



CARICOM Energy Innovation Challenge Concept Document

Background and Context

Energy is a key input to the region's economy, with our future growth dependent upon equitable availability and access to more sustainable energy services. While our Member States are endowed with significant natural and human resources, energy production and consumption in most cases lack efficiency.

Power generation and energy consumption are closely linked to economic development of any country, as major sectors of economy depend upon the availability of energy resources. However, inadequate and unreliable electricity infrastructure and heavy dependence on imported fossil fuels continue to constrain our economic development.

The energy security challenges of Caribbean countries, linked to their disproportionate dependence on imported fossil fuels are well known and articulated, especially in the context of their status as Small Island Developing States (SIDS).

It is recognized that the solution to many of our sustainable development challenges of our region is through access to clean, affordable and reliable energy services which are fundamental to reducing poverty and improving health, increasing productivity, enhancing competitiveness and promoting economic growth. In this regard, development of renewable energy resources coupled with efforts to improve efficiency and reduce costs is one of the most efficient and effective solutions for CARICOM countries.

All CARICOM member countries have acknowledged the importance of increasing energy security and have developed a regional energy policy and, in some instances, national energy policies with targets for renewable energies and energy efficiency. At the regional level, Member States adopted the CARICOM Energy Policy in 2013 that, inter alia, promotes a shift to sustainable energy through increased use of renewable energy sources and improvements in energy efficiency. Complementary to this, the Caribbean



Sustainable Energy Roadmap and Strategy (C-SERMS), provides the basis for a targeted approach to advancing sustainable energy development under the regional policy.

In particular, innovation is one of the key factors that will drive the regional energy transition process which can help CARICOM Member States to meet both regional and national sustainable energy targets as well as their climate targets, including the decarbonisation of the energy sector through low-carbon technologies.

Innovation can reduce the cost of technologies to economically viable levels. Yet, high technological risk, the financial cost and the strong commercial competition from established, low-cost products and solutions, represent some of the key barriers to sustainable energy innovation. In order to accelerate sustainable energy innovation in CARICOM, several financial, regulatory and institutional hurdles must be tackled through a coordinated regional approach through better collaboration and streamlined support among stakeholders including the citizens.

In this regard, the purpose of the CARICOM Energy Innovation Challenge is to create a platform for innovation to thrive in the region by empowering the citizens – particularly the youth – to become innovative in their communities, schools and homes.

Concept

The Innovation Challenge is being hosted by the CARICOM Secretariat and the Caribbean Centre for Energy and Energy Efficiency (CCREEE). The CCREEE aims to transform the energy landscape in the Caribbean into a climate resilient, sustainable and affordable sector; focused on improving the lives of our people with the strategic objectives:

- i. To create a market intelligence repository;
- ii. To optimize and accelerate innovative applications of technology, policy and finance and;
- iii. To embed and transform, utilizing sustainable energy solutions as a means to advance the well-being of at-risk and vulnerable groups



Gender inequalities like occupational segregation with women tending to have lower-wage occupations and lower female participation in the overall workforce persist in the CARICOM region. Equal or higher educational achievements of girls in Science, Technology, Engineering, the Arts and Mathematics (STEAM) has not yet translated into a higher participation in the labor market or into the closing of the wage gap. Educational gaps at secondary and tertiary levels are serious constraints to economic growth and well-being in the region. Research has shown that there are no gender differences in science and mathematics achievement at primary and secondary school level. However, there is a stark gender gap for STEAM education emerging at the post-secondary level: Despite higher rates of overall University enrolment and graduation on a global scale, women are less likely to major in certain STEAM fields, such as engineering, manufacturing and construction or information and communication technologies.

In 2014, women represented 44.7% of the workforce employed in scientific research and development in the LAC region. Nonetheless, women are less likely to enter and more likely to leave STEAM careers, with leave rates in science, engineering and technology peaking about 10 years into their careers. Influencing factors are multifaceted, but early interventions at secondary and tertiary education levels like boosting girls' confidence by providing hands-on experience, fostering interactions with relevant role models and mentoring could have a positively reinforcing effect on women's participation in STEAM careers.

In this regard, the Innovation Challenge is closely linked to an initiative of the CCREEE which involves the design and regional roll-out of STEAM Centres, which is intended to be operated and maintained by students of educational institutions in currently underserved and remote areas of the CARICOM region. The Innovation Competition will be held to determine the first pilot site within the CARICOM region.

The broad objectives of the competition are to:

- i. Improve awareness and the existing knowledge base on sustainable energy and climate technologies in the CARICOM region and beyond
- ii. Promote gender equality and equal chances on the labor market



- iii. Promote the deployment of renewable energy technologies in the region
- iv. Improve access to sustainable and reliable energy services in underserved areas

Specific objectives include:

- i. Make STEAM more accessible to the youth and in particular, girls through hands-on experience with technology
- ii. Encourage girls to enter a STEAM career and balance current gender disparities in the region
- iii. Let young people learn to take responsibility in a playful way
- iv. Showcase sustainable and innovative technologies
- v. Enable cross-learning and exchanges through a regional student network
- vi. Motivate the younger generation to stay enrolled in secondary level and enter tertiary education

Following the implementation of the first Pilot Centre, five (5) pilots are foreseen in the currently underserved areas in Haiti and hinterland regions of main land territories of CARICOM, namely, Belize, Guyana and Suriname. Building on the lessons learned and adaptations from the 5 pilot sites, a regional rollout of STEAM Centres is envisaged.

The STEAM Centres

The STEAM Centres will feature innovative applications of sustainable energy and climate technologies, such as rainwater harvesting and waste water treatment, on-site renewable energy generation and distribution to neighboring households and facilities through a micro-grid.

A training and control center will enable dedicated students to gain hands-on experience in operating and monitoring the technical systems, to experiment with the featured technologies and to create an interactive student network in the Caribbean and worldwide. Students, and particularly female students, will be actively mentored and



encouraged in discovering their passion and confidence for pursuing a STEAM career. Mentoring will be provided by distinguished professionals working in the field, ranging from scientists to entrepreneurs. Learnings and data obtained from the STEAM Centres will feed into the CARICOM Energy Knowledge Hub and shared through an interactive student network (**See Table 1**).

Table 1. Features of the STEAM Centre

1	Water Management	a) Rainwater harvesting b) Waste water treatment – bio-digester
2	Energy supply	Solar PV (roof mounted) and biogas generation
3	Power distribution	Smart power distribution system (control, sensing and communication, and optimization technologies) Micro-grid for a small community
4	Energy storage technology	Batteries (Li-ion)
5	Kitchenette	Energy efficient lighting and appliances; showcase of most commonly used labelling systems
6	Control centre	Control centre for power and energy control to houses and others
7	Training centre	a) Water resource lab – reverse osmosis kit and pumps b) Energy lab / different types of RE, EE and conventional energy supply lab kits c) Community centre with workspaces and virtual communication room (global student network)

Approach

The Competition is open for participation to all CARICOM citizens at two levels- primary and secondary school students. Primary school students will be invited to submit creative videos describing their interest in STEAM and the importance of a lab to their school, community and everyday life.

Secondary students from different age groups will be invited to form project teams and obtain a support letter from their school willing to host and maintain the STEAM Centre. Teams comprising four (4) students and one (1) teacher will be required to design



innovative concepts for how they would use and manage the STEAM Centre. The best proposal for bringing the STEAM Centre and student network to life will determine the country and location of the first CARICOM STEAM Centre.

The Secondary Level Challenge will occur in two Stages.

In the First Stage, students will be invited to submit a Concept Proposal during the period 6 January 2020 – 8 February 2020. Three Concepts will be shortlisted by a regional selection team to advance to the Second Round. During the Second Stage, from 19 February – 30 April 2020, the three teams will be allocated US \$200 to advance their concept to include videos, 3D models, PowerPoint presentations

Students may be invited to present to a panel including regional institutions and sponsors at the Caribbean Energy Investment Forum in March 2020. The winners will be announced in September 2020 and implementation of the STEAM Centre will commence in November 2020.

RULES AND GUIDELINES: PRIMARY SCHOOL

1. Eligibility

- The Challenge is open for participation to all CARICOM nationals and citizens at the **Primary Level**: Standards 4-5/ Grades 5-6/Classes 3-4
- Children and immediate families of staff of the CARICOM Secretariat; the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) and sponsors are **not eligible** to participate.
- Entries will only be considered if they meet the eligibility criteria.

2. Composition

- Teams must comprise 1 teacher and 4 students.
- A teacher within the STEAM school curricula is highly recommended.
- The team can comprise of a mixture of students across Standards 4-5)/Grades 5-6/Classes 3-4 or within the same Standard/ Grade.



- More than 1 team from the same school is allowed.
- For co-ed schools only: teams must comprise of at least one female and at least one male student.
- The above requirement does not apply for same-sex schools.

3. Entry Period

The Challenge will be take place in between January-September 2020.

Judging

- The judging panel will comprise of six (6) representatives from the region's financial, technical and environmental sectors, as well as the Platinum Sponsor.

4. How to Enter

Step 1: Online registration

- All teams desirous of participating in the competition must pre-register by completing the registration form found [here](#). Each team will receive a confirmation of registration email from the CARICOM Energy Programme.

▪ **Step 2: Submission**

- A teacher must submit the entry on behalf of the Team.
- All queries must be e-mailed by the teacher to innovate@ccreee.org
- The e-mail submission MUST include:
 - i. Videos no more than 5 minutes in length uploaded in .mov, .mp4, .avi, or wmv format. Preferred format HD 720p 16 x 9. Acceptable codecs are H.264 (MP4), MPEG-4, H.263, MPGV, WMV, DivX. Video must be submitted via accessible hyperlink.
 - i. The full name, age and sex of each student, school, and grade/form (Please check



- your school policy on student's participation in competitions).
- ii. Proof of nationality or citizenship of each student – submit a scanned copy of **any one** of the following: (Birth certificate / Bio-data page of passport / Identification card)
 - iii. Teacher: name, telephone number, e-mail address and your school address.
 - iv. A signed declaration form which requires the signature of the team leader, teacher AND school principal along with the school's stamp. Example of the format can be found at **Annex I**.
 - v. A short brief on how the remodeled lab will be managed and sustained in the long term.
 - vi. A support letter from the school indicating their willingness to host and maintain the STEAM Centre if their Students are selected as the winner.

5. Guidelines for Concept Document

Teams are invited to develop a creative video of 5 minutes or less describing 1) why they are interested in STEAM and 2) how a lab could benefit them in their school life, community and at home. Teams are highly encouraged to be bold and creative as well as to engage other students within their school population in their video production.

Teacher requirements:

- Teachers should ensure that a classroom or dedicated space is available to be remodeled into a lab before students enter the competition.
- Teachers must submit a short brief on how the remodeled lab will be managed and sustained in the long term.
- Students from schools without an available classroom or dedicated space are also encouraged to participate in this challenge. In such a case, science laboratory equipment, to be determined by the selection committee, will be awarded to the winning school.



6. Selection Criteria

Videos will be assessed based on the following criteria:

Criteria	Weighting
Motivation	20
Clarity of message including understanding of STEAM	10
Creativity	50
Sustainability	10
Quality of video production	10

7. Prize and Award

The CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency will refurbish a classroom or dedicated space at the school of the winning team into a STEAM Centre estimated at US \$104, 200.

8. Rights

- The CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency reserve the right to reject any additional entries; or entries that are deemed to be incompliant with the challenge rules. By entering, you indicate your acceptance of the Official Rules and Decisions of the competition which are final and binding.
- If you submit an entry, you grant the CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency non-exclusive rights to:
 - Allow third-parties to share the Concept
 - Use the video and likeness of participants in the CARICOM Secretariat and CCREEE's internal and external communication materials and projects.



- Use, in connection with the CARICOM Energy Innovation Challenge, your name, school and country of residence in promotions and other publications.
- Retain a copy of your video that will be archived in the CARICOM Secretariat and CCREEE libraries.

9. Questions

Questions about the CARICOM Energy Innovation Challenge can be emailed to innovate@ccreee.org.

RULES AND GUIDELINES: SECONDARY SCHOOL

1. Eligibility

- The Challenge is open for participation to all CARICOM nationals and citizens **at the Secondary Level:** Forms 4-6/ Grades 10 -12
- Children and immediate families of staff of the CARICOM Secretariat; the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) and sponsors are **not eligible** to participate.
- Entries will only be considered if they meet the eligibility criteria.

2. Composition of Teams

- Teams must comprise 1 teacher and 4 students.
- A teacher within the STEAM school curricula is highly recommended.
- The team can comprise of a mixture of students across Forms 4-6/ Grades 10 -12 or within the same Form/ Grade.
- More than 1 team from the same school is allowed.
- Teams which comprise of at least one CXC Green Engineering CAPE student will receive a bonus point towards their final score in Stage 1 only.
- For co-ed school only: teams must comprise of at least one female and at least one male student.
- The above requirement does not apply for same-sex schools.



3. Entry Period

- The Challenge will be launched in January 2020.

Stage 1: Submission of Innovative Concepts

- During Stage 1, participants will be invited to submit innovative concepts (See Section 5).
- Entries submitted after this period will not be eligible.

Short listing

- Shortlisting will take place from **8 -19 February, 2020**.
- The top 3 teams will be shortlisted by a judging panel based on the rubric (See Section 7). The top 3 teams will move on to Stage 2 to prepare a detailed design (See Section 6).
- The top 3 successful teams will be contacted in **February, 2020**

Stage 2: Preparation of Detail Design and Pitch Presentation

- Stage 2 will be held from **20 February – 30 April 2020**.
- During this time, the 3 teams will be required to further advance their concepts into a detailed design.
- Teams may be invited to present their draft designs to a panel of experts at the First Annual Regional Energy Investment Forum which will be held in **March 2020 in Saint Lucia**. At this presentation, teams will receive feedback on how to improve their designs.
- Expenses including, flights, accommodation, transport and per diem, for Teams residing outside of Saint Lucia will be covered by the CARICOM Secretariat and CCREEE.
- Teams will be required to incorporate the feedback and make their final submission by **12.00 AM (EST) 30 April 2020**.



Judging and Announcement of Winners

- The judging panel will comprise of six (6) representatives from the region's financial, technical, environmental sectors as well as the Platinum Sponsor.
- The winning team will be announced in **September, 2020**.

4. How to Enter

Step 1: Online registration

- All teams desirous of participating in the competition must pre-register by completing the registration form found [here](#). Each team will receive a confirmation of registration email from the CARICOM Energy Programme.

- **Step 2: Concept Submission (Stage 1)**

- A teacher must submit the entry on behalf of the Team.
- All submissions must be e-mailed by the teacher to innovate@ccreee.org
- The e-mail submission MUST include:
 - vii. The completed Concept Document attached in pdf format (**maximum 2000 words**)
 - viii. The full name, age and sex of each student, school, and grade/form (Please check your school policy on student's participation in competitions).
 - ix. Proof of nationality or citizenship of each student – submit a scanned copy of **any one** of the following: (Birth certificate / Bio-data page of passport / Identification card)
 - x. Teacher: name, telephone number, e-mail address and your school address.
 - xi. A signed declaration form which requires the signature of the team leader, parent or teacher AND school principal along with the school's stamp. Example



- of the format can be found at **Annex I**.
- xii. A support letter from the school indicating their willingness to host and maintain the STEAM Centre if their Students are selected as the winner.

Step 3: Final Design Submission (Stage 2)

- A teacher must submit the entry on behalf of the team.
- The submissions must be e-mailed by the teacher or parent to:
innovate@ccreee.org

5. Guidelines for Concept Document

- Concepts must not exceed the **2000 words** limit (without references).
- Concepts must be original and written by the students with input from the teacher. Plagiarized entries will be rejected.
- Concepts must be written in English, Times New Roman, font 12, single line spacing
- All sources must be properly referenced, using APA style preferably
- Entries not meeting the requirements will be disqualified and removed from the competition.
- The Concept should include the following sections A-F:

A. General background on the school

This section should provide a brief outline of the school, its student composition and activities being conducted with regard to STEAM activities such as: labs, projects, Student Based Assessments or extracurricular activities. STEAM subject area offered in the upper school grades should also be stated in this section.

B. Understanding of a STEAM Centre

This section should highlight the students' understanding of a STEAM Centre and the benefits to be derived from a STEAM Centre in general.



C. Motivation for participating in the Competition

This section should provide insight into the rationale for the students' and school's participation in the CARICOM Energy Innovation Challenge. Focus should be placed on how the STEAM Centre will inspire student's career choices; how it will impact teaching at the school; and the benefits to be derived in their community and homes.

D. Innovative Concept

Teams should develop innovative and sustainable elements that can be incorporated into the STEAM Centre. This includes but is not limited to: renewable energy technologies; efficient devices; a sustainable building design for the STEAM Centre; use of sustainable materials; or other concepts which promote sustainability.

E. Intended use and long term strategy

This section should identify who will use the STEAM Centre; the types of projects and activities that can be undertaken in relation to the school curriculum and how the centre will be managed and maintained in the long-term.

F. Suitability of the STEAM Centre at the School Facility

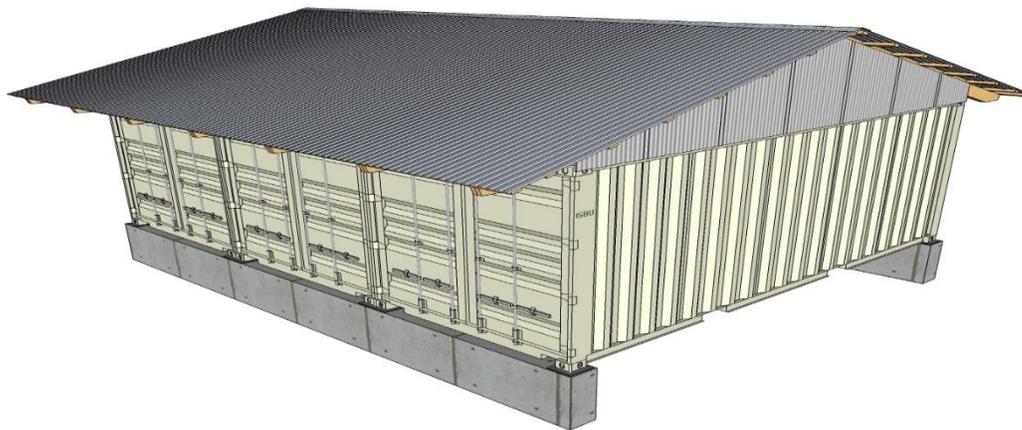
The STEAM Centre is expected to measure: 8ft (2.43m) wide, 8.5ft (2.59m) high and 20ft (6.06m) in length. Students are required to present a layout of the school's facility and identify a suitable, proposed location which can accommodate the STEAM Centre.



Schematic of STEAM Centre showing the proposed layout without the roof

(Source: http://www.sweethome3d.com/support/forum/viewthread_thread,5778_offset,10)

A fourth container can be added at the entrance on the left.



Schematic of STEAM Centre

(Source: <http://sallbeda.blogspot.com/2015/02/buy-build-insulated-shed-floor.html>)



6. Guidelines for Final Design and Pitch Presentation

- Once selected to advance to Stage 2, teams will be required to advance their innovative concepts (Section D) using videos and/ or 3D models or any other medium.
- The presentation can be a demonstration or PowerPoint and should be no more than 20 minutes long, which will be followed by 10-15 minutes of questions by the judges.
- All members of the team are not required to participate in the presentation but all members should be prepared to answer any questions from the judging panel.
- Each finalist team will receive a wire transfer of USD \$200 to purchase materials or services to advance their concepts (Receipts/invoices to be submitted).
- The final submission format:
 - ▶ Videos must be uploaded in .mov, .mp4, .avi, or wmv format. Preferred format HD 720p 16 x 9. Acceptable codecs are H.264 (MP4), MPEG-4, H.263, MPG, WMV, DivX. Videos must be provided via hyperlink for download.
 - ▶ Presentations can be submitted in PowerPoint or PDF

7. Selection Criteria

A. Concepts will be assessed based on the following criteria:

Criteria	Weighting
Motivation	10
Innovation	50
Sustainability	25
Feasibility	15
1 CXC CAPE Green Engineering Team Member	+1



B. Final Designs will be assessed based on the following criteria:

Criteria	Weighting
Motivation	10
Team Composition	+ 1
Clarity of the final design	15
Originality and Quality of proposed design	15
Sustainability level (Financial, Economic, Social)	25
Feasibility of Implementation	15
Team Presentation of the Design	20

8. Prize and Award

The CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency will award the STEAM Centre estimated at US \$650,000.

9. Rights

- The CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency reserve the right to reject any additional entries; or entries that are deemed to be incompliant with the Challenge Rules. By entering, you indicate your acceptance of the Official Rules and Decisions of the Competition which are final and binding.
- If you submit an Entry, you grant the CARICOM Secretariat and the Caribbean Centre for Renewable Energy and Energy Efficiency non-exclusive rights to:
 - Allow third-parties to share the Concept
 - Use the concept and design in the CARICOM Secretariat and CCREEE's internal and external communication materials and projects.
 - Use, in connection with the CARICOM Energy Innovation Challenge, your name, likeness, school and country of residence in promotions and other publications.



- Retain a pdf copy of your concept and design that will be archived in the CARICOM Secretariat and CCREEE libraries.

10. Questions

Questions about the CARICOM Energy Innovation Challenge can be emailed to innovate@ccreee.org.

Annex I

Team Declaration Form

Team Name:

Name of School:

I declare that this Concept has been produced solely by our team and that it has not been submitted, in whole or in part, in any previous submission. Except where states otherwise by reference or acknowledgment, the work presented is entirely the Team's original work.

Student (Team Lead) Signature _____ Date _____

Student Name:

Teacher Signature _____ Date _____

Parent/Teacher Name:

Principal Signature _____ Date _____

Principal Name: