Costa Rica
Market Readiness Proposal (MRP)
(Partnership for Market Readiness)

Ministry of Environment and Energy

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Contents

Tables

Graphs

Figures

Acronyms

AFODESOS: Association for the Promotion of Sustainable Development
CACR: Architects Association of Costa Rica
CB: Carbon Board
CCC: Costa Rican Construction Chamber
CCD: Climate Change Directorate
CDM: Clean Development Mechanism
CENCE: National Center for Energy Control
CER: Certified Emissions Reductions
CFIA: Federation of Engineers and Architects
CH_4: Methane
C-neutral: Carbon Neutral
C-neutrality: Carbon Neutrality
CO: Carbon monoxide
CO_2: Carbon dioxide
CO_2: Carbon dioxide
CO_2e: Carbon dioxide equivalents
COP: Conference of Parties
CTO: The Certifiable Tradable Offset
CYMA: Program of Competitiveness and Environment
DCC: Climate Change Directorate
DIGECA: Office for Environmental Quality Management
DVCM: Domestic Voluntary Carbon Market
ECA: Costa Rican Accreditation Entity
EPD: Environmental product declarations
FONAFIFO: National Forestry Financing Fund
GDP: Gross Domestic Product
GHG: Greenhouse gases
GIZ: Program of the German Agency for International Cooperation
GMA: Grand Metropolitan Area
HFC: Halo fluorocarbons
ICE: Costa Rican Electricity Institute
IMN: National Meteorological Institute
INTECO: Technical Standards Institute of Costa Rica
IPCC: Intergovernmental Panel on Climate Change
IAT: Institute of Tropical Architecture
IWM: Integral Waste Management
LCA: Life-cycle analysis
MAG: Ministry of Agriculture and Livestock
MINAE: Ministry of Environment and Energy
MINSA: Ministry of Health
MIVAH: Ministry of Housing and Human Settlements
MOPT: Ministry of Public Works and Transportation
MRV: Monitoring, Reporting and Verification
N_2O: Nitrous oxide
NAMA: National Appropriate Mitigation Actions
NCCS: National Climate Change Strategy

NDP: National Development Plan
NEEDS: National Economic, Environment and Development Study for Climate Change
NES: National Electricity System
NGO: Non Governmental Organization
NMVOC: Non-methane volatile organic compounds
NOx: Nitrogen oxides
OCIC: Office for Joint Implementation,
PES: Payment for Environmental Services
PFC: Per fluorocarbons
PFRNC: Non Conventional Renewal Source Plan
PRUGAM: Urban and Regional Planning of the Greater Metropolitan Area
QCT: Qualified carbon technician
R&D: Research and development
REDD+: Reducing Emissions from Deforestation and Forest Degradation and Plus
RESET: Requisites for Sustainable Buildings in the Tropics
RSW: Residential Solid Waste
SF6: Sulfur hexafluoride
SINAC: National System of Conservation Areas
SO_2: Sulfur dioxide
SWM: Solid Waste Management
TNA: Technology Needs Assessment
UCC: Costa Rican Compensation Units
UNEP: United Nations Environmental Program
UNFCCC: United Nations Framework Convention on Climate Change
VCS: Verified Carbon Standard
VER: Verified Emissions Reductions

1 General context

The Costa Rican National Strategy on Climate Change is an integrated, long-term strategy for sustainable development that seeks to align the country's climate change and economic competitiveness strategies[1]. The carbon mitigation component of the strategy focuses on becoming a carbon neutral economy by 2021 and central to this aspiration goal is the design and operation of a voluntary domestic carbon market.

Through its participation in the PMR, Costa Rica seeks financial support to further this integrated strategy through the development, design and implementation of market readiness activities. These involve (i) the completion of the domestic market design, including legal, institutional and regulatory aspects, and registry platform/tracking tools, (ii) strengthening of demand by assessing a wide range policy options and implementing pilot projects with firms pursuing the carbon neutrality status, and (iii) consolidation of supply through the implementation of mitigation and offset activities across a range of sectors[2].

1.1 Costa Rica's low emissions development goal

Costa Rica is a country with 4.6 million inhabitants, and covers 51,100 km2. Even though its area only represents 0.03% of the planet's surface, Costa Rica is custodian to 800 million metric tons (mt) of CO_2 and 5% of the world's biodiversity.[3] Per capita greenhouse gas (GHG) emissions equaled 1.8 tons of CO_2 in 2007, substantially lower than the global average of 4.6 tons of CO_2 that same year.[4] The country's Gross Domestic Product (GDP) is US $41 billion (2011), with a projected real growth rate of 4.8% for 2012 and 4.2% for 2013.[5]The carbon intensity of the economy is 0.17 tons/$1,000 of GDP, already one of the lowest in the world.[6]

In 2007 Costa Rica announced its pledge to become carbon neutral by 2021. This commitment was incorporated into the 2011-2014 National Development Plan (NDP), the country´s highest-level statement of public policy. Costa Rica's commitment to climate change mitigation and adaptation is also expressed in this plan: "one of the country's most important objectives is to have an economy with low greenhouse gas emissions (on its way to becoming a carbon-neutral country by 2021), committed to climate change mitigation and adaptation."[7]

The commitment to a low emissions development strategy has been reinforced by the current governments "eco-competitiveness" agenda, in which growth is based in a balance between competitiveness and the environment. The environment and development agendas must converge to guide the design of command-and-control instruments based on legislation on one side, and market on the other side, including voluntary mechanisms like adoption of standards and

[1] Ministerio de Ambiente, Energía y Telecomunicaciones. Estrategia Nacional de Cambio Climático- 1 ed.- San José, CR: Editorial Calderón y Alvarado S. A., 2009
[2] Sectors include: Renewable energy, energy efficiency, transport, housing, waste management and agriculture.
[3] Source:Propuesta REDD+ de Costa Rica, FONAFIFO, 2012.
[4] http://data.worldbank.org/indicator/EN.ATM.CO2E.PC
[5] Source: Banco Central de Costa Rica, www.bccr.fi.cr
[6] http://data.worldbank.org/indicator/EN.ATM.CO2E.PC
[7] Ministerio de Planificación Nacional y Política Económica. Plan Nacional de Desarrollo 2011-2014.

schemes of self-regulation on the way. With eco-competitiveness the country seeks the most advanced stage of environmental policy that represents scaling-up initiatives currently under implementation in the areas of clean production, eco-efficiency and corporate social responsibility, among others.

The main drivers of this low-emissions development and eco-competitiveness policies are explicit in the National Climate Change Strategy (NCCS), coordinated by the Ministry of Environment and Energy (MINAE) through its Climate Change Directorate (CCD). The Strategy creates an inter-institutional coordination platform that builds in climate change concepts and variables within institutions related to priority productive sectors.

The NCCS mandates that all public institutions, local governments and autonomous institutions formulate and implement an action plan for the short, medium and long terms and with clear goals that include four fundamental bases and six areas of action. The fundamental bases are: shared responsibility, opportunity, threats and capacity building, and international legitimacy. The six areas of action include: 1) mitigation, 2) vulnerability and adaptation, 3) measurements, 4) capacity building and technology transfer, 5) education and awareness, and 6) financing.

The NCSS has tangible support from the population, given Costa Ricans´ awareness and concern about Climate Change, and also from the private sector.[8] Since the carbon neutrality pledge was announced by the government, a number of private firms have expressed their commitment to become carbon neutral and are already in the process of preparation to fulfill the requirements of the C-Neutral certification, as will be established later in the document. Newspapers and other media often publish news and articles related to the government's actions and challenges to meet the goal, which is deemed important for the country´s benefit and its international reputation.

1.2 International context: Costa Rica's pledge on voluntary mitigation action and underlying considerations

In January 2010, Costa Rica submitted an official communication to the UN Framework Convention on Climate Change (UNFCCC) in the context of nationally appropriate mitigation actions that developing country Parties intend to implement, as well as the related context, conditions and considerations associated with these mitigation actions, including with regard to the support required for their preparation and implementation. In this "C-Neutrality Note" Costa Rica communicated that it will implement a "long-term economy-wide transformational effort to enable carbon-neutrality" that will help the country to significantly deviate from 'business as usual' emission scenarios from now until 2021 and beyond. [9]

As a first step in this context, Costa Rica stated that it is currently in the process of identifying the most relevant sectors and concrete policies and measures that are likely to be developed as

[8] A 2009 survey showed that 90% of the interviewed believe that humans cause climate change and that 86% are concerned or very concerned about it. (CATIE and Peace with Nature, Estudio de la percepción y actitudes de la población costarricense sobre cambio climático, 2009)

[9] UNFCCC Copenhagen Accord Appendix II - Nationally appropriate mitigation actions of developing country Parties http://unfccc.int/resource/docs/2011/awglca14/eng/inf01.pdf

specific sector offset programs, and eventually NAMAs, following agreed guidance and due process. On a preliminary basis, efforts will focus on the following sectors: (a) Transport (b) Energy (c) Forestry, and, (d) Waste management. This initial list of sectors, however, does not preclude the further inclusion of additional sectors or even more specific actions within sectors as the ongoing process continues to provide more specific data.[10]

Costa Rica also communicated that the preliminary estimates of incremental costs to implement the package of identified actions would involve a level of financing equivalent to approximately 1 per cent of annual national GDP in addition to regular projected investments. To allow immediate and up-scaled action towards carbon neutrality and to fulfill the incremental costs, Costa Rica will require the support of the international community through a broad range of financial mechanisms, including international cooperation (official development assistance), grants, soft loans, private investment and climate-related market-based funding. Additional support will also be required for policy and capacity development and implementation, including the design and implementation of the appropriate financial architecture and governance requirements, as well as the additional administrative obligations that will be potentially acquired through specific NAMAs. At this stage, the scope of Costa Rica´s actions is of a voluntary nature and contingent upon these supporting conditions. Other actions, such as sector benchmarks or caps are not included in the scope of action.

This explains why bilateral and multilateral cooperation as well as the participation of development entities and markets will be critical to allow the country to expand current efforts and undertake new ones in order to meet its projected climate change goals and thus increase its contribution to global mitigation targets. Coherent and transparent national and international monitoring, reporting and verification schemes for national GHG emissions, mitigation actions and the international support provided will be implemented as required and in accordance with the UNFCCC guidelines and shall address both the effectiveness of actions as well as the support provided. Costa Rica´s C-neutrality pledge uses a production-based UNFCCC criteria-based system and, as will be shown later, and clear measures to prevent double counting or double claiming of emission reductions will be adopted.

1.3 Overview: composition of Costa Rica's GHG emissions and projected emissions trends

1.3.1 Greenhouse gas (GHG) emissions

Costa Rica ratified the UNFCCC's Kyoto Protocol in 2002, thus formalizing activities such as national communications, inventories of greenhouse gases and programs to mitigate and adapt to climate change that had been initiated nationally several years before.

The National Meteorological Institute (Instituto Meteorológico Nacional-IMN) acts as the Technical

[10] Agriculture was added to the priority sector list as of 2011.

Focal Point of the Intergovernmental Panel on Climate Change (IPCC). IMN has led the preparation of two National Communications to the Convention (the last one in 2009), national GHG inventories, studies on vulnerability and adaptation, technology transfer and education and awareness with support from national and international experts in different areas.

The following gases are included in the national GHG inventory: carbon dioxide (CO_2), methane (CH_4), carbon monoxide (CO), nitrous oxide (N_2O), nitrogen oxides (NOx), and other non-methane volatile organic compounds (NMVOC). In addition, IMN measures emissions of sulfur dioxide (SO_2), halofluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF6). Emissions are presented in units of carbon dioxide equivalents (CO_2e).

The 2005 National GHG Inventory (Second National Communication) shows that the energy sector is the largest emitter, of which transportation contributes with 64%. The agricultural sector follows, where the enteric fermentation process in livestock generates most emissions. Waste management and industrial processes jointly add close to 25% of Costa Rica´s CO_2e emissions.

Table 1. National GHG Inventory 2005

Sector	Emissions in Tons of CO_2e	%
Energy	5,688,600	65%
Agriculture	4,603,900	52%
Waste Management	1,320,900	15%
Industry	672,500	8%
Changes in Land Use and Forestry	-3,506,700	-40%
Total	**8,779,200**	**100%**

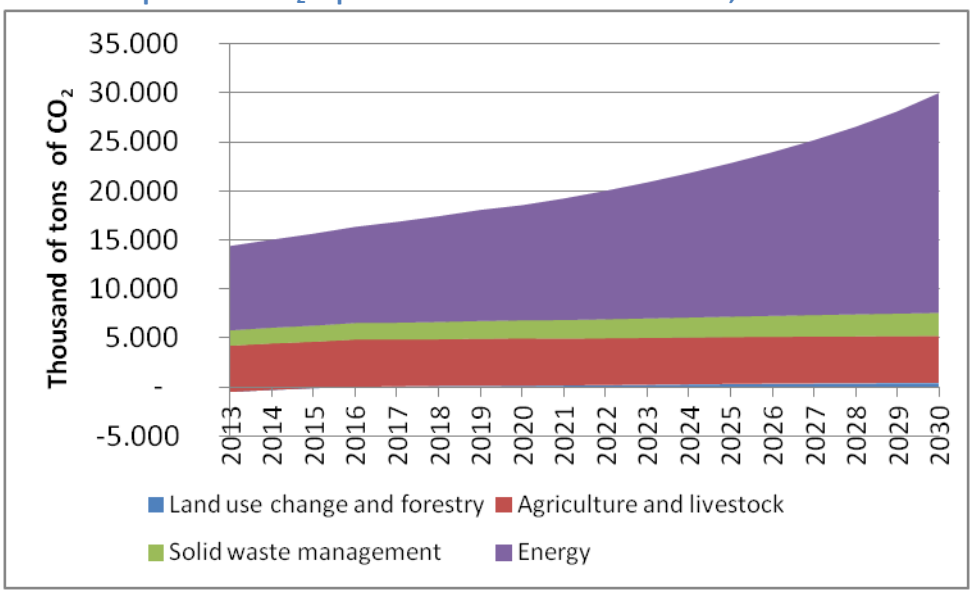
Source: IMN

1.3.2 Emissions scenarios

Opportunities to mitigate greenhouse gas emissions and their economic implications were identified in the "National Economic, Environment and Development Study for Climate Change" (NEEDS) assessment. NEEDS is an official MINAE document, promoted by the UNFCCC, applied methodologies from this Convention and from IPCC. It shows national and sector costs estimates and potential impacts on the country's capacity to mitigate GHG emissions that would result from the use of technology and alternative productive practices.

NEEDS analyzed the energy, solid waste, forest, and agricultural sectors individually to establish emission trends. The study examined the combined effects of mitigation or sequestration on the expected baseline, based on current patterns and trends. The baseline scenario of net carbon emissions from the four sectors (energy, forestry, waste management and agriculture) is shown in Graph 1. Emissions are expected to grow by 11.699 million tons of CO_2 in 2008, and close to 35 billion in 2030. This implies that in a moderate scenario, increase of greenhouse gas emissions by 195% in 22 years.

Graph 1. Net CO_2 equivalent emissions in Costa Rica, 2008-2030



Source: NEEDS, 2010

1.4 Review of policy and institutional framework to advance low emissions development

1.4.1 National Climate Change Strategy (NCCS)

The general objective of the NCCS is "to reduce the social, environmental and economic impacts of climate change and promote sustainable development through economic growth, social welfare and environmental protection using mitigation initiatives and adaptation actions so that Costa Rica improves the quality of life for its people and eco-systems by moving toward a carbon-neutral competitive economy by 2021."

The objectives of the NCCS as part of the national agenda are:

Mitigation	Achieve a carbon-neutral economy by 2021 simultaneously strengthening competitiveness and sustainable economic development
Adaptation	Reduce sector and geographic vulnerability
Metrics	Develop a rigorous, reliable and verifiable information system
Capacity building and technology	Improve the efficiency and efficacy of implementation measures
Public awareness, education and cultural change	Create changes in behaviors
Financing	Commit financial resources and their efficient use

Table 2. Sectors included in the NCCS strategic areas

Mitigation Area	Adaptation Area
Energy	Water
Transportation	Energy
Agriculture and Livestock	Agriculture and Livestock
Industry	Fishing and Coastal Areas
Solid Waste	Health
Tourism	Infrastructure
Water	Biodiversity
Changes in Land Use	

Source: ENCC

Mitigation

The mitigation area of action within the NCCS was designed so that the country could eliminate net carbon emissions and adopt a vision that combines environmental, sanitary, economic, human, social, ethical, moral, cultural, educational and political actions within the country's competitiveness strategy.

The goal of the NCCS is to develop mechanisms and a culture in which different sectors take concrete steps to mitigate GHG. It proposes to establish a system by which organizations and entities interested in reducing their emissions can develop inventories and reports towards periodic measurements and emissions management. The NCCS also identifies mitigation opportunities that increase process performance and de-carbonization.

Mitigation will be implemented through three strategic sub-areas: reduction of gas emissions by source, biological sequestration of carbon, and the creation of an effective national carbon market with active participation in international markets.

The Strategy focuses on eight priority target-areas for studies and possible intervention measures in mitigation: Transportation, Agriculture and Livestock, Industry, Solid Waste, Tourism, Water and Changes in Land Use.

The Ministry of Environment and Energy (MINAE) is the entity in charge of implementing the Strategy at the national level, mainly through its Climate Change Directorate (CCD). The CCD's legal mandate comes from Decree No. 35669-MINAET, January 6, 2010. The Decree establishes the context for policy-making within the National Climate Change Program, explicitly through the creation of new capacities and the integration of a platform for knowledge exchange in climate change mitigation and adaptation.

The CCD is finalizing NSCC´s Action Plan, which is envisioned as the reference point for policy design and implementation, while strengthening education and public awareness processes.

Responsibilities of the Climate Change Directorate

- Coordinate, manage, formulate and implement public policy on climate change, promoting the integration of a climate change agenda among Ministries.
- Coordinate and integrate the Ministries' agenda on climate change.
- Support the highest level of design and execution of a priority climate change agenda nationally and internationally.
- Coordinate the Technical Secretariat of the Inter-Ministerial Council on Climate Change.
- Coordinate, lead and plan for the implementation of the National Climate Change Strategy through the National Climate Change Program.
- Coordinate and establish the National Metrics System.
- Coordinate and monitor ministerial, organizational and sector plans on climate change, promoting the creation of standards that feed into the National Metrics System.
- Act as the Technical Secretariat for the Carbon Board and manage the registry platforms.
- Coordinate the C-neutral process with different national actors and sectors.
- Coordinate, manage and monitor the National Adaptation Plan.

Other entities directly related to implementation of the country's climate change agenda are the Costa Rican Office for Joint Implementation (OCIC), National Forestry Financing Fund (FONAFIFO), the National System of Conservation Areas (SINAC), and the Office for Environmental Quality Management (DIGECA) and the National Environmental Technical Secretariat. However, there are many other institutions that are indirectly related to this agenda, such as the Costa Rican Electricity Institute (ICE) and the Ministries of Agriculture and Livestock, Health, Housing and Human Settlements and Public Works and Transportation, among others.

1.5 Experience with GHG market instruments

Costa Rica´s commitment to climate change mitigation has been evident and pro-active for more than two decades. This strategy has always relied in the existence of markets. In September 1994, Costa Rica and the United States signed a bilateral letter of intent on cooperation for sustainable development and joint implementation. This agreement led to the "Cooperative Assessment of Baselines and Certifiable and Transferable Greenhouse Gas Emissions Offsets". This, together with the conformation of a high level Consultative Committee on Climate Change, shaped Joint Implementation policy.

At the first meeting of the Parties of the Climate Change Convention in Berlin in 1995 (COP 1), Costa Rica made a solid defense of Joint Implementation and compensation for ecosystem services, with a mandate from all the Central American countries.

The Costa Rican Office for Joint Implementation (OCIC) was established in April 1996, with the authority to formulate JI policy and evaluate and approve projects, reporting to the Ministry of Environment and Energy (MINAE). The office established project approval criteria and assisted in the development of more than fifteen project proposals, many internationally noted as among the best designed of the first generation of similar attempts. In the late 90s, the OCIC strategy became one of exclusively promoting three national-scale projects focusing on 1) parks'

consolidation (Protected Areas Project), 2) natural forest management by private landowners (Private Forestry Project), and 3) renewable energy. The Protected Areas Project and the Private Forestry Project included long term monitoring of carbon benefits, using satellite imagery, ground verification and independent third party verification. The Project was certified by SGS Forestry and monitored annually.

1.5.1 The Certifiable Tradable Offset (CTO)

Costa Rica designed a financial instrument for placing greenhouse gas offsets in the international marketplace, called the Certifiable Tradable Offset, or CTO. A CTO represents a specific number of units of greenhouse gas emissions expressed in carbon equivalent units reduced or sequestered. The home-country verification process certifies that the offsets are of a high enough quality to allow them to count against national and company-level GHG reduction commitments, if such crediting were eventually permitted under the UNFCCC.

In July 1996, Costa Rica sold its first 200,000 CTOs for US $2 million. At that time, the governments of Norway and Costa Rica, along with companies from both countries, agreed to cooperate on a JI project that involved, among other things, reforestation and forest conservation as part of the Private Forestry Project. The Norwegians were the final users of the offsets.

Two cooperation projects with the Dutch governments enabled Costa Rica to issue CTOs in new market niches other than carbon sequestration. The first project consisted in the anaerobic treatment of organic waste from coffee processing, which resulted in avoiding methane emissions and the implementation of clean technologies and energy savings through the use of biogas. The second project was directed to the reforestation of 78 hectares of former banana plantations that contributed to carbon sequestration and environmental sustainability conditions for banana production. The Netherlands received the CTOs for the annual reduction of 500 tons of methane gases in addition to the ones resulting from carbon sequestration.

Costa Rica's goal for CTOs was to trade them in a manner similar to the United States market for sulphur oxides (SOx). Conversations were held with Natsource Energy Brokers and The Centre for Financial Products, Ltd, an active participant in the development of SOx, but the idea proved to be early for its time.

Currently OCIC is the national authority for the Clean Development Mechanism (CDM). The CDM projects pipeline shows that Costa Rica presented 16 projects of which 14 are related to electricity generation: 2 in biomass, 6 hydroelectric, 2 with landfill gas and 4 in wind power. [11]

Environmental Services Payments

FONAFIFO leads the National Strategy on Reducing Emissions from Deforestation and Forest Degradation (REDD+).[12] This is the newest system of policies and incentives to encourage

[11] http://www.cdmpipeline.org
[12] The Fund was created in 1990 through Forestry Law No. 7174 and regulations, as well as Executive Decree No.19886-MIRENEM.

participation in the forestry sector in order to mitigate global climate change. It was adopted by the Climate Change Convention in the XVII Conference of the Parties in Cancun (2010). REDD+ will be a fundamental pillar in the country's progress toward becoming an economy with low carbon emissions. In addition, it is expected that it will generate additional resources to expand the Payment for Environmental Services (PES) Program coverage and support the consolidation of the country's protected areas.

Since 1997 Costa Rica implemented the PES Program designed to promote the maintenance and recovery of the country's forest cover. It addresses four areas: water protection, scenic beauty and biodiversity, as well as the reduction of greenhouse gas emissions, and benefits small and medium landowners with forest or woodland.

The general purpose of FONAFIFO is to finance reforestation, forestation, forest nurseries, agro-forestry systems, the recovery of cleared areas and technological changes that support and industrialize forestry resources for small and medium producers. Financing is provided through loans or other mechanisms that support forest management. FONAFIFO may also receive financing for the payment of environmental services in forest areas, forest plantations and other activities needed to strengthen resource management.

The PES Program resulted in a local market of environmental services for water, biodiversity, scenic beauty, and carbon associated with avoided deforestation, and maintenance and increase of forest carbon stocks. Currently, the PES Program is the fundamental element of the REDD+ Strategy, as there are multiple actors who have joined efforts in their own ways and for their own purposes, and has engaged a broad representation with different institutions local, regional, national, and international interests.

Since its inception, the PES Program was designed to contribute to global efforts to reduce emissions and allow the country to participate in the global carbon emissions reduction market. In addition, FONAFIFO has developed a series of innovations to generate additional financial resources to support its programs and allow the private and public sectors to be involved in green investments, including: the Environmental Services Certificate, the green card, the Fund for Sustainable Biodiversity, requests for subsidized loans from international banks, credit lines for the forestry sector, and others.

1.6 Carbon Neutrality target and strategy to achieve it

This section lays out Costa Rica's Carbon Neutrality Target and maps the strategy and pathway to achieve it. Two types of priorities are considered: mitigation priorities based on total emissions, and priorities for carbon neutrality market, based on the potential of voluntary market uptake by the sectors.

1.6.1 Rationale

The National Development Plan 2011-2014 recognizes that Costa Rica is well positioned as a global leader in environmental issues and as a pioneer of incentive-based environmental programs. As such, it reaffirms the country's aspiration to reach carbon-neutrality by 2021.

As mentioned in section 1.4, the Costa Rican National Strategy on Climate Change (NSCC) offers an integrated, long-term approach to sustainable development that seeks to align the country's climate change and economic competitiveness strategies. Key to this is the promotion of 'C-Neutral' organizations, which involve entities voluntarily opting to: 1. Measure their carbon footprint; 2. Reduce emissions; and 3. Offset any residual emissions.

In seeking Carbon Neutrality, Costa Rica aims to meet its ambitious sustainable development and GHG reduction targets and position itself as a leader in environmental policies and solutions. In addition, the development of the C-neutral brand is designed to differentiate Costa Rican products in environmentally demanding consumer markets.

1.6.2 Strategy to achieve Carbon Neutrality

The Costa Rican Government intends to establish a Domestic Voluntary Carbon Market (DVCM) as the primary policy tool to achieve its Carbon Neutrality target. It is intended that the promotion of C-Neutral entities, regions and communities, among other stakeholders, will provide incentives for action and will result in demand for carbon offsets within Costa Rica. The five priority sectors participating in the voluntary market that will provide the supply of the required offsets are: Energy, Transportation, Agriculture, Solid Waste Management and Sustainable Construction.

In addition to achieving Carbon Neutrality, it is expected that the NSCC will help develop the domestic carbon market by pursuing complementary sustainable development objectives, including:

- Development of an accurate, reliable, and verifiable information system (metric focus);
- Improve efficiency and effectiveness of implementation measures (capacity building and technology development focus);
- Create a change in habits (public awareness raising, education, and cultural change focus)
- Efficient use of resources (financing focus).
- Reduction in sector and geographic vulnerability (adaptation focus);

Alongside the Domestic Voluntary Carbon Market, the REDD+ strategy will continue to be implemented by FONAFIFO, as discussed in section 1.5. Among the various actions undertaken with REDD+, emphasis is placed on the fact that production and consumption of sustainable timber from natural primary and secondary forests will be encouraged, as well as timber coming from reforestation. Therefore, the REDD+ strategy seeks to finance a program to eliminate cultural, legal, technological, and training barriers that discourage the massive use of timber.

2 The Costa Rican domestic voluntary carbon market

2.1 Market framework

This chapter introduces the Costa Rican Domestic Voluntary Carbon Market – the overall mechanics, supply/demand infrastructure and participants.

2.1.1 Rationale

As the primary policy tool to drive emission reductions, the Domestic Voluntary Carbon Market is intended to help Costa Rica meet its sustainable development and national Carbon Neutrality targets in the most flexible and cost-effective way. The market is also designed to provide a financial incentive for investment in low emissions technology research, development and commercialization. In addition, each component of the market will be guided by considerations of:

- Environmental integrity: design options should achieve the desired environmental outcomes.
- Economic efficiency: the new Costa Rican Carbon Market should achieve its environmental goals as efficiently as possible.
- Simplicity and transparency: The scheme's operational rules and parameters should be simple and transparent.
- Flexibility: the design aspects of the scheme should allow it to respond to changing circumstances at both the domestic and international levels.

2.1.2 General criteria for the Domestic Voluntary Carbon Market

Mitigation policies will be implemented through three strategic sub-areas: reduction of gas emissions by source, biological sequestration of carbon, and the creation of an effective national carbon market with active participation in international markets, as shown in Figure 2. This strategic vision (macro) is linked to mitigation actions by firms and organization (micro) through two instruments: the Carbon Market and the Carbon Neutrality Country Program, as explained below.[13]

The Carbon Neutrality Country Program (Acuerdo-36-Minaet 20112) is an official agreement that establishes the voluntary procedure by which a productive process becomes carbon-neutral. It is based on the application of the carbon neutrality equation established in the national standard INTE 12-01-06:2011 "Management System to Demonstrate Carbon Neutrality"). The Country Program sets forth the steps that an organization should follow to become carbon neutral (Figure 2).

Where:

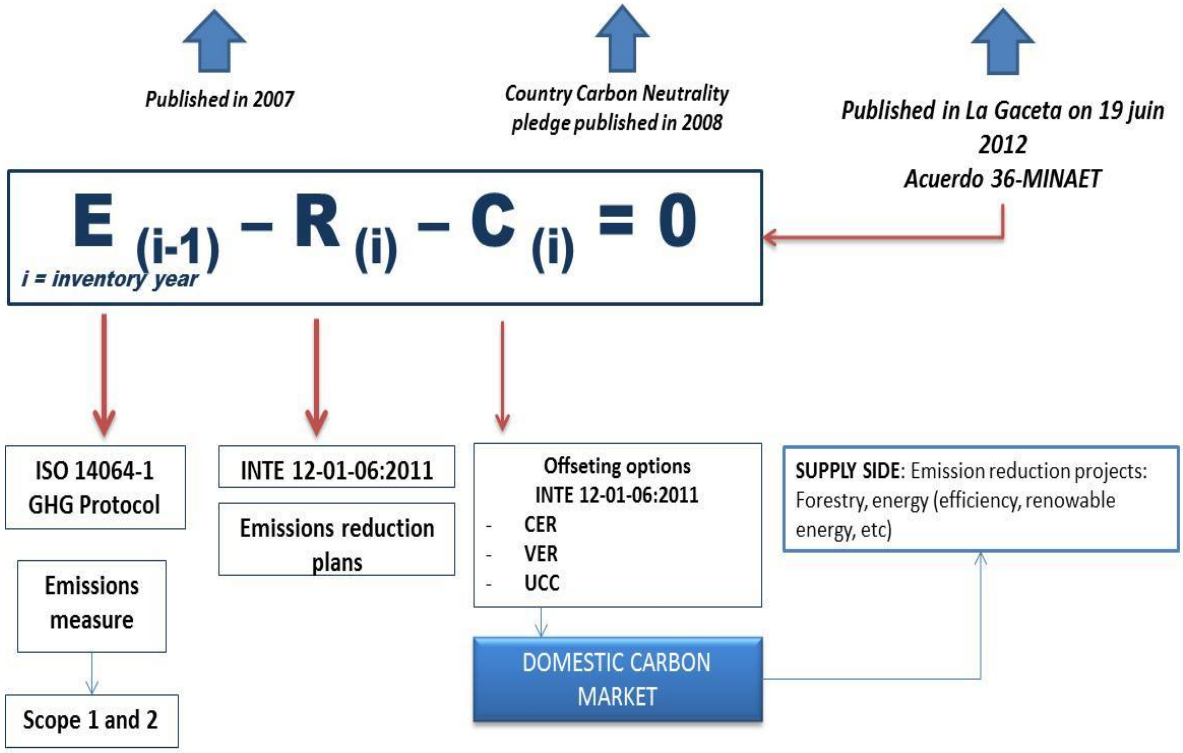
[13] http://www.minae.go.cr/recursos/ALCA79_19062012-acuerdo-programa-pais.pdf, http://www.minaet.go.cr/dcc/index.php/2012-05-22-19-47-24/empresas-y-organizaciones-hacia-la-carbono-neutralidad-2021

E pertains to the organization's emissions measured using internationally recognized standards (ISO 14064-1 or the GHG Protocol of the World Resources Institute).

R pertains to the reduction plans that the organization should carry out to document its emission reduction efforts. The reduction process is instrumental to the carbon neutrality certification, such that the organization's main efforts in terms of reduction of tons of CO_2 equivalent should be reflected in **R**.

C pertains to the compensation choices for allowed GHG emissions (Certified Emissions Reductions-CER, Verified Emissions Reductions-VER and Unidades Costarricenses de Compensación-UCC [Costa Rican Compensation Units]). **C** is where the UCCs are established as a compensation choice for emissions of quality comparable to CERs and VERs.

Figure 1. NCSS and Mitigation Focused on Organization.



Source: DCC

For estimating **E**, the measurement of the organization's GHG inventory must necessarily include Scopes 1 and 2, while Scope 3 is optional. The inventory should be constructed with a focus on the organization's operational control. Likewise, the Country Program states that the verification assurance level should be reasonable, with a 5% significance threshold. As seen in figure below: *Steps in the Carbon Neutrality Country Program*, the organization´s GHG inventory should be verified by a verification/validation organization that is accredited by the Costa Rican Accreditation Entity (ECA). The purpose of this step is that the inventory is verified in compliance with Standard ISO 14064-3 (specifications on validating and verifying the GHG declarations). This provides transparency to the inventory verification processes and ensures the reliability of the GHG

information and data coverage. As for **R,** the requirements to reduce emissions and/or increase removal are defined in the national standard INTE 12-01-06:2011. Specifically, it indicates that a management plan should be implemented to achieve GHG reduction and/or removal. The reduction plan should include as a minimum: statement by upper management about the commitment to carbon neutrality, reduction objectives, expected resources and compensation strategy. The standard states that the organization should update the management plan to maintain carbon neutrality at least every 12 months. In addition, the standard indicates that organization should have documentation to justify GHG reductions. As for **C** the standard states that organizations may offset GHG emissions that have not been reduced internally by acquiring UCCs in the carbon market.

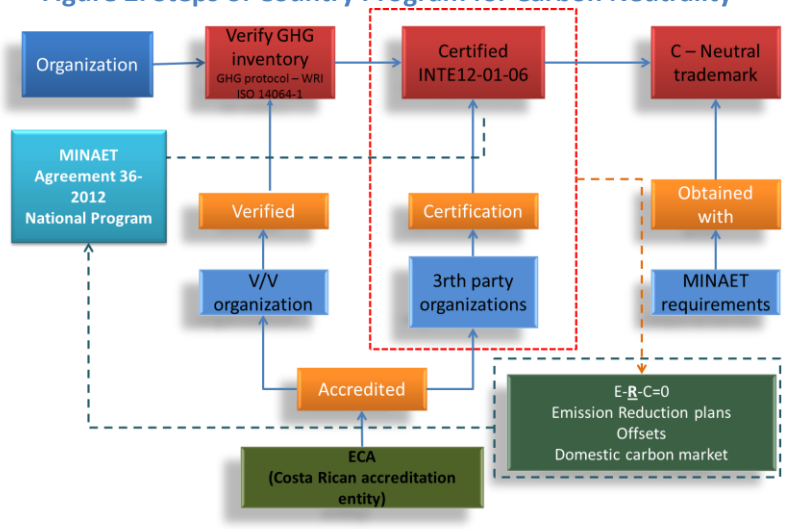
MEASURES TO AVOID DOUBLE-COUNTING

In the inventory-reporting phase, the clear definition of the scope within the inventory verification process is where limits are determined. Therefore, the definition of these inventory limits is clearly attached to the sources of the UCCs (the **C** in the carbon neutrality equation).

Other options in the compensation project validation process include the incorporation of a definition and a sworn statement of the project scopes. Based on this information, a crosscheck of the information against the inventory reported by the organization demanding UCCs will clearly show double counting, if present.

In addition, as set forth in the DCC creation decree (Decree 35669-MINAET), a National Emission, Reduction, and Compensation Registry will be created. This registry allows crosschecking inventories (**E**) vs. compensation (**C**), evidencing any double counting if present.

Figure 2. Steps of Country Program for Carbon Neutrality



Source: DCC

The basic concepts for creating the domestic market derived from an analysis of international standards, where 22 separate components were evaluated: base components, project cycle, and institutional arrangements. The analysis of these issues has obtained the next main points:

- Project cycle parameters: Development of the project plan, validation, public consultation, registration, monitoring, verification, certification, marketing and credit transfer.
- Parameters for institutional arrangements: the governing body, development of modalities and procedures, development or approval of new methodologies and complementary tools.
- Parameters linked to the base concepts: baseline, additionality, early consideration, aggregation, permanence, crediting period, materiality, and project eligibility.

2.2 Regulatory and institutional infrastructure

This section outlines the proposed regulatory and institutional structure and roles/functions required to oversee, develop and implement the Costa Rican Voluntary Carbon Market.

2.2.1 Rationale

Costa Rica recognizes that sound regulatory and institutional arrangements will be critical to delivering the outcomes expected from the Voluntary Carbon Market in an efficient, effective and accountable way.

2.2.2 Criteria to guide Regulatory and Institutional Framework considerations

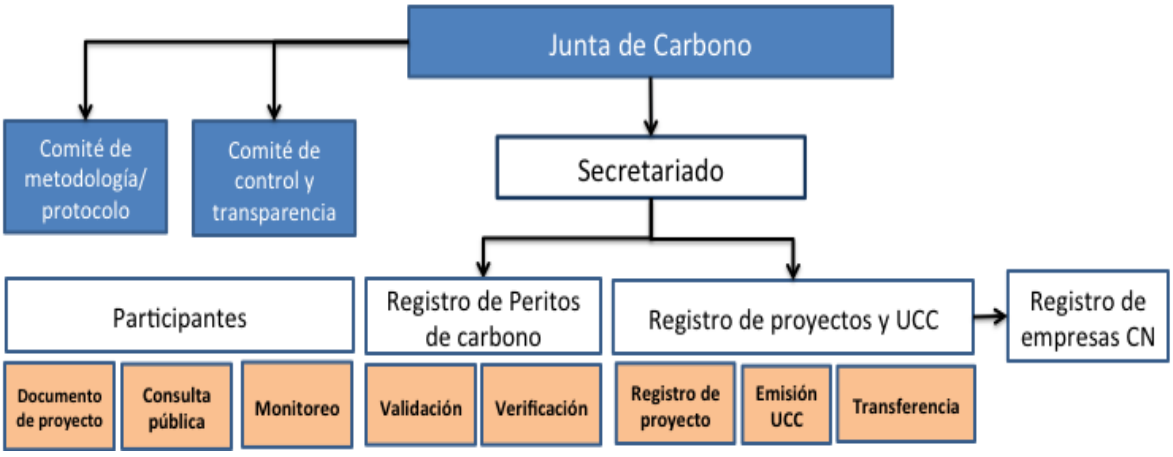
The design and implementation of the regulatory and institutional infrastructure is guided by the following considerations:

- Efficiency: Ability to achieve goals using the best combination of tools and resources available.
- Effectiveness: Ability to achieve goals using the means and resources allocated
- Robustness: Ability to generate stability in the system and overcome or adapt to external changes that may affect positively or negatively the institutional arrangements that are generated.

2.2.3 Regulation and oversight

The implementation of the Domestic Voluntary Carbon Market is led by MINAE. Decree CCD 35669-MINAET outlines the general structure of the voluntary market in Costa Rica as shown in Figure 4 below.

Figure 3. Structure of the Domestic Carbon Market in Costa Rica



Source: DCC 2012

2.2.4 Institutional roles and functions

As the above diagram indicates, four key institutions are to be created as part of the market infrastructure. The table below provides more detail on these institutions and elaborates upon the proposed functions and composition.

Body	Proposed Functions	Proposed Composition
Carbon Board	The creation of a Carbon Board (CB)[14] is the basis of the general market structure. Specifically its function is to: • Ensure the growth and adaptation of the system to changing market conditions. • Define the framework of action and regulation of the Carbon Market. • Register approved projects in the project registry. • Approve or disapprove recommendations, methodologies, protocols, standards, registration and/or issuance of UCC. • Approve the volume of UCCs issued in accordance with the requirements of project validation. • Promote efficiency and transparency in the market through public information sharing and protection against double counting within the Carbon Market.	As the governing body of the system, it is suggested that the Board is comprised of representatives of carbon experts from the public and private sectors, and academia to ensure that the views and interests of each of these stakeholders is considered in all stages of implementation and operation of the system. In that sense, it is proposed that the Carbon Board is headed by a representative of MINAE (Director of the Secretariat) and composed of five members and five alternates from the following

[14] The Carbon Board has already been approved in the decree that creates the Climate Change Directorate; appointments have not yet been made.

Body	Proposed Functions	Proposed Composition
	• Instruct the project registration coordinator and the coordinator of the transaction log to allocate issued UCCs. • Define the transfer procedure and withdrawal of UCCs jointly with the coordinator of the transaction log and with the support of the Control and Transparency Committee. • De-register projects that violate the modalities, procedures and requirements of the market. • Define the institutions and experts that comprise the standing committees. • Establish requirements for qualified carbon technicians in coordination with professional associations. • Establish and coordinate the accreditation system of qualified carbon technicians in coordination with the Costa Rican accreditation entity.	institutions: • Energy Sector Directorate. • Ministry of Economy, Industry and Commerce. • Costa Rican REDD • National System of Protected Areas • National Chamber of Tourism. • Chamber of Industries of Costa Rica. • National Council of Rectors.
Secretariat	The main role of the Secretariat is to provide technical and operational support to the Carbon Board and provide general support to the development of projects related to project developers, activities and protocols. Specifically it will: • Ensure the proper functioning and transparency in the operations of the Project Record. • Ensure proper functioning and transparency in the operations of the Registry of Carbon Qualified Technicians, giving access to information on accredited technicians for different projects types, including contact details and reference rates. • Liaise between the project developer, protocols and activities, carbon qualified technicians and Carbon Board, ensuring compliance with the requirements of the rules and procedures of the system at each stage of the project cycle. • Provide information services to participants in the voluntary carbon domestic market of Costa Rica, promoting the voluntary market. • Implement system start-up activities, including	• Director of the Secretariat. • Project Manager and Carbon Registry Expert. • Technical Specialist - Energy and Waste. • Technical Specialist - Forestry.[15] • Marketing and Training Specialist. • Legal Specialist.

[15] Will include other experts as other protocols are being designed.

Body	Proposed Functions	Proposed Composition
	marketing activities and capacity building. • Provide information and respond to clarifications on system operation.	
Control and transparency committee	• Support the Carbon Board to promote efficiency and transparency in the system. • Provide access to information about projects, protocols and activities, as well as decision-making processes related to the system. • Collaborate with the Carbon Board in the protection against double counting within the Carbon Market, participating in the development of modalities and procedures related to UCC transactions. • Ensure proper functioning and transparency in the operations of the Carbon Market.	The Control and Transparency Committee should be comprised of members linked to the market, but with no interest in participating in this. Therefore, it is recommended that this committee be comprised of members of the: • Federation of Professional Associations • National • Meteorological Institute (IMN) • Union of Chambers.
Methodology Committee	The Methodology Committee is a purely technical committee established with the objective of proposing methodologies adopted by other standards or systems to the Carbon Board, or requesting approval of the Costa Rican system methodologies following the modalities and procedures defined by Board. Specifically its function is to: • Request Carbon Board acceptance of methodologies adopted by other standards or systems, valid in the Costa Rican system. • Request Carbon Board approval of Costa Rican system methodologies. • Support the Carbon Board in establishing the conditions of experience and training needed by experts to validate carbon add and / or verify each project type.	It is recommended that it be comprised by: • Costa Rican Accreditation Entity (ECA), • National Forestry Financing Fund (FONAFIFO), • The Ministry of Agriculture and Livestock (MAG), • Costa Rican Electricity Institute (ICE) and the Chamber of Industries.

Source: Proposal under technical review by DCC.

2.2.5 Participants

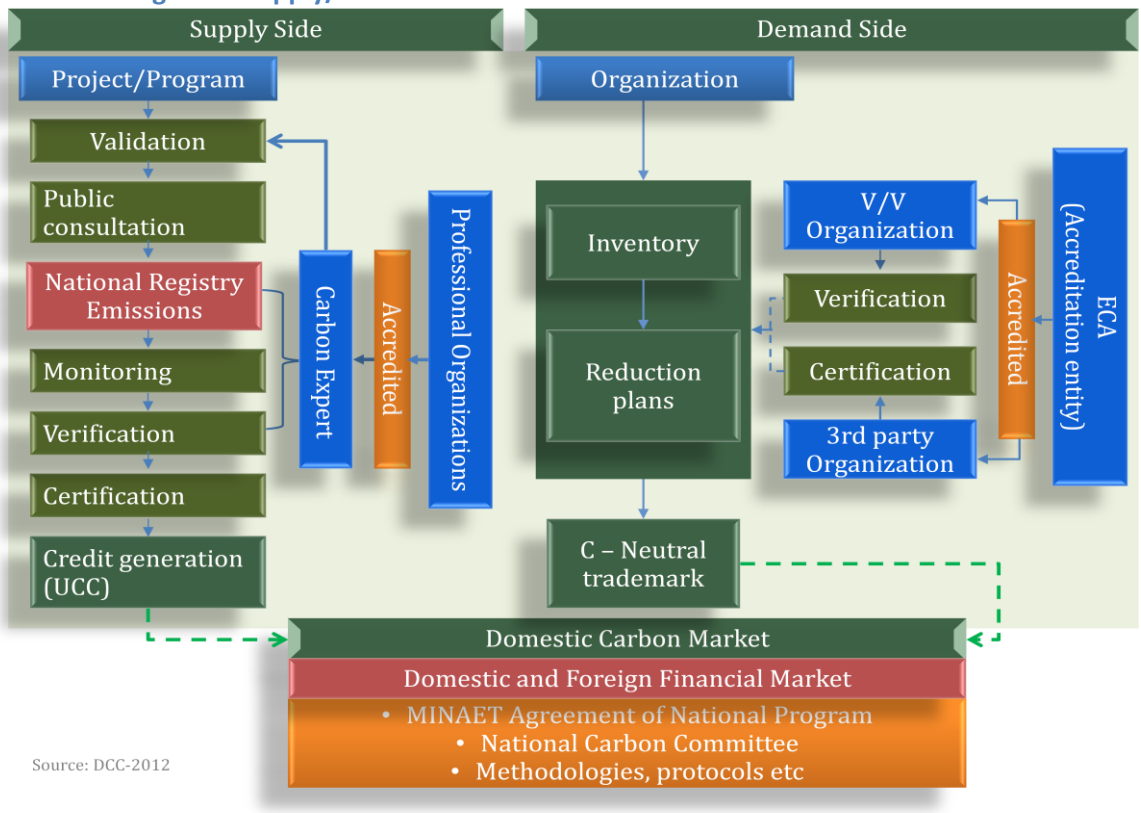
As a voluntary mechanism, the Costa Rican Domestic Carbon Market is open to all natural or legal persons who are interested in generating, buying or selling credits. However, the demand and supply infrastructure depicted below is designed to create the following groups of participants:

- Organizations that seek Carbon Neutrality by purchasing offsets. This demand derives from companies seeking to access markets with environmental standards or those who seek a comparative advantage based C-neutrality or low carbon development strategies.
- Project developers and wholesalers of offsets generated from the mitigation, reduction, removal or storage of GHGs.
- Intermediaries including retailers and brokers. For non over-the-counter transactions, these market players act as middlemen to facilitate trade and promote market liquidity.

2.2.6 Supply and demand infrastructure

The following figure shows the proposed supply/demand interaction and the validation, verification, and registration process that will be followed in each case. In addition, it shows the infrastructure provided by the financial market and the existence of protocols to apply and develop methodologies.

Figure 4. Supply/Demand Interaction and Institutional Infrastructure



2.3 Policy options for demand stimulus

Demand in the domestic voluntary market has been only partially assessed.[16] The DCC is committed to further exploring policy options to stimulate demand, that range from capitalizing on the demonstration-effect created by large Costa Rican firms integrating voluntarily to the market, to studying the feasibility of establishing sector emission caps. The policy mix eventually chosen by MINAE will depend of scientific, educational and cultural factors that come to play when designing successful public policy instruments.

Presently almost of all the demand in the voluntary market is met through forestry related offsets managed by FONAFIFO or other forestry organizations. A robust system of monitoring and reporting system exists and the Costa Rica system is georeferenced, tracked by satellite and aerial photography and verified annually on the ground. Costa Rica is therefore ready to participate in REDD international markets.

Certain Costa Rica private sector firms stand ready to participate in the Domestic Voluntary Market, and have already made important commitments to C-Neutrality goals. In June 2012, during the Chamber of Industries' Annual Environmental Congress, public recognition was given to the first 9 'champion' companies related to carbon neutrality, the first to have enrolled in the process established by the Costa Rica Country Program as per Section 2.1.2 above.[17] The companies included in the initial process are the following: Grupo Holcim, Florida Bebidas, Bridgestone, Intel Costa Rica, Plycem, Cooperativa Dos Pinos, Corporación Florex, and Travel Excellence.

Verifying GHG inventories for these 9 industrial companies reflects their commitment to carbon neutrality, as they must comply with the official rules that regulate verification and subsequent definition of carbon neutrality goals. The following chart shows aggregate emissions of the participating companies in year 0.

Table 3. Emissions of the participating companies

Scope Verified[18]	Tons of CO_2e
Scope 1	750,541.85
Scope 2	18,866.98
Scope 3[19]	19,657.31
TOTAL (1+2)	769,408.83

Source: DCC

[16] A recent study requested by the DCC and carried out by Ecoressources (2012) provides some initial demand estimates but these are only partial results.
[17] http://www.minaet.go.cr/dcc/index.php/2012-05-22-19-47-24/empresas-y-organizaciones-hacia-la-carbono-neutralidad-2021/30-intel
[18] Scopes based on the Corporate Reporting and Measurement Standard (WRI GHG Protocol).
[19] Scope 3 is voluntary; yet some of these firms will provide follow-up to these emissions. These emissions are not included in the mandatory reporting for carbon neutrality registration.

These emissions pertain to the **E** in the carbon neutrality equation for an organization (see Section 2.1.2). Therefore, organizations in the process of moving toward carbon neutrality should document their reduction processes in compliance with the **R** defined in the equation. Finally, the **C** for compensation is incorporated by acquiring UCCs.

In addition to these firm commitments, there are other clear indications that the Costa Rican private sector is interested in pursuing carbon-neutrality:

- Several banks, including Banco Nacional de Costa Rica (the largest in the country), Banco Popular and BAC Credomatic have made C-Neutrality commitments[20]
- Banco Nacional de Costa Rica is negotiating a contract with the Ministry of Agriculture and Livestock to purchase agriculture-based offsets.
- In addition to Intel, the largest exporter in Costa Rica with over $2 billion exports per year and Hewlett Packard, which is Costa Rica second largest employer, there are 45 other high technology and 41 medical technology companies that have made specific commitments or shown some interest.[21]

These ongoing efforts should be supported by PMR to consolidate demand throughout the industry, assessing additional potential and expanding coverage. Other areas of interest include reducing transaction costs, and providing technical assistance in structuring sector programs.

Assessed in a wider national context, these expressions of interest from the private sector are clear indications that demand potential for carbon certificates is present, and that options must be further studied to understand limits to what can be accomplished by voluntary measures and if additional policy options are warranted to strengthen the scope of the market towards the national goal of carbon neutrality.

2.4 Creation of a market instrument

This section introduces the Costa Rican Compensation Unit (UCC) as a carbon offset class in the Costa Rica Carbon Market to guide activities relating to Carbon Neutrality and the supply of offsets.

2.4.1 Rationale

Entities participating in the carbon neutrality program, after exhausting their emissions reduction strategies can still be competitive in their efforts towards carbon neutrality by acquiring UCCs. In addition, this unit is designed to support emission reduction activities in a broad range of sectors

[20] http://www.bncr.fi.cr/BNCR/Conozcanos/RSEambiente.aspx, http://www.costaricaneutral.cr/
http://www.elfinancierocr.com/ambiente/noticias/bancos-se-apuntan-a-respaldar-iniciativas-verdes,
[21] http://www.minaet.go.cr/dcc/index.php/2012-05-22-19-47-24/empresas-y-organizaciones-hacia-la-carbono-neutralidad-2021/30-intel

in the context of protocols that meet national standards or international standards, where available and practical.[22]

The UCC

- Represents emissions that were avoided, reduced, removed, and stored and that have been monitored, reported and verified
- Is equivalent to 1 ton of CO_2e
- Tradable within the Costa Rica domestic market. It is expected that market design will be sufficiently solid to allow UCCs to be internationally recognized and eventually incorporated into a regional or global market.
- Must be registered with the official entity that will manage the registry system
- Marked by a unique serial number.

2.4.2 Generation of UCCs

The UCC supply will be accessible via the project or transaction registry, where buyers will have access to information about registered projects apt to generate UCCs and their formal owners. The transaction registry will have information about volumes available for sale and the process to for making transfers. The figure below outlines the process for generating UCCs.

2.4.3 UCC project cycle

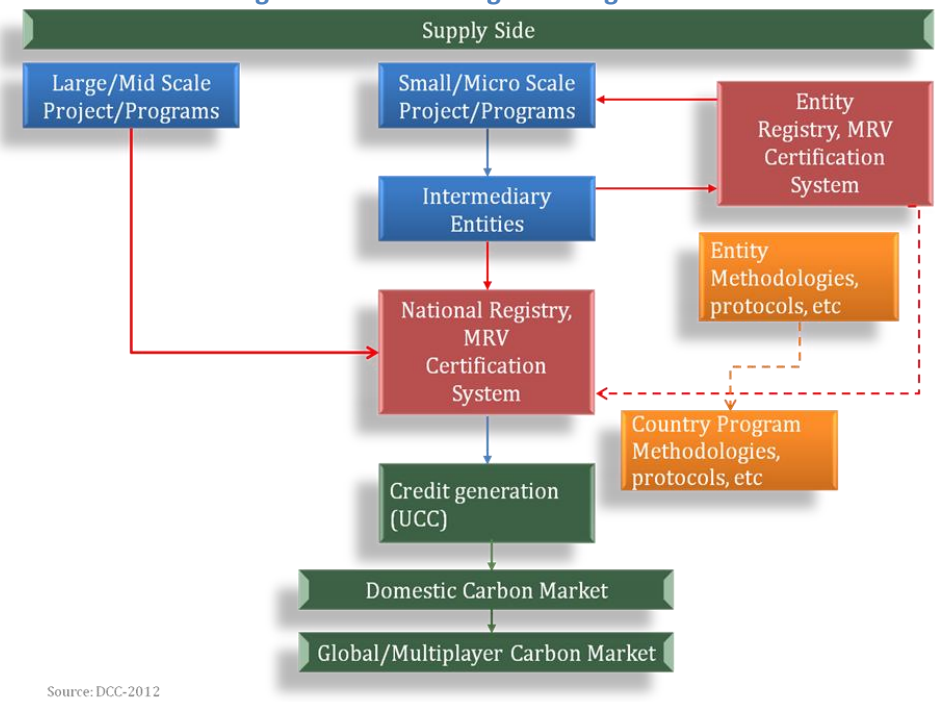
The steps included in the project cycle are shown in next figure. These are: the Project Plan, Public Consultations, Validation, Registration, Monitoring, Verification, Issuance of UCCs, and Transfers, as described below.

- The project proponent or 'developer' will prepare the Project Plan for consideration by the Carbon Board. This plan will be based on a methodology or protocol that has been duly approved by the Carbon Board. This form includes the main elements that should be considered by the Carbon Board and the qualified carbon technician (QCT) when evaluating a project.

- Public Inquiry: Public inquiries should be an integral part of the documentation to be evaluated in the validation process. The developer is responsible for organizing the inquiries and to consider the relevant comments from the participants in the project design process.

[22] The National standard against which UCCs are issued, INTE 12-01-06:2011, has been developed by the Technical Standards Institute of Costa Rica (INTECO).

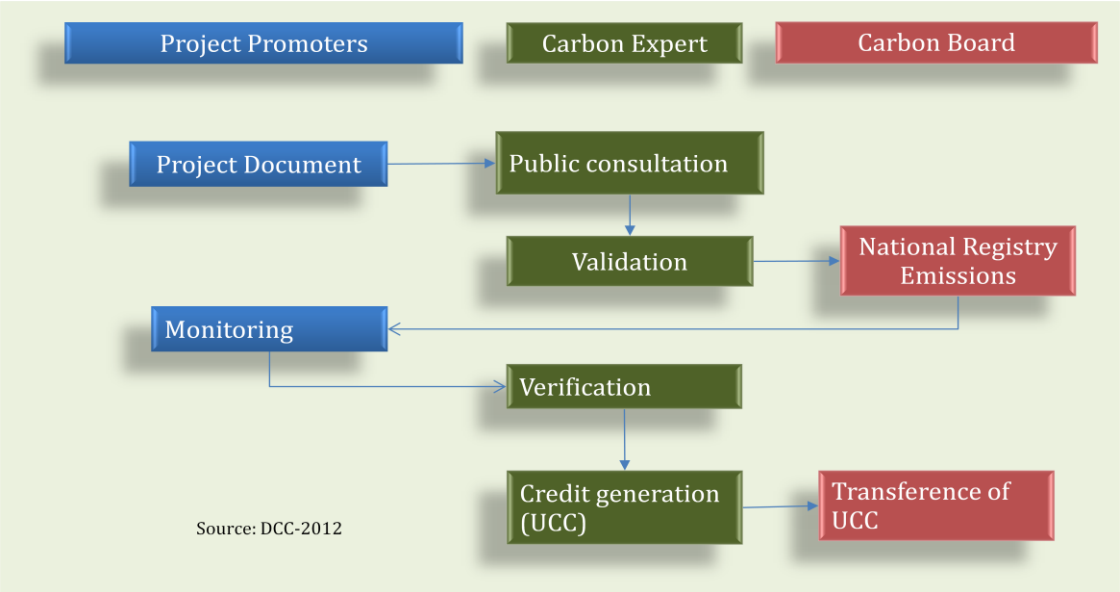
Figure 5. Process for generating UCCs



- Validation: The developer will hire the services of a QCT who must be accredited by the Carbon Board to do the work and be registered in the QCT registry. The QCT will validate the project plan, including the public inquiry. In cases where the project has some kind of fast track conclusion the validation will be used as verification as well. The number of UCCs to claim will be based on a methodology that has been properly approved by the Methodology and Protocol Committee and the Carbon Board. The QCT will be responsible for sending the Carbon Board a positive or negative opinion about the validation.

- Registry: Once the QCT has sent a positive validation notification, the Carbon Board will add the project to the Voluntary Market Project Registry of Costa Rica. At that time, the developer will be able to generate UCCs originating in that project. The Project Registry will be linked to the Carbon Neutrality Registry to update it with the projects that can generate UCCs. In addition, the Project Registry will be linked to the Transaction Registry to update the UCC transfers between accounts or withdrawals.

Figure 6. UCC Project Cycle



- Monitoring. The developer is responsible for properly implementing the project, including the pertinent monitoring plan based on the plan that has been established and the methodology used. The monitoring information from must be registered and stored properly and will be used to prepare a report that is the basis for calculating the number of UCC's that the project will be able to generate.

- Verification. Verification is the evaluation of the implementation of the project, the monitoring plan, and the monitoring report. As a result of the verification, the QCT must send a report that indicates the number of UCCs that the project has generated based on the established monitoring plan and the methodology used.

- Issuance of UCCs. Once the Carbon Board has received the verification report, it will order the Project Registry to issue the number of UCCs corresponding to the project developer assigned to the verified project. At this time, one of the options being proposed to reduce the risk of project performance is the creation of a reserve account managed by the Carbon Board and its Secretariat. The Carbon Board will withhold a pre-determined percentage of the UCCs for each project to cover performance risks, leaks, or problems with the verification process. The withheld UCCs will be determined by the Carbon Board for each methodology approved for the generation of UCCs.

- Transfers. The project developer (the owner of the UCCs) has the option of using the UCCs for its own benefit and interest, to keep them (expecting price increases), or to trade them. The transactions will be reported to the Carbon Board, which will order the Project Registry to make the necessary changes about the availability of the project's UCCs and will communicate with the Transaction Registry about any transfer or withdrawal.

2.4.4 Wholesale sellers

Providers of offsets generated from the mitigation, reduction, removal or storage of GHG may include wholesale sellers or retailers that make up portfolios of carbon certificates to trade them in the market.

Wholesalers involved in sector mitigation activities may be official institutions that allow for small mitigation or sequestration projects to participate in the market using registration and MRV systems. This set-up may become necessary when the eligibility (validation, monitoring, and verification) of a small project requires technical, logistic, and human capacity more adequately provided by the official wholesaler. Each small project is registered directly and a record and a sector-scope MRV apply depending on the position of the official wholesaler in the sector. The official wholesaler may receive the rights to offsets for these small projects and build certificate portfolios and sector funds that would finance support activities for the developers of small mitigation or sequestration projects.

2.4.5 MRV for the Carbon Neutrality Standard

The Costa Rican Accreditation Entity (ECA) defines the validation and verification concepts included in its standards: *validation* is an evaluation process to determine whether the GHG reduction and removal goals are calculated properly and if they are reachable; *verification* is done to check whether the GHG data and information are correct and may be used to evaluate the carbon footprint. The INTE-12-01-06 standard establishes that the party doing the validation may not verify the same process. [23]

ECA determines the procedure that validation and verification organizations must follow to apply for accreditation (ECA-MC-P09- F13). It also lays out the verification procedure (ECA-MC-P13-F13), the criteria to evaluate the standard INTE/ISO 14065 (ECA-MC-C10) and the witnessing procedure (ECA-MC-P25). ECA also spells out the requirements for validation and verification entities that issue statements for organizations about: a) the calculations for a proposed GHG reduction or removal project, b) the GHG inventory, and/or c) the declaration of C-neutrality. The concept of a national standard may be used to check the GHG inventory but not for compensation projects.

ECA has established that the certification process includes validation and verification for the management systems or products. These procedures for the organization's emission declaration towards carbon neutrality must be done by an entity accredited with ISO 17021 with an extension to the national standard. Therefore, only validation and verification will exist, but not certification for GHG declarations associated with projects, organizations, or products. However, the DCC is working in a process of certification under ISO 17021.

[23] This is applicable within the framework of projects to reduce emissions to create carbon credits. In the domestic market, additional processes are established.

ECA has indicated that as long as no accredited organizations exist in Costa Rica, MINAE will recognize verifiers accredited in other countries. Once Costa Rican organizations are accredited by ECA, the country, through ECA, will recognize accredited organizations from other countries as long as multilateral arrangements are in place to warrant the same accreditation system as in Costa Rica.

In terms of reporting, the C-neutrality standard establishes that as a first requirement, the organization defines the operating limits and facilities, along with the resources, functions, responsibilities, and authority involved in this management system. To quantify and document the inventory of GHG emissions and removals, the organization should identify the sources and sinks; select and compile data; select the emission factors, and finally run the calculation for emissions and removals.

To demonstrate C-neutrality, organizations should implement a management plan to achieve the GHG reductions and/or removals, including the following as a minimum: the statement of commitment by the organization to C-neutrality; the GHG reduction objectives, the resources provided to achieve them and maintain them, the offset goal strategy, the activities or actions that should be carried out, the methodology to follow, the parties who are responsible, and the follow-up indicators and tracking methods that allow for ongoing improvement to the management system. In addition, the organization should update this management plan at least every 12 months, so as to periodically evaluate the plan's performance and apply corrective measures when necessary.

In terms of reporting, the C-neutrality standard establishes that the inventory report and management plan should contain information about the methodology used, the ways and means to achieve reductions, the justification for the selected methodology and reduction methods, a description of the processes and sites, the emission or removal factors, the time period, and the inventory report.

To that end, the organization should document the scheme used in compliance with the principles that compensations represent reductions elsewhere; they should follow the additionality criteria, consider permanence, leaks and double counting, and be verified by an accredited verifier. Likewise, as compensations are credits issued after reductions have taken place, they must be generated in the inventory year, and they must be credits coming from an independent, transparent, official registry.

C-neutrality declarations must be documented and have a management plan for the information they contain. The report should be issued in terms of tons of carbon dioxide equivalent (tCO_2e) by applying the conversion factors. This report should contain, among other things, a description of the organization, the scope of the management system to demonstrate C-neutrality (justification, the inventory, the decision criteria, the description of the processes and sites), the time period, direct GHG emissions, GHG removals, the base year selected, the GHG inventory and the description of the methodologies and the reasons they were selected.

2.5 Data and reporting

This section outlines the key reporting obligations that will underpin the Costa Rican Carbon Neutrality Standard and the supply of offsets.

2.5.1 Rationale

Costa Rica recognizes that reliable data is essential for ensuring the environmental integrity of the Domestic Voluntary Carbon Market. Establishing an effective data collection and reporting system in Costa Rica involves application both by companies that want to offset their carbon footprint in search of carbon neutrality and those wishing to generate offsets from emission reduction activities.

2.5.2 General criteria to guide data and reporting considerations

The design and implementation of the data and reporting frameworks is to be guided by the following considerations:

- Completeness
- Comparability
- Transparency
- Accuracy

2.5.3 Data and reporting against the Carbon Neutrality Standard

Organizations classified as Carbon Neutral will be required to monitor and report their emissions, keep adequate records and surrender eligible offsets equal to their residual emissions. In addition, they must re-certify every year to ensure the Carbon Neutrality equation is applicable.

Where practical, ISO and IPCC standards or internationally recognized methodologies will be used as the basis for monitoring, reporting and assurance of emissions under the Carbon Neutrality Standard. With these Protocols as the starting point, the Government still needs to decide the methods available to entities in each sector for monitoring and estimating their emissions, and thus their obligations under the Carbon Neutrality Standard.

Once liable entities have monitored and estimated their emissions, they would need to report them to the Government before surrendering credits against the Carbon Neutrality Standard.

2.5.4 Data and reporting in the voluntary market

Emission factors set by the National Meteorological Institute and direct measurement factors will be used as the basis for monitoring, reporting and verification of emissions, when practical.

Transactions in a carbon market are based on the acceptance of a crediting threshold, which establishes the basis for issuing GHG credits. It justifies the need to evaluate the existence, pertinence, and sufficiency of data, as well as how it is processed. Considering that the Costa Rica

Carbon Market will be based on a voluntary model, the reliability of data, information and the MRV processes that follow are fundamental to maintaining confidence in market transactions.

Data and information generation should come from mitigation projects and programs with a sector, industrial, or domestic scope. For the latter there is a need to strengthen and develop the domestic GHG inventories as the main source of this data, with a view to supporting the baseline estimate, the mitigation potential estimate, the goals based on activities and mitigation actions, and the MRV processes.

In that regard, the challenge is to improve the methodologies that the IPCC has generated to estimate emission and GHG sequestering inventory. These are applied to obtain domestic and global estimates but are not necessarily the source from the sector perspective. Moreover, for some sectors or sub-sectors, these definitions are not sufficiently fine-tuned so as to be easily applied in generating data for mitigation projects and programs. Within this context, building historic emission data also takes on importance since the use of trends will be an alternative for mitigation baseline estimates or potential.

2.6 Development of methodologies and protocols

2.6.1 Rationale

Costa Rica recognizes that a sound MRV system is a critical market readiness component. Designing an MRV framework in Costa Rica's case involves its application to companies wishing to become Carbon Neutral, and to the supply of offsets.

In that regard, the Costa Rican Government recognizes that MRV must respond at both the project level and sector scope programs. In addition, it must respond to specific sector issues that will initially participate in the market and also be susceptible to adjustments for those sectors interested in joining at later stages and/or to include lessons learned.

The challenge of implementing an MRV system with alternate focuses is that the community involved in the discussions on climate change still has not defined the MRV characteristics that may be sector related, the characteristics that may be based on national GHG inventory measurements, the characteristics that may arise from baselines and mitigation or sequestration estimates at the project or program group level or at the industrial scale, and those MRVs based on ex-post estimates and based on activities and actions. These alternatives are going to be explored in next phase of PMR in the MRV design and implementation.

2.6.2 General criteria to guide MRV considerations

The goal of the MRV system is to allow the domestic regulator to monitor emissions and to ensure compliance with domestic policy goals and the regulations, standards and protocols established for the Costa Rican carbon market, and to provide confidence to market participants that emission reductions from the crediting baseline are real. Specifically it should:

- Establish clear standards and procedures that are nationally recognized and internationally audited (in the case of UCCs), for generating credits that are additional, permanent and real

- Respond to sub-sector, industrial, and specific product activity challenges

- Align with international standards and best practice. This will optimize the credibility of the Costa Rican Voluntary Carbon Market and also establish the possible links to the international market (in due course). Given that MRV standards and best practice at the international level are constantly evolving, Costa Rica recognizes that its domestic MRV framework will need to be flexible enough to accommodate this.

- Insure an expeditious, efficient, low cost system that matches the country's budget and institutional limitations as well as the financial implication for the private sector since such barriers may block quick adoption or become an obstacle that stops the development of some MRV components.

- Have the capacity to measure and monitor goals not related to GHG and the variance of that measurement from sector to sector. Consideration has been given to allowing the inclusion of smaller scale projects within the market. The measurements for these activities cannot be expressed in terms of GHG, but in units that reflect the performance of the sector, industry, or program involved. In some cases, goals may be composite indices that arise from a combination of GHG with production or population indicators, which adds new information to performance.

- Build on existing capacity

The design of an MRV system for a voluntary market in Costa Rica seeks, despite the uncertainty that surrounds the subject, procedures and methodologies that are applicable to the possible mitigation projects and programs that are applied based on internationally recognized standards. It is intended that this be carried out by independent parties who are recognized and accredited by the pertinent entities in the country as described in the earlier sections.

2.6.3 Recognition of international best practice

Costa Rica will seek to apply lessons learned from international best practice. The greatest experience in developing MRV framework comes from fulfilling the mitigation obligations for the countries in Annex I, using the Kyoto Protocol of the UNFCCC as well as GHG transactions among different countries, including those of non-Annex I countries. For example, MRV frameworks and methodologies have been developed under the Clean Development Mechanism (CDM) that may be used and adapted to develop mitigation projects and programs targeting voluntary markets.

The methodologies developed by the Verified Carbon Standard (VCS) may also be relevant since they are especially suitable for the land use sector (agriculture and forests). The methodologies developed by the Climate Action Reserve also may be used and adapted to develop carbon mitigation or sequestration projects and programs.[24]

The post-Kyoto market discussion has introduced the language of "sector mitigation goals" that may allow linking the GHG inventory methodologies with the baseline calculation and mitigation estimates. The IPCC guidelines allow for the development of domestic and global emission factors for GHG. As mentioned earlier, however, the default factors are not necessarily appropriate for sector emission inventories despite the fact that the IPCC guidelines establish methodologies that can be used at sector and subsector levels. Furthermore, new methodologies should be developed to address the need of sectors with established emission objectives that do not exactly match the IPCC sector categories.

2.7 Registry and tracking system

This section outlines the components and functions of the Costa Rican National Registry underpinning the Carbon Neutrality Standard and the supply of offsets.

2.7.1 Rationale

Costa Rica recognizes that a registry/tracking system is needed to ensure appropriate treatment and accounting of Carbon Neutral certification and emission reductions. A registry/tracking system also contributes to a country's assessment of its domestic implementation. The proposed GHG registry system involves its application for the carbon neutrality process described in Sections 2.2-2.4 above.

2.7.2 General criteria to guide registry considerations

The proposed registry/tracking platform will:

- Provide security and transparency
- Provide legal proof of credits and transactions
- Provide an accounting system with details about all credits
- Process the implicit compliance in transactions
- Be flexible enough to be configured using a voluntary domestic system that will start up the Costa Rican market towards a regulated system and with international links

[24] In addition to the VCS, two other studies about MRV systems have been analyzed: *Best Practices Guide: Monitoring, Evaluation, Reporting, Verification, and Certification of Climate Change Mitigation Projects* (USAID Office of Energy, the Environment, and Technology, 2000); along with the EPA guide: *Fundamentals of Successful Monitoring, Reporting, and Verification under a Cap-and-Trade Program* (John Schakenbach, Robert Vollaro, and Reynaldo Forte, 2006).

- Provide a source of centralized information in real time with solid processes; the registration system allows for the management the life cycle of a carbon credit from emission, verification, allocation of a unique identifier, and transparency through expiration.
- Register projects, credits that are issued, processes carried out and the stakeholders involved
- Follow-up all physical transfers
- Record all market participants and store detailed information about transactions

2.7.3 Registry features

The CCD is studying options for registry design and links to a technology platform. Access to the registry will be online to enable multiple registrations through a multi-standard interface. Features include:

- Automatic delivery of transactions
- Contributes to preparing the Carbon Market infrastructure
- Creates great carbon liquidity and efficiency
- Provides a tool to help manage a voluntary domestic market
- Provides a consolidated view of the market thanks to the Global Climate Portal
- Easily modified using Web Services
- Allows the addition of emission goals or ceilings
- The facilities may be easily moved from one operator to another in case of acquisitions or a change in owner
- Facilities to do mass loading using an XML file and extraction of Excel files
- General and detailed view of facility compliance
- A notification panel
- Standard reports in electronic format
- The registry administrator may decide which information is confidential

2.7.4 Registry components

The National Registry infrastructure will be divided into four components:

Projects Registry offers registration for those mitigation projects and programs that fulfill the eligibility criteria for issuing compensation units, and that have a numbering and verification process. It shall contain the basic data of each project participant, necessary for the identification and traceability of both the project and the UCC generated by it. The information contained in this record will include, among others,

- Project name.
- Project code
- Name of the developer or principal representative of the UCCs

- Other participants, co-holders of UCCs
- Type of project / methodology or protocol used
- Location
- UCC generation potential
- Crediting period
- Quantity of UCCs generated.

Transaction Registry will provide the follow-up to the exchange of compensation units and their status, validity, and expiration date. This registry will enable market participants to record their transactions and request the Carbon Board to transfer UCCs or cancel them. [25]

Qualified Carbon Technician (QCT) Registry is a list of accredited experts who offer validation and verification services for mitigation projects and compensation units. QCTs will be accredited using criteria established jointly with professional associations.

Participants' registry. This registry will list the companies or institutions that intend to become Carbon Neutral certified and that may offset their emissions using UCCs or other eligible offsets.

The registry would have multiple users, including but not limited to project developers, participants in the Carbon Neutrality program, brokers and the public, to hold, transfer and surrender UCCs and to access public information.

2.7.5 Options for the Management and Registration Project Management and Transactions

In all cases, the system will have the option to manage and administer records in-house or sub-contract a specialized entity. The table below summarizes the advantages and disadvantages identified for each case.

2.7.6 Administration

The Registry will be administered by MINAE, who will:

- Define the rules for project eligibility, and
- Define the goal allocation methods when needed and manage the new and existing standards to operate a voluntary market

The registry system will require steering committees, advisory committees and working groups to support its work in specific areas.

[25] Importantly, the registry will not track the trading of subsidiary instruments such as futures contracts or subsidiary interests that may be traded in relation to eligible credits.

	Management and Internal Administration	Outsourced Management and Administration
Advantages	With this option Carbon Board has control over its own record. Registration may be linked to the development and implementation of the project, ensuring that the UCC will be awarded automatically when the project completes its verification. The Carbon Board may also automate the UCC deduction linked to the reserve account. Keep management process to ensure the integrity of internal recording and the system.	Outsourcing experience could ease the cost and responsibility of the Carbon Board and its Secretariat. These costs could be charged to developers of projects or activities directly at the time of registration or inclusion. A record may be linked outsourced to the database system in the same way if handled and administered internally. An outsourced service can provide independence of the image and reinforce the message MDVCCR quality. A registration service provider can provide a service experience tailored to the needs of the system. A registration service provider can provide a service experience tailored to the needs of the system.
Disadvantages	An internal administration would be more expensive to have to be designed and implemented by the Carbon Board. This means developing the database and if applicable software, including security issues. The Carbon Board will be responsible for coordinating with other records, such as carbon neutrality, on their own. Internal administration will increase the workload of a small professional team.	The costs could represent a barrier, as existing and experienced third are located outside the region. A very close collaboration between the governing body and the third and close control of the governing body are essential conditions to prevent this affected the integrity of the system and registry.

Source: DCC 2012, proposal under review

2.8 International alignment – international third party audit process

This section introduces Costa Rica's proposal to achieve international alignment through an international third party audit process.

2.8.1 Rationale

Given the national imperative to achieve Carbon Neutrality by 2021, Costa Rica intends to meet the majority of its emissions abatement by domestic demand. However, the Government recognizes that the growth and development of international carbon markets may present linking opportunities for by extending the market for Costa Rica's abatement in the medium-term.

In the interim, Costa Rica intends to achieve international alignment of the Costa Rican carbon market through an international third party audit process of the proposed institutional

arrangements, procedures and protocols by which standards are set and adopted, including the standards for carbon neutrality and generation of offsets within Costa Rica for meet the goal of carbon neutrality at the enterprise level

2.8.2 General criteria to guide the International Third Party Audit Process

- Accountability
- Transparency
- Environmental integrity
- Economic efficiency

2.8.3 International Third Party Audit Process

The third party audit process may consider any of the following in the course of the review:

- The effectiveness and efficiency of the Domestic Carbon Market scheme as a whole, including administration costs for both scheme participants and government
- The effectiveness of emissions reporting and coverage by the scheme
- The effect of, and potential for, international linking
- Governance arrangements, including the responsibilities of the regulator and the responsible minister's power of direction
- Any other aspect of the scheme and its operation that MINAE asks to be reviewed.

In reaching its recommendations, the international third party audit would be expected to consider issues such as:

- Actual experience with the scheme
- International developments, including the extent to which commitments have been made by major trade partners or competitor countries on emissions abatement and the extent to which countries have introduced carbon constraints into their own economies
- Emerging developments in climate change science
- Improvements in technology.

2.9 Next steps requiring PMR support

The PMR can lend support to help develop and implement next areas:

Table 4. Activities on market infrastructure development and Demand Strengthening

Domestic market infrastructure
1) Design and implementation of the legal, institutional and economic framework
Design and implementation of the legal framework
Review, consultation and approval process of market creation decree
Review of the implications of the carbon market in existing legislation and necessary for the operation of the market.
Design business plan for the C Market Neutrality
Design and implementation of institutional arrangement
Design and Launch Campaign Marketing Campaign
International Accreditation and Auditing of Costa Rica System
2) Design and implementation of the registry and tracking system
Development and implementation of registries
Software and hardware
3) Generation of protocols and methodologies for offset programs and MRV
Identification of existing protocols and methodologies suitable for country mitigation programs
Development of protocols
4) Capacity building and social awareness
Generation capacity-developers
Generation capacity-experts-Professional Association
Generation capacity-market actors
Design and implementation of social awareness campaign
5) Pilot Project of the basic structure of market transactions and preliminary exercise with 5 companies (CHAMPIONS)
Strengthening of Demand
1) Design and implementation of strategy of policy options to promote the goal of C Neutrality
2) Implementation of Activities for demand creation
3) Outreach of activities on private sector for C Neutrality adoption
4) Sector base discussions on policy and instrument for C Neutral objective
5) Pilot Project of scaling up of offset program from experience with 5 champion companies

3 Mitigation potential by sectors and market suitability

3.1 General criteria to guide coverage considerations

Decisions on coverage have been guided by the following:

- GHG emission reduction potential. This is a natural criterion as it correlates directly with the potential volume of emission reductions or sequestration that can be achieved and transacted in the market. Calculating the emission reduction potential of the sector can be determined *top-down* based on long-term emission trajectories of sectors, or *bottom up*, considering available technologies and investment cycles.
- The availability of emissions data and acceptable methodologies for monitoring, reporting and verification (MRV). To establish the credibility of emission reductions, these must be stringently monitored and reported, and there is a need to create institutional capacities for data collection and verification.
- A desire to attract investment in low emissions technology, research development and commercialization by extending coverage as widely as possible
- Investment in new sub-sectors and activities. Access to strong MRV frameworks is the most desirable context for new sub-sectors and activities; yet sectors with limited MRV frameworks may participate in the market by agreeing on a lesser degree of accuracy of the reported emission reductions. MRV frameworks can be remedied to achieve this purpose though incurring in additional costs.
- Analyzing the managing feasibility and transaction costs present in the Costa Rican context.

This chapter presents a first approach of the expected mitigation potential of the five sectors included in the first phase of the operation of a domestic carbon market: Power Generation, Agriculture, Solid Waste, Transport, and Sustainable Construction.

The market suitability of these sectors will be fully assessed in the implementation phase of the PMR, but the first considerations are presented as an introduction for every sector.

3.2 Power generation sector

Considerations for further analysis about market participation

The power sector is an example of low emission strategies already in place in certain sectors of the Costa Rican economy, despite the fact they were not explicitly established as such at inception. The low emission concept has been implicit at the Costa Rica Electricity Institute (*Instituto Costarricense de Electricidad* -ICE) planning exercises, following an electric expansion path based mostly in renewable sources. ICE´s Electric Expansion Plan 2012-2024 aims at reducing the current installed thermal capacity from 21% to 13% by 2020, thus ensuring a 95% share of total power generation based on renewable sources.

However, planning in the electric sector faces multiple risks, including climate variability that affects energy expected from renewable sources. Additionally, large renewable projects in Costa Rica are confronting high social and environmental resistance that can delay or even threaten their effective implementation. In the case that these important barriers and menaces could not be removed, thermal projects appear as feasible options in terms of short-term investment and implementation possibilities.

In this sense, ICE and other utilities and power companies involved in the electric expansion plan could consider the domestic carbon market as an instrument to set incentives and emissions caps to meet the target on renewable sources mandated by the Energy National Policy and the National Development Plan.

Market support for renewable generation goals

Different scenarios can be built for the interaction between the electric power sector and the carbon market. For example, establishing a cap of 5% of the total for thermal generation with no carbon offsetting, and generation over this cap must be C-neutral electricity. (UCCs bought by ICE or ICE can buy energy from companies supplying C- neutral electricity.)

This cap could be adopted voluntarily by the sector or as a set of sector agreements and standards, or it can be mandatory in the future. The suitability of any of these approaches will be assessed in the PMR implementation phase as the multiple options to increase the demand for the domestic carbon market. Also the scheme should be considered and discussed by the power key stakeholders.

Another option for companies is to implement the sector program allowing suppliers of thermal over-the-cap electricity to offset the energy after the selling, by a pre-accorded buying of UCCs in the carbon market. The scheme does not require the company or the installation must be declared C-neutral in advance (but will limit its declaration of own offset activities), but will participate in the domestic market by acquiring UCCs, which are going to be transferred to ICE (dispatch center host) to accomplish the over-the-cap electricity offsetting.

An important point with the interaction between the electric power sector and the carbon market is ICE will count on a market instrument to incentivize the Non Conventional Renewal Source Plan. This plan defines as non-conventional sources those of up to 5 MW that are not included in the ICE's electrical expansion plan 2012-2024. The non-conventional will come from renewable sources with the stated goal of ensuring a 95% share of generation based on renewable energies by the displacement of thermal generation. The requisite of carbon neutrality for the over-the-cap electricity generation puts in similar conditions the overall feasibility of these non-conventional renewable sources, because renewable sources do not require offsetting their emissions, while it is cost thermal electricity should face in the over-the-cap generation.

Structure for the sector participation in the carbon market

The set up of the domestic carbon market at the power sector level can be conceived as the definition of a program established under a national policy for the sector as stated under the goal of ensuring 95% of renewable generation. The program will act as framework to define the mitigation activities can be recognized, and by following the offsetting rules approved for the program by the Carbon Board.

Utilities and power producers can be in the program when fitting the conditions for participation and in the moment they are ready, or in different stages during the period the program runs. This can make the validation process straight forward; provide a fast-track for the definition of protocols and methodologies for MRV; open a sector window for quitting procedures in the registry system, and make the financial, legal and organizational design and management easier, giving transparence, functionality and sustainability to the operational structure.

ICE as sector program manager

The program manager will be a key player for the operation of the program and the involvement in the carbon market. ICE has the technical, management and governance conditions to act as managing entity, and also has showed a clear interest to play a central role in the carbon market. ICE can register the umbrella program and other utilities and power producers can be added by presenting eligible projects. Obviously, other utilities can present their own programs.

As managing entity ICE would be granted with other responsibilities as bringing together the various financial, legal and institutional aspects in a coherent structure, assuring the program is working according to a business plan and a roadmap, securing carbon standard compliance, hiring relevant staff to assure the program management and technical assistance on carbon methodologies and procedures related to the domestic market and engaging in communication with the stakeholders to ensure effective program functioning based on clearly defined roles and responsibilities of each actor.

Monitoring and verification

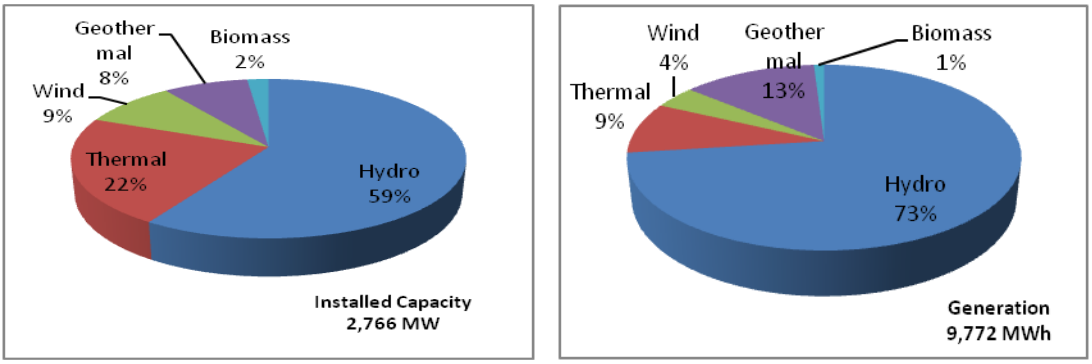
The methodologies and protocol are approved for the entire program by the Carbon Board, which ensures that the methodology provides correct guidance on how emission reductions are to be calculated and monitored for the power projects. All emission reductions generated under the program must be monitored and reported for verification, but the program can use methodologies focus on historic data or surveys on the monitoring process. Part of the advantages in the power sector is the energy generation is monitored by the ICE Production Unit providing a monitoring infrastructure and reducing the risk of leakages.

3.2.1 Rationale for focusing on the power generation sector

The National Development Plan 2011-2014 (NDP) indicates that energy demand is rising at a rate of between 5% and 6% annually. If this outlook remains the same, estimates are that in 20 years the installed capacity for energy generation must be doubled. In parallel, a decline has been occurring in the share of renewable electricity generation. Fossil fuel-based generation has significantly risen over the last decade, from 0.8% in 2004 to 7.4% in 2008 and 9% in 2011.

Costa Rica generated 91% of its electricity from renewable sources in 2011, which makes the sector already low in emissions. However, the increase in thermal energy in recent years (reaching 9% in 2011 from less than 1% in 2004) indicates that the country is vulnerable to increase generation from non-renewable sources.

Graph 2. Installed Capacity and Generation 2011



Source: Mayorga, 2012.

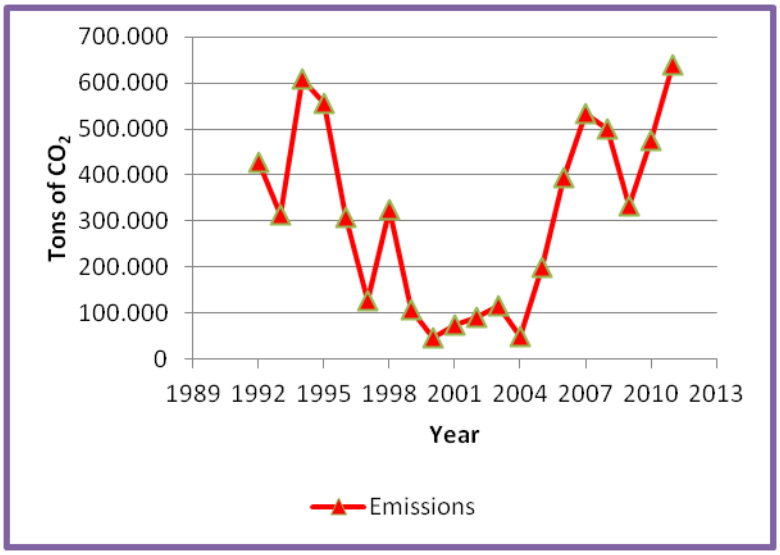
Maintaining this high rate of generation from renewable sources presents a set of new challenges: climate variability has caused longer periods of low water levels, which make it increasingly difficult to generate hydro-electricity, and the country has very few seasonal reservoirs for power generation in the dry season (demand peaks occur in this season); developing projects with multi-year regulation reservoirs has been difficult due to environmental considerations, and; there are legal barriers to developing projects, in particular geothermal, in certain Protected Wildlife Areas.

3.2.2 Historic and projected emission levels

The 2005 GHG national inventory shows that the energy sector represents 64% of the total net emissions (8,779 Gg CO_2e). The electric generation emissions, however, were just 233.5 Gg CO_2e, equivalent to 4% of the total GHG emissions. The emissions arising from hydroelectric and geothermal generation are equivalent of 20% of the total emissions, while they represent 85% of the electricity generation. In addition, thermal plants contribute 8% of the total generation and produce 80% of the GHG emissions.

The figure below shows the growth trend in thermal generation emissions in the last 16 years, only interrupted by the crisis in 2009.

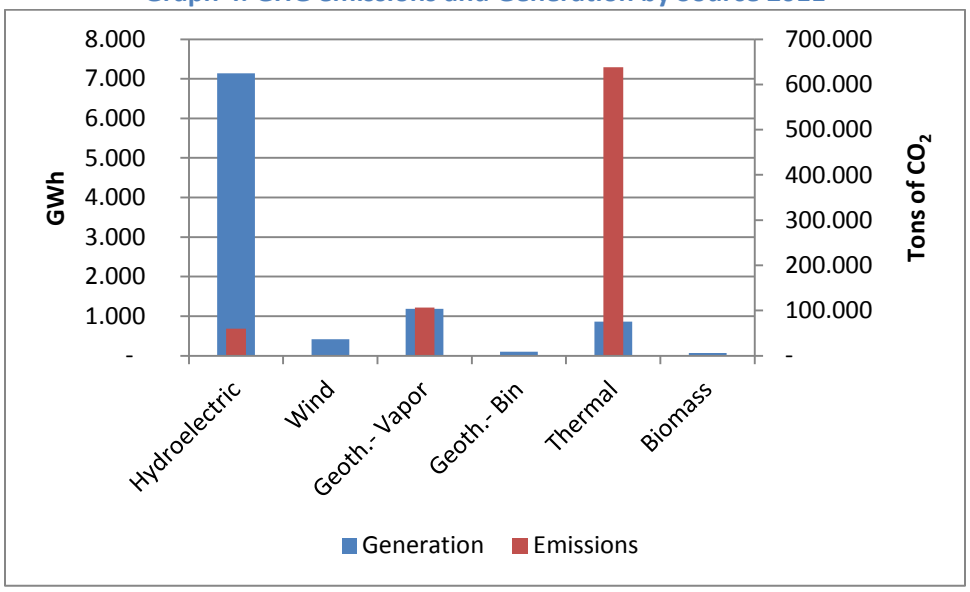
Graph 3. Historical variation of thermal plant emissions



Source: ICE based on CENCE data.

GHG emissions in the National Electricity System (NES) generation stage have been quantified since 2009. Figure 9 below shows total emissions of 805,000 tons of CO_2e. Seventy-three percent of the total energy produced is hydroelectric and it only produces 8% of the total emissions. Emissions from wind sources are zero (considering only direct emissions); however, they contribute 4.2% of the NES energy. Geothermal emissions are around 13% of the total, while producing 12% of total energy. The technology that produces the highest direct emissions is thermal with fossil fuels, representing 80% of total emissions.

Graph 4. GHG emissions and Generation by Source 2011



Source: Montero 2012.

3.2.3 Policy context pertaining the use of market instruments to reach low emissions development objectives

The power generation sector, through the Costa Rican Electricity Institute (*Instituto Costarricense de Electricidad* -ICE), has developed and adopted various policy instruments oriented toward generation with renewable resources to reduce GHG emissions. These instruments are depicted in the National Energy Plan, the Generation Expansion Plan 2012-2024, the Non Conventional Renewal Source Plan (PFRNC), and the Distributed Generation Pilot Plan. For the power generation sector, the interest in participating in the carbon market arises from the explicit mandate on renewable sources.

As seen previously, non-conventional sources are those of up to 5 MW that are not foreseen in ICE's Electrical Expansion Plan 2012-2024. The electricity sector seeks non-conventional sources predominantly from renewable sources, with the stated goal of ensuring a 95% share of generation based on renewable energies, thus displacing thermal generation.

3.2.4 Barriers for implementation of mitigation measures and use of market instruments

As identified by ICE, the promotion of non-conventional renewable sources of energy requires addressing barriers such as:

a. New non-conventional renewable sources in general have a greater cost-benefit in relation to traditional sources, especially because of technologies recently introduced to the market, or due to the investment-energy production ratio, that do not show the economies of scale for large conventional projects.

b. A tariff policy is needed to encourage investment in renewable sources.
c. An institutional framework is needed to encourage and foster generation with non-conventional renewable sources using different economic instruments.
d. The sources to generate electricity on the small and medium scale are generally held by the private sector.
e. There is a need for capacity building at the private sector stakeholder level and for the electrical sector entities for operating in a carbon market.
f. The costs of formulating carbon offset projects and inherent MRV processes in the carbon market deserve attention, since they could represent a financial barrier for small and micro operators.
g. One of the PFRNC's strategic actions is to create an appropriate setting to remove the regulatory and legal barriers that block the addition of non-conventional renewable sources.

3.2.5 Interaction with other policy instruments

- Large-scale, conventional renewable energy projects, as identified in ICE's Power Generation Plan 2012-2014, are vulnerable to major delays in execution arising from social and environmental barriers. These delays cause, in practice, the goals to increase generation with renewable sources to become difficult to meet.
- Along those lines, the integration of carbon market incentives in the PFRNC aims at attracting micro, small, and medium renewable projects along with private investment and public-private partnerships. Thus, options are increased for more diversification of renewable sources in the electric grid and greater diversification in the sources of financing.

3.2.6 Objective and scope of proposed sector mitigation program

The proposed sector mitigation program seeks to displace thermal generation with generation from non-conventional renewable sources. It includes a greater share of energy from small-scale hydro, solar, biomass, and wind in the national electricity system. It involves the PFRNC that creates the regulatory, institutional and technical conditions needed with a clear link to the domestic carbon market.

The program supports the national positioning and differentiation objectives that are looking for the sector to add value to domestic electric energy production and to advance energy efficiency and conservation. A more renewable energy grid that is low in GHG emissions will be a differentiation that will bring about international recognition and be an attraction for foreign investment. Moreover, a central objective related to energy security is to contribute to decreasing the dependency on fossil fuels along with lowering the impact of the oil bill on the balance of payments.

3.2.7 Approach for determination of mitigation potential

As per ICE's Electrical Expansion Plan 2012-2024, the planned capacity additions and total installed capacity are shown in the table below. It should be noted that the planned capacity additions in this plan seek to expand the installed capacity in order to meet the projected demand in the moderate scenario of that plan.

Taking into account that thermal generation has been variable in recent years, a simplified model of electric generation expansion was built, seeking to establish the average composition of the sources. For this, the structure of the average generation was studied for the last 6 years and the results are summarized in the following table. Thermal generation is equivalent to 7% on average.

Table 5. Structure of the average generation

Source	2006	2007	2008	2009	2010	2011	Average 2007-2011
Hydropower	76%	75%	78%	78%	76%	73%	**76%**
Geothermal	14%	14%	12%	13%	12%	13%	**13%**
Wind	3%	3%	2%	3%	4%	4%	**3%**
Biomass	1%	1%	1%	1%	2%	1%	**1%**
Thermal	6%	8%	7%	5%	7%	9%	**7%**
Total	100%	100%	100%	100%	100%	100%	**100%**

Source: Own elaboration with data from ICE

In order to estimate the expected emissions from thermal generation, the expected fuel used in this generation is calculated based on the information contained in the Electricity Expansion Plan. For conversion to CO_2, the conversion factors used for calculation are 0.0691 Gg CO_2 / TJ for Bunker and 0.0741858 Gg CO_2 / TJ for diesel.

3.2.8 Preliminary estimation of potential emissions reductions

With its PFRNC program, ICE seeks to guide and prioritize investments in renewable technologies and stimulate the development of non-conventional renewable sources that contribute to displace thermal generation. Assuming the PFRNC were conducive to reaching the goal of limiting the share of thermal generation at up to 5%, during the first year the program would reach 40% of the thermal displacement target, and 75% in its second year. According to this preliminary estimation, the average potential emission reductions are roughly 200.000 tons CO_2e per year.

3.2.9 Sector readiness activities to be carried on during PMR implementation phase

With the aim of advancing the low-emissions development objectives in the sector, a roadmap to enhance capacities for the prioritized GHG mitigation actions has been outlined in close coordination with ICE. ICE, through its Planning Directorate, leads its implementation.

PMR would support activities related to the in-depth assessment and design of sector offset programs (UCC supply generation for the domestic carbon market). Moreover, the PMR

Implementation phase will provide a platform for required coordination and consultation among ICE, MINAE (lead agency for implementation of the domestic market infrastructure), and other relevant sector agencies/stakeholders.

The following table summarizes the key activities of the referred roadmap. The specific activities for PMR support will be defined with the sector counterparts as part of ongoing consultations.

Table 6. Readiness Activities in Power Sector

Studies supporting the market participation of the sector
• Design and implementation of offset programs for the participation of the sector in the carbon market.
• Identification of priority projects to be promoted under the PFRNC and other power projects suitable for the offset sector program.
• Feasibility studies to estimate the total offset contribution from projects in the PFRNC and those suitable for the program.
Baseline methodologies and MRV protocols for UCC project activities in the sector
• Development of baseline study for grid-connected renewable energies, grid emission factors; protocols for periodic review of grid emission factors.
• Development/adjustment of UCC methodologies for baseline setting and calculation of emission reductions
• Development of MRV protocols for UCC renewable energies program/project activities, including protocols for the power market administrator
Institutional and capacity development for the implementation of the PFRNC
• Strengthening technical capabilities of ICE and other key institutional actors.
• Strengthening technical and institutional capabilities for tariff setting.
Stakeholder consultation processes
• Participatory process to inform sectors, assessing inputs, determine needs, etc.
Formulation of Sector Offset Program
• Integration of components set forth above and financial aspects for sector mitigation program

3.3 Agriculture and livestock sector

Considerations for further analysis about market participation

As the governing body in agriculture and livestock, the Ministry of Agriculture and Livestock (MAG) has defined the participation in the domestic carbon market with three sub-sectors: cattle because of the importance of its emissions, coffee as an important iconic export product, and sugar cane due to its environmental issues around the harvesting burning practices.

Agriculture and livestock must be considered as both a source and a reducer of GHG. The sector generates GHG through fertilizer use, manure generation and soil effect during the tilling activities. At the same time, forest and pasture cover and the soil protection in farms can sequester and

store GHG. By reducing fertilizer use, reducing methane from cattle activities and conservation practices maximizing sequestration and storage, the agriculture and livestock sector can be an integral piece of the domestic carbon market.

Another area where this sector can be involved is in the power generation in the Non Conventional Renewable Sources Plan or in generation of heat and power for self-consumption. Methane digestion technology that burns animal waste methane uses the heat to generate biomass electricity, meeting energy needs while destroying methane, and potentially the energy can be sold to the electricity grid as an extra flow of income for farmers.

Incentives for participation of the sector in the domestic carbon market

The adoption of an offset scheme in agriculture and livestock has to be evaluated as a set of strategies. One is the market incentive by the recognition of a price for carbon sequestration. The adoption of offset commitments should be initially by voluntary agreements and self-regulation. In this area MINAE can support the current initiative by building parameters of the GHG emission per production unit. This can act as an indicative cap. If the sector has this maximum limit as reference, the subsectors represented by agriculture and cattle products could engage in an internal trading to offset their emissions and meet the GHG emission per production unit. MINAE, MAG and farmer organizations can support this program by disseminating information and knowledge to achieve an easier adoption of self-regulation measures. Mandatory regulation could be assessed in the future in case voluntary agreements do not reach the emission caps.

Even though MAG can manage an overall program for the sector, an approach that could probably have a more effective scope is to divide the sector in separate programs engaging specific agriculture and livestock products. The specific programs would have a common basis, and the overall program from MAG can focus in these common work areas. The importance of the program approach is it reflects the current operation of the sector, where strong farmer organizations plan and implement policies and measures from MAG or from the areas of competence assigned to these organizations.

For example, the company Dos Pinos is a cooperative organization in milk and dairy products representing the most important and extended number of milk producers, processing about 80% of milk production in Costa Rica. Dos Pinos has committed to C- neutrality, and works in a voluntary initiative with its milk suppliers. Support from the Carbon Board can come by establishing a program for this product, in which farmers can start mitigation and offset programs or enroll in the future with a pre-established framework. This program can also be adopted by other dairy companies or by independent producers, but the program will establish the registry conditions, the methodologies and protocol, the MRV procedures and so on. Eventually this program should be the blueprint for mitigation actions for beef cattle.

The coffee sector is another example where an initiative of the Coffee Institute requires support to get the proper engagement of the coffee companies, generally consisting in cooperative

organizations covering farming and milling processes and with a large number of producers. The sugar cane production has several similarities, but maybe some particularities of their organization also require a tailor-made offsetting program.

Sector program manager

Unlike the power sector, the agriculture and livestock sector has a higher dispersion of actors. The program manager is a key player in the involvement in the carbon market demanding technical and management conditions for organization to act as managing entities. MAG had a previous experience when the National Bank of Costa Rica announced the voluntary commitment to offset their emission to reach the C-neutrality by purchasing offsets from agriculture and livestock. MAG identified their legal limitations to act as a trading organization, requiring the support from NGOs or other external entities by the specific contractual relationship.

Monitoring and verification

The Carbon Board approves the methodologies and protocol for every subsector program, and an overall program approved by MAG for sector baselines will also possibly be required.

3.3.1 Rationale for focusing on the agriculture and livestock sector

Costa Rica has a relatively modern and developed set of environmental norms. The country still faces the challenge of integrating production activities with environmental considerations and the intelligent use of natural resources.

Approximately 40% of the national territory is used for agriculture and livestock, of which 23.4% is dedicated to livestock and the remaining 16.6%, is dedicated to agricultural production. Some 15.6% of the herd is for dairy, 58.2% consists of beef cattle, and 26.2% serve dual purpose (dairy and beef).

MAG has prioritized three products in the sector for the purposes of promoting participation in the carbon market: cattle, coffee, and sugar cane. The choice of livestock is justified because it is the product that generates the most emissions in the sector. Coffee is a very important product within the country's export supply; the coffee producer association has announced its interest in participating in the carbon neutrality program. Sugar cane is a relevant crop due to the size of the planted area and environmental sensitivity around the burning practices while it is harvested.

According to the Project *'Support for the Preparation of Low-Emissions, Climate Resilient Development Strategies'* (UNDP-CINPE, 2012) ", for 2010, the sugar business reported an aggregate value of $30.946 billion, which represented a 17.9% increase in relation to the previous year (SEPSA-MAG, 2011). Meanwhile the value of its exports came to US $81 million (in 2010) after growing by 192.3% in relation to 2009. The figure paid for 174,530 metric tons showed a 137.8% increase (inter-annual variance from 2009 to 2010). Likewise on the other hand, this project reports that, according to the data provided by ICAFE, the coffee sub-sector generated 2.72% of

the country's total export revenue in 2010 and 11.77% of the total foreign currency generated by the agricultural / livestock sector, including fishing. Coffee production represented 14.5% of the agricultural GDP in 2010, and 9.02% of GDP.

3.3.2 Historic and projected emission levels

Agriculture/livestock represents 37% of Costa Rica's total GHG emissions. These are generated by five sources: a) livestock, b) rice crops, c) burning pastures, d) burning agricultural waste in the field, and e) agricultural soils.[26] Methane (CH4) is approximately 90% of the emissions in the sector, and is generated by cattle due to enteric fermentation in digestion. The second gas in importance is nitrous oxide (N20) as the result of nitrogen-laden fertilizers used for coffee and pastures.

There is partial evidence of a trend, which has still not been quantified, that nitrous oxide emissions have dropped in the last several years due to the increase in the international price of fertilizers.[27] It is assumed that producers, in line with the need to maintain competitiveness in their products, have reduced the use of production inputs in general, and especially fertilizers. Conservatively speaking, it is estimated that the reduction in emissions may have been 15% in relation to emissions in 2005, but this needs further analysis and quantification.

3.3.3 Policy context pertaining the use of market instruments to reach low emissions development objectives

The '*Action Plan for Climate Change and Agro-Environmental Management 2011-2014*' of the Ministry of Agriculture and Livestock (MAG) proposes mitigating actions with technical options that reduce the release of GHG and capture and retain carbon on farms. In this strategy, C-neutrality is viewed as an element of differentiation between the agricultural/livestock products due to the highly technical value added contained in them.

In addition, MAG proposes payment for environmental services for sustainable production as a climate change mitigation and adaptation strategy. Sustainable production initiatives with an ecosystem approach will be encouraged by taking advantage of the PES.

3.3.4 Barriers for implementation of mitigation measures and use of market instruments

MAG representatives and other public and private sector stakeholders have highlighted the following key barriers:

- *Resistance to change and emphasis on immediate costs:* The producers' skepticism in relation to new production practices that mitigate GHGs is a recognized barrier. The

[26] MINAE. IMN (2009) Inventario nacional de emisiones de gases de efecto invernadero y de absorción de carbono en Costa Rica en el 2000 y 2005.
[27] Dr. Johnny Montenegro, MAG, personal communication, March 26, 2012

practices that these producers have adopted date back decades (i.e., people who have used fertilizers for years resist the suggestion of using lower amounts or that changing fertilizers may bring about a benefit). For many, the national mitigation objectives and commitments that the country has made internationally are too far removed from their daily practices. The awareness of the benefits of accurate agriculture with good environmental management is on the rise. But for some people, mitigation is seen as an imposition from outside that increases the operating costs without necessarily increasing the economic benefits.[28]

- *Limited public resources:* The lack of financial resources has limited the effective implementation of some laws and programs related to sustainable agriculture based on a model that provides incentives to the producers, such as recognition for their environmental services. The scarcity of public funds may also affect the implementation of future mitigation measures based on a "payment" model for producers, such that they have to develop other financial plans that do not go beyond the public coffers.

- *The lack of a GHG emissions reporting system for the private sector:* An information system has yet to be developed to monitor emissions from the production sector. This is a stumbling block for recording of the emission trends, not just nationally but for the main agricultural / livestock sub-sectors.

- To face these barriers, a suggestion has been brought up to create a new coordination platform among the sector's stakeholders, to be specific in sector goals and participation, rationing the financial resources, measuring the co-benefits, increasing the effect of a "practical demonstration" and creating a culture among farmers of data recording and reporting.

3.3.5 Interaction with other policy instruments

For the time being, the government has chosen voluntary market instruments instead of a mandatory compliance policy with a sector ceiling that would require emissions to be reduced. The basis for choosing a carbon market as a low emission development strategy is to create an incentive so companies are able to view carbon footprint reduction as a genuine business opportunity.

There are links between a market instrument that stimulates adoption of sustainable agricultural practices, on the one hand, and generating co-benefits, on the other hand. Water resources are key to other production sectors, in particular the energy sector. MAG and ICE, given their high technical capacity and their common interest in water resources, are in a good position to explore a joint strategy to protect this strategic resource for the country that would be threatened under a

[28] Stakeholder consultation process for MRP.

drought-driven climatic scenario. Droughts would affect the producers in the agricultural / livestock sector and the ICE generating plants.

3.3.6 Objective and scope of proposed sector mitigation program

- The Ministry of Agriculture and Livestock has established three activities as a priority for the design of a (nation-wide) sector mitigation program: cattle (dairy and meat), coffee and sugarcane. Livestock is the largest source of emissions within the sector. Coffee is a prime export product of the country; the coffee producer association has announced its interest to participate in the carbon neutrality program. Sugarcane is critical because of the total size of sugar cane plantations in the country and environmental sensitivity around current harvesting practices.

- The sector program includes improving livestock grazing, cattle productivity improvement, reduction of NO_2, and reforestation of pastures. In the coffee activity, actions are proposed in cultivation and milling processes. In sugarcane, the actions focus is on reducing the use of NO_2.

- The proposal in the agriculture sector aims at strengthening the design and implementation of the priority mitigation activities proposed by MAG, in particular in regards to generation and management of GHG data relevant for the estimation of GHG emissions and carbon sequestration, reporting protocols at activity level, and overall the design of a MRV system.

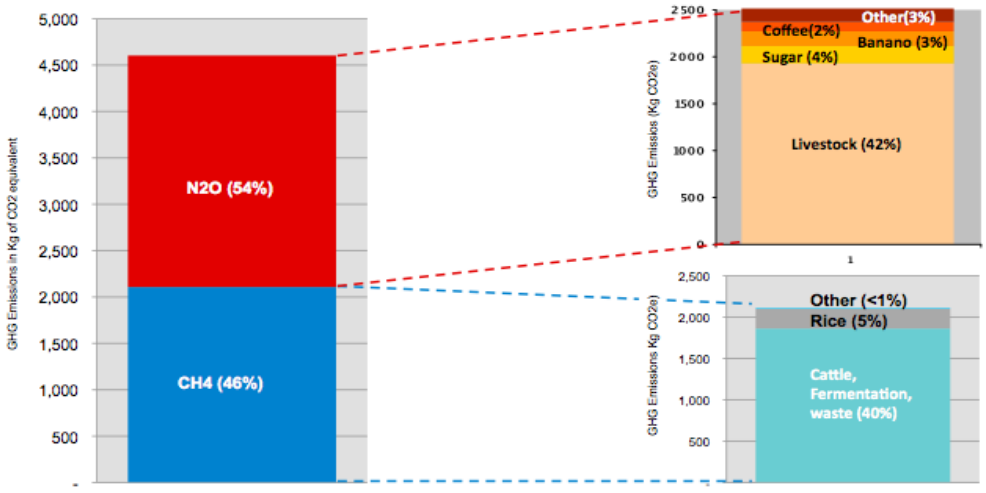
3.3.7 Mitigation options and potential

According to IMN (2009) and Montenegro (2010), the annual GHG emissions from the agriculture and livestock sector are 4.6 million tons CO_2e. Out of this sector total, 54% are N_2O emission and 46% are CH_4 emissions. Activities related to cattle management are attributed 42% of the total N_2O emission and 40% of the total CH_4 emissions.

The project UNDP-CINPE (2012) has assessed the next prioritized mitigation measures:

- The identified mitigation activities in livestock are: agro-pastoral improvements, with the goal of reducing methane from cattle farms and increase the area of improved pastures and adjusting grazing cycles depending on forage availability and nutritional quality. Furthermore, the reduction of fertilizer uses in order to reduce nitrous oxide emissions. The challenge is to explore new sources of fertilizer and application forms so as to reduce emissions without reducing pasture quality and adversely affect milk production. Finally, to promote reforestation the program will implement a mechanism for environmental services applicable on farms.

Graph 5. Composition of GHG Emissions from Agriculture and Livestock



Source: IMN (2009) and Montenegro (2010)

- In coffee production, both shade coffee and coffee without shade. Mitigation options are discussed in the production and processing stages. The study proposes the reduction of nitrogen fertilization, phosphorus, potassium, magnesium and boron to be applied to a plantation in production to meet the nutritional needs of the crop. The study also discusses methods of fertilizer application and adjustment according to the absorption capacity of the culture, as well as various stages of reduction in the amount of fertilizer applied. In coffee milling, mitigation activities include improved practices to reduce water use, wastewater treatment, energy use for combustion and use of solid waste for composting.

- Emissions from sugarcane soils are associated with agricultural field burning of agricultural residues. However, analysis of mitigation options focusing on nitrous oxide emissions, which are generated in the cane, fields as a result of nitrogen fertilization process. The proposal focuses on the mitigation option in the agricultural phase through controlled release fertilizer nitrogen and other actions to improve carbon cycle.

The NEEDS assessment estimated the GHG emission reductions through similar measures to those presented in livestock, such as improved pasture systems, pasture management, and reducing fertilizer use, resulting in a potential mitigation annual average of 400,000 tons of CO_2e.

3.3.8 Readiness activities for the PMR implementation phase

MAG and MINAE have begun the identification of mitigation potential under the Project *'Support for the Preparation of Low-Emissions, Climate Resilient Development Strategies'* (UNDP-CINPE, 2012).

The results of this research allow identifying the potential of specific mitigation actions, but in the three covered sub-sectors (livestock, coffee and sugar cane) relevant gaps have been identified as

to be able to design an offset program. These gaps are related specially to data availability and quality, which leads to conclude that a first step for formulating an offset program is to develop reliable data.

The next table summarizes the key activities of the referred roadmap. The specific activities for PMR support will be defined with the sector counterparts as part of ongoing consultations.

Table 7. Readiness Activities in Agriculture and Livestock

Studies supporting the market participation of the sector
• Design and implementation of offset programs leading to the participation of the sector in the carbon market, with definition of geographical scope, number of farmers to include and activities of offset of CO_2.
• Definition of a roadmap to follow by the agriculture and livestock sector to implement the offset program
Improving GHG data generation and management in the sector
• Development of protocols and methodologies to be applied for calculating of CO_2e emissions and sequestration in livestock, coffee and sugar cane
• Determine amount of CO_2 captured in sustainable production projects developed from 2008 to 2011, as a tap of the database available within this MAG program.
• Development of MRV protocols for UCC from the sector with rolls, functions, responsibilities and stakeholders accountable for
• Studies an fieldwork to estimate emission factors in agricultural sector
• Case studies (coffee two cases: a cooperative and a micro-mill; cane case; livestock two cases).
Institutional, capacity building and social awareness
• Strengthening of the technical, legal, administrative and financial bodies in MAG and other key actors
• Technical training to potential leaders and producer organizations
• Systematization and exchange of experiences in mitigation and CO2 capture
• Technical training for the implementation and sustain of the MRV system
• Designing marketing strategy for positioning the scheme nationally
• Socialization of the topic and consultation to organizations of producers
Process of consultation with stakeholders
• Participatory process to inform sectors, assess inputs, determine needs, identify barriers, etc.
Formulation Sector Mitigation Program
• Integration of above components and financial aspects for sector offset program

3.4 The solid waste management sector

Considerations for further analysis about market participation

According to the study "Mitigation Potential in the Field of Ordinary Solid Waste" (CYMA-GIZ) [29], the solid waste management sector represents 17% of total country emissions, and even the current annual growth in waste generation would result in emissions of 1.07 million tCO_2e in 2021. C-neutrality for the sector in the long run is possible if the country adopts advanced technologies and their broader application.

Achieving long-term neutrality involves implementing a program to consider, in a coordinated way, the wide application of advanced technologies already available in the country and some technologies adopted in developed countries. This will also imply a significant involvement of all stakeholders and a profound conversion of the solid waste management sub-sector, in the long term, towards a model similar to that in developed countries. Also, this requires preparation and accompaniment to overcome barriers in the institutional, technical, legal and administrative aspects. The strategy would entail a correct design in economic incentives, financial support, information base, monitoring, training, awareness and external support in terms of technology transfer and adaptation as well as technical advice.

Incentives for participation of the sector in the domestic carbon market

The adoption of an offset scheme in the solid waste management would most likely be based on mandatory regulations rather than voluntary agreements or self-regulation. Again, the set of policy options will be assessed on the implementation phase of the PMR. The active uptake and offset of methane emissions from landfills should be a mandatory policy. This means landfills should be able to transfer the cost to municipalities, which are the entities that collect waste, and municipalities would have to improve their ability to transfer costs to businesses and residence areas from collection services. This would also be linked to the adaptation of the regulatory framework to allow increased rates of collection and disposal of waste, and be able to cover a portion of the high costs associated with a low-emission disposal.

Work should be developed in parallel with the adaptation of the regulatory framework to facilitate electricity generation with the captured methane gas from landfills, simplifying procedures and ensuring adequate tariffs for sale of electricity.

The enforcement of active uptake and offsetting of methane in landfills should also allow recognition of GHG reduction and offset of emissions from the source of waste. This means that actions like recycling, composting and waste reduction can be recognized as offsets and there would be incentives for actors to evaluate the cost of paying for the capture and disposal of greenhouse gases in landfills or reducing GHG from the early stages of the chain waste production.

[29] In January 2012 the CYMA program published the study "Mitigation Potential in the Field of Ordinary Solid Waste", supported by GIZ. This study, and consultant Mr. Jan Jansen were invaluable inputs to this MRP.

This scheme means the Carbon Board should entitle a program to recognize offsets not only from the methane capture and use in power generation, but also from recycling and composting. It is also important here to implement an umbrella program enrolling actors when the market suitability is present, because not only do the landfills managers (some municipalities) have different capacities to engage in this scheme, but at the level of municipalities there is an uneven capacity to improve collection, recycling and ensure and enforce the payment of collection fees.

In this sense the sector has advanced in issuing relevant policies and legal framework. The National Policy for Integrated Waste Management 2010-2021 has been issued by the Ministry of Health. Also, the Law for Integrated Waste Management No. 8839 has been issued, requiring the inclusion of integrated solid waste as part of the measures for mitigating and reducing the effects of climate change, by applying technologies for the treatment, recovery and disposal of waste.

Sector program manager

This sector presents a profound dispersion of actors, which also show important weaknesses. The Ministry of Health can be an important technical and organizational support for the overall system, but is should have a profound institutional and legal arrangement to act as a program manager. Additionally, municipalities have a complex set of roles as to be seen as the right entities to accomplish the management of the multiple commitments that the program involves.

In this case, possibly the sector needs support to implement a scheme of public-private partnerships between public related entities with NGOs or industrial organizations with the technical, management and governance profile allowing them to act as program manager closely working with the Ministry of Health and municipalities, through protocols and special regulation.

Monitoring and verification

The Carbon Board can approve the methodologies and protocol for the sector program, and should consider not only capture and use of methane, but also recycling, composting and advanced technologies.

3.4.1 Historic and projected emission levels

According to the Study Mitigation Potential in the Field of Ordinary Solid Waste (CYMA-GIZ), the SWM sub-sector emits approximately 0.94 million tCO_2e and represents the largest source of GHG in the waste sector. This estimate refers to net emissions (i.e. it considers the emissions avoided by recycling materials). The main drivers in emissions are:

- The disposal of OSM, i.e., emissions of methane gas at landfills and dumps: Approximately 1.08 million tCO_2e.
- Recycling activities emit 0.07 million tCO_2e and avoid 0.21 million tCO_2e (recycling as a GHG sink; energy savings in recycled material compared to raw material processing), resulting in net emissions of -0.14 tCO_2e.

In 2012, the waste management sector, according to the IPCC definition, is causing projected emissions of 1.67 million tCO_2e. The RSW sub-sector represents 56% of sector emissions and 9.5% of domestic emissions from estimates of 9.94 million tCO2e according to the model used for these scenarios. The basis for the estimates involves data of different qualities and different soundness and will need an effort to improve the information about waste flow and quantities.

The business-as-usual scenario or the RSW sub-sector baseline, assuming, on the one hand, that the country does not take any additional mitigation measures, and, on the other hand, a 1.5% annual growth in waste generation would result in emissions of 1.07 million tCO_2e in 2021 and 1.27 million tCO_2e in 2032. Taking the projections that have been made for 2021 and 2032, the chart below shows an approximation of the expected trend in CO_2 emissions from the sector.

3.4.2 Context of the policy to use market instruments to reach the mitigation goal.

The approval of the Integral Waste Management Law (Law 8839) in 2010, places the country within a scenario involving greater challenges, but it also provides more opportunities related to responsibility definition, management principles, and stakeholder articulation. As a complement to implementing the law, there is a need to provide incentives for alternative businesses to take advantage of this type of waste and raise the awareness of the population about appropriate integral management practices.

The Ministry of Health, as the governing body for the Solid Waste Sector, has made a significant improvement to the conceptual and legal/standard-setting framework over the last several years to establish a modern and adequate Integral Solid Waste Management system with the support of the 'Competitividad y Medio Ambiente' (CYMA) Program of the German Agency for International Cooperation (GIZ). This framework (still under development and in different stages of implementation) represents a favorable sign in general terms to define a sector-wide GHG mitigation program, including participation in the carbon market.

3.4.3 Barriers to policy alignment with market instruments

Some of the barriers for implementation are the following:

- Current lack of awareness and little involvement by many of the stakeholders in the envisioned mitigation program. The program needs a participatory process related to information, inquiries, and validation to develop a sector wide GHG mitigation program.

- The database and information to design and implement the sector mitigation program and for the Monitoring, Reporting, and Verification (MRV) system are weak. With the development of the MRV system for the program, training and backing program needs to be put in place for the Ministry of Health and the key stakeholders in adopting and executing the MRV and information systems.

- Capacities need to be created for the Ministry of Health and other key institutional stakeholders to develop and run the anticipated mitigation program. An evaluation is needed

for the actions to date and to identify the institutional development needs. Coordination and allocation of responsibilities and functions need to be strengthened for the institutions involved in the program.

- Current conceptual, legal, and administrative framework for the Integral Waste Management (IWM) is not focused on climate change. This framework needs to be adapted and complemented, including the creation of private sector incentives and/or obligations.

- Requirements of awareness and information for the sectors of society. The existing campaigns and initiatives about mitigation within the SWM need to be mainstreamed.

- There is a lack of integration and coordination among the key stakeholders to implement the mitigation program. Alliances with the key stakeholders need articulation, integration, coordination, and training: private sector, public institutions, NGOs, academy and other sectors.

- High costs are associated with investment in infrastructure, technologies and operating costs, while there are low collection and disposal fees for IWM service. The sector needs: the regulatory framework to allow collection and disposal fees to be adapted, promotion related to lines of credit for investment in mitigation technologies, existing economic incentives for private investment and mobilization of external support and international aid.

- Barriers in the technical field: Some of the technologies to be implemented still have not been fully applied in the country, involve technological and economic risks or lack in cooperation between the academy and private sector. Support is needed to transfer technologies that have been approved internationally.

3.4.4 Interaction with other policy instruments

Faced with the barriers to implementing market instruments, the diversity of the stakeholders and their interests, and the mitigation cost, there is some doubt about whether merely introducing the market mechanism will be able to ensure that the mitigation goals are reached. Consequently, a combination of instruments is recommended:

- An active capture mandate in the sanitary landfills based on a size to be defined.
- Adaptation of the regulatory framework to make it possible to increase collection and disposal fees so they cover part of the high costs of final disposal with reduced emissions.
- Adaptation of the regulatory framework to facilitate electrical generation with methane gas captured at the sanitary landfills, i.e., simplification of the procedures and fees adjusted for the sale of the generated electricity.
- Financial compensation using market instruments to increase recycling.
- More demanding follow-up on the obligation that the municipalities have to implement separated collection.

- Analysis of the options for implementing the principle of “extended producer responsibility (EPR)” in relation to recyclable materials, e.g., packaging and wrappers.
- Encourage demand for the compost that is produced.
- Incentives through development funds for technological adaptation.
- Analysis of the possibility of forcing the stakeholders in the sector to apply technologies and to adapt the collection fees so they cover part of the high cost of applying technologies; the relevant adaptation of the regulatory framework.

3.4.5 Objective and scope of proposed sector program

The mitigation program focuses on ordinary solid waste and includes several technical options to be implemented together, beginning with the capture and use of methane gas in landfills. A second treatment technology is recycling waste, which already contributes to GHG mitigation in the waste sector and represents a GHG sink so increased recycling rates lead to significant additional mitigation. As the third treatment technology, is the composting of organic waste. In the medium to long term technology poses a profound conversion of integrated solid waste management and a transition to advanced treatment technologies in landfills.

3.4.6 Approach for determination of mitigation potential[30]

The baseline estimate of GHG emissions and the mitigation potential in the Solid Waste Management sector was supported by the GIZ in Costa Rica, which in early 2012 ended the Program Competitiveness and Environment (CYMA), which produced significant results in 2010 for the sector as the National Policy for Waste Management 2010 to 2021 for the Ministry of Health; the Law for Integrated Waste Management (No. 8839), and the Costa Rica Plan of Solid Waste, as well as various regulations and technical guidelines.

In January 2012 the CYMA program produced the study *Mitigation Potential in the Sector of Ordinary Solid Waste*. This study followed a methodology that consisted, among other things, in the compilation and updating of information on the status of the Integrated Solid Waste Management Program in Costa Rica, the review of the reports like "Projections of Generation and Solid Waste Composition Ordinary Type household and Commercial Costa Rica" and "The National Information System on Waste Management". The estimates are based on the use of a tool called Calculator SWM-GHG which was developed on behalf of GIZ and KfW. This tool aims to understand the effects of proper waste management on GHG emissions. The calculator allows quantification and comparison of different waste management strategies, even if the information is not all available, providing the necessary parameters.

For the baseline scenario the calculator provides a projection of future emissions from the SWM subsector, assuming the country does not take additional mitigation measures and a growth of 1.5% in waste generation.

3.4.7 Preliminary estimation of potential emission reductions

The proposed mitigation program with features and assumptions offers a mitigation of about 480,000 tCO_2e per year on average, which is proposed as a preliminary mitigation goal. The SWM subsector provides even more mitigation potential, which could be exploited through the implementation of some advanced technologies and a broader application of these technologies. Thus the sub could become long term, in a neutral field in GHG emissions, offering a long term mitigation potential of up to 940,000 tCO_2e.

The proposed mitigation program in the subsector of SWM with its four main technical strategies and their mitigation potential is described below. It is a comprehensive and long-term program with significant interrelationships and interdependencies between the individual technical strategies. Thus the total mitigation does not constitute the sum of the parts; but the mitigation of each independent technology mentioned below.

Technical Strategy 1: Capture and destruction of methane gas in landfills, in feasible cases complemented by the energy use of methane gas. The most important mitigation strategy in the short and medium term is the active uptake and destruction with high efficiency (conversion to carbon dioxide) of methane gas in the three or four largest landfills, complemented by the use of gas for power generation or thermal use in profitable cases. The estimated mitigation potential of this strategy is about 200,000 tCO_2e per year on average.

Technical Strategy 2: Recovery (recycling) of materials such as plastics, paper / cardboard, metal and glass. The estimated mitigation potential of this strategy is about 80,000 tCO_2e per year on average.

Technical Strategy 3: Composting and bio-digestion of organic waste (waste from agricultural fairs, parks, gardens and facilities such as restaurants, shopping centers and hospitals). This organic waste can be relatively easily collected separated, and treated properly. The estimated mitigation potential of this strategy is about 100,000 tCO_2e per year on average.

Technical Strategy 4: Evaluation and implementation of advanced treatment and solid waste energy recovery for a transition to advanced technologies, allowing a radical reduction of the landfill deposited waste volume, and the use of the dry fraction of waste as energy. The estimated mitigation potential of implementing the biological stabilization is about 100,000 tCO_2e per year on average.

The study by GIZ builds three scenarios: mitigation moderate scenario (Scenario 1), optimistic scenario of mitigation (Scenario 2) and the optimistic scenario of mitigation with application of advanced technologies (Scenario 3).

As seen in the chart below, in the optimistic mitigation scenario, the emissions level is down to 400,000 tCO_2e a year. This means a net reduction of emissions by about 57% or about 540,000 tCO_2e a year compared to the reference scenario. When the composting or digestion (parks and

gardens waste or organic fraction of overall RSO) strategy is introduced in the optimistic scenario, the sum of the estimated mitigation potential is around 480,000 tCO_2e per year on average.

3.4.8 Readiness activities for the PMR implementation phase

According to the consultant Jan Jansen, who is the technical advisor for this report in behalf of GIZ and has been advisor for the CYMA program, the selection and combination of strategies are examples and are based on a number of assumptions, for example, regarding the efficiency of the technologies and the percentage of RSO that would be treated by a certain treatment. Each presents different potential strategies for mitigation, specific mitigation costs, benefits to GIRS objectives, co-benefits and possible barriers, influencing the prioritization, plus there are interdependencies between them.

So the formulation of an offset program requires a more in-depth analysis of these technical strategies to define the individual and joint scope, considering the interdependence between each other and the interrelationships between them within the framework of an integral program. Also the program needs a more profound analysis of the current waste flow to develop and implement a database and a waste-flow simulation system. A protocol needs to be developed to apply methodologies that support the baseline design, potential mitigation, and an MRV system.

The next table summarizes the key activities to follow a roadmap for the sector and arrive at an offset program. The specific activities for PMR support will be defined with the sector counterparts as part of ongoing consultations.

Table 8. Readiness Activities in Solid Waste Management Sector

Studies supporting the market participation of the sector
• Design and implementation of offset programs leading to the participation of the sector in the carbon market.
• Analysis to define scope, necessary infrastructure, technology and other necessities related to methane capture and use, waste recovery (recycling), composting and bio-digestion and advanced treatment technologies for waste management.
• Identification, design and implementation of a medium-and long-term strategy to transition to advanced waste treatment technologies, with definition of scope and boundaries.
Improving GHG data generation and management in the sector
• Develop, improve and implement a database system simulation and waste streams. Strengthening of information system of the Ministry of Health for GIRS. Protocol for Development of methodologies. Development of an MRV system.
Institutional, capacity building and social awareness
• Conduct training and support program for the Ministry of Health and key stakeholders in the adoption and implementation of an MRV and information systems.
• Strengthening of the technical, legal, administrative and financial aspects of the Ministry of Health and other key institutional actors and processes of institutional and sector coordination.

• Development of a methodology for aligning GIRS municipal plans according to mitigation needs and implications at the municipal level.
• Supporting actions building and strengthening partnerships with the private sector and organizations that contributes to the aspects of mitigation program.
Process of consultation with stakeholders
• Participatory process to inform sectors, assess inputs, determine needs, identify barriers, etc.
Formulation Sector Mitigation Program
• Integration of above components and financial aspects for the sector offset program

3.5 The transport sector

Considerations for further analysis about market participation

The CDM pipeline report indicates the expected CERs until 2012 from CDM projects in each sector. The transport sector represents only a 0.3% share in the total of projects[31], while renewable projects are at the top with 35% participation. This indicates that transport has not been an attractive or feasible source of projects in the carbon market. In contrast, a recent study "Accessing International Financing for Climate Change" (GEF, 2012), states that according to the characteristics of multilateral and bilateral financing sources, transport represents 34% of the financing allocation, while energy (including renewable energy and energy efficiency) has the highest share of 47%.

These examples illustrate the difficulty of the carbon market to generate a transition of the transport sector to a clean technology pattern. The UCC will be a market incentive, but only if run alongside compulsory policies to adopt: a modern and organized public transport system; voluntary efficiency standards; regulation on road driving cost; taxes, insurance costs and measures encouraging public transport use; non motorized alternatives and use of biofuels; electric transportation; and low consumption light vehicles.

This approach of using a market instrument like the UCC, accompanied by a strong body of policies, regulations and standards encouraging a shift for low carbon transport, recognizes that carbon market prices are always going to be insufficient to lead a major transformation in car purchasing and use habits or to provide core financing for public transport modernization.

The participation of transport in the carbon market will make sense only after the country can define a comprehensive plan to implement a public bus system, a strategy for biofuels, gas and electric cars, and the transformation of the existing train system to one based on electric power integrated with the bus system.

[31] http://www.cdmpipeline.org

The reason this comprehensive policy definition is prerequisite to understanding the financial impact of the carbon market is because it is necessary the design of a financial architecture considering the several sources to be identified and the respective plans of how to access each. Only after designing this financial structure, can the income flows from the carbon market be understood as complementary sources, and not as foundations to cover the gaps and achieve a profitable transport transformation. These gaps, if existing, should be covered by government subsidies or by redesigning the planned system, but never they should be used to estimate the required carbon price of the offsets coming from the sector. This is because on this basis the sector would hardly have market suitability, despite the fact that the amount of UCCs can be significant and that at market price these could mean an important financing source.

Incentives for participation of the sector in the domestic carbon market

The generation of offsets in the transport sector is hardly going to come purely from carbon market incentives.

When the strong body of policies, regulations and standards mentioned is in place, the result will be offset generation in the sector as a derived market, and the sector will produce offsets which even at the market price will represent an important flow of income.

The offset programs will be based on implemented policies and regulations for public bus operators to engage in a rapid transit system for the metropolitan area. Also, the policies will result in the implementation of a light electric train, adoption of biofuels countrywide, and standards and incentives for gas, electricity and other clean fuel use in public transport. The set of regulations to restrict private car use and for substitution in cargo fleet is also important.

Sector program manager

This sector presents not only the profound dispersion of actors other sectors show, but also the presence of important stakeholders with economic and organizational power. This means a power manager in the sector with enough competencies in terms of the market roles as well as transport roles must be entitled. The Ministry of Public Works and Transport (MOPT based on its acronym in Spanish) presents high organizational fragmentation, requiring a deep legal and institutional change in order to qualify as the right entity to act as program manager. Here PMR can also support in the design of a scheme of public-private partnerships between MOPT, NGOs, and private firms with the technical, managerial and governance capabilities to perform a program managing entity role.

Monitoring and verification

The methodologies and protocol to be approved by the Carbon Board for the sector program should consider the policies regarding traffic substitution and reduction and also the shift towards advanced clean technologies.

3.5.1 Rationale for focusing on the transport sector

The National Development Plan (NDP) of Costa Rica indicates that MOPT will invest in improving the roadway infrastructure so that it can be more efficient and in harmony with the environment. It includes actions such as promoting the inter-sector public transportation routes, finalization of the city beltway system and reorganization of public transportation in the metropolitan area. This latter will be fulfilled by finishing up a Master Public Transportation Plan for the Grand Metropolitan Area (GMA) and setting up a rail transportation system in the GMA.

Transportation constitutes one of the main challenges for the country since it requires a profound transformation towards a multi-mode public transportation system, adoption of sustainable technologies, and a modern and efficient management system. In Costa Rica, transport is responsible for 75% of emissions (Barrientos, 2010). An increase in congestion in the metropolitan area causes vehicles to speed up and slow down constantly, consuming more fuel and emitting more pollution. It is also the sector of the economy that consumes the most oil-based energy with a high dependency on imports (Flores, 2012).

The public transportation system is based on buses with no inter-modal vision. The system is very disjointed and has a service structure with radial buses that come from outside the city to downtown San José. Nor is there any hierarchy that provides dedicated lanes for public transportation. These problems have caused the metropolitan population that uses the bus system to decrease from 75% a decade ago to 63% currently. Inhabitants look for alternative forms of transportation such as using informal services, taxis and their own vehicles, including traveling by foot (PRUGAM, 2008).[32] In addition, Flores (2011) mentions an increase of buses, which are the so-called “special services”, (vans for school and university students, industries, and diverse job centers, as well as tourist services).

The public service has not incorporated the technological improvements needed and the bus fleet in many cases is not suitable for mass transportation (PRUGAM, 2008).

In addition, the Government of Costa Rica is pushing the National Bio-Fuel Program to seek 15% bio-diesel in diesel fuel and 10% ethanol in gasoline, without having finalized the implementation of these measures (MINAE-MAG, 2008).

3.5.2 Historic and projected emission levels

According to the national GHG inventory from 2005, the energy sector constitutes 65% of the net carbon dioxide emissions in the country, with 5,688,600 metric tons of CO_2e. Transport represents 3,861,100 tons, equivalent to 68% of the energy sector emissions and 44% of the total emissions in the country.[33] The main problem with GHG emissions in transport comes from the private vehicle use. These vehicles are responsible for 45% of the emissions and the fleet has continued to grow

[32] PRUGAM (2008), Estudio de Oferta y Demanda de Transportes de la GAM (Transportation Supply and Demand Study in the GMA).
[33] Ground transportation reported emissions of 3,247,600 tons of CO_2e, equivalent to 57% of the energy sector emissions.

by 8% over the last years.[34] Cargo transportation is responsible for 35% of the emissions (Flores, 2012). Despite the fact that these problems do not come from public transport, responsible for only 10% of the GHG emissions, the actions taken for a modern public transportation system in the metropolitan area may stimulate less use of private vehicles and contain their growth.

According to the NEEDS study, consumption of fossil fuels in the transportation sector will expand, implying that the sector's emissions will increase 60% in the next 10 years.

3.5.3 Context of the policy to use market instruments to reach the mitigation goal.

The division of public transportation into sectors is based on technical studies and recommendations to organize the bus routes and thus avoid most of the buses entering the San Jose Metropolitan Area. In the future, this bus organization will be made up of other mass personal transportation modes such as the train, making way for a multi-modal transportation concept.

The Policies and Strategies for Public Transportation Decree of 2000 supports the sectorization regulation program, and given that the Remunerated Transport Regulatory Act provides concessions for 7 years, in the upcoming renovation for 2014 MOPT can demand changes toward the sectorization scheme and sustainable technology shift.[35]

Additionally, another complementary policy is the National Bio-Fuel Program. This Program includes the development of "a bio-fuel industry that contributes to energy security and efficiency, the mitigation of climate change, the reactivation of the farming sector, and the local socio-economic development." (MINAE-MAG, 2008). This policy needs to be revamped and encouraged as progress is made in the carbon market.

3.5.4 Policy context pertaining the use of market instruments to reach low emissions development objectives

To operate a market instrument a set of policies is necessary to foster transport modernization and the adoption of extended sustainable technologies. Promoting C-neutrality alone is insufficient to change the transportation sector, as removing existing barriers is imperative.

- The technological and financial cost involved in the transformation is very high. Therefore, it requires the building of financing channels accompanied by pricing policies that encourage modernization and adoption of transport clean technologies.
- One of the main problems that the sector has faced is the lack of financial resources for entities such as the MOPT and the MINAE. This shortfall (added to budget execution problems) has caused a reduction in planning and implementation capacities.

[34] According to the Urban Mobility Observatory (OMU based on its acronym in Spanish) of the CAF, this accelerated growth in vehicular traffic is due, in addition, to "credit facilities" and "imports of used vehicles."

[35] The Paid Transportation for People in Motor Vehicles Regulatory Law establishes that the MOPT may concede the rights to individual businessmen, to be accomplished by means of a concession to capitalize on a line to be acquired through a bidding process for up to seven years, with the possibility of renewal.

- The gap between private sector and public administration has caused a drain of highly trained people away from the central government to both private sector and other public sector institutions. This results in reduced human resources and limited management capacity in a sector that has an increasing number of functions.
- The country has created a strong stimulus towards growing the private vehicle fleet due to the inefficient, unsafe, and problem-ridden public transportation system. A multimodal public transport system is a first requirement, but must be accompanied by measures to contain private car use.
- The current legal framework that allows the presence of transportation company representatives on the MOPT councils that manage the transportation sector leaves the government in an unfavorable position in relation to calling for radical changes in the public transportation management programs. This circumstance, combined with the presence of stakeholders with a high degree of financial, political, and social pull, constitutes an important barrier that may slow and even stop initiatives.
- Bio-fuels have a low priority with rising prices of primary products. Hence, the subject currently does not generate any resources or efforts to continue exploring its potential, stimulating bio-energy products, or generating a supply of bio-fuel production and adequate service stations.
- Lastly, the sector is highly fragmented, added to the fact that the competencies in the institutional realm are highly spread out as well. NDP 2015-2035, the institutional architecture is the biggest problem in developing the transportation system. Te sector will encounter serious difficulties in making the qualitative leap that it needs, unless public managers are endowed with sufficient authority and capacity to govern it efficiently. In addition, MOPT's authority for planning has decreased, and the responsibility now not only relies on the Sector Planning Department, but is shared and its proposals and actions are generally not those that prevail in the MOPT's strategy.

3.5.5 Interaction with other policy instruments

To complement the market instrument, the transport sector needs to adopt the necessary policies and regulations in favor of modernizing public transportation and converting to a multi-mode transportation system.

To promote a technological swap for clean technologies, the fact that the bus concessions are expiring must be used to push for standards and incentives to adopt less polluting technologies. Standards and incentives, however, should also be established for the individual private transportation fleet and for cargo transportation.

In addition, another complementary policy revolves around the National Bio-Fuel Program, which should promote farming activities with bio-energy potential and pilot projects that stimulate bio-fuel production and use.

3.5.6 Objective and scope of proposed sector mitigation program

The mitigation program in the transport sector includes measures in three main areas: implementation of a multimodal transport system, shift towards the use of sustainable technologies and strengthening of transport management. The objective is to promote a transformative low carbon vision in transport. Because the mitigation program seeks a broad impact in the emissions from transport sector, focal areas include the rapid bus system, light urban train system, freight train, management of private vehicle demand, alternative sustainable fuels, incentives for technological change and strengthening of government agencies responsible for transport planning and management.

Regarding scope, the public transport organization measures are focused on the buses and light rail in the metropolitan area of San Jose. Activities related to private demand management and urban integration of public transport with bike lanes and pedestrian crossings will take place in the metropolitan area of the capital and along the train route. The substitution of freight by means of train is in Atlantic and Pacific logistics corridors, which are the routes that go from San Jose to Limon and to Puntarenas respectively. The adoption of biofuels and new sustainable technologies incentives will be national scale and oriented to both public and private transport.

3.5.7 Approach for determination of mitigation potential

The main problem of greenhouse gas emissions in transport comes from using private vehicles, representing 45% of emissions and whose fleet has followed a growth of 8% annually in recent years. Freight follows with 35% of emissions. Although these problems are not from public transport, representing only 10% of greenhouse gas emissions, the actions for modern and agile public transport in the metropolitan area may encourage less use of private vehicles and contain growth.

3.5.8 Preliminary estimation of potential emission reductions

As mentioned above, activities in the transport sector take place in three main areas: implementation of a multimodal transport system, shift towards the use of sustainable technologies and strengthening of transport management.

The implementation of a multimodal transport system has as a first step the sectorization of public transport in the Metropolitan Area, consisting in the organization of bus routes to prevent their entry into the metropolitan area of San José. The system will have high capacity main route buses (160 passengers) fed by branch lines of conventional buses at transfer stations, which are located outside the capital. The organization of buses will be accompanied with parallel actions to modernize the train system, and achieve a gradual integration and consolidation with the bus network. Other motorized transport as taxis and private fleet, as well as non-motorized options as bike paths and walkways will be designed for integration with public transport by bus and train. The measures include restricted free entry actions to San Jose for the private and cargo fleets.

The train service is also considered for freight trains in the Pacific and Atlantic logistics corridors, where they would have a clear reduction effect on freight road transportation.

The measures to promote the shift towards sustainable transport technologies resume biofuels programs, use of natural gas, LPG, electric transport, compressed air vehicles and hybrid cars. Regarding train, measures include the transformation of the current diesel train to an electric train system.

For the identification of the potential of mitigation in transport, the PMR in its first phase work with MOPT to build a model as preliminary approach of the impact in emission for a set of intervention measures. The summary of these estimates and their results are presented below.

The mitigation potential estimate of sectorization transport buses in the metropolitan area begins with a comparison of the fuel consumption of the current fleet of buses and the estimated consumption of the new fleet of buses. The sectorization covers nine sectors planned for the modernization of transport: Escazu-Santana, Hatillo-Alajuelita Tibas Santo Domingo, San Pedro-Curridabat, Pavas, San Francisco-Desamparados, Moravia- Guadalupe Heredia-La Uruca and the central sector. To calculate fuel consumption the parameters are: fleet size, number of trips per day, kilometers per trip and kilometers per liter of fuel. By comparing the resulting consumption for the current fleet and fleet modernization projects with transport, it is expected that mitigation is of 46,293 tons of CO_2 per year.

To estimate the effect of the sectorization in private car shift, MOPT recommended using a substitution of 15% of trips from the covered areas by the sectorization. The parameters are: the population of these areas and according to transportation surveys, the percentage of people who go out to work, the population using private vehicles, the number of people per vehicle, per day travel in kilometers and kilometers per liter of fuel. Based on these parameters the private car shift is estimated as well as the reduction in the amount of fuel consumption. The result in terms of emission reduction is 74,150 tons of CO_2e.

A third expected effect of the sectorization is reduction in traffic congestion. The parameter is the amount of kilometers per liter of fuel with and without congestion. The figures are 4.3 km / liter with congestion and 6.5 km / liter with reduction of congestion. Other parameters used are the fleet size and the average trip. The result in terms of emission reduction is 141,147 tons of CO_2e.

Regarding the freight train and its effect on the fleet of freight logistics corridors in Limon and Puntarenas, the emission reduction is calculated based on the estimate of trucks traveling through these corridors and assuming a 20% substitution. The metropolitan train assumes a 10% replacement of the bus fleet and private vehicles covering areas of the train ride, and 5% of taxi services.

Regarding biofuels, the introduction of measures assumes a biofuels blend of biodiesel with 15% diesel and 10% ethanol with gasoline. The consumption of biodiesel and ethanol is projected

based on the projection of fuel consumption. Finally, the introduction of technologies such as hybrid, electric and gas cars is modeled on the assumption that 15% of the private vehicle fleet is replaced.

The figure below presents the mitigation potential for all the measures previously detailed. The total estimate of mitigation potential (when the measures are in full implementation) is 918,000 tons of CO_2e, equivalent to a 22% reduction in emissions from the transport sector. With the sectorization of public transport, its impact on attracting private transport users and the decongestion effect, a reduction of 6% in emissions is expected. With the implementation of an electric train in the GAM and the Pacific and Atlantic logistics corridors the reduction in emissions is 9%. Finally, with the technology shift the reduction is 7% of the emissions.

3.5.9 Readiness activities for the PMR implementation phase

The transport sector is the largest emitter of greenhouse gases, and the prospect is that intervention in this field should be wide enough to attempt generating a high-impact mitigation program in accordance to the requirements posed by the national C – Neutrality goal.

The challenges of an outreach program are to request a wide range of activities without losing the accuracy of the proposed measures projected scope, and especially the implementation capacity of a long-range program.

Transport studies and surveys are required to generate much of the essential metrics. Also required are strengthening techniques such as road engineering calculations, transport flows, origin and destination surveys, etc. All these techniques have been used traditionally in the area, but not in order to generate systematic information for an offset project as in this case. Information about transport fuel consumption is outdated and requires ambitious strategies for collection, especially through surveys.

In collecting data for program design, as well as for MRV, the sector requires extensive coordination with various stakeholders and integration of data platforms. The latter highlights the need of more organizational and sector coordination in parallel to generate the required information.

The next table summarizes the key activities to follow a roadmap in order to address the above considerations. The specific activities for PMR support will be defined with the sector counterparts as part of ongoing consultations.

Table 9. Readiness Activities in Transport Sector

Studies supporting the market participation of the sector
• Design and implementation of offset programs leading to the participation of the sector in the carbon market.
• Development of studies to define the transport activities to be included in a sector offset program with specification of scope, measures, activities and time table for the implementation of

the program following a sector roadmap.
• Development of technical guidelines for the implementation of an integrated multimodal transport system, and incentives, standards and regulation for technology shift according to the sector roadmap.
Improving GHG data generation and management in the sector
• Development of protocols for application of methodologies to support the estimate of baselines, mitigation potential and support MRV system.
• Studies of traffic flows, transportation fleet and transport user demand.
• Design of a proposed tariff model (ARESEP).
• Development, improvement and implementation of a database for the transport sector.
Institutional capacity building and social awareness
• Strengthening of the technical, legal, administrative and financial bodies in MOPT and other key institutional actors and of the process for institutional and sector coordination.
• Design and implementation of a demand management strategy in the GAM, hierarchy of roads and fleet separation.
• System design and administration of electronic fare collection and implementation of a pilot project.
Consultation process with stakeholders
• Participatory process to inform sectors; assess inputs, needs, barriers and to design a mitigation program. Workshops on demand management in the private sector, urban transport integration and implementation of sustainable technologies.
• Conduct training and support program for MOPT and key players in the adoption and implementation of the MRV and information systems.
• Implement a strategy for education, training, communication and stakeholder demo about the benefits, requirements and other implications around multimodal public transport and the adoption of sustainable transportation technologies.
Formulation of the Sector Mitigation Program
• Integration of above components and financial aspects for sector offset program.

3.6 The sustainable building sector

Considerations for further analysis about market participation

The general strategy for CO_2 mitigation in the construction sector comprises four PMR actions: Market instruments; Voluntary agreements and regulations; Mandatory regulations and Information and knowledge transfer.

In Costa Rica, construction activities are subject to well-developed regulations and standards, ranging from technical standards, mandatory safety considerations and architectural factors, to environmental requirements and indoor health standards.

Regulations exist for the construction of new buildings, as well as for the renovation of existing buildings. The regulations are adhered to by various degrees, depending on the perceived relevance of the regulated issue and the level of enforcement. In any case, regulations provide an important yardstick and reference of what are considered minimum standards in the national context. However, there is no regulation specifically focused on high performance building, regarding issues like CO_2 emissions and storage in general.

Incentives for participation of the sector in the domestic carbon market

The overall goal is to develop a market mechanism for trading rights of CO_2 through a set of policies which would include mandatory regulations, voluntary agreements and self-regulations to offset CO_2 in buildings and infrastructure compared with a baseline at project level, from raw material and operation to final disposition. Different policies will be considered during the next PMR phase. Recent voluntary guidelines for measuring the carbon footprint in organizations' operations have been issued. This trend is receiving growing support, and is generating a voluntary market for certified GHG reductions. For example, currently organizations including Intel, Holcim, Plycem Construsistemas, Florex, Florida Bebidas and Bridgestone, have committed to measuring their carbon footprint and issued a transparent report. It is likely that many other companies will follow their lead.

The operation of a similar scheme regarding existing and planned constructions requires the existence of a protocol establishing a baseline for every type of building or infrastructure, for the "Business as Usual" scenario. These baselines should be based on the current state of the art in building technology. Additionally, the system would design a CO_2e footprint calculator for buildings and infrastructure, accessible through the internet, permanently updated, regarding emission factors, indicators and type of building, among other factors.

With a baseline and carbon calculator in place, some incentives can be developed for carbon trading. Some of these incentives are financial preferences in interest rate, term or other conditions, permits, municipal taxes, awards, rating, stimulus for developers in terms of density and coverage, restrictions, SETENA's guarantee deposit, local regulation plan flexibility, green label, other certification systems, etc.

For example, banks can finance those buildings with a lower carbon footprint with better financial conditions (lower interest rates for example), and part of the agreement is that the bank will receive the carbon rights and act as a wholesale seller of carbon emission reductions coming from construction of individual houses and edifications or from urban developers and building companies. Banks or other wholesale sellers can participate in over-the-counter trading or by brokers in the stock exchange.

Sector program manager

The construction sector is highly fragmented, with many, often poorly integrated actors involved in the value chain. Key stakeholders include developers, capital providers, designers, engineers, contractors, agents, owners, users, and local government. The interaction complexity among these participants is one of the greatest barriers to energy efficient buildings.

The building sector is mostly organized from the private sector, with companies, private organizations and professional organizations with competences or roles complementing the Ministry of Housing and Human Settlements (MIVAH), head of the construction and urban planning policy in the country.

Here the program manager should be a public-private partnership involving the Engineers and Architecture Professional Organization, entities related to the building chamber, NGOs and private companies, all jointly supporting the operational management of a set of offset programs for the sector approved by the Carbon Board, and the MIVAH can execute a role of supporting with the necessary regulations, surveillance of standard design and tracking of the sector roadmap.

Monitoring and verification

The Carbon Board approves the methodologies and protocol for the sector programs. The carbon calculator and MRV can be operated based on the construction platform in the Engineers and Architecture Professional Organization (CFIA), which has an online system to present building permits and obtain their authorization. A new component of the platform is a qualified carbon technician working on validation in the building sector as an accredited professional, enabling access to the UCC framework.

3.6.1 Rationale for focusing on the sustainable construction sector

The building sector has considerable potential for change by taking advantage of new technologies and new processes in design, construction and deconstruction. This sector has the ability to become more efficient in terms of resource use along being less environmentally intensive and more profitable. Sustainable construction can also be used as a mitigating opportunity for greenhouse gas emissions during its life cycle. The carbon footprint for buildings includes embodied carbon and operational carbon. The embodied carbon in a building comes from the CO_2 produced while materials are being manufactured, transported and assembled on site, while they are being maintained and replaced, while they are disassembled and while they decompose. Operational carbon is carbon emitted in operating a building. A typical carbon footprint for a building would ideally include the following:

- Material development and preparation;
- Construction process (including transportation);
- Disposal or ongoing occupational emissions from tenant occupants; and
- Refurbishment and redevelopment.

Accordingly, five core activities are proposed: 1. Reduce construction waste; 2. Increase wood as a construction system; 3. Foster environmentally friendly materials (with environmental product declarations (EPD); 4. Reduce energy consumption in building operations; and 5. Green Urban Development. This represents a national approach that will lead to a high-performance building with environmental and economic benefits. The main goals are: intelligent specifications based on impact and simple implementation; creating demand for products with low-carbon processes; encouraging demand for market transformations in carbon-intensive sectors in the supply chain; valuing the impact of strategies such as renewable energy technologies and carbon sequestering products such as wood, encouraging the use of recycled and recyclable products, and designing for "deconstruction", meaning ease in disposing of old buildings.

3.6.2 Historic and projected emission levels

The construction sector built 3.2 million m^2 in 2011 and consists of the residential, commercial, services and industrial sub-sectors. During the last ten years, the historic figure amounts to 30.4 million m^2 [inec.go.cr]. This figure is projected to be 38.6 million m^2 in 2012-2021, showing an annual growth of 4.5 millions of m^2, equivalent to a 3.7% annual increase.

In Costa Rica, buildings are responsible for 60-75% of total electricity use and 40-60% of the waste volume. More than 60% of the population lives in flat urban areas, where 97% of buildings are one-story. The pressure on land is increasing at a fast pace, unless aggressive policies are made to foster compact cities and high-rise buildings. Due to population growth and economic development, construction activities are now more intense than ever. The cement market has been growing at 3.7% in the last ten years despite the recent market slowdown in 2008-2009.

Estimates project 4.1 millions of tons of CO_2 emissions by 2011, and the outlook for 2012-2021 predicts that the sector will release 46.8 millions of tons of CO_2, based on the mass balance. Another source of carbon is wastewater. In Costa Rica, about 75% of the wastewater is treated using septic tanks and latrines, putting water reservoirs at risk. Most of the remainder goes into rivers without any kind of treatment (only less than 5% receives treatment). Taking into account the CH_4 and N_2O released into these waters, there is a mitigation potential that must be included in the National Carbon Strategy, in addition to the environmental and health benefits.

3.6.3 Policy context pertaining the use of market instruments to reach low emissions development objectives

Currently there is no national policy that articulates a set of long-term objectives and strategic programs to align public and private agents with sustainable construction. However, within the context of a highly regulated country looking at environmental issues with a robust and strict legal framework there is an excellent platform to foster a new paradigm in this regard. Key institutions are: (a) the Ministry of Housing and (b) the Ministry of the Environment, Energy and Telecommunications.

On the other hand, leading organizations such as the Costa Rican Construction Chamber (CCC) and the Federated Association of Engineers and Architects (CFIA) have created commissions that work toward improving technological transfer in the sector and awarding best practices.

The behavior of the building sector is influenced by a wide range of signals from government, public utilities, customers, architects and engineers, financiers, researchers, contractors, real estate agents, the construction product industry, distributors, developers, and academia, etc. They cover virtually all the issues related to the building business. An NGO, the Sustainable Construction Council (AFODESOS based on its acronym in Spanish), is identifying all stakeholders in the construction sector to open up spaces for dialogue and exchange and to articulate a unique vision in the sector. Governmental policies have a special role in influencing the building sector itself, but also in influencing the behavior of the participants.

There is a need for policies and associated tools (some of which are addressed below) that encourage broad support for more sustainable buildings, including policies regarding energy pricing, waste construction, wastewater treatment and environmentally friendly products, awareness and education, technology access, and building safety, among others.

3.6.4 Barriers for implementation of mitigation measures and use of market instruments

- The construction sector is highly fragmented, with many, often poorly integrated actors involved in the value. Key stakeholders include developers, capital providers, designers, engineers, contractors, agents, owners, users, and local government. The complexity of interaction among these participants is one of the greatest barriers.
- The building sector has all of the following distinctive characteristics: small savings per technology improvement; large number of buildings; widespread locations, and many technologies used to achieve efficiency improvements; various specifications for dispersed end-use requirements; varying end-user knowledge levels, and decentralized energy use decision making.
- The business environment of the building and construction sector is considered to be highly uncertain and risky, especially in fast developing countries. The sector's history of construction bubbles and recessionary cycles have fostered a generally conservative and risk-averse culture. New types of initiatives, such as energy efficient building projects, are generally not welcome because they require deviation from practices that have been known to work.
- There are some barriers and limitations in the energy, housing, and waste management sectors that are caused by deficient institutional designs and the failure to apply the existing legal frameworks. They may also be because of requiring new legal frameworks that match the international low-impact trends for greenhouse gas emissions. In addition, there is a need for a definition of the climate change policies in the sector setting. The standard-setting and institutional framework needs to be established for special agreements that each sector must make for its share of the domestic carbon market.

3.6.5 Interaction with other policy instruments

The construction sector is scattered with a low level of coordination, depending on leading organizations that operate independently, as the Construction Chamber and the CFIA (the Federation of Engineers and Architects); on the public side, through the Ministry of Housing (MIVAH) and the Ministry of Public Works and Transportation (MOPT); as well as a wide range of institutions or state companies.

A key activity is to strengthen regulations in the field of energy efficiency for equipment and processes by establishing standards, labels, energy levels and the necessary mechanisms for control and verification. A system of incentives is being consolidated for more efficient equipment on the market through various mechanisms among government agencies, energy companies and suppliers that foster and guide customer preference for energy efficiency through actions related to certification, financing, assets, information and training. For example, the hourly rates are a clear signal of the cost of electricity, the need to promote the rational use of energy, and to encourage energy savings.

One of the key actions that need to be addressed in the sector is to encourage standardization, industrialization, and promotion for pre-fabricated modules. These actions are affected by regulations that MIVAH should encourage and by standards that are boosted through adoption by the private sector. The same is true for promoting sustainable operations through buildings with low water consumption and efficient energy usage.

The impact sought for urban development will be over the long term, but it implies pushing for reforms to the domestic and municipal urban planning standards in relation to the urban regulatory plans. Currently, the GMA urban regulatory plan is being analyzed by the MIVAH. Since it is the ministry that pushes these mitigation measures, conditions will be created that are conducive to the climate change perspective with actions to promote green urban development into the new urban regulations.

3.6.6 Objective and scope of proposed sector program

The sustainable construction sector's mitigation program is a set of measures to encourage more efficient building processes in terms of resource use, environmental intensity in construction zones, profitability, design, construction methods and deconstruction. The program also seeks to influence the carbon footprint reduction of buildings during the manufacture of materials, their transport and assembly on site, maintenance and replacement, disassembly and decomposition. The program is responsible for the reduction of negative climate change impacts coming from energy use, liquid and solid waste generation and consumption of hazardous materials. On the other hand, the program seeks the increase of use of wood incorporated in the construction system, which has been decreasing and replaced by aluminum, steel and cement with a much higher carbon footprint.

The objective is to propose and implement a set of government policies and a comprehensive strategy -headed by the Ministry of Housing which is the governing body of the urban planning- to be agreed upon, for coordinating public and private actors and encouraging a wide support for more sustainable buildings by design and implementation of measures to impact the construction process. The government policies and comprehensive strategy proposed are expected with a countrywide scope and covering different sectors by their activities related to construction.

The mitigation program targets areas representing key drivers for CO_2 mitigation: reduce consumption and waste; substitution of high emission factor materials for CO_2 by sequestering materials (wood); reduce the emission factor and carbon embodied in material by promoting environmentally preferable materials; reduce energy consumption in building operation by bioclimatic building design, and high efficiency and compact cities with urban planning and green infrastructure.

3.6.7 Approach for determination of mitigation potential

Since the statistical data available for the construction sector does not include the whole building activities, in order to estimate the carbon emissions the methodology applied considers the local production and net exterior trade of construction materials, with an estimation of the construction waste. So the product categories of non-metallic, metals, wood, plastics and coatings were quantified based on public records of international commerce and direct industry information. Additionally, two components of carbon release were considered: soil disturbance and building operation and energy consumption by missing bioclimatic architecture design. Another source of carbon is the wastewater with about 75% treated in septic tanks and latrines and the remaining goes into rivers without any kind of process. Estimation is made of 4.1 millions of tons of CO_2e emissions by 2011, and in the horizon 2012-2021, the sector will release 46.8 millions of tons, according to a mass balance. The non-metallic represents 29%, metals account for 31%, plastics and coatings add up to 5%, the wood participates with an 18% and the building operation accounts for 17%. Cement represents almost 75% of non-metallic emissions and a 20-22% of the sector.

Note that the construction sector does not exist as an independent sector among the sectors of the GHG inventory, for this reason the estimates have a cross-sector perspective, which has been carefully considered in the baseline estimates to avoid double accounting emissions in the other MRP sectors.

3.6.8 Mitigation potential

As mentioned previously, for the sustainable construction sector five core activities are proposed: 1. Reduce Waste construction 2. Increase wood as constructive system, 3. Fostering environmentally friendly materials (with EPD) 4. Reduce energy consumption in building operation and 5. Green Urban Development. These represent an approach that will lead to a high performance building with environmental and economic benefits.

For the reduction of construction waste, identified key actions are: the industrialization and standardization of building systems, especially housing; increasing the entrepreneurship in waste utilization; and expanding the use of prefabricated systems through this standardization proposal. It is key to establish a universal module of coordination in order to harmonize all building systems.

To increase the use of wood in construction, identified key actions are: the standardization of wood products; the extent of supply and use of prefabricated components; the certification of sustainable timber plantations; promoting housing design with high-wood use, and a joint strategy with forestry and conservation programs in the country that seek to increase the use of sustainable timber.

For encouraging the use of environmentally preferable materials, the key actions are: establishing the EPD; a certification system for environmentally preferable products; development of local industry with these products; local technology development; strengthening of the marketing network; and incentives for recycled products.

In reducing energy consumption in the operation of buildings, actions proposed are: a bioclimatic building design, with adoption of systems with low water use and energy efficiency, and adoption of recycling systems.

Regarding the green urban development, it is understood that the building is as important as its surroundings, so actions in this area seek the alignment of public policy and private agents in order to: (1) Embrace land mosaic patterns to promote sustainable urban development, green infrastructure investment patches and more sustainable urban development. (2) Promote compact cities and planned extension of urban areas in opposition to unplanned urban sprawl. (3) Balance strategic facilities with diversified local economic opportunities; (4) Expand network infrastructure while getting the most out of existing networks; (5) Construct greener built environments that use water and energy efficiently; (6) Protect valuable ecosystem services and biodiversity hotspots while increasing resilience to some natural disasters; (7) Promote clusters of green industries and green jobs; and (8) Promote public health.

The following chart shows an incremental mitigation from zero since 2012 to 663 thousand tons of CO_2e per year by 2021. The expected annual average mitigation is 284 thousand tons of CO_2.

3.6.9 Readiness activities for the PMR implementation phase

The inclusion of the sustainable construction sector has introduced significant challenges, as it is a transversal industry crossing several sectors included in the National GHG inventory. This requires building a methodology to set a baseline for the sector, avoiding double accounting of the expected offsets from the construction program. Emission factors should be defined for various activities and construction materials.

Data collection for MRV is facilitated by involving the CFIA, an organization with a centralized information platform, but it must be noted that intense work has to be done to set standards, a protocol and methodologies acceptable in the offset program framework.

The main challenge for the sector is in defining the real scope and roadmap for the implementation of the offset program.

The following table shows the first approach to the goal proposed in the long term for the mitigation measures by the MIVAH in the study of mitigation potential the sector has conducted to support the MRP. These measures are the basis for the preliminary identification of the mitigation potential.

Table 10. Strategic Actions and Targets in Sustainable Construction Sector

Strategic Action	**Target**
1. Construction Waste	
Waste generation reduction in the construction site over baseline	12%
Recycle and co processing waste construction materials / over total weight	5%
Increase waste construction diversion from a landfill over baseline	50%
2. Increase wood in building	
Increase of wood used in constructive systems over current sales	25%
Fraction of total wood sold under standards of modular coordination	15%
3. Environmentally Preferable Materials	
Fraction of products with EPD from total	15%
100% Prefabricated houses sub-segment: affordable housing	10%
Material sold with unique module of coordination and standardization	25%
4. Green building operation	
Reduce energy consumption below baseline	10%
Buildings with certification of Requisites for Sustainable *Buildings* in the Tropics (RESET[36])	100
Energy from solar devices	5%
5. Green Urban Development	
Ratio vertical house in apartment related individual house (new construction)	20%
Volume wastewater plant treatment related with volume in septic tanks	40%
Urban special plans	3

The next table summarizes the key activities of the referred roadmap. The specific activities for PMR support will be defined with the sector counterparts as part of ongoing consultations.

[36] INTECO, the Institute of Tropical Architecture (IAT), CFIA and Architects Association of Costa Rica (CACR), developed the RESET standard that evaluates the decisions on design , construction, and operation of a building in the tropics.

Table 11. Readiness Activities in Sustainable Construction Sector

Studies supporting the market participation of the sector
• Design and implementation of offset programs leading to the participation of the sector in the carbon market.

• Design and implementation of a construction waste program based on:
  • Waste quantification at construction sector and footprint associated
  • Incentives for public purchases of zero waste materials
  • Promote materials with recycled content in public purchases
  • Builders general agreement to submit information and waste management
  • Incentives for architects and engineers for use of modular design
  • Technology management in waste construction co-processing
  • Legislation on producer responsibility (material construction sector)
  • Special tax for construction waste
  • Market study for implementation of the universal module for standardization
  • Pilot projects to scale up (short term impact)
  • Social housing 100% standardized according to Universal Module

• Design and implementation of a program to increase wood in building based on:
  • R&D, design and built wood frame buildings and panels
  • Industrialization process and life-cycle analysis (LCA) of CO_2 emissions in the country
  • Modify directive social sousing and public schools
  • Analysis, studies, and investigations to better understand market demand
  • New technologies related to traceability and information processing
  • Study of wood production waste and market organization
  • Pilot projects to scale up (short term impact)
  • Develop a constructive system: frame, panels, trust, for second floor
  • High performance code for wood construction (Chapter)
  • Forest Industry Agreement for Sustainable Construction and R&D
  • Design and build a prototype of house for second floor
  • Education and training of standard makers, project managers and contractor
  • Technical training activities for professionals

• Design and implementation of a program on Environmentally Preferable Materials
  • Directive for use-only modular and standardized construction products in public buildings
  • System for certification and professional accreditation
  • Web site information platform to inform the customers and stakeholders
  • Develop accredited professionals for certification
  • Develop a national ECO-LABEL and promote it in the construction market
  • Industry agreement inside each sub-sector level.
  • Incentives system for refurbishing and retrofit with EPD
  • Pilot projects to scale up (short term impact)
  • Social housing project built with 50% EPD
  • Education program for Architects and engineers as well as technicians and workers

• Design and implementation of a program on Green building operation based on:
  • High performance building code
  • Financial package: developers, final customer, retrofit
  • Information at invoice level, about CO_2 emissions related with building operation
  • Annual Award

• Design and implementation of a program on Green Urban Development based on:
  • Develop urban forestry concept and its application to GAM
  • Technology transfer in wastewater treatment plants and sludge disposal
  • Develop urban agriculture concept and its application to GAM
  • Develop a sustainable set of indicators and goal for Urban Planning
  • Integrate sustainable urban inside in Municipal Planning at GAM level
  • Knowledge transfer about urban sustainable urban planning to Municipalities
  • Develop strategy for urban green financing (public, private, swaps, trust funds)
  • Alternative transportation routes (bicycle and foot paths)

Institutional and capacity building and Social Awareness
• Strengthening of the technical, legal, administrative and financial bodies in MIVAH, other key institutional actors and the process for sector coordination
Consultation process with stakeholders
• Participatory process to inform sectors, assessing inputs, needs, barriers and to design mitigation and offset programs.
Formulation of the Sector Mitigation Program
• Integration of above components and financial aspects for sector offset program

3.7 Mitigation potential of sector offset programs

Initial estimates of the mitigation potential of sector offset programs identified in the MPR are presented below. These preliminary figures, based on existing information in the country, placed annual average mitigation potential in about 2,349,500 tons of CO_2e through 2021.

Table 12. Expected Annual Mitigation by Sector

(Average from 2014 to 2021)	
Sector	**Tons of CO_2**
Electricity	200.000
Agriculture and Livestock	400.000
Transport	985.500
Solid Waste Management	480.000
Sustainable Construction	284.000
Total	**2.349.500**

Source: Own elaboration based on sector studies data

4 Organization, Communication, Consultation and Engagement

4.1 Organization for MRP

The Climate Change Directorate (CCD) of the Ministry of Environment and Energy had the overall responsibility for MRP coordination. The CCD exercised the technical supervision of the project and officially submitted all products. The CCD also conformed the PMR Core Team, which held at least 25 coordination meetings, including discussions with the Minister of Environment and Energy. (See Annex 1)

A Senior Advisor advised on the overall strategy, selection of priority sectors, organizational structure, selection of coordinator and consultants, and reviewed drafts and presentations submitted to the Partnership meetings.

A Project Coordinator supervised day-to-day activities in close communication with the CCD and the Senior Expert, who provided technical assistance on various aspects of the project across sectors.

The Core Team worked very closely with a National Technical Team, composed of experts appointed by the authorities in charge of policy making and implementation in target areas, together with sectorial experts who supported specific needs in each stage of the process. The National Technical Team has the following members:

- The **DCC** contributed with the technical aspects of the domestic market (conception, creation and instrumentation).
- **The energy sector** was divided in two working groups, one for **renewable sources of energy**, and one for **energy efficiency**. The renewable energy team was based at the Costa Rican Electricity Institute (ICE), and the energy efficiency team worked with the Sectorial Energy Directorate (DSE) of MINAE.[37]
- **The agriculture and livestock sector** worked under the coordination of the Deputy Minister of Agriculture and Livestock and the support of her technical team.
- **The transport sector** teams were based at the Ministry of Public Works and Transportation, with the leadership of the Deputy Minister of Transport, and the support of staff from the Public Transport Council.
- **The waste management** sector received technical cooperation from GIZ experts within a project that has worked in this area for several years in Costa Rica together with the Health Ministry.

[37] Energy efficiency was a potential target area originally. During the MRP process, the DCC decided to leave it for future assessment.

- **The sustainable construction area** worked with consultants in close coordination with the Housing Vice-Minister.

Finally, the PMR Core Team has held ongoing follow up calls with the World Bank staff that served as counterpart to the team. This practice proved highly effective, as it kept colleagues at the Bank abreast of the progress made in the field, and created a space for questions and high quality technical discussions.

4.2 Communication, Consultation and Engagement

The team organized an intense process of multi-stakeholder awareness raising and consultation among government agencies, public and private entities, independent experts and other stakeholders. The different stages of this process are briefly described below.

4.2.1 Research and existing documentation

Prior to initiating engagement with stakeholders, the PMR team undertook the task of the identification and analysis of existing research and institutional work in order to systematize current knowledge and findings. Historical documentation is essential to assessing existing recommendations on possible mitigation programs, analysis of barriers and in the definition and strategic inclusion of market instruments. Taking stock and integrating ongoing teams was key in conducting interviews and consultations throughout the process, as it implied respect for institutional groundwork and consolidating a platform for future implementation.

4.2.2 Sectorial meetings[38]

Sectorial meetings took two forms: interviews with experts and authorities from different entities, and half-day workshops, which are specific sectorial consultations held with groups of between 8 to 12 people and requires a specific type of organization (also referred to as 'mini workshops').

The interview process began contacting participants to the First National Workshop (see below) and other key players. Areas of discussion included the selection of proposed mitigation activities, analysis of existing barriers and identification of actions needed to remove them, definition of baselines and estimation of mitigation potential, and a preliminary identification of needs and cost estimates for implementation. The team held at least 20 face-to-face meetings with sectorial representatives.

Access and contact with high level officials (deputy ministers) proved essential to the process, not only because it implies political support to their own teams and their proposals, but also as a coordinating space for donors and the DCC in climate change topics.

[38] See Annex 1 for additional details

Mini workshops served their purpose as places for dialogue and exchange of ideas on specific subjects of common interest. They allowed horizontal discussions between experts and public sector officials on viable proposals for climate change mitigation and market options. At least 10 mini-workshops were carried out during the proposal preparation phase.

4.2.3 National Workshops

Three workshops were held with the DCC, the National Technical Team, consultants, and the PMR Core Team.

The First National Workshop was held early on for the purpose of creating of the stakeholder network and introducing key players to PMR concepts and objectives. The purpose of this workshop was to exchange ideas for organizing and coordinating teams and technical support to key institutions for this project.

The second workshop´s objective was to exchange ideas about the expectation of mitigation projects, which had been identified by the diverse sectors, and to offer training on the implications of NAMA development. The workshop also sought to validate the progress of activities identified as areas for mitigation projects within the PMR objectives.

A third validation workshop took place in order to share the activities that were defined by each sector for the PMR implementation phase. Feedback from the Cologne PMR Assembly meeting was shared, and participants also benefited from comments from the full group.

4.2.4 External cooperation[39]

The DCC holds periodic coordination meetings (called “Sinergia”) with donor representatives and project managers. Three full meeting have been convened during the last 12 months, and have fostered efficient information-sharing networks on Costa Rica´s mitigation objectives and financing priorities.

In addition, the Core team participated in scientific, policy-based and other networks, which may be of benefit to project implementation though lessons learned, generating a two-way flow of information between this project and other projects of a similar focus.

The DCC plans to continue this close coordination activities and maintain the information network on planning, implementation and budgeting together with the Ministry of Planning (MIDEPLAN) so as to improve cost-efficiencies and avoid duplications.

[39] See Annex 2

4.3 Planned market readiness activities in the implementation phase

The Costa Rican Domestic Voluntary **Market infrastructure** requires immediate actions that will move its concept from paper to concrete actions. DCC will carry out these early actions with the support of donors who stand ready to facilitate this stage, and with local counterpart funds. These actions include, as priorities, the design and implementation of the legal, institutional and economic framework for the market, and the development of initial protocols and methodologies for offset programs and MRV. In later stages, dissemination and marketing activities will be required, as well as the design of international accreditation and auditing of the system.

The registry and tracking systems deserve special attention on a separate track, as an interim registry will be necessary at the outset, while the more complex and tailor-made version is designed. Resources will be required to finance specific hardware for this platform.

Finally, it is intended to pilot one market operation with one of the ´champion´ firms that have voluntary C-neutrality pledges. This exercise will test-drive market procedures and teach lessons to all parties involved.

Costa Rica intends to pay close attention to the **strengthening of demand.** The DCC will study a range of policy options to determine if the C-neutrality goal requires going beyond voluntary participation into mandatory measures. After identifying this menu of options, feasibility must be further established, and an adequate policy mix will be formulated, taking into consideration legal context, policy instruments and stakeholder inputs. Technical support for created or spontaneous demand must be expeditious at DCC and the newly created Carbon Board. Finally, dissemination and public awareness are necessary components for an increased demand.

On the area of mitigation potential by sectors and market suitability, market readiness activities in the implementation phase have been classified in five categories that apply to all five sectors depicted in Chapter 3. It must be noted that each sector has a different status regarding market-readiness, and the PMR Team has identified these different starting points and has constructed specific budgets for each. These supporting tables are available upon request; yet, for the MRP informal presentation, the team has condensed sector readiness activities in common line items to achieve comparability and clarity at this early stage of the process. These line items are:

- Studies supporting the market participation of the sector
- Improving GHG data generation and management in the sector[40]
- Institutional, capacity building and social awareness
- Consultation process with stakeholders
- Formulation of Sector Offset Program

[40] This activity is defined as “baseline methodologies and MRV protocols for UCC project activities in the sector” for the Power Generation Sector.

4.4 Planned Capacity Building Activities

Activities for capacity building are organized in two levels: one related to the capacity building across the board on topics associated with an in-depth understanding of the Domestic Voluntary Carbon Market, its operation and participation opportunities. This level of capacity building can be common to different groups, generating economies of scale in resources and time management.

A second level is related to specialized needs. Market infrastructure, for example, requires new skills in project developers, professional associations, market participants and qualified carbon technicians. The Carbon Board has to be trained, and the general public requires specific communication strategies to understand and lend support to the carbon market as a policy instrument and eventually as a financial option. In sectors, activities range from the technical support to identify the possible activities to engage in an offset program, to the institutional strengthening to create a favorable environment for the market operation at the sector level. Other capacity building activities include the development and training to generate data and the MRV system, both of which are instrumental to the market operation, and is a field with much uncertainty where knowledge can be created and exchanged.

4.5 Process of consultation with stakeholders

The DCC intends to continue engaging with the broad sectorial network and alliances it has built in the past few years for design, consultation and implementation of market readiness activities. The offset program design, the needs assessment and the planning of the capacity building activities are also matter of consultation with stakeholders. National workshops and synergy groups will continue, as well as the formulation of management instruments for donor coordination and aid effectiveness. A detailed list of DCC´s network is contained in Annex 4.

5 Overview of Market Readiness Activities, Total Budget and Timeline

Below is the estimated total budget for the implementation phase of the Costa Rican Carbon Market, which is divided into three areas of market readiness: the domestic market infrastructure, strengthening demand and supply generation. Most of the budgetary requirements were detected in activities of design and implementation of the infrastructure for market operation. While this process has started, it is still in a pre-design stage in several areas. For example, some of the major components in the organizational structure have been identified, but specific roles, responsibilities and duties need to be drafted.

In legal matters, the promulgation of The Carbon Neutrality Country Program and the national standard INTE 12-01-06:2011 *Management System to Demonstrate Carbon Neutrality* lay the regulatory groundwork to operate the market. Yet, there is still a number of regulatory bodies that cover various fields of activities involving market operations that need to be inserted in the network. Similarly, at the participating sector level, legal and regulatory changes are required to ensure their full inclusion. In institutional and organizational issues, although there is some level of experience with the system of PES, the domestic market creation brings a new dimension in the work of public and private entities, NGOs and civil society. Several government agencies must undergo fundamental changes to work with the market requirements and the full implications have not yet been identified and studied in depth.

The registry system is at the conceptual level, and design depends on complex technical and practical considerations regarding this platform. Protocols and methodologies for baselines, calculation of potential mitigation and MRV face similar challenges.

For training, capacity building and social awareness, some of the activities will be carried out across sectors. Actors in the governance and management levels of the market must be an initial focus for these activities, as well as organizations that act as hubs in the dissemination and linkage between market structure and the participants in the supply and demand for carbon certificates.

A key activity for market operation is the design of the business model to be followed by the market rules. This activity will establish market structure links with subsequent activities, such as the strengthening of demand. Precisely because the domestic market will initiate as a voluntary market based on the carbon neutrality declaration sought by organizations, it will require significant outreach and promotion to generate strong and sustainable demand. The DCC will also study the feasibility of adopting a variety of complementary policies to generate offsets demand in a more predictable way, and in some cases to encourage standards that foster self-regulation and voluntary action.

Finally, the third area of activity is the generation of supply of carbon certificates, where measures will be designed and implemented towards generating compensation efforts in selected sectors of the Costa Rican economy. The market would act as the clearing house to make the balance between potential demand and supply of carbon certificates within sectors and across sectors.

TOTAL MARKET READINESS BUDGET																			
	Time table			Total Cost (Thousand of US USUS$)	Other Donor Counterpart							National Conterpart						
Activity	Year 1	Year 2	Year 3		PNUMA	PNUD	BID	GIZ	USA	AECID-EU	GEF	MINAE	ICE	MAG	MIVAH	M. Salud	MOPT	FONAFIFO
Domestic market infrastructure				**1.800**														
1) Design and implementation of the legal, institutional and economic framework				600		√		√				√						
2) Design and implementation of the registry and tracking system				700		√						√						
3) Generation of protocols and methodologies for offset programs and MRV				150		√		√	√			√						
4) Capacity building and social awareness				200		√		√		√	√	√						
5) Pilot Project of the basic structure of market transactions and preliminary exercise with 5 companies (CHAMPIONS)				150								√		√				√
Strengthening of Demand				**500**														
1) Design and implementation of strategy of policy options to promote the goal of C Neutrality				150		√						√						
2) Implementation of Activities for demand creation				100		√						√						
3) Outreach of activities on private sector for C Neutrality adoption				100		√						√						
4) Sector base discussions on policy and instrument for C Neutral objective				100		√						√						
5) Pilot Project of scaling up of offset program from experience with 5 champion companies				50				√	√		√	√	√	√	√		√	

TOTAL MARKET READINESS BUDGET																				
	Time table			Total Cost (Thousand of US USUS$)	Other Donor Counterpart							National Conterpart								
Activity	Year 1	Year 2	Year 3		PNUMA	PNUD	BID	GIZ	USA	AECID-EU	GEF	MINAE	ICE	MAG	MIVAH	M. Salud	MOPT	FONAFIFO		
Generation of Supply				**3.500**																
1) Studies supporting the market participation of the sector				1.600	√	√	√	√			√	√	√	√	√	√	√	√		
2) Improving GHG data generation and management in the sector				1.100			√		√		√	√	√	√	√	√	√	√		
3) Institutional and capacity building for the implementation				550			√	√	√	√	√	√	√	√	√	√	√	√		
4) Stakeholder consultation processes				200				√		√		√	√	√	√	√	√	√		
5) Formulation of Sector Offset Program				50		√		√				√	√	√	√	√	√	√		
Total without Administrative Cost				**5.800**																
Administrative Cost				**1.160**																
TOTAL BUDGET				**6.960**																

Annex 1. Log of Coordination Process

Internal Discussions

1.1 Core Team-DCC

January 12th
January 20th
February 7th
February 17th
February 24th
March 2nd
March 19th
March 26th
April 13th
April 20th
April 24th
April 26th
May 2nd
May 3rd (Minister MINAE)
May 4th
May 10th
May 18th
May 21st
June 7th
June 25th
June 29th
July 9th
August 3rd
August 6th

1.2 Calls Core Team-World Bank Staff

January 24-27 (mission)
February 9th and 23rd
March 8th and 22nd
April 13th
April 24th
May 2nd
May 9th
May 11th
May 18th
May 21st
June 28th
July 24th
August 13th
August 20-21st (mission)

Annex 2. Log of Consultative Process

Bilateral meetings by sector

Electricity

-Interviews

February 20th ICE
February 21st DSE
February 28th DSE
March 6th ICE/DSE
May 2nd ICE

-Mini-workshops

January 24th – 25th

Agriculture

-Interviews

January 13th (Vice Minister)
February 10th MAG
February 24th MAG
February 28th MAG
April 11th MAG
April 27th MAG
June 18th MAG
July 19th MAG

-Mini-workshops

March 14th

Waste Management

-Interviews

March 6th GIZ
March 20th GIZ
April 12th Health Ministry
May 29th GIZ

-Mini-workshops

May 10th
June 1st

Transport

-Interviews

February 13th MOPT
March 19th MOPT
April 16th MOPT

-Mini-workshops

April 18th
June 6th (CTP)

Sustainable housing

-Interviews

February 3rd (Vice Minister)
March 7th (Vice Minister)
June 5th (Vice Minister)

-Mini-workshops

March 15th
June 6th
June 13th

National Workshops

January 27th
March 29th
May 7th (consultants only)
June 8th
August 31st

Annex 3. Log of Consultation with Donors

External cooperation (includes coordination meetings with donors and experts on mitigation topics and attendance to meetings conveyed by them on relevant subjects)

January 26th – coordination DCC/Donors
February 16th – EPYPSA (AECID) / Transport
February 17th – IADB / Transport
February 27th – GIZ bilateral / Waste Management
March 1st – coordination DCC/Donors
March 16th – bilateral MOPT UNDP / Transport
May 3rd – DCC/Ecoressources /Domestic market development
August 7th – EC LEDS / CATIE / Agriculture
August 17th – MAG donor coordination
August 24th – DCC public sector/donor coordination

Annex 4: Internal Teams, Stakeholders, and Alliances

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