

A New Paradigm for Caribbean Development:  
**Transitioning to a Green Economy**





# **A New Paradigm for Caribbean Development: Transitioning to a Green Economy**

May 2014

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ISBN: 978-976-95695-1-5

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Published by: Caribbean Development Bank

Cover Design by: Unison Graphics

Printed by: Caribbean Development Bank

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# Foreword

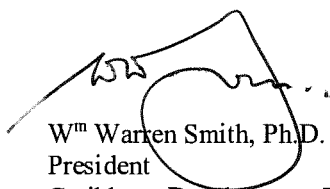
Global warming, together with the increase in the frequency and the intensity of weather events associated with climate change, makes imperative the restructuring of production processes and consumption patterns. Such restructuring encourages consistency between the triple goals of environmental, economic and social sustainability.

This challenge of climate change has given rise to a variety of initiatives aimed at the “greening of the global economy”, that is, the creation of an economy which the planet can sustain indefinitely. The argument for new production and consumption patterns is further bolstered by the increasing demand and competition for natural resources; upward pressure on limited supplies and fears of resource depletion; degraded ecosystems; increasing production costs; and price escalations with negative implications for equity, poverty and social development.

The arguments for “greening” are not purely defensive. Examples of significant cost savings resulting from increased efficiency of resource use abound. Also, rising consumer demand for environmentally-friendly products, fuelled by growing environmental consciousness, provide significant opportunities for profit-making. On the supply side, green technologies that are cheaper can contribute to increased profitability by reducing costs. Additionally, the high labour intensity of green technologies, in some sectors relative to traditional, petroleum-based technologies, creates the potential for increased employment levels and lower levels of poverty.

The achievement of the afore-mentioned outcomes presupposes adequate access to finance; the availability of external technical assistance; a robust policy and regulatory environment to provide the appropriate incentives for private sector investment; development of the relevant skills; and communication with stakeholders.

These and other critical considerations are explored in “**A New Paradigm For Caribbean Development: Transitioning to A Green Economy**”. Additionally, the study offers an invaluable tool for sharing the experiences of Borrowing Member Countries of the Caribbean Development Bank as they transition towards this new paradigm of economic and social development.



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President  
Caribbean Development Bank

# Acknowledgements

This publication was commissioned by the Economics Department of the Caribbean Development Bank (CDB) and prepared by the Caribbean Natural Resources Institute (CANARI). CDB acknowledges with sincere gratitude the commitment and dedication of the authors of the study: Ms. TigheGeoghegan, Mr. David Ince, Professor Michael Witter, Mr. Cletus Springer, Mr. Felix Finisterre and Ms. Nicole Leotaud.

An internal team comprising Dr. Kari Grenade and Dr. Patrick Kendall was responsible for the technical supervision of the process. Mr. Joseph Williams provided comments on the draft final reports.

Secretarial and administrative support, including the formatting of the document, was provided by Mrs. Ann Marie Massiah, Mrs. Denise Padmore and Mrs. Andria Murrell.

It is our hope that policymakers, scholars, business persons and international development partners will find much value and usefulness in this publication.

Dr. Justine A. Ram  
Director, Economics Department  
Caribbean Development Bank

# Acronyms

ACP	Africa, Caribbean and Pacific
BL&P	Barbados Light & Power
BBD	Barbados Dollar
BMCs	Borrowing Member Countries
bn	billion
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community
CARILEC	Caribbean Electric Utility Service Corporation
CCCCC	Caribbean Community Climate Change Centre
CDB	Caribbean Development Bank
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CEO	Chief Executive Officer
CFL	Compact Fluorescent Lamps
CHENACT	Caribbean Hotel Energy Action Plan
CIF	Climate Investment Fund
CIPORE	Caribbean Information Platform on Renewable Energy
CRECS	Caribbean Renewable Energy Capacity Support
CREDP	Caribbean Renewable Energy Development Project
CSEP	Caribbean Sustainable Energy Project
C-SERMS	Caribbean Sustainable Energy Roadmap and Strategy Framework
CTF	Clean Technology Fund
DPSIR	Driving Forces-Pressures-State of the Environment-Impact-Responses
ECERA	Eastern Caribbean Energy Regulatory Authority
EE	Energy Efficiency
ELPA	Electricity Light & Power Act
Energy SMART Fund	Sustainable Energy Investment Programme
EU	European Union
FCPF	Forest Carbon Partnership Facility
FTC	Fair Trading Commission
GCF	Green Climate Fund
GDP	Gross Domestic Product
GE	Green Economy
GE ALG	Caribbean Green Economy Action Learning Group
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GIZ	German Society for International Cooperation
GRENLEC	Grenada Electricity Services Ltd.
GREN SOL	Grenada Solar Power Ltd.
IDB	Inter-American Development Bank
IMF	International Monetary Fund
IPCC	Inter-governmental Panel on Climate Change
IPP	Independent Power Producer
JPSCo	Jamaica Public Service Company
kW	Kilowatt



## Acronyms

kWh	Kilowatt-hour
LCOE	Levelised Costs of Electricity
LDC	Least Developed Country
LNG	Liquefied Natural Gas
LUCELEC	St. Lucia Electricity Services Limited
META	Model for Electricity Technology Development
mn	million
MW	Megawatts
NEIS	National Energy Information System
NGO	Non-Governmental Organisation
NSEP	National Sustainable Energy Policy
OAS	Organization of American States
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OECS	Organisation of Eastern Caribbean States
OLADE	Latin American Energy Organisation
OUR	Office of Utility Regulation
PPA	Power Purchase Agreement
PSSP	Power Sector Support Programme
PV	Photovoltaic
R&D	Research and Development
RE	Renewable Energy
REDD+	Reducing Emissions from Deforestation and Forest Degradation “plus”
REETA	Renewable Energy and Energy Efficiency Technical Assistance
RFP	Request for Proposals
Rio+20	2012 UN Conference in Sustainable Development
SCF	Strategic Climate Fund
SE4All	Sustainable Energy for All
SECCI	Sustainable Energy and Climate Change Initiative
SEF	Sustainable Energy Framework
SGP	Small Grant Programme
SIDS	Small Island Developing States
SPREP	Scaling up Renewable Energy Programme
SWH	Solar Water Heater
TA	Technical Assistance
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States Dollar
UWI	University of the West Indies
WIP	West Indies Power
WB	World Bank

# Executive Summary

The Caribbean Development Bank (CDB) contracted the Caribbean Natural Resources Institute (CANARI) to undertake a study entitled “A New Paradigm for Caribbean Development: Transitioning to a Green Economy”. The main objective of the study is to augment the regional and international dialogue on the Green Economy in the context of inclusive and sustainable development. The study contributes to knowledge about and understanding of the fundamental requirements for transitioning to a Green Economy in the Caribbean and the attendant implications for policy and institutional arrangements. The study offers new and innovative ideas to promote green, inclusive, sustainable development, as well as assesses the net socioeconomic and environmental impacts of moving to a Green Economy. It is intended to help countries craft green development strategies by providing practical recommendations to governments and other key stakeholders in the development process on how to identify and exploit green opportunities for productive transformation and, by extension, inclusive and sustainable development.

Much of the interest in green economy, in the Caribbean, as elsewhere, revolves around its implications for the energy sector. Most Caribbean countries clearly want to reduce dependence on fossil fuels through the development of indigenous alternative sources that are more sustainable with significant emphasis on renewable energy and energy efficiency within broader strategies to green key sectors. For example, policymakers in the Region are looking for concrete advice and direction with respect to renewable energy for electricity generation. They need economic data on the costs and benefits of switching to renewable energy, including information on the potential for significant foreign exchange savings, revenue impacts, employment generation and environmental impacts.

All major energy institutions globally (including IEA, WEC) and regionally (OLADE) agree that EE is huge and is more immediate and near term with respect to impact. However, it is in the area of RE development that the major opportunity exists for permanently transitioning the current energy generation systems of the Caribbean to being more sustainable over the long term. In fact, pursuing RE development will necessarily be accompanied by some measure of EE improvement along the energy system, to ensure maximisation of the productivity of harnessed resources and investments. For this reason this study will focus on renewable energy.

Chapter 1 of the study reviews the evolution of the green economy concept internationally and in the Caribbean region. The chapter reviews the main drivers of the concept; evolution of a Caribbean vision and Caribbean work on green economy; and the main current and emerging sources of finance for green economy initiatives and opportunities for the Caribbean under these. In Chapter 2, the general context for renewable energy development in the Region is presented, followed by a detailed analysis of renewable energy initiatives in three key sectors: utility scale grid-tied electricity generation, tourism and construction. Cases reviewed are the Wigton Wind Farm in Jamaica; Sandals La Toc in St. Lucia; and Williams Industries in Barbados. Lessons and policy recommendations from each of these are discussed. Chapter 3 presents a conceptual framework for measuring the net socio-economic impact of green economy transitions (with an emphasis on renewable energy). This draws on frameworks developed by the Organisation for Economic Cooperation and Development (OECD), United Nations Environment Programme (UNEP) and the World Bank (WB), as well as other work in this area. It pays explicit attention to the openness, and hence the economic vulnerability of Caribbean economies, and to the proneness to natural hazards, and hence the environmental vulnerability of the Region. The model is applied to the Wigton Wind Farm Case Study to assess the economic, environmental and social impacts of the project. Unfortunately, there was insufficient data to apply this model to the other two Case Studies.

Although the three cases reviewed highlighted success stories in the Region, they also identified a number of institutional and policy gaps which will have to be addressed if the positive outcomes of the Case Studies discussed are to be replicated throughout the Region. Chapter 4 summarises major lessons learned and recommendations gleaned both from the Case Studies and general experiences in the Caribbean from various interviews.

### Lessons identified were:

1. *Importance of having the appropriate Policy and Regulatory Environment* to encourage and facilitate both public and private sector investment in renewable energy options. Specific areas highlighted were: the need for policy formulation and implementation and capacity building for policy implementation; policy reforms to create incentives for renewable energy development; a clear and long-term policy framework; and, where appropriate, revising the policy and regulatory framework as the context evolves.
2. *Need for Policy Consistency*: Although there are many instances in policy documents where governments emphasise their commitment to developing renewable energy, there are often other policy statements and signals that negate or reduce the effectiveness of efforts to promote renewable energy.
3. *The Importance of Critical Combination of Government Policy, Private Sector Innovation, Markets, and Finance (International and Domestic)* to create a virtuous cycle towards sustainable energy and green economy, with any one able to kick start the process, but all needed and required to work in synergy.
4. *Need for a Consolidated Approach and International Finance to Overcome Risk-related Market Failures*, noting however that although internationally-funded projects reduce the risk to commercial lenders and so increase the incentive to invest, the projects funded should complement those investments and innovations being made at the local level to ensure buy-in and encourage local innovation.
5. *The Importance of Exemplar Successes in Encouraging Scaling up Nationally and Regionally*: Well-targeted, successful pilot projects and Case Studies of their success can be used as a guide for policy development. In order to create such examples, it may be necessary to concentrate financial resources on those initiatives that look most promising, rather than spreading support more widely.
6. *The Important Role of Governments in Oversight, Regulation and Enabling*: Governments clearly have strong roles to play, for example, in regulating, issuing of licenses, creating national programmes to support private sector initiatives, and encouraging or mandating green certification.
7. *Government Ownership can Yield Policy Co-benefits*: When the government has a stake in a business, it is more likely to seek a policy environment that is favourable to the business'

success. This is especially so if that business generates significant social, environmental and economic returns.

8. *Need for Structured Processes of Learning from Experience:* Pioneering attempts are inevitably imperfect; but if they encounter a supportive and flexible policy environment, they may offer lessons on the conditions needed for the sector to flourish.
9. *Need for Renewable Energy Development to be placed in a Broader Sustainable Development Policy and Planning Framework:* The benefits of scaling up renewable energy will only be fully achieved if the work on the sector occurs within larger national and regional green economy transitions, for example, with national land use planning to support allocation of land for renewable energy development.
10. *Need for Information to Guide Evolution of Renewable Energy Strategies:* Studies are needed to: estimate the resource base of individual renewable energies; understand what incentives and mitigating measures will be needed for increasing renewable energy use and what will be the impact on per unit energy costs, consumer prices, employment, foreign exchange savings, and environmental sustainability.
11. *Need for Benchmarks to Measure Progress:* Monitoring protocols – including time-bound targets of renewable energy use, benchmarks and indicators of progress– should be built into renewable energy and other sectoral and national policies. Identifying measurable indicators is challenging, given the general paucity of data.
12. *Need for Greater Dissemination of Information:* Wider dissemination of reports and studies on impacts of energy development on the economy would aid overall development of energy policy and renewable energy development.

Finally, preliminary recommendations were made to promote and develop renewable energy which can inform national agencies responsible for energy policy and related sectors, as well as regional and international agencies that have a mandate either to offer funding for projects or provide technical support in a variety of areas. Specific recommendations made are presented in the following table.

RECOMMENDATIONS	
<b><i>Policy and Institutional Framework:</i></b>	
1.	Develop strategic packages of incentives and public education aimed at overcoming risk aversion of consumers, firms and lenders towards investment in renewable energy options. Risk aversion is a major obstacle that must be addressed in order for the sector to move forward.
2.	Make climate change mitigation a policy priority even though the Region is not a major emitter of greenhouse gases. Mitigation contributes to adaptation as it involves the use of renewable energy and energy efficient technology. In reducing their own carbon footprint, the countries are helping to strengthen their economic resilience. A policy environment supportive of mitigation also would be favourable to development of the renewable energy sector.

3.	Rank priorities identified in policies. The direction a country takes will depend on the goals considered most important: An environmentally sustainable energy mix? Reduction in foreign exchange use by using more indigenous sources? A competitive market? Greater capacity in terms of human development? While all these are laudable and complementary goals, governments have to determine which are most critical and identify when priorities might change. Engaging stakeholders in policy development is critical to include multiple perspectives in the prioritisation process and for buy-in and support to implementation.
4.	Assess impact of policies on other sectors while developing energy policy. Although the cross cutting nature of energy is often recognised, policies rarely acknowledge the impact that energy policies will have on existing policies relating to tourism, customs, agriculture, fisheries, coastal zone management, etc. Care should be taken to make sure these aspects are not overlooked in developing energy policies. Again, stakeholder participation in policy development is critical.
5.	Ensure policy stability as much as possible and reduce the occurrences of policy changes being made automatically with change of government.
6.	Identify and reserve land with favourable characteristics for development of renewable energy.
7.	Ensure clear institutional roles, responsibilities and accountability mechanisms are included in policy formulation and implementation.
8.	Eliminate contradictions within policy statements, decisions, regulations and legislation.
9.	Develop energy policies to address issues of energy efficiency.
<b><i>Finance and Technical Support for Institutional Strengthening</i></b>	
10.	Establish tailored grant and concessional loan facilities and subsidies to overcome widespread risk aversion and budget constraints in the private and public sectors.
11.	Pool funding from various sources to address scale and fiscal constraints/issues at the national level.
12.	Develop programmes and incentives to overcome economy of scale constraints related to equipment, maintenance, technical know-how and finance, especially on smaller islands and for smaller businesses.
13.	Use market-based instruments to encourage the use of energy efficient technologies in homes and businesses.
14.	Strengthen institutional capacity for sound energy planning and management at the national and regional levels.
15.	Provide institutional strengthening and assistance for administrative and management functions such as the formulation of terms of references and requests for proposals at both the national and regional levels to enable agencies to pursue renewable energy development opportunities.

<i>Sustainability</i>	
16.	Develop data collection and monitoring systems to track progress and impacts and to generate data on which to base investment decisions and policy reforms.
17.	Integrate renewable energy and 'greening' into building design, architecture and building codes.
18.	Consider mandating hotels to adopt green certification to support sustainability of the tourism industry.
<i>Information and Communication</i>	
19.	Develop the information base needed to set policy goals, targets and strategies and to reduce the risk of project failure.
20.	Improve dissemination of relevant studies and other literature.
21.	Increase public awareness on the importance of energy efficiency, developing renewable energy and transitioning to a green economy.
22.	Assess the scale at which renewable energy can be accommodated on the electric utility grid.



# Introduction

The Caribbean Development Bank (CDB) contracted the Caribbean Natural Resources Institute (CANARI) to undertake a detailed study for publication, entitled “*A New Paradigm for Caribbean Development: Transitioning to a Green Economy*”. The main objective of the study is to augment the regional and international dialogue on the Green Economy in the context of inclusive and sustainable development. The study contributes to knowledge about and understanding of the fundamental requirements for transitioning to a Green Economy in the Caribbean and the attendant implications for policy and institutional arrangements. The study offers new and innovative ideas to promote green, inclusive, sustainable development as well as assesses the net socioeconomic and environmental impacts of moving to a Green Economy. It is intended to help countries craft green development strategies by providing practical recommendations to governments and other key stakeholders in the development process on how to identify and exploit green opportunities for productive transformation and, by extension, economic, social and environmental sustainability.

Much of the interest in green economy, in the Caribbean as elsewhere, revolves around its implications for the energy sector. Most Caribbean countries clearly want to reduce dependence on fossil fuels through the development of indigenous alternative sources that are more sustainable and include renewable energy and energy efficiency within broader strategies to green key sectors. Policymakers in the Region are looking for concrete advice and direction with respect to renewable energy for electricity generation and other areas of economic activity. They need economic data on the costs and benefits of switching to renewable energy, including information on the potential for significant foreign exchange savings, revenue enhancement, employment generation and environmental impacts.

Chapter 1 of this study broadly scopes the evolution of the green economy concept internationally and in the Caribbean region. The chapter reviews the main drivers of the concept and the main current and emerging sources of finance for green economy initiatives and transformations. Chapter 2 reviews opportunities and requirements for introducing renewable energy in three major industries identified by the CDB: utility scale grid-tied electricity generation, tourism and construction. Chapter 3 presents a conceptual framework for measuring the net socio-economic impact of green economy transitions (with an emphasis on renewable energy), and applies it to selected Case Studies from the Region. Chapter 4 proposes an action agenda for green, inclusive and sustainable development in the Caribbean by recommending priorities and options for key stakeholders, including governments, private sector, non-governmental organisations (NGOs) and regional and international institutions.



# Chapter 1

## Green Economy: Concepts, Definition and Relevance to the Caribbean

### EVOLUTION OF GREEN ECONOMY IN CONCEPT, POLICY AND PRACTICE

The Green Economy (GE) concept has its roots in early ideas around the relationship between sustainable environmental management and economic development. The 1987 Brundtland Commission Report, *Our Common Future*, which introduced the concept of sustainable development to the world, envisioned “a new era of economic growth... based on policies that sustain and expand the environmental resource base”.<sup>1/</sup> Around the same time, pioneering environmental economists, including James Pearce and Edward Barbier, were exploring what sustainable economic development would mean in practice, even employing the term “green economy”.<sup>2/</sup> But while environmental economists continued to develop the concept over the next two decades, the term fell into disuse in the wider development discourse and failed to have much impact on mainstream economic thinking or national development planning.

The term was revived and entered the international development discourse following the global financial crisis of 2008, as national governments and international organisations grappled with ways to reboot the economy in a more sustainable way. Several countries launched “green stimulus” programmes, which were essentially public sector incentive packages for private investment in “green” energy sources and technologies. Among the earliest and most ambitious was Korea’s, launched in August 2008, which proposed “to shift the current development paradigm of quantity-oriented, fossil-fuel dependent growth to quality-oriented growth with an emphasis on the use of new and renewable energy resources”.<sup>3/</sup> UNEP was another early champion, launching its GE Initiative in October 2008.<sup>4/</sup>

The GE concept also resonated in climate change mitigation policy arenas and it became an important theme in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations, starting from the 15th Conference of Parties in Copenhagen in 2009.

While the concept gained momentum, it was not understood the same way by everyone. By around 2010, three distinct “branches” of the GE conceptual tree could be identified, with a focus on:

- (a) a transition towards an economic model based on the sustainable generation of equitable social, environmental and economic benefits. This framing is embraced by civil society and international agencies active in the field of sustainable development, including the Green Economy Coalition ([www.greeneconomycoalition.org](http://www.greeneconomycoalition.org)) and UNEP’s Green Economy Initiative ([www.unep.org/greeneconomy/](http://www.unep.org/greeneconomy/));

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<sup>1/</sup> United Nations. 1987. *Our Common Future*. Report of the World Commission on Environment and Development. <http://www.un-documents.net/our-common-future.pdf>.

<sup>2/</sup> See for example, Pearce, D., A. Markanadya and E.B. Barbier. 1989. *Blueprint for a Green Economy. A report by the London Economics Centre*. London: Earthscan Publications; Barbier, E.B. 1987. The concept of sustainable economic development. *Environmental Conservation* 14(2): 101-110.

<sup>3/</sup> <http://gggi.org/about-gggi/programs-plan-history/>.

<sup>4/</sup> Source for early history of GE: UN Sustainable Development Knowledge Platform, webpage on Green economy: <http://sustainabledevelopment.un.org/index.php?menu=1446>.

- (b) the potential of green sectors and industries as engines of growth. This framing, now commonly referred to as “green growth”, is championed by many OECD countries, private sector interests and international financial institutions. Proponents include the Global Green Growth Institute (GGGI) ([www.gggi.org](http://www.gggi.org)) and the Green Growth Knowledge Platform ([www.greengrowthknowledge.org](http://www.greengrowthknowledge.org)); and
- (c) climate change mitigation and resilience potential. This framing is generally termed “low carbon development” or “climate resilient development” and is widespread in climate change policy circles.

### Defining Green Economy

The wide range of definitions of GE that sprouted up reflects both the similarities and differences between these framings. Environmentally sustainable economic progress is at the heart of most definitions but they differ in terms of how they frame economic progress (e.g., improved quality of life versus economic growth), social and environmental sustainability (e.g., preservation of natural assets versus reducing climate risk):

- (a) “[a GE] results in improved well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP);<sup>5/</sup>
- (b) a GE is “an economy in which economic growth and environmental sustainability work together in a mutually reinforcing fashion while supporting progress on social development” (International Chamber of Commerce Green Economy Task Force);<sup>6/</sup>
- (c) “green growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. It focuses on the synergies and tradeoffs between the environmental and economic pillars of sustainable development” (Green Growth Knowledge Platform);<sup>7/</sup> and
- (d) low carbon development strategies are “forward-looking national economic development plans or strategies that encompass low-emission and/or climate-resilient economic growth” (OECD).<sup>8/</sup>

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<sup>5/</sup> UNEP. 2011. *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers*. Geneva: United Nations Environment Programme.

[http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER\\_synthesis\\_en.pdf](http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf).

<sup>6/</sup> International Chamber of Commerce. 2012. Green Economy Roadmap. p. 10. [http://www.iccwbo.org/Advocacy-Codes-and-Rules/Document-centre/2012/ICC-Green-Economy-Roadmap-a-guide-for-business-policy-makers-and-society-\(2012\)/](http://www.iccwbo.org/Advocacy-Codes-and-Rules/Document-centre/2012/ICC-Green-Economy-Roadmap-a-guide-for-business-policy-makers-and-society-(2012)/).

<sup>7/</sup> <http://www.greengrowthknowledge.org/Pages/About.aspx>

<sup>8/</sup> <http://sustainabledevelopment.un.org/index.php?menu=1448>

### Policy Implications and Strategic Directions

These definitions, although varied, broadly suggest the policy shifts and strategic interventions underpinning transitions to a GE. UNEP has suggested that the policy foundation for GE should include:

- (a) development of a regulatory framework to encourage green investment, protect environmental assets and set standards for sustainable production and consumption (including by governments themselves);
- (b) protection of and investment in natural capital, including through incorporation of the value of natural capital into national accounts;
- (c) encouragement of low carbon technologies and green innovation through direct investment, tax incentives and other measures; and
- (d) investment in work force reskilling to facilitate the shift from “brown” to “green” jobs.

In a recent publication<sup>9/</sup> the Green Economy Coalition highlights five priority areas for policy action, several of which overlap with UNEP’s:

- (a) “measuring what matters”: new definitions of economic progress that include indicators of economic resilience, individual prosperity and well-being and business opportunity in addition to growth;
- (b) financial institution reform to reduce systemic risk and improve the investment environment for green businesses, especially small and medium enterprises;
- (c) emphasis on greening those sectors that consume the most resources or generate the most waste; these include energy, food, housing and transport;
- (d) investment in human resources, through education, skills training and sector strategies aimed at reducing poverty and economic inequality; and
- (e) managing natural systems for the generation of sustainable and equitable benefits.

### Green Economy Uptake and Proponents

United Nations (UN) agencies and other major international development actors strongly promoted the GE concept from 2008 onwards. “Green Economy in the context of sustainable development and poverty eradication” was selected as one of the two themes of the 2012 UN Conference on Sustainable Development (Rio+20).

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<sup>9/</sup> Green Economy Coalition. 2012. *The green economy pocketbook: The case for action*. London: Green Economy Coalition. [http://www.greeneconomycoalition.org/sites/greeneconomycoalition.org/files/Green%20Economy%20Pocketbook%3B%20the%20case%20for%20action\\_0.pdf](http://www.greeneconomycoalition.org/sites/greeneconomycoalition.org/files/Green%20Economy%20Pocketbook%3B%20the%20case%20for%20action_0.pdf).

This represented both GE's high and low points on the international scene, as it brought to light considerable suspicion of and opposition to GE as a new international paradigm. Some governments and civil society voices questioned whether GE represented a disguised attempt by wealthy countries to "commodify nature" and impose new restrictions and conditionalities on economic development and trade in developing countries.<sup>10/ 11/</sup> Rio+20 also offered a forum for groups to promote the different visions of and approaches to GE discussed above. All this controversy was valuable, as it has contributed to a more flexible use of the term, based on an understanding that it can and should be interpreted and approached in different ways depending on context and objectives. And while neither Rio+20 nor subsequent developments have reconciled the three branches of GE described above, there has been some merging and much cross-fertilisation over the past few years.

Since Rio+20, GE has continued to be championed by the international development community and adherents of sustainable development. Beyond a long-standing interest in renewable energy, donor investment has mainly focused on the "soft" side of GE, i.e., concept development and dissemination of learning through initiatives such as the Green Growth Knowledge Platform and the Partnership for Action on GE, a new collaborative initiative among UN agencies. International climate finance has offered a more immediate vehicle for a growing number of interested developing countries to pursue green economic development strategies. UNEP's GE Initiative and the GGGI have provided technical assistance (TA) and limited financial support for some of these initiatives.

Sustainable Energy for All (SE4All) is another UN-led initiative relevant to GE.<sup>12/</sup> Launched in 2011, SE4All's three objectives are to ensure universal energy access; increase energy efficiency; and double the portion of renewable energy in the global energy mix. Voluntary public and private sector commitments to financing these objectives exceeded USD50 million (mn) by 2012 (more recent figures unavailable). This funding is spent directly by the countries and corporate entities making the commitments or is channeled through one of SE4All's "hubs". The hub for Latin America and the Caribbean is the Inter-American Development Bank (IDB).

GE remains popular in international development circles and has spurred a good deal of civil society and government interest. Perhaps the most important outcome of Rio+20 overall was the proposal included in the conference declaration to replace the Millennium Development Goals (MDG), due to expire in 2015, with a broader set of globally agreed Sustainable Development Goals. This proposal has been widely supported, and sustainable development issues are prominent in the discussions now underway on the scope and structure of the "post-2015 development framework". While countries are taking different positions on the extent to which a global agreement should tackle the structural economic aspects of GE transitions, it is likely that the final agreement and goals will, at a minimum, encourage and offer incentives to countries and businesses to embark on GE pathways.

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<sup>10/</sup> Ling, C.Y. and S. Iyer. 2010. Developing countries raise concerns on "green economy" as Rio+20 begins. *South Bulletin* 47:13-14. [www.southcentre.org](http://www.southcentre.org).

<sup>11/</sup> Green Economy Coalition. 2012. Green Economy: Everyone's talking about it. An analysis of the UNCSO zero draft text submissions. <http://www.greeneconomycoalition.org/document/green-economy-analysis-uncsd-submissions>.

<sup>12/</sup> [www.se4all.org](http://www.se4all.org)

Despite its progress in policy arenas, with a few exceptions such as SE4All, GE's embrace by the private sector has been tepid. Governments have offered a range of fiscal and other incentives, but according to the WB, because of flaws in design and implementation, they have not been very effective in practice.<sup>13/</sup> Concerns about fossil fuel scarcity and energy price volatility have not translated into substantial "green" policy shifts from either governments or businesses.<sup>14/</sup> And while renewable energy costs are dropping as technologies improve, comparable fossil fuel options are still generally cheaper,<sup>15/</sup> and subsidies in many countries increase the price gap. On the other hand, many sectors and businesses have taken on board sustainable development principles and approaches over the past twenty years or so, in some cases pushing governments to do more to protect economically important natural assets and ecosystem services. If GE is to achieve widespread acceptance, its proponents must make far greater effort to engage private sector interests in developing the concept and testing approaches.

### Key Literature

GE has generated a vast literature that can be daunting to navigate. There are, however, a manageable number of sources that offer a comprehensive picture of the GE concept, its evolution and its application in development planning, both globally and in the Caribbean region. Annex 2 provides a lightly annotated list of key references. Largely missing from the literature are robust studies of the policy requirements and economic costs and benefits of implementing GE programmes and actions in specific locations. The research that has been done (some of which is discussed in Chapter 3 of this report) has mainly been for municipal areas in North America or Europe, where data are abundant and policy contexts and economic drivers very different from those found in the Caribbean and other developing countries and regions. This study seeks to contribute to the filling of that gap.

## GREEN ECONOMY IN THE CARIBBEAN<sup>16/</sup>

### Caribbean Economic Overview

The geographic extent of the Caribbean region can be defined in many ways. In this paper we refer specifically to the Borrowing Member Countries (BMCs) of the CDB. This definition includes most of the English-speaking countries of the Caribbean Basin plus Haiti and Suriname and reflects the wide economic, ecological and social diversity of the Region.

<sup>13/</sup> See pp. 47-52 in World Bank. 2012. *Inclusive Green Growth: the Pathway to Sustainable Development*. Washington, D.C.: The World Bank. [http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive\\_Green\\_Growth\\_May\\_2012.pdf](http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf).

<sup>14/</sup> See p. 14 in Cantore, N. with A. Antimiani and P.R. Anciaes. 2012. *Energy price shocks: Sweet and sour consequences for developing countries*. ODI Working Paper 355, August 2012. London: Overseas Development Institute. <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7794.pdf>.

<sup>15/</sup> See p. 15 in IRENA. 2013. *Renewable power generation costs in 2012: an Overview*. Abu Dhabi: International Renewable Energy Agency Secretariat. [http://www.irena.org/DocumentDownloads/Publications/Overview\\_Renewable%20Power%20Generation%20Costs%20in%202012.pdf](http://www.irena.org/DocumentDownloads/Publications/Overview_Renewable%20Power%20Generation%20Costs%20in%202012.pdf).

<sup>16/</sup> Parts of this section draw heavily on a 2010 background paper prepared by CANARI for the regional Green Economy Dialogue: [http://www.canari.org/documents/Caribbeanneweconomyconferencebackgroundpaper25Jan11\\_000.pdf](http://www.canari.org/documents/Caribbeanneweconomyconferencebackgroundpaper25Jan11_000.pdf).

### Structure of Caribbean Economies

Most Caribbean economies are dependent on natural resources. Tourism, the Region's major economic sector, and agriculture, the mainstay of rural economies, are both characterised by a mix of externally driven production systems and markets (export crops such as banana and sugar cane in the case of agriculture, resorts in the case of tourism) and somewhat "greener" systems and approaches (small scale peasant agriculture, agro-processing, fair-trade, nature and heritage tourism). A few economies are heavily dependent on non-renewable natural resources (e.g. bauxite in Jamaica and petroleum and natural gas in Trinidad and Tobago). Caribbean small island economies are highly vulnerable to natural disasters.

Export markets have dominated the economy, and their structures, products and operations have been largely determined by trade partners and indirectly by northern consumers. This model has contributed to vulnerability to global economic volatility and shocks, negative environmental externalities, employment insecurity, poor labour standards, and a host of social and economic problems. On the other hand, it has also driven some changes in a more positive direction – for example, the introduction of markets for Fair Trade products, which mitigated to some extent the impacts of the loss of preferential markets in recent decades, and of demand for sustainable tourism practices, which has nurtured a niche market and influenced the practices of more mainstream tourism enterprises. These drivers may not, however, spur businesses to make holistic changes; for example, consumer demand for nature tourism and sustainable practices may contribute to reduced impact on the environment, but not necessarily to improved labour practices or increased local procurement.

### The Economic Policy Environment

For the last twenty or more years, the economies of the Region have been guided by liberal economic principles introduced by IFIs, trade partners and development assistance agencies. With the encouragement of IFIs, most countries abandoned long-term national development planning in the 1990s (although it is beginning to return, partly in response to new practices and requirements of donor agencies). In place of comprehensive planning frameworks reflecting long-term national goals and objectives, governments have relied on tax and other, often piecemeal, incentives to keep the economy lurching forward.

In such a policy and economic environment, with the added uncertainties associated with the impact of disasters, the focus of the private sector, and particularly foreign companies, has been on short-term returns rather than longer-term socially, environmentally and economically sustainable investment strategies.

### The Institutional Environment

While the discourse of both government and regional organisations reflects and promotes an integrated approach to development, in practice, their programmes and activities are often disconnected, with "sustainable development" remaining separate from "economic development" (and sustainable development activities being limited, in many cases, to environmental projects). Reductions in fiscal revenue and Official Development Assistance (ODA) have also reduced the capacity of public institutions to address development issues in a strategic and innovative manner.

### Energy Production and Consumption

The rise in global oil prices, and the expectation that they will rise much higher, has stimulated businesses around the world to begin investing in renewable forms of energy. Regional and global agreements on climate change mitigation targets and incentives are also driving investment in renewable energy, especially in the North and the large emerging economies. This trend is not occurring to nearly the same degree in the Caribbean, however. Mitigation is not a policy priority, given the Region's relatively low contribution to greenhouse gas emissions and the exclusion of Caribbean countries from international target agreements. The PetroCaribe agreement, which allows participating countries of the Region to purchase oil from Venezuela at preferential lending rates, has limited demand for alternative energy options in other countries of the Region. However, the cost of energy for domestic and commercial use is very high in many Caribbean countries, offering both potential supply-side and demand-side opportunities for alternative sources and increased efficiency.

### RATIONALE FOR A CARIBBEAN GREEN ECONOMY APPROACH

The three converging issues that sparked the GE concept – climate change, the global economic crisis and sustainable development – are all highly relevant to the Caribbean.

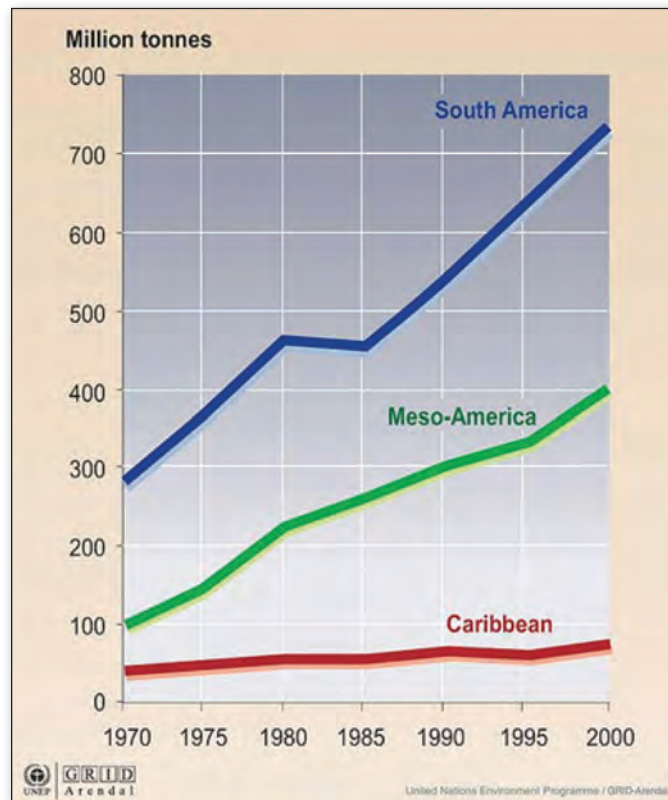
*Climate Change:* Small island states have been identified by the UNFCCC as among the most vulnerable to climate change, particularly the impacts from sea level rise and increased frequency and intensity of hurricanes<sup>17/</sup> (UNFCCC 2007). The anticipated impact of climate change on the Caribbean is highly disproportionate to the Region's small contribution to greenhouse gas emissions<sup>18/</sup> (see Figure 1).

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<sup>17/</sup> UNFCCC. 2007. *Report on the expert meeting on adaptation for small island developing States*: Report by the Secretariat. Item 8a on the Provisional Agenda of the 26th Session of the Subsidiary Body for Implementation, Bonn, 7-8 May 2007. <http://unfccc.int/resource/docs/2007/sbi/eng/11.pdf>.

<sup>18/</sup> One exception is the emissions contribution of air travel to and from the Region.

FIGURE 1:

REGIONAL DIFFERENCES IN CO<sub>2</sub> EMISSIONS  
LATIN AMERICA AND THE CARIBBEAN <sup>19/</sup>

Climate change poses a substantial threat to the Caribbean's main economic sectors, particularly tourism and agriculture. Both already suffer periodic collapses following hurricanes and other natural disasters. Coastal erosion has been costly for the tourism industry, and sea level rise will increase the impact. Climate change also poses a threat to scarce potable water resources on many islands.

A study by the Caribbean Catastrophe Risk Insurance Facility suggests that climate change could increase already high losses from climate-related events in the Region by 1-3 per cent (%) of Gross Domestic Product (GDP) annually.<sup>20/</sup> The report underlines the need for urgent cost-effective adaptation measures. Clearly there is also a need for diversification to reduce dependency on highly vulnerable economic activities.

<sup>19/</sup> UNEP/GRID-Arendal. 2005. *Regional differences in CO<sub>2</sub> emissions Latin America and the Caribbean*. UNEP/GRID-Arendal Maps and Graphics Library.

[http://maps.grida.no/go/graphic/regional\\_differences\\_in\\_co2\\_emissions\\_latina\\_merica\\_and\\_the\\_caribbean](http://maps.grida.no/go/graphic/regional_differences_in_co2_emissions_latina_merica_and_the_caribbean).

<sup>20/</sup> CCRIF. 2010. *Enhancing the climate risk and adaptation fact base for the Caribbean: Preliminary results of the ECA study*. CCRIF's Economics of Climate Adaptation (ECA) Initiative. Grand Cayman, Cayman Islands: Caribbean Catastrophic Risk Insurance Facility.



*The Global Economic Crisis:* Given their highly open economies, it is unsurprising that most Caribbean countries were severely affected by the crisis of 2008 and have been extremely slow to recover. The latest figures from the International Monetary Fund (IMF) indicate that Caribbean countries continued to experience sluggish or even negative growth through 2012, and little improvement is foreseen through 2014.<sup>21/</sup>

Depending on how it is framed and implemented, GE approaches could help Caribbean economies become more productive and resilient. For example, GE provides a potential solution to the weak economic performance and vulnerability to global volatility of key sectors, through the introduction of new value added economic activities; increased efficiency and reduction of waste; and the generation of green jobs. It also may offer a way out of its dangerous dependency on fossil fuels, through exploitation of the Region's largely untapped potential for renewable energy generation.

GE could potentially provide a tool for confronting the impacts of climate change. Caribbean economic vulnerability is already exacerbated by high disaster risk, and that risk is expected to increase with climate change, through more frequent tropical storms and hurricanes; rapid coastal erosion through sea level rise; and changes in fisheries and agricultural production patterns. Caribbean countries invest heavily in disaster preparedness and recovery. A GE approach to economic development could incorporate a strategic shift from preparedness and adaptation to more sustainable climate and disaster resilience, while also contributing, albeit at a small scale, to global efforts to reduce carbon emissions. Regional institutions such as CDB and the Caribbean Community Climate Change Centre (CCCCC) would have an important role to play in supporting countries to make such shifts.

### Evolution of a Caribbean Green Economy Vision and Agenda

#### *Caribbean Governments in the Vanguard*

The notion of “greenness” has been part of the economic development discourse of the Caribbean long before the term “GE” found international favour. Dominica, for example, has promoted itself as “the nature isle of the Caribbean” for decades. The Caribbean Alliance for Sustainable Tourism was established by the Caribbean Hotel Association in 1997, and the Caribbean Community (CARICOM) launched the Caribbean Renewable Energy Development Programme (CREDP) in 2004. CARICOM also established a Regional Energy Programme in 2008 with emphasis on renewable energy development. Through these and many similar initiatives, GE concepts and approaches have been around the Caribbean for some time.

The year 2009 probably marks the start of the present era of GE in the Caribbean, when the term itself was chosen by politicians in a few countries as a strategy to get economies moving again following the global economic crisis, and to make them more resilient to climate change, market volatility, oil price rises and other external shocks and risks. In a key speech laying out a national development strategy that year, the late Prime Minister of Barbados David Thompson stated his aim to make Barbados the “most environmentally advanced “green” country in Latin America and the Caribbean”.<sup>22/</sup> The Barbados Government followed

<sup>21/</sup> <http://www.imf.org/external/pubs/ft/survey/so/2013/CAR101113A.htm>.

<sup>22/</sup> Cox, N. 2009. *On the path to green*. Barbados Advocate, 31 March 2009. <http://www.barbadosadvocate.com/newsitem.asp?more=columnists&NewsID=2790>.

up on this challenge in 2010 when it joined forces with the University of the West Indies and UNEP's GE Initiative to prepare a national GE Scoping Study.<sup>23/</sup> The same year, President Bharrat Jagdeo of Guyana, another strong advocate, launched Guyana's Low Carbon Development Strategy,<sup>24/</sup> one of the first in the world. Also in 2009, the Government of Jamaica introduced its Vision 2030 National Development Plan,<sup>25/</sup> which reflects many GE ideas and mainstreams a number of GE-related outcomes.

Green Economy Promoted Through Regional Initiatives

## BOX 1

## CARIBBEAN NATIONAL GREEN ECONOMY INITIATIVES

Guyana's Low Carbon Development Strategy aims to shift the country to a low carbon pathway with financing generated through preservation of its vast tropical forests. The strategy is built around Reducing Emissions from Deforestation and Forest Degradation plus (REDD+) financing available from the FCPF (see next section for detailed information on REDD+). The major initial funder is the Government of Norway, which has pledged up to USD250 mn, of which about half has now been disbursed. The funding is being invested in renewable energy (especially hydropower) and "green" rural development initiatives. The Government of Barbados has put GE at the heart of its current growth and development strategy. The Green Economy Scoping Study, launched in 2012, sets out a "roadmap", including detailed policy recommendations, for a transition to a green economy in five key sectors: (i) agriculture; (ii) fisheries, (iii) housing and construction; (iv) transport; and (v) tourism. While national leaders have hailed the study as a major accomplishment, its recommendations are yet to be formally endorsed by Government and its fate is therefore somewhat uncertain.

*Green Economy Promoted Through Regional Initiatives*

Momentum grew through regional and international GE initiatives. In late 2009, the GE Coalition invited CANARI to organise a Caribbean GE "dialogue", one of a series the Coalition was sponsoring around the world. The Caribbean dialogue brought together the views of a wide range of stakeholders, from politicians and senior civil servants to business people, community activists and natural resource managers. It resulted in a policy paper outlining key steps towards a "green and resilient economy for the Caribbean",<sup>26/</sup> and in the establishment of the Caribbean GE Action Learning Group (GE ALG). The GE ALG is an independent grouping of people from around the Region with expertise in a range of fields relevant to

<sup>23/</sup> United Nations Environment Programme, University of the West Indies and Government of Barbados. 2012. *Barbados Green Economy Scoping Study -- Synthesis Report*

[http://www.unep.org/greeneconomy/Portals/88/documents/SYNTHESIS%20REPORT\\_Barbados.pdf](http://www.unep.org/greeneconomy/Portals/88/documents/SYNTHESIS%20REPORT_Barbados.pdf).

<sup>24/</sup> Republic of Guyana. 2010. *Transforming Guyana's Economy While Combatting Climate Change. A Low Carbon Development Strategy*. Georgetown, Guyana: Office of the President, Government of Guyana.

<sup>25/</sup> Planning Institute of Jamaica. 2009. *Vision 2030 Jamaica: National Development Plan*. Kingston: Planning Institute of Jamaica. <http://www.vision2030.gov.jm/NationalDevelopmentPlan.aspx>.

<sup>26/</sup> CANARI. 2012. *Towards a green and resilient economy for the Caribbean*. CANARI Policy Brief No. 13. Laventille, Trinidad: Caribbean Natural Resources Institute. <http://www.canari.org/documents/CANARIGrEcoPB13-2012final.pdf>.

GE, from macroeconomics to urban planning, rural development and public sector reform.<sup>27/</sup> The full Group met for the first time in mid-2013 to develop a detailed research agenda and programme of work<sup>28/</sup> (see Box 2).

CARICOM has had an interest in aspects of GE as far back as the Port-of-Spain Accord of 1988. This interest is evidenced in many provisions of the Revised Treaty of Chaguaramas (2001) and has been operationalised in CARICOM institutions and programmes including the Caribbean Environmental Health Institute, CREDP, the Caribbean Community Climate Change Centre (CCCCC) and the CARICOM Energy Programme. CARICOM's Regional Energy Policy,<sup>29/</sup> approved in 2013, has a goal of fundamental transformation of the energy sector, placing considerable emphasis on actions towards greening the sector, particularly through the rapid expansion of renewable energy sources for electricity generation. CARICOM has also developed a Caribbean Sustainable Energy Roadmap and Strategy (C-SERMS) Framework within which initial targets for the contribution of renewable energy to total electricity generation have been established, namely, 20, 28 and 47% by 2017, 2022 and 2028, respectively. These regional targets were approved by Energy Ministers in 2013. The Regional Framework for Achieving Development Resilient to Climate Change (2009-2015) prepared by CCCCC provides guidance on reducing climate vulnerability, as well as shifting to more low carbon energy pathways.<sup>30/</sup> The Organisation of Eastern Caribbean States (OECS) Secretariat also established a sustainable Energy Unit to provide greater focus on sustainable energy development.

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<sup>27/</sup> CANARI. 2013. *Support green economy pathways in the Caribbean through action learning*. CANARI Policy Brief No. 14. Laventille, Trinidad: Caribbean Natural Resources Institute.

<http://www.canari.org/documents/CANARIPB14English.pdf>.

<sup>28/</sup> CANARI. 2013. *Caribbean Green Economy Action Learning Group Programme of Work*. June 2013. Laventille, Trinidad: Caribbean Natural Resources Institute. <http://www.canari.org/documents/GEALGprogrammeofworkdraftJune2013.pdf>

<sup>29/</sup> CARICOM. 2013. Caribbean Community Energy Policy. Approved 1 March 2013. [http://www.caricom.org/jsp/community\\_organs/energy\\_programme/CARICOM\\_energy\\_policy\\_march\\_2013.pdf](http://www.caricom.org/jsp/community_organs/energy_programme/CARICOM_energy_policy_march_2013.pdf).

<sup>30/</sup> CCCCC. 2009. *Climate Change and the Caribbean: A Regional Framework for Achieving Climate Resilient Development (2009-2015)*. Belmopan, Belize: Caribbean Community Climate Change Centre. <http://www.iadb.org/intal/intalcdi/PE/2013/10773.pdf>.

## BOX 2

## TOWARDS A GREEN ECONOMY RESEARCH AGENDA FOR THE CARIBBEAN

The purpose of the GE ALG is to identify and promote ways in which green economy can advance sustainable development in the Caribbean through shaping visions, perspectives, positions and actions.

The GE ALG's work includes analysis, documentation and dissemination of the results of its research and learning through a range of methods and media, as well as training and capacity building activities. The GE ALG has identified eight areas of initial work based on its assessment of priority needs and taking account of the expertise within the Group.

These areas are:

- (a) Physical and land use planning for green economies.
- (b) Inclusive and participatory governance models to guide new economic development processes and approaches.
- (c) The role of creative industries, including cultural events and sustainable economic development strategies.
- (d) Catalysing, supporting, and empowering Small, Medium and Micro-Enterprises (SMMEs), including the informal sector.
- (e) Managing sustainable energy investments.
- (f) GE approaches to public, private local and foreign investments.
- (g) Sustainability indicators for measuring a green economy.
- (h) Developing a Caribbean "road map" towards green economies.

CARICOM produced a joint Member State position statement on GE for the Rio+20 Summit. It is partnering with UNEP's GE Initiative on a regional project to build the capacity of Caribbean governments to pursue GE pathways.<sup>31/</sup> The Caribbean Single Market and Economy offers a framework for mainstreaming GE in regional economic development policies and strategies. At sub-regional level, the OECS has been a strong promoter of GE investment.

<sup>31/</sup> [http://www.unep.org/greeneconomy/Portals/88/CARIBBEAN/CaribbeanProjectFlyer\\_lowres.pdf](http://www.unep.org/greeneconomy/Portals/88/CARIBBEAN/CaribbeanProjectFlyer_lowres.pdf).

### *Signs of Private Sector Interest*

There have also been some signs of private sector interest, both in green niche markets such as ecotourism that have existed for some time and in new directions. The Caribbean Tourism Organisation holds annual sustainable tourism conferences, and a number of mainstream Caribbean hotels and resorts have achieved certification from Green Globe and other similar programmes for their good environmental and social practices. More than 60 companies and building industry professionals are part of the Trinidad and Tobago Green Building Council ([www.ttgbc.org](http://www.ttgbc.org)), dedicated to fostering “green building practices” in the twin-island state. The Dominica Organic Agriculture Movement brings together farmers and traders in support of making Dominica’s agricultural sector entirely organic.

Some private sector interest has been stimulated by government initiatives. The policy decision of the Nevis Island Government to aim for energy self-sufficiency by 2020 is being operationalised through a recent contract with an American consortium to construct a geothermal energy plant for the island.<sup>32/</sup> Civil society and business organisations are also encouraging private sector involvement. In Barbados, for example, the Future Centre Trust operates Green Business Barbados, an environmental sustainability programme that has certified 15 “green” businesses to date.

The Caribbean Climate Innovation Centre<sup>33/</sup> is a new initiative of the WB, funded by the Government of Canada and jointly managed by the Jamaica Scientific Research Council and the Caribbean Industrial Research Institute. Its purpose is to promote green enterprise and provide technical support and advice to green entrepreneurs in the Region.

### **No Single Definition of Caribbean Green Economy**

This host of national and regional, governmental and non-governmental GE initiatives reflects both the relevance and timeliness of the concept to Caribbean contexts and priorities, and the diversity of ways GE can be understood and approached. Some initiatives focus largely on public sector policy reform; others on the “greening” of specific economic sectors or on the unrealised economic potential of certain environmental resources. Some, like the GE ALG, promote transformational change in how Caribbean development challenges are understood and approached. Others, like Nevis’s renewable energy initiative, have much more specific and operation-oriented aims, although often linked to a broader commitment to GE. While it would be pointless to try to capture this vast range of perspectives in a single definition of “Caribbean GE”, they all form part of a coherent and mutually reinforcing regional effort towards an economic pathway that is more resilient, productive and environmentally sustainable.

### **Green Economy in the Caribbean and Renewable Energy and Energy Efficiency**

Whatever the definition of GE adopted, inevitably the energy sector must remain a main area of focus. Given the intricate link to the economy, and because energy production is still predominantly fossil fuel based,

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<sup>32/</sup> <http://thinkgeoenergy.com/archives/17213>.

<sup>33/</sup> <http://caribbeancic.org>

renewable energy (RE) and energy efficiency (EE) will always emerge as key GE dimensions. In addition to greenhouse gas reduction, RE for energy generation is critical to the sustainable energy future of the Caribbean. RE is critical for energy diversification, increased energy security, enhanced competitiveness, economic, social and environmental sustainability. EE is an established mitigation option in its own right, but is also considered to be the twin dimension of RE interventions as it will improve the impact of RE. EE is therefore an important part of achieving GE objectives in the Caribbean, especially since a large percentage of imported energy is wasted or lost in transformation and end-use devices. This study, however, will focus on the role of RE in the greening of Caribbean economies.

## **GREEN ECONOMY FINANCING OPPORTUNITIES AND MECHANISMS**

### **Overview**

The “policy implications and strategic directions” identified in the first section of this Chapter offer a useful initial framework for assessing investment needs, globally, regionally and nationally. This section looks at the ways in which actions within that framework, and particularly their energy-related aspects, are being financed around the world, and what sources and mechanisms have worked or are worth exploring by CDB BMCs. The section also examines the existing or potential applicability of each of the finance sources and strategies discussed to the Caribbean context.

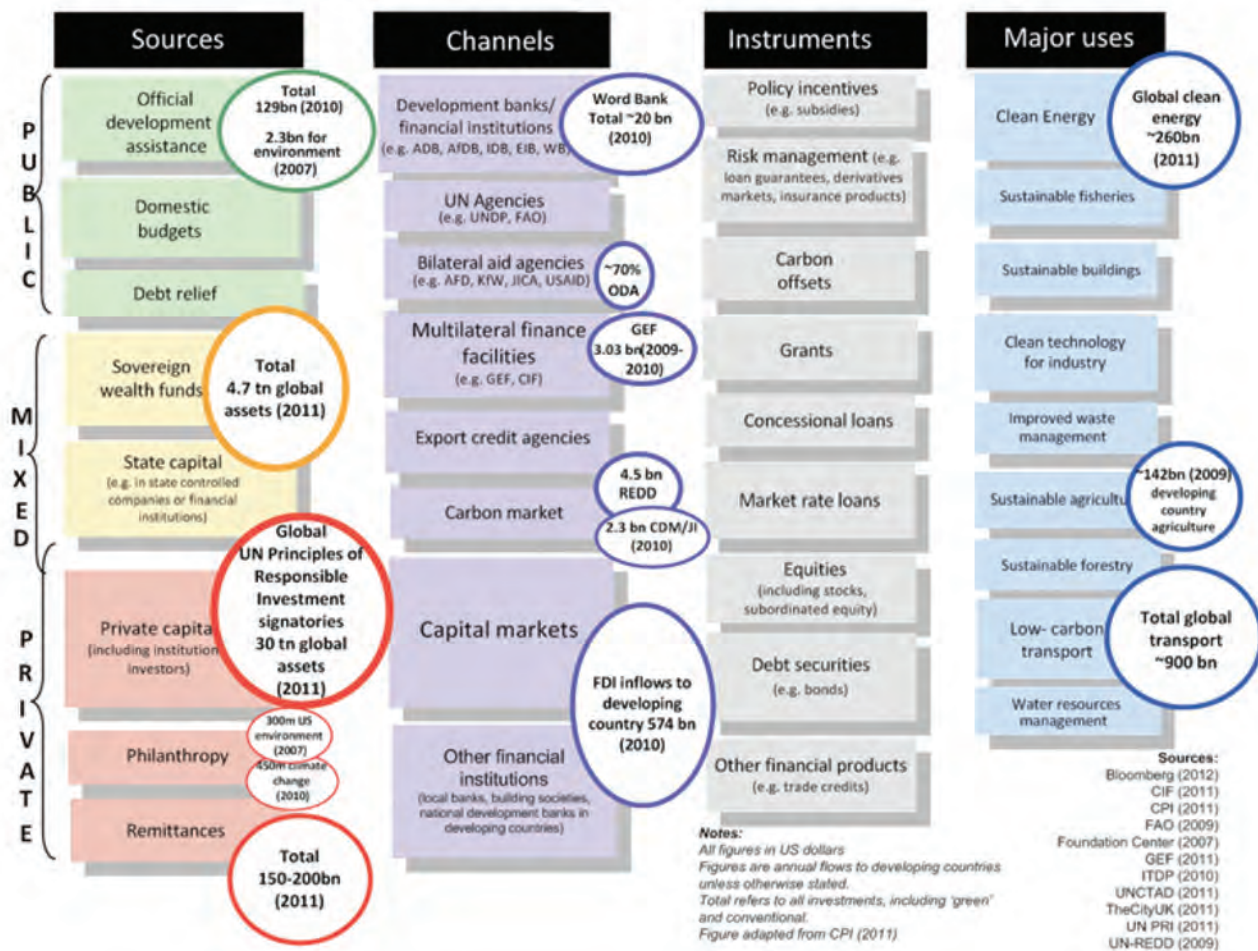
The UN Commission on Sustainable Development conducted a detailed review of the global GE financing landscape ahead of Rio+20 in 2012.<sup>34/</sup> The review identified a wide range of existing and proposed finance sources, channels and instruments, which are graphically presented in Figure 2. The figures in the graphic are rough estimates of funding required to achieve a GE transition globally.

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<sup>34/</sup> UNCSO. 2012. *Finance for the transition to a green economy in the context of sustainable development and poverty eradication*. Rio 2012 Issues Briefs No. 16, August 2012. UNCSO Secretariat. <http://www.uncsd2012.org/content/documents/529Issues%20Briefs%20-%20Finance.pdf>.

FIGURE 2:

THE GLOBAL GREEN ECONOMY FINANCING LANDSCAPE



Source: UNCSO 2012

There are essentially five types of finance driving this complex landscape: private investment; government investment; ODA; international climate finance; and market-based instruments.

**Private Investment**

While from a market-based economic perspective, GE transitions should be driven largely or entirely by private sector investment, there is first a need to overcome the market failures that constrain that response. These include the unwillingness of businesses to internalise the costs of the environmental impacts of their operations; the cost differential between green and brown technologies; and the constrained investment

climate since the 2008 financial crisis. In the absence of government regulation or incentives, the private sector has been reluctant to invest except in established green market niches, such as ecotourism, solar water heating or organic agriculture. Oil price spikes have been widely seen as an incentive for companies to switch to RE sources, but the cost of switching creates a counterbalancing disincentive, as does the increasing availability and low cost of alternative fossil fuels, notably natural gas. Switching is also hindered by lack of policies and regulations to encourage the change and the lack of capacity in terms of personnel trained in RE compared to those knowledgeable in the area of traditional fossil fuels.

However, a recent report<sup>35/</sup> indicates that in some countries a shift may be occurring. According to public disclosure statements made available to the environmental research organisation Carbon Disclosure Project (CDP), many American companies have started integrating a carbon price into their business strategies. Nearly all of the major United States (US)-based energy companies now have adopted an internal carbon price, along with many other major corporations, ranging from Wal-Mart to Microsoft. While the report does not include information on the impact of this practice on business operations, it clearly provides companies with an internal incentive to invest in climate resilient business practices and technologies. However, one reason that US companies are pricing their carbon footprint is in anticipation of “cap and trade” climate mitigation regulations. Since Caribbean countries are relatively low carbon emitters, they face far less domestic and international pressure to adopt emissions caps. However, Caribbean countries could consider caps proactively as a means to encourage lower carbon footprints especially on the part of the energy sector.

For the most part, Caribbean economies differ from highly industrialised countries in the immaturity of their private sectors; the fragility and insecurity of the business environment (due to the openness and small scale of the economies); and the heavy role of the public sector as an investor and source of employment. Although there is certainly potential to incentivise some private investment where risk is low and returns are high, these characteristics suggest that GE transition strategies that are substantially based on private sector investment are unlikely to be effective in the Caribbean context over the short term. However, Caribbean governments can significantly improve the situation over the longer term by creating a policy environment that offers strong encouragement to green investment. There are examples already from the Region that demonstrate the effectiveness of strong policy signals. These include the development of the solar water heater industry in Barbados and investment in geothermal energy in OECS countries.

### Government Investment

While private sector investment has been constrained by market failures, some governments have heavily invested in GE transitions. Following the 2008 financial crisis, several high-income countries created “green” stimulus packages as part of their response. Notable examples include South Korea (USD115 billion [bn] since 2008); the US (USD50 bn); and the United Kingdom (UK) (USD850 mn).

Even before the recession, some governments were setting up Green Funds and Green Investment Banks. These offer more structured, long-term instruments than stimulus packages, and have the advantage of

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<sup>35/</sup> CDP. 2013. *Use of carbon price by companies as incentive and strategic planning tool. A review of findings from CDP 2013 disclosure*. New York: CDP North America. <https://www.cdp.net/CDPResults/companies-carbon-pricing-2013.pdf>.



being able to attract finance from sources other than government revenues. The UK's Green Investment Bank, which provides loan finance for offshore wind, EE and waste projects, has been capitalised by the government at £3.8 bn (<http://www.greeninvestmentbank.com>). The South African government recently established a Green Fund with an initial capitalisation of around USD80 mn to support a low carbon economic transition (<http://www.sagreenfund.org.za>). At a regional level, African governments called on the African Development Bank in 2011 to establish an Africa Green Fund.<sup>36/</sup> The concept is still under consideration, and it is not clear how the Fund would be capitalised.

Fiscal incentives provide an indirect channel of government investment. Many instruments have been developed by countries around the world to incentivise businesses to invest in green technologies and practices, and for consumers to buy green. However, high debt burdens constrain the ability of most Caribbean governments to allocate public revenues to green initiatives or to invest them in green finance facilities. Those debt burdens have also forced several countries into loan agreements with the IFIs, such as the IMF, which view most fiscal incentives as perverse and price-distorting. Barbados does offer a portfolio of tax incentives for green business practices, many aimed at encouraging fossil fuel alternatives,<sup>37/</sup> but given the country's current economic difficulties, the future of these incentives is uncertain. One indirect way that Caribbean governments may be able to support GE is by channeling revenues from external sources, including donor-funded projects and international climate finance, towards GE initiatives and enterprises.

### Official Development Assistance

Whether channeled bilaterally or through an IFI or other international agency, ODA has been a major driver of GE initiatives in some countries. Several donor agencies and IFIs have made GE or green growth a priority area for engagement. The top bilateral donors globally are: Germany; Norway; the UK; Australia; Denmark; Spain; the European Union; Japan; the US; Canada; and Sweden.<sup>38/</sup> Much of the ODA allocated to GE is not being delivered directly to recipient countries but rather channeled through IFIs, including the WB and the IDB, regional organisations including the Organization of American States (OAS) and international organisations such as UNEP; United Nations Development Programme (UNDP); the Global Environment Facility (GEF); and the GGGI.

While there is no global system to track GE-targeted ODA, the OECD believes the amount has been on the rise, though it may now be leveling off in the face of shrinking ODA budgets. Priority areas of investment include low carbon transport, RE, sustainable agriculture and ecotourism. Globally, bilateral donors contributed more than \$1 bn towards greening the energy sector in 2009; that figure may have risen since.<sup>39/</sup>

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<sup>36/</sup> African Development Bank Group. 2011. *Framework document on the proposed Africa Green Fund (AfGF)*. [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Africa%20Green%20Fund%20Framework\\_Revised%20Version%2024\\_%20Aug%2025\\_edited\\_clean.pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Africa%20Green%20Fund%20Framework_Revised%20Version%2024_%20Aug%2025_edited_clean.pdf).

<sup>37/</sup> "Green business incentives". Website of the Barbados Investment and Development Corporation. [http://www.bidc.com/index.php?option=com\\_content&view=article&id=145:green-business-incentives&catid=87:news-archives&Itemid=167](http://www.bidc.com/index.php?option=com_content&view=article&id=145:green-business-incentives&catid=87:news-archives&Itemid=167).

<sup>38/</sup> UNDESA Division for Sustainable Development. 2013. *A Guidebook to the Green Economy: Issue 4*. <http://sustainabledevelopment.un.org/content/documents/916geguidebook4.pdf>.

<sup>39/</sup> OECD. 2013. *Putting Green Growth at the Heart of Development*. OECD Green Growth Studies. OECD Publishing. <http://www.oecd.org/dac/environment-development/geengrowthanddevelopment.htm>.

ODA has been declining for many years in most Caribbean countries, as donors have prioritised other countries and regions. Nonetheless, the Region continues to receive support from several donors with historical or political ties to the Region, including the European Union (EU), the US, the UK and Canada. Of these, the EU has been an important source of GE-related finance in the Caribbean. The Africa, Caribbean and Pacific (ACP)-EU Energy Facility was established in 2005 “to co-finance projects on increasing access to modern and sustainable energy services for the poor in ACP countries”.<sup>40/</sup> The latest Facility (ACP-EU EF II) has covered the period 2009-2013. The Facility has provided nearly USD20 mn for off-grid RE projects (biomass, biofuel, mini-hydro, and solar) in rural Dominican Republic, and around USD2 mn for solar off-grid projects for Haiti. In the English-speaking Caribbean, it has supported a number of national and multi-country projects aimed at improving the sustainability of the energy sector, with an emphasis on EE and renewables. These have had a total value of close to USD5 mn.<sup>41/</sup> In March 2013, the EU launched the Caribbean Investment Facility with an initial commitment of €40 million (USD52 mn) “to support investment projects in the Caribbean region, boosting potential for economic growth and reducing poverty”.<sup>42/</sup> While not solely directed at green investment, the Facility has provided around USD10.3 mn to develop Dominica’s geothermal energy potential.<sup>43/</sup> The OAS recently completed the Caribbean Sustainable Energy Project, a five-year initiative funded by the EU, which focused on the formulation of sustainable energy policies and strategies and capacity building. The CARICOM Secretariat executed a €1.5 mn Caribbean Renewable Energy Capacity Support (CRECS) funded by the EU which, inter alia, supported capacity building efforts in the Region, including development of three MSc Programmes at the University of the West Indies (UWI); model RE legislations and regional energy awareness programmes. The OECS is executing a TA project funded by CDB with a budget of approximately USD1.5 mn to strengthen framework conditions for EE, but will also support RE efforts.

A number of bilateral donors support GE-related initiatives of the IDB. Several Caribbean countries are eligible for its multi-donor Sustainable Energy and Climate Change Initiative (SECCI), which provides grant funding for projects in RE and EE; sustainable biofuel production; access to carbon markets; and climate change adaptation.<sup>44/</sup> CARICOM Secretariat and the German Government through the German Society for International Cooperation (GIZ) commenced in 2012 a Renewable Energy and Energy Efficiency Technical Assistance (REETA) project based at the CARICOM Secretariat with a budget of €4.5 mn.

### International Climate Finance

International climate finance is a rapidly evolving source of funding for sustainable development linked to the UNFCCC. Climate finance is often lumped with ODA, but the two are distinct.<sup>45/</sup> Donor countries unilaterally decide how and where ODA will be spent, although international frameworks such as the

<sup>40/</sup> <http://www.energyfacilitymonitoring.eu>

<sup>41/</sup> Figures from ACP-EU Energy Facility database:

<http://database.energyfacilitymonitoring.eu/acpeu/PublicProjectOverview.xhtml>.

<sup>42/</sup> European Commission press release. EU launches €40 million Caribbean Investment Facility (CIF). [http://eeas.europa.eu/delegations/barbados/documents/press\\_corner/news/release\\_no7\\_caribbean\\_investment\\_fund\\_launch1.pdf](http://eeas.europa.eu/delegations/barbados/documents/press_corner/news/release_no7_caribbean_investment_fund_launch1.pdf).

<sup>43/</sup> <http://thinkgeoenergy.com/archives/15004>

<sup>44/</sup> <http://www.climatefinanceoptions.org/cfo/node/62>

<sup>45/</sup> The distinction between ODA and climate finance is a subject of debate. Donor countries prefer to consider it as ODA, as it increases their performance against ODA targets, whereas developing countries and civil society advocates have argued that climate finance should be separate from and additional to ODA.

MDGs and the Paris Declaration on Aid Effectiveness provide guidance. Climate finance is based on the agreed responsibility of developed countries to assist low-emitting climate vulnerable countries to respond to climate change. Some, but not all, climate finance is provided through pledges and channels negotiated within the UNFCCC process; other finance comes from donors unilaterally or from non-governmental sources. Climate finance instruments have been designed to support developing countries to implement actions on adaptation, mitigation – including reducing emissions from deforestation and land degradation plus conservation (REDD+) – and resilience building (in which adaptation and mitigation are blended).

The UNFCCC process has recognised Small Island Developing States (SIDS) as among the most vulnerable to climate change impacts and hence eligible for special consideration in the allocation of funding. Haiti is also entitled to special consideration as a Least Developed Country (LDC).

A detailed picture of the current global climate finance architecture has recently been prepared by the Climate Finance Update initiative.<sup>46/</sup> In this crowded landscape, the following mechanisms stand out for their particular applicability to GE transitions in the Caribbean.

#### *Global Environment Facility*

The Global Environment Facility (GEF) ([www.thegef.org](http://www.thegef.org)) was established in the wake of the first UN Earth Summit in 1992 to support developing countries to implement the international conventions on climate change, biodiversity, desertification and Persistent Organic Pollutants. The GEF is implemented through four-year programmes. The current programme, which ends in June 2014, is GEF 5. Under the programme, base allocations for projects on climate change mitigation, biodiversity and land degradation are computed for all eligible countries. These are referred to as STAR allocations. The climate change mitigation focal area is the one most relevant to GE. The GEF 5 STAR allocations for climate mitigation are USD2 mn for each BMC except for Trinidad and Tobago, which is allocated USD2.94 mn due to its higher carbon emissions.<sup>47/</sup> GEF administers two dedicated funds for projects on climate change adaptation: the LDCs Fund and the Special Climate Change Fund. These funds also are available for GE-related actions. Among other projects, GEF 5 has supported:

- (a) CREDP (USD4 mn);
- (b) a project to increase EE and the use of RE in the building sector in Jamaica (USD2.3 mn);
- (c) promotion of access to clean energy services in St. Vincent (\$1.7 mn); and
- (d) promotion of sustainable energy in the Bahamas (USD1 mn).<sup>48/</sup>

<sup>46/</sup> Nakhooda, S., C. Watson and L. Schalatek. 2013. *The global climate finance architecture*. Climate Finance Fundamentals 2. Climate Finance Update, November 2013. London: Overseas Development Institute and Washington, D.C.: Heinrich BöllStiftung North America. <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8685.pdf>.

<sup>47/</sup> [http://www.thegef.org/gef/STAR/country\\_allocations](http://www.thegef.org/gef/STAR/country_allocations)

<sup>48/</sup> Information from the GEF database: [http://www.thegef.org/gef/gef\\_projects\\_funding](http://www.thegef.org/gef/gef_projects_funding).

GEF 6 is now being negotiated. The climate change focal area is likely to place emphasis on the development and scaling up of low carbon technologies, renewables and sustainable transport. Unlike previous programmes, GEF 6 may include some non-grant instruments, increasing its flexibility as a source of GE finance.

GEF funding is notoriously administratively cumbersome, and the amount available for the climate change focal area may be slightly reduced in GEF 6 as other climate finance channels are coming on-stream. Nonetheless, GEF should continue to offer one of the most accessible and reliable climate finance channels available to BMCs. Governments and regional organisations (including CDB) are eligible for GEF funding, channeled through one of GEF's designated agencies, which include the IDB, WB, UNDP, the Food and Agricultural Organization and UNEP. The national portfolio formulation exercises that will take place at the start of GEF 6 offer an opportunity for Caribbean countries to strategically employ GEF funds to further GE objectives.

The GEF also has a decentralised Small Grant Programme (SGP) for community-level initiatives, which operates through national offices in most BMCs. A low carbon energy access focal area is proposed for the SGP in GEF 6.

#### *Adaptation Fund*

The Adaptation Fund ([www.adaptation-fund.org](http://www.adaptation-fund.org)) is currently the main mechanism under the UNFCCC for channeling international climate adaptation finance. A Board comprised of representatives of selected Kyoto signatory countries manages the Fund with support from a Secretariat based at the WB. The Adaptation Fund has not been very active in the Region, having only funded one project, for building adaptive capacity in the agriculture sector in Jamaica. However, CDB is seeking accreditation as an Adaptation Fund Implementing Entity (see below), which could make the Fund more accessible to BMCs.

#### *Forest Carbon Partnership Facility*

The Forest Carbon Partnership Facility (FCPF) ([www.forestcarbonpartnership.org](http://www.forestcarbonpartnership.org)) was created in 2008 under the UNFCCC to incentivise action by developing countries on REDD+. The Facility's Readiness Fund supports countries to develop REDD+ strategies and actions, while the Carbon Fund pays them for verified emissions reductions from those actions. The Funds are capitalised by a mix of public and private sector donations. Countries must apply to be eligible for the Facility. Guyana has achieved eligibility, which has allowed it to receive funding from Norway and potentially other donors towards its Low Carbon Development Strategy (see previous section). Jamaica and Belize have applications pending; few if any other Caribbean countries have the extensive forest resources needed to generate significant Carbon Fund payments.

#### *Climate Investment Funds*

The Climate Investment Funds (CIFs) ([www.climateinvestmentfunds.org/cif/](http://www.climateinvestmentfunds.org/cif/)) are another well-established source of climate finance, managed by the WB. To date, 14 countries have contributed a total of USD 6.5 bn to the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). The largest

donors have been the US, the UK and Japan. There are currently four programmes, three of which fall under the SCF:

- (a) CTF, which supports energy transformations in middle-income countries, has benefitted to date only a small number of (mainly large) countries, none of which are in the Caribbean;
- (b) Scaling up Renewable Energy Programme (SPREP) is for lower income countries. The only Caribbean countries eligible for SPREP, Haiti and Guyana, have requests for support pending;
- (c) Pilot Programme on Climate Resilience has provided funding to many Caribbean countries. However, it mainly funds national adaptation activities such as early warning meteorological systems and is thus less directly relevant to GE transitions; and
- (d) Forest Investment Programme provides support for REDD+ and forest conservation actions. Jamaica has requested support under that programme.<sup>49/</sup>

#### *Bilateral Climate Funds*

Under the UNFCCC Cancun Agreements of 2010, donor countries pledged to provide “fast start” climate finance approaching \$30 bn over two years, in order to fill the funding gap while a long-term financing mechanism is put in place. This fast start finance is being disbursed through a host of bilateral funds. Funds that are active or potentially active in BMCs include the following:

- (a) The Canadian Climate Fund for the Private Sector in the Americas (C2F) offers concessional loans for RE projects in Latin America and the Caribbean. The USD250 mn fund was established in 2012, and is managed by the IDB. See <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37430372> for more information.
- (b) Germany’s International Climate Initiative ([www.international-climate-initiative.com/en/](http://www.international-climate-initiative.com/en/)) has funded several medium-sized projects in the Region, including development of “low carbon energy roadmaps” for the Dominican Republic, Haiti and Jamaica, and a bioenergy project in St. Vincent and the Grenadines.
- (c) Norway’s International Climate Forest Initiative has provided USD115 mn and pledged up to USD250 mn through 2015 to the WB-managed Guyana REDD+ Investment Fund to support implementation of the country’s Low Carbon Development Strategy. [http://www.regjeringen.no/upload/MD/2011/vedlegg/klima/klima\\_skogprosjektet/Infohefte\\_kos\\_nov2012.pdf](http://www.regjeringen.no/upload/MD/2011/vedlegg/klima/klima_skogprosjektet/Infohefte_kos_nov2012.pdf) (See for more information).

<sup>49/</sup> Information on country participation from Climate Investment Funds. 2013. *Approaches and criteria for considering new pilot countries. Paper prepared for the Meeting of the CIF Committee, Washington, D.C., October 28-November 1, 2013.* [https://climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF\\_TFC.12\\_8\\_Approaches\\_and\\_criteria\\_for\\_considering\\_potential\\_new\\_countries\\_0.pdf](https://climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF_TFC.12_8_Approaches_and_criteria_for_considering_potential_new_countries_0.pdf).

- (d) The UK's International Climate Fund, which focuses on low carbon development, has mainly been channeled through the CIFs. However, it is now in the process of revising its strategy and, given the UK's historic support to the Region, may offer opportunities.
- (e) The US Agency for International Development's Global Climate Change Initiative ([www.usaid.gov/climate](http://www.usaid.gov/climate)) has funded projects that include some GE-related activities (e.g., sustainable agriculture and tourism) in Jamaica and the OECS Member States.

### *Green Climate Fund*

Finance has been a major area of negotiation in the UNFCCC, and a long-term financial framework is beginning to fall into place. The Green Climate Fund (GCF) ([www.gcfund.net](http://www.gcfund.net)), which has been legally established and launched but not yet capitalised, is intended to become the major channel for international climate finance, aggregating funds from multiple public and private sources. The modalities of the Fund's operation are now being formulated, with the aim to start mobilising finance by the end of 2014.<sup>50/</sup> The Fund's Board includes two representatives from the Caribbean, one from the Government of Barbados and one from the Government of the Dominican Republic. The GCF is expected to be the primary channel for international climate finance over the long term, and the scale of funding that will flow through it is potentially enormous.

### **Market-based Instruments**

A wide variety of market-based instruments has been developed or proposed to bridge the anticipated gap between the cost of building a climate resilient planet and public and private sector capacity to invest. These market instruments have been controversial in terms of their financial performance, contribution to climate change mitigation and distributional impacts. They continue, however, to have many champions and are likely to continue to be a major component of the climate finance picture for some time to come.

The mechanism of most relevance to BMCs is the Clean Development Mechanism (CDM). The CDM was created under the UNFCCC to support emissions-reducing initiatives in developing countries. Projects that qualify to receive Certified Emission Reduction credits can sell them to historically high-emitting ("Annex 1") countries as "offsets", thereby helping those countries meet their emissions reduction targets. The qualification process for CDM projects is rigorous, and verification and other administrative requirements are onerous. Only two projects in the Region have qualified to date: a bagasse co-generation project in Guyana and the Wigton Wind Farm project in Jamaica.<sup>51/</sup> The UNFCCC recently established an office in Grenada to encourage greater regional uptake.<sup>52/</sup>

<sup>50/</sup> Shalatek, L. and S. Nakhooda. 2013. *The Green Climate Fund. Climate Finance Fundamentals 11. Climate Finance Update, November 2013*. London: Overseas Development Institute and Washington, D.C.: Heinrich BöllStiftung North America. <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8683.pdf>.

<sup>51/</sup> Information from CDM website database: <http://cdm.unfccc.int/Projects/projsearch.html>.

<sup>52/</sup> <http://cdm.unfccc.int/filestorage/s/0/extfile-20130725132513300-2013-25.7-Release-RCC-Grenada.pdf/2013-25.7-%20Release-%20RCC%20Grenada?t=dTN8bXpjaTh1fDDouioFbBCVJqYogMGws22R>.

The concept of green investment funds, including the “greening” of pension or money market funds, has attracted some interest. The International Emissions Trading Association, for example, has proposed the creation of “Green NAMA<sup>53/</sup> Bonds” “aimed at interesting the bond market in low carbon development”.<sup>54/</sup>

### The Current and Potential Role of the Caribbean Development Bank in Green Economy Finance<sup>55/</sup>

As this section has demonstrated, GE financing opportunities are increasingly concentrated in the climate finance arena. It is therefore essential that the Region position itself to take advantage of existing and emerging climate finance opportunities. However, BMCs have only made limited progress in that direction. Accessing climate finance is highly competitive, and the share that BMCs have been able to access, given their limited capacity to develop large numbers of well-evidenced project proposals, is not nearly commensurate with their vulnerability to climate change relative to other countries. In addition, the precarious economic situation of BMCs makes commercial, or even standard concessional, finance unaffordable for large-scale green economic transformations. At least at their initial stages, those transformations will require grants and heavily discounted loans.

CDB sees itself as having a central role in increasing the contribution of climate finance to the economic development of BMCs, and has been developing systematically its capacity to play that role effectively over the past year or so. These efforts are complementary to CDB’s ongoing work to support the development of the RE sector through concessional finance and TA. With funding from the UK Department for International Development, the Bank established the position of Climate Finance Advisor, which has been filled through a secondment from the Government of Barbados for a two-year period. Working in partnership with CCCCC and the German development agency GIZ, CDB is focusing on: (a) increasing the Region’s and individual BMCs’ readiness to access and manage climate finance; and (b) positioning the Bank to be an effective climate finance intermediary.

Readiness efforts are focused on supporting BMCs to establish the systems and mechanisms required to access, implement and absorb climate finance and monitor, report on and verify its use and impacts. This is a major challenge for small states, and in some cases countries may need to pool resources to create sub-regional mechanisms. The Bank is also supporting countries to establish “national designated authorities” to act as focal points and executing agencies for GCF finance. A major task for these authorities will be to integrate climate finance proposals with national development strategies and priorities. The Bank is therefore encouraging countries to establish their national designated authorities within institutions with broad oversight over national development such as, for example, Ministries of Finance or Planning, rather than environment ministries that may not be at the centre of economic decision-making.

The GCF is expected to have a private sector window, and access to finance through that channel could be instrumental in supporting private sector investment in GE transitions, including RE. CDB therefore

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<sup>53/</sup> NAMA is the acronym for Nationally Appropriate Mitigation Actions, i.e., national climate change mitigation strategies.

<sup>54/</sup> IETA. 2011. Green NAMA Bonds: Summary Note.

[http://www.ieta.org/index.php?option=com\\_content&view=article&id=423:green-nama-bonds-summary-note&catid=24:position-papers&Itemid=91](http://www.ieta.org/index.php?option=com_content&view=article&id=423:green-nama-bonds-summary-note&catid=24:position-papers&Itemid=91).

<sup>55/</sup> This section is based largely on interviews with CDB Climate Finance Advisor Selwin Hart (5 February 2014) and Disaster Risk Management Specialist Yuri Chakalall (28 January 2014).

intends to work with the regional private sector over the coming year to sensitise members to the emerging opportunity and to help them prepare to take advantage of it. The main sectors to be targeted are energy (renewable and EE) and climate vulnerable sectors such as water, agriculture and infrastructure.

To better position itself as a channel for climate finance, CDB has recently achieved UNFCCC accreditation, and is seeking accreditation as an Adaptation Fund Implementing Entity in order to directly receive and manage Adaptation Fund finance. With funding from GIZ, the Bank plans to establish a RE and EE unit to improve its ability to develop and successfully guide projects in those areas through the GCF proposal process. CDB is also working with and through the GCF Board Member from Barbados to assure that the Fund is structured in ways that optimise its usefulness to the Region.

It is likely that when the GCF begins operations, there will be fierce competition among eligible countries and a bias towards large, high-impact projects. CDB aims to get the Region ready with eligible projects, and support regional and sub-regional proposals to achieve scale. In addition to GIZ, the EU has indicated interest in supporting CDB in these efforts.

In addition to its efforts on climate finance, the Bank has a few other facilities that could support GE initiatives. These include:

- (a) A €50 mn (USD67 mn) line of credit from the European Investment Bank for mitigation and adaptation projects, subject to CDB appraisal. To date, the Bank has reviewed three projects, which are moving towards the funding pipeline. Eligible projects will mainly be in climate vulnerable sectors, such as water and infrastructure.
- (b) Community Disaster Risk Reduction Trust Fund, a USD23.5 mn multi-donor trust fund with contributions from Canada (USD20 mn), the UK (USD3 mn) and CDB (USD500,000). The Fund, which will end operations in March 2018, provides grants up to USD500,000 for innovative community initiatives that build climate resilience. While the scope of potential projects is broad, the Fund could offer opportunities for projects in RE and other green sectors that contribute to disaster resilience. Short-listed proposals under the first call are now in the final stages of review.
- (c) A natural disaster risk management facility is being negotiated with the EU-ACP Cooperation Programme and other implementing partners. The facility will focus on building resilience in the transport and water sectors.



## Chapter 2

### Moving Towards a Green Economy in the Caribbean: Opportunities and Policy Requirements for Greening Key Sectors Through Renewable Energy

#### CARIBBEAN RENEWABLE ENERGY CONTEXT

The Caribbean region abounds with potential for RE development. Solar energy is available in abundance everywhere; the trade winds make wind a viable option in a number of locations; and geothermal energy has significant potential as a source in some of the states in the Eastern Caribbean. There is also substantial potential for the use of hydropower in countries with a considerable number of rivers and surface water sources. Guyana, Dominica, Jamaica and St. Vincent have hydropower facilities, and are continuing to explore opportunities for further hydropower development. In Belize, Guyana and Suriname, there is also considerable potential for biomass/bioenergy.

Apart from the availability of RE, other drivers favour development of these resources. Small islands are unable to benefit from the economies of scale of large centralised electricity systems, and are more ideally suited to distributed generation which RE systems can provide more efficiently. The high cost of imported petroleum and derivatives is a major constraint to Caribbean economic and social development. Substantial energy security risks are also associated with high import dependence. With fuel prices consistently high and predicted to escalate further, countries may not be able to afford fuel imports, thereby compromising their energy security, economic and social development. Diversifying the energy mix by incorporating RE sources would increase not only energy security but also environmental, social and economic sustainability.

While not a significant contributor to greenhouse gas emissions globally, indications are that the Caribbean will suffer disproportionately the consequences of climate change. RE development domestically and globally is therefore within the Region's self-interest.

In spite of the potential benefits related to the development of RE such as increased energy security and the potential for greater social, economic and environmental sustainability, there remain a number of challenges to RE adoption which so far have led to a relatively slow uptake of the technology in the Caribbean. These barriers are explored further in the course of this Chapter, and include the following which are not listed in order of priority:

- (a) absence of legislation, regulatory institutions and instruments;
- (b) lack of consistent and coherent policies;
- (c) inadequate financing/high levels of public sector indebtedness;
- (d) high initial capital costs;
- (e) inadequate access to land;
- (f) technical limitations (for example, 30% generation limits), related to grid absorption capacity;

- (g) economy of scale limitations;
- (h) high transaction costs;
- (i) limited Research and Development (R&D) resources; and
- (j) inadequate availability of skills.

In an attempt to address some of these challenges, a number of regional programmes have been established over the years. These include, but are not limited to, the initiatives discussed below.

CREDP aimed to address barriers to RE. These were identified as capacity, policy, financing and awareness. The project was implemented with two components: the CRDP/UNDP/GEF component executed by the CARICOM Secretariat; and the CREDP/GIZ component executed by Projekt-Consult based in St. Lucia. The CREDP/ UNDP component was finalised in 2009 within the CARICOM Energy Programme, while the CREDP/GIZ component has entered Phase II and is currently in operation. The Project has impacted development in the Caribbean by providing technical support in policy development, capacity building, resource potential analysis and general information transfer throughout the Region, including the establishment of the Caribbean Information Portal on RE (CIPORE), a one stop point for RE information in the Caribbean. These activities have not, however, in most cases translated into significant RE projects on the ground.

The CARICOM Unit was established in 2008 to provide greater regional focus on energy matters and to develop and execute a Regional Energy Programme. Activities so far include finalisation and approval of the CARICOM Energy Policy in 2013; establishment of improved regional coordination; and a strategic approach for RE and EE advancement.

The EU-funded Caribbean RE Capacity (CRECS) Project was executed under the Regional Energy Programme. Through CRECS, a regional CARICOM Energy Week; model legislations for RE; and a model sustainable awareness programme were developed.

With IDB support, the C-SERMS framework was also established to provide a more strategic approach for RE development and EE. This has included strategy formulation; tools for improved energy information management; and a C-SERMS Platform for coordination of activities among countries. Within the C-SERMS framework, regional initial targets for RE were approved by energy ministers along with an agreement that a net-billing approach for grid feed-in for small scale distributed RE be used. The initial targets for RE contribution to total electricity generation were established for short, medium and long term horizons viz: 20, 28 and 47% for 2017, 2022, and 2027, respectively.

Organisations such as OAS, IDB and the WB have been involved in establishing projects or providing technical or financial support to existing projects. OAS has been involved in providing technical support for the formulation of energy policies in many countries. It has also been involved in the establishment of GeoCaribe, a regional project focused on geothermal energy development in Nevis, St. Lucia and Dominica. IDB has provided loans in the Caribbean for a number of policy projects and programmes designed to establish mechanisms that make financing for RE technologies more accessible. One example is the Sustainable Energy Investment Programme (the Energy SMART Fund) in Barbados.

## BOX 2

## TOWARDS A GREEN ECONOMY RESEARCH AGENDA FOR THE CARIBBEAN

The Barbados SMART Fund consists of the following:

- **Technical Assistance (TA) Facility** (BBD1 mn) provides TA grants to businesses for funding pre-investment studies of renewable energy and energy efficiency projects, to assess their technical and financial viability and support implementation.
- **EE Retrofit and RE Finance Facility** (BBD12 mn) provides subsidised loans to businesses for financing the implementation of viable renewable energy and energy efficiency projects.
- **Pilot Consumer Finance Facility** (BBD1 mn) provides interest rate rebates or rebates on retail prices (subsidies) to selected retailers that have experience in 'hire-purchase' consumer finance, and who will in turn offer better hire-purchase terms to their customers for purchasing renewable energy and energy efficiency enhancing equipment.
- **Compact Florescent Lamp (CFL) Distribution Facility** (BBD1 mn), a grant facility which provides free CFLs to a limited number of residential customers of Barbados Light and Power (BL&P), through the issuance of vouchers.
- **Air-conditioning Rebate Trade-In Facility** (BBD3 mn), a grant facility, provides a 50% instant rebate for households and businesses to replace older air-conditioning models with more energy efficient and ozone-depleting-substance (ODS) free systems.
- **Discretionary Grant Facility** (BBD2 mn) provides grants for institutional support to execute the Energy SMART Fund through facilitation of public awareness and education programmes to promote the importance of renewable energy and energy efficient technologies, support data collection and monitoring of the programme. ([www.energy.gov.bb/web/energy-smart-fund](http://www.energy.gov.bb/web/energy-smart-fund)).

World Bank funding has helped in developing regulatory frameworks specifically for the Independent Regulatory Commission in Dominica and also the Eastern Caribbean Energy Regulatory Authority (ECERA) which will be established as the body to regulate the energy sectors in Grenada and St. Lucia.<sup>56/</sup>

The Caribbean Electric Utility Service Corporation (CARILEC) is an association of utilities established to represent their interests and to be involved in addressing issues surrounding Independent Power Producer

<sup>56/</sup> The body was originally established to regulate the power industry for all of the islands in the OECS. However, only the governments of St. Lucia and Grenada have agreed to be a part of it.

(IPP) legislation, liberalisation and regulatory break-up. The utilities stand to be affected in their operations if grid-tied renewable technologies such as solar photovoltaics (PV) and wind are adopted. This will mean the possible introduction or expansion in number of IPPs and that Power Purchase Agreements (PPAs) will have to be established between the IPP and the utility. The utilities have an interest in ensuring that the resulting contracts do not negatively affect the financial viability of their operations. Regulations that seek to encourage competition by establishing markets in the area of generation or transmission and distribution can affect revenue flows of the companies. In some cases, the utilities are keen to take part in competition in the RE market, and want to make sure that their ability to compete is not hampered by existing or future regulations.

The Organisation of Caribbean Utilities Regulators has been established to analyse liberalisation issues from a regulatory perspective. With many countries seeking to establish competition in the electricity generation market, the level and nature of regulation of the utilities is in the process of changing from traditional rate of return regulation, where there is a guaranteed percentage earnings on investments, to one where incentives for efficiencies are being incorporated. Regulatory schemes such as price cap, revenue cap and performance-based regulation are being developed. Ensuring efficiency in all parts of the electricity production chain is an important part of establishing a competitive market.

The three campuses of the University of the West Indies (UWI) in Cave Hill, Barbados, St. Augustine, Trinidad and Mona, Jamaica have all embarked on initiatives designed to increase understanding of the ways in which renewable energies can be harnessed to their maximum technical and economic potential.

1. UWI Cave Hill has established a Masters programme in RE Management and a RE Lab for R&D.
2. UWI Mona has established a RE research group within the Department of Physics. The University also offers a Certificate Course in Alternative Energy.
3. UWI St. Augustine has established a Masters of Science programme in RE Technology within the Faculty of Science and Technology.

The IDB-funded Caribbean Hotel Energy Action Plan (CHENACT) was established to assist hotels in the Region in attaining economic and environmental sustainability through EE enhancements. The pilot in Phase I was undertaken for Barbados, St. Lucia, Grenada, Antigua, St. Vincent and the Grenadines and St. Kitts and Nevis. Energy audits were undertaken in hotels in the countries identified and recommendations made particularly with respect to lighting and air conditioning. To date, there appears to have been no implementation of the recommendations.

## **RENEWABLE ENERGY DEVELOPMENT IN SELECTED BORROWING MEMBER COUNTRIES**

### **Initiatives in the Region**

At the country level, many governments have sought to implement policies aimed at increasing the use of RE, and the CARICOM Secretariat itself has established an Energy Desk that has provided frameworks and roadmaps for individual countries to pursue their own paths to RE development and sustainability.

Some initiatives undertaken by BMCs in the last ten years are identified in Table 1.

TABLE 1

**SELECTED INITIATIVES UNDERTAKEN BY  
BORROWING MEMBER COUNTRIES IN THE LAST TEN YEARS**

Country	Renewable Energy Projects	Renewable Energy Policies, Institutions and Programmes
Anguilla		National Energy Policy.
Antigua and Barbuda	PV Demonstration at the Government Headquarters PV Street Lighting Project Wind Assessments.	National Energy Policy and Sustainable Energy Action Plan.
The Bahamas	Waste to Energy	Sustainable Energy Programme.
Barbados	Plans to implement 11 Megawatts (MW) wind Farm at Lamberts Planned PV installations for secondary schools Planned PV project for government buildings Solar stills installed at secondary schools; PV installation for ice production at Skeete's Bay fishing village PV power at bus stations Biodiesel project at Future Centre Trust PV development at Harrison's Cave Solar Water Heater production Increased use of PVs for home use.	Masters programme in RE Management GE Scoping Study RE Rider Establishment of Barbados RE Association National Energy Information System Energy SMART Fund for RE and EE Establishment of Electricity Light & Power Act Sustainable Energy Framework (SEF) National Sustainable Energy Policy (NSEP).
Dominica	PV at hotel resort Geothermal Project under development with production targeted for end of 2015 Hydropower facilities.	Legislative Reform Electric Supply Act National Energy Policy Geothermal exploration financing from the EU.
Grenada	100 Grenada Solar Power Ltd. (GRENSOL) PV systems installed Solar Water Heater (SWH) installations.	Net Metering Project (now rescinded) Interconnection Policy.

Country	Renewable Energy Projects	Renewable Energy Policies, Institutions and Programmes
Guyana	Plans for Hydro 150 MW Cogeneration at sugar plant Plans for 10 MW wind farm Solar PV systems in Hinterland Traffic lights all powered by PV Bio-diesel production/supply some public transport.	Unserved Area Electrification Programme Power Sector Support Programme Guyana Energy Policy Low Carbon Development Strategy.
Jamaica	Wigton Wind Farm E-10 Ethanol gasoline blend programme Waste to Energy Project Solar Street Lighting Hydro energy Great River Project Bagasse Cogeneration St. Thomas.	2020 RE Policy Utility Regulation Act for Self Generation 15% externality benefit on RE tariffs for IPPs Vision 2030 National Policy RE Research group at UWI Mona IDB project for EE in the public sector Worldwatch Institute RE Roadmap.
Montserrat	Geothermal Energy Project	National Energy Policy
Nevis	Wind farm development Plans for Geothermal exploitation	
St. Kitts	Plans for wind farm at Bellevue PV installation at airport	
St. Lucia	Plans for wind farm at Sugar Hill PV Solar National Trust Community Centre Solar air conditioning for hotels (The Landings)	National Energy Policy
St. Vincent and the Grenadines	Geothermal Project Hydropower facilities	National Energy Policy
Suriname	Bio-energy Projects	Draft RE Policy
Trinidad and Tobago	Pilot Project 5 kW PV Standard for RE wiring Wind Assessments	Establishment of RE Committee Plans to establish a RE Centre supported by United States Department of Energy. Master of Science in RE Technology
OECS	OAS GeoCaribe Project	Development of framework for ECERA

Country	Renewable Energy Projects	Renewable Energy Policies, Institutions and Programmes
Regional		<p>Caribbean Wind Energy Initiative</p> <p>Caribbean Sustainable Energy Project</p> <p>CREDP</p> <p>OECS Secretariat Sustainable Energy Programme</p> <p>CARICOM Energy Programme</p> <p>CRECS Project</p> <p>C-SERMS Framework</p> <p>CARICOM Increasing Sustainable Energy Awareness in the Public Sector Project</p> <p>CARICOM – GIZ REETA Project</p> <p>OAS regional policy development</p> <p>Caribbean Energy Information Systems</p> <p>Policy Development Research</p> <p>Caribbean Information Platform on RE (CIPORE)</p> <p>GIZ wind resource measurements in 11 Caribbean countries</p> <p>GIZ Caribbean policy development support</p> <p>WB Study on grid interconnection of islands.</p> <p>OAS Caribbean sustainable energy programme in the OECS and Bahamas</p> <p>GIZ hydro potential studies in St. Vincent, Dominica and Jamaica</p> <p>Caribbean Renewable Energy Technical Assistance Facility</p> <p>CHENACT</p> <p>Latin American Energy Organization (OLADE) EE programme for the Caribbean</p> <p>SECCI</p> <p>CARILEC</p> <p>RE Research Centre being formulated in Trinidad and Tobago</p> <p>CARICOM Task Force on Energy</p> <p>Caribbean vocational qualification for installation of SWHs.</p>

### Experiences and Lessons from the Region

To add context, below is a summary of experiences and illustrative lessons learned from some BMCs. The experiences in Barbados, Jamaica and St. Lucia are not considered here. These are addressed in the analysis of Case Studies that follows later in the chapter.

#### *Dominica: Geothermal Energy*

The Government of Dominica recognises that the country has considerable potential for the development of geothermal energy. At least 300 MW is available, and there is the possibility that as much as 1000 MW is present.<sup>57/</sup>

Dominica is keen to develop this resource, not only to supply local energy needs, but also for export to neighbouring islands. To this end, there has already been funding for a project from Électricité de France (EDF) (the French electric utility) which is interested in purchasing energy from Dominica for distribution in Martinique and Guadeloupe. The policy in France is that prices of electricity for residents in the French islands should be the same as in mainland France. In light of current fossil fuel prices, electricity tariffs in the French islands have to be highly subsidised. If geothermal energy becomes a reality, the level of subsidy needed from the French government will be reduced.<sup>58/</sup> This experience highlights the importance of international influences, in this case France and the EU, on Caribbean RE development.

#### *Nevis: Geothermal and Wind Energy*

Nevis is seeking to reduce fossil fuel dependence through RE development. To this end, wind and geothermal studies have been undertaken in Nevis since the 1980s, funded by CDB.<sup>59/</sup>

The GeoCaribe study suggested that about 50 MW in geothermal capacity was possible in Nevis. Given the results of this study, in 2006 a business consortium, West Indies Power (WIP), which included local and international investment, made a proposal to the Nevis Island Administration (NIA) to develop the resource for local and regional use.

Granovetter (1973) speaks about the social capital that can be gained by interaction of many agencies with “weak ties”. In the case of Nevis, it appears that the interaction of several agencies at various levels has helped to facilitate the project and develop trust on all sides. Unfortunately, the geothermal project in Nevis has stalled over the last two years due the collapse of the WIP consortium. Nonetheless, it serves as an example of how local regional and international organisations can interact to form networks to facilitate viable RE projects.

Windwatt Inc., a small Canadian company, conducted wind studies and negotiated a PPA with NIA in 2009. A 2.2 MW wind farm was subsequently developed consisting of eight turbines. The wind farm started operations in August 2010.

<sup>57/</sup> Mr. Michael Fadelle, Ministry of Energy, Dominica interviewed April 2011.

<sup>58/</sup> Mr. Colin Cover, DOMLEC, Dominica interviewed April 2011.

<sup>59/</sup> Mr. Cartwright Farrell, Nevlec interviewed April 2011.



There was no established energy policy before the start of the RE projects in Nevis; policy has been developed as the projects have come on line. The small size of Nevis and the close network ties within the jurisdiction seem to have played a part in facilitating the development of the projects more so than formal institutions.

### *Grenada Solar Photovoltaics*

Grenada was the first country in the English-speaking Caribbean to establish rules for interconnection for grid-tied RE. The key local players have been the Grenada Electricity Services Ltd. (GRENLEC) and the Government of Grenada. The development has been influenced to a large extent by Mr. Dirk Birkhardt, owner of the company (GRENSOL) and a native of Germany, a jurisdiction in which there has been significant solar energy development with progressive policies (Di Maggio and Powell, 1983).

The interest of the Government of Grenada and the willingness of GRENLEC to be involved in a pilot programme for grid-tied PV in 2007 made Grenada a demonstration model which others in the Caribbean have followed. However, the situation in Grenada changed in 2012 when GRENLEC established a new policy for interconnection which stated that new entrants wishing to sell excess electricity to the grid must do so at 45 cents/kWh, but must purchase power from the utility at \$1.06/kWh. This stifled the growth of the solar PV market for domestic users in Grenada.<sup>60/</sup>

This experience serves as a cautionary tale with respect to the importance of appropriate pricing policy. Grenada, although having at one time a programme for interconnection that was very attractive for RE and PV installation, now has one of the less favorable environments for RE development in the Caribbean.

### *Guyana: Hinterland Programme*

Guyana has developed a number of solar PV installations in the Hinterland region. For these communities, the cost of extending the grid is prohibitive, making stand-alone RE technologies viable. The communities pay a nominal fee towards the upkeep of the RE systems.<sup>61/</sup> It is also noteworthy that Guyana has converted all of its traffic lights to be powered by solar power as part of a project with the Government of India.

### *Trinidad and Tobago: Manufacturing Solar Photovoltaic Panels*

Trinidad and Tobago has an economy based on petroleum, natural gas and petrochemicals. The Government of Trinidad and Tobago recently sought to diversify its energy mix due to the changing international environment. The US is a major market for natural gas produced in Trinidad but in recent years has been increasing its production of natural gas. This has economic implications for Trinidad and Tobago which has started to investigate the use and development of RE technologies to a greater extent.<sup>62/</sup> However, in addition to market considerations including the desire to maximise the export of hydrocarbons, the desire to reduce carbon intensity is also high on the national agenda. Trinidad has been among the top twelve countries in the world with respect to per capita carbon emission.

<sup>60/</sup> Mr. John Auguste, personal communication, November 2012.

<sup>61/</sup> Mr. Horace Williams, Office of the Prime Minister, interviewed July 2009.

<sup>62/</sup> Mr. Garvin Alexander, Regulated Industries Commission, interviewed June 2011.

This interest on the part of Trinidad and Tobago to develop RE technologies, even though the cost of conventional energy there is extremely low, suggests that there are issues beyond narrow financial impacts that drive change. The desire to reduce carbon intensity is also high on the national agenda.

Trinidad and Tobago also sees an opportunity in the manufacturing of solar PV panels, based on its low energy cost. Two pilot projects for the production of solar PVs are being established in Trinidad, and the government is also in the process of establishing a standard for wiring of RE devices into the main grid.<sup>63/79</sup> In Trinidad and Tobago, the lack of economic viability has been a significant determining factor in the absence of RE development. Because of the low price of fossil fuel when compared to RE sources, the government has not had the incentive to put formal institutions in place to promote development. In spite of the lack of interest in RE sources within Trinidad and Tobago, the investment of Solaris in Barbados in the solar water heating industry suggests that some companies there recognise the benefit of investing in renewable resources in other islands in the Caribbean where the cost of electricity is higher.

### **CASE STUDIES**

Within the context explored above, the following section considers RE projects and programmes as they relate to three major sectors identified by CDB:

- (a) Electric utility (large scale)
- (b) Tourism
- (c) Construction

For each sector, one project was identified within the Caribbean to use as an illustration of the challenges and issues experienced. While describing these key projects, the general policy and institutional context of each Caribbean island is presented as well.

The three main projects assessed in the foregoing sectors are:

- (a) Electric Utility (large scale): Wigton Wind Farm in Jamaica;
- (b) Tourism: Sandals La Toc Beach Resort in St. Lucia; and
- (c) Construction: Williams Industries in Barbados

#### **Case Study 1: Wigton Wind Farm, Jamaica**

##### *The Energy Policy Context*

The current energy policy is the latest in an evolving policy and regulatory framework, which includes the 1995 Energy Policy and Green Paper and the Jamaica Energy Policy 2006-2020. These policies all built on the previous ones, and helped maintain consistency in activities aimed at developing RE resources over the years under both political parties.

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<sup>63/</sup> Mr. Garvin Alexander, Regulated Industries Commission, Interviewed June 2011.

The current policy is the National Energy Policy for 2009-2030. The Vision for the energy sector is as follows:

*“A modern, efficient, diversified and environmentally sustainable energy sector providing affordable and accessible energy supplies with long term energy security and supported by informed public behavior on energy issues and an appropriate policy, regulatory and institutional framework” (Jamaica National Energy Policy 2009-2030).*

The Strategic Framework of the Energy Policy specifically lists the following objectives:

- (a) security of energy supply through diversification of fuels as well as development of renewables;
- (b) modernisation of Jamaica’s energy infrastructure;
- (c) development of RE sources such as solar and hydro;
- (d) energy conservation and efficiency;
- (e) development of a comprehensive governance/ regulatory framework;
- (f) enabling government ministries, departments and agencies to be models/leaders for the rest of the society in terms of energy management; and
- (g) eco-efficiency in industries.

The Policy notes that “by focusing on the seven priority areas listed above, the National Energy Policy will ensure that the country minimises the effects of volatile and rising crude oil prices; takes advantage of renewable resources; and promotes conservation and efficiency in the use of energy resources amongst all sectors of the society” (Jamaica National Energy Policy 2009-2030).

The quote above, as well as the Strategic Framework, speaks directly to the development of RE. These policy statements are supported later in the document by development of strategies and targets that stipulate time-bound goals for the amounts of RE generation.

One of the objectives in terms of strategy discussed later in the section and of particular relevance to Wigton’s expansion deals with competition. The Government undertook to “promote the development of an efficient and low cost renewable plant with a size of 15 MW (later adjusted to 25MW) or more on a competitive basis through establishment of a level playing field” (Jamaica National Energy Policy 2009-2030).

### *Institutional Arrangements*

Following on from the National Energy Policy 2009-2030, the new Electricity Act, replacing the previous one from 1890, formalised the rules and enshrined the roles and responsibilities of the agencies with

responsibility for energy in Jamaica. These include the Ministry of Energy; the Office of Utility Regulation (OUR); the national electric utility, Jamaica Public Service Company (JPSCo); and the Petroleum Corporation of Jamaica. It also established rules governing the activities of IPPs and the negotiated PPAs. Over the years, there have been changes in the roles and responsibilities in these agencies that accompanied changes in the ownership structure of JPSCo.

JPSCo was privatised in 2004. This change in ownership led to modifications in roles within the sector, and has influenced activities directed at developing RE grid-tied sources in Jamaica. The early development and studies in RE in the 1970s in Jamaica were led by Dr. Raymond Wright, who was at the time a geologist working with PCJ. PCJ was established in 1979 to be involved with oil and gas exploration activities and the supply of energy to Jamaica mainly through the importation of oil and other conventional fuels. As the PCJ developed, it took greater interest in exploring RE and started by developing some small hydro projects. In the 1990s, PCJ decided to become involved in wind energy which was becoming more cost competitive. Wind studies were undertaken that ultimately led to the Wigton Wind Farm which was commissioned in 2004.<sup>64/</sup>

PCJ eventually became the agency that led activities in RE development even though it did not have a formal policy mandate. PCJ was established as a commercial entity and Dr. Wright's influence along with PCJ's financial and technical resources made PCJ the ideal agency to lead.<sup>65/</sup>

As a result of the informal leadership shown by PCJ over the years, in 2005 the company was given an exclusive license to research and develop RE sources in Jamaica, although at the time there was some concern expressed by stakeholders that its exclusivity might hamper competition.

Apart from the changing role of the PCJ, there was further complication in the sector that had arisen through the changing role of OUR. The establishment of OUR was prompted by the plans to privatise JPSCo in 2004. At that time, many of the employees of JPSCo moved from the utility to work for OUR. As a result, a significant amount of the capacity and knowledge of utility planning came to reside in the regulator (OUR) rather than the utility (JPSCo) itself. The Government at that time took a unique approach of placing the responsibility of utility planning within OUR. This gave OUR a leading role in developing and planning for RE in Jamaica, and it has to some extent directed the Wigton Wind Farm expansion as well as other planned large utility scale RE grid-tied projects since 2005.

### *Policy Implementation*

Jamaica's current energy policy is under implementation and both policy directives and policy targets have played a role in providing the environment for the expansion of the Wigton Wind Farm and other RE projects within Jamaica. The RE targets in the policy of 11% for 2012, 12.5% for 2015 and 20% for 2030 have been used to guide wind energy expansion.

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<sup>64/</sup> Dr. Raymond Wright, Petroleum Corporation of Jamaica, Interviewed July 2010.

<sup>65/</sup> Mr. Fitzroy Vidal, Ministry of Energy and Mining, interviewed July 2010.

### The Case (1): Wigton Wind Farm – Jamaica

Wigton Wind Farm Inc. is a commercial company owned by PCJ.

The project has had three phases of development starting in 2004. They were designated as Wigton 1, Wigton 2 and Wigton 3. Below is a summary of the developments that have taken place in an evolving regulatory framework in three stages.

#### *Wigton 1*

At the beginning of Wigton 1, obtaining funds for the development was a significant barrier.<sup>66/</sup> Additionally, PCJ proposed a price of eight US cents/kWh but was forced to accept a price of 5.6 cents/kWh. That made a big difference in terms of profitability. A price of seven US cents/kWh would have been the minimum for making a profit.<sup>67/</sup>

At the time that the wind farm was established, there was no regulatory framework and the agreement was made between the Government and JPSCO, which then was a government-owned utility. Later on, regulations came into place which gave to alternative energy developers the avoided cost of fuel and an additional 15%, known as an externality benefit. Once that regulation was in place, PCJ sought to receive the same tariff, even though Wigton 1 had been established before this regulatory stipulation. In so doing, the Wigton Wind Farm developers were seeking to break a contracted tariff with JPS which had been agreed to last for 20 years. The Government resolved the contract issue by adjusting the policy to speak to arrangements that were made prior to the regulatory framework.

#### *Wigton 2*

In 2010, when the developers were ready to undertake their first expansion with Wigton 2, the regulations stipulated that any project with a capacity greater than 15 MW would have to go out to competitive bidding. However, studies undertaken by Wigton Wind Farm Inc. determined that up to 18 MW was commercially viable.

The situation was further complicated by the fact that at that time PCJ, which was the owner of Wigton Wind Farm Inc., had been given an exclusive license by the Government of Jamaica to develop RE. The Government was therefore faced with a dilemma where the technical and commercial viability of a project favoured development but whose development in the absence of competition would be contrary to the regulations established by OUR.

The Government eventually allowed the project to go ahead without a competitive bidding process even though this was contrary to existing legislation. It justified its action by making provisions within the policy to speak of the merits of doing projects which could be seen as important to the overall sustainable

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<sup>66/</sup> Dr. Raymond Wright, Petroleum Corporation of Jamaica, Interviewed July 2010.

<sup>67/</sup> Dr. Raymond Wright, Petroleum Corporation of Jamaica, Interviewed July 2010.

development of Jamaica. In Jamaica at the time, there was also no other developer that had expressed an interest in establishing a wind project. Had this been the case, OUR may have been forced to go out for a bid.<sup>68/</sup>

Since 2010, OUR regulations have been modified to allow up to 25 MW installed capacity without a competitive bidding process. The exclusive license for development that PCJ had was also revoked. These changes were the result of the conflict that the Government faced in the development of Wigton 2. It has been acknowledged by the Government that this was a case where the previously existing procurement rules could have ruled out the best project. Consequently, the Government considered that developing a project contrary to the regulation was better than sticking to the regulation and delaying or eliminating this project that was seen as critical for national development.<sup>69/</sup>

### *Wigton 3*

In November 2012, OUR announced a request for proposals for 112 MW of RE. This was the first time that there was a competitive bidding process for wind expansion. Wigton Wind Farm Inc. and another wind company, Blue Mountain Power, won projects.

Wigton won permission for the production of 34 MW and Blue Mountain Power, 24 MW. There was also an award for the production of 20 MW of solar electricity. It is expected that these projects will come on line in 2015.

By the end of the first quarter of 2014, OUR was expected to go out to tender for an additional 38 MW of firm renewable capacity to make up the remaining capacity in the 112 MW. The capacities outlined in the Request for Proposals (RFP) of OUR come directly from the national policy which stipulates a target of 12.5% of energy generated using RE by 2015; 15% from renewables by 2020; and 20% from renewables by 2030. The policy has been further revised to have a target of 30% of electricity generated from RE sources in order to allow for the fact that some RE will be used in generation of energy in non-electricity sectors such as transport.<sup>70/</sup>

Based on the ongoing procurement activities of OUR, the target of 12.5% of RE in 2015 seems likely to be achieved and, if schedules of procurement for subsequent years are followed, the targets for later years should be achieved as well. This is significant because in many other jurisdictions in the Caribbean, there is no direct link between the targets outlined in the national policy and the actual level of developments of projects on the ground. In Jamaica, OUR's actions related to procurement activity exactly follows government policy and this close coordination has improved the likelihood that government policy stipulations will actually be transferred into energy capacity.

Once the approved projects for wind are implemented, Jamaica will have a capacity of 96 MW for wind, which will be about one sixth of Jamaica's peak usage of 600 MW. This would make Jamaica one of the highest jurisdictions internationally in terms of percentage of electricity generated from wind.<sup>71/</sup>

<sup>68/</sup> Mr. Hopeton Heron, Office of Utility Regulation, Jamaica, Interviewed January 2014.

<sup>69/</sup> Mr. Fitzroy Vidal, Ministry of Science, Technology, Energy and Mining, Jamaica interviewed January 2014.

<sup>70/</sup> Mr. Fitzroy Vidal, Ministry of Science, Technology, Energy and Mining, Jamaica interviewed January 2014.

<sup>71/</sup> Mr. Fitzroy Vidal, Ministry of Science, Technology, Energy and Mining, Jamaica interviewed January 2014.

The Government of Jamaica has sought to inform its policy development by conducting a grid impact study that is now being considered by the stakeholders involved. The study suggests that about 30% (197 MW) of capacity can be accommodated on the grid from RE without impacting the stability of the system. Should the findings of the study be accepted by the utility, this technical study will be used to inform policy, and will form the basis of regulations that direct development of the sector going forward.

Although there is benefit from integrating aspects of institutional learning gained from the Wigton Wind Farm development, there is some concern that many aspects of the policy were inserted only to deal with that wind farm. This raises the question of whether the policy guidelines will serve as useful guidelines for other projects in the wider RE context.

### The Wider Industry

#### *Influence of Wigton Wind Farm on other Renewable Development*

It has been suggested that the development of the wind project in Jamaica has acted as a spur for other RE projects in Jamaica and perhaps for the wider Caribbean as well. It is further evidence that the development of a technology in one country could lead to interest in others in a manner similar to Nevis in geothermal energy or Barbados with respect to solar water heaters.<sup>72/</sup>

#### *Lessons Learned*

**Policy:** One important factor in establishing the Wigton Wind Farm as referenced earlier is the consistency of government policies. Wigton 1 was completed under one government, Wigton 2 under a second government and Wigton 3 under the government that held power during Wigton 1. Both governments committed to the project and built on what existed when they came to power.

Lack of consistency of policies as political parties change has been identified as a barrier to RE development in many Caribbean countries. Policy consistency has been seen as a contributor to the success of other RE projects in the Region, notably in Barbados where economic policy incentives for installation of solar water heaters were maintained by both governments since the start of the industry in the 1970s. This has helped to spur the growth of the solar water heater industry in Barbados since that time.

**Roles of Agencies:** This is now being reviewed by the Government of Jamaica. At the moment, it is the intention of the Government to take over the role of planning to ensure that the developments in RE remain closely linked to policy. Planning capacity will take time to build. Hence it is likely that OUR will continue to be engaged in planning in the short run.

An important lesson that should be taken from the development of the Wigton Wind Farm is that clear specification of the roles and responsibilities of national agencies in designing, monitoring, evaluating and implementing projects is critical.

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<sup>72/</sup> Mr. Conroy Watson, Ministry of Energy and Mining, Jamaica interviewed July 2010.

***IPP Negotiation:*** There is concern by some stakeholders, most notably representatives from Wigton Wind Farm, that the RFP of 115 MW was undertaken before enough information was known about the impacts of connecting RE to the grid. They thought it would have been more advantageous to wait for the results of the grid impact study and data from further wind studies before going out to bid. Private developers were told by OUR that the interconnection logistics was a matter for JPS. Meanwhile, JPS told developers that it was waiting on OUR. That revealed that even though the process for implementation of RE projects had improved, there was still a lack of coordination between agencies.

***Need for Appropriate Pricing Policy:*** Wigton was disadvantaged economically from the 5.6 US cents per kWh that was given at the beginning of the project. The intention at the beginning was that Wigton Wind Farm would have been sold if commercial development proved profitable. However, this never happened due to the low tariff that Wigton received at the outset. The loss for agreeing to this reduced rate was USD150 mn.

The existing tariffs that Wigton Wind Farm is receiving in the IPP have made wind energy more economically viable and would seem to have safeguarded the future of the project. Before the rate was renegotiated, the wind farm had faced the threat of closure or being sold. Although representatives from Wigton acknowledge that the current arrangements have been a vast improvement on what existed before, they consider that they have not reached the ideal level and that losses in revenue over previous years have been a setback.

***Implementation of Fiscal Incentives:*** Another practical issue identified by the Wigton experience related to the fact that there needed to be a separate application for duty exemptions every time that a spare part was imported for use in the wind farm. Although the tax incentives were useful in spurring wind development, it required at times three to six weeks to receive imported equipment because of the long time needed to process documentation to determine whether the equipment was eligible for tax exemptions. Storage costs had to be paid for by Wigton Wind Farm, and played a part in eroding some of the profits that would have ordinarily accrued to the company.

***Skills Development:*** The project has significantly helped development of local engineers as personnel installing equipment are now only contracted for the warranty period. Local professionals have been trained to replace them. More than Jamaican dollars 100 mn has been saved through local maintenance.

***Ownership:*** A key issue for discussion in Jamaican wind development is the ownership of Wigton Wind Farm and the question of whether the changes in policy and regulations which were made to accommodate Wigton Wind Farm would have been made if the wind farm had been privately owned. However, the adjustments to policies and legislation as a result of Wigton can be viewed as reasonable from the fact that Wigton Wind Farm was established as a pilot project. In undertaking this pilot project, government benefitted from firsthand experience of the challenges for a commercial wind developer, and recognised not only technical and economic challenges but also areas where changes to existing policies, regulations and legislation were needed. The experience also helped inform aspects of institutional arrangements and the identification and allocation of tasks among the various stakeholders in the energy sector. These lessons learned over the lifetime of the Wigton project will now be incorporated in subsequent versions of the energy policy.<sup>73/</sup>

<sup>73/</sup> Mr. Fitzroy Vidal, Ministry of Science, Technology, Energy and Mining, Jamaica interviewed January 2014.



**Tariffs:** From the consumer perspective, the impact of tariffs from the addition of wind to the mix has not been negative. This is based on the fact that the tariffs for electricity in Jamaica range from USD35-41 cents per kWh. In this context, consumers will not complain if the tariff for wind is somewhat higher because they will see a decrease rather than increase in their electricity bills as more wind is added to the system.

Below is a summary of lessons learned from the project, and issues that can be explored further in looking at future development of utility scale RE in the Region.

- (a) Evolving policy in developing a project can give flexibility and allow for institutional learning in the process. However, policies should still be clear in order to inform the process. Changes can be made later as needed.
- (b) Ideally, policies should drive legislation. However, policies can at times be used to override legislation, in the event that the legislation is not based on realistic technical or economic criteria.
- (c) A regulatory authority that strictly follows policy guidelines can facilitate development that closely aligns with policy expectations.
- (d) Changes in tariffs along the way and opportunities to make changes to contracts can be beneficial (because of avoided cost and externality benefits).
- (e) A regulatory agency sending out a RFP needs to ensure that regulations are based on adequate information.
- (f) An ownership structure with government involved in commercial activities can help government understand issues relating to tariffs, regulation, legislation and competition. This can make it easier for future companies entering the market.
- (g) Individual champions in projects are important.
- (h) Some policy aspects were established specifically for Wigton; it is not certain whether those rules and principles would be as effective in dealing with other renewable projects.
- (i) The process for managing tax exemptions should be efficient.

#### *Recommendations for Addressing Challenges*

Given the experiences of Jamaica and the Wigton Wind Farm, there are a few specific areas to which attention should be paid and resources made available to address the challenges facing Jamaica and the wider Caribbean.

**Flexibility:** One of the main factors that played a part in the success of the Wigton Wind Farm was the ability of the Government to adapt and adjust policies to changing realities. Had potential conflicts between policy, regulations and the economic reality been identified earlier, the project development may have proceeded even more smoothly and beneficially. One suggestion for development is to make policies

flexible. This can be done by developing policies in stages; first identifying an overall framework, then moving towards strategies to guide activities and finally identifying more specific targets and goals when more is understood about what is technically and economically feasible. It should be noted that even though policy flexibility is desirable, policies should provide clear guidance. In that way, policy evolution can proceed towards a desired goal rather than just become a ‘knee jerk’ attempt to eliminate immediate problems.

Information: Policies and regulations need to reflect technical and economic conditions. However, this is often not the case. The only way that this can be addressed is by having more information available to policymakers when making decisions. Resources need to be made available to provide answers to questions such as:

- (a) What are the limits of RE that can be accommodated on the grid?
- (b) In what cases is a competitive environment for RE development more desirable than a government-led coordinated approach?
- (c) What types of policies, incentives and regulations should be used to encourage private sector participation?
- (d) When are government-led initiatives desirable?

Help in the acquisition of information through the conduct of appropriate studies can be provided by regional and international organisations.

***Roles and Responsibilities:*** Another important area to be addressed is that of the roles, responsibilities and capacities of institutions charged with management of the energy sector. Roles and responsibilities should be clearly defined. Additionally, institutions should have the necessary human, financial and other resources required to ensure effective management. A well-defined policy, regulatory and institutional framework reduces investor risk and encourages investment. However, in recognition of the fact that circumstances change with the evolution of the sector, governments should allow for the possibility of changes in institutional roles.

***Communication of Policy:*** Policy rules have to be clear to every agency or individual that may be affected. Clear and effective communication of policy to stakeholders is important to facilitate appropriate responses. For example, change in policies with respect to import duties mean that departments that have responsibilities for implementing these must update their processes accordingly. If not, the burden of additional transaction and administrative costs can reduce or eliminate the benefits of policy changes.

### The Case (2): Sandals La Toc – St. Lucia

#### *The Energy Policy Context*

St. Lucia's National Energy Policy was approved by Parliament in January 2010. The introductory paragraph sets out the Government's position on energy development:

“The Government of St. Lucia is committed to the broad objective of relying on market forces to achieve the efficient allocation of resources. Nevertheless, in the case of energy, the Government may intervene where necessary, in order to support the exploitation of new and indigenous energy resources and promote energy conservation and efficiency” (St. Lucia Energy Policy 2009-2030).

The reliance essentially on market forces to achieve efficiency in the sector does not suggest a strong commitment to RE development where many of the technologies require incentives beyond what market forces can supply to get started.

That notwithstanding, the policy statement speaks strongly to efficiency which is an important part of energy sustainability and complementary to the objectives of RE development. There is also a commitment to develop “new and indigenous energy resources” which would have implications for the development and use of renewables. It is for this reason that in this section it is relevant to include a case study that focuses on the impact of EE as much as it does on RE.

#### *Institutional Arrangements*

The National Energy Policy speaks to the institutional arrangements for energy planning and policy. It is important to identify these because, unlike the case for Jamaica, St. Lucia has no independent regulatory authority equivalent to OUR, nor does it have an agency responsible for commercial development similar to PCJ.

The only entities involved in energy planning, policy, tariffs, monitoring and maintenance in energy and electricity production are the Government of St. Lucia through the Energy Division of the Ministry of Sustainable Development and the electric utility, St. Lucia Electricity Services Limited (LUCELEC).

In the policy, the Ministry takes on inter alia the following roles:

- (a) energy policy formation, national energy planning and energy sector coordination;
- (b) fostering the development of appropriate legislation for electricity, petroleum and gas sub-sectors through a participatory and consultative process;
- (c) fostering the development of appropriate EE and safety standards;
- (d) encouraging private sector participation in RE technologies; and
- (e) overseeing and coordinating activities relating to energy and the environment.

It can be seen from the foregoing that the Ministry is expected to take on a coordinating or advocacy role, but will not be leading in implementation of policies or setting targets that the utility or members of the private sector will be required to follow. This is different from countries such as Jamaica where the government has undertaken a more active role in developing the regulations and setting RE targets.

This difference in approach by St. Lucia should not be seen as a lack of interest in development of the sector in comparison with Jamaica. However, without the appropriate legal authority to enforce laws or the capacity to conduct required research into areas such as grid impact of renewables, the Government remains more limited in what it can achieve.

St. Lucia at the moment has no regulatory authority in place for electricity. However, the Ministry has been charged with “*protecting the consumer interests by ensuring that they are provided with an efficient, reliable and cost effective energy service*” (St. Lucia Energy Policy 2009-2030). There is some uncertainty as to how effective the Ministry can be in this area without the support of legislation. However, the policy includes provisions for the establishment of a national regulatory body.

Currently, the OECS Secretariat is also involved in activities designed to establish ECERA as a regional energy regulator for the OECS. However, so far only St. Lucia and Grenada have agreed to participate in ECERA. The St. Lucia’s National Energy Policy anticipates that the St. Lucia energy regulator could eventually be integrated into the regional body when formed. With the regulatory authority both at the national and regional levels still to be established and no set timelines for the formation of either body, LUCELEC remains responsible for utility planning.

The policy document outlines the plans for the role of the Regulatory Commission in approving plans, and it speaks to negotiations between LUCELEC and the Regulatory Commission. However, without the establishment of the Regulatory Commission, the policy document is ineffective in providing a basis on which activities of LUCELEC can or should be monitored and evaluated.

There are targets for RE within the policy of 5% for 2013, 15% for 2015 and 30% by 2020. There is no basis given on how these targets were determined. However, the policy does provide for adjustment of the targets based on “national resource assessments”, which are still to be done.

The policy goes on to state the following:

*“LUCELEC will be responsible for ensuring that the quota (of RE) is achieved by generating or purchasing renewable electricity from adequate generation facilities licensed by the Ministry in charge for public utilities. The incumbent utility LUCELEC may for such purpose either set up its own RE facilities, establish joint ventures, or sub-contract suitable investors” (St. Lucia National Energy Policy).*

This leaves LUCELEC with significant responsibility for RE introduction into the grid. There is no legislation determining the basis on which purchases will be made and how agreements will be made or disputes settled. Without these provisions, it is difficult to see how the policy will be effective in facilitating the development that the Government desires.

Discussions with the Ministry in St. Lucia revealed that: “In spite of the written policy which has been approved by government, the procedures used to make decisions on RE development tend to be made following institutional memory.”<sup>74/</sup>

This is not surprising, given that, as mentioned earlier, there are no set procedures that emerge directly from policy. However, the policy is useful as a general guide for the direction that the Government takes in the energy sector.

Dr. Fred Isaac, an independent energy consultant in St. Lucia who had previously worked in a senior position at LUCELEC, believes that one weakness in the policy is that it relinquishes too much power to LUCELEC. LUCELEC at the moment has the power to approve licenses. He considers this a responsibility that should be retained in the hands of the state.

### *Policy Implementation*

It appears, given the discussion above, that the developments in RE projects and EE in St. Lucia have been undertaken without specific regard to any stipulations in the written national energy policy. Nevertheless, St. Lucia has embarked on a number of projects in solar and wind energy as discussed below. Additionally, St. Lucia has undertaken significant exploration into the development of geothermal energy in the area of Soufriere in the south since the 1950s. To date, no geothermal project has been developed.

***Solar:*** St. Lucia has witnessed growth in solar energy and the establishment of a market for solar water heaters. There have also been a few PV projects such as the installation of PVs on the St. Lucia National Trust Community Building. However, there is at the moment no legislation in place to allow sale of electricity to the grid by customers or IPPs. LUCELEC is currently undertaking a study that is expected to determine the level of tariffs to be set for RE IPPs interconnecting to the grid.

***Wind:*** St. Lucia has also conducted wind studies in a number of areas and identified viable sites. However, LUCELEC encountered resistance when it wanted to develop the wind energy projects. For example, there have been difficulties encountered regarding the most attractive site for wind, Sugar Mill, because of land ownership issues. The difficulty in coming to agreement with land owners for land development is not unique to St. Lucia. There are similar accounts in Barbados and St. Vincent and the Grenadines.

***St. Lucia Hotel and Tourism Industry RE and EE Initiatives:*** The hotel and tourism industry has been growing in recent years, and is the main foreign exchange earner. At the moment, there is not a strong link between the national and regional tourism associations. It is therefore a challenge to have regionally coordinated hotel projects in RE and EE. This also makes it difficult to obtain financing.

Mr. Noorani Azeez, President of the St. Lucia Hotel and Tourism Association, is of the view that hotels in St. Lucia understand the benefits of switching to RE and more energy efficient devices for the good of the social, economic and environmental well-being of the country. Additionally, the cost of energy is a main contributor to the high cost of operating the hotels.<sup>75/</sup>

<sup>74/</sup> Ms. Judith Ephraim, Ministry of Sustainable Development, St. Lucia interviewed January 2014.

<sup>75/</sup> Mr. Noorani Azeez, St. Lucia Hotel and Tourism Association, interviewed January 2014.

However, a significant barrier to EE and RE development is the lack of access to loans from banks at an attractive interest rate. Mr. Azeez reported that the barrier was the inability to reap economy of scale benefits through collective borrowing. Larger hotels with more financial resources have been able to make some headway; but the majority of hotels have been unable to.

It is somewhat disappointing that although many hotels had energy audits undertaken as part of CHENACT, none of the recommendations so far has been implemented. This appeared to be due to the cost of implementation. Even if significant long-term savings could be demonstrated, hotels preferred not to invest due to upfront cost.

Dr. Fred Isaac, a St. Lucian who was an energy consultant on the CHENACT project and made recommendations based on the energy audits conducted in St. Lucia, echoed Mr. Azeez's assessment. He concluded that the problem was a matter of the mindsets of those at the hotels in not looking at the broader financial impacts of projects.<sup>76/</sup>

The desire to safeguard profits and returns in the short run was seen as posing a significant barrier to investments in the areas of EE and RE within the hotel sector. Mr. Azeez was of the view that any reduction in oil prices internationally could lead to massive loss of interest and reduction in investments.<sup>77/</sup>

Due to significant upfront costs, hotels have tended to embrace EE rather than RE projects. A cap of 25 kW for PV grid connections that has been set by LUCELEC is also seen as a barrier to development by some stakeholders. This cap has been set due to concerns related to grid stability. However, it is not clear how this cap was determined by LUCELEC.

The Ministry of Tourism plays a role in setting policy for the hotel and tourism sector. The Ministry is also involved in monitoring the sector to ensure that activities carried out contribute to its long-term viability.

In 2013, there was an OAS Project administered by the Ministry of Tourism designed for assisting small hotels (those with a total of 30 rooms or less). The project concentrated on water conservation and solid waste management but also investigated some energy issues. Some general recommendations for hotels emerged out of this assessment, but no activities were undertaken. Hotels involved cited the cost of installation as the reason for lack of implementation.

Ms. DeepaGirdhari, a Tourism Officer in the Ministry, has the responsibility of ensuring that the hotels are up to tourism accommodation standards. Part of that mandate includes inspections to determine whether properties are engaging in appropriate EE measures in areas such as lighting, air conditioning and refrigeration. This gives her the opportunity to emphasise some aspects of energy conservation to the hotels. However, while she has the authority to make recommendations, the Ministry does not have the power to mandate that the hotels undertake the activity.

One key piece of legislation within the hotel sector is the Tourism Incentive Act. This Act is designed to spur general development of the industry. Unfortunately, it currently does not make reference or promote any

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<sup>76/</sup> Dr. Fred Isaac, Energy Consultant, St. Lucia interviewed January 2014.

<sup>77/</sup> Mr. NooraniAzeez, St. Lucia Hotel and Tourism Association, interviewed January 2014.

‘greening’ or environmental development. The Act will have to be upgraded to include wider sustainability issues if it is to have an impact on the hotels in encouraging them to adopt more RE and EE enhancing technologies or even sustainable practices in general.

### *Sandals La Toc*

Sandals La Toc has 331 rooms and four main blocks. It caters to the high-end luxury market and is exclusively a couples resort. The property spreads over 220 acres. The cost of a room ranges from USD596 to USD2,923 per day for the millionaire suites. Two other Sandals resorts are located in St. Lucia. The Grand has 301 rooms and the Halcyon 169 rooms. The average occupancy of the hotel per year is about 80%. Sandals also has hotels in Jamaica, the Bahamas and Barbados.

Many external factors can affect decisions on whether to invest in environmental projects. These include the condition of the national and international economy; the price of oil and electricity; and the room occupancy rate. A combination of these factors is used in determining the feasibility of EE and RE projects.

Every Sandals Hotel has an Environmental Manager who deals with issues of energy conservation and use. This Manager reports to a regional head and corporate director. The energy director for the chain of hotels is based in Jamaica, and has responsibility for all the hotels and for identifying the opportunities for EE and RE.

The environmental department has existed at Sandals La Toc for 15 years. The hotel became Green Globe certified in 2003, and is now Platinum Certified with Earth Check, the standard that has replaced Green Globe as the measure of environmental excellence in the hotel industry. Certification must incorporate annual measurement of operational indicators related to energy, emissions, water, waste, community involvement, paper use, cleaning and pesticide use. Sustainability claims need to be backed by third party verification, undertaken by a suitably qualified auditor. Earth Check Business Planning and Design System measures the following:

- (a) greenhouse gas emissions;
- (b) EE, conservation and management;
- (c) management of social and cultural issues;
- (d) land-use planning and management;
- (e) air quality and noise control;
- (f) waste water management;
- (g) solid waste management; and
- (h) environmentally harmful substances.<sup>78/</sup>

<sup>78/</sup>

[www.earthcheck.org](http://www.earthcheck.org)

The environmental goals are clearly stated in the hotel mission statement and are reinforced in posters and notices throughout the hotel. The hotel also has a large “energy wheel” which can be seen by all the guests. This displays the energy used in the hotel daily, and gives an indication of the target of maximum efficiency.

An energy budget has been allocated to all the hotels. The environmental and maintenance unit in each department is responsible for budget management. The Environmental Manager has an environmental action plan, and is required to identify specific projects to attain energy conservation goals. This is communicated to all department heads. Once the planned activity can be funded by the budget, the project is implemented.

The environmental department has a mandate for energy conservation, and has embarked on a number of projects to enhance EE in lighting and air conditioning. Solar water heating units are used extensively on the property, and the hotel has a programme also aimed at water conservation and waste management.

Other EE and conservation projects include an automatic key card that shuts off all appliances and lights when a guest leaves the room. Also, linen reuse cards have been issued to encourage guests to conserve on laundry use.

In the area of RE, there was one pilot project with respect to solar air conditioning. The solar unit was provided by Solar Connections, a local company. It used solar thermal energy to satisfy 70% of its energy requirements and the national grid to satisfy the remaining 30%.

The hotel determined that this particular unit was not appropriate as it did not have the potential to reduce energy use significantly enough. Additionally, if the hotel was to adopt these air conditioning units, it would need to install one in each room. This would mean that the hotel would not be able to benefit from economies of scale through use of a centralised system as it currently does.

An energy audit, undertaken by the hotel in 2005, forms the basis of decisions on EE programmes that have been embarked on since then. The hotel has implemented a significant lighting programme through which 95% of the incandescent lights have been replaced by Light-emitting Diodes (LED) lighting. Additionally, many fixtures were eliminated in areas that were overlit.

Ms. Melanie Pamphile, the Environmental Manager at the hotel, noted that guests did not necessarily see environmentally friendly hotels as better hotels. There are some clients who value the environmental work; but it is generally not a deal breaker. Sandals, however, recognises the direct financial benefits of being environmentally friendly.

It is apparent that the developments in Sandals La Toc, although spurred by external hotel policy, have much to do with the drive that the Environmental Manager brings personally to environmental management. She came to the hotel having experience in health and safety, but always had a personal interest in the environment, having been involved in environmental clubs at school and university. When speaking of how environmental issues were viewed when she joined the organisation, she recalled that environmental awareness was often seen as a matter of pest control and garbage removal. A lot of staff education was needed.



### The Wider Industry

#### *Economic Incentives and Economies of Scale*

One of the barriers to RE development within the hotel industry, as well as in St. Lucia on the whole, relates to the lack of economic incentives. The duties are high on solar equipment, 26%. The tariffs given for grid-connected PV from LUCELEC have also not provided an incentive. LUCELEC undertook a tariff study using a pilot PV project in Marchaud. It established a rate which was much lower than the retail rate.

Another barrier to projects in St. Lucia and the entire Caribbean is lack of scale economies. Dr. Fred Isaac revealed that he could purchase 250 kW PV panes for USD160 per unit. However, this would require the purchase of large quantities. It is estimated that PV projects could pay for themselves in 12 years but between seven and eight years if purchases are made in bulk. This is an argument for establishing a storehouse for panels either to serve St Lucia or the Caribbean as a whole. However, without financing, it is difficult to establish and to sustain business.

Mr. Julian Adjodha, Chief Executive Officer (CEO) of Solar Connections, who has provided a great deal of the solar equipment that has been used in the hotels (including those for projects at Sandals La Toc) also spoke of challenges related to economies of scale. He mentioned that it was difficult to keep containers stocked with all of the appliances without the cash flow that a reliable market would provide. At times, it took six weeks to restock equipment such as solar air conditioning units.

Additionally, some investors have had an interest in developing the PV market, but have shied away because of a lack of trained personnel on the island. Some companies have collapsed, and this has led to a lack of confidence in the industry.

#### *Lessons Learned*

- (a) Small hotels are hard pressed to implement RE projects due to large finance requirements needed up front.
- (b) Larger hotels with financial resources have more interest in implementing RE and EE projects.
- (c) External investors in hotel properties in St. Lucia have made an impact with respect to EE.
- (d) There is need for a specific manager with responsibility for energy and environmental matters in hotels.
- (e) RE and EE projects are more effective when undertaken in an environment that promotes sustainability in all areas.
- (f) Development of hotel sustainability projects is almost entirely private sector driven, without the influence of national policy.

- (g) Government policy needs to be translated into regulation and legislation to have further impact. Government can and has played a role in promoting sustainability in hotels but has no power to mandate.
- (h) Environmental sustainability must be embraced throughout the organisation, and it must be translated into measurable indicators at every level.

### *Recommendations for Addressing Challenges*

#### *Financing*

All stakeholders interviewed in large and small hotels and in wider tourism organisations agreed that hotels in the Caribbean stand to benefit significantly from embracing RE technologies and EE measures. The main barrier cited in almost all cases is the initial financial cost of investing.

The situation with the hotel sector is quite different from the one discussed earlier with the Wigton Wind Farm in that hoteliers do not have the same access to financing that governments may have through bilateral or multilateral agreements or relationships with international agencies and regional organisations such as CDB and CARICOM. Hotels are generally independent commercial entities and, similar to other businesses, remain viable through their ability to make a profit both in the short and long term. However, as the viability of the hotel industry affects the Caribbean's economic sustainability, there are advantages in a consolidated regional approach to help put measures in place to raise the capability of the sector as a whole. The CHENACT project has attempted to do this by identifying areas where changes can be made, but without hotels having the means to implement the measures, the impact has been limited. This suggests that financing, especially for the small hotels, can help; but one has to ensure that the funding once allocated is used effectively.

#### *Giving Hotels an Environmental Score and Attaching Financial Incentives*

One way to ensure this is to establish a rating system with respect to the environment. Rating could be determined in terms of the properties' activities in marine preservation, waste management, eco-preservation, recycling etc. Hotels that display a culture that values the environment are far more likely to embrace RE and EE programmes and to translate funding or loans into long-term benefits. Providing an environment where hotels with this type of culture can be encouraged to work together and share expertise can also pay dividends.

The development of a Caribbean association of environmentally friendly hotels, where the criteria for qualifying are clear to all, could be very useful. This could create a competitive environment that would encourage hotels to aim to be in this elite group in a way similar to Green Globe or Earth Check certification schemes. Funding for projects by international financiers could then be made to the group of hotels rather than on an individual basis. This would overcome some of the economy of scale concerns that occur when a single hotel is looking for assistance on its own. There is also an option for governments to mandate green certification, given that the negative impact of the industry on environmental assets would undermine the sustainability of the sector. However, if this were done, a funding source may have to be established to help some hotels cover the start-up costs for the activities.

*Greater Links between Energy Policy and Tourism Policy*

Hotels in many Caribbean islands are responsible for a significant amount of the energy consumption through use of air conditioning, refrigeration, heating for laundry and lighting loads. Yet, as was illustrated in the example with St. Lucia, there is little connection made between policies in the two key national sectors of energy and tourism.

Ideally, policies and legislation developed for the tourism sector should have inputs by ministries with responsibility for energy in the countries. The Tourism Incentive Act in St. Lucia does not include incentives related to EE or RE, and therefore will not assist the sector in achieving long-term energy and environmental sustainability. The link between environmental and economic sustainability needs to be emphasised in sectoral policies and reflected in the various pieces of tourism sector legislation.

*Appointment of Environmental Managers in Smaller Hotels*

The case study of Sandals La Toc demonstrated the importance of a champion or advocate within the organisation in formulating plans and identifying areas where changes can be made and generally fostering a culture of environmental sensitivity and sustainability.

Many of the smaller hotels do not have the finances available to have a dedicated staff member to work in such a specialised area. As a result, areas where hotels could benefit from EE or RE development often are overlooked.

Given the difference that having an officer in this area can make, it may be worth funding the hiring of such an employee, who can be attached to small hotels. This funding could be part of the allocation made to hotels that demonstrate an interest in the environmental aspects described earlier. A strong environmental officer can help to change the culture of a hotel and make sustainability a part of all operations. However, for the purpose of maximising the effectiveness of the intervention, the appropriate policies and accountability mechanisms would need to be in place. Collaboration among these employees at the various hotels can foster greater synergies and widen the effectiveness of interventions throughout the sector.

**The Case (3): Williams Industries – Barbados***National Energy Policy*

Barbados currently has a National Sustainable Energy Policy (NSEP) which has been approved by Parliament. This policy was based on the Sustainable Energy Framework (SEF) which was developed through an IDB project.

The SEF had the following objectives which were reflected in the NSEP:

- (a) reducing the country's dependency on imported fossil fuels;
- (b) enhancing security and stability in energy supply; and
- (c) improving overall environmental sustainability.

In addition to the policy, there have been specific projects also emerging out of SEF designed to promote and stimulate the RE sector. These include the following:

- (a) EE and RE pilot projects funded by GEF; and
- (b) the Sustainable Energy Investment Programme (Energy SMART Fund).

The current energy policy in Barbados was developed in large part as a requirement of an IDB loan in which one of the conditions of the loan was the need to have the policy in place.<sup>79/</sup>

The present energy policy establishes a target of 29% of energy generated to be obtained from RE sources by 2029. Strategies for reaching the 2029 goal have not been specified. However, the Government of Barbados is in the process of developing an Energy Roadmap to aid the process.

Currently, the main policy impetus for developing RE development in Barbados comes from the recently passed Electricity Light & Power Act (ELPA) and the RE Rider that was proposed by the Barbados Light & Power (BL&P) company and approved by the regulator, the Fair Trading Commission (FTC). (See Box 4).

Similar to the case in Jamaica, and in contrast to the situation in St. Lucia, Barbados has a national regulator for electricity, the FTC. The FTC does not have the same powers or responsibilities of OUR in terms of directing electricity planning, but it monitors rates and the standards of service of the utility. The BL&P does its own planning, and FTC is the body charged with the responsibility to assess and approve the plans.

#### BOX 4

#### THE RENEWABLE ENERGY RIDER

The Renewable Energy Rider is available as a pilot programme for a period of two years, and is specific to customers with renewable resource generation facilities such as a wind turbine, solar photovoltaic or hybrid (wind/solar) power source located on the customer's owned or rented premises. Customers receive a credit as follows:

##### MONTHLY RENEWABLE ENERGY CREDIT:

All kWh supplied to the grid @ 1.8 times the Fuel Clause Adjustment or 31.5 cents/kWh, whichever is greater.

The Fuel Clause Adjustment is calculated according to the Fuel Clause approved by the Fair Trading Commission and may vary from month to month. [www.blpc.com](http://www.blpc.com)

<sup>79/</sup> Mr. Bryan Haynes, Ministry of Energy, Barbados interviewed February 2014.

Barbados' first draft energy policy was laid in Parliament but was not approved. This policy draft was completed in 2007 when the current opposition was in power. That policy covered both conventional and RE, and was predicated on sustainable development principles from the National Sustainable Development Policy.<sup>80/</sup>

Since then, the Government has embarked on policy development with assistance from the IDB as mentioned earlier. The Sustainable Energy Framework Initiative is the grant facility under GEF for EE and RE pilot projects. These projects will be established under the RE Rider. The other component, the SMART Energy Fund, is a USD10 mn loan facility for retrofits in EE or RE.<sup>81/</sup> The SMART Fund programme is for assistance to local entrepreneurs who are interested in developing grid-tied RE projects. Mr. Darcy Boyce, the Minister of Energy, views the SMART fund as helping consumers to obtain lower cost funding to execute EE and RE projects. Additionally, Government is seeking to obtain IDB funding to retrofit public buildings for enhanced EE. There is also a project planned for generating energy using PVs on the roofs of government buildings.<sup>82/</sup>

One of the major current drivers in Barbados is the RE Rider which was proposed by BL&P and approved by the FTC during the Rate Hearing of 2010. Under the RE Rider, individuals selling electricity to the grid are to be paid at a rate of 1.8 times the fuel clause adjustment. The Rider allows customers to interconnect RE systems up to a capacity of 5 kW and commercial entities up to 150 kW. In 2013, the RE Rider provisions were reviewed and FTC established a cap nationally at 7MW under the rider. Additionally, customers were given 1.6times the fuel clause adjustment at the new rate. This has, however, not yet been applied by BL&P.

The RE Rider capacity has grown steadily over the last three years, and there are now about 2.6 MW of PV on the grid from approximately 300 systems.<sup>83/</sup> This represents a substantial increase after the slow uptake that was recorded in the first year. In the first year of the Rider (2010-2011), only six systems were installed under the programme. There are now nine companies in Barbados engaged in photovoltaics in the market including Emera Caribbean Renewables, which also owns 80% of BL&P.

No problems are expected with connecting renewables to the grid up to 16 MW. This is the cap which BL&P has placed on the capacity that can be interconnected at the moment, and represents approximately 10% of demand. The upper limit of 7 MW under the RE Rider leaves 9 MW of capacity available for large scale renewable projects such as solar and wind farms. Firm capacity RE sources are not included under the cap. There is therefore no limit on the maximum capacity to which they can be developed.

BL&P is currently undertaking an Intermittent RE Penetration study with the assistance of General Electric. The Study will identify mitigating measures needed for increasing RE percentages. The FTC will then have to make decisions regarding any new capacity limits that may be proposed as a result of this study.

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<sup>80/</sup> Ms. Elizabeth Thompson, Former Minister of Energy Barbados interviewed June 2009.

<sup>81/</sup> Mr. Leighton Waterman, former manager of IDB Project for Sustainable Energy Framework Barbados, Interviewed May 2011.

<sup>82/</sup> Mr. Darcy Boyce, Minister of Energy, Barbados interviewed October 2011.

<sup>83/</sup> Mr. Roger Blackman, Barbados Light & Power Co Ltd interviewed April 2011.

The main recent development in legislation that is expected to have an impact on how the industry develops is the recently passed ELPA. The Minister will be charged with responsibility of administering the Act with support of an advisory committee. The advisory committee will take into consideration the capacity of the RE system; the type of RE generation; and the amount of RE connected to the electricity grid (see Box 5).

## BOX 5

## EXCERPTS OF THE ELECTRIC LIGHT &amp; POWER ACT (ELPA)

**Selection of Advisory Committee**

4. (1) The Electric Light and Power Advisory Committee has been established.

The functions of the Committee are to: (a) consider and make recommendations to the Minister in respect of applications for the issue or renewal of licences or for approval of assignments of licenses or rights thereunder; and (b) advise the Minister on any other matter relevant to the administration of this Act.

**Issue of Licence**

6. (1) The Minister may, upon payment of such fee as may be prescribed, issue to a person who satisfies the requirements of subsection (3), a licence granting a non-exclusive right to supply electricity for any purpose within any area and for such period as the Minister considers appropriate in the circumstances.

- (2) In determining whether to issue a licence to an applicant, the Minister shall:

1. (a) consider the recommendation of the Committee in relation to the applicant; and
2. (b) take into account, where relevant
  1. (i) the current and projected demand for electricity;
  2. (ii) the cumulative installed capacity of
    1. (a) the generation systems that are a part of, or are connected to, the public grid;
    2. (b) the generation systems of licensees; and
    3. (c) the renewable energy generation systems that are a part of, or are connected to the public grid, and of each type of renewable energy generation system, classified according to the source of renewable energy utilised; the purposes purposes of this Act, being, among other things, to promote the generation of electricity from renewable energy and to enhance the security and reliability of the supply of electricity.

This Act sets out provisions for the interconnection of IPPs. However, there are still regulations, legislations and rules for licensing that need to be specified under the new Act. ELPA will be the policy to guide procedures for RE installations that do not fall under the RE Rider.

One of the main aspects that was removed after consultation on the initial draft of ELPA was “Wheeling”, which refers to the transfer of electrical power through transmission and distribution lines from one utility service area to another. Wheeling was removed because the information required to make a decision on it was unavailable.<sup>84/</sup> BL&P suggested that wheeling would lead to an increase in rates.

At the more general level of environmental sustainability, a GE Scoping Study (GESS) was undertaken under the Ministry of Environment, emerging from principles set out in the National Strategic Plan 2006-2025. This study was undertaken with funding from UNEP and several government ministries, and involved the UWI, Cave Hill, as well as other private sector partners. The information from this document is expected to play a role in future energy policy development.

In the Ministry of Energy, the division responsible for energy policy has developed a National Energy Information System (NEIS) with assistance from OLADE. This electronic system is expected to come on line shortly.<sup>85/</sup> There are now plans to develop an Energy Information Unit within the Ministry.

#### Policy Implementation

Although the national energy policy is being implemented and plays a part in influencing activities, it is not as closely linked to activities in the energy sector as is the case in Jamaica. One limiting factor in Barbados as well as St. Lucia is that the policy is not available online. This makes it difficult to be embraced by all stakeholders.

#### Solar Water Heaters

Barbados has engaged in activity over the years to promote development of the RE sources of wind, bagasse and solar. The greatest success is in the area of solar water heating in which Barbados is a leader in the hemisphere in terms of number of installations per capita.

This began with the establishment of the solar water heating industry in 1974, and involved four companies. There are three companies operating locally now – Solar Dynamics, Solaris (formerly Aqua Sol) and SunPower. About 50% of households in Barbados now have solar water heaters installed.<sup>86/</sup> Solar water heaters are also widely used in the commercial sector, especially in hotels.

The solar water heating industry was stimulated by tax incentives on the manufacturing components as well as income tax write offs that are available for domestic customers that install these devices. It is a widely accepted anecdote that a solar water heater was installed on the roof of the home of the Prime

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<sup>84/</sup> Mr. Bryan Haynes, Ministry of Energy, Barbados interviewed February 2014.

<sup>85/</sup> Mr. Bryan Haynes, Ministry of Energy, Barbados interviewed February 2014.

<sup>86/</sup> Mr. James Husbands, Solar Dynamics, Barbados interviewed June 2009.

Minister at the time. He was so happy with the performance that he put the necessary economic incentives in place that drove the industry. Once these incentives were in place, the market was able to take advantage and influence attitudes of customers and suppliers, creating an informal institution that was favourable to the development of the industry.

In addition to the role of policy, early private sector entrepreneurs such as Mr. James Husbands, the owner and founder of Solar Dynamics, played a major role as well. It is interesting to note that in spite of the success of the solar water heating industry, other RE projects in the years following did not enjoy the same success even though they had tax incentives to encourage development in a manner similar to those established for the solar water heaters. Solar air conditioners, crop dryers and wind turbines were all encouraged through tax incentives but there was not the same success as there was for the water heaters.<sup>87/</sup>

In spite of these long-standing economic incentives, Barbados' solar water heating industry never had a documented policy from government to chart its development. The lack of formal policy in place to stimulate development is similar to what obtained in Curaçao for wind development as well as Nevis in geothermal energy. However, in spite of the lack of formal policies, the long-term tax incentives which were maintained over 30 years in spite of various changes of government were important in safeguarding the continued growth of the industry.<sup>88/</sup> Overall, the combination of the entrepreneurial interest and the tax incentives appears to have provided the impetus for the success of the solar water heating industry in Barbados.<sup>89/</sup>

In the last three years, the Government has put incentives in place to promote the growth of the PV industry in a manner similar to the solar water heaters. There is a notion that the historical success of Barbados in the solar water heating industry can be replicated by the development of solar PVs.

### Wind

The Government of Barbados started exploring the possibility of wind generation in the 1980s. A wind turbine was erected in Lamberts, St. Lucy but was operational for less than one year, after being severely damaged by salt corrosion. In 1998, the Government of Barbados carried out a feasibility study for a wind farm in the north of the island in conjunction with a British company, RE Services (RES). It was determined that the conditions were favourable for the construction of a 16 MW wind farm. However, the wind farm was not developed because RES and BL&P were unable to agree on a price per kWh.

Another barrier was related to the acquisition of the land and obtaining Town and Country planning permission. There was the suggestion from land owners that in the future this land could be used for tourism and other developmental purposes.

Mr. Andrew Gittens, former Managing Director of BL&P and now the Chairman of the Holding company, recalled that in the 1990s, many of the shareholders were anxious to see a wind project developed and

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<sup>87/</sup> Mr. James Husbands, Solar Dynamics, Barbados interviewed June 2009.

<sup>88/</sup> Mr. Thomas Scheutzlich, GIZ, St. Lucia, interviewed April 2011.

<sup>89/</sup> Ms. Elizabeth Thompson, Former Minister of Energy Barbados, interviewed June 2009.



expressed this regularly at meetings. This provided part of the impetus to BL&P to develop wind power.<sup>90/</sup> This indicates that the development of the technology, in addition to being pushed by the economics, was also being influenced by the informal pressure from key stakeholders in the form of shareholders.

Recently, as wind energy has become more reliable, BL&P has sought to develop a wind farm in the Lamberts area.<sup>91/</sup> There continue to be impediments to the project due to issues related to the leasing of the land. This is similar to the situation with the proposed wind projects in St. Lucia. This did not become an issue in Jamaica as PCJ had rights through the Government to develop the Wigton site. BL&P has now been given the right to develop the land in Lamberts for wind power, but there are still negotiations to be undertaken. Barbados has not chosen compulsory acquisition of the land as was done in St. Lucia. BL&P and Sagicor will be required to agree on a price for BL&P to lease the land.

#### *The University of the West Indies Cave Hill Renewable Energy Development*

The UWI in Barbados has been historically the main institution that has promoted R&D of RE technologies. Professor Oliver Headley was the principal pioneer of these projects. In the last five years, the university has sought to carry on Professor Headley's legacy by establishing new research and training opportunities for students in RE. Among the achievements within the last two years are establishment of a Masters Programme in RE Management and a RE Laboratory. The research being conducted there includes tests on efficiency of different PVs installed in Caribbean environmental conditions.

#### *Opportunity for Manufacturing*

Mr. Bryan Haynes, Policy Analyst in the Ministry of Energy, related the Government's interest in promoting manufacturing of RE and EE products in Barbados. This activity is being encouraged to allow for more of the foreign exchange to be retained in Barbados.<sup>92/</sup> Caribbean LED is producing and manufacturing energy efficient lighting in Barbados, and is hoping to also construct solar streetlights. Over BBD3 mn could be saved on solar streetlight installation if the manufacturing were all done in Barbados.

#### *Williams Industries*

Williams Industries is a company in Barbados involved in building construction and electrical installations. Its goal is eventually developing solar farms of 1 MW or greater in Barbados. Williams Industries' CEO Ralph "Bizzy" Williams has been a champion of RE and other innovative technologies for many years. Mr. Williams has installed systems on many of Williams Industries' office buildings, and the company has been able to acquire considerable experience in the area of PVs through this activity.

At the moment, the company has installed 2 MW of solar panels capacity over 13 buildings. The installed capacity of the largest system is 180 kW with peak wattage of 150 kW, just under the cap of 150 kW of the

<sup>90/</sup> Mr. Andrew Gittens, Barbados Light & Power Holdings, interviewed March 2011.

<sup>91/</sup> Mr. Roger Blackman, Barbados Light & Power Co Ltd interviewed April 2011.

<sup>92/</sup> Mr. Bryan Haynes, Ministry of Energy, Barbados, interviewed February 2014.

RE rider. A 150 kW system requires investment of about BBD1 mn by the company. The 150 kW system produces 22,500 kWh per month on average.

Williams Industries first demonstrated its commitment to RE 25 years ago when it erected a 40 kW wind turbine at BRC West Indies Limited, a local steel construction company affiliated with Williams Industries. Williams Industries was also involved in the prototype 200 kW wind turbine at Lamberts discussed earlier. Mr. Williams views RE projects as critical to national development. The company has, however, backed away from wind energy due to repeated challenges to securing land for development.<sup>93/</sup> Offshore turbines have been considered, but are prohibitively expensive. PV is viewed as the best of the RE technologies since the economics are favourable, and the peak demand of the utility follows the peak in solar energy availability. The energy produced by PV in such cases is replacing plant that burns at low efficiency using expensive fuels such as kerosene or jet fuel.<sup>94/</sup>

Mr. Williams considers that the policy environment is gradually improving, but shared that it was challenging at the beginning to import project inputs. He revealed that there were times when the company had to pay up to BBD900,000 in Value-Add Tax to get equipment out of the Port.

Williams Industries sees itself as having the capability of undertaking all of the local development needed in PV, and rejected the view that there was need for international companies to do the installations. The biggest benefit to developing solar and RE on the island was seen as the savings on foreign exchange for the country; the other significant impact is that on the environment.<sup>95/</sup>

Mr. Williams revealed that the RE part of the business was marginally profitable. In terms of the impact on jobs, the numbers were not significant. Only 10-15 people were used to install existing projects. Presently there are not as many installations being undertaken by the company and the number of employees required is less.

Williams Industries' access to capital and financing facilitated the expansion of its RE programme. The impediment of having a high upfront cost to install systems is not as significant a barrier as it would be for other smaller companies.

However, Williams Industries sees room in the market for both the larger and smaller players. They see the smaller companies as able to compete in the residential and small commercial systems that are not the interest of Williams Industries. At present, nine PV companies in Barbados are offering services in this area.

### *Lessons Learned*

- (a) The legacy of solar water heating success is important for development of the PV industry. It is useful to note here the fiscal incentives that spurred the solar water heating industry (see Box 6). Similar measures can support the development of PV as well.

<sup>93/</sup> Mr. David Staples, Williams Industries, Barbados, interviewed January 2014.

<sup>94/</sup> Mr. Ralph 'Bizzy' Williams, Williams Industries, Barbados, interviewed January 2014.

<sup>95/</sup> Mr. David Staples, Williams Industries, Barbados, interviewed January 2014.

- (b) Inappropriate legislation and regulations, or absence thereof, can be a barrier.
- (c) An integrated approach is important; the GESS involved many stakeholders national, regional and international in examining issues and opportunities.
- (d) Policies need to be backed up with clear legislation and regulations to give the required direction to the private sector.

## BOX 6

**FISCAL INCENTIVES FOR DEVELOPMENT OF THE SOLAR WATER HEATING INDUSTRY IN BARBADOS<sup>96/</sup>**

The Fiscal Incentive Act 1974 allowed businesses to benefit from import preferences and tax holidays.

A 30% consumption tax was placed on electric water heaters.

A tax write off of BBD3,500 was allowed from mortgages for solar water heaters.

*Recommendations for Addressing Challenges*

*Integration and Consolidation of Policies and Legislation*

In Barbados, there are a number of initiatives that have been undertaken to develop policy and drive the use of PVs and other renewables. The RE Rider and ELPA are driving developments in the sector with caps of 5kW for domestic installations and 150 kW for commercial installations. At the moment, there is considerable debate between stakeholders as to whether these caps have been appropriately set. The NSEP is not generally being used as a guide to inform decisions of how caps should be determined, and whether they should be adjusted and on what basis. Jamaica has been able to have a system where policies and regulations are closely linked. Barbados and other Caribbean countries could benefit from following the same path.

At the moment, there is a contradiction between the RE Rider, which allows developments up to 150 kW, and the ELPA, which requires a license for selling if the capacity is over 100 kW. These types of contradictions between pieces of legislation, decisions and policies need to be eliminated.

<sup>96/</sup> Ince 1999, Hinds and Perlac, 2003.

It is also important that findings from the GESS (led by the Ministry of Environment) and the NEIS (led by the Ministry of Energy) feed into the overall NSEP and then into legislation such as ELPA. It is important that all available and relevant information is fed into policies, legislations and decisions.

*Integrating Energy Efficiency and Building Codes into Grid-connected Legislation*

As was previously noted, cost of installation is a major barrier to adopting RE technologies, but often cost of installations for buildings can be reduced substantially if EE measures are taken before PV or other renewable systems are installed.

The SMART fund in Barbados recognises the importance of this, and requires energy audits and EE measures be taken before loans are given. However, in general, these stipulations are not required for all grid-connected PV. It may be useful to have EE measures as a part of the requirements for all individuals that wish to develop PV. By doing this, EE in buildings can be enhanced. This would also lead to enhanced competitiveness through reduced resource use, an increase in foreign savings and improved environmental sustainability.

Additionally, there are initiatives that can be taken with respect to the architecture of buildings to include more natural lighting, passive cooling and sloping of roofs. These measures can maximise benefits that RE systems produce, and lead to buildings having a greater impact on environmental sustainability overall. If these considerations are included in building codes, they could promote faster uptake of RE technology. These have been largely neglected in establishing the PV systems, which are often seen as add-ons to the premises rather than a part of an integrated system for environmental sustainability.

### Overall Lessons Learned From Case Studies

Based on the three Case Studies, several important lessons can be identified:

- (a) capacity is needed in responding to requests for project proposals, applying for financing and managing projects;
- (b) current projects and champions need to be identified and supported;
- (c) a platform is needed to coordinate and share information across the Region and internationally. This will help to guide investors and enhance levels of investment;
- (d) funding is needed to reduce risks to government-funded national entities that can be leaders of pilot projects;
- (e) it is important to develop capacity to collect information on economic, environmental and social impacts of projects in order to demonstrate to potential international donors the viability of projects;
- (f) more collaboration is needed between universities and research institutes to facilitate training and learning. Additionally, there should be greater exposure at the level of primary and secondary schools; and

- (g) institutional arrangements and staffing need to be strengthened to ensure that there is a person or department dedicated to managing RE projects in organisations.

### Concluding Recommendations

The three Case Studies and general experiences in the Caribbean suggest that the Region is moving ahead in developing RE and EE technologies. Difficulties still, however, exist in the following areas and need to be addressed.

1. *Collaboration and Coordination:* While many agencies have capacity in-house to undertake projects and to develop programmes and policies, there is a lack of communication and coordination with others, both in their countries and in the Region as a whole. Support and resources should be put into activities to facilitate coordination and establish networks that foster communication.
2. *Information and Communication:* Policies can only be effective to the extent that they are informed by robust information. It is important that countries have adequate knowledge of their own energy sectors, as well as of the experiences of others in the Region and internationally in order to make good decisions. Studies such as the Worldwatch Institute Roadmap for Jamaica can be used as guides. Resources and financing need to be put in place to ensure that studies are undertaken and made available. It is important that as information becomes available, it is disseminated effectively to all stakeholders.
3. *Institutional Strengthening:* It is clear in a number of cases that the funding for projects has been available from international organisations but institutions locally do not have the capacity to effectively deliver or implement programmes for which the funding is given. It is important that in giving funding for projects, donor organisations include funds for institutional strengthening, as well as implementation capacity for the project itself. Governments in the Caribbean need help in building their capacity to effectively prepare terms of references for consultants; write RFPs; evaluate bids; refine policies; and establish administrative procedures. These should all be a part of any funding consideration in the financing of projects.
4. *Support of Stakeholders and of Existing Projects:* Governments and donor agencies have often been quick to establish new programmes and projects designed to stimulate the growth of the RE sector. As attractive as these programmes are, they have not always had the full buy-in of the stakeholders that the programme has been designed to assist. Often the resistance comes from the fact that stakeholders do not view the programme as theirs, do not have a sense of ownership and even sometimes view it as an imposition. Meanwhile, there are grassroots programmes in the countries where champions in the area of RE are striving to make a difference, but without the financial and infrastructural support to help. In these cases, funding may be better used assisting such persons and organisations rather than establishing additional programmes. Identifying the appropriate individuals or organisations to support can be a challenge. Having a collaborative approach on the ground with government and NGOs as key players can be particularly effective in such cases. Greater stakeholder participation in decisions on policies and projects is needed.

## Chapter 3

### Net Socio-Economic Impacts of a Green Economy: The Caribbean

#### LITERATURE REVIEW

The OECD has developed a long list of potential indicators for “green growth”<sup>97/</sup> within a framework<sup>98/</sup> for application to OECD economies. The framework, shown in Figure 3, depicts the basic relationships among the main economic processes for a stand-alone economy – production, consumption and investment – public policy and the natural environment. For the open economies of the Caribbean, the framework will have to be modified to take explicit account of international trade so as to highlight its importance as a channel of vulnerability. For simplicity, economy of analysis and availability of the relevant data, the OECD has selected a short-list of indicators, some of which are relevant to Caribbean economies. The constraint of available relevant data is even more binding for the Caribbean, and therefore the list of indicators will be even shorter. Indeed, the greening of the economies will require appropriate and relevant adjustments to official collection of economic, environmental and social data, for the purposes of monitoring the progress and assessing the impact of greening. Official data collection will have to be complemented by academic and professional research exercises, especially where gaps are not easily filled by inflexible work programmes of official agencies.

The indicators fall into four groups:<sup>99/</sup>

- (1) “Environmental and resource productivity [that measure] the volume of output per unit of services from natural assets”.
- (2) “Indicators describing the natural asset base” of the economy.
- (3) “Environmental quality of life” which refers to the “direct impact of the environment on people”.
- (4) “Opportunities arising from environmental considerations” referring to the “production of environmental goods, services and technologies” as well as innovation.

Figure 3 shows the OECD’s framework. In particular, it shows the relationships between the natural asset base and the economic system, where the natural asset base supplies resources and services, and receives the waste from the economic system. The economic system in turn is depicted as the production system supplying aggregate consumption and the natural asset base supplying services to households and government. The third component of the framework is the government acting upon the economic system as a whole and the natural asset base.

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<sup>97/</sup> OECD, “Towards Green Growth: Monitoring Progress – OECD Indicators”, 2011.

<sup>98/</sup> *ibid*, p.12.

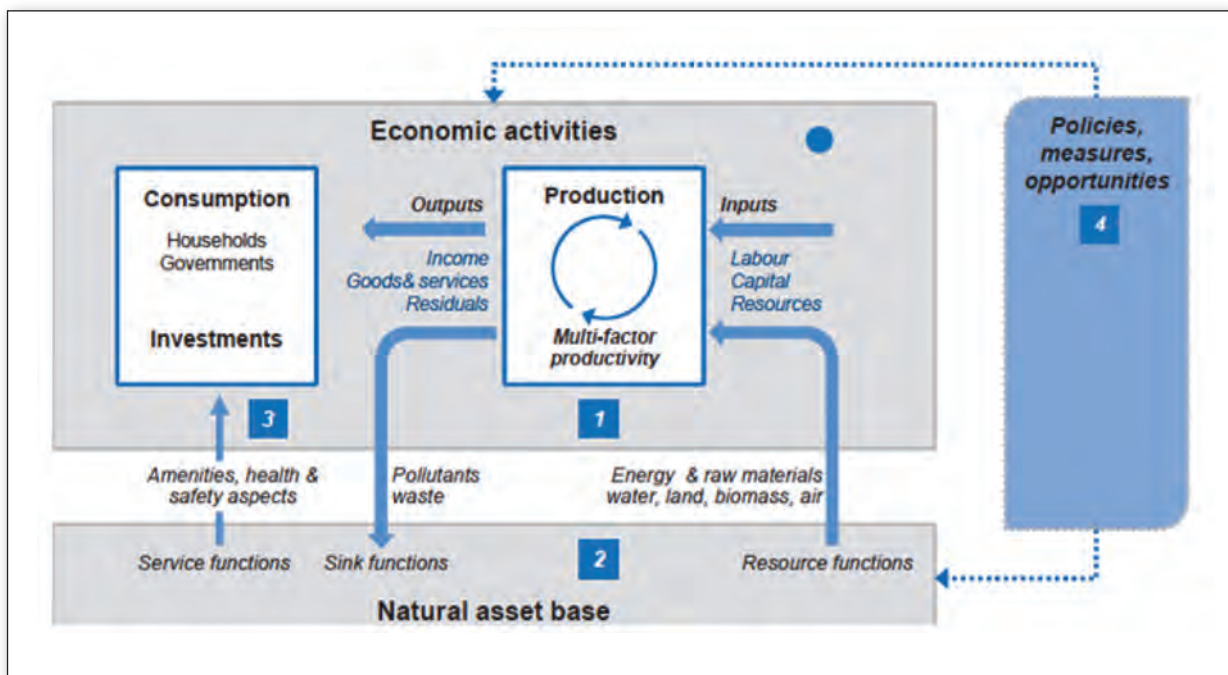
<sup>99/</sup> *ibid*, p.10,11.

This is a general framework that is more often than not abbreviated by assuming away the natural asset base. Even in its present form, it abstracts away from a dialectical interaction among the components – “natural asset base” and “economy” – and the other spheres of culture, society and governance, presumably because the focus is on economic growth.

For the Caribbean, the simplification has always been a serious analytical shortcoming because of the extreme dependence on the natural environment for economic and social activity. The economy and the society are highly vulnerable to natural hazards and variability. Further, because of the extreme openness of the economies and their historical integration in the global economy, it is useful to represent international economic relations explicitly by adding a fourth block to represent the rest of the world with the links between that and the consumption and production systems.

FIGURE 3

### ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT'S CONCEPTUAL FRAMEWORK



Source: OECD 2011

The framework also would be more relevant to the Caribbean if the conception of the natural asset base were expanded to include hazards to which the economies are vulnerable. In these ways, the modified OECD framework could capture the economic and environmental vulnerabilities the Caribbean economies share with other SIDS.

The OECD has defined green growth as follows:

*“Green growth is about fostering economic growth and development while ensuring that the natural assets continue to provide the resources and environmental services on which our well-being relies. To do this, it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities”.*<sup>100/</sup>

The emphasis in the document is on expanding economic output, with little attention to development, and certainly, no attention to income distribution, which underpins the element of equity in the concept of the GE. Growth is central to the sustainability of the GE, however defined. The rate of growth in the Caribbean, in particular, will ultimately be constrained by the requirements of preserving the natural assets for future generations. Green growth strategies for sustainability will extend the limits of expansion for the economy further than the current practices of depleting the natural stock of assets for short-run gain, such as in mining industries and chemical-intensive agricultural practices. In the future, it may even mean programmed contraction of the economy if the fundamental constraint of production and consumption, hydrocarbon-based energy, becomes even more tightly binding because of declining physical availability and the rising cost of accessibility of all forms of energy. Nevertheless, the OECD’s analysis and the indicators it has proposed are both useful starting points for the development of a framework for assessing the impact of the GE in the Caribbean.

The analysis is useful because it refocuses attention on the relationship between the economic system, and the natural environment, though it is arguably a linear, non-dialectical relationship. The indicators were proposed for intra-OECD comparative analysis, and some of them suggest analogous indicators that may be feasible even in some of the Caribbean economies with the relevant data. One can also conceive of indicators that may not be used for comparing economies, but for tracking the changes in a given economy over time.

UNEP’s Driving Forces-Pressures-State of the Environment-Impact-Responses (DPSIR) Conceptual Framework,<sup>101/</sup> adopted from the United Nations System for Environmental-Economic Accounting,<sup>102/</sup> shown in Figure 4, also depicts the relationship between the economy and the natural environment, but with a focus on the “pressures” of consumption and production on the “state” of the natural environment and the “impact” on the natural environment. The “responses” of the systems within the natural environment on consumption and production complete the feedback loop. As with the OECD’s framework, there is no explicit treatment of international trade, which is an essential part of the Caribbean socio-economic system.

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<sup>100/</sup> ibid, p.9.

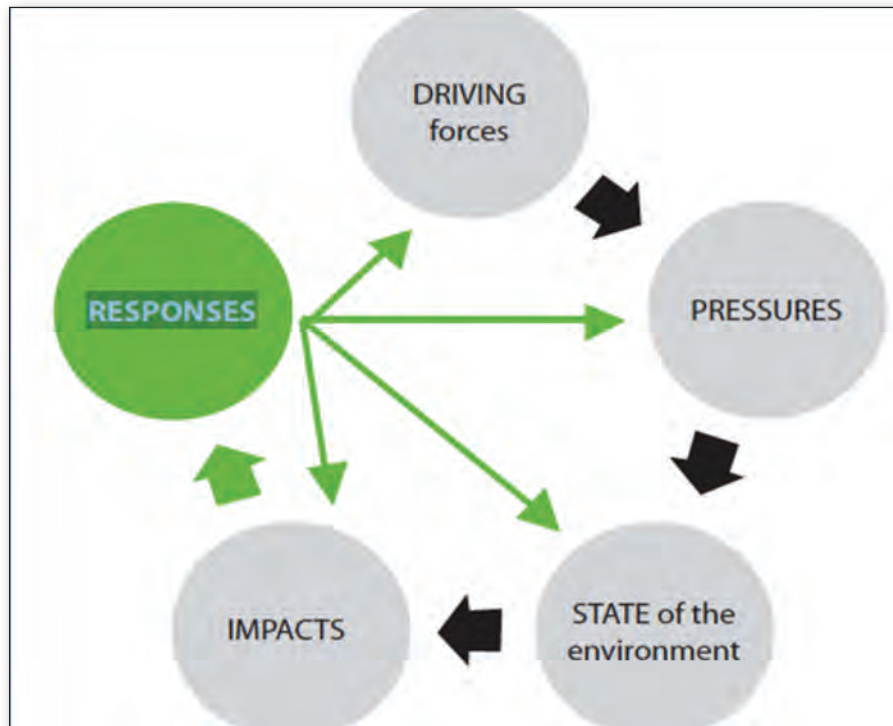
<sup>101/</sup> UNEP, 2010, p.20 shows a more detailed diagram. This simplified version is taken from UNEP 2012, p.15

<sup>102/</sup> This model was originally developed by the European Environmental Agency, the OECD and UNCSD – See UNEP, 2012, p.13



FIGURE 4

UNITED NATIONS' ENVIRONMENT PROGRAMME –  
DRIVING FORCES-PRESSURES-STATE OF THE  
ENVIRONMENT-IMPACT-RESPONSES  
CONCEPTUAL FRAMEWORK (UNEP 2010)



UNEP's GE Report<sup>103/</sup> defined a GE as a “low carbon, resource efficient, socially inclusive” economy and concluded with three findings:

- (a) “greening not only generates increases in wealth, in particular a gain in ecological commons or natural capital, but also (over a period of six years) produces a higher rate of GDP growth;
- (b) the inextricable link between poverty eradication and better maintenance and conservation of the ecological commons; and
- (c) in a transition to a GE, new jobs are created which, overtime, exceed the losses in ‘brown economy’ jobs”.

<sup>103/</sup> UNEP, 2011, p.6

These results assumed an investment strategy that targets agriculture, buildings, energy, forestry, fisheries, industry, tourism, transport, waste, and water for the global economy with an overall investment of 2% of GDP.<sup>104/</sup>

The US Department of Commerce defined the GE as a “clean and energy efficient economy”, and a green product or service as one that “conserves energy and other natural resources or reduces pollution”.<sup>105/</sup> It estimated the share of the GE on a sector-by-sector basis, and assumed that the proportion of employment was the same as the share of industry output. For the US, the estimate of the GE was 1-2% of private economic activity.

ICJ International’s study<sup>106/</sup> of “green activity” in the Washington DC, Maryland and Virginia area used input-output tables to estimate the job creation. A similar methodology was used to estimate the employment impact of green energy investments in Ontario, Canada.<sup>107/</sup> Without up to date input-output tables, this methodology would not be applicable in the Caribbean.

In their brief review of “greening” in the Canadian economy, Alexander and McDonald argue against the use of the term “GE” and in favour of the concept of greening as “efforts to improve environmental conditions are motivated by government environmental policy, environmental and economic efficiency, and corporate responsibility”.<sup>108/</sup> They distinguish between two types of meaning for the “GE”. The first is that the GE is viewed as a subset of the whole economy. This facilitates quantitative estimates of the share of the GDP, but necessarily excludes the “green products and services” used as intermediate inputs in the rest of (the “brown”) economy. The second meaning is the systems approach that is holistic in its view of the complex of relations between the economy and the environment. This is conceptually sounder, but cannot be quantitatively measured because of the lack of data.

They adopt a framework<sup>109/</sup> for studying “greening” that consists of three main elements:

- (a) government environmental policy, that regulates economic activity;
- (b) environmental and economic efficiency, which captures decision-making and the impacts of those decisions; and
- (c) community preferences and corporate responsibility, referring to the interaction between consumer and corporate behaviours that shape greening activity.

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<sup>104/</sup> See UNEP, 2011, Annex III, p.42

<sup>105/</sup> US Department of Commerce, 2011, p. 1

<sup>106/</sup> ICJ International, 2011

<sup>107/</sup> Robert Pollin and Heidi Garrett-Peltier, “Building the Green Economy: employment Effects of Green Energy Investments in Ontario”,

[http://www.peri.umass.edu/fileadmin/pdf/other\\_publication\\_types/green\\_economics/Green\\_Economy\\_of\\_Ontario.PDF](http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/Green_Economy_of_Ontario.PDF)

<sup>108/</sup> Craig Alexander and Connor McDonald, October 2, 2013, p.1

<sup>109/</sup> *ibid*, p.4

They recognise that for developing countries, the concept of the GE embraces other dimensions and “typically focus(es) on social issues, such as resource development, economic growth and their implications with respect to human rights or income equality”.<sup>110/</sup> For Canada, they argue, the concern is more narrowly focused on the environment. Nevertheless, their approach to constructing a framework for studying greening is instructive, since it focuses on a process – greening – rather than a structure – GE – and it introduces explicitly the interaction between consumers and firms in “shaping greening activity”.

The Green Growth Knowledge Platform Scoping Paper is the result of collaboration among four leading institutions<sup>111/</sup> researching indicators to measure the progress toward a GE. Except for a further detailing of the many gaps in knowledge to be filled by future research, the paper made no real advance on the OECD’s study of 2011.

The World Bank has developed a conceptual framework for Poverty and Social Impact Analysis<sup>112/</sup> based on a series of questions that can be adapted to the analytical task at hand:

1. *Impact of what:* What is being analysed? In this study, it is the impact of the GE.
2. *Impact on what:* What is the welfare measure being assessed? Various indicators of the social and economic dimensions of the welfare of Caribbean households will be used.
3. *Impact on whom:* Whose welfare is being analysed? Caribbean households with special attention to the poor and vulnerable.
4. *Impact how:* How are impacts channeled? The WB’s channels are relevant here: “(i) employment; (ii) prices (production, consumption, and wages); (iii) access to goods and services; (iv) assets; and (v) transfers and taxes”.
5. *Impact how:* How do institutions affect outcomes? This refers to government, markets and civil institutions.
6. *Impact when:* When do impacts materialise? Here consideration is given to the net impact on different groups over a given time, as well as the net impact on a given group over time.
7. *Impact if:* What are the risks of an unexpected outcome? Reference here is to risks of underlying assumptions being incorrect as well as unanticipated external shocks.

<sup>110/</sup> *ibid*, p.3

<sup>111/</sup> These are the OECD, UNEP, Green Growth Institute, and the World Bank

<sup>112/</sup> Poverty and Social Impact Analysis, <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPSIA/0,,contentMDK:21711600~menuPK:6145100~pagePK:148956~piPK:216618~theSitePK:490130~isCURL:Y,00.html>

## A FRAMEWORK FOR ASSESSING THE SOCIO-ECONOMIC IMPACTS OF GREENING AN ECONOMY

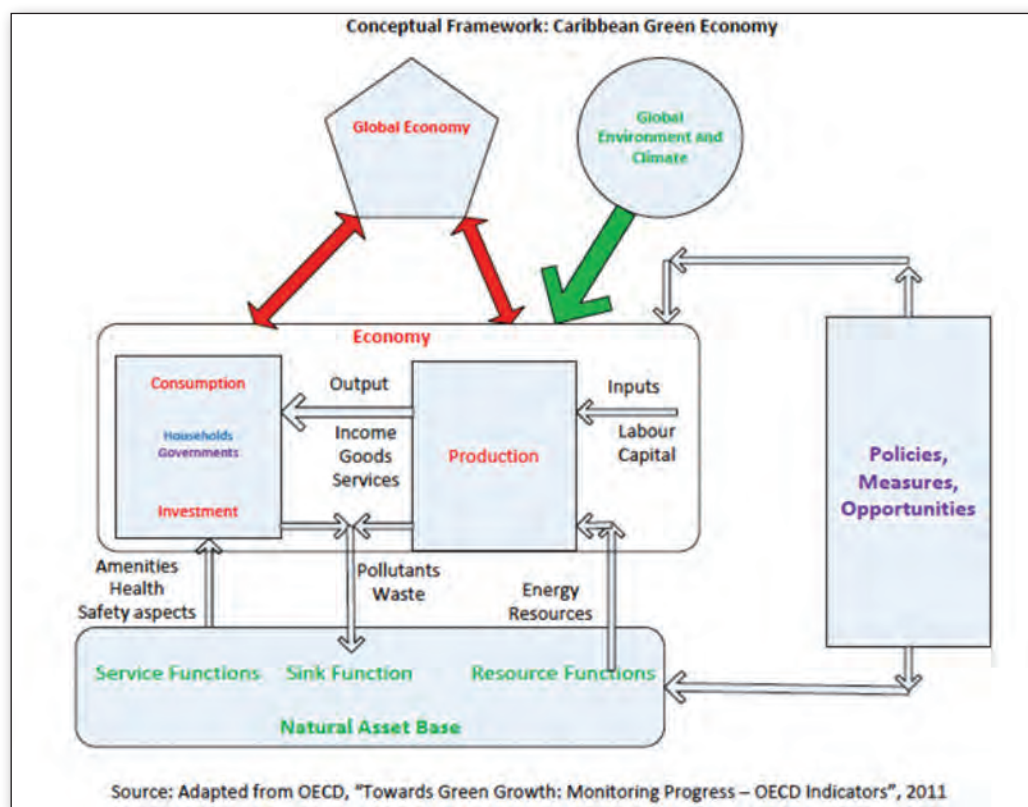
### The Framework for the Caribbean

The proposed conceptual framework for analysing the net socio-economic impact of the greening of the Caribbean economy draws on the body of literature reviewed above, with the explicit attention to the openness, and hence the economic vulnerability of the Caribbean economies, and to the proneness to natural hazards, and hence the environmental vulnerability of the Region.

Figure 5 depicts the model on which the conceptual framework is based.

FIGURE 5

### CONCEPTUAL FRAMEWORK FOR THE CARIBBEAN GREEN ECONOMY



The diagram focuses on the essential relations among the production and consumption system, and the policy regime. It explicitly identifies the links with the global economy and the impact of the global environment and climate on the economy. Of course, the natural asset base is itself a part of the global environment, but for the purposes of focus on the Caribbean economy, it is separated out conceptually.

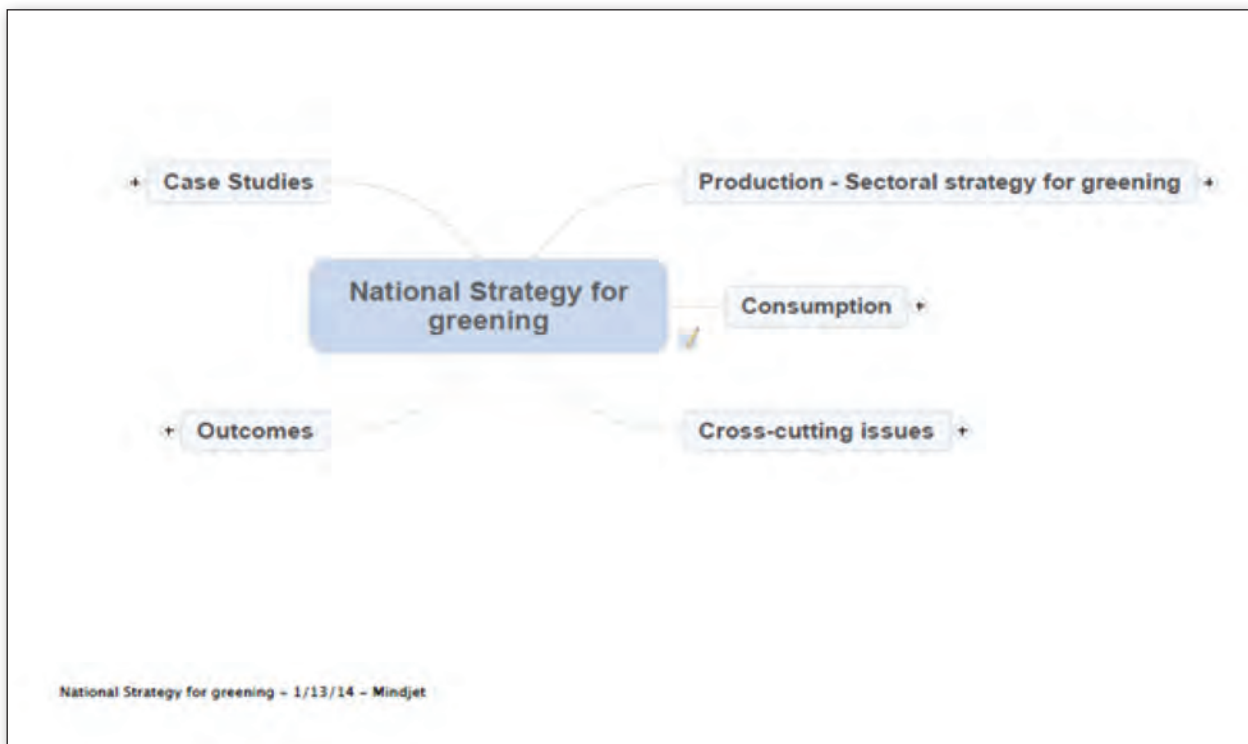
There are other linkages too, such as the link between the global economy and the global environment and the policy regime. The representation of these is omitted so as not to clutter the diagram, and lose the focus on the essential relations among the production and consumption systems, and the policy regime.

Assume a process of greening that begins with policies that facilitate entrepreneurs exploring market opportunities for the production of green products and/or services, and/or reducing the input of natural resources per unit of existing output, and/or reducing the carbon footprint of their current production processes. Policies may take the form of taxes on non-green activities, incentives for green activities, and regulations in favour of green activities. Policy-makers may also promote programmes of public education for the greening of consumption, by increasing demand for green goods and services, reducing waste per unit of consumption, conserving energy and/or water, and reducing the carbon emissions from consumption.

Figure 6 shows the national strategy for greening, consisting of the production and consumption components; some of the principal cross-cutting issues; the outcomes of the strategy; and the Case Studies to which the strategy will be applied in this study. The economic, environmental and social changes resulting from the national strategy may be measured by indicators – red border for economic, purple border for social, and green border for environmental changes – shown in the following figures.

FIGURE 6

## GREENING OF PRODUCTION



Similarly, Figure 7 shows the economic and social impacts of the greening of production. It shows as well the outline of the policies for greening and the high level indication of environmental impacts. The same colour coding shows the indicators for economic, social and environmental changes.

FIGURE 7

PRODUCTION GREENING STRATEGY - ECONOMIC IMPACT

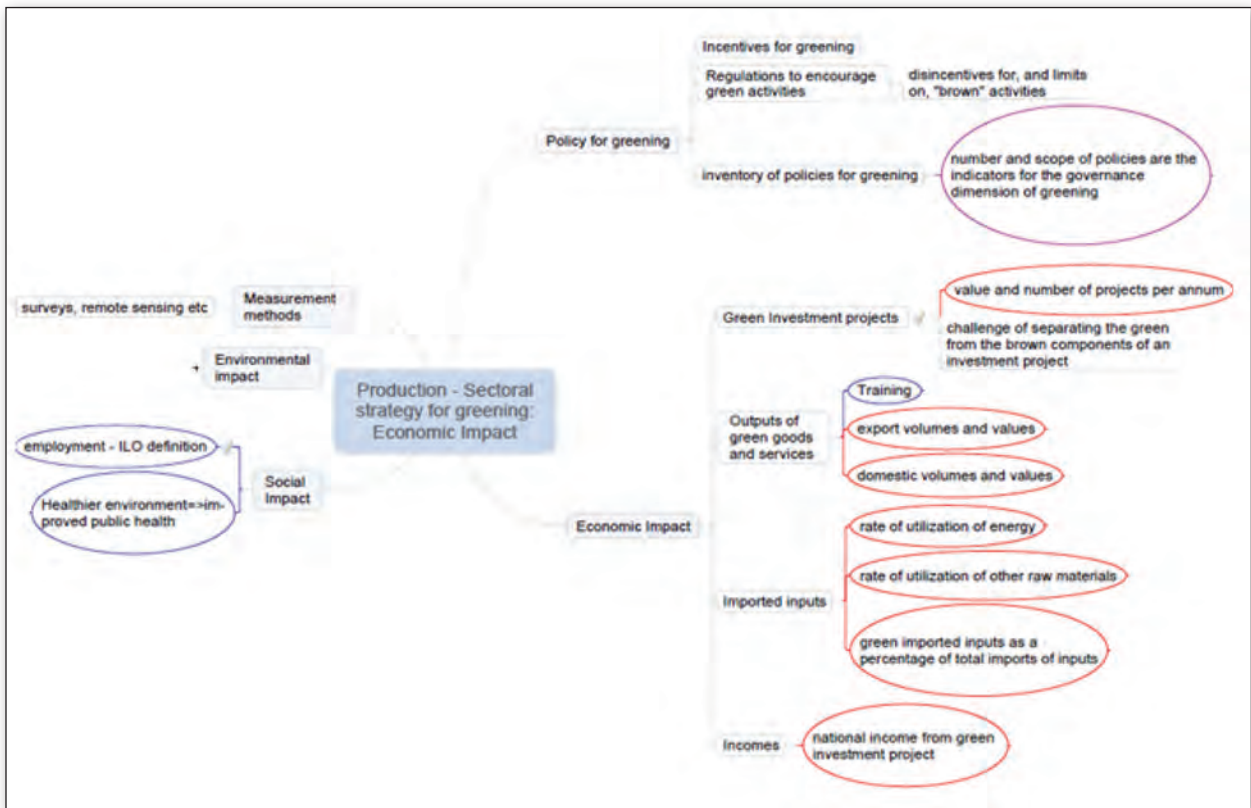


Figure 8 depicts the environmental impact of investment, with high level indicators for the economic and social impacts, policy for greening.

FIGURE 8

PRODUCTION GREENING STRATEGY – ENVIRONMENTAL IMPACT

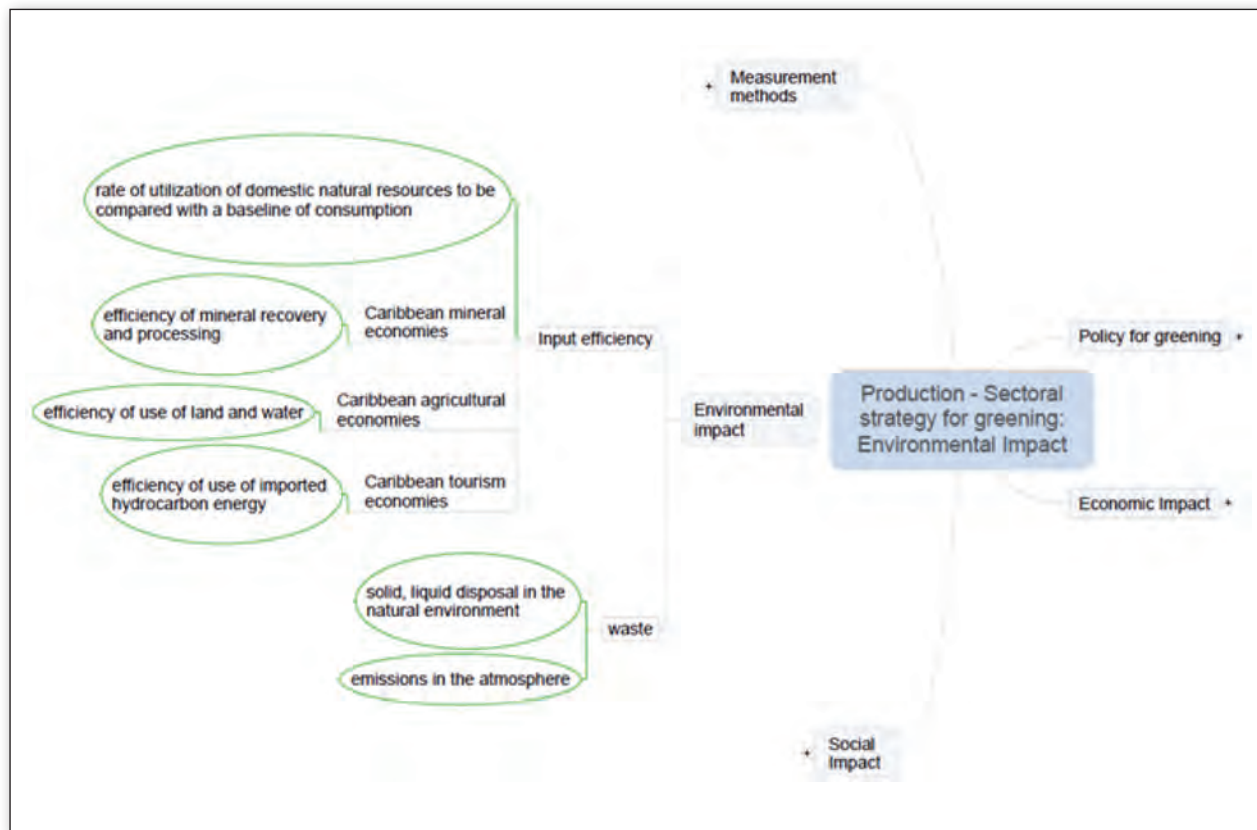


Figure 9 shows the policies for greening consumption and the impacts. It is the breakout of the high level indicator, consumption, in Figure 6 above.

**FIGURE 9**  
**GREENING CONSUMPTION**

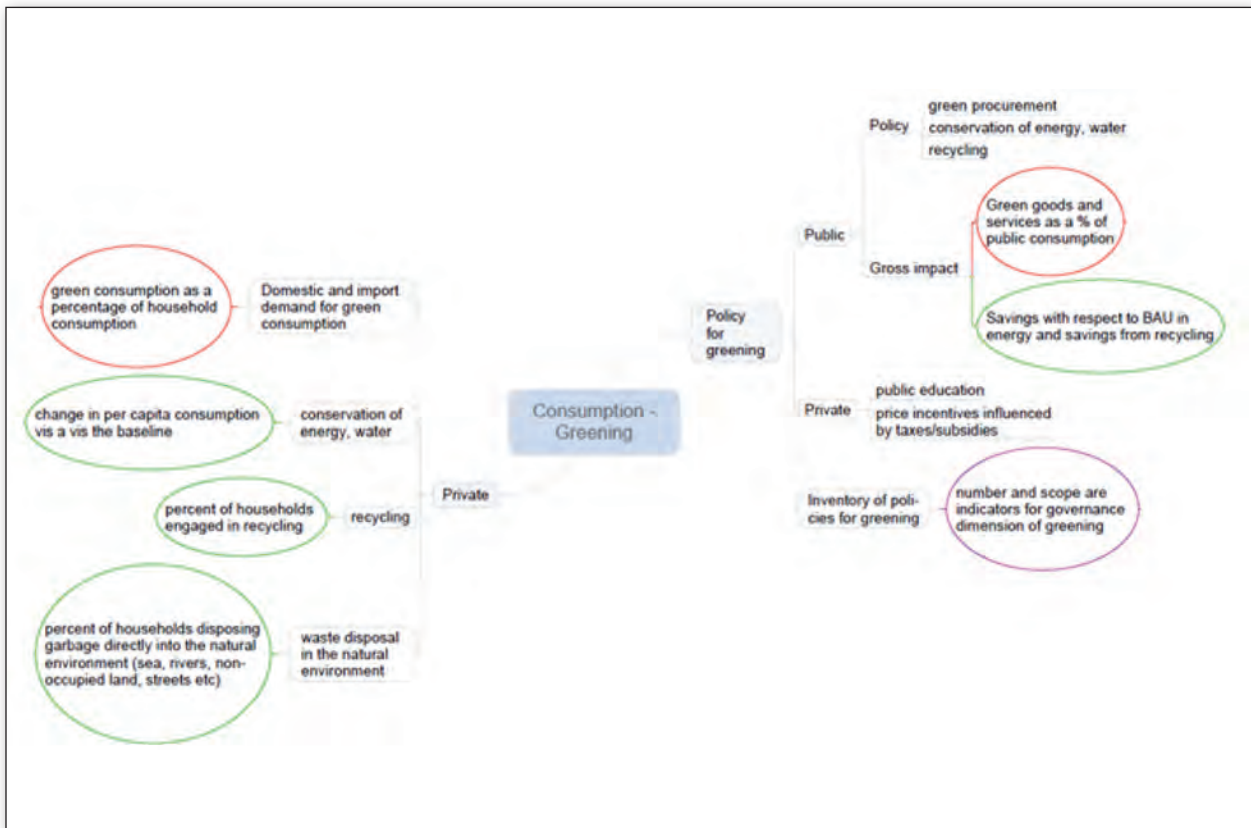
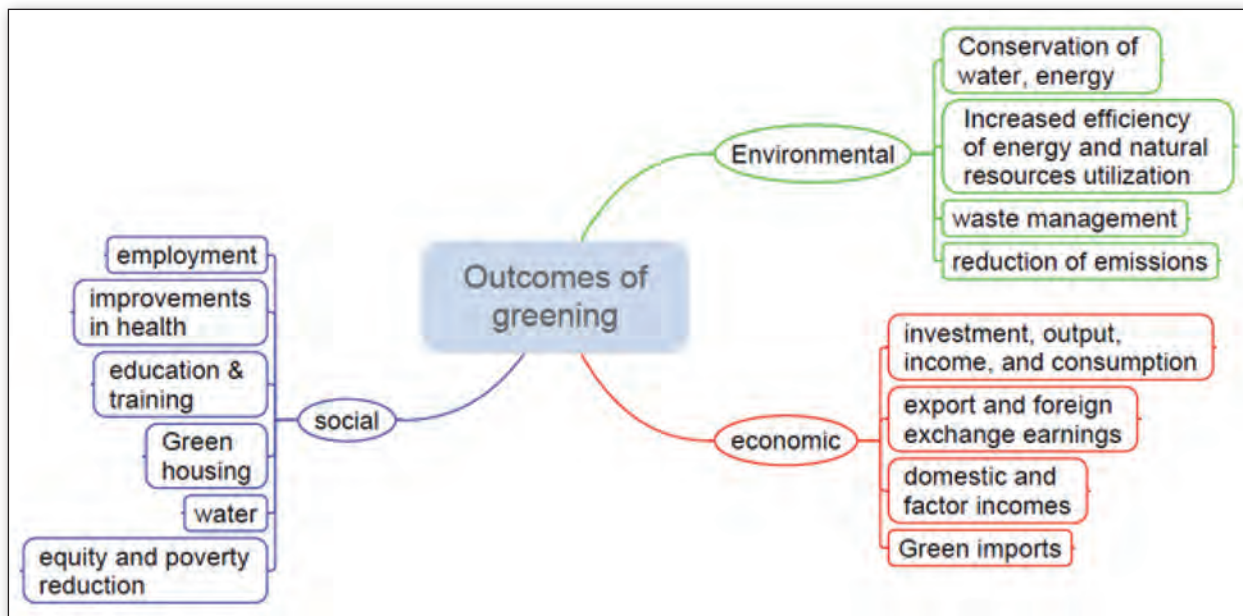




Figure 10 breaks out the high level indicators in Figure 6 for outcomes of the greening process. Two outcomes, not shown, are the impact on equity and poverty, and the development of a portfolio of policies and regulations for greening.

FIGURE 10

## OUTCOMES



The three Case Studies selected for this exercise were RE as captured in the Wigton Wind Farm in Jamaica, green tourism as embodied in Sandals Hotel La Toc in St. Lucia, and green construction as exemplified by Williams Industries in Barbados. Only the case of Wigton was studied because of the availability of data, and the corresponding lack of data for the St. Lucian and Barbadian cases. Following the methodology for impact assessment used by the WB that was mentioned previously, the following questions will guide the analysis:

- (a) How is the project greening the sector/economy?
- (b) Was the project facilitated by government policy, and if so, which?
- (c) What is the value of the investment?
- (d) What are the expected outcomes of the project?
- (e) For completed projects, have outcomes been met?

- (f) What is the value of the project's output?
- (g) What is the employment generated?
- (h) How has the project saved, or will save, hydrocarbon energy, especially imported?
- (i) What is the waste disposal strategy?
- (j) How will the project contribute to reducing greenhouse gas emissions?
- (k) How will the project contribute to reducing air/water pollution?
- (l) What are the other environmental impacts of this project?
- (m) What are the social benefits of the project?

Table 2 lists examples of outcomes and indicators for economic sectors. It merely expands on the possibilities for sectoral greening policy, with some likely outcomes and relevant indicators. The Region is already committed to greening under a number of international agreements that need only be implemented.

TABLE 2

## SECTORAL OUTCOMES FROM GREENING

Sector	Policy	Outcomes	Indicators
<i>Agriculture</i>	<ul style="list-style-type: none"> <li>• Incentives for green agriculture.</li> <li>• Regulations on chemical applications.</li> <li>• Inventory of green sectoral policies.</li> <li>• Use of drought-resistant crop varieties and precision irrigation systems.</li> <li>• Mainstream hazard risk management and climate change adaptation into agricultural planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced nutrition, reduced unfriendly practices to the environment.</li> <li>• Increased production per unit of water consumed.</li> <li>• Increased resilience of agricultural sector to hazard risks including climate variability and climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects per annum.</li> <li>• Employment in green projects.</li> <li>• Output of products from green activities per annum.</li> <li>• Relative prices <i>vis-a-vis</i> “brown” substitutes.</li> <li>• Consumption of green products per capita.</li> <li>• Employment in green activities</li> <li>• Inventory of green sectoral policies.</li> </ul>
<i>Fisheries</i>	<ul style="list-style-type: none"> <li>• Establishment of sanctuaries.</li> <li>• Regulations on fishing practices.</li> <li>• Inventory of green sectoral policies.</li> <li>• Improved protection/management of coastal and marine assets such as reefs and mangroves.</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced nutrition, reduced unfriendly practices to the environment.</li> <li>• Increased production of fisheries.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects per annum.</li> <li>• Increased catches per annum.</li> <li>• Increased average sizes of fish.</li> <li>• Price of fish</li> <li>• Consumption per capita.</li> <li>• Inventory of green sectoral policies.</li> </ul>
<i>Forestry</i>	<ul style="list-style-type: none"> <li>• Protection and regulation.</li> <li>• Incentives for private forests.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved forest services – water, recreation, carbon sink.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects per annum.</li> <li>• Employment in green projects.</li> <li>• Growth of the forests – number of trees and areas covered.</li> <li>• Inventory of green sectoral policies.</li> </ul>

Sector	Policy	Outcomes	Indicators
<i>Tourism</i>	<ul style="list-style-type: none"> <li>• Environmental regulations for greening the industry.</li> <li>• Incentives for energy conservation/efficiency and promotion of RE technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved attraction of green product, reduced pressure on the environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects per annum</li> <li>• Employment in green projects</li> <li>• Feedback from tourists</li> <li>• Energy consumption per tourist</li> <li>• Green services as a proportion of the basket of services offered</li> <li>• Inventory of green sectoral policies</li> <li>• Number of hotels with green certification</li> </ul>
<i>Buildings</i>	<ul style="list-style-type: none"> <li>• Green regulations.</li> <li>• Incentives for green housing construction.</li> <li>• Building code.</li> <li>• Green requirements of public housing projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced petroleum –based energy consumption.</li> <li>• More efficient use of water.</li> <li>• Recycling of waste.</li> <li>• Use of green inputs in construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment housing projects per annum.</li> <li>• Employment in green housing projects.</li> <li>• Energy consumption per capita for housing.</li> <li>• Per capita use of RE/water sources.</li> <li>• Inventory of green sectoral policies.</li> </ul>

Sector	Policy	Outcomes	Indicators
<i>Energy</i>	<ul style="list-style-type: none"> <li>• Regulations.</li> <li>• Incentives for energy conservation.</li> <li>• Incentives for RE applications.</li> <li>• Inventory of green sectoral policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased use of renewables, decreased imports of petroleum, decreased carbon dioxide emissions, decreased pollution, improved health.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects in renewables and conservation per annum.</li> <li>• Employment in green projects.</li> <li>• CO2 emissions per annum per capita.</li> <li>• Energy consumption per capita.</li> <li>• GDP/barrels of energy.</li> <li>• Renewable supplies as a proportion of the total energy supply.</li> <li>• Pollution from energy sources.</li> <li>• Inventory of green sectoral policies.</li> </ul>
<i>Water</i>	<ul style="list-style-type: none"> <li>• Design/implement Integrated Water Resource Management policies and regulations.</li> <li>• Incentives for water conservation.</li> <li>• Promotion of household and enterprise water management.</li> <li>• Rainwater harvesting.</li> <li>• Recycling of waste water.</li> <li>• Management of water run-offs.</li> <li>• Inventory of green sectoral policies.</li> <li>• Design/implement early warning systems for floods and droughts.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced petroleum-based energy consumption per capita</li> <li>• Reduced water consumption per capita.</li> <li>• Reduced duration and impacts of floods and droughts on productivity and on human health.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects per annum.</li> <li>• Water consumption per capita.</li> <li>• Water consumption per hectare of agricultural land.</li> <li>• Percentage of households with water storage.</li> <li>• Inventory of green sectoral policies.</li> </ul>

Sector	Policy	Outcomes	Indicators
<i>Waste</i>	<ul style="list-style-type: none"> <li>• Regulations.</li> <li>• Incentives for waste recycling and other environmentally friendly management practices.</li> <li>• Inventory of green sectoral policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced pollution, potential alternative energy source.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects in waste management, especially waste-to-energy, per annum.</li> <li>• Proportion of energy supply from recycled waste.</li> <li>• Recycled waste as a percentage of total waste per household and per enterprise.</li> <li>• Inventory of green sectoral policies.</li> </ul>
<i>Exports</i>	<ul style="list-style-type: none"> <li>• Policies/regulations for sustainable production.</li> <li>• Incentives for green exports.</li> <li>• Marketing strategy, a la fair trade bananas.</li> <li>• Inventory of green sectoral policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance efficiencies to reduce energy-intensive and resource-intensive exports, such as the mineral exports of Jamaica, Suriname and Guyana; reduce the energy-intensity of tourist consumption in the Region.</li> </ul>	<ul style="list-style-type: none"> <li>• Value and number of green investment projects for export production per annum.</li> <li>• Employment in green export projects.</li> <li>• Green products as a proportion of the export basket.</li> <li>• Foreign exchange earnings from green exports as a proportion of total export earnings.</li> <li>• Inventory of green export policies.</li> </ul>
<i>Imports</i>	<ul style="list-style-type: none"> <li>• Policies/regulations for sustainable consumption.</li> <li>• Incentives for green imports.</li> <li>• Inventory of green sectoral policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage imports of energy efficient appliances, equipment, and machinery.</li> <li>• Encourage imports of green technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Green imports as a proportion of the total import basket.</li> <li>• Green import bill as a proportion of the total import bill.</li> <li>• Inventory of green import policies.</li> </ul>

**APPLICATION OF FRAMEWORK TO RENEWABLE ENERGY CASE STUDY**

Out of the three Case Studies reviewed in Chapter 2, only for the case study on the Wigton Wind farm in Jamaica was data available to allow analysis.

**Micro-impacts**

Table 3 summarises the economic, environmental and social impacts of the project.

TABLE 3

**GREEN IMPACTS ON WIGTON FARM WIND FARM**

Type of Impact	Wigton Wind Farm	
<i>Project</i>	Outline the project, with the expected outcomes	Wigton 1: – 20.7 MW capacity battery of wind turbines. Wigton 2: – 18 MW capacity battery of wind turbines. Wigton 3: – 24 MW capacity battery of wind turbines expansion planned which will save USD 7 mn annually, and generate 63 mn kWh annually.
	How is the project greening the sector/ economy?	Wigton 1 and 2: Replaces the equivalent of 60,000 barrels per annum of imported petroleum with RE. Wigton 3 will increase the savings by 60-70,000 barrels per annum.
	For completed projects, have outcomes been met?	Yes, in so far as the installation of capacity went. However, output has been lower than the rated turbines for a variety of reasons.
<i>Policy</i>	Was the project facilitated by government policy, and if so, which?	A range of policies were developed over time, generally in response to initiatives taken to push the project by the promoters. <sup>113/</sup>

<sup>113/</sup> See discussion on policy context in Chapter 2.

Type of Impact	Economic	
<i>Economic</i>	What is the value of the investment?	Wigton 1 – USD26 mn. Wigton 2 – USD50 mn. Wigton 3 – USD45 mn.
	What is the value of the project's output?	Wigton 1 – USD 5.35 mn. Wigton 2 – USD 6.39 mn. Wigton 3 – USD. Wigton 1 + 2 – 107 million kWh/annum. Wigton 3 – 63 million kWh per annum.
	What is the employment generated?	Wigton 1 + 2: 16 employees, 8 of whom in administration Wigton 3: 125 jobs during construction, 3 permanent jobs for engineers
	How has the project saved, or will save, hydrocarbon energy, especially imported?	Wigton 1+2 saving 60,000 barrels of oil per year = USD4 mn. <sup>114/</sup> 335,000 barrels of oil saved in the period, 2004-2013 Wigton 3 expected to save an additional 72,000 barrels of oil per year.
<i>Environmental</i>	What is the waste disposal strategy?	Minimal waste.
	How will the project contribute to reducing greenhouse gas emissions?	Wigton 1+2 reduced emissions of carbon dioxide by 85,000 tonnes per year, and Wigton 3 is expected to reduce emissions by a further 102,000 tonnes.
	How will the project contribute to reducing air/ water pollution?	By reducing emissions of particulates, carbon dioxide and other GHG's.
	What are the other environmental impacts of this project?	Noise, possible disruptions of bird life; each turbine has a small footprint of 4 meters in diameter.
<i>Social</i>	What are the social benefits of the project?	Employment, electricity for 50,000+ households.

<sup>114/</sup> Note that these are gross and not net foreign exchange savings, which would be a more meaningful indicator.



## SCALING UP OF THE RESULTS OF THE CASE STUDY

### Net Impacts – Macro Estimates

In October 2013, the Worldwatch Institute published<sup>115/</sup> what it regards as a “sustainable energy road map” for Jamaica. The study used the Levelized Costs of Electricity (LCOE) approach to compare alternative options for electricity generation in Jamaica, which uses “the price, per unit of electricity, required for the investment in an electricity project to break even over its useful life.”<sup>116/</sup> To estimate the LCOE for Jamaica, the study “adapted and modified” the WB’s Model for Electricity Technology Development (META) to take account of Jamaica’s “project- and country-specific performance characteristics and cost parameters and extended META’s timeframe to 2030”.<sup>117/</sup> META’s default data was drawn from three countries chosen as models for developed (USA), middle-income (Romania) and developing (India) countries. However, it allowed for customising with country-specific data, and WWI populated the model with Jamaican data instead of using the Romanian data for middle-income countries. In particular, WWI used “RE resource assessments – local cost data for equipment, fuel, and labour; as well as local performance data for plant efficiencies, capacity factors, and fuel quality”.<sup>118/</sup>

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<sup>115/</sup> Worldwatch Institute, “Jamaica Sustainable Energy Roadmap: Pathways to an Affordable, Reliable, Low-Emission Electricity System”, Washington, D.C., October 2013

<sup>116/</sup> WWI 2013, p.94

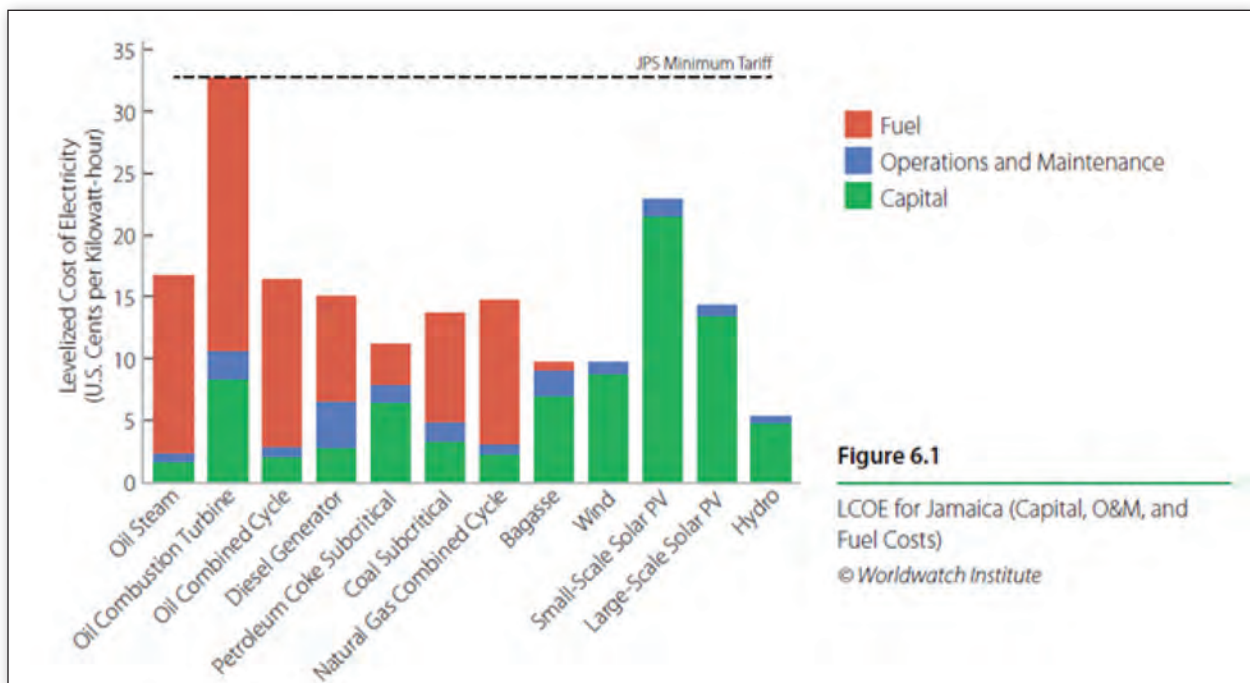
<sup>117/</sup> WWI 2013, p.94

<sup>118/</sup> WWI 2013, p.94

The analysis concluded that “when costs of capital, operations and maintenance, and fuel are factored in, most RE technologies already are competitive solutions for electricity generation”, as illustrated in Figure 11.

FIGURE 11

### THE LEVELISED COST OF ELECTRICITY FOR ALTERNATE ENERGY



Sources: (WWI 2013, Figure 6.1, p. 95)

Wind energy, as with the other renewables, has relatively high capital costs, but no energy costs, and overall, only hydroelectricity has lower generation costs. The JPSCO has plans to construct a 360 MW plant using Liquefied Natural Gas (LNG) by 2016 at a cost of USD614 mn. This is equivalent to a cost of USD1.7 mn per MW, compared to the analogous construction cost of USD1.9 mn per MW for Wigton 3. However, in mid-2013, the Government seemed to have backed away from building the infrastructure for LNG, which means that the JPSCO would have to bear the additional costs.<sup>119/</sup>

The analysis went further to include “externalities – such as negative health effects caused by local emissions of pollutants”,<sup>120/</sup> as well as costs associated with climate change as proxied by emissions of carbon dioxide.

<sup>119/</sup> See The Gleaner, June 9, 2013

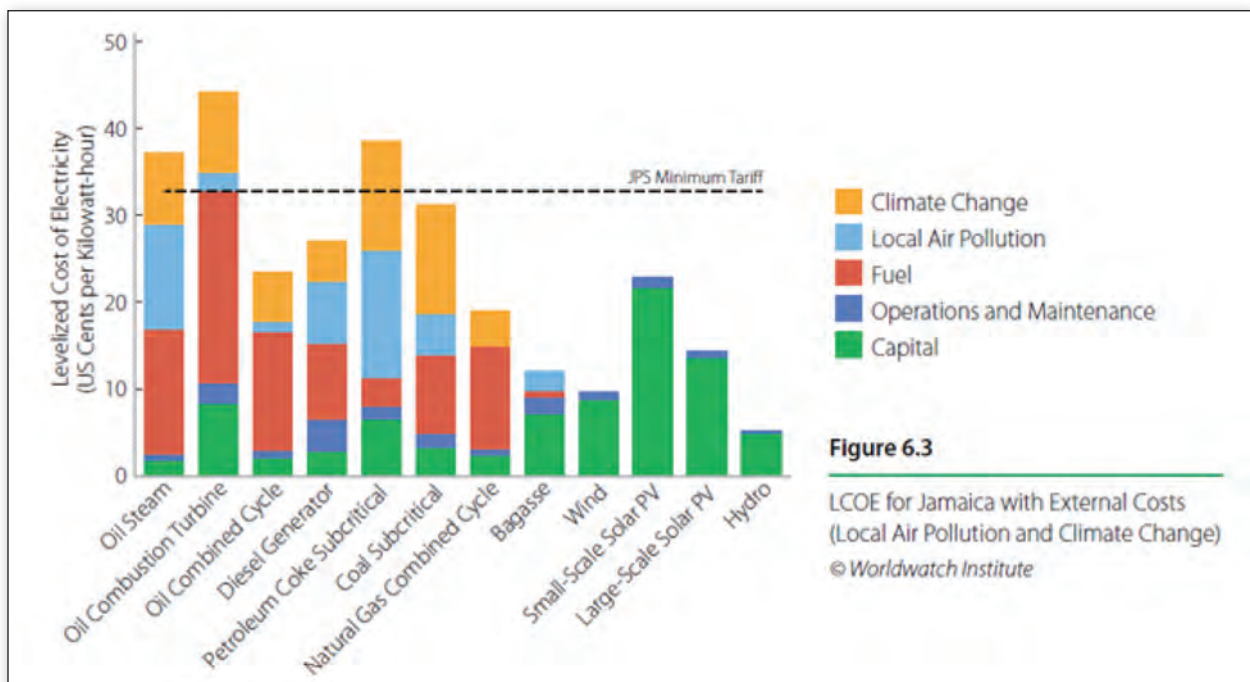
<sup>120/</sup> *ibid*, p.97

The study acknowledged the limitations of data to extend this analysis, and opted for a “WB model developed specifically to evaluate the damage from pollutants in developing nations”,<sup>121/</sup> which was then incorporated in the original LCOE model.

The results of the extended LCOE analysis show the additional advantages of the RE strategy for Jamaica, and in particular the advantages of wind energy. Figure 12 demonstrates the results.

FIGURE 12

**THE LEVELISED COST OF ELECTRICITY FOR  
ALTERNATE ENERGY SOURCES WITH  
EXTERNALITIES AND CLIMATE CHANGE IMPACTS**



Sources: (WWI, 2013, Figure 6.3, p. 101)

With no emissions of particulates or carbon dioxide, the cost advantages of wind over petroleum-based energy are even greater, and will increase over time as the cost of oil rises. Projections to 2030 show the costs advantages of wind energy surpassing coal and natural gas by 2015, with only hydro and solar PV systems costing less in the long run. The study compares three scenarios – gas, coal and oil – with varying shares of RE with a business-as-usual scenario,<sup>122/</sup> and concludes that with renewables accounting for 93%

<sup>121/</sup> ibid, p.99

<sup>122/</sup> See WWI 2013, Figure 6.5, p.104

of the electricity supply and oil making up the balance, generation costs will decline from approximately USD22 cents per kWh to “below USD7 cents per kWh” by 2030. Currently, the retail cost of electricity is USD 35-41 cents/ kWh, whereas wind generated electricity costs USD14 cents per kWh. This would mean sharp declines in the cost of electricity, which will redound to the benefit of producers and consumers by 2030. Note that Jamaica’s long-term development plan, Vision 2030, projects renewables accounting for 20% of the total national energy supply, which has been interpreted to mean 30% of the electricity supply from renewables.<sup>123/</sup>

For comparison, the JPSCo 360 MW plant projects a 30-40% decline in electricity costs. At USD35-41 cents per kWh currently, the projection is that the new plant will deliver electricity to customers at USD21-29 cents per kWh, perhaps as early as 2017. However, the long run trajectory of fuel prices will force the prices of electricity to customers upward, thereby widening the gap between the costs of electricity generated from LNG and other hydrocarbons, and the cost of wind-generated electricity to end-users.

It should be noted that all energy options entail expenditure of foreign exchange for imports, but none earn foreign exchange. Instead, it is the relative displacement of import costs for fuel sources, or savings of foreign exchange, that have to be taken into account. The low levelised costs of wind energy reflect the fact that the relatively higher capital costs are offset by the savings from displaced fuel imports.

The WWI study went on to estimate the social and environmental impacts of the option with a high RE share to be 4,000 more jobs than in the business-as-usual scenario, and a decrease in the “annual emissions in the electricity sector by up to 5.2 million tons, to an estimated 0.7 million tons”.<sup>124/</sup> The employment estimate was obtained using a model by Wei, Patadia and Kammen,<sup>125/</sup> which is “derived from a meta-analysis of 15 job-creation studies [but is based on] assumptions [that] can lead to uncertainties in job creation estimates”.<sup>126/</sup> In general, it argued that electricity generated from renewable sources was more labour intensive than oil-based generation.

Apart from a 3 MW commercial wind farm, Wigton was the basis of the study’s analysis of the actual and potential contribution to Jamaica’s electricity supply. In addition to wind studies being conducted by Wigton, WWI did its own studies including off-shore sites. It concluded that “Jamaica overall has very strong wind potential” and identified locations which could host 10 sites that “could supply at least half of Jamaica’s current power demand”.<sup>127/</sup>

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<sup>123/</sup> David Ince, Interview Notes with Hopeton Heron and Peter Black, January 2014

<sup>124/</sup> *ibid*, p.94

<sup>125/</sup> *ibid*, p.113

<sup>126/</sup> *ibid*, p.113

<sup>127/</sup> *ibid*, p.46

# Chapter 4

## Action Agenda for Moving Towards a Green Economy in the Caribbean via Renewable Energy

### INTRODUCTION

The earlier chapters, while highlighting success stories in the Region, have identified a number of institutional and policy gaps which will have to be addressed if the positive outcomes of the Case Studies discussed are to be replicated throughout the Region.

This chapter starts by summarising major lessons learnt both from the case studies and general experiences in the Caribbean from various interviews. One is cognisant of the fact that there is a large body of literature that makes recommendations regarding 'greening' the energy sector. However, this chapter focuses mainly on data and information gleaned from the study. These form the basis of the recommendations.

It needs to be recognised that recommendations made here are preliminary, because the degree to which the experiences of the three isolated case studies and diverse interviews conducted can be extrapolated to the wider Caribbean context is not known. Nonetheless, there are some general principles emerging from the experiences that were explored to suggest that there are some useful insights for governments, organisations and agencies in the Caribbean that are seeking to promote and develop RE or EE projects. There are also insights that could inform international and regional agencies that have a mandate either to offer funding for projects or provide technical support in a variety of areas.

### LESSONS

1. *Importance of the appropriate Policy and Regulatory Environment.* Substantial development of the RE sector is unlikely in the absence of a strong policy and regulatory framework oriented towards encouraging and facilitating both public and private sector investment in RE options.
  - (a) *Implementation and Capacity:* Although most countries now have energy policies and plans (e.g., Barbados and Jamaica), a critical issue is implementation, for which capacity is lacking. For example, delays with getting goods through Customs in Barbados resulted in significant losses and hindered development of solar energy initiatives. The St. Lucia experience also showed that while a weaker policy was useful to provide general direction, legislation and regulatory oversight is important in setting of formal procedures for policy implementation.
  - (b) *Reforms and Incentives:* Further, even where such frameworks exist, they may need reforms to make them more conducive to the development of RE. For example, lack of economic incentives in St. Lucia is a barrier, with 26% duty on solar equipment and inappropriate tariffs for grid connected PV. The lack of an appropriate pricing policy and clear regulatory environment in Barbados has hindered the development of wind energy, even though it was found to be feasible.
  - (c) *Long-term Policy:* A clear policy and regulatory framework is critical to reducing uncertainty and investment risks.

- (d) *Evolving Policy*: Revising the policy and regulatory framework as the context evolves is also important, as was highlighted in the Jamaica case study.
2. *Need for Policy Consistency*: Although there are many instances in the policy documents examined where governments emphasise their commitment to developing RE, there are often other policy statements and signals that negate or reduce the effectiveness of efforts to promote RE. For example, the opening paragraph of St. Lucia's energy policy, which leads with the Government's allegiance to letting the markets have their way, does not offer a strong foundation for building a supportive policy environment. In Barbados, at the moment there is a contradiction between the RE Rider, which allows developments up to 150 kW, and the ELPA, which requires a license for selling if the capacity is over 100 kW.
  3. *The importance of the Critical Combination of Government Policy, Private Sector Innovation, Markets, and International and Domestic Finance*: There are four forces, which, if conditions are right, can create a virtuous cycle towards sustainable energy and GE: policy environment, private sector innovation, markets and finance, both international and domestic. Any one of these can kick-start the process, depending on the specific context in a given place at a given time, but all four are needed and have to be able to work in synergy. A clear policy and regulatory framework is critical to stimulate investment. It appears that successful innovation, for example at Wigton Wind Farm, can spur policy reform and finance that encourages new entrants, but policy reform and finance are less capable of getting things moving if innovation and willingness to take risks are not there. Individual change agents in the private sector, for example Ms. Pamphile in St. Lucia and Mr. Williams in Barbados, drove innovation and catalysed change in their organisations and sectors. Existing market conditions in most countries (i.e. monopoly suppliers) constrain private sector innovation and finance. Policies and political will are needed to break these monopolies and to foster the conditions for wider participation in energy markets in the Region. Monopoly suppliers constrain private sector innovation and finance.
  4. *Need for a Consolidated Approach and International Finance to Overcome Risk-related Market Failures*: All stakeholders interviewed in large and small hotels and in wider tourism organisations in St. Lucia agreed that hotels in the Caribbean stand to benefit significantly from embracing RE technologies and EE measures. The main barrier cited in almost all cases is the initial financial cost of investing. This is especially a barrier for smaller hotels. A consolidated approach with funding support is needed. International finance (climate finance, development grants and concessional loans) can reduce the risks to commercial lenders and so improve the general investment environment. However, care must be taken to ensure that the projects funded complement those investments and innovations being made at local level. This ensures that there is buy-in to the projects and that local innovation is encouraged.
  5. *Exemplar Successes can Encourage Scaling up Nationally and Regionally*: Well-targeted Case Studies of success stories similar to those identified in this research can be used as a guide for policy development. In order to create such examples, it may be necessary to concentrate financial resources on those initiatives that look most promising, rather than spreading support more widely.

6. *Government Role in Oversight, Regulation and Enabling:* In St. Lucia, the policy devolves the power to grant licenses to LUCELEC; but this was felt to be a more appropriate role for the sovereign state. Also in St. Lucia, the absence of a national recycling programme is a barrier to private sector companies engaging in recycling efforts. In addition, while some hotels (for example, Sandals in St. Lucia) pursue greening strategies, and are encouraged by government officials to do so, this is not mandated by government. Requiring that hotels receive green certification would contribute to ensuring sustainability of this key economic sector.
7. *Government Ownership can Yield Policy Co-benefits:* When the government has a stake in a business, it is more likely to seek a policy environment that is favourable to success. This is especially so if that business generates significant social, environmental and economic returns. This was observed in Jamaica with the government-led development of Wigton Wind Farm, where the policy framework improved as the commercial project expanded.
8. *Need for Structured Processes of Learning from Experience:* Pioneering attempts are inevitably imperfect. However, if they encounter a supportive and flexible policy environment, they may offer lessons on the conditions needed for the sector to flourish. It appears from the research, that Wigton offered more useful learning about the enabling environment for RE than generic technical advice programmes.
9. *Need for RE Development to be placed in a Broader Sustainable Development Policy and Planning Framework:* While this study has focused on RE development as a key driver of the GE, the benefits of scaling up RE will only be fully achieved if the work in the sector occurs within larger national and regional GE transitions. Allocation of land for development of RE was a critical issue reflected in the St. Lucia and Barbados Case Studies resulting in slow uptake of wind energy.
10. *Need for Data and Information to Guide Evolution of RE Strategies:* Studies, such as those occurring in Barbados and Jamaica, are needed to understand what mitigating measures will be needed for increasing RE percentages and what will be the impact on costs and consumer prices to inform policy-making. The general lack of data for two of the Case Studies is not uncommon. This is a fundamental challenge to information-based planning and assessment.
11. *Need for Benchmarks to Measure Progress:* In order to promote continuous development and improvement on the journey to a GE, it is important to be able to measure progress. Monitoring protocols, including benchmarks and indicators of progress, should be built into RE and other sectoral and national policies. However, identifying measurable indicators (for example, from those presented in Chapter 3) is challenging, given the general paucity of data noted above.
12. *Need for Greater Dissemination of Information:* Throughout this research, it was clear that there was considerable effort in the Region to develop programmes and policies and carry out studies to increase understanding of various impacts of energy development on the economy. Unfortunately, in many cases the impact and usefulness of the studies and reports were not recognised beyond the department or agency that was responsible for producing them. Wider dissemination of these reports and studies would aid overall development of energy policy and RE development at both the national and regional levels.

**RECOMMENDATIONS**

TABLE 4

**SPECIFIC RECOMMENDATIONS**

Recommendation	To Whom	Specific Measures and Steps
<b><i>Policy and Institutional Framework:</i></b>		
Design or reform energy policies to support the development of standards and incentives that drive EE and energy conservation in homes and businesses and encourage the creation of suppliers of energy goods and services. Risk aversion is a major obstacle that must be cleared in order for the sector to move forward.	Ministries and institutions responsible for energy policy.	<p>Conduct study of energy intensity of economy, contrasted and benchmarked against international standards. Set goals for national energy intensity on this basis. Include goals for overall reduction of carbon intensity and level of energy input per unit output nationally in future energy policies.</p> <p>Develop strategic packages of incentives and public education aimed at overcoming risk aversion of consumers, firms and lenders towards investment in RE options.</p> <p>Review the institutional environment and regulatory and legislative framework and make recommendations for modifications as necessary.</p> <p>Identify and engage with “champions” who can demonstrate the potential for success in the field.</p>
Make climate change mitigation a policy priority even though the Region is not a major emitter of greenhouse gases. Mitigation contributes to adaptation as it involves the use of RE and energy efficient technology. In reducing their own carbon footprint, the countries are helping to strengthen their economic resilience. A policy environment supportive of mitigation also would be favourable to development of the RE sector.	BMC Governments, CARICOM Secretariat	<p>Develop, promote and employ investment decision-support methods that assign a cost to environmental externalities (climate change, air pollution).</p> <p>Policies should provide methods for evaluating both negative and positive externalities.</p>



Recommendation	To Whom	Specific Measures and Steps
Rank priorities identified in policies. The direction a country takes will depend on which goals are considered most important: An environmentally sustainable energy mix? Reduction in foreign exchange use by using more indigenous sources? A competitive market? Greater capacity in terms of human development?	Ministries and institutions responsible for energy policy.	Use consultative process with stakeholders to identify priorities and rankings. Where stakeholders differ in their views, these should be noted and the policies reflect them accordingly.
While all these are laudable and complementary goals, governments have to determine which are most critical and identify when priorities might change. Engaging stakeholders in policy development is critical to include multiple perspectives and for buy-in and support for implementation.		
Assess impact of policies in other sectors while developing energy policy. Although the cross cutting nature of energy is often recognised, policies rarely acknowledge the impact that energy policies will have on existing policies relating to tourism, customs, agriculture, fisheries, coastal zone management, etc. Care should be taken to make sure these sectors are not overlooked in developing energy policies.	Ministries and institutions responsible for energy policy and other government agencies.	Hold forums with representatives of different ministries that are impacted by energy policy or could have an impact on energy policy and discuss current policies and procedures in those sectors.
Ensure policy stability as much as possible and reduce the occurrences of policy changes being made automatically with change of government.	Ministries and institutions responsible for energy policy and other government ministries.	Develop policies with timelines that go beyond a government term.  Involve opposition government officials in the process.

Recommendation	To Whom	Specific Measures and Steps
Identify and reserve land with favourable characteristics for development of RE.	Ministries with responsibility for land use planning, Ministries and institutions responsible for energy policy.	<p>Review land use and zoning plans from the perspective of RE potential and allocate land for RE (e.g., wind, bio-energy) development as appropriate.</p> <p>Bring land with high strategic RE value into the national land banks if possible.</p> <p>Develop public-private partnerships that include owners of land with high strategic RE value.</p>
Strengthen inter-sectoral linkages to place RE development in the context of regional and national sustainable development.	Ministries and institutions responsible for energy policy.	<p>Support policy makers in the energy sector to:</p> <ul style="list-style-type: none"> <li>• build a better understanding of the integral linkages between their sector and economic, social, environmental and cultural challenges, including the major challenges that economic globalisation poses for small-scale producers and the many economic, social and environmental benefits that would accrue to the national economy from the comprehensive development of indigenous energy sources; and</li> <li>• work in a more synergistic manner with their counterparts in economic development to better understand the trade-offs, and how the choices made in the energy sector can make the difference between vulnerability or resilience.</li> </ul>
Ensure clear roles and responsibilities and accountability mechanisms are included in policy formulation and implementation.	Ministries and other government agencies with responsibility for energy policy	Establish multi-agency coordinating committee to agree on roles and responsibilities and monitor implementation.

Recommendation	To Whom	Specific Measures and Steps
Eliminate contradictions within policy statements, decisions, regulations and legislation.	Ministries with responsibility for energy policy and other government ministries	<p>Establish multi-agency coordinating committee to identify issues, develop strategies to ensure policy coherence and monitor implementation.</p> <p>Include mandate to ensure policy coherence in Terms of Reference of consultants contracted to assist with policy development.</p>
Strengthen institutions to promote and support development and uptake of EE and RE technologies.	Ministries with responsibility for energy	<p>Determine how best to encourage technology transfer and the national/regional adaptation of renewable-energy technologies and EE, and how this could reduce the need for government subsidies.</p> <p>Establish national/regional energy centres and programmes to:</p> <ul style="list-style-type: none"> <li>• actively support sustained research, development and demonstration, as well as education and public awareness programmes; and</li> <li>• disseminate technology options for improving end-use EE in homes and businesses, including wider diffusion of technologies, such as more efficient equipment and appliances; efficient heating and air-conditioning systems; and more efficient building envelope designs.</li> </ul>

Recommendation	To Whom	Specific Measures and Steps
<b><i>Policy and Institutional Framework:</i></b>		
Establish tailored grant and concessional loan facilities and subsidies to overcome widespread risk aversion and budget constraints in the private and public sectors.	International, regional and national financial institutions and funding agencies	<p>Develop more innovative financing mechanisms in partnership with the local and external private sector; and access cheaper capital available internationally, through MEAs and other international sustainable development agreements.</p> <p>Establish finance windows that can be accessed by the private sector directly or in partnership with governments.</p> <p>Develop the capacity of national development foundations and banks to support projects in the RE and other green sectors.</p> <p>Make financial assistance for institutional strengthening, regulatory and policy reform a priority, rather than restricting grants and development loans to the physical development of projects.</p>
Pool funding from disparate sources to address scale and fiscal issues at the national level.	CDB	Develop Caribbean fund to support RE development in the public and private sector. Fund should be available to support both national projects as well as regional or sub-regional projects involving multiple BMCs.

Recommendation	To Whom	Specific Measures and Steps
<p>Develop programmes and incentives to overcome economy of scale constraints related to equipment, maintenance, technical know-how and finance, especially on smaller islands and for smaller businesses.</p>	<p>Regional and international funding agencies.</p>	<p>Develop and implement programmes to have a consolidated approach to sectors, for example, supporting the hotel industry to adopt green technologies.</p> <p>Collect data on RE requirements in individual countries and identify opportunities for providing public or private support at the national or regional levels, for example, with storing and distributing RE equipment such as solar panels.</p> <p>Establish loan schemes similar to the SMART fund in Barbados (see Box 3).</p>
<p>Use market based instruments to encourage the use of energy efficient technologies in homes and businesses.</p>	<p>Ministries and institutions with responsibility for energy policy, CDB, and international agencies such as OLADE, OAS and IDB</p>	<p>Undertake studies to determine long-term sustainability benefits of various RE options and 'greening' projects.</p> <p>Reflect benefits in economic, social and environmental terms and translate these into reductions on taxes and tariffs for RE equipment and services and/or taxes and tariffs on equipment and activities that are not environmentally sustainable.</p>

Recommendation	To Whom	Specific Measures and Steps
<p>Strengthen institutional capacity for sound energy planning and management at the national level. Develop a robust and sustained capacity-building programme to include:</p> <ul style="list-style-type: none"> <li>• training of engineers, research scientists, architects, sustainable-energy systems, policy makers, managers and technicians;</li> <li>• facilitating the regular exchange of information and expertise;</li> <li>• strengthening capacity to assess the potential of new and renewable-energy resources; and</li> <li>• strengthening capacity to implement energy audits.</li> </ul>	<p>Ministries with responsibility for energy policy, with support from CDB and international agencies such as OLADE, OAS, IDB, OECS Secretariat and CARICOM Secretariat.</p>	<p>Undertake capacity needs assessment of government agencies and other key stakeholders. Expertise in assessing the technical and financial feasibility of energy projects, especially from foreign energy investors, is a priority need already identified.</p> <p>Develop proposals and seek support for capacity building, including exploring options for joint capacity building at the regional level.</p> <p>Include capacity building element as part of any TA or funding programme.</p> <p>Design and implement capacity building programmes.</p>
<p>Provide institutional strengthening and assistance for administrative and management functions such as formulation of terms of references and requests for proposals at both the national and regional levels to allow agencies to pursue RE development opportunities.</p>	<p>Ministries and institutions with responsibility for energy policy and international agencies such as OLADE, OAS, IDB</p>	<p>Offer training and technical support to governments in the areas of management and administration of projects.</p>
<b>Sustainability</b>		
<p>Develop data collection and monitoring systems to track progress and impacts and to generate data on which to base investment decisions and policy reforms.</p>	<p>Ministries with responsibility for energy policy and international agencies such as OLADE, OAS and IDB, OECS Secretariat and CARICOM Secretariat</p>	<p>Develop frameworks, with appropriate measurable indicators, to monitor policy implementation.</p> <p>Build capacity to support systematic monitoring.</p> <p>Implement monitoring systems, including assessing the returns from incentives and the sustainability of incentivised behaviours (for example, data is available from solar heating incentives for Barbados).</p>

Recommendation	To Whom	Specific Measures and Steps
		Identify recommendations for policy revisions and communicate to Ministries responsible.
Integrate RE and 'greening' into building design, architecture and building codes.	Ministries and institutions with responsibility for energy policy and construction and international agencies such as OLADE, OAS and IDB	Involve architects and building designers in determining the policies and codes for greening the construction industry. Use international standards and benchmarks where appropriate.
Consider mandating hotels to adopt green certification to support sustainability of the tourism industry.	Ministries with responsibility for tourism.	Explore green certification schemes used internationally and assess national relevance and feasibility in collaboration with hotels and other key stakeholders.
Develop and increase RE storage and other technologies to facilitate the expansion of RE use for electricity. The variability in supply of some RE options limits the use of these sources in grid tied systems, because fluctuating energy resources affect grid stability. Barbados and Jamaica are conducting studies to determine where these limits are but the stability of grids will always be affected by intermittent sources of RE such as wind and solar. Bearing this in mind, countries in the region should increase the opportunity for RE use through energy storage and other facilitative technologies which will allow solar and wind to integrate into the energy mix without such constraining limits and without risks to electric utilities or stability and reliability of the grid.	Regional and international funding agencies	Expand regional RE projects to include provision for investment in technologies to accommodate a larger supply of RE (energy storage technologies such as battery storage, pumped hydro storage and compressed air, etc.).

Recommendation	To Whom	Specific Measures and Steps
<i>Information and Communication</i>		
Develop the information base needed to set policy goals, targets and strategies and to reduce the risk of project failure.	International agencies to assist with undertaking studies. National governments as facilitators of the studies	Expand research programmes to measure renewable resource potential at the national level to include newer and more experimental forms of RE such as Ocean Thermal Energy Conversion and wave energy.
Improve dissemination of relevant studies and other literature.	The Caribbean Energy Information System, OLADE, OECS Secretariat and CARICOM Secretariat (regional level), Ministries of planning and/or sustainable development (national level), with support from Ministries with responsibility for energy.	Establish a single regional online database with all the policies and studies available in the area at both the regional and national levels and make publicly accessible.  Promote availability of information on databases to key target stakeholders.
Increase public awareness on the importance of developing RE and transitioning to a GE.	Ministries and institutions responsible for energy, government media and communication agencies.	Implement public awareness campaigns promoting increased use of RE technologies and emphasising the link between RE development and economic development.  Promote programmes of public education for the greening of consumption, increasing demand for green goods and services, reducing waste per unit of consumption, conserving energy and/or water, and reducing the carbon emissions from consumption.



Recommendation	To Whom	Specific Measures and Steps
Assess the scale at which RE can be accommodated on the electric utility grid.	Electricity utilities and ministries responsible for energy, with the financial and technical support of international agencies.	Undertake national studies on the stability of the grid with various levels of RE integration. The studies should be similar in nature to the Grid Impact Study in Jamaica and the RE Penetration Study in Barbados.

## CONCLUSION

The issues and challenges in the energy sector in the Caribbean are known to a considerable extent. Governments are increasingly recognising the need to reform their energy sectors. By and large, the will is there, but not the means including financing; human resource capacity; policy and regulatory framework; laws; technology; and land allocation. Moreover, energy markets are not sufficiently liberalised. In nearly all countries, monopolies exist and most Governments (especially those in the Eastern Caribbean) are finding out that they are locked into long-term energy agreements with mainly foreign-owned utilities, and that these agreements cannot be broken except at prohibitive costs.

Beyond this, financing poses the biggest challenge. Governments do not have the fiscal space to take on the high initial capital costs of RE. Money now available from Multilateral Environmental Agreements and through the International Swaps and Derivatives Association is too little and too disparate. A pooled financing mechanism is desperately needed, along the lines of SIDS-DOCK support programme for SIDS, but specifically for the Caribbean. CDB can potentially provide such a mechanism. Indeed, it is best placed to do so. But Governments must empower the CDB to take on this role by ceding to it a central role in international negotiations over financial issues. CDB could also intervene directly through negotiations with non-borrowing members.

While solutions to the funding issue are being explored, there is still much that Governments can do to spur EE and reduce their foreign exchange outlay and fiscal squeeze. There is considerable room for EE in Government's own operations. CDB can play a pivotal role here through grants and concessionary loans for retrofitting Government buildings. CDB can also adopt internal policies that call for all new buildings financed by it to be as "green" as possible. Internal standards and guidelines should be developed regarding the maximum energy footprint of buildings like hospitals, health centres, and schools. UWI and national training institutions can contribute by designing and delivering courses for architects, building technicians, and contractors.

Further, the CDB can help to catalyse the formation of private-public partnerships, by designing and promoting models of such partnerships at the national and regional level. In this regard, CDB can also convene regular annual meetings with national and commercial banks to build and sustain their commitment to sustainable energy development.

The challenge of achieving energy security in the context of a wider sustainable development approach (with integrated economic, social and environmental objectives) is primarily one for Caribbean Governments and their partners. While there are areas in which external assistance is needed in the short term, much can be achieved with clear-sighted and realistic policies and with a strong will to implement them.

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