiency expressed as a percentage (dimensionless) E_c = Combustion Efficiency expressed as a percentage (dimensionless)	Commercial Boilers	Commercial Boilers Spec and/or Eligibility Criteria commercial boilers have a thermal efficiency of ≥ 94.0% and a turndown ratio of ≥ 5:1. ENERGY STAR certified They use 14 percent less energy than a standard model **Recommendation**: CARICOM Procurement Officials should seek to purchase Commercial Boilers with higher annual fuel utilization efficiency (AFUE) and higher Turndown Ratios

NB: Unit Conversion: For 1 KW = 3,412 Btu/h)		specifications subject to budget considerations
Table C404.2 Minimum Performance of Water Heating Equipment (pg. C-62 & C-63) Units of Measure: kW = kilowatts; L = Letres V = Volume in Letres V_m = Measure Volume in Letres EF = Energy Factor E_t = Thermal Efficiency expressed as a percentage (dimensionless) SL = Standby Loss COP = Coefficient of Performance SEF = Solar Energy Factor (dimensionless) NB: Unit Conversion: 1 KW = 3,412 Btu/h) °F = [°C • 1.81] + 32 1 L = 0.2642 gal 1 W/L = 5,076 Btu/gal	Commercial Water Heaters	Commercial Water Heater Key Product Criteria and/or ENERGY STAR Program Requirements Product Specification for Commercial Water Heaters Eligibility Criteria See Tables at URL for: (a) Commercial Water Heater Key Product Criteria; (b) ENERGY STAR Product Performance Criteria for Certified Commercial Gas fired Water Heaters, i.e. - Thermal Efficiency TE ≥ 0.94, and Maximum Standby Loss [Btu/hr] ≤ 0.84 * [(Input Rate / 800) +110 (Volume$_r$)$^{1/2}$] ; and (c) Criteria for Certified Commercial Electric Heat Pump Water Heaters **Recommendation**: CARICOM Procurement Officials should seek to purchase Water Heaters with higher Thermal Efficiency (TE or E_t) specifications, and lower Standby Loss (SL) specifications subject to budget considerations
No CREE BC Code	Connected Thermostat	Connected Thermostat Device Criteria and/or ENERGY STAR Program Requirements Product Specification for Connected Thermostat Products Eligibility Criteria Version 1.0 Rev. Jan 2017

		See Table 1 at URL for Connected Thermostat Device Criteria **Recommendation**: CARICOM Procurement Officials should seek to purchase Thermostats that follows the ENERGY STAR recommendations.

Table 4

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search	
Table C403.3.2 (5) Minimum Efficiency Requirements: Gas- and Oil-Fired Boilers (pg. C-38) Units of Measure: kW = kilowatts; AFUE = Annual Fuel Utilization Efficiency expressed as a percentage (dimensionless) E_t = Thermal Efficiency expressed as a percentage (dimensionless) E_c = Combustion Efficiency expressed as a percentage (dimensionless) NB: Unit Conversion: For 1 KW = 3,412 Btu/h)	Boilers (Residential and other)	Boiler Specs and/or ENERGY STAR® Program Requirements Product Specification for Boilers Eligibility Criteria Version 3.0 ENERGY STAR certified gas boilers have annual fuel utilization efficiency (AFUE) ratings of 90% ENERGY STAR certified (residential and other) oil boilers have annual fuel utilization efficiency (AFUE) ratings of 87% **Recommendation**: CARICOM Procurement Officials should seek to purchase Boilers (Residential) with higher annual fuel utilization efficiency (AFUE) specifications subject to budget considerations
Table C403.3.2 (5) Minimum Efficiency Requirements: Gas- and Oil-Fired Boilers (pg. C-38) Units of Measure: kW = kilowatts; AFUE = Annual Fuel Utilization Efficiency expressed as a percentage (dimensionless) E_t = Thermal Efficiency expressed as a percentage (dimensionless)	Commercial Boilers	Commercial Boilers Spec and/or Eligibility Criteria ENERGY STAR certified commercial boilers have a thermal efficiency of ≥ 94.0% and a turndown ratio of ≥ 5:1 **Recommendation**: CARICOM Procurement Officials should seek to

E_c = Combustion Efficiency expressed as a percentage (dimensionless) NB: Unit Conversion: For 1 KW = 3,412 Btu/h)		purchase Commercial Boilers with higher annual fuel utilization efficiency (AFUE) and higher turn down ratio specifications, subject to budget considerations

Table 5

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search ENERGY STAR Recommendations for Section C403 Building Mechanical Systems of CREE BC	
No CREE BC Code	Dehumidifiers	Dehumidifiers Key Efficiency Criteria – Energy Star and/or ENERGYSTAR® Program Requirements Product Specification for Dehumidifiers Eligibility Criteria Version 5.0 See Tables at URL for: Dehumidifiers Key Efficiency Criteria ENERGY STAR Efficiency Criteria for Certified Portable Dehumidifiers ENERGY STAR Efficiency Criteria for Certified Whole-Home Dehumidifiers Integrated Energy Factor (IEF): A measure of energy efficiency of a dehumidifier that expresses the amount of water the dehumidifier can remove with a given energy input under test conditions, reported in liters per kilowatt hour (L/kWh). **Recommendation**: CARICOM Procurement Officials should seek to purchase dehumidifiers with a high Integrated Energy Factor (IEF)
Table C403.3.2 (1). Minimum Efficiency Requirements: Electrically Operated Unitary Air Conditioner and Condensing Unit (pg. C-32 & C33) Units of Measure: kW = kilowatts; $SCOP_c$ = Sensible Coefficient of Performance (cooling);	Light Commercial Heating and Cooling	Light Commercial HVAC Key Product Criteria and/or ENERGY STAR® Program Requirements, Product Specification for Light Commercial HVAC, Eligibility Criteria Version 3.1 Rev. March 2017 See Tables at URL for: ENERGY STAR Light Commercial HVAC – Eligible Product Type

COP_c = Coefficient of Performance (cooling); $ICOP_c$ = Integrated Coefficient of Performance (cooling) NB: Single phase, air-cooled air conditioners less than 19 kW (65,000 Btu/h) are regulated by NAECA. SEER values are those set by NAECA. NAECA = National Compliance Energy Conservation Act (USA) SEER = Seasonal Energy Efficiency Ratio (USA) NB: Unit Conversion: For 1 KW = 3,412 Btu/h Table C403.3.2 (2) Minimum Efficiency Requirements: Electrically Operated Unitary and Applied Heat Pumps (pg. C-34 & C-35) Units of Measure: kW = kilowatts; $SCOP_C$ = Sensible Coefficient of Performance (cooling); COP_C = Coefficient of Performance (cooling); $ICOP_C$ = Integrated Coefficient of Performance (cooling)) $SCOP_H$ = Sensible Coefficient of Performance (heating); COP_H = Coefficient of Performance (heating); NB: Unit Conversion: For 1 KW = 3,412 Btu/h) Table C403.3.2 (3) Minimum Efficiency Requirements: Electrically Operated Packaged Terminal Air		ENERGY STAR Efficiency Criteria: (a) Criteria for Certified Light Commercial Air Conditioners (b) Criteria for Certified Light Commercial Heat Pumps (c) Criteria for Certified Light Commercial VRF Multi-Split Systems EER = Energy Efficiency Ratio: The ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour. Unit Conversion: EER = 3.41214 × COP, or COP = EER / 3.41214 **Recommendation #1**: CARICOM Procurement Officials should seek to purchase Light Commercial Air Conditioners and other Heating, Ventilation and Air Conditioning (HVAC) equipment with higher EER's or COP's specifications subject to budget considerations. **Recommendation #2**: CARICOM Procurement Officials should seek to purchase HVAC equipment with copper coils and fins. While these are more expensive, copper withstand the climatic and saline atmospheric conditions of the Caribbean must better than other materials. Further, they are easier to clean and maintain.

Conditioners, Package Terminal Heat, Single-Package Vertical Air Conditioners, Single Vertical Heat Pumps, Room Air Conditioners and Room Air Conditioner Heat Pumps (pg. C-36 & 37) Units of Measure: kW = kilowatts; $SCOP_C$ = Sensible Coefficient of Performance (cooling); COP_C = Coefficient of Performance (cooling); $ICOP_C$ = Integrated Coefficient of Performance (cooling)) $SCOP_H$ = Sensible Coefficient of Performance (heating); COP_H = Coefficient of Performance (heating); NB: Unit Conversion: For 1 KW = 3,412 Btu/h)		

Table 6

<table>
<tr><td rowspan="2">2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)</td><td colspan="2">Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search</td></tr>
<tr><td colspan="2">ENERGY STAR Recommendations for Section C403 Building Mechanical Systems of CREE BC</td></tr>
<tr><td>Table C404.2 Minimum Performance of water Heating Equipment (pg. C62 & C-63)

Units of Measure:

kW = kilowatts;

L = Letres

V = Volume in Letres

V_m = Measure Volume in Letres

EF = Energy Factor

E_t = Thermal Efficiency expressed as a percentage (dimensionless)

SL = Standby Loss COP = Coefficient of Performance

SEF = Solar Energy Factor (dimensionless)

NB: Unit Conversion:
1 KW = 3,412 Btu/h)
°F = [°C • 1.81] + 32
1 L = 0.2642 gal</td><td>Water Heater, Gas Condensing

Water Heater, Heat Pump

Water Heater High Efficiency, Gas Storage</td><td>ENERGY STAR® Program Requirements
Product Specification for Residential Water Heaters
Eligibility Criteria
Version 3.2, Certification Criteria, paragraph (C)

See PDF at URL, Section 3 (C) for Certification Criteria Tables as follows:

Table 1: Criteria for Certified Electric Water Heaters
<table><tr><th colspan="2">Criteria</th><th>ENERGY STAR Requirements</th></tr><tr><td rowspan="2">Energy Factor</td><td>≤ 55 gallons</td><td>EF ≥ 2.00</td></tr><tr><td>> 55 gallons</td><td>EF ≥ 2.20</td></tr><tr><td colspan="2">First-Hour Rating</td><td>FHR ≥ 50 gallons per hour</td></tr><tr><td colspan="2">Warranty</td><td>Warranty ≥ 6 years on sealed system</td></tr><tr><td colspan="2">Safety</td><td>UL 174 and UL1995</td></tr><tr><td colspan="2">Lower Compressor Cut-off Temperature (Reporting Requirement Only)</td><td>Report ambient temperature below which the compressor cuts off and electric resistance only operation begins</td></tr></table>
Table 2: Criteria for Certified Gas Storage Water Heaters
<table><tr><th colspan="2">Criteria</th><th>ENERGY STAR Requirements</th></tr><tr><td rowspan="2">Energy Factor</td><td>≤ 55 gallons</td><td>EF ≥ 0.67</td></tr><tr><td>> 55 gallons</td><td>EF ≥ 0.77</td></tr><tr><td colspan="2">First-Hour Rating</td><td>FHR ≥ 67 gallons per hour</td></tr><tr><td colspan="2">Warranty</td><td>Warranty ≥ 6 years on system (including parts)</td></tr><tr><td colspan="2">Safety</td><td>ANSI Z21.10.1/CSA 4.1</td></tr></table>
Table 3: Criteria for Certified Gas Instantaneous Water Heaters
<table><tr><th>Criteria</th><th>ENERGY STAR Requirements</th></tr><tr><td>Energy Factor</td><td>EF ≥ 0.90</td></tr><tr><td>Gallons Per Minute</td><td>GPM ≥ 2.5 over a 77°F rise</td></tr><tr><td>Warranty</td><td>Warranty ≥ 6 years on heat exchanger and ≥ 5 years on parts</td></tr><tr><td>Safety</td><td>ANSI Z21.10.3/CSA 4.3</td></tr></table>
Table 4: Criteria for Certified Light Duty EPACT covered Gas Water Heaters
<table><tr><th>Criteria</th><th>ENERGY STAR Requirements</th></tr><tr><td>Thermal Efficiency</td><td>TE ≥ 0.90</td></tr><tr><td>Standby Loss</td><td>Standby loss ≤ 1889 Btu/h ×(TE–0.73)</td></tr><tr><td>Warranty</td><td>Warranty ≥ 6 years on system</td></tr><tr><td>Safety</td><td>ANSI Z21.10.3/CSA 4.3</td></tr></table></td></tr>
</table>

<table>
<tr>
<td>1 W/L = 5,076
Btu/gal</td>
<td></td>
<td>
Table 5: Criteria for Certified Solar Water Heaters
<table>
<tr><th>Criteria</th><th>ENERGY STAR Requirements</th></tr>
<tr><td>Solar Energy Factor</td><td>SEF ≥ 1.8 for electric backup
SEF ≥ 1.2 for gas backup</td></tr>
<tr><td>Warranty</td><td>Warranty ≥ 10 years on collector,
≥ 6 years sealed system,
≥ 2 years on controls,
≥ 1 year on parts</td></tr>
</table>

<u>Recommendation #1</u>: CARICOM
Procurement Officials should seek to purchase boilers with higher Energy Factors
(EF) or higher Thermal Efficiency (TE)
</td>
</tr>
<tr>
<td>Table C404.2
Minimum
Performance of water Heating Equipment (pg. C62 & C-63)

Units of Measure: kW = kilowatts SEF = Solar Energy Factor
(dimensionless)

NB: Unit Conversion:

1 KW = 3,412 Btu/h)
°F = [°C • 1.81] + 32

1 L = 0.2642 gal

1 W/L = 5,076
Btu/gal</td>
<td>Water Heater, Solar
(Residential)</td>
<td>ENERGY STAR® Program Requirements
Product Specification for Residential Water Heaters
Eligibility Criteria
Version 3.2, Certification Criteria, paragraph (D)

Table 5: Criteria for Certified Solar Water Heaters
<table>
<tr><th>Criteria</th><th>ENERGY STAR Requirements</th></tr>
<tr><td>Solar Energy Factor</td><td>SEF ≥ 1.8 for electric backup
SEF ≥ 1.2 for gas backup</td></tr>
<tr><td>Warranty</td><td>Warranty ≥ 10 years on collector,
≥ 6 years sealed system,
≥ 2 years on controls,
≥ 1 year on parts</td></tr>
</table>

Recommendation: CARICOM procurement officials should seek to purchase solar water heaters with higher Solar Energy Factor (SEF) than those required by the CREEBC
</td>
</tr>
</table>

Table C404.2 Minimum Performance of water Heating Equipment (pg. C62 & C-63) Units of Measure: kW = kilowatts; L = Letres V = Volume in Letres V_m = Measure Volume in Letres EF = Energy Factor E_t = Thermal Efficiency expressed as a percentage SL = Standby Loss COP = Coefficient of Performance SEF = Solar Energy Factor NB: Unit Conversion: 1 KW = 3,412 Btu/h) $^{o}F = [^{o}C \bullet 1.81] +$ 32 1 L = 0.2642 gal 1 W/L = 5,076 Btu/gal	Water Heater, Whole Home, Gas Tankless (i.e. Instantaneous)	ENERGY STAR® Program Requirements Product Specification for Residential Water Heaters Eligibility Criteria Version 3.2, paragraph (C.b) NB: No specs for commercial systems at URL. Residential systems reported for guidance only. Instantaneous (or "tankless") type units which initiate heating based on sensing water flow and deliver water at a controlled temperature of less than 180 °F, heat water, but contain no more than one gallon of water per 4,000 Btu per hour of input with an input capacity greater than 50,000 Btu per hour but less than 200,000 Btu per hour

Table 7

<table>
<tr><td>2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)</td><td colspan="2">Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search</td></tr>
<tr><td>Table C403.8.1 (1)
Fan Power
Limitation (pg. C-52)

Units of Measure: kW = The maximum combined motor nameplate [power] in kilowatts;

kW_i = The maximum combined fan nameplate [power] in kilowatts;

L/S_S = The maximum design airflow rate to conditioned spaces served by the system in cubic
feet per minute;

L/S_D = The design airflow rate through applicable device from Table
C403.8.1(2) in litres per second;

A = sum of [PD x L
L/S_S / 65,000]

PD = Each applicable airdrop adjustment form Table C403.8.1920 in units of Pa (Pascals)

hp = The maximum combined nameplate horsepower</td><td>Fans, Ceiling</td><td>Ceiling Fans product Criteria and/or ENERGY STAR® Program Requirements
Product Specification for Residential Ceiling Fans
and Ceiling Fan Light Kits
Eligibility Criteria
Version 4.0, Ceiling Fan Requirements

See graphs and tables at URL for:
(a) Ceiling Fan Efficiency Requirements.

Units = Minimum Efficiency (cfm/W); and
Units = Minimum High Speed Airflow (cfm)
<table><tr><th>Type</th><th>Size (diameter) (in.)†</th><th>Minimum Efficiency (cfm/W)†</th><th>Minimum High Speed Airflow (cfm)</th></tr><tr><td rowspan="3">Ceiling Fan</td><td>D ≤ 36 inches</td><td>≥ 0.72*D + 41.93</td><td>≥ 1767</td></tr><tr><td>36 inches < D < 78 inches</td><td rowspan="2">≥ 2.63*D - 26.83</td><td>≥ 250*π*(D/24)^2</td></tr><tr><td>D ≥ 78 inches</td><td>≥ 8296</td></tr><tr><td rowspan="3">Hugger Ceiling Fan</td><td>D ≤ 36 inches</td><td>≥ 0.31*D + 36.84</td><td>≥ 1414</td></tr><tr><td>36 inches < D < 78 inches</td><td rowspan="2">≥ 1.75*D - 15</td><td>≥ 200*π*(D/24)^2</td></tr><tr><td>D ≥ 78 inches</td><td>≥ 6637</td></tr></table>†D represents the fan size in inches

(a) Ceiling Fan Light Kit Efficacy Requirements.
Units = lumens / watt
Ceiling Fan Light Kit Efficacy Requirements
<table><tr><th>Type</th><th>Minimum Efficacy (lumens/W)</th><th>Minimum Light Output (lumens)</th></tr><tr><td>Shipped with ENERGY STAR certified light bulbs</td><td>65.0</td><td>N/A</td></tr><tr><td>Separable Light Source</td><td>65.0</td><td rowspan="2">800</td></tr><tr><td>Integrated Light Source</td><td>70.0</td></tr></table>
<u>Recommendation</u>: CARICOM Procurement Officials should seek to purchase Ceiling Fans with specification higher than the requirements of the CREEBC</td></tr>
</table>

NB: Unit Conversion: 1kW = 1.34 bhp 1 kW = 1.36 hp 1 L/s = 2.12 cfm		
Table C403.8.1 (1) Fan Power Limitation (pg. C-52) Units of Measure: kW = The maximum combined motor nameplate [power] in kilowatts; kW_i = The maximum combined fan nameplate [power] in kilowatts; L/S_S = The maximum design airflow rate to conditioned spaces served by the system in cubic feet per minute; L/S_D = The design airflow rate through applicable device from Table C403.8.1(2) in litres per second; A = sum of [PD x L L/S_S / 65,000] PD = Each applicable airdrop adjustment form Table C403.8.1920 in units of Pa (Pascals)	Fans, Ventilating (Residential) NB: No commercial systems given at URL. Residential systems reported for guidance only	Ventilating Fans key Product Criteria and ENERGY STAR® Program Requirements Product Specification for Residential Ventilating Fans, Eligibility Criteria, Version 4.1, Certification Criteria See Tables at URL for: (a) Criteria for ENERGY STAR Certified Residential Ventilating Fans — Minimum Efficacy Levels (b) Criteria for ENERGY STAR Certified Residential Ventilating Fans — Maximum Allowable Sound Levels **Recommendation**: CARICOM Procurement Officials should seek to purchase Ventilating Fans following the recommendations of ENERGY STAR.

hp = The maximum combined nameplate horsepower NB: Unit Conversion: 1kW = 1.34 bhp 1 kW = 1.36 hp 1 L/s = 2.12 cfm		

Table 8

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search	
Table C403.10.1 (1) Minimum Efficiency Requirements: Commercial Refrigeration (pg. C-55) Table C403.10.1 (2) Minimum Efficiency Requirements: Commercial Refrigerators and Freezers (pg. C-56 & C-57) Table C403.10.2.1 (1) Walk-In Cooler and Freezer Display Door Efficiency Requirements (pg. C-57) Table C403.10.2.1 (2) Walk-In Cooler and Freezer Non-Display Door Efficiency Requirements (pg. C-57) Table C403.10.2.1 (3) Walk-In Cooler and Freezer Refrigeration System Efficiency Requirements (pg. C-57)	Commercial Refrigerators & Freezers (food service)	Commercial Refrigerators & Freezers Key Product Criteria: ENERGY STAR and ENERGY STAR Program Requirements Product Specification for Commercial Refrigerators and Freezers Eligibility Criteria Version 4.0 See Table at URL for: (a) Commercial Refrigerators & Freezers Key Product Criteria. Unit of Measure = Maximum daily energy consumption (MDEC) requirements. NB: These MDEC criteria should be interpreted with care as they may be unique to the USA MDEC = Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) **Recommendation**: CARICOM procurement officials should seek to purchase Commercial Refrigerators and Freezers with higher instantaneous energy efficiencies of equipment as measured by EER (Energy Efficiency Ratio) or COP (Coefficient of Performance)

Table 9

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search	
Table C403.10.1 (1) Minimum Efficiency Requirements: Commercial Refrigeration (pg. C-55) Units of Measure: V = Volume of the chiller r frozen compartment as defined in AHAM-HRF-1 AHAM-HRF-1 = Association of Home Appliance Manufacturers - Energy and Internal Volume of Refrigerating Appliances Table C403.10.1 (2) Minimum Efficiency Requirements: Commercial Refrigerators and Freezers (pg. C-56 & C-57) Table C403.10.2.1 (1) Walk-In Cooler and Freezer Display Door Efficiency Requirements (pg. C-57) Table C403.10.2.1 (2) Walk-In Cooler and Freezer Non-Display Door Efficiency Requirements (pg. C-57) Table C403.10.2.1 (3) Walk-In Cooler and Freezer Refrigeration System Efficiency Requirements (pg. C-57)	Commercial Ice Makers	Commercial Ice Maker Key Product Criteria: ENERGY STAR and ENERGY STAR® Program Requirements Product Specification for Automatic Commercial Ice Makers Eligibility Criteria Version 3.0 See Tables URL for: (a) ENERGY STAR Requirements for AirCooled Batch-Type Ice Makers (b) ENERGY STAR Requirements for AirCooled Continuous-Type Ice Makers Units of Measure: (a) Applicable Ice Harvest Rate Range (H) (lbs of ice/24 hrs) (b) Energy Consumption Rate (kWh/100 lbs ice) (c) Potable Water Use (gal/100 lbs ice) **Recommendation**: CARICOM Procurement Officials should purchase Commercial Ice Makers with specifications that are higher than ENERGY STAR

Table 10

<table>
<tr><td>2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)</td><td colspan="2">Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search</td></tr>
<tr><td>Table C403.10.1 (1) Minimum Efficiency Requirements: Commercial Refrigeration (pg. C-55)

Units:
V = Volume of the chiller r frozen compartment as defined in AHAM-HRF-1

AHAM-HRF-1 = Association of Home Appliance Manufacturers - Energy and Internal Volume of Refrigerating Appliances

Table C403.10.1 (2) Minimum Efficiency Requirements: Commercial Refrigerators and Freezers (pg. C-56 & C-57

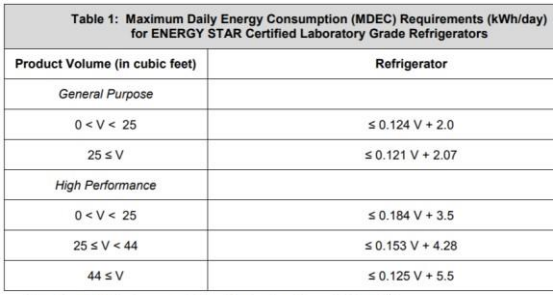
Units: Same as above

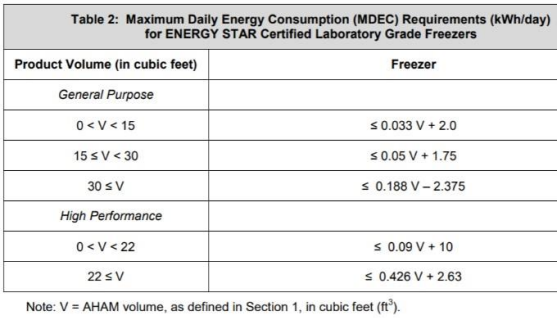
Table C403.10.2.1 (1) Walk-In Cooler and Freezer Display Door Efficiency Requirements (pg. C-57)</td><td>Laboratory Grade Refrigerators and Freezers</td><td>ENERGY STAR® Program Requirements
Product Specification for Laboratory Grade Refrigerators and Freezers
Eligibility Criteria
Version 1.1

Section 3: Certification Criteria – Sub-Section 3.2 - Energy Efficiency Requirements:

Table 1 - Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Refrigerators; &

Table 2 - Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Freezers

 
<table><tr><th colspan="2">Table 1: Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Refrigerators</th></tr><tr><th>Product Volume (in cubic feet)</th><th>Refrigerator</th></tr><tr><td>General Purpose</td><td></td></tr><tr><td>0 < V < 25</td><td>≤ 0.124 V + 2.0</td></tr><tr><td>25 ≤ V</td><td>≤ 0.121 V + 2.07</td></tr><tr><td>High Performance</td><td></td></tr><tr><td>0 < V < 25</td><td>≤ 0.184 V + 3.5</td></tr><tr><td>25 ≤ V < 44</td><td>≤ 0.153 V + 4.28</td></tr><tr><td>44 ≤ V</td><td>≤ 0.125 V + 5.5</td></tr></table>
Note: V = AHAM volume, as defined in Section 1, in cubic feet (ft³).

 
<table><tr><th colspan="2">Table 2: Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Freezers</th></tr><tr><th>Product Volume (in cubic feet)</th><th>Freezer</th></tr><tr><td>General Purpose</td><td></td></tr><tr><td>0 < V < 15</td><td>≤ 0.033 V + 2.0</td></tr><tr><td>15 ≤ V < 30</td><td>≤ 0.05 V + 1.75</td></tr><tr><td>30 ≤ V</td><td>≤ 0.188 V – 2.375</td></tr><tr><td>High Performance</td><td></td></tr><tr><td>0 < V < 22</td><td>≤ 0.09 V + 10</td></tr><tr><td>22 ≤ V</td><td>≤ 0.426 V + 2.63</td></tr></table>
Note: V = AHAM volume, as defined in Section 1, in cubic feet (ft³).

NB: These MDEC criteria should be interpreted with care as they may be unique to the USA</td></tr>
</table>

Units: Same as above Table C403.10.2.1 (2) Walk-In Cooler and Freezer NonDisplay Door Efficiency Requirements (pg. C-57) Units: Same as above Table C403.10.2.1 (3) Walk-In Cooler and Freezer Refrigeration System Efficiency Requirements (pg. C-57) Units: Same as above		MDEC = Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) **Recommendation**: CARICOM procurement officials should focus on comparing instantaneous energy efficiencies of equipment as measured by EER (Energy Efficiency Ratio) or COP (Coefficient of Performance)

Table 11

<table>
<tr><td>2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)</td><td colspan="2">Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search</td></tr>
<tr><td>Table C403.10.1 (1) Minimum Efficiency Requirements: Commercial Refrigeration (pg. C-55)

Units:
V = Volume of the chiller r frozen compartment as defined in AHAM-HRF-1

AHAM-HRF-1 = Association of Home Appliance Manufacturers - Energy and Internal Volume of Refrigerating Appliances</td><td>Water Coolers</td><td>Water Cooler Key Product Criteria: ENERGY STAR and ENERGY STAR® Program Requirements
Product Specification for Water Coolers Eligibility Criteria Version 2.0

<table><tr><th colspan="2">Energy-Efficiency Criteria for ENERGY STAR Certified Water Coolers Using the "On Mode with No Water Draw" Test*</th></tr><tr><td>Water Cooler Category</td><td>Qualification Level</td></tr><tr><td>Cold Only or Cook and Cold Units</td><td>≤ 0.16 kWh/day</td></tr><tr><td>Hot and Cold Units – Storage Type**</td><td>≤ 0.87 kWh/day</td></tr><tr><td>Hot and Cold Units – On Demand</td><td>≤ 0.18 kWh/day</td></tr></table>
NB: These Maximum Daily Energy Consumption (MDEC) criteria using the "On Mode with no Water Draw" Test are may be unique to the USA.

MDEC = Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day)

<u>Recommendation</u>: CARICOM procurement officials should focus comparing instantaneous energy efficiencies of equipment as measured by EER (Energy Efficiency Ratio) or COP (Coefficient of Performance)</td></tr>
</table>

Table 12

2018 CARICOM Regional Energy Efficiency Building Code (CREE BC)	Energy Star (USA) - Products. Also see Product Specifications & Partner Commitments Search	
No CREE BC Code	Lamps	Light Bulb Key Product Criteria and ENERGY STAR® Program Requirements Product Specification for Lamps (Light Bulbs) Eligibility Criteria, Version 2.1, Recommendation: CARICOM Procurement Officials should use the lighting efficacy (lumens per watt) requirements and other key product specifications as given at the URL.
No CREE BC Code	Light Fixtures (Luminaires)	Purchasing Guide - LED Bulbs Made Easy Just Look for the ENERGY STAR® and Color and Mood and ENERGY STAR® Program Requirements Product Specification for Luminaires (Light Fixtures) Eligibility Criteria Version 2.2 **Recommendation**: CARICOM Procurement Officials should use the guidance and product specifications given at all three URL's

8 Summary

This Toolkit was develop to support the Green Buildings Procurement Manual developed for the Caribbean Community Climate Change Center in Belize. The Toolkit aims to facilitate users to quickly compare national frameworks for procurement and energy and environmental policy across five Member States of CARICOM. The Toolkit also provides tools for the user to compute award criteria using existing cycle cost analyst tools. Twelve (12) table of product specifications are presented that allow the user to map the requirements of the CARICOM Regional Energy Efficiency Building Code to the single criteria ENERGY STAR label. Other multiple criteria environmental labels are listed for the consideration of procurement official as they develop their national green building procurement programmes.