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Best practice in utilizing energy and climate policies to develop NDC mitigation targets in the Caribbean

Authors

Dr. Deborah Cornland and Dr. Peter Pembleton

Cornland International AB for the Swedish Energy Agency

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Energy and climate policy frameworks as a basis for developing NDCs

A review of the NDCs for the CARICOM member states illuminated that there is a strong correlation between the extent to which the energy and climate policies of the countries were elaborated and up to date and the specificity of each country's NDC. As illustrated in the three case studies below, countries with well-elaborated policy frameworks were in a better position to define specific emission-reduction (ER) targets, indicate how they intend to achieve them, and to indicate the extent to which they expect to be able to achieve their targets with and without international support. This is important because the better-elaborated an NDC is the more prepared a country will be to implement it. Preparedness for NDC implementation is one important indicator of a country's ability to access international support for climate-change mitigation actions.

The following three national case studies present what we have found to be "best practice" examples in this regard in the Caribbean region. Although the contexts of the countries and the ways in which they have expressed their ER targets differ, all three were able to utilize their existing policy frameworks as a basis for defining the anticipated efforts expressed in their NDCs, and to provide specific goals and measures for achieving them.¹

Antigua and Barbuda

Mitigation aspirations expressed in the national NDC

Antigua is one of only two CARICOM member states that have not adopted either a percentage-(of BaU) or fixed Mt-based emission-reduction target for (circa) 2030. On the surface this can lead a reader of their NDC to conclude that it is weak. However, the NDC indicates a very specific RE goal: to "achieve an energy matrix with 50MW of electricity from renewable sources both on and off-grid in the public and private sectors."²

To understand this goal-based expression of the target one must put it in the perspective of their current energy mix. The total peak-generation capacity requirement (peak demand) for Antigua and Barbuda is 50MW and the share of RE in the power-generation mix in 2012 was 0.001%.³ This means that their NDC goal is equivalent to replacing their entire peak-power-generation capacity with renewable energy resources. In addition to this goal, the NDC indicates an intention to construct a waste-to-energy plant by 2025 and to produce 100% of electricity demand for water services (including desalination) from off-grid RE resources. Specific measures and tools for achieving energy-efficiency improvements (including updating the building code and establishing EE standards for imported vehicles and appliances) are also included in the NDC, although the anticipated mitigation outcomes of such measures are not quantified.

¹ Please note that the selection of these examples as best practice makes no attempt to compare national NDCs with respect to total anticipated emission reductions in physical terms (Mt CO_{2eq}). However, the best-practice example NDCs selected all have high levels of ambition in relative terms (degree of change anticipated relative to current conditions and/or anticipated BaU). We have not assessed the plausibility of the BaU scenarios used as a basis for setting targets in the NDCs.

² Government of Antigua and Barbuda, "Intended Nationally Determined Contribution (INDC)," submitted to the UNFCCC October 2015. This document was re-submitted, with the title as referenced here, as Antigua and Barbuda's first NDC in September 2016.

³ Energy Transition Initiative, "Energy Snapshot: Antigua and Barbuda," NREL, May 2015

The NDC also indicates that over one quarter of the country’s fossil fuel imports in 2014 were consumed in the transport sector. Because of this important source of both import dependency and emissions, the NDC for Antigua and Barbuda states an aim to, “establish efficiency standards for the importation of all vehicles (and appliances), by 2020.” The NDC also explicitly mentions a connection to the National Energy Policy (NEP) in addressing emissions in the transport sector. The NEP recommends *inter alia* the use of vehicles with higher fuel efficiency and lower emissions, and support for hybrid, flex-fuel for electric vehicles as national targets.

Key NDC indicators – Antigua and Barbuda

Indicators	Quantified values	Comments
Emission-reduction target	Not specified	Conditional: by 2030, achieve an energy matrix with 50MW of electricity from renewable sources both on and off-grid in the public and private sectors
Priority sector(s)		Energy, health, tourism, agriculture, waste, water, transportation, and forestry and land use change
NDC implementation tools		Conditional: By 2020, establish efficiency standards for the importation of all vehicles and appliances By 2020, finalize the technical studies with the intention to construct and operationalize a waste to energy (WTE) plant by 2025. (WtE target not considered part of the 50MW RE target) Unconditional: Enhance the established enabling legal, policy and institutional environment for a low carbon emission development pathway to achieve poverty reduction and sustainable development By 2020, update the Building Code to meet projected impacts of climate change
RE target		50MW of publicly and privately owned RE power generation capacity in energy matrix by 2030, including on- and off-grid By 2020 finalize technical studies with intention to construct a WtE plant by 2025 By 2030 produce 100% of electricity demand for water services (including desalination) from off-grid RE sources
EE target	Not specified	
Transport target	Not specified	
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None
Related policy documents		Antigua and Barbuda National Energy Policy Antigua and Barbuda Sustainable Energy Action Plan Renewable Energy Act A National Adaptation Strategy and Action Plan to Address Climate Change in the Water Sector in Antigua and Barbuda

The NDC expresses the country’s support for carbon markets. “Antigua and Barbuda considers the establishment of an international market mechanism as an important complementary option to reduce total costs associated with limiting GHG emissions and to assist global efforts limiting temperature to 1.5 degrees Celsius above pre-industrial levels”

acknowledging “the potential for a renewed and reformed Clean Development Mechanism to fulfill this roll through its existing structure.”⁴

Taken as a whole, Antigua and Barbuda’s NDC mitigation aspirations are ambitious. And, importantly, they are connected to the achievement of specific investments and policy measures. This paves the way for a relatively straightforward strategy for attempting to implement the NDC and, as part of that strategy, preparing to attract international support for doing so.

Energy and climate policy frameworks as a basis for Antigua and Barbuda’s NDC

In the first sentences of the opening statement of Antigua and Barbuda’s National Energy Policy (adopted August 2011), the Prime Minister firmly places this policy in the context of climate change: “Antigua & Barbuda in an effort to play our part in combating climate change and rising fuel prices has developed a comprehensive National Energy Policy (NEP) like many other Small Island Developing States (SIDS). Antigua is aware that our dependence on energy affects all sectors within our society and has made the commitment to meet the energy needs of the present generation by 2030 while safeguarding the environment and enabling future generations to meet their own energy needs.”⁵ The NEP establishes five targets: reducing the energy intensity of the economy; utilizing renewable energy for power supply; improving the quality of electricity supply; reducing the national carbon footprint and; promoting new clean energy-focused businesses. While working economy-wide, the policy places greater emphasis on the power and transportation sectors. Two of the five targets are quantified:

1. “...to reduce the overall energy intensity of the economy by 10% below a 2010 baseline within 10 years” and;
2. “...to achieve 15% renewable energy in the electricity supply by 2030.”⁶

In general, the NEP is qualitatively focused and measures-oriented. For the power sector, it envisions introducing solar, wind and waste to energy to displace fossil fuels. It calls for the use of resource assessments and pre-feasibility studies, comprehensive legislative and regulatory reform (*i.e.* re-structuring the power sector), financial incentives, efficiency standards for electricity generation, transmission and distribution, and energy-efficiency awareness campaigns and capacity-building programs. For the transportation sector, the policy recognizes a heavy reliance on air travel to support tourism and a high level of private vehicle penetration. It calls for diversifying options for consumers, fuel-efficiency and emissions standards, economic incentives, economic measures to support more sustainable choices, and introducing efficient vehicles and cleaner fuels to the government’s fleet.

⁴ Op cit. ref. 2

⁵ National Energy Task Force, “Antigua and Barbuda National Energy Policy,” Government of Antigua and Barbuda, August 2011

⁶ Interim RE targets implying a gradual increase are also provided: 5% by 2015 and 10% by 2020.

In March 2013, the government published a draft Sustainable Energy Action Plan (SEAP) for implementing the NEP.⁷ Like the NEP, the SEAP is primarily qualitative and focuses on enabling achievement of the national goals for the energy sector. The SEAP is intended to serve as an energy roadmap for the country from 2010 until 2030, and establishes one general cross-cutting and three measure-specific strategies for implementing the NEP. The three measure-specific strategies aim to address the following barriers, respectively: institutional and regulatory barriers; barriers to energy conservation and efficiency; barriers to renewable energy development, and; barriers associated with low or lack of education and awareness. For each strategy there are clearly defined and prioritized “strategic intents” and policy lines of action. For each line of action the policy defines specific implementation measures, timelines, the agencies and stakeholders responsible for them, expected outcomes and indicators for measuring implementation progress. The specific quantitative NEP targets indicated above are amongst the many indicators defined in the SEAP.

Finally, the Parliament of Antigua and Barbuda passed the Renewable Energy Act in 2015, “to establish legal, economic and institutional basis to promote the use of renewable energy resources and for connected matters.”⁸ This Act establishes requirements for instituting some of the most critical policy-environment prerequisites to promoting private-sector investment in RE: net billing (for grid-connected consumers producing power with renewables); feed-in tariffs (for commercial independent power production and sales to the electricity utility), and; wheeling (use of the grid for transmission and distribution of power generated and sold privately). The Act also calls for, *inter alia*, “an environmental impact assessment of the use of biomass for generating electricity and other renewable energy resources (heating, cooling and transport fuel)” and regulations for “issuing of renewable generation licenses and, as far as reasonably practicable, simplify the licensing process for facilities using renewable energy resources to facilitate timely development of these installations.” The Act calls for establishing a Renewable Energy Fund to which transfers shall be made from the National Development Fund and to be used to: fund renewable energy projects approved by Cabinet; fund research and development into renewable energy resources; procure goods and services for renewable energy projects, and; for any other Cabinet-approved purpose related to generating renewable energy. The Act establishes incentives for registered RE investments including exemptions from import duties, waiver of customs duties, relief of payment of corporate tax, and a sales tax exemption. The Act also calls for designing government and utility procurement processes for new power-generation capacity to “solicit proposals for generation using renewable energy resources.”

The government of Antigua and Barbuda is in the process of developing a national climate change policy with funding from the Global Climate Change Alliance, which is expected to be finalized in mid-2017.⁹ The Caribbean Community Climate Change Centre (5Cs) prepared a

⁷ Department of Sustainable Development of the General Secretariat of the Organization of American States, “Antigua and Barbuda Draft Sustainable Energy Action Plan,” EU Caribbean Sustainable Energy Program, March 2013

⁸ Government of Antigua and Barbuda, “Renewable Energy Act, 2015,” No. 6 of 2015

⁹ Personal communication, Government of Antigua and Barbuda, Department of the Environment, Ministry of Health and the Environment, January 27, 2017

report for Antigua and Barbuda's Ministry of Health and Environment focused on adaptation in the water sector.¹⁰ While this is not a policy document it is consistent with government climate change-related concerns applicable to adaptation and water resource management, the latter being one of the priority sectors mentioned in the NDC and a target sector for going 100% renewable. The 5Cs document refers to energy-related concerns for: desalination plants (increased use of small-scale renewable energy, effect of diesel generators and energy costs in facilities); energy efficiency; energy recovery and renewable energy (water and wastewater sectors); livestock farms (bio-energy); agriculture (high energy costs); and tourism/ resorts (energy cost of producing water).

While the NEP, the SEAP and the Renewable Energy Act do not specifically identify the investments targeted in Antigua and Barbuda's NDC, one can see a clear process in the country of preparing the policy environment to be market ready for promoting such investments. It is logical given this government focus on preparing for RE investments that the NDC would be formulated with the accomplishments of such investments in focus, and that the NDC rests firmly on this policy framework. It is also a logical outcome of the policy- and measure-oriented approach that the government of Antigua and Barbuda has not followed the more common qualitative scenario-oriented path of defining its NDC targets in terms of avoided BaU emissions. Although the actions called for in the Renewable Energy Act remain to be carried out, the Act itself takes Antigua and Barbuda's policy framework an important step beyond those of the other countries reviewed.

From the perspective of policy preparedness for implementing the NDC and attracting international support for doing so, Antigua and Barbuda clearly deserves to be considered amongst the countries demonstrating best practice for the region.

Commonwealth of Dominica

Mitigation aspirations expressed in the national NDC

The Commonwealth of Dominica's emission-reduction target stands out in because it is expressed as a reduction compared to base year (2014) emissions (as opposed to project BaU emissions for 2030).¹¹ Setting the ER target compared to 2014 emissions means that any growth in energy consumption between 2014 and 2030 will essentially be greenhouse-gas emissions-free (i.e., entirely renewable). The overall target is broken down in detail, attributing specific absolute reductions (in gigagrams) resulting from ten identified measures, converted to a percentage basis and summed to arrive at the total. Further, each of the ten measures has been assigned an individual timeline for implementation. The measures' absolute physical targets are also aggregated by sector, for which targets are expressed as a percentage of the respective sector's 2014 emissions. As a country with

¹⁰ Caribbean Community Climate Change Centre, "Final Report - A National Adaptation Strategy and Action Plan to Address Climate Change in the Water Sector in Antigua and Barbuda," European Union Global Climate Change Alliance (EU-GCCA) Caribbean Support Project, November 2014

¹¹ Commonwealth of Dominica, "Nationally Determined Contribution (NDC) of the Commonwealth of Dominica," submitted to the UNFCCC September 2016. This document was re-submitted, with the title as referenced here, as Dominica's first NDC in September 2016. The only other CARICOM country to express its ER target as a reduction from a prior year is Grenada. See Annex 1.

significant forest cover, the NDC also indicates that Dominica’s forests will be protected as a carbon sink.

Dominica’s NDC contains the most detailed emission-reduction target specification in the region. It is also the most ambitious. This is due in part to the country’s geothermal potential (over 300MW), which is large enough to meet the entire demand for domestic power and export significant quantities to neighboring countries.¹² National energy-sector emissions are expected to be reduced by 98.6%. However, there are four other countries in the region in a similar position with respect to geothermal power (Grenada, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines). The ability and confidence of Dominica to identify how it can achieve emission reductions through specific measures stems from having detailed assessments of available measures, reviewed together in scenario analyses, and articulated as components of national policy.

Key NDC indicators - Dominica

Indicators	Quantified values	Comments
Emission-reduction target	44.7% of 2014 emissions by 2030	164.5 Gg Conditional: The target is entirely conditional Interim targets: 17.9% by 2020; 39.2% by 2025 Dominican forests will continue to sequester 100 Gg of national GHG emissions on an annual basis during the period 2020 to 2030
Priority sector(s)		Energy, transport, manufacturing and construction, and the commercial, residential, agricultural, forestry, fishing, and solid waste sectors
NDC implementation tools		RE investments in geothermal, solar PV, off-grid micro-hydro and wind Policy to gradually replace all government vehicles with hybrids Introduce incentives for private-sector purchases of hybrid vehicles Reducing the volume of organic wastes entering the national landfill Replacing streetlights in Portsmouth with LED fixtures EE retrofits program targeting lighting, air conditioning and appliances A vigorous education and awareness drive EE building code complemented with a training and CB program
RE target	>68 Gg	Of which: <ul style="list-style-type: none"> • Geothermal power generation: 39.3Gg • Solar PV for Hotel Sector: 0.24Gg • Solar PV for schools, universities, hospitals, commercial buildings, manufacturing plants, government buildings, municipal facilities: 0.86Gg • Off-grid Hybrid Micro-hydro, Wind, Solar PV, and DG Back-up for Ross University: 1.71Gg • Three RE-powered mini-grids for South-East and East Coast of Dominica: 2.92Gg • Promoting hybrid vehicles: 12Gg • Reduce CH4 emissions from landfill: >11Gg
EE target	5.2 Gg	Of which: <ul style="list-style-type: none"> • LED Streetlights in Portsmouth: 0.36Gg
Transport target	12 Gg	Reduce transport-sector emissions by 16.9% of 2014 emissions by 2030. It is expected that the prioritized actions (measures to promote hybrid vehicles to the government fleet and private sector) will be implemented before 2020, and will continue to the end of 2030, and beyond.
Use of carbon market planned?		Yes

¹² Ibid

NAMA Registry and NAMA Database		Low Carbon Climate Resilient Development Strategy in Dominica
Related policy documents		Low-carbon Climate-resilient Development Strategy (2012-2020) National Energy Policy (draft) Sustainable Energy Plan (draft)

According to its NDC, “Dominica intends to introduce market-based mechanisms to promote energy conservation/efficiency and reduce greenhouse gas emissions from the transport sector principally through incentives to promote the import of hybrid vehicles.” Two priority measures are proposed, which involve a policy requiring that all government vehicles, when replaced, are replaced with hybrids and market-based mechanisms to promote private-sector purchases of hybrid vehicles when replacing existing vehicles. Dominica has posted the “Low Carbon Climate Resilient Development Strategy in Dominica” NAMA, for which it is seeking support, in both the NAMA Registry and the NAMA Database.^{13,14}

Energy and climate policy frameworks as a basis for Dominica’s NDC

Dominica’s NDC indicates that it was developed based upon several national assessments and strategies, including the Dominica Low Carbon Climate Resilient Development Strategy, a Draft National Energy Policy, and a draft Sustainable Energy Plan.^{15,16,17}

The Draft National Energy Policy (NEP), published in 2014, expresses one primary and five supplementary objectives. Three main chapters of the NEP address “Specific Policies for Energy Transformation and Use,” “Policies Specific to End-Use Sectors of the Economy,” and “Policy on Institutional Strengthening and Funding.” “The primary objective of the Policy is to pursue sustainable energy that is reliable, extends access to energy, provides energy at the lowest possible cost, and increases energy security.” The supplementary objectives are to: increase use of domestic energy sources; increase energy efficiency; increase environmental sustainability; reduce energy costs and tariffs, and; extend electricity coverage to all citizens. For each, the policy emphasizes the importance of economic viability. With respect to environmental sustainability it states, “The Government will position Dominica to move toward a low-carbon economy in full compliance with global climate change mitigation efforts where economically viable” and that “This objective is consistent with the approach of Nationally Appropriate Mitigation Actions (NAMAs) of abating greenhouse gas emissions while increasing economic development.”

The chapter on energy transformation and use focuses heavily on harnessing the country’s renewable energy resources, particularly for electricity supply. It calls for, *inter alia*, regulatory measures and incentives (including standards and guidelines), developing local

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http://www4.unfccc.int/sites/nama/_layouts/un/fccc/nama/NamaSeekingSupportForImplementation.aspx?ID=34&viewOnly=1 Accessed January 2017

¹⁴ http://www.nama-database.org/index.php/Low_Carbon_Climate_Resilient_Development_Strategy_in_Dominica Accessed January 2017

¹⁵ Commonwealth of Dominica, “Dominica Low-carbon Climate-resilient Development Strategy 2012 – 2020” undated

¹⁶ Commonwealth of Dominica, “Draft National Energy Policy of the Commonwealth of Dominica,” April 2014

¹⁷ Commonwealth of Dominica, “Draft Sustainable Energy Plan of the Commonwealth of Dominica,” April 2014

expertise and a national program of education and awareness in renewable energy. Hydro, geothermal, solar, wind, waste, and biomass resources are targeted for development. The policy lists but does not discuss in detail identified measures for achieving RE investments. These include, *inter alia*: resource assessments; cost-benefit analyses and feasibility studies; developing resource-specific capacities (including training technicians); establishing, where required (as in the case of geothermal), legal and regulatory frameworks for RE development; strengthening the capacity of government agencies to support their oversight roles, and; implementing agreements with developers, financiers, purchasers and other stakeholders.

The chapter also expresses an aim to “reduce the country’s energy intensity while increasing its economic growth by adopting best practices in energy efficiency and conservation.” The measures identified for achieving this aim include: public education programs; encouraging consumers to use energy-efficient appliances; encouraging appliance suppliers to import reliable and energy-efficient appliances; requiring energy labeling on appliances; establishing building efficiency standards; encouraging energy audits, especially for hotels and households; encouraging equipment retrofits in homes and commercial buildings; developing an energy-efficiency equipment-retrofit plan for public buildings and streetlights, and; reporting progress on energy efficiency in national economic reports and statistics. The end-use sector-specific chapter briefly addresses the transport, agriculture, industrial & commercial, domestic (household), and tourism & hospitality sectors. For transport, the NEP calls for promoting “efficient vehicles, crafts, and a strong integrated public transport sector strategy.” Measures include: research into alternative fuels and the feasibility of integrating electric vehicles into the sector; optimizing the efficiency of the transport fleet and fuel mix, and; organizing a regulated and rational public transit system.

On the whole the NEP establishes a foundation of intent but lacks insight as to how the policy would be implemented or the roles and responsibilities of government agencies and institutions in transforming the expressed objectives and aims into substantive policy actions. Neither does it clarify whether or not the diversification of the energy mix is expected to involve changes in the landscape of stakeholders, particularly in the targeted power sector. This is important because the sole electricity utility, Dominica Electricity Services Limited (DOMLEC), is vertically integrated (i.e., controls all generation, transmission and distribution of power in the country) and has a single majority shareholder that is a foreign commercial entity. Hence the importance of the draft Sustainable Energy Plan (SEP).

The NEP refers to the SEP as “a companion document to the Policy.” The NEP states that the SEP “specifies the legislative and regulatory changes require to achieve the Policy’s goals. It also specifies capacity building, education programmes, and incentive schemes to achieve those goals.” The SEP itself declares that “The goal of the Plan is to increase the efficiency and sustainability of energy supply and demand, wherever it is economically feasible.” The SEP builds directly on the specific policies established in the NEP and defines actions and sub-actions for the implementation of each. The SEP contains 39 actions and from one to four sub-actions for each action. For each sub-action the SEP establishes responsible bodies and a time scale for implementation. The sub-actions describe concrete activities such as

preparing studies, adopting new and revising existing regulations and legislation, establishing standards, seeking donor assistance, revising the electricity tariff structure, establishing standardized power purchase agreements for UPPs, establishing a subsidy for the smallest residential power consumers, providing training and supplementing educational curricula, establishing databases, and facilitating the construction and operation of RE-based power plants.

The action of “Promoting Geothermal Power” is the most detailed, and involves 12 sub-actions ranging from the revision and adoption of the *Draft Geothermal Bill 2013* to negotiating for power exports and commissioning the inter-island transmission lines that this requires. The expectation is that two geothermal power plants will be established, in phases, with a combined capacity of approximately 110MW. The first phase involves a 10 – 15MW plant to supply DOMLEC. The second would be built for export to Guadeloupe and Martinique (40 – 50MW each).

The goals and sub-actions for the other RE sources, energy-efficiency and end-use sector (including transport, which it notes is the largest user of fossil fuels, representing 52% of total fuel consumption) are much less detailed and ambitious, focusing primarily on, for example, resource assessments, cost-benefit, feasibility and best practice studies, and stakeholder consultation and awareness raising. For transport, it reiterates a focus on improving the efficiency of private vehicles, optimizing the fuel mix, and organizing public transportation, as reflected in the NEP. It calls for cost-benefit analyses, studying the potential to produce biofuels or ethanol blends, exploring the use of reduced tariffs to promote the import of the most efficient vehicles, education and awareness programs, and developing a public transit plan. However, it is the investment in geothermal that drives this energy plan. While it does not provide the quantitative analysis that is reflected in Dominica’s NDC, the breakdown of policies into actions and actions into sub-actions in the SEP clearly provided the roadmap upon which the NDC is based.

Dominica’s low-carbon development strategy is not dated but appears to have been prepared before the NEP and draft SEP. This strategy document takes a broad look at the development context and associated risks in key sectors of the economy, infrastructure and human and physical environments, including a section on “Energy and Carbon Footprint.”¹⁸ In addition, energy issues are noted to be of concern in sections dealing with: infrastructure and human settlements (“long distances, rugged terrain and high costs of fuel make local transportation costs high”); and tourism (“high energy costs for business and the tourism industry”).

The Strategy *inter alia* refers to: various development plans, programs and reports that are mostly adaptation-oriented, although one section considers the “Development of Alternative Energy Sources”; a “Policy, Legal and Institutional Analysis”; and financial support and options.

There are brief sections of the Strategy specifically dealing with energy issues:

¹⁸ Op cit. ref 15

One reviews the main sources of fuel available for electricity and transport referring to the problems associated with having to import petroleum products. A table of GHG emissions (1994-2005), derived from the country's Second National Communication, is included;

Another deals with alternative energy sources, mentioning the potential for use of hydropower (~38% of electricity generation at that time) and other RE technologies, but highlighting the "tremendous potential for geothermal energy use";

Yet another refers to energy conservation and RE to "conserve energy and promote renewable energy options to address rising energy costs..." and to "increase percentage of national energy from renewable sources by harnessing geothermal, solar, wind and hydro energy potential."

In the Foreword by the Prime Minister he states that the energy sector is among those identified as being "particularly at risk to the potential global climate change impacts." While the authors consider Dominica to be carbon neutral ("limited use of fossil fuels (28% of energy from renewable sources) and significant system of protected areas that serve as carbon sinks"), the Government still wishes to transform the country into "a green economy." However, the report states that "There is no legislation to control Greenhouse Gas (GHG) emissions or promote energy efficiency and the use of renewable energy."

In the concluding sections, the Strategy includes a few energy-related interventions as part of the country's proposed "Low-carbon Development Pathway" such as: harnessing RE resources; promoting green communities and reducing GHG emissions (energy conservation, RE, WtE); development of biofuels; financing for low-carbon technologies; and development of supportive management services. There are between four and six tasks specifically proposed for the energy sector (geothermal, solar, wind, hydropower, biofuels) and for energy in the context of green communities, waste management, technology, and services.

The major strength of Dominica's energy and climate policy framework is that it describes a clear and detailed vision for RE and EE development. The emissions implications of this vision are quantifiable utilizing scenario analysis, which is what was done in support of preparing the national NDC. The specificity of the NDC puts Dominica in a strong position to develop NAMAs and seek international support for specific mitigation actions that will contribute to sustainable development and climate resilience in the country. The challenge for Dominica will be to create the legal foundation for achieving the investments called for in the NDC, particularly with respect to creating an enabling environment for renewable-energy investments. This is particularly important because the successful implementation of the NDC hinges to a large degree on large-scale geothermal investments.

Jamaica

Mitigation aspirations expressed in the national NDC

Jamaica has adopted an emission-reduction target of 10% of BaU by 2030, of which 7.8% is unconditional.¹⁹ Jamaica intends to achieve this target by increasing the share of renewables in its primary energy mix to 20% by 2030 and will continue to pursue energy conservation and efficiency. The entire target is associated with the energy sector, which is explicitly stated to include transport. An interim emissions-reduction target for 2025 is also defined in the NDC. Notably, Jamaica was also able to express what its percentage-based targets translate to with respect to quantifying physical emission reductions (in Mt CO_{2eq}) avoided.

Key NDC indicators - Jamaica

Indicators	Quantified values	Comments
Emission-reduction target	10% of BaU by 2030 ²⁰	Corresponds to an emission reduction of 1.4 Mt CO _{2eq} , of which 1.1 Mt are unconditional
Priority sector(s)		Energy (includes transport)
NDC implementation tools		Jamaica will implement its NDC through the Climate Change Policy Framework and the National Energy Policy 2009-2030 Jamaica has developed a NAMA for the scale-up of renewable electricity that will be central to the full implementation of its NDC Will continue to pursue energy conservation and efficiency
RE target	20%	Increasing the share of renewables in the primary energy mix to 20% by 2030
EE target	Not specified	
Transport target	Not specified	Explicitly stated to be included in the energy-sector target of 10%
Use of carbon market planned?		No
NAMA Registry and NAMA Database		Jamaica Renewable Energy NAMA
Related policy documents		Jamaica's National Energy Policy 2009 – 2030 Climate Change Policy Framework for Jamaica Vision 2030 Jamaica

In its NDC Jamaica indicates that it does not foresee the use of carbon markets to achieve its target. However, the earlier NEP stated that a Carbon Emissions Trading Policy was being developed and this is repeated in the climate change policy. Jamaica has posted a Renewable Energy NAMA in the NAMA Database, for which it is seeking support.²¹

Energy and climate policy frameworks as a basis for Jamaica's NDC

Jamaica intends to implement its NDC through its national Climate Change Policy Framework and the National Energy Policy 2009-2030 (NEP). The NDC lists seven areas in which policy actions will be used to contribute to achieving its emission-reduction target. These policies are excerpted from the NEP. In the NEP, the policies referred to in the NDC

¹⁹ Government of Jamaica, "Intended Nationally Determined Contribution of Jamaica Communicated to the UNFCCC" November 2015

²⁰ The base year for Jamaica's BaU scenario is 2005, which is the most recent year for which a complete inventory of Jamaica's GHG emissions exists.

²¹ http://www.nama-database.org/index.php/Jamaica_Renewable_Energy_NAMA Accessed January 2017

are presented as fundamental elements of a long-term strategic vision for the sector. They include a comprehensive set of interventions addressing: awareness raising regarding efficient energy consumption; modernization of infrastructure; affordability, safety, reliability and security of energy supply; governance, institutional and legal regulatory frameworks; stakeholder engagement; public-sector leadership and environmental stewardship, and; engaging the private sector. The RE target in the NDC comes directly from the NEP, which in turn was developed to be consistent with other aspects of government policy, “particularly Vision 2030 Jamaica – National Development Plan as well as the Government’s commitments to reductions in greenhouse gas emissions.”²²

The energy policy also contains energy demand projections from 2005 to 2030 as well as scenarios indicating the impact of introducing RE to the energy mix, and was used as a basis for informing the modelling of energy-sector emissions with and without policy intervention for the NDC. The policy further identifies strategies and policy actions at the sub-sectoral level to be implemented with the aim of achieving the goals set out in the policy. This enabled Jamaica to arrive at specific ER targets that could be quantified in physical terms (Mt CO_{2eq} avoided). It also created a basis for identifying the need for international support and, thereby, differentiating between the conditional and unconditional contributions to the total ER target. The unconditional contribution is based on the current level of implementation of the National Energy Policy and an existing pipeline of RE projects. The conditional contribution is based on an estimate of what can be achieved with international support aimed at enhanced implementation of the NEP.

The country’s recent climate change policy indicates that “Jamaica will continue to actively pursue opportunities for the reduction of greenhouse gas emissions through mitigation measures that are appropriate in the national context such as energy efficiency and conservation, the use of renewable energy...”²³ This policy refers to Vision 2030 Jamaica, in particular to “National Outcome #10 ‘Energy Security and Efficiency’” which addresses energy efficiency, conservation and renewable energy and “National Strategy 12-5 ‘Promote Eco-efficiency and Green Economy’” which promotes the use of clean technologies within the manufacturing sector.

The climate change policy also refers to and confirms the RE target elaborated in the NEP and reiterated in the NDC, and to more general objectives of promoting “conservation and efficiency in use of energy resources amongst all sectors of the society.”

Although Jamaica lacks a formalized plan for implementing its National Energy Policy and the legal frameworks needed to fully promote private-sector investment in RE and EE, one can clearly see that the policies that are in place in the country provided a strong foundation for defining objectives in their national NDC and quantifying the anticipated results of those

²² Government of Jamaica, Ministry of Energy and Mining, “Jamaica’s National Energy Policy 2009-2030,” adopted October 2009

²³ Government of Jamaica, Ministry of Land, Water, Environment and Climate Change, “Climate Change Policy Framework for Jamaica,” 2015

objectives in terms of emission-reduction targets. It is this clarity and policy coherency that places Jamaica amongst the best practice examples in this study.

Annex 1: Key NDC indicators of other CARICOM member states

With the exception of Belize, the information in these and the previous tables has been summarized by the authors from the INDCs submitted by the countries under the UNFCCC in the latter part of 2015. These documents were re-submitted as first NDCs upon ratification. Belize submitted a revised document, summarized below, as their first NDC upon their ratification. The full text INDCs (for those countries that have not ratified) and NDCs are available on the respective portions of the UNFCCC web site.^{24,25}

The Commonwealth of the Bahamas

Indicators	Quantified values	Comments
Emission-reduction target	30% of 2030 BaU	Economy-wide target, entirely conditional
Priority sector(s)		Energy (wind, solar, waste-to-energy and biomass), forestry, and transport (incorporated under energy)
NDC implementation tools		Refers to National Energy Policy Implementation of “various national policies and initiatives” PPPs for RE investments Residential energy self-generation program Establishing supporting transport legislation and infrastructure for biofuels Taxation of vehicle imports tied to fuel consumption and engine capacity Lowered import duties on hybrid and electric cars Measures intended to influence vehicle use, fuels, traffic and availability of public transit EE building code Establishing a permanent National Forest Estate
RE target	30%	30% minimum of RE in the energy mix by 2030
EE target	Not specified	
Transport target	Not specified	Included in the economy-wide target of 30% under the energy sector
Use of carbon market planned?		Open to consideration
NAMA Registry and NAMA Database		Energy Efficiency and Climate Change Planning
Related policy documents		National Energy Policy (2013-2033) National Policy for the Adaptation to Climate Change ²⁶ Forestry Act

²⁴ <http://www4.unfccc.int/Submissions/INDC/Submission%20Pages/submissions.aspx>

²⁵ <http://www4.unfccc.int/ndcregistry/Pages/Home.aspx>

²⁶ This policy document is dated 2005. The Bahama’s INDC refers to a “National Climate Adaptation Policy” from 2006. We have been unable to locate the latter document.

Barbados

Indicators	Quantified values	Comments
Emission-reduction target	44% of BaU by 2030	Conditional: Barbados intends to achieve an economy-wide reduction in GHG emissions of 44% compared to its business as usual (BAU) scenario by 2030. This translates to a reduction of 23% compared with the baseline year, 2008 Interim target: economy-wide reduction of 37% by 2025 (equivalent to a reduction of 21% compared to 2008)
Priority sector(s)		Energy (includes transport), industrial processes and product use, waste, agriculture, LULUCF
NDC implementation tools		Tax incentives to be used to encourage adoption of alternative vehicles and fuels (CNG, LPG, ethanol, NG, hybrid and electric)
RE target		RE to contribute 65% of total peak electrical demand by 2030 RE sources to be utilized include: solar PV (distributed and centralized), WtE, biomass, wind, and landfill gas capture and use for electricity generation
EE target		"Electrical EE": a 22% reduction in BaU by 2029 "Non-electrical EE": a 29% reduction compared to BaU by 2029 (includes transport)
Transport target	Not specified	Included in the economy-wide target of 44% under the energy sector
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		NAMA in renewable energy and energy efficiency; Energy Efficiency and Climate Change Planning
Related policy documents		National Sustainable Energy Policy National Climate Change Policy

Belize

Indicators	Quantified values	Comments
Emission-reduction target	Total ER not quantified	Unconditional Enabling the existing policies, laws and projects, staff time and integration of development and climate change objectives Conditional All other RE, EE and Transport targets defined (see below)
Priority sector(s)		Energy, solid waste management, transport and LULUCF
NDC implementation tools		Protection of forest reserves and sustainable forest management Reduction of fuel wood consumption Protecting and restoring mangrove forests Implementing the Sustainable Energy Strategy and Action Plan Develop transport policy and implement transport master plan Promote energy efficiency in the transport sector through appropriate policies and investments Develop and implement the National Solid Waste Management Policy
RE target	Up to 4,252Mt CO ₂ cumulative to 2030	Increasing the share of RE in its electricity mix to 85% by 2030
EE target	Not specified	Cookstoves fuel-wood target: reduction fuel wood consumption by 27 – 66% (target date not indicated) Electricity transmission and distribution: reduce losses from 12 to 7% by 2030
Transport target	20% by 2030	Achieve "at least a 20% reduction in conventional transportation fuel use by 2030"
Use of carbon market planned?		Willing to explore. Already working with MRV & CDM
NAMA Registry and NAMA Database		None but working with NAMAs
Related policy documents		The national development framework: Horizon 2010-2030 National Energy Policy Framework Strategic Plan 2012-2017: Integrating energy, science and technology into national development planning and decision making to catalyze sustainable development Sustainable Energy Action Plan 2014-2033 National Climate Resilience Investment Plan 2013 National Solid Waste Management Policy Growth and Sustainable Development Strategy 2016-2019 A National Climate Change Policy, Strategy and Action Plan to Address Climate Change in Belize 2015-2020

Grenada

Indicators	Quantified values	Comments
Emission-reduction target	30% of 2010 emissions by 2025	Conditional Committed target: 30% reduction compared to 2010 by 2025 Indicative 2030 target: 40% of 2010 emissions
Priority sector(s)		Electricity, transport, waste, forestry
NDC implementation tools		Building codes Transport interventions: introduction of biofuel blends, gasoline and diesel taxes, and implementation of EE standards for vehicles through incentives
RE target	One third of the 30% total target	New RE installed capacity by 2025: 10MW solar, 15MW geothermal, 2MW wind Landfill CH ₄ capture and use for electricity: to reduce landfill CH ₄ emissions by 90%
EE target	Two thirds of the 30% total target	20 of the 2025 30% ER target comes from EE improvements in electricity use, of which building retrofits (20% reduction), building codes (30% reduction), EE in hotels (20%)
Transport target	20% by 2025	
Use of carbon market planned?		Willing to explore
NAMA Registry and NAMA Database		None. Energy sector NAMA under development with support from the UNDP-LECB program
Related policy documents		National Energy Policy National Climate Change Policy and Action Plan (2007-2011)

Co-operative Republic of Guyana

Indicators	Quantified values	Comments
Emission-reduction target	Total ER not quantified	Conditional: Avoided deforestation: 48.7 Mt CO _{2eq} annually Energy: 100% renewable power supply by 2025
Priority sector(s)		Forests, Energy
NDC implementation tools		Forestry policies --Forest monitoring/ reduce illegal logging --Implement the Voluntary Partnership Agreement (VPA) under EU-FLEGT --Strengthen support for indigenous communities' stewardship of their lands/ REDD+ activities --Equity between the extractive sector and indigenous peoples Policies to encourage energy efficiency and the use of renewable energy --Building codes --Net-metering of residential RE --RE power for six newly established townships --Remove import duty and tax barriers for RE equipment (CFL & LED lamps) to incentivize energy efficiency --Conduct energy audits and replace inefficient lighting at public, residential and commercial buildings --Public education, awareness and tools to reduce energy consumption and expenditure
RE target		Increase share of RE by 100% by the 2025 (several RE investments in pipeline)
EE target	Not specified	
Transport target	Not specified	
Use of carbon market planned?		Existing agreement with Norway Has MRV system Interested in green consumer markets
NAMA Registry and NAMA Database		None. Energy sector NAMA under development with support from the UNDP-LECB program
Related policy documents		National Low Carbon Development Strategy Climate Change Action Plan

Republic of Haiti

Indicators	Quantified values	Comments
Emission-reduction target	31% of BaU by 2030	Unconditional: 5% by 2030 compared to BaU (10Mt CO _{2eq}). Includes 37.5MW new hydro by 2020 and the control and regulation of used vehicle imports Conditional: Additional 26% (35Mt CO _{2eq})
Priority sector(s)		Energy, AFAT (Agriculture, Forestry and Allocation of Land), Waste
NDC implementation tools		Promoting EE stoves & charcoal production Distribution of EE lamps (see EE target) Nationally appropriate mitigation actions (NAMAs) are to be developed in the transport sector. Sustainable transportation included under the energy sector.
RE target	47% increase by 2030	Increasing share of RE in electricity system to 47% by 2030, of which: 60MW hydro (24.5%), 50MW wind (9.4%), 30MW solar (7.5%) and 20MW biomass (5.6%)
EE target		Reduce fuelwood consumption by 32% by 2030 (partly through promoting the use of energy efficient stoves and partly through increasing the efficiency of charcoal production) Distribution of 1M low-consumption lamps to replace incandescent bulbs.
Transport target	Not specified	
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None
Related policy documents		Haiti Energy Sector Development Plan 2007 - 2017

Federation of Saint Christopher and Nevis

Indicators	Quantified values	Comments
Emission-reduction target	35% of BaU by 2030	Entirely conditional Target: 35% of absolute projected BaU emissions (equivalent to an estimated 296 Mt CO ₂ reduction) Interim target: 22% by 2025 (148 Mt CO ₂)
Priority sector(s)		Electricity generation and transport
NDC implementation tools		Transport interventions: combination of incentives and disincentives to promote purchases of fuel-efficient vehicles and retrofits of inefficient ones See also EE target comments
RE target	50% increase	Increase in use of RE by 50%, of which: 35MW geothermal, 1.9MW solar, 7.6MW wind, 0.5MW WtE
EE target		Reduce electricity losses by at least 50% (through metering measures) 5% reduction in national energy consumption
Transport target	5%	At least 5% reduction in national fuel consumption by 2030
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None
Related policy documents		National Energy Policy

Saint Lucia

Indicators	Quantified values	Comments
Emission-reduction target	23% of BaU by 2030	Entirely conditional Target: 23% reduction relative to BaU by 2030 (equivalent to an estimated 188 Mt CO _{2eq}). Base year 2010. Interim target: 16% by 2025 (121 Mt CO _{2eq})
Priority sector(s)		Energy demand, electricity generation, transport
NDC implementation tools		Proposed EE interventions: EE buildings, appliance, water distribution and network efficiency (no specific targets) Transport interventions: Levy on imports of used vehicles, reduced excise tax and duty on imports of fuel efficient and alternative fuel vehicles, escalating taxes on higher engine capacity vehicles, proposed transport policy and strategy (potential for further emission reductions), and expanded public transport.
RE target	50% of generation by 2050	35% of energy generated using RE by 2025, 50% by 2050. Sources: geothermal, wind and solar (no source-specific targets)
EE target	Not specified	
Transport target	Not specified	
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None. NAMA to increase renewable energy and energy efficiency solutions and technologies in school buildings in St. Lucia under development with support from the UNDP-LECB program
Related policy documents		National Energy Policy The Saint Lucia Climate Change Adaptation Policy

Saint Vincent and the Grenadines

Indicators	Quantified values	Comments
Emission-reduction target	22% of BaU by 2025	All unconditional 22% ER compared to BaU by 2025 (2010 base year. 2025 estimated BaU 407 Mt CO _{2eq})
Priority sector(s)		EE (including domestic transport); energy generation; industry; agriculture; LULUCF; and waste management
NDC implementation tools		New building code Labelling of appliances Reducing import duties for Low Emission Vehicles (LEVs)
RE target		50% of electricity supply coming from geothermal. Renovation of hydro. Enabling and encouraging small-scale solar PV
EE target		15% reduction in electricity consumption by 2025 compared to BaU (focus: retrofit of streetlights, new building code, labelling of appliances)
Transport target	~10%	~10% ER over 10 years
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None. Transport sector NAMA under development with support from the UNDP-LECB program
Related policy documents		Energy Action Plan for St. Vincent and the Grenadines Sustainable Energy for SVG: The Government's National Energy Policy

Republic of Suriname

Indicators	Quantified values	Comments
Emission-reduction target	Not specified	Conditional 62MW from thermal energy Only other specification is the RE target for the energy sector which may already have been met
Priority sector(s)		Forests, Renewable energy
NDC implementation tools		Unconditional Consumer awareness programs to promote EE light bulbs and building designs Removal of tariffs on RE products (done) Solar PV introduced in hinterland Study on WtE at national landfill Establishment of an energy authority
RE target	25% RE by 2025	Conditional: Further studies to explore potential of biofuels A 168MW hydropower plant A biofuel project for 25MW of power (plus to blend ethanol in gasoline for 60% of vehicles)
EE target	Not specified	
Transport target	Not specified	Conditional: A biofuel project to blend ethanol in gasoline for 60% of vehicles (plus produce 25MW of power)
Use of carbon market planned?		Possible use
NAMA Registry and NAMA Database		None. Transport sector NAMA under development with support from the UNDP-LECB program
Related policy documents		National Energy Plan National Climate Change Policy, Strategy and Action Plan

Republic of Trinidad and Tobago

Indicators	Quantified values	Comments
Emission-reduction target	15% of BaU in priority sectors by 2030	Conditional (partly): 15% below cumulative BaU in the three priority sectors by 2030 (equivalent to 103 Mt CO _{2eq}) Unconditional: of this, 30% ER in public-transport sector compared to BaU by 2030
Priority sector(s)		Transport (public-transport is unconditional) Power generation (conditional) Industry (conditional)
NDC implementation tools	Not specified	
RE target	Not specified	
EE target	Not specified	
Transport target	1.7 Mt CO ₂ -eq. (30% of the 15% total target)	Reduction compared to BaU, base year 2013
Use of carbon market planned?		Yes
NAMA Registry and NAMA Database		None. Three NAMAs, in the petrochemical & heavy industry, oil & gas, and transport sectors, under development with support from the UNDP-LECB program
Related policy documents		Carbon Reduction Strategy National Climate Change Policy