

Commonwealth of Dominica



Energy Balances
2010 - 2012

Commonwealth of Dominica Energy Balances (2010 - 2012)

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List of Acronyms

Bbl	Barrel
Boe	Barrel Oil Equivalent
CAF	Development Bank Of Latin America
CO ₂	Carbon Dioxide
CARICOM	Caribbean Community Secretariat
CARILEC	Caribbean Electric Utility Service Corporation
CDB	Caribbean Development Bank
CEIS	Caribbean Energy Information System
CELAC	Community of Latin American and Caribbean States
CHL	CHL Consulting Co LTD
CIPPET	The Caribbean Information Platform on Petroleum
CREDP	The Caribbean Renewable Energy Development Programme
CSO	Central Statistical Office
DM	Dominica (Commonwealth of)
DO	Diesel Oil
DOMLEC	Dominica Electricity Services Ltd
EC\$M	East Caribbean Dollar
ECCB	Eastern Caribbean Central Bank
ECCs	Eastern Caribbean Countries
ECCU	Eastern Caribbean Currency Union
ECERA	Eastern Caribbean Energy Regulatory Authority
FAO	Food and Agricultural Organization of the United States
GDP	Gross Domestic Product
GX	Gasoline
IRC	Inland Revenue Dominica
JF	Jet Fuel
LA&C	Latin American and the Caribbean
LPG	Liquefied Petroleum Gas
MoAFF	Ministry of Ambient, Forestry and Fisheries
NEP	National Energy Policy
NP	The Trinidad and Tobago National Petroleum Company Limited
NREL	National Renewable Energy Laboratory
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OLADE	Latin American Energy Organization
SEP	Sustainable Energy Programme
SOL	The SOL Group
USAID	United States Agency for International Development
WTTC	World Travel and Tourism Council

i. Introduction

As stated in the Lima Action Plan adopted during the First Meeting of Energy Ministers of CELAC, OLADE was requested to participate as Technical Advisor. Subsequently, during the V Meeting of Energy Ministers of OLADE, the OLADE's Cooperation with CELAC was approved. The agreement included a study project for developing Energy Balances of six Caribbean Member Countries of CELAC that are Non-Member Countries of OLADE. The Development Bank of Latin America (CAF) funded the project and the Commonwealth of Dominica was selected as the start-up country. (CELAC, 2013; OLADE, 2013).

Considering the need to analyze and enhance knowledge related to the regional energy integration debate and real options, the preparation of energy balances is fundamental to rise up a baseline about supply and demand on the energy sector. Energy balances will permit "the identification of surpluses or deficits, potential of exchanges of energy, prospects for energy demand and possibilities for change of the energy matrix from which it is possible to establish development plans and regional energy policies, imply the availability of up-to-date official information, homogeneous and consistent to allow an adequate knowledge of the characteristics of the energy systems of the countries, comparative analysis and consolidation of information for built-in features of the region, whereas the national energy balances as the basic element" (OLADE, 2013).

The present report is focused on Dominica's Energy Balance. This document and results were prepared after a compilation process on available energy information and data collection from accurate primary sources such as surveys, interviews, Government published material, census records and reports or studies carried out by international energy and cooperation agencies. The guidelines and recommendations to develop this research were based on OLADE's Energy Balance Methodology.

Based on the stakeholder analysis and mapping of the structure of the energy sector, several forms and surveys were applied to the most representative public and private institutions that participate in the main phases of the energy chain of the country, such as suppliers and consumers.

The document is divided into eight sections: The first section deals with the country's general information that includes a description on geography, climate, socio-economic characteristics, and the overall energy sector. The second section provides an overview of the concepts defined by the OLADE's Energy Balances Methodology. The third section contains the description of the data gathering process. The fourth section describes the technical visit to the country. The fifth section provides the results on the Energy Balances that were elaborated for the periods of 2010, 2011 and 2012. The sixth section presents the country's Greenhouse Gases Emission Inventories (2010-2012) by following the technology approach. The seventh section shows economic and energy indicators built by using the energy balance results. The last section describes the final conclusions and recommendations on the Dominica's Report. By the end of the eight sections, more additional details can be found in the Annex.

ii. Background

The First Meeting of Energy Ministers of CELAC was held in Lima, Peru, on November 16, 2012, where the Lima Action Plan was adopted and OLADE was requested to participate as Technical Advisor. Subsequently, the V Meeting of Ministers of the Latin American Energy Organization (OLADE) was held in Quito, Ecuador, on May 17, 2013, approving the participation of OLADE as a Technical Advisor of the Meeting of Ministers of CELAC. This meeting of Ministers also accepted the working program (OLADE's cooperation to CELAC), which was presented previously at the V Meeting of Coordinators of CELAC on May 9-10, in Havana, Cuba.

The working program approved by the 5th extraordinary meeting of Ministers of OLADE included the Reduction of asymmetries in the CELAC energy sector information. Since there isn't a source of consistent information that could be used to analyze the supply and demand situations of some CELAC's Member States and to develop projects to diversify their energy matrix, OLADE presented the action plan for the elaboration of the Energy balance of Saint Lucia, Antigua & Barbuda, Bahamas, Dominica, Saint Kitts and Nevis, Saint Vincent and the Grenadines. This project has the financial support of the non-refundable technical cooperation with the Development Bank of Latin America – CAF” (OLADE, 2013).

Dominica has been trying to promote alternative energy sources such as geothermal energy in order to harness their high local potential. Other renewables sources that are still being developed are the wind and solar energy sources but in a small scale. Within the Dominica's overall energy arena, in order to have an integrated energy planning and not to keep heavily reliant on foreign oil, Dominica needs to centralize all the energy data that is spread all over the country. In that sense, supply and demand side data is required to gather in the hydrocarbon, electricity and renewable subsectors. Some other additional information such as socio-economic data, energy infrastructure, vehicle fleet, and census, among others is also required to have a complete overall picture of the energy sector of Dominica.

Based on the country's necessity of having a sustainable energy development and a tool to aid its decision-making, and the readiness of CELAC in having a deeper understanding of the energy sector in the Eastern Caribbean Member Countries, OLADE has prepared the following report hoping to fulfill both, Dominica and CELAC's requirements.

I. Country description

I.1. General profile

Country	Commonwealth of Dominica
Capital city	Roseau
Head of State	Honorable Eliud Thaddeus Williams
Head of Government	Honorable Roosevelt Skerrit (since 2005)
Languages	English, French Patois
Currency	Eastern Caribbean Dollar (EC\$)
Exchange rate (2014)⁽¹⁾	USD 1: EC\$ 2.7169
Economy	Agriculture and Tourism based
Population (Census 2011)⁽²⁾	71,293
GDP (Constant 2005prices) (US\$ MM) (2012)⁽³⁾	479.69

Sources: (1) Eastern Caribbean Central Bank – ECCB (www.eccb-centralbank.org, web page visited Jan, 16th 2014); (2) Central Statistical Office and (3) World Bank (www.databank.worldbank.org, web page visited Jan, 15th 2014).

I.2. Geography

Region	Eastern Caribbean
Location	Between the French islands of Guadeloupe to the north and Martinique to the south
Latitude	15° 20' N
Longitude	61° 22' W
Surface area	751 km ² (289.5 sq. mi)



Map1. Eastern Caribbean⁽¹⁾



Map2. Dominica⁽²⁾

Sources: (1) Google earth (web page visited Nov, 23th 2013) and (2) <http://dominica.gov.dm> (web page visited Nov, 23th 2013)

Dominica is a volcanic island and the largest and most mountainous among the Windward Islands in the Eastern Caribbean Sea, limited to coastal areas in the northeast, in river valleys and in certain areas in the center of the island (MoAFF, 2012 pp. 19 and NREL, 2012 pp. 90).

I.3. Climate

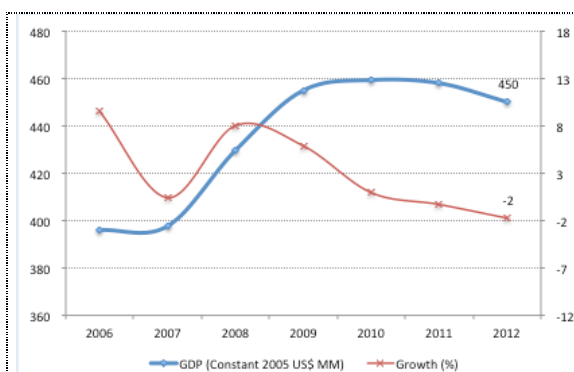
The climate of Dominica is classified as humid tropical marine. Temperature average is around 27°C and the average annual rainfall above 2,000 mm. Due to its location natural hazards affecting the island are tropical storms and hurricanes (MoAFF, 2012 pp. 20).

I.4. Socio-Economics Characteristics

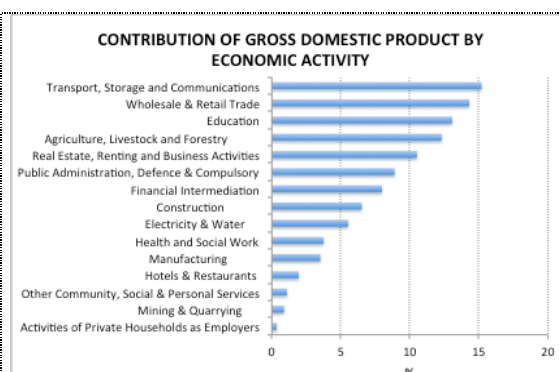
Current macro-economic results

The Gross Domestic Product for year 2012 reached an amount of US\$MM 480 at current prices, while in terms of constant prices (2005) was US\$ MM 450. Economic growth was -2% (See Graph 1). GDP per capita accounted US\$ 6,692 the same year while the annual Inflation rate was 1%¹.

During 2012 Dominica's import represented 51% of GDP and exports the 40%². Main imports include manufactured goods, machinery and equipment, food and chemicals, whilst major exports consist of bananas, soap, bay oil, vegetables, grapefruit and oranges³.



Graph 1. Gross Domestic Product and Economic Growth (2001 – 2012)



Graph 2. Contribution of Gross Domestic Product by Economic Activity (%) (2012)

Source: Eastern Caribbean Central Bank

¹<http://databank.worldbank.org> (web page visited Jan, 15th 2014)

²<http://databank.worldbank.org> (web page visited Jan, 16th 2014)

³www.commonwealthofnations.org (web page visited Jan, 15th 2014)

General description

Dominica's economy is described as a small, open and vulnerable to external shocks (ECCB, 2010 pp. 5). In terms of GDP contribution, one of the dominant sectors has been Agriculture, reaching a 12.3% in 2012. This activity is mainly composed by banana production and export (Crops represents a 10.9% of GDP, Banana crops reached 1.1% while other crops remain relevant; citrus, mangoes, coconuts, and cocoa). It counts with a relatively important tourism sector based on the country's natural attractions (MoAFF, 2012 pp.21). Named "The Nature Island", Dominica is doing efforts to position itself as a premier eco-tourism destination in the Caribbean (MoTLA, 2013).

Other relevant sectors are Government Services, Wholesale and Retail, Banking and Insurance, Communications and Construction (ECCB, 2010 pp. 7).

Manufacturing sector consists primarily of a number of light industries producing for the domestic and regional markets, being soap the main primary export product⁴.

The GDP of Dominica represents 9% of the Total GDP of the Eastern Caribbean Currency Union⁵ –ECCU–, with Agriculture, Livestock and Forestry as the main activity, with an overall contribution of 2.8%.

Residential

Preliminary results of the *Population and Housing Census 2011* shows a population of 71,293 mainly located in the Parish of Saint George –the 30% of total– which includes the Capital city Roseau.

Number of Customers (2012) ⁽¹⁾	30,512
Number of Households (2011) ⁽²⁾	26,085
Number of persons per Households (2011) ⁽²⁾	2.7
Electricity consumption (MWh) (2012) ⁽¹⁾	40,785

Table 1. Residential Summary – 2012

Source: (1) DOMLEC, 2012; (2) Central Statistical Office, 2011.

In terms of living units, 26,085 households were registered, 8.5% additionally in comparison with the previous census (2001).

During 2012, the Residential Sector represented the 45.3% of total electricity consumption, and the 87.5% of total costumers.

⁴ www.commonwealthofnations.org(web page visited Jan, 15th 2014)

⁵ The Eastern Caribbean Currency Union –ECCU– is a development of the Organization of Eastern Caribbean States, and under the supervision of the Eastern Caribbean Central Bank. The ECCU is composed of Antigua & Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines.

The Central Statistical Office –CSO– in the Ministry of Finance is a key stakeholder with the responsibility to provide timely, accurate and reliable data to the public and private sectors⁶. Most of the relevant data for residential analysis but for all other sectors depend on the CSO.

Industry

Dominica's Industry consists of a number of light industries producing for domestic and regional markets. Manufacturer products consist of soaps and agro-processed items like beverages, furniture and textiles (MoAFF, 2012 pp. 59). Total added value reaches 3.5% of the total GDP (ECCB, 2012). The largest manufacturer in the country is Dominica Coconut Products Ltd, which is controlled by Colgate-Palmolive. The company produces soaps and other personal hygiene products from coconuts (CDB, 2010).

Added Value (EC\$M) Constant (2006) ⁽¹⁾	34.4
Added Value as % of GDP ⁽¹⁾	3.5
Number of electricity consumers ⁽²⁾	31
Electricity consumption (MWh) (2012) ⁽³⁾	7,868

Table 2. Industrial Summary – 2012

Source: (1) ECCB, 2013; (2) Central Statistical Office, 2011; (3) This value is referred to the consumers connected to the grid, registered by DOMLEC. It does not include self-generators. DOMLEC, 2012.

The Ministry of Employment, Trade, Industry and Diaspora Affairs have the responsibility for formulating and implementing Dominica's domestic and external trade policies⁷.

Agriculture, Fishing and Mining

Agriculture, Fishing and Mining Sector represents 12.3% of total GDP (2012). By the 1970s, banana production and export, based on a preferential access regime for bananas in the UK, was the principal source of foreign exchange and employment. However, the cultivation of that crop has declined over the last years due to change in export agreements and competition (MoAFF, 2012). Despite of this, Agriculture continues to be one of the most important economic activities⁸ and employer (24%)⁹.

Added Value (EC\$M) Constant (2006) (2012) ⁽¹⁾	120.4
Added Value as % of GDP (2012) ⁽¹⁾	12.3
Agriculture main products ⁽²⁾	Banana, Oranges, Grapefruit, Coconuts, others
Agricultural area (ha) ⁽³⁾	26,000

Table 3. Agriculture, Fishing and Mining Summary

Source: (1) ECCB, 2013; (2) CSO; (3) <http://faostat3.fao.org> (web page visited Jan, 16th 2014) and MoAFF, 2012;

⁶<http://finance.gov.dm/> (web page visited Jan, 16th 2014)

⁷<http://dominica.gov.dm/> (web page visited Jan, 16th 2014)

⁸<http://www.commonwealthofnations.org/> (web page visited Jan, 16th 2014)

⁹<http://faostat3.fao.org/> (web page visited Jan, 16th 2014)

For year 2011, FAO Statistics⁹ reports an agricultural area of 35% of total Country area. Agricultural sector is composed primarily of a large number of small farmers to larger mono crop plantations, cultivating from 0.5 to 10 hectares of land and with minimal technological¹⁰ and scientific inputs¹¹.

The Ministry of Agriculture and Forestry is the primary public sector institution responsible for formulating, executing, monitoring and coordinating the Government of the Commonwealth of Dominica agricultural and environmental policies¹¹.

Commercial, Services and Public Sector

Following the grouping methodology of the Standard Industrial Classification, this economic sector is comprised by electricity, gas and water; wholesalers, retailers, restaurants, and hotels; transportation and communications (only business establishments but not vehicle fleets, whether or not they belong to the above); financial establishments (banks), insurance companies, and services provided to other companies; and social and community services, such as schools, universities, health, churches, movies, theaters, repair businesses, public administration, defense, etc. (OLADE, 2004).

Added Value (EC\$M) Constant (2006) ⁽¹⁾	738.2
Added Value % GDP ⁽¹⁾	75.9
Number of electricity consumers ⁽²⁾	4,327
Electricity consumption (MWh) ⁽²⁾	41,460

Table 4. Commercial, Services and Public – 2012

Source: (1) ECCB, 2013; (2) DOMLEC, 2012.

Due to its location and natural attractions, Tourism and Travel Industry is one key economic activity. Dominica's Government has declared it as a high priority sector. It is supposed to be a driver in national development and diversification (CHL, 2013). In year 2012, the contribution of Hotels and Restaurant (as % of total GDP) was 2.0%, and registered an annual growth of 2.4% in the last three years (ECCB, 2013). During 2012, the country welcomed a total of 363,500 visitors, generating a total visitors expenditure of EC\$M 302,600 (CHL, 2013).

The World Travel and Tourism Council reports that the *direct contribution* of Travel and Tourism to GDP was 9.5% of total in 2012 directly supported 3,000 jobs (8.8% of total employment) and generate an investment of 13.9% of total (WTTC, 2013).

¹⁰ As a reference, in 1995 the Food and Agriculture Organization of United Nations –FAO– carried out Dominica Agricultural Census. In the Report of Main Results, a total area of 21,146 Ha was classified by size of total area of 9,026 agricultural holdings (farms). In that moment, near to 4,500 holdings occupied an area of 4,716. Most of this land surface was used for agricultural purposes (69.6%), whose Cropland uses registered 13,048 Ha. In terms of permanent crops, a total of 1,224 holdings were devoted to bananas. Other crops were Coconut, Plantains, Grapefruit, Oranges, Cocoa, Mangoes, Coffee, among others. Some Machinery and Equipment used reported by holdings were sprayers, pumps and motor vehicles.

¹¹ <http://www.commonwealthofnations.org/> (web page visited Jan, 16th 2014)

There are some different informer units of that sector such as the Central Statistical Office, Ministry of Finance, Ministry of Employment, Trade Industry and Diaspora Affaires, Ministry of Lands, Housing, Settlements, and Water Resource Management, Ministry of Public Works, Energy and Ports, among others.

Transport

As is the case in other developing countries, road transport is one of the biggest energy consumers in Dominica. A total fleet of around 12,000 registered vehicles was reported by the Inland Revenue Division (2013)¹². The Commonwealth of Dominica Second National Communication (2012) mentions that from licensed vehicles from 1999 to 2006 “less than 15% of newly registered vehicles were new. The remainder was purchased as re-conditioned/used vehicles from overseas”. This tendency was expected to increase due to the possibility of comparatively cheap reconditioned vehicles made easy available through the Internet.

Added Value (EC\$M) Constant (2006) ⁽¹⁾	70.28
As % of GDP ⁽¹⁾	7.18
Vehicles Fleet ⁽²⁾	12,000

Table 5. Transport Summary – 2012

Source: (1) ECCB, 2013; and (2) IRD, 2013

Construction and Others

Construction sector is mostly promoted from tourist and construction industries, for the construction of hotels and other related infrastructure. This activity is funded by foreign investment or through government initiatives¹³; such is the case of the Public Sector Investment Programme. Some basic indicators shows a total of construction starts of 117 in 2011, in contrast to 96 units in 2010 (21.9%) and Cement sales (Bags) 678,850 units (-3.2%).

Added Value (EC\$M) Constant (2006) ⁽¹⁾	63.7
Added Value as % of GDP ⁽¹⁾	6.5
Electricity consumption (MWh) ⁽²⁾	3,770

Table 6. Constructions and Others Summary – 2012

Source: (1) ECCB, 2013; (2) MoAFF, 2012.

The government ministries in charge of the sector include the Ministry of Lands, Housing, Settlements and Water Resource Management, which focuses on housing provision; the Ministry of Public Works, Energy and Ports, which concentrates on

¹² Base don the Inland Revenue Report (Excel file), the total fleet of registered vehicles only include those vehicles, which have been licensed during that particular year.

¹³ <http://www.commonwealthofnations.org/> (web page visited Jan, 16th 2014)

infrastructure; and the Ministry of Environment, Natural Resources, Physical Planning and Fisheries, which focuses on town planning¹².

I.5. Energy sector

Dominica's energy supply is heavily dependent on fossil fuel imports, especially diesel oil. Although Dominica does not have any hydrocarbon resources, it is one of the two Caribbean Islands with waterfalls that has harnessed its hydropower potential. As the majority of the volcanic islands, it has an extensive geothermal energy potential, apart from solar, wind and biomass resources (OAS, 2010).

The Ministry of Public Utilities, Energy and Ports is the responsible to carry out the nation's energy policy. The Energy Unit of the ministry sets policy on electricity generation and distribution, including development of Renewable Energy, through the Dominica's Renewable Energy Programme (OAS, 2010 pp. 90). The Independent Regulatory Commission (IRC) is the regulatory authority for the generation, transmission, distribution, supply and sales of electricity and reports to the Minister¹⁴.

I.5.1. Institutional structure

National Level

- ❖ **Ministry of Public Works, Energy and Ports**¹³: The Energy Unit is the responsible for coordinating activities related to the development and expansion of electricity production and distribution, including the development of renewable energy sources such as geothermal, solar, wind and hydro energies. The Unit also coordinates matters related to the supply and provision of public lighting. Some of its main objectives and functions are, among others: i) Articulate and document the National Energy Policy (NEP) for Dominica; ii) Develop a Sustainable Energy Plan (SEP) for Dominica and iii) Improve the legislative and regulatory framework for the energy and electricity sector in Dominica.
- ❖ **Independent Regulatory Commission – IRC**¹⁵: The IRC was established under the Electricity Act –Act 10 of 2006– which was passed into Law in October 2006. IRC effectively took off in June 1, 2007, following the appointment of its five Commissioners, and their subsequent inauguration on June 22, 2007. IRC has been set up as an independent regulator whose primary responsibilities are: i) Ensure orderly development of a competitive power market; ii) Ensure efficient, safe and adequate production of electricity; iii) Promote competition & private sector participation; iv) Protect consumers and the public interest; among others.
- ❖ **Dominica Electricity Services LTD –DOMLEC–**: DOMLEC have granted two licences from the IRC, the first is a non-exclusive generation Licence, and the second as an exclusive transmission, distribution and supply electricity within Dominica (IRC, 2013). Both licences came effective since January 1st 2014. Before the Company operated under the 2006 Electricity Supply Act¹⁶. Formed

¹⁴<http://publicworks.gov.dm/> (web page visited Dec, 15th 2014)

¹⁵<http://www.ircdominica.org/> (web page visited Dec, 15th 2014)

¹⁶<http://domlec.dm/> (web page visited Dec, 15th 2014)

in 1949, the Organization has more than sixty years of operations consisting in Generation and Transmission & Distribution. Is owned by the US firm WRB (52.8%), the Dominica Social Security (owns 20%) and Local Corporate and Private Citizens own the remaining 27% (DOMLEC, 2011).

In April 2013 Light and Power Holdings bought WRB Enterprises shares and became the majority shareholder of the company¹⁷.

Regional Level (Eastern Caribbean)

i. Electricity Sector

- ❖ **Caribbean Electric Utility Services Corporation –CARILEC–¹⁸**: The CARILEC Secretariat strives to enhance communication among its members and to serve as the focal point for general and technical information. The Secretariat takes the lead in advocating for change in the electric utility industry in the Caribbean and in this regard produces a number of information products and provides a range of services to members.
- ❖ **The Caribbean Renewable Energy Development Programme –CREDP–¹⁹**: The CREDP is a joint project of CARICOM and the German International Cooperation GIZ. It is financed by the German Federal Ministry of Economic Cooperation and Development BMZ and implemented by the consortium of Projekt-Consult GmbH, Germany and Entec AG, Switzerland, on behalf of the GIZ. CREDP seeks to remove barriers for the use of Renewable Energy and application of Energy Efficiency measures in the Caribbean Region.
- ❖ **Eastern Caribbean Energy Regulatory Authority –ECERA–²⁰**: ECERA is *expected* to provide arms-length regulation and oversight of the electricity utilities to achieve cost efficiency in electricity supply and by extension lower electricity rates to consumers in the medium to long term. Another associated benefit of ECERA is the provision of advisory services to Governments on renewable energy development, electricity sector plans and cross border interconnection, which is critical for geothermal development within the OECS.

ii. Oil Sector

- ❖ **PetroCaribe**: It is an *Energy Cooperation Agreement*, which consists of a series of bilateral market agreements between each Caribbean state and *Petróleos de Venezuela, S.A.* (Petroleum of Venezuela) (PDVSA), the Venezuelan state oil company, were established. These agreements, known collectively as PetroCaribe Treaties, have enabled Caribbean states to purchase oil on conditions of preferential payment²¹.
- ❖ **The Caribbean Information Platform on Petroleum –CIPPET–²²**: CIPPET was developed by the Scientific Research Council –SRC–, located in Kingston Jamaica, as a regional focal point for the **Caribbean Energy Information System –CEIS–**. The CEIS is a network of 18 Caribbean Countries with responsibility for the coordination, gathering and dissemination of energy information for these countries to facilitate sharing of energy information among each other and to aid policy decision-making. CIPPET is managed by CEIS

¹⁷<http://domlec.dm> (web page visited Jan, 15th 2014)

¹⁸<http://carilec.com/> (web page visited Nov, 25th 2013)

¹⁹<http://credp-gtz.org/> (web page visited Nov, 25th 2013)

²⁰<http://www.oecs.org/our-work/projects/ecera> (web page visited Nov, 25th 2013)

²¹ <http://www.petrocaribe.org/> (web page visited Feb, 25th 2014)

²²<http://www.ceis-caribenergy.org/> (web page visited Nov, 25th 2013)

and will serve as a tool to facilitate the provision of Caribbean Petroleum Energy Information and Statistics to member countries of CEIS and other users of information related to petroleum. It creates a central access point through which member countries can submit their requests for information, it also allows users to “Be in the Know” on past and current issues relevant to the petroleum industry.

I.5.2. Legal and policy framework

Government’s objectives for the energy sector are among key strategic plans of actions due to the high cost for the population and to imports dependency on fossil fuels. Dominica legal and policy framework is detailed below.

❖ Energy Development Program²³

Among other things highlights minimizing of the cost of energy, diversify energy sources, reduce the reliance on fossil fuels, and conserve energy, while at the same time, reducing emissions of Greenhouse gases. One key aspect of the EDP includes the exploration and development of Dominica’s geothermal resources, primarily for the generation of clean and lower cost electricity.

The Project intends to:

- Sell at least 40 MW of electricity each to Guadeloupe and Martinique.
- Reserve about 20 MW of electricity generated for Dominica.
- Begin production of geothermal energy (electricity) within 5 years.
- Reduce the cost of electricity produced in Dominica from US\$0.27/KWh to US\$0.06/KWh, before fuel surcharge...

❖ National Energy Program²⁴

The National Energy Policy will articulate government’s position with regards to the governance of the energy sector, and shall provide guidance on areas such as: Regulation, Legal Aspects, Pricing and taxation; Safety and Industry Standards, Power expansion planning/development, Public-Private Partnerships/Engagements, Trading and Export and Capacity Building; It will also address Self Generation, Independent Power Production, Net Metering, Development of indigenous sources of renewable energy – geothermal; hydro; solar; wind; biomass..., Service standards, Tariffs, Energy Efficiency, Environmental Aspects and Universal access to electricity.

❖ Sustainable Energy Plan²³

The Sustainable Energy Plan will, together with the National Energy Policy:

- Lay out a strategy by which the energy production and use in Dominica may be transformed, becoming more economically and environmentally sustainable, while enhancing the electricity generation mix.

²³ Ministry of Public Utilities, Energy and Ports. Dominica, 2009 (from <http://www.sidsenergyforall.org> - web page visited Jan, 21th 2014)

²⁴ Ministry of Ambient, Forestry and Fisheries. Commonwealth of Dominica Second National Communication. Dominica, 2012

- Ensure the existence of adequate energy supplies at affordable rates to sustain economic development, while meeting current and projected power demand.
- Provide for stable, reliable, and affordable electricity supplies for all customers.
- Reduce the cost of electricity for consumers
- Enhance the security of energy supply and use for all sectors of the economy.
- Allow reasonable incomes for businesses engaged in the local energy sector, while attracting international investment where appropriate – tourism; manufacturing; agro-processing...
- Creation of new job opportunities for Dominicans.
- Promote energy efficiency and conservation at all levels of the economy in order to achieve optimum economic use of renewable and non-renewable sources of energy.
- Protect the local and global environment by maximizing the use of renewable-energy and energy-efficiency alternatives where viable. This is especially relevant in Dominica as much of the renewable energy generation may take place in nature preserves or rain forest areas. It is essential that this be done in a manner that does not threaten biodiversity, forestation levels, and other environmental aspects.
- Promote the generation of income through energy exports produced from renewable energy sources (esp. geothermal resources).
- Contribute to improving the Balance of Payments accounts for Dominica.

1.5.3. Electricity

As it is the case in many Eastern Caribbean Countries –ECCs–, the energy industry is characterized by a single utility responsible for production, transmission, distribution and sale of electricity.

Dominica Electricity Service –DOMLEC– is a public - private corporation with a recently granted exclusive Licence with an expected term of 25 years (IRC, 2013). DOMLEC operates two diesel plants (Fond Cole and Portsmouth – representing 20.1 MW) and three hydropower facilities (Laudat, Trafalgar and Padu – representing 6.6 MW) with a total capacity of 26.7 MW. The distribution system serves near to 34,900 customers, with an annual energy consumption of 90 GWh in 2012, which represents an increase of 1.4% over 2011 (DOMLEC, 2011 and 2012). During 2008 the average price of electricity (0.4567 \$/kWh) it was the highest among Eastern Caribbean Countries (Total average price of electricity of ECCs 0.31 \$/kWh) (NREL, 2012 p.93).

Energy Supply	101.6 GWh
Diesel generation	74.9 GWh
Installed capacity	18.1 MW
Hydro generation	26.7 GWh
Installed capacity	6.7 MW
Costumers	34,391
Price (2008)⁽¹⁾	0.4567 US\$/kWh
Demand growth	2.4%

Table 7. Electricity - General Information (2012) ⁽²⁾

Sources: (1) NREL, 2012; (2) DOMLEC, 2012

Dominica has nearly 100% electrification, thanks to past rural electrification programs funded by the Caribbean Development Bank, USAID and OAS. Losses as percentage of Gross Generation vary from 8% (2012) to 9.3% (2010) (DOMLEC, 2012), while energy demand is expected to rise modestly about 2.7% in the next years (NREL, 2012 p.42).

Consumers

Dominica has registered an annual average increase of 4.0% on electricity demand during the last three years, mainly due to the growing demand in the Commercial sector (6.3%), followed by Street Lighting (5.6%) and Residential with an average of 3.9% (DOMLEC, 2010 – 2012) (See Table 9).

Electricity constitutes the primary source of commercial energy for industrial and other uses. However, the main end users of electric source of energy are domestic, commercial and institutional... “And the patterns of use demonstrate the low energy use of industry...” (MoAFF,2012).

Hotels electricity consumption has decreased (-19.0%) simultaneously with the reduction in the number of facilities (-95.1%). The Residential sector shows a positive

variation in the number of customers (5.7% inter annual), reaching 30,512 units while in the opposite rank Hotels show a reduction of -26.3% (See Table 8).

Electricity – Operating Statistics			
Number of Customers			
Sector	2010	2011	2012
Residential	28,948	29,838	30,512
Commercial	3,907	4,027	3,962
Industrial	28	29	31
Hotel	571	28	27
Street Lighting	496	469	338
TOTAL	33,986	34,391	34,870
Growth	11.3	1.2	1.4
Energy Demand (MWh)			
Residential	39,473	40,149	40,785
Commercial	35,537	37,858	38,692
Industrial	7,449	7,560	7,868
Hotel	2,769	1,654	1,071
Street Lighting	1,547	1,654	1,697
TOTAL	86,775	88,842	90,113
Growth	8.1	2.4	1.4

Table 8. DOMLEC's Electricity Operations Statistics, 2010 - 2012

Source: DOMLEC, 2012

1.5.4. Renewable Energies

Due to its volcanic origins Dominica may have geothermal power generation and is now drilling and testing of three geothermal wells in the Roseau Valley. Because of its big potential, the project would include the electricity selling to Guadeloupe and Martinique via interconnection with submarine cables. In the short term it is expected to construct a 15 MW Geothermal Power Plant and at large scale 120 MW facility in the long term²⁵. Table 9 shows Technical Potential for Renewable Energy Developments (MW).

Since 1998 the CARICOM has created the CARICOM Renewable Energy Development Programme (CREDP). Conceived with the support of 13 Caribbean countries, it aims to reduce barriers to the increased use of renewable energy, thus reducing the dependence on fossil fuels while contributing to the reduction of greenhouse gas emissions²⁶.

Hydro	Wind	Geothermal	Solar PV	Biomass	Total Potential
17	30	300	45	Unknown	392

Table 9. Technical Potential for Renewable Energy Developments (MW)

Source: NREL, 2012

²⁵<http://publicworks.gov.dm> (web page visited Jan, 15th 2014)

²⁶<http://caricom.org/> (web page visited Dec, 13th 2013)

1.5.5. Hydrocarbons

Dominica does not have any upstream oil sector and remains dependent on fossil fuel imports; mainly for electricity generation (Diesel generation is about 75% of total). Consequently, internal prices of energy depend on the oil price rise and market volatility (NREL, 2012).

A total of four companies import all of oil products, these are The Trinidad and Tobago National Petroleum Company Limited (NP), SOL, RUBIS and PetroCaribe.

*The Trinidad and Tobago National Petroleum Company Limited*²⁷ was founded in Trinidad and Tobago in 1972, and is now one of the most diversified petroleum marketing utilities in the English-speaking Caribbean. It sells Petroleum Fuels, Lubricating Oils and Greases, Liquefied Petroleum Gas and Compressed Natural Gas and Bituminous Products and Automotive Specialty Products, and delivers Marine bunkering and Aviation re-fueling at their facilities in both Trinidad and Tobago and in Dominica.

*The SOL Group*²⁸ is an independent petroleum marketing company in the Caribbean basin, founded in 2005 with operations across 21 countries. Supplied petroleum products are fuels, lubricants and LPG. *Sol Antilles and Guianas Limited* operate in Dominica.

RUBIS²⁹ is a French private limited company established in 1990. Its operations consist in the distribution of petroleum and aviation fuels, LPG and lubricants. It has presence throughout the Eastern Caribbean including Antigua, Barbados, Dominica, Grenada, Guyana, St Lucia and St Vincent as well as the Western and French Caribbean, among others countries and continents.

At the same time, Dominica participates in *PetroCaribe*³⁰, since the initiative was launched in 2005. The supply quota is 1 kbd, and petroleum-based products include Diesel, LPG and Gasoline 95. The construction of some facilities was part of the cooperation agreement, apart from social plans. The mixed company founded *PDVCaribe (Dominica) Ltd* is in charge to operate the following projects:

- Fuel distribution and LPG filling plant (39MB)
- Electricity Power Plant (7MW)
- Service station for fisherman (10)

Identified imported and consumed secondary main energy sources are Diesel Oil, Gasoline, Liquefied Petroleum Gas (LPG) and Kerosene and Jet Fuel.

²⁷<http://www.energy.gov.tt/> (Web page visited on Jan, 16th 2014)

²⁸<http://solpetroleum.com/> (Web page visited on Jan, 16th 2014)

²⁹<http://www.rubis-caribbean.com/> (Web page visited on Jan, 16th 2014)

³⁰<http://www.petrocaribe.org/> (Web page visited on Dec, 15th 2013)

II. Structure of energy balance, sources and activities definition³¹

II.1. General structure of the Balance

The energy balance of OLADE is comprised by a double-entry matrix where the columns indicate the energy sources and the rows correspond to the activities, which form part of the energy system.

A barrel of oil equivalent (Boe) is the calorific unit used to display the energy balance.

The basic components of the energy balance are:

- Energy sources
 - Primary energy
 - Secondary energy
- Activities
 - Supply
 - Transformation
 - Demand

The energy balance matrix developed by OLADE, in terms of final energy, reflects the relations among all of the stages of the energy process.

In the Table 10, three stages described below can be distinguished:

- | | |
|------------------|---|
| • Supply | Energy supply through the combination of production, importation, exportation and variation in stocks. |
| • Transformation | Physical, chemical and/or biochemical modification of one energy source or form to another, in a transformation center. |
| • Demand | Consumption of energy sources by final consumers in the different sectors, prior to some chemical or physical conversion of energy. |

³¹ OLADE Methodology for Preparing Energy Balances, October 1995.

		PRIMARY SOURCES										SECONDARY SOURCES												TOTAL
		NON RENEWABLE SOURCES				RENEWABLE SOURCES				Electricity	L.P.G.	Gasoline / Alcohol	Kerosene	Diesel Oil	Fuel Oil	Coke	Charcoal	Gases	Other Secondary	Non-Energy	Total Secondary			
		Petroleum	Natural Gas	Coal	Fission Fuels	Hydroenergy	Geothermal	Firewood	Sugar Cane Products													Other Primary	Total Primary	
		kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe	kBoe
SUPPLY	PRODUCTION (PP)																							
	IMPORT (IM)																							
	EXPORT (X)																							
	INVENTORIES (IV)																							
	UNUSED (UN)																							
	TOTAL SUPPLY																							
TRANSFORMATION	REFINERY																							
	POWER PLANTS																							
	SELF PRODUCERS																							
	GAS TREATM.PLANT																							
	CHARCOAL PLANT																							
	COKE/BLAST FURNAC																							
	DISTILLERY																							
	OTHER CENTERS																							
TOTAL TRANSFORMATION																								
FINAL CONSUMPTION	OWN CONSUMPTION																							
	LOSSES																							
	ADJUSTMENT																							
	TRANSPORTATION																							
	INDUSTRY																							
	RESIDENTIAL																							
	COMMERC.,SERV.PUB																							
	AGRIC.,FISH.MIN.																							
	CONSTRUCTION,OTH.																							
	ENERGY CONSUMPTION																							
	NON ENERGY CONSUM																							
	FINAL CONSUMPTION																							

Table 10. Structure of an Energy Balance

Source: OLADE (2004)

II.2. Sources

II.2.1. Primary energy sources

Primary energy sources are obtained directly from nature or following an extraction process. Directly: water energy, solar energy, wind, firewood and other vegetable fuels. After an extraction process: petroleum, natural gas, coal, geothermal energy, etc.

The primary energy sources considered in this methodology are listed and defined as follows:

i. Non-renewable energy sources

- ❖ Crude oil: This is a complex mixture of hydrocarbons having different molecular weights, in which there are usually a small proportion of compounds containing sulphur and nitrogen. The composition of petroleum is variable and may be divided into three types, according to distillation residues: paraffin, asphalt or a mixture of the two.

Crude oil is used as a feedstock in refineries, where it is processed to obtain derivatives.

- ❖ Natural gas (free and associated): This is a mixture of gaseous fuels and includes both free natural gas and, present in coalmines or geopressure zones. Herein, both (the net free and associated gas produced) are placed under the same heading due to their similar nature and uses.

- Free Natural Gas

A gaseous mixture of hydrocarbons made up primarily of methane obtained from gas fields. Since it generally does not contain condensates, it is commonly called “dry gas”.

- Associated Natural Gas:

This is a gaseous mixture of hydrocarbons that is produced in association with crude oil. It generally contains fractions of light liquid hydrocarbons (condensates), so is frequently called “wet gas”.

- ❖ Coal: This is a black or dark brown solid fuel mineral that essentially contains carbon, as well as small amounts of hydrogen and oxygen, nitrogen, sulfur and other elements. It results from the degradation of the remains of plant organisms during long periods, due to the action of heat, pressure, and other natural physical–chemical phenomena.

Due to the different degrees of change in the process, coal is not a uniform mineral and is classified by ranks according to its degree of degradation, in series that range from lignites and anthracites, which have considerable differences in their volatile contents, fixed carbon and caloric value.

- ❖ Fissionable Fuel or Nuclear Energy: This energy is obtained from the mineral uranium following a purification and/or enrichment process. What is considered

primary energy as “nuclear fuels” is not the mineral uranium in and of itself, but the contents of the fissionable material that is what feeds the nuclear plants.

ii. Renewable Energy Sources

- ❖ *Hydroenergy*: The energy potential of a water flow
- ❖ *Geoenergy*: Geothermal energy is stored under the earth’s surface in the form of heat, which can be transmitted to the surface through a fluid that is in contact with the heated rock. This fluid is generally made up of water in liquid state, steam, or a combination of both. Only the portion of this energy source that is used in power generation is considered.
- ❖ *Wind energy*: This energy is produced by the wind and can be used jointly with a turbine–generator.
- ❖ *Firewood*: This energy is obtained directly from forest resources. It includes tree trunks and branches, but excludes timber industry wastes, which are included under the definition of “plant wastes” used for energy purposes.
- ❖ *Sugarcane products* (molasses, juice, and bagasse for energy purposes): These include sugar cane products for energy purposes. They include bagasse, the sugarcane juice and the molasses.
- ❖ *Other primary sources* (animal waste and other vegetable waste, recovered energy, etc.).
 - **Animal Wastes**: This refers to wastes from farm activities and urban wastes. These may be used directly as a fuel in dry form or converted to biogas, through a process of fermentation or decomposition method.
 - **Vegetable wastes**: These are energy sources obtained from farm and forestry wastes. This includes all farm wastes (except for sugarcane bagasse), such as: rice husks rice husks, coffee husks, palm nut husks, etc., sawmill wastes (not included under the heading of firewood nor bagasse, etc.), for energy purposes.
 - **Industrial or Recovered Wastes**: Substances with energy contents produced in industrial plants as a byproduct of the production process, such as black pulp liquor, chemical industry wastes (except for petrochemicals, which should be considered secondary products because they come from natural gas or petroleum derivatives), etc.
 - **Other Primary Energy Sources**: These include solar (water heating in households and hotels, grain drying, lighting with photovoltaic cells), urban wastes (garbage or liquid wastes) and any other primary source that is not mentioned in the descriptions above, but are relevant to the energy structure of the country.

II.2.2. Secondary energy sources

Secondary energy refers to the difference energy products whose origin is the different transformation centers, after undergoing a physical, chemical or biochemical process, and whose destination are the diverse consumption sectors, and/or other transformation centers.

The secondary energy sources considered in this methodology are listed and defined below.

- ❖ *Liquefied gas (LPG)*: This consists of a combination of light hydrocarbons that are obtained from distilling oil and/or treating natural gas. They can be of three types:
 - a) Combination of hydrocarbons from the C3 group (propane, propene, propylene)
 - b) Combination of hydrocarbons from the C4 group (butane, butylene)
 - c) Combination of C3 and C4 in any proportions
- ❖ *Gasoline and Naphtha* (aviation gasoline, motor gasoline, natural gasoline and naphthas): A combination of light liquid hydrocarbons obtained by distilling oil and/or treating natural gas, whose boiling range is generally between 30–200 degrees Celsius. It also includes the alcohol obtained from distilleries that is used as an energy product. This group includes:
 - *Aviation Fuel*: This is a combination of reformed naphthas of high–octane, high volatility and stability, and high freezing point, used in propeller–driven aircraft with piston motors.
 - *Motor Gasoline*: A complex mixture of relatively volatile hydrocarbons used, with or without additives (such as lead tetra–ethyl) for operating internal combustion engines.
 - *Natural Gasoline*: A product of natural gas processing, used as a raw material for industrial processes (petrochemical) in refineries or mixed directly with naphthas.
- ❖ *Alcohol*: Includes both ethanol (ethyl alcohol) and methanol (methyl alcohol) used as fuels.
 - *Ethanol*: is a colorless liquid that can be produced by fermentation of plant materials with a high sugar content, such as sugarcane juice or molasses; plant materials with high starch content, such as cassava, corn, etc.; and materials with high cellulose content: firewood, plant wastes. It can be used as anhydrous or hydrated alcohol, alone or mixed with gasoline in internal combustion engines.
 - *Methanol*: is also a colorless liquid that can be produced from several raw materials such as firewood, plant wastes, methane, natural gas, coal, etc. It is used in internal combustion engines.
- ❖ *Kerosene and Jet fuel*:
 - *Kerosene*: A liquid fuel made up of the oil fraction that is distilled between 150 and 300 degrees Celsius. It is used as a fuel for cooking foods, lighting, in motors, in refrigeration equipment, and as a solvent for domestic waxes and insecticides.
 - *Jet fuel*: This is kerosene with a special degree of refining, with a freezing point below that of common kerosene. It is used in reaction motors and turbo propellers.

- ❖ *Diesel oil (also including gas oil)*: Liquid fuels obtained from atmospheric distilling of oil from 200 to 380 degrees Celsius, are heavier than kerosene and are utilized in diesel engines and other compression–ignition engines.
- ❖ *Fuel Oil or Heavy Fuels*: This is waste from refining oil, which includes all heavy products and is generally used in boilers, power plants and navigation.
- ❖ *Coke*: The general term “coke” applies to a solid, non–smelting material with high carbon content, obtained as a result of the destructive distilling of coal, oil and other carbon materials. There are different types of coke that are normally identified by adding the name of the material of origin to the end. Included in this source are oil coke and coke oven coke.
- ❖ *Electricity*: This is energy transmitted by electrons in movement. It includes electric energy generated with any resource, whether primary or secondary, in hydroelectric, thermal, geothermal or nuclear plants.
- ❖ *Charcoal*: This fuel is obtained from the destructive distilling of wood in absence of oxygen, in charcoal plants. This product absorbs humidity rapidly, and often contains 10 to 15 % water, besides 0.5 to 1.0 % hydrogen and 2 to 3 % ash, with lower caloric power of around 6,500 Kcal / Kg. These characteristics may vary according to the quality of the firewood of origin. In some cases it can substitute coke in foundry processes, and be consumed in industries such as brick making, and in the residential sector for cooking.
- ❖ *Gases (biogas, coke gas, furnace gas, refinery gas)*: Included in this category are gaseous fuels obtained as by–products of refining activities, coke ovens and blast furnaces. It also includes the gas obtained in bio–digesters.
 - *Refinery Gas*: Non–condensable gas obtained from refining crude oil. Consists primarily of hydrogen, methane and ethane used mostly in refining processes.
 - *Blast furnace Gas*: Obtained as a by–product of steel production in blast furnaces, being used generally as a fuel for heating purposes in the plant.
 - *Coke Oven Gas*: The gas obtained as a by–product in the intense heating of coal or coke, with a combination of air and steam, in coke ovens. Composed of carbon monoxide, nitrogen and small amounts of hydrogen and carbon dioxide.
 - *Urban Gas*: Gas produced by the total carbonization or gasification of petroleum derivatives, with or without enrichment. Used fundamentally for food cooking in households, although it may have some industrial type uses.
 - *Biogas*: The gas, primarily methane, obtained from the anaerobic fermentation of biomass wastes.
 - *Other Gases*: All those not mentioned, having an energy use.
- ❖ *Other Energy Fuels*: All the secondary energy products that have not been included in the above definitions and have a share in the energy structure of a country.
- ❖ *Non–Energy Products* All products that are not used for energy purposes, although they contain a considerable energy content, among which are the asphalts, solvents, naphthas, oils and greases, lubricants, etc.
 - *Naphtha*: A volatile liquid obtained from processing oil and/or natural gas. Used as a raw material in refineries, as a solvent in manufacturing paints

and varnishes, and as a cleansing agent. Also used in petrochemistry and the production of fertilizers.

II.3. Activities

II.3.1. Supply

Production

i. Primary Energy Production

All energy, extracted, exploited, harvested, etc., is considered to be of importance to country, and of course that it has been produced within the national territory.

ii. Secondary Energy Production

It refers to the amount of energy that is generated from primary energy processing and/or in transformation plants before accounting for self-consumption. If any part of the production is recycled to the same transformation center that it comes from, this should be deducted from production.

All secondary energy production should be accounted at the transformation center where each energy product is produced..

Imports and Exports of Primary and Secondary Products

This explanation is valid for any energy source that can be imported and/or exported. The most common ones that are exchanged among countries are oil, natural gas, coal, nuclear fuel, other primary sources, electricity, liquefied gas, gasoline / alcohol, kerosene / jet fuel, diesel oil, fuel oil, charcoal, non-energy sources, and other secondary products.

i. Imports

It includes all primary and secondary energy sources originated outside the borders and that come into the country to be part of the total energy supply system.

ii. Exports

It is the amount of primary and secondary energy that a country spends on the foreign trade. Some countries follow the practice of considering the aviation gasoline and jet fuel sold to foreign aircraft, as well as the bunker sold to foreign ships as exports. OLADE does not recommend this procedure, because in order to be consistent, it would have to take what domestic ships and craft load abroad as imports.

According to OLADE's conception, the amount purchased by a consumer within a country is assumed to be part of final consumption although the physical process of consumption may take place in international spaces or waters. The same occurs when a vehicle loads gasoline in one country and then crosses the border consumes it in a neighboring country.

Stock change

Stock change is the difference between initial stocks (at January 1) minus final stocks (at December 31) for a given year, in the storage facilities for different products.

Inventory variation is considered according to its nature. Thus, an inventory increase means a reduction in the total supply and vice-versa.

Unused

This unused energy is the amount of energy that is presently not being used due to the technical and/or economic feasibility of developing it. Those most commonly dealt with under this heading are:

- ❖ Spilled crude oil
- ❖ Unused natural gas In countries that are large producers of oil-associated gas, it is common for a large part of that gas to be burned in the open. This is the unused natural gas, and the reasons for its non-use may be:
- ❖ Insufficient market
- ❖ The market exists, but there is no gas pipeline to transport the gas to the user's doors
- ❖ The market and the gas pipeline exist, but oil extraction requires that the amount of gas produced be greater than the demand can use

In any of these cases, unused natural gas represents a waste of an energy product that is highly valued by consumer sectors. Other Unused Primary Energy Sources You should take into account the amounts of "other primary sources" that have been considered as production but that do not reach final consumption.

Transformation Centers

This refers to energy that enters special processors called transformation centers for modification; these centers produce physical or chemical changes from one energy source to another or others, seeking in this way to improve the use of energy.

One of the paths that TOTAL SUPPLY can follow is as feed for transformation centers. In the case of primary energy, the flow is called TRANSFORMATION; if it is secondary, RECYCLING.

i. Refinery

It is a processing plant where oil is transformed into derivatives. Refineries basically separate crude oil into its different components (Figure No. 4). This methodology will treat all refineries as if they were a single processing unit. Although this representation does not allow you to completely describe the transformation center in terms of refining, or analyze the internal flexibility of each refinery, it suffices to establish the input and output ratios for the balance that proposed herein. There are different types of refineries with different types of processes, which do not always obtain the same products.

ii. Power Plants

Depending on the case, these transformation centers may consist of hydroelectric plants, conventional thermoelectric plants with steam turbines, gas turbines and internal combustion engines, nuclear power plants and geo-thermoelectric plants.

iii. Gas Treatment Center

In treatment plants, natural or associated gas is processed for the primary purpose of recovering compound liquid hydrocarbons such as gasoline and naphthas, pure hydrocarbons such as butane, propane, ethane or a combination thereof, and non–energy products such as carbon through a process of physical separation of gas components.

iv. Charcoal Plants

This is essentially a furnace where partial combustion of firewood is achieved, producing charcoal, non–volatile and volatile products, and generally the latter are not used. Note that wood, in the form of charcoal, has a greater caloric value.

v. Coke/Blast furnaces

These are found in the foundry industry. Coal is transformed into coke and coke oven gas in the coke oven. The coke then goes to a blast furnace, from which pig iron and blast furnace gas are obtained. Coke ovens for coal treatment produce coke, coke oven gas and non–energy products (benzols, tars, etc.). Part of the coke is obtained in the production of blast furnace gas, and the other part is consumed in the mineral reduction process in the blast furnace.

vi. Distillery

These are centers where mostly sugarcane juice is treated to produce alcohol. Likewise, they include alcohol distilleries that process other raw materials such as beets, cassava, or other products with high starch or cellulose contents.

vii. Other Centers

These may be the anaerobic digesters and pyrolysis furnaces, etc., which take farm, animal, forest, agroindustrial, and urban wastes, plus those from energy plants or any other transformation centers that are included in the country's balance and that are not among the above.

viii. Total Transformation

The total transformation is the sum of both primary and secondary energy for all inputs into transformation centers. When there is no energy source feed to transformation centers, the total is zero.

Note: OLADE's Energy Balance uses the negative sign as a convention for inputs from energy sources to transformation centers to transform them into other energy sources. Inputs for power generation are an example.

Self-Consumption

This is one of the four possible paths for SUPPLY. Self–consumption is the part of primary and secondary energy that the energy sector itself uses for its operations.

Statistical Adjustment

This line serves primarily, in some cases, to make up for differences due to conversion of different sources, from their original measurement units to units that are compatible for preparing the balance; and in other cases to make up for differences that are imperceptible and very difficult to find. In all cases, adjustment should not be greater than 5 % of the total supply. $\text{Adjustment} = \text{Domestic Supply} - \text{Total Transformation} - \text{Losses} - \text{Total Final Consumption}$

II.3.2. Demand

i. **Transportation Sector**

The final consumption of a country's transportation sector is the total amount of fuel required to move its vehicle fleet. The modes of transportation may be: a) Highway, b) Railroad, c) Air, d) River, and e) Maritime.

ii. **Industrial Sector**

An industry is an establishment classified as such in the "large division 3" of the Standard Industrial Classification.

Final consumption of the industrial sector consists of any energy source used in the processes that are carried out within the limits of the establishment, in which certain raw materials are transformed into final products.

This definition leaves out certain fuels that the industries purchase to facilitate delivery of their products to the market. It is common for certain industries such as beverages to distribute their products using their own vehicle fleet. However, that consumption belongs to the transportation sector.

Sometimes the distinction between industry and agriculture may not be very clear: the recommended criteria to solve doubtful cases are to consider as agricultural all activities carried out within the farm and as industry otherwise.

iii. **Residential Sector**

The final consumption of this sector pertains to a country's urban and rural households. A household is what the population census defines as such, and there are as many households as the census and derivative mechanisms have determined. It is important to emphasize that the energy balance has no particular definitions for population parameters, and is based on the definitions of available demographic studies, even when those definitions may be or appear incorrect.

iv. **Commercial, Service and Public Sectors**

The sector information unit is an establishment belonging to one of the following groups from the Standard Industrial Classification:

Div. 4 = Electricity, gas and water; Note: Electricity and gas are not counted here, as they belong to the energy sector (self-consumption), which leaves only water.

Div. 6 = Wholesalers, retailers, restaurants, and hotels.

Div. 7 = Transportation and communications; only business establishments but not vehicle fleets, whether or not they belong to the above.

Div. 8 = Financial establishments (banks), insurance companies, and services provided to other companies.

Div. 9 = Social and community services, such as schools, universities, health, churches, movies, theaters, repair businesses, public administration, defense, etc.

Final consumption for this sector is that of all establishments listed above, provided it is produced within the building where the establishment is located.

This excludes vehicle consumption. For a complete description, consult the Standard Industrial Classification.

v. Agriculture, Fishing and Mining Sectors

The informational unit of the farming, fishing and mining sectors is an establishment defined as follows in the Standard Industrial Classification data code:

Div. 11 = Agriculture and hunting

Div. 12 = Forestry and saw mills

Div. 13 = Fishing

Div. 2 = Extraction of minerals and metals

When it is difficult to separate agriculture from agroindustry, fishing from the fishing industry, and mining from metallurgy, the Standard Industrial Classification method supposes that the establishment is classified according to the group that most of its activities fall under. The best recommendation is to adopt the rule followed by the office in charge of developing national accounts.

vi. Construction and Other Sectors

This sector consists of two sub-sectors: Construction and Other Sectors.

Construction includes:

- ❖ New buildings and remodeling of old buildings;
- ❖ New industrial establishments;
- ❖ Civil works, such as bridges, reservoirs, tunnels, etc.;
- ❖ New roads and maintenance of the existing road system.

Other Sectors refers to any energy consumer that is not specified in the identified sectors; this item is generally used to complete consumption and as such should not be very large. If it were over 5 % of all final consumption, for example, this would mean that your country's balance is not well disaggregated.

vii. Final Energy Sector Consumption

This refers to the total amount of primary and secondary products used by all the aforementioned consumption sectors to meet their energy needs, and is therefore the sum total of all energy consuming sectors.

viii. Final Non-Energy Consumption

This sector is defined by the consumers that use energy sources as raw material for the manufacture of non-energy source goods. Here are some examples:

- ❖ Natural gas and petroleum derivatives (naphtha, reformatting, refinery gas, etc.), consumed in petrochemistry to make plastics, solvents, polymers, rubber, etc.
- ❖ Bagasse for making paper or pressed board
- ❖ Animal waste as fertilizers
- ❖ Plant wastes as feed for cattle

ix. **Total Demand**

This is all energy that is delivered to the consumption sectors, both for use as energy sources and as non-energy sources. The sum of all energy consumption (Line No 25) plus non-energy consumption (Line No 26) is the result of this sum.

II.3.3. Energy Chain

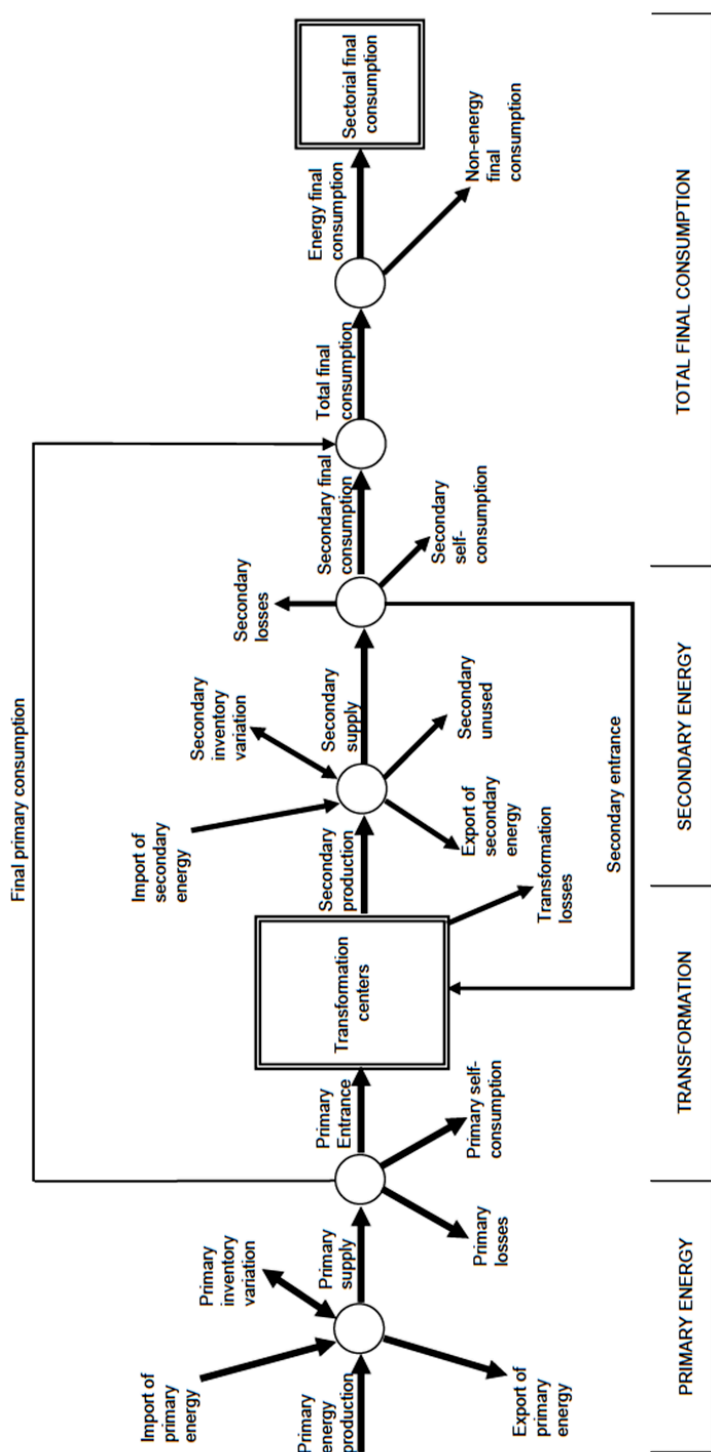


Figure 1. Energy Chain

III. Gathering information process

Following OLADE's methodology for Energy Balances, the Forms designed for data collecting consider three stages of the energy chain: supply, transformation and consumption.

III.1.1. Data collection process

The process of data collection consisted in the following steps:

- a) Characterize the energy sector (what to look for? and where to look at?):
 - Energy sources
 - Energy facilities
 - Key stakeholders
- b) Identify the most important sources and data requirements of information that will permit to build the metadata, so as to ensure the transparency, traceability, reliability and replicability of Energy Balance preparation;
- c) Design the contact list and agenda for OLADE's technical visit to Dominica with help of the Focal Point; and,
- d) Develop the templates and data collection surveys according to the defined OLADE's methodology for Energy Balances.

III.1.2. Forms description

General Energy Variables

3.1 [Form 1. F03_SURVEYDOMINICA_2013.xls](#)

Oil and Products (Section 1)

This form enables to collect annual *Oil* data by *Activity* and *Energy Source*. Activities are disaggregated in *Production*, *Exports*, *Imports* and *Consumption*, each of which divided into energy sources; *Oil*, *LPG*, *Gasoline*, *Kerosene* and *Jet Fuel*, *Diesel Oil* and *Fuel Oil*. Physical units are expressed in barrels (kbbbl). *Natural Gas* is disaggregated in *Production* (Without reinjection or flaring), *Flaring* (Burned into the atmosphere), *Exports*, *Imports* and *Consumption*. In this last case, classification includes *Power generation*, *Transportation*, *Residential*, *Commercial*, *Industrial*, *Agriculture*, *Fishing and Mining* and *Others*. Physical units are expressed in millions of cubic meters (MMm³).

Other Energy Sources (Section 2)

As in the previous case, *Other Energy Sources* lap permit to collect data from *Other Energy Sources* and some *relevant activities* as follows: *Coal* (*Production*, *Exports*, *Imports* and *Consumption*), *Alcohol* (*Production* and *Consumption*), *Biodiesel* (*Production*, *Exports*, *Imports* and *Consumption*), *Firewood* (*Consumption*), *Sugar Cane Products* (*Production* and *Consumption*), and *Agricultural Wastes* (*Production* and *Consumption*). Depending on the type of energy source, physical units are expressed in tones (t), barrels (bbl.) and barrels of oil equivalent (Boe).

Electricity (Section 3)

Data collection of annual *Electricity* variables is disaggregated in five activities: *Production, Exports, Imports, Consumption* and *Losses*. In the case of *Production*, the information is classified into two categories: *Public Generation* (By technology: *Hydro, Thermal, Geothermal, Wind, Photovoltaic* and *Nuclear*) and *Self-Producers' Generation* (By technology: *Hydro* and *Thermal*). *Consumption* is divided in economic sectors such as *Transportation, Residential, Commercial, Industrial, Agriculture, Fishing and Mining*, and *Others*. Units are expressed in GWh.

Potential and Storage (Section 4)

This sheet is intended to collect data about *Reserves*, –in the case of *Oil, Natural Gas* and *Coal*; *Capacity*, –in the case of *Alcohol Distillery* and *Biodiesel Plants*; and *Potential*, –in the case of *Electricity (Estimated and Installed)*.

3.2 [Form 2. HC_SURVEYDOMINICA_2013.xls](#)

Storage (section 1)

The *Hydrocarbons Survey –HC–* permit to collect information about *Storage Capacity, Supply* and *Sales* of each energy source. In the first case, data include the identification of *Facilities* (name and location), and its *Storage Capacity* reported for each of its energy sources (*Oil, Gasoline, Diesel Oil, Fuel Oil, Kerosene and Jet Fuel, LPG, Asphalts, Lubricants* and *Greases*), expressed in physical units (kbbl).

Supply and Other Variables (section 2)

This section is oriented to determine the amount of *Production, Imports, Exports, Initial/Closing Stocks, Unused* and *Losses* of each energy source previously mentioned, expressed in physical units (kbbl).

Hydrocarbons' Total Sales (section 3)

Section 3 enables to identify *Total Sales* of each energy source, previously mentioned, among different economic sectors, expressed in physical units (kbbl).

3.3 [Form 3. EE_SURVEYDOMINICA_2013.xls](#)

This form is designed to identify the general characteristics of the Electricity Sector, including annual key variables such as *Power Plants General Characteristics* including a range of information from the *Name and Location (section 1)*, to *Technology Type, Installed Capacity, Plant Factor, Electricity Generation, Fuel Consumption, Own Consumption* and *Losses (section 2)*. On the other hand, *section 3* refers to *Hydroenergy Technical Specifications (Reservoir Name, Capacity and Flow, Average Flow, Precipitation Flow, Turbine Flow, among others)*.

3.4 [Form 4. CTR_SURVEYDOMINICA_2013.xls](#)

The CTR Survey allows collecting Transportation Sector characteristics both in general terms like *Added Value* and *Total Fleet* by type of each transportation category (*Road, Sea* and *Air*). At more detailed level, information includes *Consumption* by relevant energy sources and *Characterization of Vehicle Fleet* in *Public* and *Private* (By fossil fuel used), and *Annual Average of Kilometers Travelled* (km/year).

3.5 [Form 5. CIN_SURVEYDOMINICA_2013.xls](#)

Characterization of Industrial Sector (section 1)

This Form is oriented to the Industrial Sector and has three sections. This one includes general information such as *Number of Industrial Facilities, Added Value, Production* and *Number of Employees*.

Consumption by Energy Sources (section 2)

This section provides information on Energy Consumption of each industry category (Food products, beverages and tobacco; Textiles and Clothing, Footwear and Leather, Wood and Furniture, among others), by energy source (Electricity – *Purchased* and *Self-Generated*–, *Crude Oil, Gasoline, Diesel Oil, Fuel Oil, Kerosene, LPG, Coke, Charcoal, Firewood* and *Others*).

Great Energy Consumers (section 3)

In order to establish a detailed level of data collecting, information is based on a *List of Great Industries*, which includes *Facility Name* and *Category of Industrial Subsector, Location, Added Value, Production* and *Number of Employees*.

Self-Generators (section 4)

The *Characterization of Self-Generators* is based on the Inputs used for self – generation: *Hydro, Diesel Oil, Fuel Oil, Photovoltaic, Bagasse* and *Others*, and a final column added for *Self-Generated Electricity*.

3.6 [Form 6. CIN2_SURVEYDOMINICA_2013.xls](#)

The Form 6 was designed with the purpose to be an *Energy Survey of Industry Sector*, which allows to access key information from *Major Energy Consumers*.

3.7 [Form 7. CCO2_SURVEYDOMINICA_2013.xls](#)

General Information (section 1)

This form aims to collect information about *General Characteristics of Commercial Sector*, by providing information on *Number of Beds and Rooms, Occupation Factor of Beds and Rooms* and *Added Value*.

Electricity and Fossil Fuel Purchases (section 2)

In that case, it is needed to report the annual Amount (Physical units) and Sales (Currency), made by overall sector for each single energy source (*Diesel Oil, Fuel Oil, Charcoal, Firewood, LPG, and subtotal on Electricity Purchased, Self-Generated* and *Others*).

3.8 [Form 8. CCOH_SURVEYDOMINICA_2013.xls](#)

The form correspond to the same structure than the described below, but instead of being addressed to the total Commercial Sector it is oriented to each Hotel Facility, constituting on a particular *Energy Survey of Hotel Industry*.

3.9 [Form 9. CCO2R_SURVEYDOMINICA_2013.xls](#)

The form corresponds to the same structure than the described for the Form 6, but instead of being addressed to the total Commercial Sector it is oriented to each Restaurant Facility, constituting on a particular *Energy Survey of Restaurant Industry*.

3.10 [Form 10. CRW SURVEYDOMINICA 2013.xls](#)

General Information (section 1)

This form is designed to identify the general characteristics of the Agricultural Sector. Annual key variables include *Added Value, Production, Number of Agricultural Production Facilities, Area Harvested* and *Level of Mechanization*.

Consumption by Energy Sources (section 2)

The section provides information on Energy Consumption of each Agriculture category (Crops 1, 2, etc., and Livestock), by energy source (Electricity –*Purchased* and *Self-Generated*–, *Crude Oil, Gasoline, Diesel Oil, Fuel Oil, Kerosene, LPG, Coke, Charcoal, Firewood* and *Others*). In Fishing activity, consumption of energy sources are focused on four of them: *Gasoline, Diesel Oil, Electricity* and *Others*.

Characterization of the Level of Mechanization (section 3)

This sheet compiles information on the level of mechanization, typically based on a percentage of the technology involved on agricultural processes such as *Irrigation, Tractors, Harvester and Fumigation*, among others, or a *Global Level*.

3.11 [Form 11. NV SURVEYDOMINICA 2013.xls](#)

This Form corresponds to the compilation of National Variables, related to social and economic data. **Section 1** compiles information about *Information Units* (Hotels, Restaurants, Public Sector and Services), whilst **Section 2** on *Energy Consumption* by energy source.

3.12 [Form 12. NVD SURVEYDOMINICA 2013.xls](#)

Constitutes the form for demographics data collection (*Population –Total, Urban and Rural; Households and Dwelling Units*, among others), including relevant information on living conditions like *Cooking (LPG, Kerosene, Charcoal, Firewood, Electricity* and *Others)* and *Lighting* energy sources (*Electricity, Kerosene, Candles, Firewood, Charcoal* and *Others*) and Equipment used (Fridge, Refrigerator, Air Conditioning, Fan, Oven, Stove, Iron, etc.).

IV. Technical Visit

The main objective of the technical visit to Dominica was to gather information from the key public and private institutions of the hydrocarbon, electricity and renewable sub-sectors, as well as information related to the energy consumers through the residential, industrial, commercial and other demand sectors.

Before the technical visit was taken place, it was necessary to analyze the characteristics and behavior of the institutional structure of the energy sector of Dominica in order to quantify and identify the institutions to be visited. Once the institutions were selected, a pre-analysis of the type of information that could be collected was defined.

In order to arrange the technical visits to the stakeholders, a visit schedule action plan was presented to the country's focal point to endorse the presence of the interviewer (See Table 11). The schedule plan of the technical visits included the name of the institution, the energy sector that it belongs to, date and time of the visit, the name of the contact person that is going to be interviewed, email address, telephone and the survey form to be applied (See annex Agenda for Country Technical Visit page 58).



DOMINICA TECHNICAL VISITS

N	SUB-SECTOR	INSTITUTION	TYPE OF INFORMATION	VISIT DATE
1	Main Energy Supply Variables	Ministry of Public Works, Energy and Ports	F03_SurveyDominica_2013.xls	Monday, December 2 nd , 2013
2	Electricity	Domlec	EE_SurveyDominica_2013.xls	Monday, December 2 nd , 2013
3	Consumption: Industry, Transport, Agr. Fish. Mining, Commercial	Ministry of Employment, Trade, Industry and Diaspora Affairs	CIN_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2012
		Ministry of Agriculture and Forestry	CRW_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2013
		The Public and Police Service Commissions	CTR_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2014
		Main Industries	CIN2_SurveyDominica_2013.xls	Wednesday, December 4 th , 2011
		Ministry of Environment, Natural Resources, Physical Planning and Fisheries	CRW_SurveyDominica_2013.xls	Wednesday, December 4 th , 2012
		Ministry of Tourism and Legal Affairs	CCO_SurveyDominica_2013.xls	Wednesday, December 4 th , 2013
4	National Statistical Variables	Central Statistical Office - Ministry of Finance	NV_SurveyDominica_2013.xls	Thursday, December 5 th , 2012
		Eastern Caribbean Central Bank	NV_SurveyDominica_2013.xls	Thursday, December 5 th , 2013
5	Hydrocarbons	Rubis	HC_SurveyDominica_2013.xls	Friday, December 6 th , 2016
		Sol	HC_SurveyDominica_2013.xls	Friday, December 6 th , 2017
		Exxon	HC_SurveyDominica_2013.xls	Friday, December 6 th , 2018

Table 11. Dominica Technical Visit Agenda

IV.1. Developed Activities

- Each one of the visited institutions was given a clear description of the background, objectives, importance and benefits of the project.
- Hydrocarbon sector institutions responsible for policies, regulations, prices, production, trade, distribution or supply of fossil fuels were visited.
- Electricity sector institutions responsible for policies, regulations, prices, production, trade, distribution or supply of electricity were interviewed.
- Renewable sector institutions that had relevant information on hydro, sugarcane products, firewood, charcoal, wind and solar were visited.
- Technical visits were made to the institutions that provided information on Population and Housing Census, GDP, Agricultural Production, vehicle fleet, transport and industrial data, wholesale and retail establishments, hotels, restaurants, among others.

While the data was being gathered, a preliminary analysis on the data collected was deployed in order to build two energy flow matrix to facilitate the development of energy balances. The first energy flow matrix contains the relationship between the energy sources and activities available in the country.

		Renewable Primary Energy				Electricity	Petroleum and Natural Gas Products						
		Hydro	Solar	Wind	Firewood		LPG	Gasolines	Kerosene & Jet Fuel	Diesel Oil	Fuel Oil	Non Energy Products	Charcoal
		Unit:	Unit:	Unit:	Unit:		Unit:	Unit:	Unit:	Unit:	Unit:	Unit:	Unit:
		GWh	GWh	GWh	Tons		Kbbl	Kbbl	Kbbl	Kbbl	Kbbl	Kboe	kt
Production		∞	∞	∞	∞								⊕
Imports							⊕	⊕	⊕	⊕	⊕	⊕	
Exports													
Unused													
Stock Change							⊕	⊕	⊕	⊕	⊕	⊕	⊕
Bunker													
Transfers													
Power Plants	Thermal					β				β	β		
	Hydro	β				β							
Self-producers			β	β		β				β			
Charcoal Plant					β								β
Gas Plant							β						
Transport sector								⊖	⊖	⊖		⊖	
Industrial sector						⊖				⊖	⊖		
Residential sector					⊖	⊖	⊖		⊖				⊖
Commercial, Services and Public					⊖	⊖	⊖			⊖			⊖
Farming, Forestry and Fishing						⊖							
Mining and Quarrying													
Construction sector and Others												⊖	
Non Energy Consumption													
Own Consumption						⊖							
Losses						⊖	⊖	⊖	⊖	⊖	⊖	⊖	

Table 12. Parameterization of Energy Balance Variables

The second energy flow matrix identifies the information units or data providers' relationship with the energy sources that they are involved with.

In annex 2 Completed forms (page 84) it is possible to check compiled information forms (Facilities' technical inventory and Collected Energy Information) and a list of Other information resources collected during research stage and Technical Visit (page 99).

	INFORMATION UNITS								
FUELS	RUBIS	SOL	Petrocaribe	West Indies	NP	Colgate Palmolive Boilers	Sukies	DOMLEC	Self -Producers
1 LPG		⊕ ⊗	⊕ ⊗				⊕ ⊗		
2 JET FUEL & KERO					⊕ ⊗				
3 GASOLINE	⊕ ⊗			⊕ ⊗	⊕ ⊗				
4 DIESEL OIL	⊕ ⊗		⊕ ⊗	⊕ ⊗	⊕ ⊗	β ⊗		β ⊗	β ⊗
5 FUEL OIL						⊕ ⊗			
6 NON ENERGY PRODUCTS	⊕ ⊗	⊕ ⊗	⊕ ⊗						
7 SOLAR									β ⊗
8 WIND									β ⊗
9 HYDROENERGY								β ⊗	

Table 13. Parameterization of Energy Balance Variables

IV.2. Additional results of the technical visit

- Dominica's Government awareness on the importance of the data gathering and the benefits of having accurate Energy Balances and GHG Emissions inventory for the decision making process.
- Fourteen public and private institutions were visited and data collection surveys were applied.
- Additional information and documentation was obtained from other institutions that couldn't have a face-to-face interview.
- A facilities' technical inventory of the power plants and fuel storage facilities were obtained (See annex 2 Facilities' technical inventory, page 84).
- The macro energy consumers such as industries and hotels were identified.

Additional comments and findings of the technical visit were given to have a more accurate development of the energy balance.

V. Energy Balance

V.1. Energy Balance sheets

Once you have compiled and analyzed the required information, OLADE methodology considers, as the next step, the data processing through a kit consisting of five sheets in which the data are transcripts to the correspondent's activities or flows of the Energy Balance.

Principal Balance Sheet

It registers horizontal subtotals of the matrix of Energy Balance.



MAIN FORM: BALANCE						
SOURCE	UNIT		kt	COUNTRY		
YEAR	1 TOTAL SUPPLY	2 TOTAL TRANSFORMATION	3 OWN CONSUMPTION	4 LOSSES	5 FINAL CONSUMPTION	1-2-3-4-5 ADJUSTMENT
2005	-	-			-	-
2006	-	-			-	-
2007	-	-			-	-
2008	-	-			-	-
2009	-	-			-	-
2010	-	-			-	-
2011	-	-			-	-
2012	-	-			-	-
2013	-	-			-	-

Table 14. Main Balance Sheet

Principal Supply Sheet

Considers the internal energy supply flows formed by: Production, Import, Export, Stock Changes and Unused.

MAIN FORM: SUPPLY						
SOURCE	Charcoal	UNIT	Kt	COUNTRY		
YEAR	1 PRODUCTION	2 IMPORTS	3 EXPORTS	4 STOCK CHANGE	5 UNUSED	1+2-3+4-5 TOTAL SUPPLY
2005						-
2006						-
2007						-
2008						-
2009						-
2010						-
2011						-
2012						-
2013						-

Table 15. Main Supply Sheet

Principal Transformation Sheet

The sheet registers data about loads and production coming from processing centers, such as refineries, power plants, –or self-producers–, gas plants, Charcoal plants, cokeries and distilleries.

MAIN FORM: TRANSFORMATION										
SOURCE	Charcoal	UNIT	kt	COUNTRY						
YEAR	1 REFINERIES	2 POWER PLANTS	3 SELF PRODUCERS	4 GAS PLANTS	5 CHARCOAL PLANTS	6 COKE PLANTS / BLAST FURNACE	7 DISTILLERY	8 OTHER PLANTS	TOTAL TRANSFORMATI ON	TOTAL PRODUCTION
2005										
2006										
2007										
2008										
2009										
2010										
2011										
2012										
2013										

Table 16. Main Transformation Sheet

Principal Consumption Sheet

It aims to register the final energy consumption in economic sectors: Industry, Transportation, Residential, Commercial, Public and Services, Agriculture, Fishing and Mining, and Construction and others.

MAIN FORM: FINAL CONSUMPTION								
SOURCE	Charcoal	UNIT	kt	COUNTRY				
YEAR	1 TRANSPORT	2 INDUSTRY	3 RESIDENTIAL	4 COMMERCIAL	5 FARMING, FISHING AND MINING	6 CONSTRUCTION OTHERS	7 NON ENERGY CONSUMPTION	1+2+3+4+5+6+7 FINAL CONSUMPTION
2005								-
2006								-
2007								-
2008								-
2009								-
2010								-
2011								-
2012								-
2013								-

Table 17. Main Consumption Sheet

Auxiliary Sheet

This form is designed to consolidate data from previous forms when information is available at a more disaggregated level.

AUXILIARY WORKSHEET:								
SOURCE	-	UNIT		COUNTRY	-			
YEAR	1	2	3	4	5	6	7	TOTAL
2005								
2006								
2007								
2008								
2009								
2010								
2011								
2012								
2013								
2014								

Table 18. Main Auxiliary Sheets

V.2. Energy Balance results and analysis

In line with OLADE's Methodology, Energy Balances are prepared in terms of physical and calorific units (kBoe).

It is adequate to bring up to the basic goals of an Energy Balance (OLADE, 2004):

- ❖ To assess the dynamics of the energy system in concordance with the economy of each country, determining the major economic–energy relations between the different sectors of the national economy.
- ❖ To serve as an instrument for energy planning
- ❖ To understand in detail the structure of the national energy sector
- ❖ To determine the competitive and non–competitive uses of each energy source, in order to promote substitution processes wherever feasible.
- ❖ To create the appropriate bases that will lead to energy information enhancement and systematization.
- ❖ To be utilized to enable energy forecasts and outlooks on the short, medium and long term.

Conceptually, the energy balance is the accounting of the energy flow between the various transformation processes and economic activities of the energy chain and its balancing relations, for which energy is produced, exchanged with the outside, transformed and consumed; taking as analysis unit, a given country, for a established period (usually one year).

The energy balances are instruments that measure the annual energy sources and consumptions in different economic sectors.

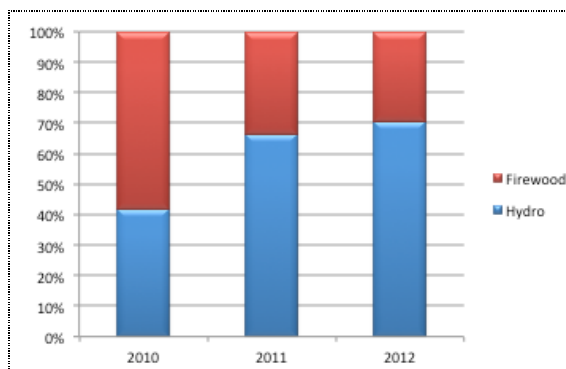
General comments

In that context, the Energy Balances of Dominica allow determining a wide range of analytics graphs and tables as key inputs for energy policy evaluation, designing and decision making processes.

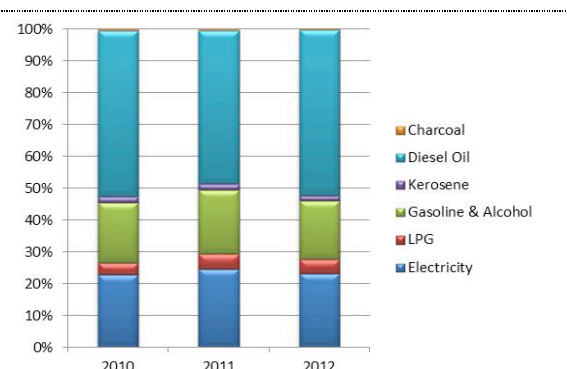
A general view on the results obtained, enables to remark that the Dominica Energy Matrix is characterized by the limited availability of primary sources to Hydropower and Firewood (See Section V.2.1 page 47). In contrast, the contribution of Total Primary Energy Supply does not exceed 10%, while supply of secondary sources reach 90% (See Graph 3 and Graph 4).

Secondary energy sources are Diesel Oil (198.48 kBoe), Electricity (88.67 kBoe), Gasoline (70.27 kBoe), LPG (16.85 kBoe), Kerosene & Jet Fuel (5.82 kBoe) and Charcoal (0.94 kBoe) (See Graph 4).

Transformation categories consist of electricity generation in power plants and by Self–generators and charcoal production activities.



Graph 3. Primary Energy Matrix (%) (2010 – 2012)



Graph 4. Secondary Energy Matrix (%) (2010 – 2012)

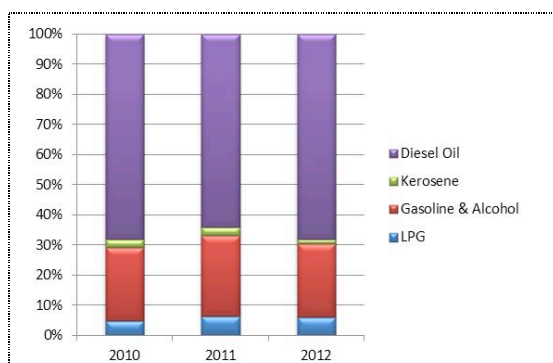
Source: Energy Balances 2010 – 2012 (%)

In terms of Final Consumption, Electricity, Gasoline and Diesel Oil are the main energy sources whilst transportation, commercial and residential registers the higher levels of energy consumption.

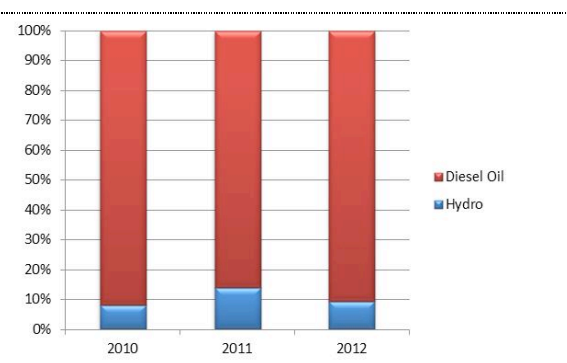
Energy Imports

As seen in the Energy Balance 2010 – 2012 (pages 47 to 49), the Country is a Net Importer of Energy. In 2012, 88% of the Total Energy Supply was mainly based on Imports of Oil Products, (See Graph 5).

Dominica shows a renewable energy production based on Hydro, Firewood and Charcoal energies. On the other hand, all the secondary energy sources are imported. In 2012, a total of 285 kBoe was imported, from which 193 kBoe was Diesel Oil (68%) (See Graph 5 and Graph 6).



Graph 5. Imports by Energy Sources (%) (2010 – 2012)

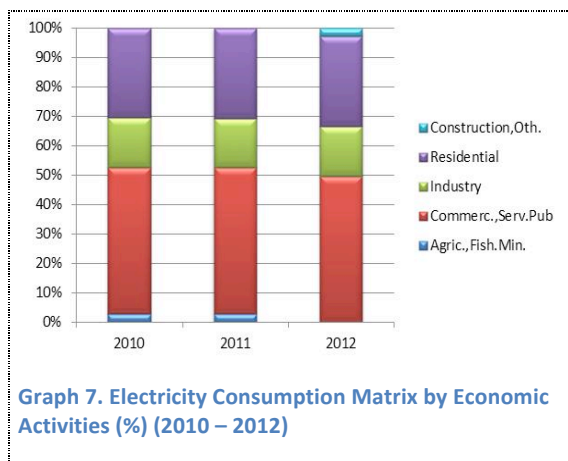


Graph 6. Energy Sources for Electricity Generation (%) (2010 – 2012)

Source: Energy Balances 2010 – 2012 (%)

Electricity generation

Electricity is generated by two sources: Diesel Oil and Hydro Energy. In 2012 Dominica used 33 kBoe of Hydro and 125 kBoe from Diesel Oil to produce electricity (See Graph 6). 71% of the country's electricity was generated by DOMLEC, and the remaining percentage by Self-producers.



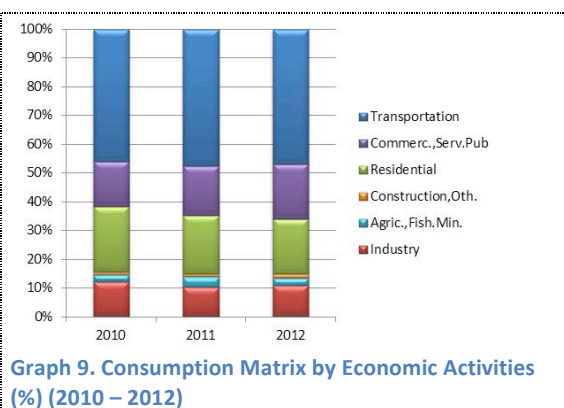
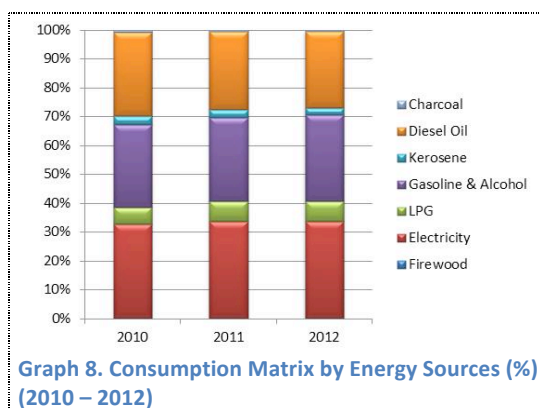
From total Electricity Consumption (82.6 kBoe), Commercial, Serv. Pub. sector represents around 50%. At the same time, Commercial has an annual average contribution (2010–2012) of 51%, Hotel 6% and Street Lighting 2.2% (See Graph above).

Final Consumption

As shown in Graph 8, there are a variety of seven energy sources that are being used in Dominica. Diesel Oil share is around 26%, while Gasoline and Electricity share has a similar level of importance in terms of its contribution (29% and 33%, respectively). In fact they represent near to 90% of Total Energy Consumption. The remaining energy sources, such as Kerosene, Charcoal, Firewood and LPG, are slowly getting more participation on the energy matrix.

Gasoline and Diesel Oil are mainly used in the Transport Sector, having a share of 57% and 38%, respectively.

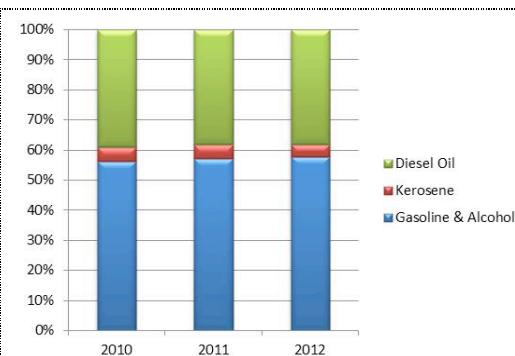
77% of total Firewood consumption is used in the Residential Sector, and the rest is transformed in a Charcoal Plant.



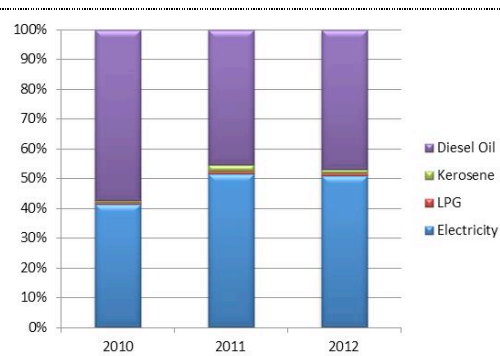
Source: Energy Balances 2010 – 2012 (%)

Transport sector is the major consumer of energy (See Graph 8 and 9). In 2012 the consumption of this sector was 121.8 kbbl, which represented 48% of Total Country Energy consumption. It was followed in importance by Commercial and Residential (with 19% each of them) and Industrial (11%).

Dominica's industrial sector mainly consumes electricity and diesel oil. There are also some amounts of Kerosene and LPG being consumed (See Graph 11).

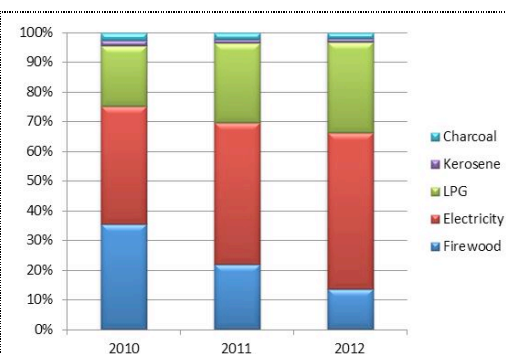


Graph 10. Consumption Matrix of Transportation Sector by Energy Source (%) (2010 – 2012)

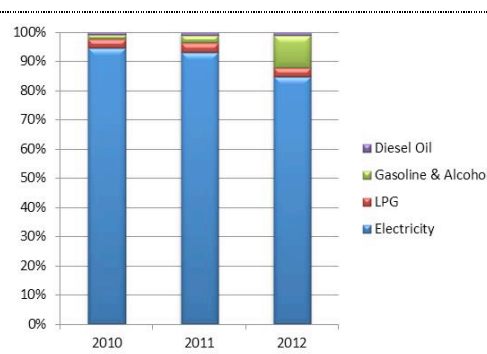


Graph 11. Consumption Matrix of Industry Sector by Energy Source

In the Residential Sector, Electricity is the most important energy source (See Graph 12) having a share of 52%. LPG follows the share with 31%, and then Firewood 14%, Kerosene & Jet Fuel 1%, and Charcoal 2%.



Graph 12. Consumption Energy Matrix of Residential Sector by Energy Source (%) (2010 – 2012)



Graph 13. Consumption Energy Matrix of Comm., Serv, Pub. Sector by Energy Source (%) (2010 – 2012)

It is important to indicate that because of the PetroCaribe Agreement, LPG has been progressively substituting Firewood, ensuring that between 2009 and 2012 the Firewood Consumption has decreased from 32% to 11%. Another important fact is the reduction of the percentage of Household using Firewood. This has declined to 2.5% in 2012 (from 15.7% in 2001), according to the Information collected during Technical Visit to Dominica³².

90% of Energy Consumption in Commercial, Services and Public Sector correspond to Electricity (See Graph 12). Gasoline and LPG are also consumed but at reduced amounts.

³² The final report of Dominica Mitigation Assessment (2010), the consumption of firewood for cooking is expected to decrease to 3% in 2015 and charcoal would represent 1%, while increasing LPG consumption to 91%.

V.2.1. Dominica's Energy Balance – 2012

i. Physical units

	ACTIVITY	PRIMARY		SECUNDARIA						
		HYDROENERGY	FIREWOOD	ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS
		GWh	kt	GWh	kbbbl	kbbbl	kbbbl	kbbbl	kt	kbbbl
SUPPLY	PRODUCTION	33,44	3,31	143,11	-	-	-	-	0,19	-
	IMPORT	-	-	-	25,14	77,51	4,80	192,92	-	0,75
	EXPORT	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	1,33	1,27	5,26	-	-
	UNUSED	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	33,44	3,31	143,11	25,14	78,84	6,07	198,18	0,19	0,75
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-
	POWER PLANTS	33,44	-	101,67	-	-	-	124,25	-	-
	SELF PRODUCERS	-	-	41,44	-	-	-	1,84	-	-
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	0,75	-	-	-	-	-	0,19	-
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	-	0,75	-	-	-	-	126,09	-	-
END CONSUMPTION	OWN CONSUMPTION	-	-	3,07	-	-	-	-	-	-
	LOSSES	-	-	7,93	-	0,56	0,01	0,03	-	-
	ADJUSTMENT	-	-	1,14	-	4,15	0,01	7,22	-	-
	TRANSPORTATION	-	-	-	-	76,38	5,12	44,96	-	-
	INDUSTRY	-	-	22,37	0,32	-	0,33	12,77	-	-
	RESIDENTIAL	-	2,56	40,79	22,02	-	0,64	-	0,19	-
	COMMERC.,SERV.PUB	-	-	66,32	2,27	6,05	-	0,46	-	-
	AGRIC.,FISH.MIN.	-	-	-	-	-	-	6,65	-	-
	CONSTRUCTION,OTH.	-	-	3,77	0,53	-	-	-	-	0,75
CONSUMPTION	ENERGY SOURCE	-	2,56	133,25	25,14	82,43	6,09	64,84	0,19	0,75
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	2,56	133,25	25,14	82,43	6,09	64,84	0,19	0,75

Table 19. Dominica Energy Balance – 2012 (Physical units)

ii. Calorific units

	ACTIVITY	PRIMARY		TOTAL	SECUNDARIA							TOTAL	TOTAL
		HYDROENERGY	FIREWOOD		ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	
SUPPLY	PRODUCTION	20,72	8,59	29,31	88,67	-	-	-	-	0,94	-	89,61	29,31
	IMPORT	-	-	-	-	16,85	69,08	4,60	193,21	-	0,75	284,49	284,49
	EXPORT	-	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	1,19	1,22	5,27	-	-	7,68	7,68
	UNUSED	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	20,72	8,59	29,31	88,67	16,85	70,27	5,82	198,48	0,94	0,75	381,78	321,48
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	20,72	-	20,72	62,99	-	-	-	124,44	-	-	62,99	82,17
	SELF PRODUCERS	-	-	-	25,68	-	-	-	1,84	-	-	25,68	23,84
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	1,95	1,95	-	-	-	-	-	0,94	-	0,94	1,01
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	-	1,95	22,67	-	-	-	-	126,28	-	-	126,28	59,34
END CONSUMPTION	OWN CONSUMPTION	-	-	-	1,90	-	-	-	-	-	-	1,90	1,90
	LOSSES	-	-	-	4,91	-	0,50	0,01	0,03	-	-	5,43	5,43
	ADJUSTMENT	-	-	-	0,70	-	3,70	0,01	7,23	-	-	2,82	2,82
	TRANSPORTATION	-	-	-	-	-	68,08	4,91	45,03	-	-	118,02	118,02
	INDUSTRY	-	-	-	13,86	0,21	-	0,32	12,79	-	-	27,18	27,18
	RESIDENTIAL	-	6,64	6,64	25,27	14,76	-	0,61	-	0,94	-	41,58	48,22
	COMMERC.,SERV.PUB	-	-	-	41,09	1,52	5,39	-	0,46	-	-	48,46	48,46
	AGRIC.,FISH.MIN.	-	-	-	-	-	-	-	6,66	-	-	6,66	6,66
	CONSTRUCTION,OTH.	-	-	-	2,34	0,36	-	-	-	-	0,75	3,45	3,45
CONSUMPTION	ENERGY CONSUMPTION	-	6,64	6,64	82,56	16,85	73,47	5,84	64,94	0,94	0,75	245,35	251,99
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	6,64	6,64	82,56	16,85	73,47	5,84	64,94	0,94	0,75	245,35	251,99

Table 20 Dominica Energy Balance – 2012

V.2.2. Dominica's Energy Balance – 2011

i. Physical units

	ACTIVITY	PRIMARY		SECUNDARIA						
		HYDROENERGY	FIREWOOD	ELECTRICITY	LPG	GASOLINE/ ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS
		GWh	kt	GWh	kbbbl	kbbbl	kbbbl	kbbbl	kt	kbbbl
SUPPLY	PRODUCTION	44,80	5,43	142,03	-	-	-	-	0,25	-
	IMPORT	-	-	-	25,28	81,30	8,39	173,02	-	1,12
	EXPORT	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	0,97	1,37	0,88	-	-
	UNUSED	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	44,80	5,43	142,03	25,28	80,33	7,02	172,14	0,25	1,12
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-
	POWER PLANTS	44,80	-	100,48	-	-	-	101,40	-	-
	SELF PRODUCERS	-	-	41,55	-	-	-	1,84	-	-
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	1,00	-	-	-	-	-	0,25	-
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	44,80	1,00	-	-	-	-	103,24	-	-
END CONSUMPTION	OWN CONSUMPTION	-	-	2,71	-	-	-	-	-	-
	LOSSES	-	-	8,34	-	0,27	0,08	0,13	-	-
	ADJUSTMENT	-	-	1,30	0,01	0,53	0,01	3,24	-	-
	TRANSPORTATION	-	-	-	-	78,20	5,84	46,47	-	-
	INDUSTRY	-	-	22,10	0,31	-	0,63	12,05	-	-
	RESIDENTIAL	-	4,43	40,42	20,90	-	0,64	-	0,25	-
	COMMERC.,SERV.PUB	-	-	66,06	2,08	1,33	-	0,43	-	-
	AGRIC.,FISH.MIN.	-	-	3,70	-	-	-	6,58	-	-
	CONSTRUCTION,OTH.	-	-	-	2,00	-	-	-	-	1,12
CONSUMPTION	ENERGY SOURCE	-	4,43	132,28	25,29	79,53	7,11	65,53	0,25	1,12
CONSUMPTION	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	4,43	132,28	25,29	79,53	7,11	65,53	0,25	1,12

Table 21. Dominica Energy Balance – 2011 (Physical units)

ii. Calorific units

	ACTIVITY	PRIMARY		TOTAL	SECUNDARIA							TOTAL	TOTAL
		HYDROENERGY	FIREWOOD		ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	
SUPPLY	PRODUCTION	27,76	14,09	41,85	88,00	-	-	-	-	1,24	-	89,24	41,85
	IMPORT	-	-	-	-	16,94	72,46	8,04	173,28	-	1,12	271,84	271,84
	EXPORT	-	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	0,86	1,31	0,88	-	-	3,05	3,05
	UNUSED	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	27,76	14,09	41,85	88,00	16,94	71,60	6,73	172,40	1,24	1,12	358,03	310,64
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	27,76	-	27,76	62,26	-	-	-	101,55	-	-	62,26	67,05
	SELF PRODUCERS	-	-	-	25,74	-	-	-	1,84	-	-	25,74	23,90
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	2,59	2,59	-	-	-	-	-	1,24	-	1,24	1,35
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	27,76	2,59	30,35	-	-	-	-	103,39	-	-	103,39	44,50
END CONSUMPTION	OWN CONSUMPTION	-	-	-	1,68	-	-	-	-	-	-	1,68	1,68
	LOSSES	-	-	-	5,17	-	0,24	0,08	0,13	-	-	5,46	5,46
	ADJUSTMENT	-	0,01	0,01	0,80	0,01	0,47	-	3,25	-	-	2,91	2,92
	TRANSPORTATION	-	-	-	-	-	69,70	5,60	46,54	-	-	121,84	121,84
	INDUSTRY	-	-	-	13,69	0,21	-	0,60	12,07	-	-	26,57	26,57
	RESIDENTIAL	-	11,49	11,49	25,04	14,01	-	0,61	-	1,24	-	40,90	52,39
	COMMERC.,SERV.PUB	-	-	-	40,93	1,39	1,19	-	0,43	-	-	43,94	43,94
	AGRIC.,FISH.MIN.	-	-	-	2,29	-	-	-	6,59	-	-	8,88	8,88
	CONSTRUCTION,OTH.	-	-	-	-	1,34	-	-	-	-	1,12	2,46	2,46
CONSUMPTION	ENERGY SOURCE	-	11,49	11,49	81,95	16,95	70,89	6,81	65,63	1,24	1,12	244,59	256,08
CONSUMPTION	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	11,49	11,49	81,95	16,95	70,89	6,81	65,63	1,24	1,12	244,59	256,08

Table22. Dominica Energy Balance – 2011 (Calorific units)

V.2.3. Dominica's Energy Balance – 2010

i. Physical units

	ACTIVITY	PRIMARY		SECUNDARIA						
		HYDROENERGY	FIREWOOD	ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS
		GWh	kt	GWh	kbbbl	kbbbl	kbbbl	kbbbl	kt	kbbbl
SUPPLY	PRODUCTION	28,92	9,66	140,94	-	-	-	-	0,32	-
	IMPORT	-	-	-	21,81	81,36	8,40	202,99	-	1,93
	EXPORT	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	0,46	0,76	3,34	-	-
	UNUSED	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	28,92	9,66	140,94	21,81	81,82	7,64	199,65	0,32	1,93
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-
	POWER PLANTS	28,92	-	99,18	-	-	-	126,05	-	-
	SELF PRODUCERS	-	-	41,76	-	-	-	1,85	-	-
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	1,29	-	-	-	-	-	0,32	-
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	28,92	1,29	-	-	-	-	127,90	-	-
END CONSUMPTION	OWN CONSUMPTION	-	-	2,92	-	-	-	-	-	-
	LOSSES	-	-	8,93	-	1,49	0,13	0,39	-	-
	ADJUSTMENT	-	-	1,00	-	0,78	-	0,70	-	-
	TRANSPORTATION	-	-	-	-	78,83	6,10	48,58	-	-
	INDUSTRY	-	-	22,07	0,30	-	0,23	18,94	-	-
	RESIDENTIAL	-	8,37	39,47	18,60	-	1,18	-	0,32	-
	COMMERC.,SERV.PUB	-	-	64,91	1,92	0,72	-	0,38	-	-
	AGRIC.,FISH.MIN.	-	-	3,64	-	-	-	4,16	-	-
	CONSTRUCTION,OTH.	-	-	-	0,99	-	-	-	-	1,93
CONSUMPTION	ENERGY SOURCE	-	8,37	130,09	21,81	79,55	7,51	72,06	0,32	1,93
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	8,37	130,09	21,81	79,55	7,51	72,06	0,32	1,93

Table 23. Dominica Energy Balance – 2010 (Physical units)

ii. Calorific units

	ACTIVITY	PRIMARY		TOTAL	SECUNDARIA							TOTAL	TOTAL
		HYDROENERGY	FIREWOOD		ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	
SUPPLY	PRODUCTION	17,92	25,06	42,98	87,32	-	-	-	-	1,59	-	88,91	42,98
	IMPORT	-	-	-	-	14,61	72,52	8,05	203,29	-	1,93	300,40	300,40
	EXPORT	-	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	0,41	0,73	3,35	-	-	3,67	3,67
	UNUSED	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	17,92	25,06	42,98	87,32	14,61	72,93	7,32	199,94	1,59	1,93	385,64	339,71
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	17,92	-	17,92	61,45	-	-	-	126,24	-	-	61,45	82,71
	SELF PRODUCERS	-	-	-	25,87	-	-	-	1,85	-	-	25,87	24,02
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	3,35	3,35	-	-	-	-	-	1,59	-	1,59	1,76
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	17,92	3,35	21,27	-	-	-	-	128,09	-	-	128,09	60,45
END CONSUMPTION	OWN CONSUMPTION	-	-	-	1,81	-	-	-	-	-	-	1,81	1,81
	LOSSES	-	-	-	5,53	-	1,33	0,12	0,39	-	-	7,37	7,37
	ADJUSTMENT	-	-	-	0,63	-	0,70	-	0,71	-	-	0,64	0,64
	TRANSPORTATION	-	-	-	-	-	70,26	5,85	48,65	-	-	124,76	124,76
	INDUSTRY	-	-	-	13,67	0,20	-	0,22	18,97	-	-	33,06	33,06
	RESIDENTIAL	-	21,71	21,71	24,46	12,46	-	1,13	-	1,59	-	39,64	61,35
	COMMERC.,SERV.PUB	-	-	-	40,22	1,29	0,64	-	0,38	-	-	42,53	42,53
	AGRIC.,FISH.MIN.	-	-	-	2,26	-	-	-	4,17	-	-	6,43	6,43
	CONSTRUCTION,OTH.	-	-	-	-	0,66	-	-	-	-	1,93	2,59	2,59
CONSUMPTION	ENERGY SOURCE	-	21,71	21,71	80,61	14,61	70,90	7,20	72,17	1,59	1,93	249,01	270,72
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	-	21,71	21,71	80,61	14,61	70,90	7,20	72,17	1,59	1,93	249,01	270,72

Table 24. Dominica Energy Balance – 2010 (Calorific units)

VI. Greenhouse Gas Emissions

The Inventory of Greenhouse Gases is a double entry matrix that provides relevant information on the contribution of Greenhouse Gas Emissions of the Country, by energy sources, activities and/or subsectors.

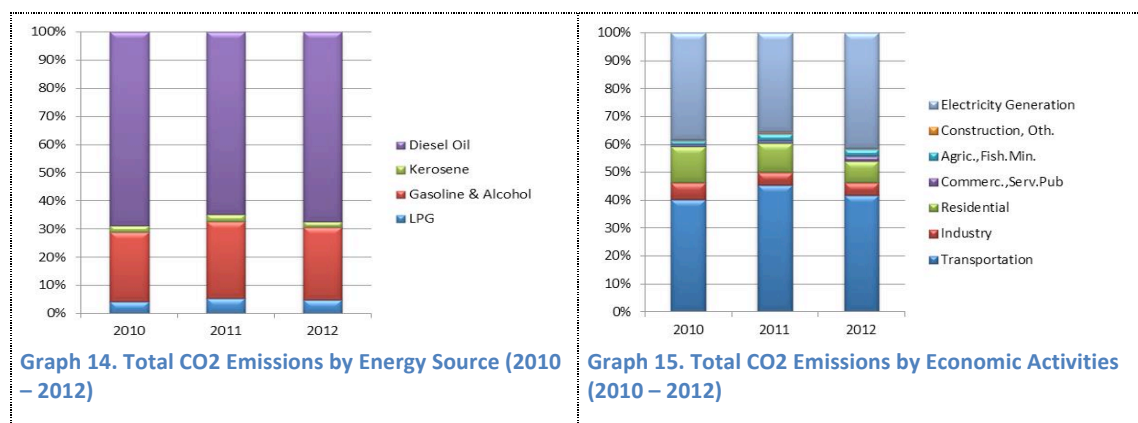
Two methodologies could be applied to obtain Greenhouse Gas Emissions: Technology approach and Reference approach.

VI.1. Technology approach³³

This IPCC³⁴ Methodology is based on the calculation of emissions by pollutants and according to the consultation variables: country, energy source, energy activity carried out in the process and the applicable year. The methodology of technologies uses the values reported by the countries on the fundamental data according to the energy activities developed by energy source, these they are operated with the factors of contamination of this technology and applied according to the pollutant in mention; they are obtained this way the emissions by pollutant (See Table 25 to Table 27).

VI.2. Reference approach³⁰

Procedure of calculation of Emissions of CO₂ based on basic indicators of Apparent Consumption, Content of Coal and non-energy Consumption of the energy sources. The obtained results are emissions in Gg CO₂. The factors can also be consulted used in the calculation process (See annex 3 Greenhouse Gas Emissions calculated by Reference approach, page 109).



For the purposes of this chapter, presented results are related to Technology approach. Reference Approach results may be revised in Annex Greenhouse Gas Emissions calculated by Reference approach, page 109.

³³<http://siec.olade.org> (web page visited on Jan, 17th 2014)

³⁴Intergovernmental Panel On Climate Change (IPCC), is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. <http://www.ipcc.ch/index.htm#.Utm37DlziqQ> (web page visited on Jan, 16th 2014).

Accordingly to the Graph 14, it is remarkable that Diesel Oil is the main CO₂ energy-emitting source, with a contribution of 77.3 Gg of CO₂, or 62% of total emissions in 2012.

Regarding CO₂ emissions by economic activity, major emitters are Transportation sector (40%) and Electricity Generation (40%) (See Graph 15).

CO2 Emissions According to Technology approach

ENERGY SOURCE	ACTIVITY	PRIMARY	TOTAL	SECUNDARIA							TOTAL	
		FIREWOOD	PRIMARY	ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	TOTAL
SUPPLY	PRODUCTION	-	-	-	-	-	-	-	-	-	-	-
	IMPORT	-	-	-	-	-	-	-	-	-	-	-
	EXPORT	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	-	-	-	-	-	-
TOTAL	UNUSED	-	-	-	-	-	-	-	-	-	-	-
	SUPPLY	-	-	-	-	-	-	-	-	-	-	-
	REFINERY	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	-	-	-	-	-	-	50,58	-	-	50,58	50,58
TRANSFORMATION	SELF PRODUCERS	-	-	-	-	-	-	0,74	-	-	0,74	0,74
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	-	-	-	-	-	-	0,27	-	0,27	0,27
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-
TOTAL	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-
	TRANSFORMATION	-	-	-	-	-	-	51,32	0,27	-	51,59	51,59
	OWN CONSUMPTION	-	-	-	-	-	-	-	-	-	-	-
FINAL CONSUMPTION	LOSSES	-	-	-	-	-	-	-	-	-	-	-
	ADJUSTMENT	-	-	-	-	-	-	-	-	-	-	-
	TRANSPORTATION	-	-	-	-	28,82	2,10	20,05	-	-	50,97	50,97
	INDUSTRY	-	-	-	0,08	0,13	5,20	-	-	-	5,41	5,41
CONSUMPTION	RESIDENTIAL	3,58	3,58	-	5,04	-	0,25	-	0,53	-	5,82	9,40
	COMMERC.,SERV.PUB	-	-	-	0,59	1,49	-	0,20	-	-	2,28	2,28
	AGRIC.,FISH.MIN.	-	-	-	-	-	-	2,97	-	-	2,97	2,97
	CONSTRUCTION,OTH.	-	-	-	0,14	-	-	-	-	0,08	0,22	0,22
TOTAL	ENERGY SOURCE	3,58	3,58	-	5,85	30,31	2,48	28,42	0,53	0,08	67,67	71,25
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	3,58	3,58	-	5,85	30,31	2,48	28,42	0,53	0,08	67,67	71,25
	EMISSIONS	3,58	3,58	-	5,85	30,31	2,48	28,42	0,53	0,08	67,67	71,25
TOTAL		3,58	3,58	-	5,85	30,31	2,48	79,74	0,80	0,08	119,26	122,84

Table 25. Dominica Greenhouse gas inventory – 2012 (Technology approach)

ENERGY SOURCE	ACTIVITY	PRIMARY	TOTAL	SECUNDARIA							TOTAL	
		FIREWOOD	PRIMARY	ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	TOTAL
SUPPLY	PRODUCTION	-	-	-	-	-	-	-	-	-	-	-
	IMPORT	-	-	-	-	-	-	-	-	-	-	-
	EXPORT	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	-	-	-	-	-	-
TOTAL	UNUSED	-	-	-	-	-	-	-	-	-	-	-
	SUPPLY	-	-	-	-	-	-	-	-	-	-	-
	REFINERY	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	-	-	-	-	-	-	41,28	-	-	41,28	41,28
TRANSFORMATION	SELF PRODUCERS	-	-	-	-	-	-	0,74	-	-	0,74	0,74
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	-	-	-	-	-	-	0,36	-	0,36	0,36
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-
TOTAL	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-
	TRANSFORMATION	-	-	-	-	-	-	42,02	0,36	-	42,38	42,38
	OWN CONSUMPTION	-	-	-	-	-	-	-	-	-	-	-
FINAL CONSUMPTION	LOSSES	-	-	-	-	-	-	-	-	-	-	-
	ADJUSTMENT	-	-	-	-	-	-	-	-	-	-	-
	TRANSPORTATION	-	-	-	-	29,51	2,40	20,73	-	-	52,64	52,64
	INDUSTRY	-	-	-	0,08	-	0,24	4,91	-	-	5,23	5,23
CONSUMPTION	RESIDENTIAL	6,20	6,20	-	4,78	-	0,25	-	0,70	-	5,73	11,93
	COMMERC.,SERV.PUB	-	-	-	0,54	0,33	-	0,19	-	-	1,06	1,06
	AGRIC.,FISH.MIN.	-	-	-	-	-	-	2,93	-	-	2,93	2,93
	CONSTRUCTION,OTH.	-	-	-	0,53	-	-	-	-	0,12	0,65	0,65
TOTAL	ENERGY CONSUMPTION	6,20	6,20	-	5,93	29,84	2,89	28,76	0,70	0,12	68,24	74,44
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	6,20	6,20	-	5,93	29,84	2,89	28,76	0,70	0,12	68,24	74,44
	EMISSIONS	6,20	6,20	-	5,93	29,84	2,89	70,78	1,06	0,12	110,62	116,82

Table 26. Dominica Greenhouse gas inventory – 2011 (Technology approach)

	ACTIVITY	PRIMARY	TOTAL	SECUNDARIA							TOTAL	
ENERGY SOURCE		FIREWOOD	PRIMARY	ELECTRICITY	LPG	GASOLINE / ALCOHOL	KEROSENE	DIESEL OIL	CHARCOAL	NON-ENERGY PRODUCTS	SECONDARY	TOTAL
SUPPLY	PRODUCTION	-	-	-	-	-	-	-	-	-	-	-
	IMPORT	-	-	-	-	-	-	-	-	-	-	-
	EXPORT	-	-	-	-	-	-	-	-	-	-	-
	INVENTORIES	-	-	-	-	-	-	-	-	-	-	-
	UNUSED	-	-	-	-	-	-	-	-	-	-	-
TOTAL	SUPPLY	-	-	-	-	-	-	-	-	-	-	-
TRANSFORMATION	REFINERY	-	-	-	-	-	-	-	-	-	-	-
	POWER PLANTS	-	-	-	-	-	-	51,31	-	-	51,31	51,31
	SELF PRODUCERS	-	-	-	-	-	-	0,74	-	-	0,74	0,74
	GAS TREATM.PLANT	-	-	-	-	-	-	-	-	-	-	-
	CHARCOAL PLANT	-	-	-	-	-	-	-	0,46	-	0,46	0,46
	COKE/BLAST FURNAC	-	-	-	-	-	-	-	-	-	-	-
	DISTILLERY	-	-	-	-	-	-	-	-	-	-	-
	OTHER CENTERS	-	-	-	-	-	-	-	-	-	-	-
TOTAL	TRANSFORMATION	-	-	-	-	-	-	52,05	0,46	-	52,51	52,51
END CONSUMPTION	OWN CONSUMPTION	-	-	-	-	-	-	-	-	-	-	-
	LOSSES	-	-	-	-	-	-	-	-	-	-	-
	ADJUSTMENT	-	-	-	-	-	-	-	-	-	-	-
	TRANSPORTATION	-	-	-	-	29,74	2,50	21,67	-	-	53,91	53,91
	INDUSTRY	-	-	-	0,08	-	0,09	7,71	-	-	7,88	7,88
	RESIDENTIAL	11,72	11,72	-	4,26	-	0,46	-	0,89	-	5,61	17,33
	COMMERC.,SERV.PUB	-	-	-	0,50	0,18	-	0,17	-	-	0,85	0,85
	AGRIC.,FISH.MIN.	-	-	-	-	-	-	1,86	-	-	1,86	1,86
	CONSTRUCTION,OTH.	-	-	-	0,26	-	-	-	-	0,20	0,46	0,46
CONSUMPTION	ENERGY SOURCE	11,72	11,72	-	5,10	29,92	3,05	31,41	0,89	0,20	70,57	82,29
	NON ENERGY CONSUM	-	-	-	-	-	-	-	-	-	-	-
CONSUMPTION	FINAL	11,72	11,72	-	5,10	29,92	3,05	31,41	0,89	0,20	70,57	82,29
TOTAL	EMISSIONS	11,72	11,72	-	5,10	29,92	3,05	83,46	1,35	0,20	123,08	134,80

Table 27. Dominica Greenhouse gas inventory – 2010 (Technology approach)

VII. Economic and Energy Indicators

A set of economic and energy indicators were calculated based on the Energy Balances 2010 – 2012.

Table 28 below compares Dominica with Latin American and Caribbean Countries (LA&C) annual average energy economic indicators. It's clearly seen that most of the Dominica's indicators are lower than the average for LA&C countries.

Dominica's Final Energy Consumption per capita is 3.7 (kboe/10(3) inhab) against 7.4 for LA&C. Similar behavior can be seen for Energy Intensity, Industrial Energy Intensity and Total CO₂ Emissions per capita.

Regarding electricity sector indicators, it is remarkable that both Total Electricity Consumption per capita ((GWh/10(3) inhab)) and CO₂ intensity for electricity generation ((Gg CO₂/GWh)) are higher than LA&C values. In the second case, Dominica emissions are more than twice the emissions of LA&C (DM 0.56 vs LA&C 0.22).

	Final Energy Consumption per capita	Total Electricity Consumption per capita	Total Energy Consumption in Residential Sector per capita	Total Firewood Consumption in Residential Sector per capita	Total Electricity Consumption in Residential Sector per capita	Energy Intensity	Industrial Energy Intensity	Total CO2 Emissions per capita	Intensity of CO2 Emissions in Electricity Sector / Generation
Year	(kbep/10(3)inhab)	(GWh/10(3)inhab)	(kbep/10(3)inhab)	(kbep/inhab)	(kWh/inhab)	(bep/10(3) EC\$)	(bep/10(3) EC\$)	(Gg CO2/bep/10(3)inhab)	(Gg CO2/GWh)
Dominica									
2010	3,80	1,83	0,86	0,31	0,34	0,23	0,94	1,89	0,60
2011	3,62	1,87	0,74	0,16	0,35	0,22	3,78	1,65	0,48
2012	3,52	1,86	0,67	0,09	0,35	0,22	0,79	1,71	0,58
<i>Averag</i>	<i>3,65</i>	<i>1,85</i>	<i>0,76</i>	<i>0,19</i>	<i>0,35</i>	<i>0,22</i>	<i>1,84</i>	<i>1,75</i>	<i>0,55</i>
Latin America and Caribbean									
2011	7,38	1,21	--	--	--	1,29	2,82	2,7	0,22

Table 28. Energy and Economic Indicators (2010 – 2012)

VIII. Data processing

The gathering information process allowed compiling the required data according to the structure of the energy balance, which considers the supply, transformation and consumption of energy. The information available to calculate the BE is the following:

- The major oil companies fulfilled hydrocarbons' questionnaires: SOL, RUBIS, Trinidad and Tobago National Oil Company and PetroCaribe, who are importers and distributors of Gasoline, Diesel Oil and LPG. This also permitted to know the energy final consumption sectors (residential, commercial, industrial, agricultural, mining, power generation and gas stations) by each energy source;
- Information on supply, transformation and consumption of electricity came from the annual reports prepared by the Utility DOMLEC and questionnaires;
- Residential consumption of firewood and charcoal was estimated on the basis of OLADE's residential consumption model, using data about population and housing distribution, family size and living arrangements and housing statistics (lighting and cooking), contained in population censuses published by the Central Statistical Office;
- Energy consumption in the transport sector was estimated based on data from the Motor Vehicle Statistics Report provided by the Inland Revenue Department-IRD- and references of specific fuel consumptions coming from OLADE's methodology.

IX. Conclusions and recommendations

In order to build the Dominica's Energy Balances (2010-2012), remarkable available information was identified in the supply side of public and private institutions that are responsible of the administration of certain sub-sectors or areas of the energy industry. Likewise, information related to the control of the institutions' main economic activity was gathered. Institutions such as Dominica's power company and the fossil fuel marketing companies were key factors on this research.

Regarding the energy demand, the possibility of having specific and systematic information that allows knowing reliable final energy consumption within the economic sectors and subsectors required for the energy balance development was limited. Therefore, the consumption of the energy products classified by economic subsectors was estimated by a calculation processes based on structural characteristics of consumers, such as vehicle fleet by type of vehicle, number of dwellings by type of fuel used for cooking, among others. Among the industrial and the commercial sector, variables such as production or added value were gathered and were verified with fuel purchases in some of the largest consumers. Despite the above-mentioned limitation, the energy balances obtained can be considered as adequate and reliable, mainly taking into account the statistical adjustment by source and for total energy.

On the other hand, despite of the level of constraints that a country may have in terms of building a national energy balance and GHG Inventories, the implementation of a practical methodology such as the one provided by OLADE, allows to optimize the time and resources to obtain reliable results.

The technology transfer and supply of the tools used in this project would allow the country to ensure a direct and continuous elaboration of energy balances, GHG Inventories as well as improving the quality of statistical data in order to do some energy planning and decision making for the development of the energy sector.

Dominica's energy matrix is mainly reliant on imported energy products. Although the country has significant geothermal resources, domestic energy production is limited to harness its hydropower and firewood. This matrix could have a significant shift if this potential is being used as an intake for electricity generation by decreasing the quantity of imported diesel oil.

Although there has been a significant reduction of firewood consumption in the residential sector, biomass is an important energy potential of the country, which is based on extensive forest areas. In addition, the share of renewable energy sources could be increased by promoting projects on solar, wind and small and medium hydropower plants, considering the large amount of rivers in the country.

As part of the gathering information process it became evident that the energy information is available but disseminated among entities, directly and indirectly involved within the energy sector. This establishes that the required data for Energy Balance's preparation is available in the country and would therefore be recommended to promote an energy information management system.

ANNEX

1. Forms

1.1. Agenda for Country Technical Visit

COUNTRYTECHNICALVISIT_2013.xls

COUNTRY TECHNICAL VISITS
December 2-9, 2013




Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

N	SUB-SECTOR	INSTITUTION	CONTACT NAME	EMAIL	PHONE	ADDRESS	TYPE OF INFORMATION	VISIT DATE
1	Main Energy Supply Variables	Ministry of Public Works, Energy and Ports					F03_SurveyDominica_2013.xls	Monday, December 2 nd , 2013
2	Electricity	Domlec					EE_SurveyDominica_2013.xls	Monday, December 2 nd , 2013
3	Consumption: Industry, Transport, Agr. Fish. Mining, Commercial	Ministry of Employment, Trade, Industry and Diaspora Affairs					CIN_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2012
		Ministry of Agriculture and Forestry					CRW_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2013
		The Public and Police Service Commissions					CTR_SurveyDominica_2013.xls	Tuesday, December 3 rd , 2014
		Main Industries					CIN2_SurveyDominica_2013.xls	Wednesday, December 4 th , 2011
		Ministry of Environment, Natural Resources, Physical Planning and Fisheries					CRW_SurveyDominica_2013.xls	Wednesday, December 4 th , 2012
		Ministry of Tourism and Legal Affairs					CCO_SurveyDominica_2013.xls	Wednesday, December 4 th , 2013
4	National Statistical Variables	Central Statistical Office - Ministry of Finance					NV_SurveyDominica_2013.xls	Thursday, December 5 th , 2012
		Eastern Caribbean Central Bank					NV_SurveyDominica_2013.xls	Thursday, December 5 th , 2013
5	Hydrocarbons	Rubis					HC_SurveyDominica_2013.xls	Friday, December 6 th , 2016
		Sol					HC_SurveyDominica_2013.xls	Friday, December 6 th , 2017
		Exxon					HC_SurveyDominica_2013.xls	Friday, December 6 th , 2018

1.2. Main Energy Variables

Form 13. F03_SURVEYDOMINICA_2013.xls

Section 1. Oil and Products

F03_SURVEYDOMINICA_2013.xls				
COUNTRY ENERGY BALANCE				
MAIN ENERGY VARIABLES FORM				
MINISTRY NAME:				
ADDRESS:				
CITY:				
CONTACT NAME:				
EMAIL:				
DATE:				
<p>Please fill in this survey as fully as you can. Your completed survey will be treated in confidence. After completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)</p>				
VARIABLES	UNIT	2010	2011	
1. OIL AND PRODUCTS				
1.1 PRODUCTION				
- Oil	10(3) bbl			
- LPG	10(3) bbl			
- Gasoline	10(3) bbl			
- Kerosene & Jet fuel	10(3) bbl			
- Diesel Oil	10(3) bbl			
- Fuel Oil	10(3) bbl			
1.2 EXPORTS				
- Oil	10(3) bbl			
- LPG	10(3) bbl			
- Gasoline	10(3) bbl			
- Kerosene & Jet fuel	10(3) bbl			
- Diesel Oil	10(3) bbl			
- Fuel Oil	10(3) bbl			
1.3 IMPORTS				
- Oil	10(3) bbl			
- LPG	10(3) bbl			
- Gasoline	10(3) bbl			
- Kerosene & Jet fuel	10(3) bbl			
- Diesel Oil	10(3) bbl			
- Fuel Oil	10(3) bbl			
1.4 CONSUMPTION				
- Oil	10(3) bbl			
- LPG	10(3) bbl			
- Gasoline	10(3) bbl			
- Kerosene & Jet fuel	10(3) bbl			
- Diesel Oil	10(3) bbl			
- Power generation	10(3) bbl			
- Fuel Oil	10(3) bbl			
- Power generation	10(3) bbl			
2. NATURAL GAS				
2.1 PRODUCTION (Without reinjection or flaring)	10(6) m(3)			
2.2 FLARING (Burned into the atmosphere)	10(6) m(3)			
2.3 EXPORTS	10(6) m(3)			
2.4 IMPORTS	10(6) m(3)			
2.5 CONSUMPTION				
- Power generation	10(6) m(3)			
- Transportation	10(6) m(3)			
- Residential	10(6) m(3)			
- Commercial	10(6) m(3)			
- Industrial	10(6) m(3)			
- Agriculture, Fishing and Mining	10(6) m(3)			
- Other	10(6) m(3)			

Section 2. Other Energy Sources

F03 SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE



Organismo Latinoamericano de Energía
Latin American Energy Organization
Organisation Latine-Américaine d'Énergie
Organismo Latino-Americano de Energia

MAIN ENERGY VARIABLES FORM

MINISTRY NAME:	-
ADDRESS:	-
CITY:	-
CONTACT NAME:	-
EMAIL:	-
DATE:	-

Please fill in this survey as fully as you can. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (see@olade.org and paola.carrera@olade.org)

VARIABLES	UNIT	2010	2011	2012
3. COAL				
3.1 PRODUCTION	10(6) t			
3.2 EXPORTS	10(6) t			
- Volume(**)	10(6) t			
- Value	10(3)US\$			
3.3 IMPORTS				
- Volume(**)	10(6) t			
- Value	10(3)US\$			
3.4 CONSUMPTION				
- Iron & steel	10(3) t			
- Industrial	10(3) t			
- Power generation	10(3) t			
- Other	10(3) t			
4. ALCOHOL (Energy use)				
4.1 PRODUCTION	10(3) bbl			
4.2 CONSUMPTION	10(3) bbl			
5. BIODIESEL				
5.1 PRODUCTION	10(3) bbl			
5.2 IMPORTS	10(3) bbl			
5.3 EXPORTS	10(3) bbl			
5.4 CONSUMPTION	10(3) bbl			
6. FIREWOOD				
6.1 CONSUMPTION	10(3) t			
7. SUGAR CANE PRODUCTS				
7.1 PRODUCTION	10(3) boe			
7.2 CONSUMPTION	10(3) boe			
- Power generation	10(3) boe			
8. AGRICULTURAL WASTES				
8.1 PRODUCTION	10(3) boe			
8.2 CONSUMPTION	10(3) boe			

(**) Specify calorific value

Section 3. Electricity

F03_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latine-américaine d'Énergie
Organização Latino-Americana de Energia

MAIN ENERGY VARIABLES FORM

MINISTRY NAME:	-
ADDRESS:	-
CITY:	-
CONTACT NAME:	-
EMAIL:	-
DATE:	-

Please fill in this survey as fully as you can. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)

VARIABLES	UNIT	2010	2011	2012
9. ELECTRICITY				
9.1 TOTAL GENERATION	GWh			
9.1.1 PUBLIC GENERATION				
- Hydro	GWh			
- Thermal	GWh			
- Geothermal	GWh			
- Wind	GWh			
- Photovoltaic	GWh			
- Nuclear	GWh			
9.1.2 SELF- PRODUCERS' GENERATION				
- Hydro	GWh			
- Thermal	GWh			
9.2 CONSUMPTION				
- Transportation	GWh			
- Residential	GWh			
- Commercial	GWh			
- Industrial	GWh			
- Agriculture, Fishing and Mining	GWh			
- Other	GWh			
9.3 LOSSES	GWh			
9.4 EXPORTS				
- Volume	GWh			
9.5 IMPORTS				
- Volume	GWh			

Section 4. Potential and Storage

F03_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE



Organisation Latinoaméricaine de Énergie
Latin American Energy Organization
Organización Latinoamericana de Energía

MAIN ENERGY VARIABLES FORM

MINISTRY NAME:	-
ADDRESS:	-
CITY:	-
CONTACT NAME:	-
EMAIL:	-
DATE:	-

Please fill in this survey as fully as you can. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (paola.carrera@olade.org)

VARIABLES	UNIT	2010	2011	2012
1. OIL				
1.1 RESERVES				
- Proven	10(6) bbl			
- Probable	10(6) bbl			
- Possible	10(6) bbl			
1.2 REFINING CAPACITY	10(3) bbl/day			
1.3 STORAGE CAPACITY	10(3) bbl			
2. NATURAL GAS				
2.1 RESERVES				
- Proven	10(9) m(3)			
- Probable	10(9) m(3)			
- Possible	10(9) m(3)			
3. COAL				
3.1 RESERVES				
- Proven(**)	10(6) t			
- Probable (**)	10(6) t			
- Possible (**)	10(6) t			
4. ALCOHOL (Energy use)				
4.1 DISTILLERY CAPACITY	bbl/day			
5. BIODIESEL				
5.1 BIODIESEL PLANTS CAPACITY	bbl/day			
5. ELECTRICITY				
5.1 TOTAL ESTIMATED POTENTIAL (Installed capacity)				
- Hydroenergy	MW			
- Geothermal				
- Wind	MW			
- Photovoltaic	MW			
5.2 TOTAL INSTALLED CAPACITY				
5.2.1 PUBLIC INSTALLED CAPACITY				
- Hydro	MW			
- Thermal	MW			
- Geothermal	MW			
- Wind	MW			
- Photovoltaic	MW			
- Nuclear	MW			
5.2.2 SELF - PRODUCERS' INSTALLED CAPACITY				
- Hydro	MW			
- Thermal	MW			

(**) Specify calorific value

1.3. Hydrocarbons Survey

Form 14. HC_SURVEYDOMINICA_2013.xls

Section 1. Storage

HC_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE

HYDROCARBONS SURVEY



COMPANY NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
TELEPHONE:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)

SECTION 1: STORAGE - GENERAL CHARACTERISTICS

N	Facility Name	Location	Storage Capacity									
			Petroleum (kbbl)	Gasoline (kbbl)	Diesel Oil (kbbl)	Fuel Oil (kbbl)	Kerosene (kbbl)	Jet Fuel (kbbl)	LPG (kbbl)	Asphalts (kbbl)	Lubricants (kbbl)	Greases (kbbl)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Section 2. Hydrocarbons' Supply and Other Variables

Section 3. Hydrocarbons' Total Sales

HC_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE

HYDROCARBONS SURVEY



COMPANY NAME:	-
ADDRESS:	-
CITY:	-
CONTACT NAME:	-
EMAIL:	-
TELEPHONE:	-
DATE:	-

YEAR: 2010

SECTION 2: HYDROCARBONS' SUPPLY SIDE AND OTHER VARIABLES

	Petroleum (kbbl)	Gasoline (kbbl)	Diesel (kbbl)	Fuel Oil (kbbl)	Kerosene (kbbl)	Jet Fuel (kbbl)	LPG (kbbl)	Lubricants (kbbl)	Asphalts (kbbl)	Greases (kbbl)
Production										
Import										
Exports										
Initial Stocks										
Closing Stocks										
Unused										
Losses										

SECTION 3: HYDROCARBONS' TOTAL SALES

	Petroleum (kbbl)	Gasoline (kbbl)	Diesel (kbbl)	Fuel Oil (kbbl)	Kerosene (kbbl)	Jet Fuel (kbbl)	LPG (kbbl)	Lubricants (kbbl)	Asphalts (kbbl)	Greases (kbbl)
Transport sector										
Industrial sector										
Residential sector										
Commercial, Services & Public										
Farming, Forestry and Fishing										
Mining and Quarring										
Construction sector & Others										
Service Stations										
Total										

1.4. Electricity Sector Survey

Form 15. EE_SURVEYDOMINICA_2013.xls

Section 1. Power Plants General Characteristics

EE_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE

ELECTRICITY SURVEY



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

COMPANY NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)

SECTION 1: POWER PLANT GENERAL CHARACTERISTICS

N	Name	Location	Service P=Public S=Self-producer	Year of Commissioning	Ownership type P=Public R=Private	Number of Units	Nominal Power [MW]	Effective Power [MW]
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Section 2. Power Plants Annual Variables

EE_SURVEYDOMINICA_2013.xls

COUNTRY ENERGY BALANCE

ELECTRICITY SURVEY



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

COMPANY NAME:	-
ADDRESS:	-
CITY:	-
CONTACT NAME:	-
EMAIL:	-
DATE:	-

YEAR:	2010
-------	------

SECTION 2: POWER PLANT ANNUAL VARIABLES

N°	Technology Type *	Installed Capacity (MW)	Plant Factor (%)	Electricity Generation	Fuel Consumed for Electricity Generation	Quantity of Fuel Used	Own Consumption	Losses
		(MW)	(%)	(GWh)	(kbbbl)	(kbbbl)	(GWh)	(GWh)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

* CC: Combined Cycle GT: Gas Turbine HY: Hydro ICE: Internal Combustion Engine PH: Photovoltaic ST: Steam Turbine WD: Wind

Section 3. Hydroenergy Technical Specifications

Section 4. Total Sales and Consumers

SECTION 3: HYDROENERGY TECHNICAL SPECIFICATIONS

N	Reservoir Name	Reservoir Capacity	Reservoir Flow	Average Flow	Precipitation Flow	Turbine flow	Average Diameter Water Mirror	Average Fall w.r.t the Turbine Axis	Initial Volume	Final Volume
		(Mm3)	(m3/sec)	(m3/sec)	(m3/sec)	(m3/sec)				
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										


SECTION 4: TOTAL SALES AND CUSTOMERS

SECTOR	TOTAL CUSTOMERS	TOTAL SALES (GWh)
Transport sector		
Industrial sector		
Residential sector		
Commercial, Services & Public		
Farming, Forestry and Fishing		
Mining and Quarring		
Construction sector & Others		
Total		

1.5. Transport Sector Survey

Form 16. CTR_SURVEYDOMINICA_2013.xls

Section 1-3. Characterization of Transport Sector; Energy sources and Characterization of Transport Sub-Sector

CTR_SURVEYDOMINICA_2013.xls										
ENERGY BALANCE TRANSPORT SECTOR			 <div style="font-size: 0.8em;"> Organización Latinoamericana de Energía Latin American Energy Organization Organisation Latino-américaine d'Énergie Organização Latino-Americana de Energia </div>							
Date: _____										
name of the institution: _____										
country: _____			parish: _____							
Please fill in this survey as fully information as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (paola.carrera@olade.org)										
2010										
SECTION 1. CHARACTERISTICS OF SUBSECTORS										
TABLE 1.1 CHARACTERIZATION OF TRANSPORT SECTOR										
Subsector	Added Value XCD	Total Fleet Units								
(GDP Categories)										
Transport and Storage										
Ground transportation										
Road Transport										
Category 1										
Category 2										
Railway										
Sea Transport										
Cruises										
Yacht										
Fishing boats										
Air Transport										
Source: _____										
SECTION 2. ENERGY SOURCES										
TABLE 2.1 CHARACTERIZATION OF ENERGY SOURCES										
Subsector	Electricity (kWh)	Crude Oil (kbbf)	LPG (MM3)	Kerosene (kbbf)	Gasoline (kbbf)	Diesel Oil (kbbf)	Fuel Oil (kbbf)	Coke (KT)	Charcoal (KT)	Firewood (KT)
(GDP Categories)										
Transport and Storage										
Ground transportation										
Road Transport										
Category 1										
Category 2										
Railway										
Sea Transport										
Cruises										
Yacht										
Fishing boats										
Air Transport										
Source: _____										
SECTION 3. CHARACTERIZATION OF TRANSPORT SUB-CATEGORIES										
TABLE 2.1 CHARACTERIZATION OF VEHICLES FLEET										
Category	Private Units		Public Units		Annual Average Rounds Km/year					
	Gasoline	Diesel	Gasoline	Diesel						
Subtotal light vehicles										
Automobil										
4x4										
Pick-up										
Others										
Subtotal buses										
Small bus										
Big bus										
Subtotal heavy cargo										
Heavy cargo										
2 axes										
4 axes										
6 axes										
>6 axes										
Source: _____										

1.6. Industrial Sector Survey

Form 17. CIN_SURVEYDOMINICA_2013.xls

Section 1. Characteristics of Industry Sector

CIN_SURVEYDOMINICA_2013.xls

ENERGY BALANCE INDUSTRY SECTOR



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

Date: 0

name of the institution: 0

country: 0 parish: 0

Please fill in this survey as fully information as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (paola.carrera@olade.org)

2010

SECTION 1. CHARACTERISTICS OF SUBSECTORS

TABLE 1.1 CHARACTERIZATION OF INDUSTRIAL SECTOR

Subsector	Number of Industrial Facilities	Added Value	Production		Number of Employees
			Amount	Units	
	Nº	XCD			Nº
Industry					
Food products, beverages and tobacco					
Textiles and clothing					
Footwear & leather					
Wood and furniture					
Pulp, paper and printing					
Chemical					
Glass and ceramics					
Cement					
Iron and steel					
Metal industries					
Other industries					
Mining & Quarrying					

Source:

Section 3. Information of Great Energy Consumers

SECTION 2. ENERGY SOURCES

TABLE 2.1 CHARACTERIZATION OF ENERGY CONSUMPTION

[illegible]

Source:

SECTION 3. GREAT ENERGY CONSUMERS OF THE INDUSTRIAL SECTOR

TABLE 3.1 LIST OF GREAT INDUSTRIES

[illegible]

Source:

Section 4. Self-Generators

SECTION 4. SELF GENERATORS

TABLE 4.1 CHARACTERIZATION OF SELF GENERATORS

[illegible]

Source:

Section 1. General Information

CIN2_SURVEYDOMINICA_2013.xls

DOMINICA ENERGY BALANCE

INDUSTRIAL SURVEY



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

COMPANY NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
TELEPHONE:	
WEBSITE:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (paola.carrera@olade.org)

SECTION 1: GENERAL INFORMATION

Subsector and Activity	Number of Employees	Total Production Value	Total Added Value	Shifts Worked	Weeks Worked per Year	Worked Days per Week	Hours Worked per Year	Schedule	Collective Vacations

Manufactured Products		Product 1	Product 2	Product 3	Product 4	Product 5	Product 6	Product 7	Product 8	Product 9	Product 10
Product Code											
Production Unit											
2010	Production Capacity										
	Production										
	Value										
2011	Production Capacity										
	Production										
	Value										
2012	Production Capacity										
	Production										
	Value										

Section 2. Purchases and Sales of Energy

DOMINICA ENERGY BALANCE

INDUSTRIAL SURVEY



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

COMPANY NAME:	0
ADDRESS:	0
CITY:	0
CONTACT NAME:	0
EMAIL:	0
TELEPHONE:	0
WEBSITE:	0
DATE:	0

SECTION 2:

PURCHASES AND SALES OF ENERGY

Energy Sources	Unit	2010		2011		2012	
		Amount	\$ Per Year	Amount	\$ Per Year	Amount	\$ Per Year
Natural Gas							
Coal							
Crude Oil							
Firewood							
Vegetal waste							
LPG							
Gasoline							
Kerosene							
Diesel oil							
Fuel oil							
Coke							
Charcoal							
Electricity purchased							
Self-generated Electricity							
Electricity sold							

1.7. Commercial Sector Survey

Form 19. CCO_SURVEYDOMINICA_2013.xls

CCO2_Survey_2013.xls

COUNTRY ENERGY BALANCE

HOTELS SURVEY



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

HOTEL NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
TELEPHONE:	
WEBSITE:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (ciece@olade.org and paola.carrera@olade.org)

SECTION 1: GENERAL INFORMATION

Year	Number of Beds	Number of Rooms	Occupation factor - beds	Occupation factor - rooms	Added Value
	Nº	Nº	%	%	\$
2010					
2011					
2012					

SECTION 2: ELECTRICITY AND FOSIL FUEL PURCHASES

Energy Sources	Unit	2010		2011		2012	
		Amount	\$ Per Year	Amount	\$ Per Year	Amount	\$ Per Year
Firewood	KT						
LPG	(MM3)						
Diesel oil	(kbbbl)						
Fuel oil	(kbbbl)						
Charcoal	KT						
Electricity purchased	(kWh)						
Self-generated Electricity	(kWh)						
Others _____	(_____)						

Hotels General Information and Energy Purchases by Sources

CCO2H_Survey_2013.xls

COUNTRY ENERGY BALANCE



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organização Latino-Americana de Energia

HOTELS SURVEY

HOTEL NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
TELEPHONE:	
WEBSITE:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)

SECTION 1: GENERAL INFORMATION

Year	Number of Beds	Number of Rooms	Occupation factor - beds	Occupation factor - rooms	Added Value
	Nº	Nº	%	%	\$
2010					
2011					
2012					

SECTION 2: PURCHASES

Energy Sources	Unit	2010		2011		2012	
		Amount	\$ Per Year	Amount	\$ Per Year	Amount	\$ Per Year
Firewood	KT						
LPG	(MM3)						
Diesel oil	(kbb)						
Fuel oil	(kbb)						
Charcoal	KT						
Electricity purchased	(kWh)						
Self-generated Electricity	(kWh)						
Others _____	(_____)						

COUNTRY ENERGY BALANCE



Organización Latinoamericana de Energía
Latin American Energy Organization
Organisation Latino-américaine d'Énergie
Organizaçào Latino-Americana de Energia

RESTAURANT SURVEY

RESTAURANT NAME:	
ADDRESS:	
CITY:	
CONTACT NAME:	
EMAIL:	
TELEPHONE:	
WEBSITE:	
DATE:	

Please fill in this survey as fully as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (siec@olade.org and paola.carrera@olade.org)

SECTION 1: GENERAL INFORMATION

Year	Number of invoices	Occupation factor	Sales value
	Nº	Capacity used / Capacity installed (%)	\$
2010			
2011			
2012			

Instructions:

Capacity is the number of persons that can be simultaneously served

Occupation Factor is the annual average of the number of persons served divided by the Capacity

Added Value is related to the annual sales value


SECTION 2: PURCHASES

Energy Sources	Unit	2010		2011		2012	
		Amount	\$ Per Year	Amount	\$ Per Year	Amount	\$ Per Year
Firewood	kt						
LPG	(MM3)						
Diesel oil	(kbbbl)						
Fuel oil	(kbbbl)						
Charcoal	kt						
Electricity purchased	(kWh)						
Self-generated Electricity	(kWh)						
Others _____	(_____)						

1.8. Agricultural Sector Survey

Form 22. CRW_SURVEYDOMINICA_2013.xls

Section 1. Characterization of Agricultural, Forestry and Fishing Sector

CRW_SURVEY_2013.xls																																																																																																								
ENERGY BALANCE AGRICULTURE, FORESTRY AND FISHING SECTOR						 <div style="font-size: 0.8em;"> Organización Latinoamericana de Energía Latin American Energy Organization Organisation Latino-américaine d'Energie Organização Latino-Americana de Energia </div>																																																																																																		
Date:	<input style="width: 95%;" type="text" value="0"/>																																																																																																							
name of the institution:	<input style="width: 95%;" type="text" value="0"/>																																																																																																							
country:	<input style="width: 25%;" type="text" value="0"/>	parish:		<input style="width: 60%;" type="text" value="0"/>																																																																																																				
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<div style="background-color: #cccccc; padding: 5px; margin-bottom: 10px;">2010</div> <div style="background-color: #cccccc; padding: 5px; margin-bottom: 10px;">SECTION 1. IDENTIFICATION OF THE STATISTICAL UNIVERSE AND INFORMATION UNIT</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p style="font-size: 0.8em; margin-bottom: 5px;">TABLE 1.1 CHARACTERIZATION OF AGRICULTURE SUBSECTORS</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="text-align: left;">Subsector</th> <th style="text-align: left;">Added Value</th> <th colspan="2" style="text-align: left;">Production</th> <th style="text-align: left;">Agricultural Production Facilities</th> <th style="text-align: left;">Waste to Energy</th> <th style="text-align: left;">Area Harvested</th> <th style="text-align: left;">Level of Mechanization</th> </tr> <tr> <th></th> <th>XCD</th> <th>Amount</th> <th>Units</th> <th>Number</th> <th>Tons</th> <th>Km2</th> <th>%</th> </tr> </thead> <tbody> <tr><td>Agriculture</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Crops</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Bananas</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Other Crops</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Crop 1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Crop 2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Crop 3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Crop 4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td> Livestock</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <p style="font-size: 0.8em; margin-top: 5px;">Source: <input style="width: 80%;" type="text"/></p> </div> <div style="width: 35%;"> <p style="font-size: 0.8em; margin-bottom: 5px;">TABLE 1.2 CHARACTERIZATION OF FISHING</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="text-align: left;">Subsector</th> <th style="text-align: left;">Added Value</th> <th style="text-align: left;">Processed Fish</th> </tr> <tr> <th></th> <th>XCD</th> <th>Tons</th> </tr> </thead> <tbody> <tr><td>Fishing</td><td></td><td></td></tr> </tbody> </table> <p style="font-size: 0.8em; margin-top: 5px;">Source: <input style="width: 80%;" type="text"/></p> </div> </div>								Subsector	Added Value	Production		Agricultural Production Facilities	Waste to Energy	Area Harvested	Level of Mechanization		XCD	Amount	Units	Number	Tons	Km2	%	Agriculture								Crops								Bananas								Other Crops								Crop 1								Crop 2								Crop 3								Crop 4								Livestock								Subsector	Added Value	Processed Fish		XCD	Tons	Fishing		
Subsector	Added Value	Production		Agricultural Production Facilities	Waste to Energy	Area Harvested	Level of Mechanization																																																																																																	
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Livestock																																																																																																								
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	XCD	Tons																																																																																																						
Fishing																																																																																																								

Section 2. Characterization of Energy Consumption

Section 3. Characterization of the Level of Mechanization

SECTION 2. ENERGY SOURCES

TABLE 2.1 CHARACTERIZATION OF ENERGY CONSUMPTION IN AGRICULTURE SECTOR BY ENERGY SOURCE

Subsector	Electricity		Crude Oil	LPG	Kerosene	Gasoline	Diesel Oil	Fuel Oil	Coke	Charcoal	Firewood	Others
	Purchase	Self-Generation										
	(MWh)	(MWh)										
Agriculture												
Crops												
Bananas												
Other Crops												
Crop 1												
Crop 2												
Crop 3												
Crop 4												
Livestock												

Source:

TABLE 2.2 CHARACTERIZATION OF ENERGY CONSUMPTION IN FISHING SECTOR BY ENERGY SOURCE

Subsector	Total	Gasoline	Diesel Oil	Electricity	Others
		(kbbl)	(kbbl)	kWh	(_____)
Fishing					

SECTION 3. CHARACTERIZATION OF THE LEVEL OF MECHANIZATION

TABLE 3.1 CHARACTERIZATION OF THE LEVEL OF MECHANIZATION

Subsector	General	Irrigation		Tractors		Harvester	Fumigation	
		Electricity	Diesel Oil	Gasoline	Diesel Oil	Diesel Oil	Aerial	Manual
	%	%	%	%	%	%	%	%
Agriculture	0							
Crops	0							
Bananas	0							
Other Crops	0							
Crop 1	0							
Crop 2	0							
Crop 3	0							
Crop 4	0							
Livestock	0							

Source:

1.9. National Variables Survey

Form 23. NV_SURVEYDOMINICA_2013.xls

Section 1. Characterization of the Universe of Information


NV_SURVEYDOMINICA_2013.xls						
ENERGY BALANCE NATIONAL STATISTICAL VARIABLES				Organización Latinoamericana de Energía Latin American Energy Organization Organisation Latino-américaine d'Énergie Organização Latino-Americana de Energia		
Date:	<input style="width: 90%;" type="text"/>					
name of the institution:	<input style="width: 90%;" type="text"/>					
country:	<input style="width: 90%;" type="text"/>	parish:	<input style="width: 90%;" type="text"/>			
Please fill in this survey as fully information as you can. It should only take around 30 minutes. Your completed survey will be treated in confidence. Once completed please return the survey to Paola Carrera (paola.carrera@olade.org)						
SECTION 1. UNIVERSE OF INFORMATION						
TABLA 1.2 HOTELS						
Description	2010	2011	2012	2010	2011	2012
	Number of rooms			Number of employees		
Hotels Total						
Hotels						
Guest Houses						
Apartment/Cottages						
TABLA 1.2 RESTAURANTS						
Description	2010	2011	2012	2010	2011	2012
	Number of establishments			Capacity (number of persons)		
Restaurants Total						
Category 1						
Category 2						
Category 3						

TABLA 1.3 PUBLIC ADMIN AND SERVICES

Description	2010	2011	2012	2010	2011	2012
	Number of stablishments			Number of employees		
Public Admin, Defense & Compulsory SocSec						
Buildings						
Wholesale & Retail Trade						
Shopping centers						
Others						
Financial Intermediation						
Banks						
Insurance agency						
Real Estate, Renting and Business Activities						
Real Estate						
Business Services						
Education						
Schools						
Others						
Health and Social Work						
Hospitals						
Others						
Other Community, Social & Personal Services						
Buildings						


Section 2. Energy Consumptions

SECTION 2 ENERGY CONSUMPTIONS

TABLE 2.1 ENERGY CONSUMPTION BY ENERGY SOURCE

Subsector	Electricity	LPG	Kerosene	Gasoline	Diesel Oil	Fuel Oil	Charcoal	Firewood
	(kWh)	(MM3)	(kbbl)	(kbbl)	(kbbl)	(kbbl)	KT	KT
Hotels								
Hotels								
Guest Houses								
Apartment/Cottages								
Restaurants								
Category 1								
Category 2								
Category 3								
Public Admin, Defense & Compulsory SocSec								
Buildings								
Wholesale & Retail Trade								
Shopping centers								
Others								
Financial Intermediation								
Banks								
Insurance agency								
Real Estate, Renting and Business Activities								
Real Estate								
Business Services								
Education								
Schools								
Others								
Health and Social Work								
Hospitals								
Others								
Other Community, Social & Personal Services								
Buildings								

Section 1. Information on Population and Other Demographics Variables

NV_SURVEYDOMINICA_2013.xls																																																			
ENERGY BALANCE NATIONAL STATISTICAL VARIABLES	 <small>Organización Latinoamericana de Energía Latin American Energy Organization Organisation Latine-américaine d'Énergie Organizaçao Latino-Americana de Energia</small>																																																		
Date:	0																																																		
name of the institution:	0																																																		
country:	0																																																		
parish:	0																																																		
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SECTION 1. IDENTIFICATION OF THE STATISTICAL UNIVERSE AND INFORMATION UNIT																																																			
<p>TABLE 1. POPULATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Total population</th> <th>Urban population</th> <th>Rural population</th> </tr> </thead> <tbody> <tr><td>2001</td><td></td><td></td><td></td></tr> <tr><td>2010</td><td></td><td></td><td></td></tr> <tr><td>2011</td><td></td><td></td><td></td></tr> <tr><td>2012</td><td></td><td></td><td></td></tr> </tbody> </table> <p>Source: </p>			Total population	Urban population	Rural population	2001				2010				2011				2012																																	
	Total population	Urban population	Rural population																																																
2001																																																			
2010																																																			
2011																																																			
2012																																																			
<p>TABLE 2. DECILES OF ANNUAL HOUSEHOLD INCOME LEVEL (XCD)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Annual household income (Decile 1)</th> <th>Annual household income (Decile 2)</th> <th>Annual household income (Decile 3)</th> <th>Annual household income (Decile 4)</th> <th>Annual household income (Decile 5)</th> <th>Annual household income (Decile 6)</th> <th>Annual household income (Decile 7)</th> <th>Annual household income (Decile 8)</th> <th>Annual household income (Decile 9)</th> </tr> </thead> <tbody> <tr><td>2001</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2010</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2011</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2012</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <p>Source: </p>			Annual household income (Decile 1)	Annual household income (Decile 2)	Annual household income (Decile 3)	Annual household income (Decile 4)	Annual household income (Decile 5)	Annual household income (Decile 6)	Annual household income (Decile 7)	Annual household income (Decile 8)	Annual household income (Decile 9)	2001										2010										2011										2012									
	Annual household income (Decile 1)	Annual household income (Decile 2)	Annual household income (Decile 3)	Annual household income (Decile 4)	Annual household income (Decile 5)	Annual household income (Decile 6)	Annual household income (Decile 7)	Annual household income (Decile 8)	Annual household income (Decile 9)																																										
2001																																																			
2010																																																			
2011																																																			
2012																																																			
<p>TABLE 3. INFORMATION UNITS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Households</th> <th>Household size</th> <th>Number of electrified households</th> <th>Dwelling units</th> <th>Occupied dwelling units</th> <th>Number of electrified dwellings</th> </tr> </thead> <tbody> <tr><td>2001</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2011</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <p>Source: </p>			Households	Household size	Number of electrified households	Dwelling units	Occupied dwelling units	Number of electrified dwellings	2001							2011																																			
	Households	Household size	Number of electrified households	Dwelling units	Occupied dwelling units	Number of electrified dwellings																																													
2001																																																			
2011																																																			

Section 2. Information on Living Conditions

SECTION 2. ENERGY SOURCES

2.1 COOKING

2001

TABLE 4.1 POPULATION DISTRIBUTION BY COOKING ENERGY SOURCE

Energy Source	Urban area	Rural area
	%	%
LPG		
Kerosene		
Charcoal		
Electricity		
Firewood		
Others		
Total	-	-

Source:

2011

TABLE 4.2 POPULATION DISTRIBUTION BY COOKING ENERGY SOURCE

Energy Source	Urban area	Rural area
	%	%
LPG		
Kerosene		
Charcoal		
Electricity		
Firewood		
Others		
Total	-	-

Source:

2.2 LIGHTING

2001

TABLE 5.1 POPULATION DISTRIBUTION BY LIGHTING ENERGY SOURCE

Energy Source	Urban area	Rural area
	%	%
Electricity		
Kerosene		
Candles		
Firewood		
Charcoal		
Others		
Total	-	-

Source:

2011

TABLE 5.2 POPULATION DISTRIBUTION BY LIGHTING ENERGY SOURCE

Energy Source	Urban area	Rural area
	%	%
Electricity		
Kerosene		
Candles		
Firewood		
Charcoal		
Others		
Total	-	-

Source:

SECTION 3. EQUIPMENTS

2001

TABLE 6.1 POPULATION DISTRIBUTION BY ACCESS TO EQUIPMENTS

Equipment	Urban population	Rural population
	%	%
Fridge		
Refrigerated		
Air conditioning		
Fan		
Ovens		
Stove		
Water heaters		
Light bulb		
Iron		
Television		
Computer		
Vacuum cleaner		
Washing Machine		
Dryer		
Microwave		
Other electromechanical devices		
Total	-	-

Source:

2011

TABLE 6.2 POPULATION DISTRIBUTION BY ACCESS TO EQUIPMENTS

Equipment	Urban population	Rural population
	%	%
Fridge		
Refrigerated		
Air conditioning		
Fan		
Ovens		
Stove		
Water heaters		
Light bulb		
Iron		
Television		
Computer		
Vacuum cleaner		
Washing Machine		
Dryer		
Microwave		
Other electromechanical devices		
Total	-	-

Source:

4. Greenhouse Gas Emissions calculated by Reference approach

DOMINICA																									
GREEN HOUSE GASES INVENTORIES 2012																									
REFERENCE APPROACH																									
FUELS			PRODUCTION (kboe)	IMPORTS (kboe)	EXPORTS (kboe)	INVENTORIES (kboe)	UNUSED (kboe)	APPARENT CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	APPARENT CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (GgC)	NON ENERGY CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	NON ENERGY CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (Gg)	FRACTION OF STORED CARBON	STORED CARBON (Gg C)	NET EMISSIONS (TJ)	FRACTION OF OXIDIZED CARBON	REAL CARBON EMISSIONS (Gg C)	CO2 EMISSIONS (Gg CO2)
Liquids	PRIMARY	PETROLEUM	-	-	-	-	-	-	5,81	-	20,00	-	-	-	5,81	-	20,00	-	-	1,00	-	-	0,99	-	-
	SECUNDARIA	LIQUID GAS	-	16,85	-	-	-	16,85	5,81	97,90	17,20	1.683,85	1,68	-	5,81	-	17,20	-	-	0,80	-	1,68	0,99	1,67	6,11
		GASOLINE/ALCOHOL	-	69,08	-	1,19	-	70,27	5,81	408,27	18,90	7.716,28	7,72	-	5,81	-	18,90	-	-	0,80	-	7,72	0,99	7,64	28,01
		KEROSENE	-	4,60	-	1,22	-	5,82	5,81	33,81	19,50	659,38	0,66	-	5,81	-	19,50	-	-	0,80	-	0,66	0,99	0,65	2,39
		DIESEL OIL	-	193,21	-	5,27	-	198,48	5,81	1.153,17	20,20	23.294,01	23,29	-	5,81	-	20,20	-	-	0,50	-	23,29	0,99	23,06	84,56
		FUEL OIL	-	-	-	-	-	-	5,81	-	21,10	-	-	-	5,81	-	21,10	-	-	0,50	-	-	0,99	-	-
		NON-ENERGY PRODUCTS	-	0,75	-	-	-	0,75	5,81	4,36	20,00	87,15	0,09	-	5,81	-	20,00	-	-	0,63	-	0,09	0,99	0,09	0,32
		Gases y Others	-	-	-	-	-	-	5,81	-	20,00	-	-	-	5,81	-	20,00	-	-	0,50	-	-	0,99	-	-
Total Liquids			-	284,49	-	7,67	-	292,16	-	1.697,51	-	33.440,67	33,44	-	-	-	-	-	-	-	-	33,44	-	33,11	121,39
Solids	PRIMARY	COAL	-	-	-	-	-	-	5,81	-	26,80	-	-	-	5,81	-	26,80	-	-	0,75	-	-	0,98	-	-
	SECUNDARIA	COKE	-	-	-	-	-	-	5,81	-	29,50	-	-	-	5,81	-	29,50	-	-	0,75	-	-	0,98	-	-
Total Solids			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gases	PRIMARY	NATURAL GAS	-	-	-	-	-	-	5,81	-	15,30	-	-	-	5,81	-	15,30	-	-	0,33	-	-	1,00	-	-
Total			-	284,49	-	7,67	-	292,16	-	1.697,51	-	33.440,67	33,44	-	-	-	-	-	-	-	-	33,44	-	33,11	121,39
		Biomass	8,59	-	-	-	-	8,59	5,81	49,91	29,00	1.447,33	1,45	-	5,81	-	29,00	-	-	1,00	-	1,45	0,70	1,01	3,71

DOMINICA																									
GREEN HOUSE GASES INVENTORIES 2011																									
REFERENCE APPROACH																									
FUELS			PRODUCTION (kboe)	IMPORTS (kboe)	EXPORTS (kboe)	INVENTORIES (kboe)	UNUSED (kboe)	APPARENT CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	APPARENT CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (GgC)	NON ENERGY CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	NON ENERGY CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (Gg)	FRACTION OF STORED CARBON	STORED CARBON (Gg C)	NET EMISSIONS (TJ)	FRACTION OF OXIDIZED CARBON	REAL CARBON EMISSIONS (Gg C)	CO2 EMISSIONS (Gg CO2)
Liquids	PRIMARY	PETROLEUM	-	-	-	-	-	-	5,81	-	20,00	-	-	-	5,81	-	20,00	-	-	1,00	-	-	0,99	-	-
	SECUNDARIA	LIQUID GAS	-	16,94	-	-	-	16,94	5,81	98,42	17,20	1.692,85	1,69	-	5,81	-	17,20	-	-	0,80	-	1,69	0,99	1,68	6,15
		GASOLINE/ALCOHOL	-	72,46	-	0,86	-	71,60	5,81	416,00	18,90	7.862,32	7,86	-	5,81	-	18,90	-	-	0,80	-	7,86	0,99	7,78	28,54
		KEROSENE	-	8,04	-	1,31	-	6,73	5,81	39,10	19,50	762,48	0,76	-	5,81	-	19,50	-	-	0,80	-	0,76	0,99	0,75	2,77
		DIESEL OIL	-	173,28	-	0,88	-	172,40	5,81	1.001,64	20,20	20.233,21	20,23	-	5,81	-	20,20	-	-	0,50	-	20,23	0,99	20,03	73,45
		FUEL OIL	-	-	-	-	-	-	5,81	-	21,10	-	-	-	5,81	-	21,10	-	-	0,50	-	-	0,99	-	-
		NON-ENERGY PRODUCTS	-	1,12	-	-	-	1,12	5,81	6,51	20,00	130,14	0,13	-	5,81	-	20,00	-	-	0,63	-	0,13	0,99	0,13	0,47
		Gases y Others	-	-	-	-	-	-	5,81	-	20,00	-	-	-	5,81	-	20,00	-	-	0,50	-	-	0,99	-	-
Total Liquids			-	271,84	-	3,06	-	268,78	-	1.561,67	-	30.681,00	30,67	-	-	-	-	-	-	-	-	30,67	-	30,37	111,38
Solids	PRIMARY	COAL	-	-	-	-	-	-	5,81	-	26,80	-	-	-	5,81	-	26,80	-	-	0,75	-	-	0,98	-	-
	SECUNDARIA	COKE	-	-	-	-	-	-	5,81	-	29,50	-	-	-	5,81	-	29,50	-	-	0,75	-	-	0,98	-	-
Total Solids			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gases	PRIMARY	NATURAL GAS	-	-	-	-	-	-	5,81	-	15,30	-	-	-	5,81	-	15,30	-	-	0,33	-	-	1,00	-	-
Total			-	271,84	-	3,06	-	268,78	-	1.561,67	-	30.681,00	30,67	-	-	-	-	-	-	-	-	30,67	-	30,37	111,38
		Biomass	14,09	-	-	-	-	14,09	5,81	81,86	29,00	2.374,02	2,37	-	5,81	-	29,00	-	-	1,00	-	2,37	0,70	1,66	6,09

DOMINICA
GREEN HOUSE GASES INVENTORIES 2010

REFERENCE APPROACH

FUELS			PRODUCTION (kboe)	IMPORTS (kboe)	EXPORTS (kboe)	INVENTORIES (kboe)	UNUSED (kboe)	APPARENT CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	APPARENT CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (GgC)	NON ENERGY CONSUMPTION (kboe)	CONVERSION FACTOR (TJ / kboe)	NON ENERGY CONSUMPTION (TJ)	EMISSION FACTOR (tC/TJ)	CARBON CONTENT (tC)	CARBON CONTENT (Gg)	FRACTION OF STORED CARBON	STORED CARBON (Gg C)	NET EMISSIONS (TJ)	FRACTION OF OXIDIZED CARBON	REAL CARBON EMISSIONS (Gg C)	CO2 EMISSIONS (Gg CO2)
Liquids	PRIMARY	PETROLEUM	-	-	-	-	-	-	5,81	-	20,00	-	-	-	5,81	-	20,00	-	-	1,00	-	-	0,99	-	-
	SECUNDARIA	LIQUID GAS	-	14,61	-	-	-	14,61	5,81	84,88	17,20	1.460,01	1,46	-	5,81	-	17,20	-	-	0,80	-	1,46	0,99	1,45	5,30
		GASOLINE/ALCOHOL	-	72,52	-	0,41	-	72,93	5,81	423,72	18,90	8.008,37	8,01	-	5,81	-	18,90	-	-	0,80	-	8,01	0,99	7,93	29,07
		KEROSENE	-	8,05	-	0,73	-	7,32	5,81	42,53	19,50	829,32	0,83	-	5,81	-	19,50	-	-	0,80	-	0,83	0,99	0,82	3,01
		DIESEL OIL	-	203,29	-	3,35	-	199,95	5,81	1.161,71	20,20	23.466,53	23,47	-	5,81	-	20,20	-	-	0,50	-	23,47	0,99	23,23	85,18
		FUEL OIL	-	-	-	-	-	-	5,81	-	21,10	-	-	-	5,81	-	21,10	-	-	0,50	-	-	0,99	-	-
		NON-ENERGY PRODUCTS Gases y Others	-	1,93	-	-	-	1,93	5,81	11,21	20,00	224,27	0,22	-	5,81	-	20,00	-	-	0,63	-	0,22	0,99	0,22	0,81
Total Liquids			-	300,41	-	3,66	-	296,74	-	1.724,05	-	33.988,50	33,99	-	-	-	-	-	-	-	-	33,99	-	33,65	123,37
Solids	PRIMARY	COAL	-	-	-	-	-	-	5,81	-	26,80	-	-	-	5,81	-	26,80	-	-	0,75	-	-	0,98	-	-
	SECUNDARIA	COKE	-	-	-	-	-	-	5,81	-	29,50	-	-	-	5,81	-	29,50	-	-	0,75	-	-	0,98	-	-
Total Solids			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gases	PRIMARY	NATURAL GAS	-	-	-	-	-	-	5,81	-	15,30	-	-	-	5,81	-	15,30	-	-	0,33	-	-	1,00	-	-
Total			-	300,41	-	3,66	-	296,74	-	1.724,05	-	33.988,50	33,99	-	-	-	-	-	-	-	-	33,99	-	33,65	123,37
		Biomass	25,06	-	-	-	-	25,06	5,81	145,60	29,00	4.222,36	4,22	-	5,81	-	29,00	-	-	1,00	-	4,22	0,70	2,96	10,84

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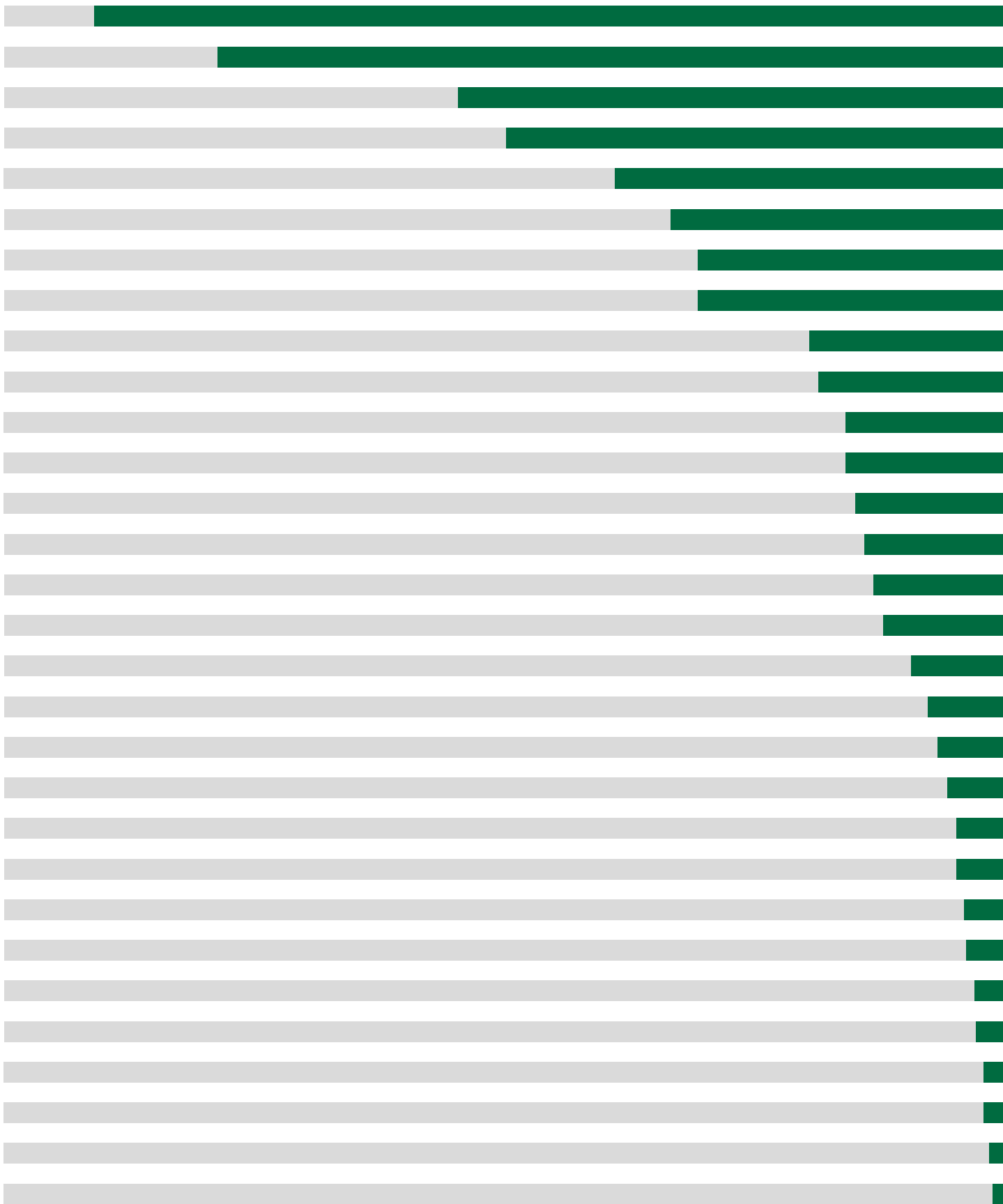
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