

# An assessment of fiscal and regulatory barriers to deployment of energy efficiency and renewable energy technologies in Curaçao

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## Executive Summary

The current energy systems within Curaçao depend primarily on high cost, imported fossil fuels, and typically constitute power sectors that are characterized by small, inefficient generation plants which result in high energy prices. As a consequence of its dependence on external fuel supplies, Curaçao is extremely vulnerable to international oil price shocks, which can impact on economic planning and foreign direct investment within their industrial sectors. The ability of the successive governments to source capital for economic stimulation and social investment is therefore significantly challenging. Additionally, there is over-dependence on two of the most climate-sensitive economic sectors, namely the tourism and fisheries sectors, but the vulnerabilities of the country to the effects of climate change make adaptation difficult and costly. It is within this context that this report focuses on identification of the fiscal and regulatory barriers to implementation of energy efficiency and renewable energy technologies in Curaçao with a view of making recommendations for removal of these barriers.

Consultations with key Government officials, the private sector as well as civil society were conducted to obtain information and data on the energy sector in the country. Desktop research was also conducted to supplement the information gathered from the consultations.

The major result of the assessment is that Curaçao is at an early stage in the definition of its energy sector. Despite some infrastructural legacies of the pre-independence era, as well as a number of recent developments including the modernization and expansion of its windfarms and completion of a modern Electricity Policy, there are still a number of important institutional and policy gaps within the energy sector in Curaçao. The most significant deficiency is the absence of a ministry or Government agency with portfolio responsibility for the energy sector as a whole; this has: limited the degree to which the activities of energy sector stakeholders are coordinated and retarded the development and implementation of a comprehensive national energy policy. The absence of an energy policy, which provides the framework for energy planning, increases investor risk. Also, the lack of political continuity that has emanated from the frequent changes in Government administrations is a concern among stakeholders and has served to reduce investor confidence in particular, and market confidence in general.

The most critical interventions that are being proposed to support the establishment of an appropriate framework for policies and regulations to facilitate development of a sustainable energy economy for Curaçao are, inter alia:

- Establishment of a ministry or Government agency with portfolio responsibility for energy: This institution should have full responsibility for energy policy and energy

planning, to include policy design, update and target setting, as well as responsibility for the maintenance of an energy information systems for providing suitable data and analysis for judicious decision making within the energy sector. There should also be a clear mandate for this body to coordinate the energy-related activities among stakeholders to include public authorities and agencies, private sector and non-governmental organizations, academia and civil society.

- Design and implementation of a National Energy Policy (NEP): This activity should produce a comprehensive overarching policy that targets security of energy supply as its main priority, incorporating this into the recent Electricity Policy which will then form the framework for energy planning within the country. The NEP will likely also draw on existing policies that currently act in support of the sustainable energy sector within Curaçao as well as the Caribbean Community (CARICOM) Regional Energy Policy and Caribbean Sustainable Energy Roadmap and Strategy (C-SERM). There is an expectation that the policy will articulate, in addition to the sub policy for electricity, sub-policies for transport, renewable energy, energy efficiency, and sustainable tourism. An expected key outcome of these policies is an ocean energy business plan, which will delineate the incentives for supporting the production of energy services, such as cooling and electricity from the country's ocean thermal resources.
- Minimum energy performance: This should include regulations that are related to minimum energy performance for buildings, commercial equipment, household appliances, and motor vehicles. This will require the introduction of energy efficiency volumes within a modern building code, equipment and appliance standards, and amendment to the existing motor vehicle tariff, duty and licensing regulations. Special focus should be given to the design and implementation of regulations and incentives that promote the mainstreaming of electric vehicles and the concomitant infrastructure, such as charging and maintenance facilities that support their efficient operation.
- Public procurement policy: Strategically directed, the demand created by public procurement policies have the ability to act as a market supporter and catalyst, incentivizing businesses to take the risks to invest, innovate and commercialize green products and services, in particular for renewable energy and energy efficiency.

The mechanisms for mainstreaming integrated resource planning, spatial planning and transport planning need to be articulated in the policy as well as definition and maintenance of a stringent coordination framework. Support is required for institutional and capacity strengthening, which will lower the “learning curve” that must be surmounted for the country to suitably optimize its sustainable energy markets. The role of Caribbean partners such as CARICOM and international organs in helping to map providing best practice examples for the Sustainable Energy Strategy in Curaçao will be critical within the next few years. Also, its ability to link with and benefit from regional markets will help to overcome some of the challenges posed by a relatively small market with limited options; in particular, the anticipated regional biofuel strategy that is expected to support biofuel markets within the CARICOM is deemed important.

## I. Introduction

Prior to October 2010, Curaçao was administered as the one of five island territories comprising the Netherlands Antilles within the Kingdom of the Netherlands. As of October 2010, when the Netherlands Antilles was dissolved, Curaçao became an autonomous country within the Kingdom of the Netherlands. As a consequence of its new governance status, significant attention has been focussed on the building of relevant institutions and development of appropriate policies for addressing the priorities within the country.

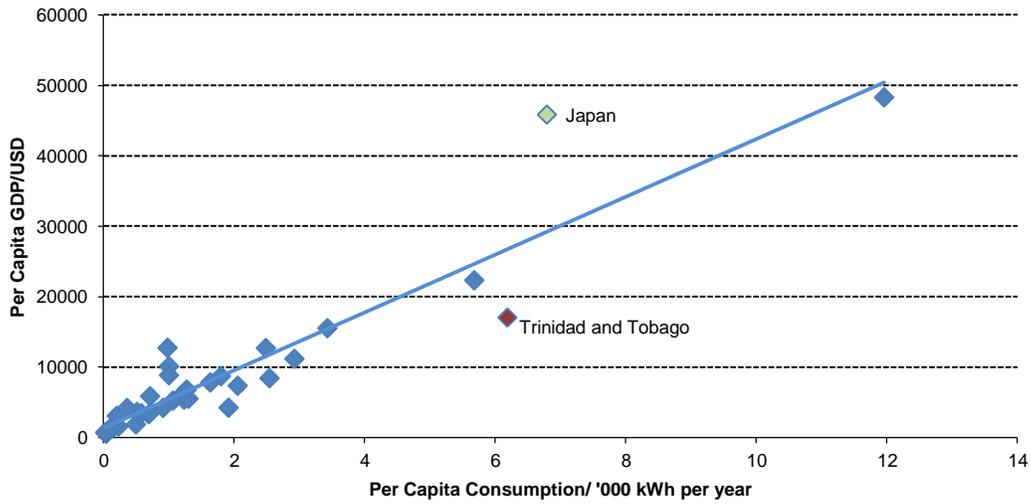
Simultaneously, Curaçao has sufficient renewable energy resources which remain to be developed since the country is ideally suited for promotion of cost effective renewable energy systems with proven wind and solar, as well as projected amounts of ocean resources. Policymakers in Curaçao face enormous challenges in the areas of education, health, social services, food and human security, disaster management and basic infrastructure and are cognisant of potentially more expensive energy technologies. Attracting private capital can also be a challenge since energy investors are concerned about the risks associated with capital intensive and long term investments in developing economies. The utility and other electricity supply chain actors tend to avoid unproven technologies or businesses perceived to carry an above-average degree of risk. Consumers may also resist the prospect of tax or tariff increases and question the reliability of new energy technologies. A key challenge for policymakers in Curaçao is to create the conditions to make renewable energy and energy efficiency projects attractive to investors and the utility without jeopardizing the attainment of other equally important development goals or placing an inequitable share of the cost burden on end users. This report seeks to identify the fiscal and regulatory barriers to implementation of energy efficiency measures and renewable energy technology in Curaçao.

Energy plays a vital role in the economic development of any society and is associated with the production of goods and the provision of services and it has been recognised that economic growth in nations has been typically accompanied by large increases in energy use, as seen in figure 1. Meanwhile, the price of energy is connected to recessions, employment and productivity.

Every year, Caribbean countries spend a significant portion of scarce foreign exchange to import liquid petroleum fuels to provide energy services; except for Suriname and Trinidad and Tobago, imported petroleum products account for more than 90 per cent of commercial energy consumption. In general therefore, the current energy systems within Caribbean small island developing States (SIDS) depend primarily on expensive, imported fossil fuels, and typically constitute power sectors that are characterized by small, inefficient generation plants, which result in

high energy prices; a defining feature of the national energy situations across the region is the high inefficiency in the use of energy resources (see figure 2).

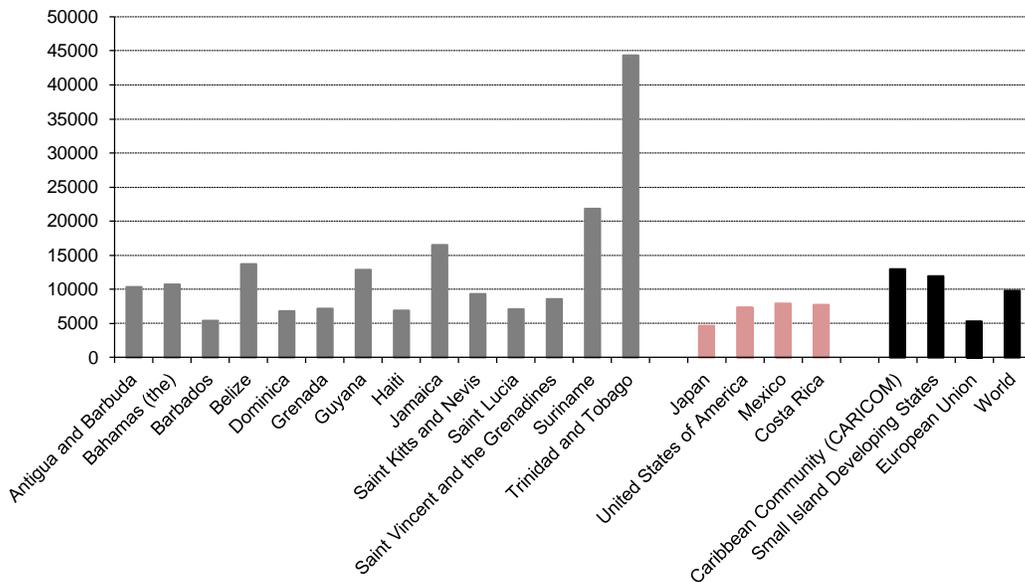
**FIGURE 1**  
**RELATIONSHIP BETWEEN ECONOMIC PERFORMANCE**  
**AND ENERGY USE WITHIN SIDS<sup>a</sup>**



Source: Author, on the basis of official figures.

<sup>a</sup> Note: A select number of other countries (Japan, United States of America, Costa Rica and Mexico) have been included for comparison, with Japan and Trinidad and Tobago singled out for emphasis.

**FIGURE 2**  
**ENERGY INTENSITY FOR CARICOM STATES<sup>a</sup>**  
*Btu/US\$*



Source: Author, on the basis of official figures.

<sup>a</sup> Note: Japan, United States of America, Mexico and Costa Rica are included for comparison.

In general, energy often accounts for more than 12 per cent of imports and, as a consequence of their dependence on external fuel supplies, Caribbean SIDS are extremely vulnerable to global oil price shocks, which can significantly disrupt economic planning and deter foreign direct investment within their industrial sectors. Meanwhile, there is cognizance that high energy costs are a significant proportion of their import costs. On the basis of the foregoing, as well as on account of the extreme openness of their economies, macro-scale energy savings within the region, in the medium term, is anticipated to not only create greater economic efficiency but also improve international competitiveness. In the case of Curaçao, there is considerable scope for developing renewable energy resources and in so doing, will simultaneously reduce the harmful effects of fossil based energy on the environment while generating economic benefits.

Due to the high cost of energy, some Caribbean countries employ subsidies on fuel as a means of redressing the challenges of affordability faced by the poor and also to drive down economic production costs. In examining the policy landscape, the trade offs between incentives to sustainable economy and the expedient measures for poverty alleviation must be properly addressed; the assumption is that significant economic gains can be made through the energy savings from energy efficiency and the substitution of imported oil with indigenous, renewable sources of energy. However, careful analysis is required for selection of the most cost effective options for incentives and regulations that will suitably support the energy strategy of the country, especially during this period of fiscal stress.

Curaçao is dependent on imported diesel and gasoline to drive its energy economy. The on-going escalation of crude oil and energy prices and the current dependence on petroleum is neither sustainable for supplies nor affordable in the long term. Simultaneously, the high level of expenditure on oil reduces the financial resources available to invest in social development, environmental protection, adaptation to climate change and improving food security. The substantial investments that are required for enabling transformation of the energy economy are not readily available. Also, Curaçao is largely unable to provide fiscal and tax incentives as a consequence of their current economic situation.

The two major sectors of energy consumption in Curaçao are electricity (including water production) and transport. For the last century, almost all the energy used in Curaçao has come from oil. Recently however, renewables, particularly wind have been introduced into the energy matrix for electricity production. There has, however, been no penetration of renewables into the transport sector and the contribution of renewables to the overall energy sector is, in general, around 5 per cent. Curaçao has been at the forefront of efforts to develop renewable energy solutions within the Caribbean. The Tera Kòrá (1993) and Playa Kanoa (2000) were among the first commercial wind parks in the region and, until their recent upgrade, consisted of 3 MW and 9 MW of total capacity respectively. In general, Curaçao has vast endowments of renewable energy resources, inter alia:

- Wind, which has already seen significant development. The Tera Kòrá and Playa Kanoa Windfarms had capacities of 3 MW and 9 MW respectively, which have recently been upgraded and expanded to 30 MW (15 MW each). With annual average wind speeds at hub height of 48 m between 9.0 and 9.5 ms<sup>-1</sup>, the sites feature among the best wind resources in Latin America and the Caribbean.
- Solar, for which there is scope to significantly increase the use of various technologies for micro- generation of electricity, for industrial and domestic water heating, and for cooling services in hotels, commercial buildings, and small industrial facilities.
- Ocean, which is believed to be feasible in several locations.

On the demand side in particular, there are numerous investment opportunities in energy efficiency within the electricity sector, particularly in the areas of lighting and cooling. Sustainable energy use in buildings may be achieved through more efficient designs that more easily allow for cooling and light penetration, as well as the utilization of efficient technologies to reduce the energy that is required for the provision of these services. There is some degree of acceptance for sustainable development principles within the tourism sector in particular, which is an area that provides

opportunities for, among other things, increasing the efficiency of energy use for services such as lighting, cooling, refrigeration and transport within the hotel and tourism industry.

The transport sector in Curaçao also offers significant opportunities for achieving reductions in fossil imports. In the absence of a significant biofuel potential for supporting fuel switching, there is urgent need for policies to reduce vehicle fuel consumption, taking into account trade offs among vehicle performance, size, weight, and fuel consumption. Vehicle purchasers and users have traditionally shown preference for greater vehicle performance and size, providing market “pull” for these attributes and typically, automobile companies and dealers compete with each other by offering ever increasing performance and vehicle size, providing the “push.” Within Curaçao, there is need for practice, knowledge and awareness programmes promoting the use of efficient light-duty vehicle technologies, as well as electric vehicles and hybrid-electric vehicles. In particular, electric vehicle and hybrid-electric vehicle use are expected to be highly suitable to the “stop and go” driving that characterizes the country, as this promotes regenerative braking and could reduce fuel consumption by 10 to 25 per cent.

## **A. Climate change**

The threats that climate change poses to Curaçao have not been widely studied. However, the economy is highly dependent on coastal services, which are vulnerable to sea level rise and threats from hurricanes. Though Curaçao officially lies outside the hurricane belt, it is still occasionally affected by hurricanes, as was the case with Hurricane Hazel in 1954, Hurricane Anna in 1961, and Hurricane Feliz in 2007. In October 2008, Hurricane Omar generated large waves which caused beach erosion and significant damage to the coastal facilities in Aruba, Bonaire and Curaçao. Curaçao has also been directly affected by tropical storms, the latest of which was Tomas in 2010, which dumped as much as 265 mm of precipitation, nearly half of the annual precipitation, on the territory in one day and caused over US\$ 28 million in damage from flooding and loss of lives. Meanwhile, the island supports infrastructure that is based on tourism, the financial services and oil refining.

Tourism is the largest single contributor to the economy of Curaçao and accounts for around 30 per cent of GDP. There is an expectation that under the current business as usual scenario, the country will experience further significant economic loss through massive damage to coastal infrastructure, loss of business from the tourism sector and substantial shift in the available maritime resources, if average global temperatures increase by 1.5 degrees Celsius or more.

Inefficiency in the production and use of energy in Curaçao and the continued over-dependence on imported fossil fuels have been identified as major barriers to sustainable economic growth. The volume of GDP and foreign exchange resources that are being spent to pay for energy imports could have otherwise been directed to social services, adaptation to climate change and sea level rise, and other critical interventions which are necessary for sustainable development and resilience building.

## **B. The oil economy**

Current oil prices continue to be significantly above the levels experienced prior to 2007. In monetary terms, it has been estimated that an increase of US\$ 10 in the world crude oil price currently translates to a 1.5 per cent decrease in GDP within SIDS, including Curaçao. Curaçao does not produce oil but one of the earliest commercial oil refineries in the region is located in the capital of Curaçao.

Oil refining began in the early 20th century when oil was discovered in the Maracaibo Basin of Venezuela. This discovery forced the Venezuelan Government to search for ideal locations for large-scale refining. In Curaçao, the naturally deep harbours, stable Government, which was far removed from much of the political uncertainties of Latin America and proximity to the oil fields in

Venezuela, was ideal. Therefore, in 1918, Royal Dutch Shell began operating the Isla Refinery in Curaçao which was the largest in the world at that time.

Since 2007, the refinery has been leased to Venezuela's state oil company, *Petróleos de Venezuela (PdVSA)*, after a symbolic transfer of the ownership from Royal Dutch Shell to the Government of Curaçao. The operation process around 320,000 barrels of oil per day for shipment onwards to the United States of America and South America, and constitutes 8 to 9 per cent of GDP. Curaçao imported around 100 per cent of the fossil fuels used in 2011. In general, approximately 105 million barrels of oil equivalent (boe) of fossil fuels were imported and 76 million boe in petroleum products exported. In 2011, the country used nearly 26 million boe to provide electricity, transport fuels and other refined petroleum products at a cost of nearly US\$ 2.5 billion.

### C. The electricity sector

Currently, the electricity sector in Curaçao is characterized by high dependence on oil, inefficiencies in generation, high transmission and demand losses, weak service performance, unreliability in production, and inadequate independent industry regulation operating within a monopolistic market model in which *Aqualectra* is the country's sole utility for electricity and water production, distribution and supply. Recently however, there have been efforts to liberalize the production of electricity to include independent power producers and self-generators. Curaçao has installed electricity generation capacity of 180 MW (see table 1). The current demand is 100 MW (baseload) to 130 MW (peak) and supplies around 62,000 households and 7,000 businesses.

**TABLE 1**  
**AVAILABLE ELECTRICITY GENERATION SUPPLY IN CURAÇAO**

Production	Capacity (MW)	Percentage of capacity (%)	Description
Gas and steam turbines	30	17	Over thirty years old; Fuel oils and distillates
Wärtsilä generators	40	22	Temporary lease; Fuel oils and distillates
Diesel generators	60	33	
Gas turbines	20	11	Excess capacity from the refinery; plagued by dispatch issues
Windfarms	30	17	Installed in July 2012
Total	180	100	

Source: Bureau of Telecommunications and Post, 2013.

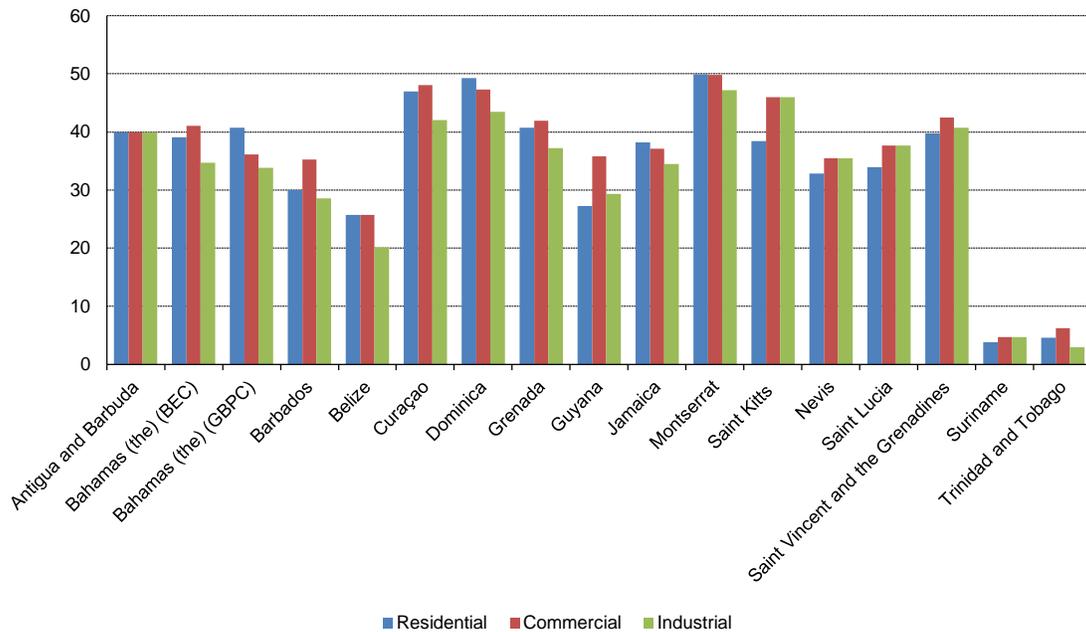
Cognizance of the state of the electricity sector resulted in recent efforts by the Curaçao Government to modernize regulations governing the industry by:

- Introducing regulation of the electricity market, through the Bureau of Telecommunications and Post (BT&P) since 2010.
- Developing regulations to allow and encourage broad based participation in generation through an Electricity Policy (2012).

Despite this, there still remains very little incentive for energy efficiency, and the sector has become associated with intermittent interruptions in supply and one of the most expensive electricity

tariffs in the region (see figure 3), which is around US\$ 0.47 per kWh with fuel charges accounting for 58 per cent or US\$ 0.27 of the cost.

**FIGURE 3**  
**ELECTRICITY TARIFFS, CARICOM AND CURAÇAO**  
(US cents per kWh)



Source: Author, on the basis of official figures

## D. The transport sector

Despite the presence of the refinery in Curaçao, fuel prices are high. In 2012, the average prices of gasoline and diesel were US\$ 1.32 and US\$ 1.10 per litre respectively. The refinery is currently owned and operated by the Venezuelan oil company, PdVSA, and the benefits of having the facility located on the island does little to influence the price of transport fuels on the domestic market. In fact, the refinery is old and requires significant capital expenditure in order to produce fuels that meet international environmental standards for use in the transport sector. The consequence of this is that a large majority of the petroleum fuels produced are either used in the power generation sector or exported. Meanwhile, Curaçao imports “low pollution” petroleum fuels such as low-sulphur diesel.

The transport sector is a major user of petroleum products for almost 60 per cent of the overall energy used in Curaçao. Although road transportation is dominant, maritime transportation plays a vital role in the lives of the island populace. Though some regulations are in place, inefficient vehicles and practices characterize the sector and there is much scope for integrating sustainable energy interventions therein. The marketing and distribution of gasoline and diesel in Curaçao is the responsibility of the state owned Curoil<sup>1</sup> and similar to the case of the electricity

<sup>1</sup> Curoil is the local oil and gas distribution company. For more information see: [www.curoil.com](http://www.curoil.com)

sector, utilises a monopolistic market model. There is very little action regarding the introduction of electric, hybrid- electric and energy-efficient vehicle technologies or renewable fuel mixes into the transport sector; the majority of the focus continues to be on the electricity sector in general and renewable generation in particular.

## **E. Renewable energy**

Renewable energy technologies have historically been used both in small isolated and utility scale applications in Curaçao. In particular, wind and solar photovoltaic electricity generation as well as solar thermal systems have been used at some scale. There is still significant scope however, for increasing the penetration of these technologies and further extending the use of renewables to the utilization of hybrid systems, such as photovoltaic/wind and biogas, especially from organic waste within the hospitality sector, as well as ocean technologies for cooling and electricity production.

**Wind:** Curaçao has a history that employs the use of wind resources. With annual average wind speeds at hub height of 48 m between 9.0 and 9.5 ms<sup>-1</sup>, the Tera Kòrá and Playa Kanoa sites are among the best wind resources in the world. As a consequence, Aqualectra upgraded and expanded the original windfarms, which had fallen into disrepair due to poor maintenance. The new windfarms have been operational since July 2012 and Curaçao now produces as much as 30 MW or 15 per cent of its electricity from wind power.

**Biomass:** Biomass energy resources are available typically as municipal solid waste and sewerage waste, which is produced in significant quantities from the hotel and tourism sector. In 2003, a feasibility study was conducted for implementation of a commercial waste to energy plant in the island but, to date, there has been no further progress. In 2008, Curoil, Refeneria di Korsou, Aqualectra and Fundashon Antiano pa Energia started an assessment of the feasibility for commercial production of biodiesel from algae and other biomass sources but that study has so far been inconclusive. The utilization of appropriate biomass conversion technologies can produce modern energy carriers such as solid, gas or liquid fuels, as well as electricity, from the available biomass resources within Curaçao.

**Ocean:** In 2005, Aqualectra and Ecofys started the process of designing a 3,000 ton Sea Water Air Conditioning project and in 2008 the project was engineered and approved. The financial crisis of that same year slowed down its development and currently, efforts are being undertaken to resume the activities.

## **F. The business economy**

The newly autonomous country within the Kingdom of the Netherlands faces substantial challenges in that growth has been low and unemployment is high. The current account deficit has widened increasing the vulnerability of the peg to the dollar and stimulating calls for dollarizing or dissolving the currency union of the Netherland Antilles. However, net international reserves have risen in recent years, and have been stable in 2011. Major data gaps significantly complicate diagnosis, but available indicators point to lack of competitiveness.

The key challenge for Curaçao is to develop and implement policies to mitigate external vulnerabilities, in particular those related to the energy sector. Though there have been calls for incentives to stimulate renewable energy investments, fiscal spending pressures are considerable. Curaçao has traditionally used incentives for industry stimulation. Within the tourism sector, for instance, the Government adopted a package of highly attractive fiscal incentives for foreign investors at the end of the 1980s. An increase in tourism volumes followed.

Tourists place high demand on energy and freshwater resources and typically use higher amounts of both energy and freshwater than local residents. Nonetheless, there is cognizance that tourism will continue to play an important role in support of the economic, social and environmental development of the country. Broad-based acceptance of sustainable development principles however, requires the tourism sector to develop in a sustainable way through strategies that seek to, among other things, increase the efficiency of energy use for services such as lighting, cooling, refrigeration and transport within the tourism sector. Consequently, the hotel sector within Curaçao stands as an obvious area of intervention for sustainable energy use; inter alia, energy efficiency applications and micro-generation from renewable sources. In general, Curaçao has many options and opportunities for building a sustainable energy platform. High energy prices and high inefficiencies in the use of energy resources make Curaçao less competitive than other countries and therefore, opportunities for job creation have remained limited to a few industries.

## II. Methodology

The objectives of this study are:

- To identify gaps and barriers that prohibit the implementation of renewable energy and energy efficiency products and services within the project countries
- The recommendation of options for the removal or minimization of existing gaps and barriers that prohibit optimization of sustainable energy markets within the project countries.

The barriers selected for examination by the project are consistent with those previously reported by the Caribbean Renewable Energy Development Programme (CREDP) for renewable energy in general. These were, *inter alia*:

- Policy (legislation and regulation): A lack of consistent energy policies hampers private sector participation in the business side of the energy sector
- Finance: Relatively low international credit-rating of most CARICOM countries results in a lack of investor confidence for project financing and the resulting feature is excessive collateral requirement and high interest terms for loans
- Capacity: Limited skill-base for developing energy policies, as well as for energy planning and forecasting
- Awareness: Limited knowledge among the populations regarding the commercially developable renewable energy resources and technologies for CARICOM states, as well as the cost benefits to end users. Despite much effort, these barriers seem to have persisted.

The project activities comprised of three steps that are illustrated in diagram 1. These are:

### A. Desk assessment

A desk assessment was undertaken through the collection and compilation of data on the traditional primary energy commodities (fossil fuels) and primary renewable sources (such as solar, wind and ocean) looking in particular at the power generation, hotel and transport sectors. Opportunities for the country to curb energy demand growth by making economies as efficient as

possible while simultaneously meeting some of the essential energy needs through low carbon options were examined within the context of the existing technology products and end use markets, as well as the policies, barriers and institutional arrangements for same. Also, the experiences of countries that have successful markets for energy efficiency applications and renewable energy technologies were assessed. This was done so as to glean insight into the policies, strategies and circumstances that either supported or hindered development of a thriving sustainable energy market economy. This information was collected through literature survey and the information used toward planning the subsequent phases of the project.

## **B. Analyses**

The second activity constituted a number of analyses performed in order to obtain appropriate indicators for the Curaçao energy economy. In many instances, comparative analyses were performed. Some of the most important indicators utilized in this study are:

- **Energy intensity (Btu/US\$):** Energy Intensity is the total heat content of the fossil fuels such as gasoline, diesel, fuel oil, jet fuel, kerosene and liquefied petroleum gas (LPG) and non-fossil fuels such as wind and other renewables consumed as a ratio of the GDP and may be interpreted as the amount of energy that is utilized to produce a dollar's worth of goods and services within the national economy. High energy intensities indicate a high cost of converting energy into GDP and conversely, low energy intensity indicates a lower cost of converting energy into GDP.
- **Energy efficiency (MBtu/US\$):** Energy Efficiency is the GDP as a ratio of the total heat content of the fossil fuels and non-fossil fuels consumed, which is essentially an inverse relationship to energy intensity. High energy efficiency indicates a lower cost of converting energy into GDP.

These energy indicators, and the underlying databases, are used to reveal key relationships between energy use, energy prices and economic activity. This insight is crucial when assessing and monitoring past and present energy policies and for designing effective future action.

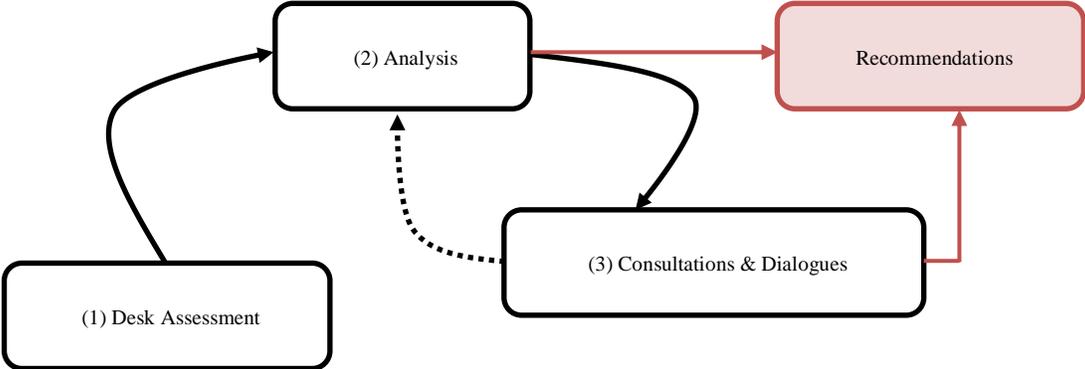
## **C. Stakeholder consultations and dialogue**

Public and private sector stakeholder consultations, as well as a number of stakeholder dialogues, were conducted. In order to implement policies that are inclusive of society and encourages adoption by the respective stakeholders, it is necessary to consult with people. Consequently, the consultations and dialogues were held to stimulate discussions among stakeholders on energy conservation and efficiency, oil-dependence, oil-pricing, oil politics, alternative energy applications, links with poverty, health and the environment, and the responsibility of the individual with regards to energy use. There is an expectation that the meetings also promoted greater understanding of the issues surrounding energy use and its implications for people's lives. Specifically, the goals of the Curaçao consultation meetings were to:

- Identify current fiscal and regulatory barriers that prohibit more broad based participation and wide spread deployment of renewable energy and energy efficiency technologies.
- Achieve a national consensus on what the respective stakeholders are prepared to do as part of a national consensus to meet the energy needs in Curaçao.

The answers elicited therefrom were in some instances used towards refinement of the analyses that had been previously performed but primarily formed part of the basis for the recommendations on the requisite fiscal and policy shifts for the Curaçao sustainable energy economy.

**DIAGRAM 1  
METHODOLOGY PATHWAY**



Source: Author’s compilation.



### III. Results

The lack of efficiency in the use of energy and the continued dependence on imported fossil fuels are major barriers to sustainable economic growth in Curaçao. Meanwhile, the country has commercially developable renewable energy resources, particularly solar and wind, as well as some amount of ocean and limited waste-to-energy opportunities. Though these resources could play a central role in the sustainable development of the country, they still remain under-utilized and despite cognizance from successive governments, a variety of barriers or conditions continue to prevent significant private investments in the sector from occurring. Often, these barriers put renewable energy at an economic, regulatory or institutional disadvantage relative to the conventional alternatives. In general, some of the main barriers to renewable energy in Curaçao include:

- High initial capital costs which are not sufficiently assessed against fuel price risk.
- Imperfect capital markets that favour traditional production and supply of energy.
- Lack of skills and information on renewable and efficient energy applications.
- Lack of business continuity between successive administrations, which invariably causes uncertainty towards renewable energy investments, resulting in increasing financing risks and higher than normal transaction costs.

These barriers may be classified as market distortions that unreasonably “discriminate” against renewable energy systems and serve to increase the cost for same relative to conventional sources. To address this, fiscal policies are usually required to “re-balance” the market and, in so doing, account for the hidden costs in the traditional energy sector. However, there are also a variety of administrative and institutional factors, such as non-financial and non-technical barriers, within the various sectors that may be suitably addressed by regulatory policy solutions.

The reduction or the removal of non-cost barriers can be considered as achievable in the short term. While much of the focus within Curaçao is on the substitution of imported petroleum fuels with renewable options, especially within the power generation sector and focussing on utility-scale wind and small solar photovoltaic options, critical areas such as energy efficiency and energy conservation that provide affordable and significant opportunities to reduce energy imports are often overlooked. At best, the “typical capacity” that exists for energy planning within Curaçao is related to least cost expansion of electricity generation, management of the power sector and the distribution of liquid fuels. As a consequence, there is little or no integrated resource planning that takes suitable account of the energy efficiency opportunities and cross-sectoral linkages that are available to the energy sector.

In general, the inefficient way in which SIDS, including Curaçao, generates and uses energy is a major barrier to sustainable economic growth. The average energy intensity of SIDS is around 12,000 Btu/US\$ of GDP, which is 22 per cent above the global average and more than double the averages of the European Union and Japan respectively.

## A. Overview of main findings

On 16 February 2011, the Government of Curaçao established an Electricity Policy, namely The Bill on Regulation of Electricity Provision Curaçao (2011-2015)<sup>2</sup>. This policy contains the vision and policy proposal of the Government concerning the electricity supply for the island and includes regulations for grid interconnection by customer generators but there is no broad-based energy policy for Curaçao, which comprehensively delineates the energy vision for the country.

In 2009, the then Government had begun working on a draft energy policy. This was expected to form part of the development strategy for the nation upon the dissolution of the Netherland Antilles in October 2010, which preceded the status of Curaçao as a constituent country of the Kingdom of The Netherlands. Though the twenty-one member legislature is elected by direct, popular votes to serve four year terms, the country has had three distinct Government administrations within the twenty-seven month period, October 2010 to January 2013. The consequence of this has been a delay in the modernisation of the regulations for the energy sector, which is necessary for supporting a sustainable energy market economy. In general, there has been no Government ministry or agency with the explicit responsibility for energy and in the past, much of the responsibilities for energy was assumed by the Prime Minister. In the absence of a clearly defined energy desk, there has been a lack of continuity in the process towards formulation of a national strategy on energy.

Much of the institutional frameworks for the energy sector were developed during the 1950s, with some degree of modifications during the 1980s. As a consequence, the operations within the majority of institutions have not shifted to accommodate many of new paradigms within which Curaçao operates. Institutional deficiencies and administrative hurdles are major obstacles toward improving the energy sector from one that is primarily concerned with the production of electricity, and the marketing and distribution of liquid fuels for transport, to one that is a modern, market-driven efficient producer of energy carriers and energy services for domestic and possibly, regional consumption.

In December 2009, a definitive step towards independent regulation within the electricity sector was taken, with BT&P being given oversight over the production of electricity and water and the monitoring of fuel distribution. Nonetheless, the absence of a designated entity that is tasked with guiding the development of an appropriate policy and regulatory framework for the energy sector remains. Also, much of the current debate concerning the promotion of renewable energy use in Curaçao has been focussed on improving grid access conditions for renewable electricity generation. The Electricity Policy was a natural outcome of this interest. While this is a crucial issue it has been noted that the importance of tackling off-grid energy services, such as solar and ocean cooling, and transport has been undervalued and, in some instances, largely ignored.

Definitive progress toward the building of a suitable policy framework for a sustainable energy economy within Curaçao is being stymied by the following overarching issues:

- The absence of a single authority with the responsibility for strategic planning within the energy sector to include a mandate to formulate and coordinate energy sector policies, sub-policies and activities: Though there is some energy subsectors, such as electricity, water and fuels, that fall within the mandate of the BT&P, policy development is not

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<sup>2</sup> For more information on the Electricity Policy document and related information see <http://energiakonsiente.com/en/>

strictly the role of an independent regulator and the design and development of policies and sub-policies for the energy sector have not been consistently pursued.

- The absence of a comprehensive, modern energy policy: Though a policy framework was articulated by the previous administration, progress has been stymied by the lack of political continuity within the country, as well as the limited capacity that is available to the Government for the efficient development and subsequent implementation of the policy.
- The absence of a strategic plan for the deployment of the sustainable energy sector, to include suitable integration with science and technology innovation: This should ideally frame a set of programmes and action plans towards achieving a low carbon economy within Curaçao, and should also include the supporting Science, Technology and Innovation (STI) options for accelerating the promotion of innovation within the energy sector in particular.

Moreover, administrative hurdles also exist and continue to play a significant role in deterring investment within the sustainable energy sector. In principle, all renewable generation technologies, even small-scale systems, are impacted by administrative barriers which, one way or another, increase transaction costs for the renewable energy developer and the society as a whole. Frequently, the involvement of many authorities and the administrative procedures and framework for approval serve to lengthen the process and increase cost, especially within a country where much of the availability of technical expertise is limited and project developers may require the assistance of “expensive expatriates”. In particular, the following hurdles are deemed relevant:

- Lack of capacity for expeditious implementation of the Electricity Policy and for the suitable development and implementation of the National Energy Policy.
- Lack of coordination among different public authorities and agencies. In particular, the presence of a “double-layer” government system in which there are distinct, mutually exclusive arms for policies and implementation within Government ministries and agencies complicates decision making within the respective agencies.
- Planning delays and restrictions on project implementation; for instance, plans for Sea Water Air Conditioning have still not materialized after nearly ten years.
- Long lead times and severe costs in obtaining authorizations and permits: In fact, the Government of Curaçao, in cognizance of this issue, sought to reduce bureaucracy for obtaining business licenses and permits, as a prerequisite to attracting more investments, through a From Red Tape to Red Carpet Policy for local and foreign investors.
- An “uncertainty” regarding the continuity of some economic policies that act in support of sustainable energy investments; there is an expectation that the new “Pais Kòrsou” will inevitably lead to decisions on fiscal and monetary policies, such as choice of currency and banking regulation, within the near term.

Within Curaçao, there is good awareness towards energy efficiency but there is nonetheless limited knowledge, attitude and practice regarding efficient energy use. Essentially, the barriers to efficient energy-use may be divided into three broad categories, inter alia: economic, institutional and behavioural and their removal may be suitably targeted through the application of fiscal policies such as economic barriers or regulatory policies such as institutional and behavioural barriers. However, there is a paucity of data on energy consumption within Curaçao and the country lacks reporting and analytical mechanisms for tracking energy use and performance. Nonetheless, qualitative assessments suggest that there is considerable scope for lowering the energy intensity within a number of sub-sectors.

The major energy consuming sub-sectors within Curaçao are categorized into the following:

- Transport: Low-carbon transport solutions must stand on the following three pillars:

- (i) Avoid fuel use, where possible, through the usage of broadband services for meetings and access to public services; currently, much travel in Curaçao is for face-to-face meetings and the transaction of business.
- (ii) Reduce fuel use by shifting to increasing mass transit systems for commuters and to non-motorized transport modes in-city, as well as by improvements in efficient fuel use obtained by moving the vehicle fleet to more efficient vehicles.
- (iii) Replace conventional fuel use, as much as is possible, through a “mix” of vehicles that are based on renewable fuels, such as biodiesel in public transport buses, and utilization of advanced technology, such as electric and hybrid electric, vehicles that integrate with a renewable energy grid.

In general, these require smarter transport planning as well as policies that promote the development of a sustainable market for vehicle supply and the requisite energy infrastructure.

- **Buildings:** Buildings account for over a third of world total energy use and the associated greenhouse gas emissions thereof. There are numerous opportunities for reducing energy consumption in buildings and many of these have short payback periods as well as immediate environmental advantages. Energy audits are important tools that help to determine energy consumption patterns and the measures to achieve energy savings therein. Within hotels, as well as commercial and public sector buildings, a mix of electricity and heating processes can be used to provide lighting, water heating, mechanical power, cooling and refrigeration processes. In some instances, heating processes can be handled by reusing waste heat, shifting to solar thermal technologies, or switching to biomass-fired equipment. The use of efficient lighting, efficient motors and drives, and the installation of energy management systems, are some of the options that can be implemented.

## **B. Renewable energy**

### **1. Electricity**

The electricity sector in Curaçao is governed by the following:

- Ordinance Electricity Concession (OJ 1963, No. 64) and the National Ordinance on Electricity Concessions (PB 1963, No. 38), which permit the production and distribution of electricity for supply to third parties.
- Price Regulation (OJ 1961, No. 117), which is an act that grants power to the Minister for fixing rates for commodities, including electricity.
- Resolution of the Executive Council (no. 2008, 61486), which sets an all inclusive tariff and defines an independent regulatory system for electricity.

The sole electric utility, Aqualetra, operated under a concession for the production, transport, distribution and supply of electricity since 1963. Interestingly, no attempts were made to renew the concession when it expired on 31 December 1979 and Aqualetra had been operating without a concession from 1980 until July 2012 when the concession was renewed. In fact, the Government of Curaçao made good on its promise to revise the electricity concession so as to unbundle the production of electricity from the transmission and distribution and supply activities. Under the current arrangement, Aqualetra has an exclusive concession for the transmission and distribution of electricity and a general concession for electricity production. The new concessions granted to Aqualetra now addresses numerous of performance targets for efficiency standards, such as heat rates and systems losses, and are based on global industry standards. It is envisioned that a greater mix of independent power producers, self generators and customer generators will participate in the

production and supply sides. In order to accommodate the shift in paradigm, the Electricity Policy Framework (2011) was developed to include the following:

- Bill on regulation of electricity provision for Curaçao (2011 2015)
- Bill on small-scale sustainable electricity provision (2011)<sup>3</sup>, which included guidelines on tariffs for small scale sustainable electricity provision

In particular, the inclusion of the electric utility under the regulatory powers of the Bureau of BT&P was delineated under provisions for the Bill on regulation; the regulator is tasked with oversight of the sector with respect to the following: market access, electricity tariff; quality of service; customer satisfaction and sustainable development. The following barriers apply to the generation of electricity from renewable sources.

## Regulatory

- Lack of a long-term strategy for grid expansion that seek to make timely and deliberate technological enhancements to the existing grid so as to facilitate the systematic addition of renewables: In 2010, peak electricity demand was around 130 MW, which is expected to increase to around 200 MW in 2020. If planning within the electricity sector is to suitably consider available electricity generation technologies for power supply and avoided generation and energy efficiency measures that modify customer demand, then technological upgrade to the grid, to include smart communication capabilities will be necessary.
- Lack of spatial planning for renewable energy systems: The spatial planning systems should focus on the provision of guidance for the locations where particular renewables, in particular wind generation, are most likely to be appropriate as well as shaping the criteria to be taken into account in the determination of project applications; this will serve to reduce the transaction costs associated with project siting and environmental permitting.
- Lack of institutional capacity for project evaluation and approval: There is a lack of expertise for dealing with renewable energy issues within the respective Government ministries and agencies, which leads to confusion, delays or unmotivated denials of approvals. This has served to limit the opportunity for diversification of sustainable energy economy and renewable energy integration has continuously focussed on utility-scale wind and small, grid-tied solar photovoltaic systems.
- Weaknesses in the regulation of the electricity sector: Many Caribbean countries that have made progress in the regulation of their electricity sector have a regulatory agency that is empowered to set service standards and tariffs. However, In Curaçao, the regulator, BT&P is not an independent regulatory body but, rather, advises the line Minister with whom the decision rests.
- Absence of systematic administrative procedures for the addition of utility-scale renewable energy generation to the grid: In the absence of a legal framework that delineates the “rules of engagement” for addition of utility-scale renewables to the grid, investors will continue to require individual licenses from the Government and will continue to negotiate power purchase agreements with the utility, Aqualectra, on an ad hoc basis, which makes it difficult for potential project developers to plan and finance projects on the basis of open and consistent rules.
- Lack of information to make informed choices on micro- and small renewable energy technologies; consumers are essentially limited by the available technology options as

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<sup>3</sup> For more information on the Bill on Small Scale Sustainable Electricity Provision see <http://energiakonsiente.com/en/duurzame-energie/beleidsnota/>

well as the available technical expertise for installation in-country. Both are creations of the regulatory environment within Curaçao, which is further hindered that there is no Government agency that has explicit responsibility for public awareness and knowledge management within the sustainable energy sector.

- Low qualification and the lack of reliable certification schemes for small scale renewable energy installers: There is a lack of trained and competent installers for small renewable energy and avoided generation systems, such as solar photovoltaic and solar water heaters in the Curaçao market. This is particularly relevant for single-family houses, where installers can often act as the decision-maker and may motivate potential users to buy sustainable energy technologies. If they are not specifically trained, they may discourage consumers or even provide a poor installation, with a negative impact on the functionality of the system and on the image of the technology.

## **Fiscal**

- Transaction costs are typically high, especially for small, grid-scale renewable energy projects: Many projects, such as wind and waste-to-energy will likely require information that may not be readily available or may require longer than usual time or “imported” technical personnel to assess and verify the bankability thereof; these needs increase the transaction cost for projects. In particular, the cumbersome negotiations for securing power purchase agreements often times add to the transaction costs.
- Tax reform has been slow: New legislation in Curaçao envisages revenue-neutral reforms that will, among other things, lower personal and corporate income tax rates. These actions will serve to increase the returns on investments in general, including investments of large-scale renewable generation by independent power producers in particular. Even more, this act will increase the disposable income of companies and individuals, which will serve to increase the level of customer based investments in renewable technologies.
- Lack of institutional incentives for renewable investments that deliver macroeconomic benefits to the country: The Curaçao Economic Development Board is meant to facilitate economic development through investment promotion and attraction of both local and foreign investments. But investment incentives have been designed for primarily for the commercial sector, in particular tourism and commerce, and are being applied to energy investors under a “one size fits all” programme. Consequently, there is no package of fiscal incentives that are tailored and directly applicable to the renewables industry and investors seeking appropriate incentives are left to seek waivers from the line Minister on case-by-case basis.
- Credit-restriction measures taken by the Central Bank of Curaçao and Saint Maarten: As a means of containing the availability of surplus liquidity within Curaçao, the Central Bank of Curaçao and Saint Maarten sought to reduce commercial bank lending to individuals, which would serve to remove much of the capital that is required for financing micro and small renewable energy systems from the market.
- Lack of incentives for third party financing of building integrated renewable energy technologies: The development of building integrated renewable energy systems are incentivized through recent customs and value added tax (VAT) Acts that provide exemption for some small-scale renewable energy technologies. But integration of renewable energy technologies, such as solar photovoltaics, hybrid photovoltaics, and solar thermal systems for cooling and water heating, may add 10 to 20 per cent to building costs. Meanwhile, there is very little or no cognizance among mortgage banks and insurance companies for the enhanced lifecycle of buildings with renewable energy technologies compared to the business as usual scenario and the usual formulae are applied to the calculation of loans. The consequence is the “additional” investment that is

required for renewable energy is prohibitive and may require third party financing. It may be necessary to consider incentivizing the financial sector as the traditional approach of incentivizing end users through tariff and tax exemptions is, in cases, not sufficient to reduce the cost barrier for renewable energy technologies.

## 2. Transport

The island of Curaçao has a population of nearly 150,000 persons spread over 444 km<sup>2</sup> which is equivalent to a population density of nearly 340 persons per km<sup>2</sup>. Curaçao, on the basis of a per capita GDP of US\$ 20,500, has one of the highest standards of living in the Caribbean, which is built on a deliberate mix of tourism, trade, transport and more recently, financial services. The role of transport planning and logistics is therefore critical to the country.

**Land:** With respect to roads, Curaçao has an efficient, modern infrastructure, consisting of 550 km of roads or a road density of 124 km per 100 km<sup>2</sup> of area. Land transportation is primarily based on a “mix” of domestic petrol vehicles and a public transport system that consists of diesel buses. The bus company, Autobusbedrijf Curaçao, consumes over 2.6 million gallons of diesel per annum, transporting approximately 3 million passengers or 1.15 gallons of diesel per passenger over twenty-four routes. Land transportation is further complemented by a network of gasoline and diesel vehicles that are used for the movement of tourists as well as a limited amount of diesel dominated freight movement; land freight activities are mainly based on the movement imported goods that are earmarked for local consumption, from the ports to inland distribution and retail centres. As it relates to international trade, Curaçao currently has ten e-zones in operation with approximately 460 established e-zone companies; the operations of the e zone are closely related to air and sea traffic, which facilitate the efficient international movement of goods such as clothing, cosmetics, shoes, jewellery, and heavy equipment.

**Air:** In order to fulfil its ambition to become a logistical hub in the Caribbean, the aviation industry, which includes airlines, the airport and air cargo businesses, enables international trade flow as it facilitates the movement of people and goods. The Hato International Airport, which is run by Curaçao Airport Holdings, handles over 1.5 million passengers and around 48,000 cargo flights on an annual basis; the country supplies a significant amount of aviation fuel for cargo and passenger airplanes.

**Sea:** The harbour activities in Curaçao and its facilities are managed by the Curaçao Ports Authority. Willemstad, which is the main port in Curaçao, is accessible through the St. Anna Bay harbour through which vessels can access the Schottegat Bay inlet. The Port of Willemstad offers most port-related services and activities, including cargo docks, a dry dock, the refinery for oil tankers, and other services. Other commercial ports in Curaçao are Bullen Bay, Caracas Bay, Fuik Bay, St. Michiels Bay and Spanish Waters. As is the case for aviation, bunkering is an important part of the Curaçao energy economy.

Since October 2012, traffic, transportation and planning have been a portfolio responsibility within the Cabinet of the Government of Curaçao. This is an indication of the central importance of the transportation sector to the country and is defined in the 2006 mission statement of executive council of the island territory of Curaçao: “By 2016, Curaçao will be recognized globally as one of the top integrated logistical hubs, offering trusted, value generating services across the following areas: international financial services, information transfer, international trade, and sea and air port services.”

In addition, BT&P has responsibility for regulating the fuel supply sector. In particular, the Bureau “advises the Minister” on issues related to the regulatory and policy landscape for fuel distribution, compliance with the quality and standard requirements for fuel distribution; and tariffs and rates for end user fuels. The regulatory framework that governs the fuel distribution landscape in Curaçao is the:

- Prices Regulation (OJ 1961, No. 117), being the ordinance relating to the fixing of rates for (among others) fuels and conditions including pricing decisions.

The marketing and distribution of gasoline and diesel in Curaçao is the responsibility of the state-owned Curoil. Curoil fuel distribution consists of two main market segments, namely the local market, including Bonaire, and the international market. The local market consists of fuel supply for local transportation, commercial users and utilities whilst the international market consists mainly of aviation and on and offshore bunkering. Despite the significance of bunkering, the transport analysis within this Report will focus on the local transport economy, which is primarily based on land transport as global factors, which are external to Curaçao, will likely continue to influence the technology choice and fuel requirements for air and sea vessels that are domiciled elsewhere. The following barriers apply to the use of renewable fuels and vehicle technologies within the transport sector.

## Regulatory

- Renewable energy vehicles, including electric and hybrid-electric vehicles, though identified as being important to the Curaçao sustainable energy framework, have not been substantially integrated therein: Despite the appropriate match of electric vehicles and hybrid-electric vehicles for Curaçao and their ability to integrate seamlessly into an energy economy that is built on a renewable power grid, there have been very some degree of incentive, such as duty exemptions, but no regulations that support their programmatic introduction into the island.
- The Curaçao transportation sector is currently served by a very large, reliable petroleum liquid fuel infrastructure: If low-carbon, renewable fuels are to displace petroleum fuels, they must provide similar levels of cost, convenience, and reliability. The mainstreaming of renewable energy vehicles will depend heavily on the availability of infrastructure to support their energy requirements and will require the Government to introduce appropriate regulations and legislation for the marketing and distribution of renewable fuels.
- Price control mechanisms are utilized by the Government as a strategy to contain transportation cost for goods and people: This degree of pricing regulation within the conventional fuel sector, though not sufficient to discourage the use of renewable fuels and vehicle technologies, serves nonetheless to distort the markets and increase the barrier for renewable energy use within the transport sector.
- Lack of information with which to make informed vehicle choices: Consumers are essentially limited by the available technology options as well as the available infrastructure for fuel distribution. In the case of fleet vehicles purchases, unlike the case of domestic vehicles, decision-makers are less limited by the in-country technology options but are nonetheless limited by the available information of applicable options as well as the available infrastructure for fuel distribution. Both are creations of the regulatory environment for motor vehicles within Curaçao, which has experienced very little change over the past three decades.
- Absence of a sustainable public transport strategy: Public transport planning in Curaçao is very traditional and is based on traffic management and scheduling. Consequently, there is very little exploration of options for advanced vehicle technologies, such as electric vehicles and hybrid-electric vehicles, or renewable energy use within the sector. In particular, there are obvious opportunities for replacing significant amounts of the 2.6 million gallons of diesel consumed annually with renewable options such as fatty acid methyl-esters, also known as biodiesel, that is derived from the transesterification of oils.

## Fiscal

- Lack of competitive pricing: Most renewable energy vehicles are manufactured on assembly lines, where mass production can greatly reduce costs. But the global infrastructure for fuel production, distribution and supply is based on fossil vehicles and renewable vehicle

technologies are, on average, 30 per cent more expensive than their conventional counterparts; Curaçao does not provide incentives for renewable energy vehicles.

- There are no fiscal incentives for the purchase of advanced vehicle technologies: The current structure of customs duties and tariffs for vehicles were formulated over thirty years ago and therefore, are based on the importation of conventional petrol or diesel-powered vehicles. Thus far, there have not been any revisions to accommodate either the current paradigm in available advanced vehicle technologies, such as electric vehicles and hybrid-electric vehicles, or the energy strategy for the country.

## C. Energy efficiency

### 1. Electricity

In 2011, around 765 GWh of electricity was generated and 400 GWh and 265 GWh were consumed by the industrial/commercial sectors and residential sector respectively. There has been acknowledgement that as much as one third of the current generation capacity is based on plants that are over 30 years old. Overall generation efficiency has been estimated from 30 to 40 per cent and some amount of improvement is expected from the unbundling of concessions to include independent power producers, especially from renewable technologies. Transmission and distribution losses have been estimated at around 13 per cent, which is in keeping with the regional average, though there are annual technical improvements to the grid and targets to reduce same to as low as 5 per cent by 2020.

There has however, been very little planning that is related to demand-side management. The residential sector, in particular, account for approximately 40 per cent of electricity end use and energy efficiency applications related to lighting, cooling, water heating and appliance have the potential to reduce consumption by around 25 per cent; this translates into a 10 per cent decrease in overall electricity consumption and a saving of 112,500 boe per annum, when calculated on the basis of 40 per cent generation efficiency. The following barriers have been ascertained to retard the rate of energy efficiency applications within the electricity sector.

#### Regulatory

- “Imperfect” information: A large body of research states that consumers are inadequately informed about market conditions, technology characteristics and their own energy use. The lack of adequate information about potential energy-efficient technologies inhibits investments in energy efficiency measures. Though the Office of the Prime Minister has developed some amount of literature for raising awareness toward energy efficiency, not much else has been done. There is nonetheless significant scope for market driven energy-efficient technologies, especially at the level of households, on account of the significant cost of electricity in Curaçao.
- Lack of decision making power: A lack of power among energy efficiency decision-makers in most organizations is likely to inhibit implementation of projects; the low importance of energy management lead to constraints when striving to implement energy efficiency measures and many organizations, including Government ministries and agencies in Curaçao, lack centralized policies and processes for treating with energy efficiency. The lack of suitable inclusion of energy performance requirements in the public procurement rules in particular, limits energy efficiency decision making when purchasing goods and services for the Government.
- Split Incentives: A split incentive may occur when the potential adopter of an investment is not the party that pays the energy bill. If so, information about available cost-effective energy efficiency measures in the hands of the potential adopter may

not be sufficient. This situation is common in residential and commercial landlord tenant arrangements or business owner manager relations. In multi-division organizations, including the Government, the lack of sub-metering may also be classified as a split incentive. Regulations, such as building ordinances that govern strata developments, are required for dealing with split incentive barriers.

- Absence of minimum energy performance requirements: The absence of minimum energy performance for industrial, commercial and public buildings, as well as end use appliances, is a barrier toward energy efficiency. The implementation of energy efficient building code requirements, as well as efficiency regulations and standards for appliances and equipment will provide a “push” factor for driving a sustainable market in energy efficient building designs, end-use technologies and services.
- Lack of regulation for cogeneration: Cogeneration is an important feature of increased energy efficiency within large commercial and industrial applications in many countries and has the potential to support incremental expansion of generation capacity within Curaçao. But the interconnection regulations that are being developed are supportive of small solar and wind systems only. There is no scope for efficient cogeneration from a mix of fossil-based fuels, such as natural gas, LPG or diesel, and heat recovery mechanisms, which may be more cost effective than renewables for industries with high heat production; the proposed regulation limits self generators to feeding less than 1 MW to the grid.

## Fiscal

- Lack of incentives for energy efficiency performance: Some technologies that support efficient energy use are currently supported through exemptions in duty and sales taxes. But despite these fiscal incentives for technologies, there are no fiscal incentives, such as tax rebates for the achievement of verifiable energy efficiency performance. It should be noted that technology is a necessary but not sufficient tool towards the attainment of efficient energy use.
- Uncertainty of investment: Despite recent increasing trends in the price of traditional energy sources, uncertainty about future energy prices and the actual savings from the use of energy efficiency technologies, combined with the irreversible nature of the efficiency investment, make the appropriate discount rate for analysing the net present value of energy savings uncertain. As a consequence, many, though mostly large commercial, energy users weigh energy efficiency investment returns against that from traditional investment portfolios.
- Bounded rationality: Decisions on energy efficiency-related incentives from the Government formally requires decision-makers to solve what may be extremely complex optimization problems in order to obtain the lowest-cost provision of energy services to society, thereby weighing the cost of revenue losses with the benefits of fuel and infrastructure expansion savings. But the simple rational view assumes that the Government is a single actor, though in reality it consists of many actors with different and sometimes conflicting, objectives. The interests of one department or agency may, for example, be in conflict with those of others; revenue loss seems to be a major deterrent to the embracing of some energy-efficiency initiatives and may need to be treated under a comprehensive revision of the systems for tax reform that is currently underway.
- Split incentives: This issue has previously been highlighted under regulatory issues but also has a fiscal component. Split incentives are most significant in houses and commercial offices that have either been rented or leased, as well as in building developments such as large apartments and commercial complexes, in which there is very little interaction between the developer and the buyer during the construction phase. Split incentives also apply to managerial behaviour toward commercial activities, such as

hotels, wherein energy costs may simply be passed on to customers; the split incentive is perhaps the single most influential barrier for energy efficiency and require third-party support for financing portfolios through either the electric utility or development bank.

- Credit-restriction measures from the Central Bank of Curaçao and Saint Maarten: As a means of containing the availability of surplus liquidity within Curaçao, the Central Bank of Curaçao and Saint Maarten has from time to time “exercised control” over commercial bank-lending to individuals. This is an antagonistic measure that serves to remove much of the capital that is required for financing small commercial and domestic energy efficiency applications from the credit market.

## 2. Transport

Despite the lack of tangible data on energy end-use within the transport sector, there is qualitative information that suggests that transportation within Curaçao may be disaggregated into two distinct segments, inter alia:

- International transport, which is primarily based on the bunkering of fuel for air and maritime transport and supports the role of the country as a hub for global commerce and trade.
- Local transport, which is primarily based on diesel and gasoline fuels for land based domestic and public transportation, as well as freight services. This report focuses on the latter, which has been estimated to account for as much as 60 per cent of fossil fuel use.

The local transport sector is based on conventional vehicle technologies operating within a dense, modern road network of 124 km per 100 km<sup>2</sup>. It permits manufacturers to assemble the inputs needed to produce their goods, it connects producers to consumers and it brings people to work, to school and makes possible a wide and varied range of leisure and business activities, including tourism. Though some regulations are in place, inefficient practices characterize the sector and there is much scope for integrating efficient energy practices therein. Within Curaçao, there is need for practice, knowledge and awareness programmes and public policies promoting the use of efficient vehicle technologies and efficient transport patterns within the sector. Despite the importance of the transport sector to energy end-use, much of the energy planning within Curaçao has largely focussed on the electricity sector on account of the fact that energy planning have largely been dominated by the public utility. Activities within the transport sector have largely focussed on the marketing and distribution of vehicles, as well as the transport fuels to power them. The sector is one that is largely disaggregated, with many diverse actors ranging from the Ministry of Traffic, Transportation and Planning, which has portfolio responsibility for the sector, to Curoil, which is the sole fuel distributor, to BP&T, which regulates fuel quality and pricing, to a variety of vehicle distributors and public, commercial and private vehicle operators. Policies that support suitable vehicle technologies, such as electric vehicles and hybrid-electric vehicles are deemed supportive to the achievement of a drastic reduction in per capita energy consumption. The following barriers inhibit efficient practices and vehicle technologies within the transport sector.

### Regulatory

- Absence of minimum energy performance requirements: There are no regulations that are related to minimum energy performance for motor vehicles. Indeed, the converse is true; regulations for the import of vehicles do not attach minimum energy performance criteria for waivers and exemptions where granted and traditional tariff structures are over thirty years old. Consequently, the tariff structures take neither the promotion of efficient fuel use nor advanced vehicle technologies into explicit account.
- Absence of emission-control standards for vehicles: Air pollution emissions associated with fossil fuel combustion generally reduce the quality and value of the air and also adversely affect human and ecosystem health. Importantly, vehicle emissions tend to be

inextricably linked with the efficiency of engine fuel use and provide clear and present mechanisms for removing significant numbers of inefficient vehicles from circulation.

- Regulations for data reporting in tourism: Tourism is the largest single contributor to the GDP of Curaçao. When considered within its broader context, the transport sector is central to tourism, which requires the movement of people for sightseeing and leisure, and well as the movement of goods and services to support the hotels, restaurants and entertainment facilities. However, Curaçao has no regulation to facilitate the tracking of fuel use within the sector; the availability of baseline data would serve to facilitate energy management within the sustainable tourism plans, to include analysis of the potential savings that can result from the use of efficient and advanced vehicle technologies, as well as fuel switching. There are also strategic advantages to be gained from the “green” label that can be attached to same.
- Lack of transport planning: There is very little capacity within Curaçao, and indeed the Caribbean, for developing transport planning features, such as transport demand management that may provide domestic vehicle users with judicious decisions on route and lane selection for efficient travel; consequently, transport planning has been limited to traffic management. Efficient transport networks and systems promote efficiency in movement and fuel use.
- Lack of public transport policy: The lack of a public transport policy, that includes an explicit public service obligation for the public transport service that is currently being provided by Autobusbedrijf Curaçao, makes it difficult to establish whether the level of subsidy is justified and whether the service could not be more efficiently provided by a more “business-oriented approach”. Under the existing scenario, the movement of each passenger accounts for 1.15 gallons in fuel use or a levelised fuel cost of just over US\$ 6.00 per passenger.

## **Fiscal**

- Lack of fiscal incentives for efficient and advanced vehicle technologies: Vehicles that are more energy-efficient than the conventional modes are sometimes more expensive to purchase. Despite the suitability of the high road density and the “stop and go” scenario for driving in Curaçao to electric vehicles, there are no policy incentives to promote either the supply or demand side for same. On the micro-scale, investments in energy-efficient vehicle technology may be problematic as commercial banks, through which the majority of new vehicles are purchased, do not usually examine the lifecycle costs, which would apply the benefits of fuel savings to the calculation of loans and insurance premiums. The availability of fiscal incentives, such as tariff reduction and VAT exemption would serve to levelize the field between traditional and energy efficient vehicle technologies.
- Lack of risk-adjusted pricing: Motor vehicle loans a common feature across the Caribbean, although purportedly designed to match the ability of the borrower to repay the loan, the loan payback requirements do not consider the operating costs of the vehicle that is being purchased despite the impact of such costs on the total cash flow of the borrower. In general, a customer who purchases an energy-efficient vehicle reduces the risk to the lender by improving his/her net cash flow and should, but does not, reduce the interest rate on the loan.
- Split incentives: In the public transport and freight services, management and operational features can provide significant energy efficiency gains; factors such as gross vehicle weight, driving practices and vehicle maintenance are important to fuel use efficiency and are frequently determined by the vehicle operator or fleet manager, who may not be the owner. As a consequence, the significance of fuel savings may not be important to the daily operation.

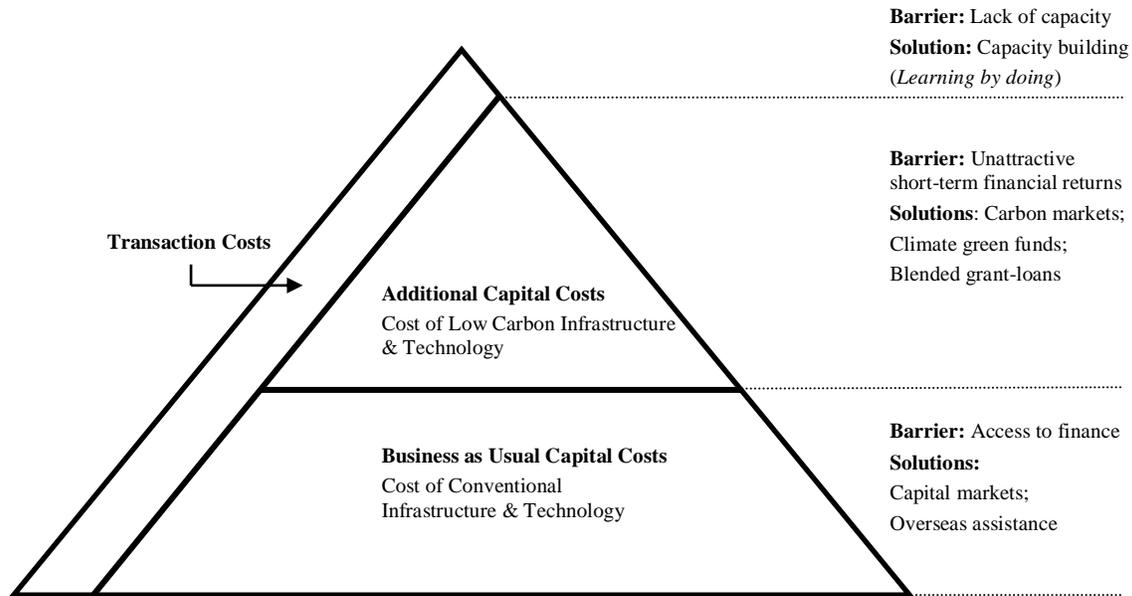
## IV. Conclusions

A multitude of barriers impede the broader adoption of renewable energy and energy efficiency systems in the sustainable energy market within Curaçao. These generally include high up-front system costs compared to conventional alternatives, a lack of available financing for businesses and consumers, a lack of awareness about the favourable lifecycle economics of sustainable energy technology vis à vis conventional technologies, and a lack of quality control, which often undermines consumer confidence as people associate some renewable and energy efficiency technologies, such as solar water heaters and compact fluorescent lamps that make a modest contribution to reducing energy use. The transaction costs for renewable energy and energy deployment within Curaçao are typically high (see diagram 2) and are usually affordable only to large project developers who typically generate renewable power for sale to the grid. But the fact is that much is expected from small, distributed renewable energy generation and energy efficiency measures. Government policy must therefore act in tandem with capacity building programmes that will serve to lower transaction costs for low carbon projects.

Also, it is important that there is consistency in market stimulation programmes such as renewable energy and energy efficiency legislation, building codes, tax credits and subsidies. This particular issue is essential for attracting long-term investment in new sustainable energy market activities. Importantly, buyers with significant market power can help to expand market demand, and the most obvious buyer with such power in Curaçao is the Government. Within the sustainable energy framework, public procurement will serve as a key policy tool for driving the agenda forward and achieving shifts in market practices by simultaneously leveraging the significant purchasing power and regulatory influence of the Government.

As purchasers of a diverse range of goods, services and infrastructure to meet not only their own operational needs but also to deliver on their public service mandate, government procurement spending represents scaled up and long term demand for sustainable energy products and services, inclusive of green building designs and construction; distributed renewable energy generation and energy efficiency technologies, and advanced vehicle technologies. Strategically directed, this demand has the ability to act as a market supporter and catalyst, incentivizing businesses to take the risks to invest, innovate and commercialize sustainable energy products and services. A key to achieving this value added green growth will come from boosting business innovation so as to overcome the traditional, inefficient patterns of the past and create novel markets for the future. Government procurement must be considered an essential demand-side strategy for incentivizing and incubating the sustainable energy market in Curaçao.

**DIAGRAM 2**  
**TRANSACTION COSTS RELATED TO CLEAN ENERGY**  
**TECHNOLOGY DEPLOYMENT IN CURAÇAO**



Source: Author's compilation.

Barriers to renewable energy use and energy efficiency applications are multi-faceted, diverse and are usually specific to individual technologies and sectors. This implies that effective policy solutions will need to address the particular features of individual energy service markets, the circumstances of different types of energy-using organization, and the multiple barriers to energy efficiency within each. It is likely that a mix of policies will be required, in which several different initiatives work together in synergy. The basic elements of this mix are well established and include best practice schemes, demonstration projects, training initiatives, market-based instruments, labelling schemes and minimum standards for the energy efficiency of equipment. The costs and benefits of these individual instruments will require careful analysis, as will the overall coherence of the mix.

However, planning for use of renewable energy technologies within the Curaçao energy sector remains aligned with utility scale wind replacement of fossil based thermal generation, as well as distributed solar photovoltaic systems. However, the most important fact is that people do not require electricity but rather use electricity as a means of providing a desired energy service; electricity is an energy carrier. There is a multi-step process whereby primary energy is converted into an energy carrier such as heat, electricity or mechanical work, and then into an energy service. Renewable energy technologies are diverse and through an integrated resource planning approach, can serve the full range of energy service needs of Curaçao.

## V. Recommendations

### A. General recommendations

The overall recommendations are as follows:

#### 1. **Establish a ministry or Government agency with portfolio responsibility for energy**

The functions of this Ministry or Agency should include:

- Full responsibility for energy policy and energy planning, with fixed revision dates for policy and target revisions.
- An energy statistics division with responsibility for periodic publication of energy balances and other target indicators, including public sector indicators, as well as the maintenance of energy information systems for farming and providing data for judicious decision making within the energy sector.
- Functional sub-divisions for renewable energy, energy efficiency, policy evaluation, and public education. This will include the presence of a “one stop office” for potential investors that provide information on commercially, developable renewable resources within Curaçao as well as energy efficiency applications and opportunities for various end user groups.
- An energy projects’ unit, staffed by personnel with the capacity to focus on the design and preparation of project proposals that are aimed at attracting grant funding for demonstration projects, which will provide suitable “concept proofs” for technology transfer and innovative use of renewable energy and energy efficiency systems, and policy support.
- Ocean energy research and development, which seek to develop and manage the emerging opportunities that are related to ocean thermal conversion and sea water cooling.

## **2. Define the roles and functions of the various institutions involved in the energy sector**

This new paradigm should provide an increasing role for the private sector, non-governmental organizations (NGOs) and communities; their involvement in energy planning may be derived through the establishment of a broad-based committee for coordinating energy planning issues among Government ministries and agencies, private sector, NGOs and academia. This body should be responsible for providing recommendations for updates and ensuring congruence of the respective regulations on energy and should constitute representation from the public sector, financial institutions, industry, civil society and academia. The precise terms of reference and scope can be determined through consultation among the stakeholder agencies.

## **3. Develop and approve a National Energy Policy for Curaçao**

This should be designed as a comprehensive overarching policy that targets security of energy supply as its main priority, linking same into the development strategy of the country. The NEP should seamlessly integrate the existing Electricity Policy and Sustainable Tourism Plan, as well as any other development plans. In addition, the NEP should include a sub-policy for:

- Transport: This should deal with the social, economic and environmental development, functioning and performance of the transport system in Curaçao; transport is a key mechanism for promoting, developing and shaping the economy and requires an extension of the legislations and regulations from its current focus on safety, infrastructure and ownership to efficiency and management. The policy should address outstanding issues such as: urban transit systems, transport demand management, public transport tariffs, charges, quality of service and regulation; and transport planning.

In particular, the role of the private sector in transport planning requires significant strengthening and the transport policy should be developed to support public-private partnerships such as joint ventures with foreign private enterprises for the development of port, rail and road infrastructure.

The other important sub-policies that are relevant to the Curaçao energy economy are:

- Tourism
- Renewable energy
- Energy efficiency

The regional energy policy of CARICOM, which was recently approved at the 41st special meeting of the Council for Trade and Economic Development for Energy, can provide a useful template for fast tracking the design of the Curaçao NEP.

## **4. Develop and approve a sustainable energy plan for Curaçao**

This should delineate the actions that are necessary for implementation of the NEP, to include timelines for the respective actions. There is an expectation that the sustainable energy plan will provide explicit mechanisms through which the NEP will be translated into regulations and implementable actions.

In particular, the specific recommendations for mainstreaming the sustainable energy market within Curaçao are as follows:

## B. Renewable energy

### 1. Electricity

- Strengthen the capacity and mandate of the electric utility regulator

BT&P is responsible for monitoring and operator compliance, with standards and targets set by the Minister, and advises the Minister on issues related to concessions for electricity production, transmission and distribution, and supply, as well as tariff setting. But whilst many Caribbean countries that have made progress in the regulation of their electricity sector have a regulatory agency empowered to set service standards and tariffs, in Curaçao, the regulator is, at best, an advisory body that makes recommendations to the Minister; best practices require that the regulator should be an independent, self-financed entity with powers granted through legislation. Simultaneously, the regulator seems to have considerable legal, personnel and financial constraints, all of which limit its ability to fulfil its role.

- Establishment of a privately financed, independent regulatory body is a vital first step to unbiased energy regulation.

The National Executive Council of Curaçao has the powers to meet and pass resolution to amend the legislation that currently governs the sector and accommodate the recommended shifts, to include mechanisms for financing from energy levies charged to concession holders. A part of its mandate should include the development of a predictable and transparent process for and approval of addition of new generating capacity, including renewables. A change of name that reflects the expanded responsibility of the institution would also be useful. The model of the Office of Utilities Regulation in Jamaica can provide useful guidance.

- Provide greater fiscal support for small renewable energy and “avoided generation” technologies

Much of the current thrust towards renewable energy legislation focuses on grid scale renewable energy generation. In instances where small scale renewable applications are considered, there seem to be an “overwhelming focus” on electricity generation applications and as a consequence, attention is being paid mainly to renewable energy systems such as solar photovoltaics. But “avoided generation” technologies will directly reduce consumption of electric grid power in exactly the same way a renewable energy electric generation technologies increase useable energy at the customer’s site. For example, where a solar water heater is used in place of an electric water heater, a solar water heater that offsets 4,000 kWh of electricity per year has the same impact on grid power consumption as a photovoltaic system that produces 4,000 kWh.

There is already cognizance within Curaçao towards the need for fiscal incentives that support small-scale renewable energy systems and there have been some moves under the recent Electricity Policy to provide some incentives. Consideration should also be given to small, efficient cogeneration systems for commercial applications. There is an expectation that a suitable revenue neutral incentive package may be devised to account for the savings in foreign exchange that accrues from the aforementioned.

### 2. Transport

- Introduce legislation and incentives that support electric and hybrid-electric vehicle technologies

The geography and land transport network in Curaçao is ideally suited to electric vehicles and hybrid-electric vehicles. The country is small (444 km<sup>2</sup>) and has a modern road network of 124 km per 100 km<sup>2</sup>, which is spread over a gentle rolling landscape which does not demand significant amount of continuous power but simultaneously facilitates regenerative braking. The support of electric vehicles and hybrid-electric vehicles by a renewable grid has the potential to incrementally transition the

country into a low-carbon economy. But there is also need for Government policy towards the introduction of vehicles and hybrid-electric vehicles as a public service obligation, since there will be need for an initial investment in charging infrastructure as well as investments in grid upgrade to support the required energy supply.

A package of duty reduction and VAT exemption may be appropriately determined in accordance with the benefits to be remitted from the reduction in imported fossil fuels that will result the benefit of the concomitant foreign exchange savings important to same.

## **C. Energy efficiency**

- Integrate energy efficiency into public procurement regulations

The importance for Government participation in sustainable energy, especially energy efficiency markets, has been highlighted herein. The ability of Curaçao to suitably implement energy efficiency benchmarks into its procurement rules will rest on its ability to attract third party funding for some activities such as minimum energy performance certification of public buildings and vehicles. A pilot programme to study same may be developed with support from donor agencies and in cooperation with other Caribbean states which have tangible interests in this model, inter alia third party energy service companies financing.

- Introduce minimum energy performance standards for buildings, equipment, appliances and vehicles

Minimum energy performance regulations should be developed and introduced to include options for building ratings; appliance standards and labelling as well as vehicle fuel efficiency. The recommendation is for an amendment of the building code to include energy efficiency requirements, with an initial voluntary scheme that involves the issuance of certificates for buildings and building technologies that meet the energy performance requirements and additional levels of certification for those with superior performances. Similarly, the introduction of energy efficiency standards and labelling schemes for household and commercial appliances, and some types of equipment, such as motors, would be done through an initial voluntary scheme that simultaneously provides guidance towards consumer awareness on energy use and benchmarks for fiscal incentives toward efficient appliance and equipment purchase.

Energy efficiency support mechanisms, such as third party financing and government incentive programmes would apply only to those projects, activities or items that are designed to attain minimum energy performance certificates; minimum energy performances provide a baseline for establishing the economic benefits that may be derived from energy efficient technologies. Under this mechanism, there are opportunities for bringing energy efficient, avoided generation and renewable energy technologies under a single VAT and duty exemption scheme; the success of the programme will be dependent on the degree to which monitoring, as well as penalties and enforcement for breaches, are instituted.

### **1. Electricity**

- Examine legislation for the operation of energy service companies

Without access to financing options, the energy efficiency markets in Curaçao will remain smaller than is intended.

A major criterion for market expansion must be the development of mechanisms to encourage the finance sector to create new or leverage existing credit instruments for the residential and commercial energy efficiency markets. The support of multilateral global and regional funding facilities, such as the Inter-American Development Bank and Caribbean Development Bank, can

help to facilitate government backing that “shepherd” a number of blended grant/loans towards capitalization of financial institutions or third-party financiers such as energy service companies. The legislation that is required for the establishment of energy service companies, as a starting point, require the collection of baseline data that is necessary toward an understanding of same.

- Mandate energy efficiency targets for utility-scale generation

Within Curaçao, regulation of the electricity sector is weak, tariffs are high and competition is absent. The weak regulation of the sector and the absence of competitive electricity production resulted in an inertia toward the adaption and exploitation of new technological opportunities for efficient generation of power. Meanwhile, the increasing cost of oil on the global market is coupled with the inefficient use of expensive, imported fuel for electricity production; the result is that the domestic tariff in Curaçao is around 30 per cent higher than the average in other Caribbean SIDS.

In essence, there is urgent need for efficient energy use and diversification of fuel source within the power generation sector; but much focus has been on the latter, and successive governments have sought to introduce increasing amounts of renewables into the power supply matrix whilst ignoring the significant gains that are to be derived from benchmarking and efficiency targets for generation. The concessions for electricity production should include rolling targets for generation efficiency, with the flexibility for innovation change. The regulator should be strengthened with the engineering personnel and energy planners, who are capable of measuring and monitoring compliance.

- Mandate utility-led demand-side management

There is a requirement for the utility to become more directly involved in provide assistance to large customers who are inefficient in their use of electricity, in particular large industries and hotels. In essence, the electric utility should be mandated to perform demand-side management activities for commercial and residential customers with clear benchmarks and targets identified for same; this will require definition as a term of reference within the concessions for electricity supply.

## 2. Transport

- Conduct an assessment of the transport sector

Within Curaçao, no serious assessment of the transport sector has been done. A recommendation of this report is that a detailed assessment of energy use within the transport sector should be conducted to include the identification of opportunities for improved efficiency in vehicle technology, renewable and alternate fuel use, as well as the development of a model for transport demand management.

Transport demand management is critical to transport planning and includes identification of modes, routes and schedule for travel and takes into account policies and legislation for supporting country-appropriate policies for the sector, including the establishment of a public service obligation for the public bus service. This activity is congruent with the establishment of minimum energy performances for vehicles and will form the basis through which the economic benefits to be derived from vehicle efficiency, which will guide the development of policies, including any incentive packages, for same.

### D. Benchmarking and quantitative aspects

Perhaps the most critical place to start in Curaçao is the operation of the public sector. The electricity bill of the Government is typically high. Benchmarking provides an opportunity for the establishment of targets and indicators within the public sector for:

- Small-scale renewable energy distributed generation
- Avoided generation, such as water heating in hospitals and cooling in offices.

- Building efficiency
- Transport efficiency

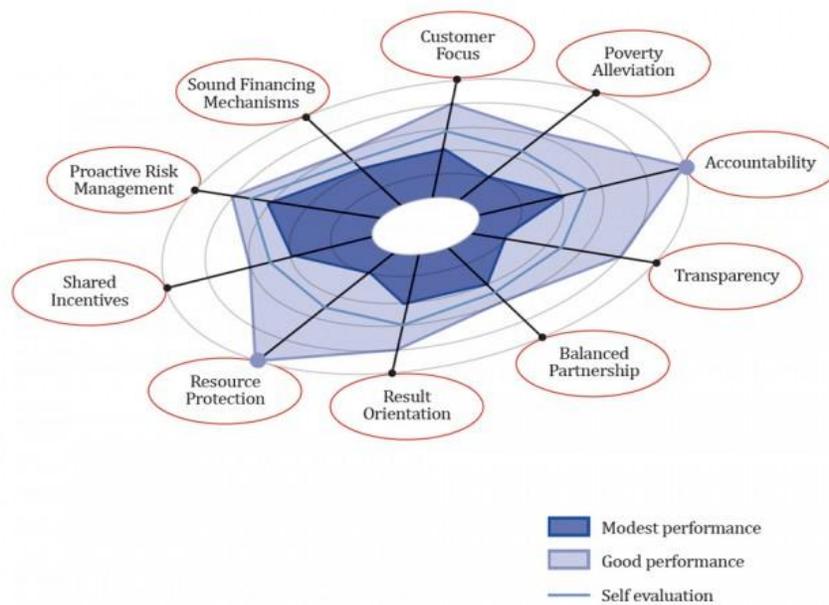
Though international benchmarks can provide useful information, special attention must be paid to issues associated to the existence of different operating environments in terms of physical, geographical, institutional and regulatory frameworks. For instance, the District of Colombia in the United States of America uses the following medians for public buildings over 10,000 ft<sup>2</sup>:

- 146 kBtu/ ft<sup>2</sup> for fire and police stations
- 246 kBtu/ ft<sup>2</sup> for libraries
- 100 kBtu/ ft<sup>2</sup> for recreation facilities
- 163 kBtu/ ft<sup>2</sup> for hospitals and public lodgings

A number of opportunities exist for examining target indicators for energy efficiency within various economic sectors in Curaçao. But within the sustainable market framework, public procurement serves as a key policy tool for governments to drive the agenda and achieve shifts in market practices by leveraging its significant purchasing power and regulatory influence. As purchasers of a diverse range of goods, services and infrastructure to meet not only their own operational needs but also to deliver on their public service mandate; government procurement spending represents scaled up and long term demand across a wide number of industries.

Strategically directed, the demand created by public procurement policies have the ability to act as a market supporter and catalyst, incentivizing businesses to take the risks to invest, innovate and commercialize green products and services. A common mechanism for benchmarking public procurement policies is the Global Energy Basel Grading Tool, which covers questions of sustainable public procurement by means of its 10 topics, inter alia: Accountability, transparency, customer focus and results orientation, poverty responsiveness, power balanced partnerships, shared incentives, sound financing mechanisms, proactive risk management and resource protection as shown in diagram 3.

**DIAGRAM 3**  
**GLOBAL INFRASTRUCTURE BASEL GRADING TOOL FOR**  
**PUBLIC PROCUREMENT BENCHMARKING**



Source: Global Infrastructure Basel, 2012.

Government procurement should be considered as an essential demand-side strategy for incentivizing and incubating innovation for growing the sustainable energy markets within Curaçao; the energy efficiency and renewable energy potential of the country will be most reasonably realized within the creation of a sustainable environment within which the Government is a primary participant.

## **E. Progress and next steps**

The vision for Curaçao is one that will integrate small, distributed renewable energy generation and energy efficiency systems alongside utility-scale projects. This will therefore require a supply chain development within the emerging sustainable energy markets starting with a small group of suppliers, preferably a mix of local manufacturers and importers, who take the responsibility for the whole supply chain, including products, distribution and (assistance in) design and installation work. Once the volume increases, the three elements will gradually separate and the different actors can take their normal role in the supply chain such as suppliers, wholesalers, designers and installers. Typically the companies involved in the supply chain are small microenterprises. The capacity of micro- financing institutions for sustainable energy market analysis is therefore critical to market expansion. Normally, the physical distribution structure will follow “normal patterns” once the market size develops. But a lack of craftsmen, who are properly trained to install and maintain renewable and energy efficiency systems can become a key barrier to growth. This is particularly relevant for the main market segment of single-family houses, as installers can often decisively act as the decision maker. For example, if installers are knowledgeable about solar thermal systems, they may motivate potential users to buy them; if they are not specifically trained, they may discourage consumers or even provide a poor installation, with a negative impact on the functionality of the system and on the image of the technology.

Markets are not perfect, but neither are the institutions that seek to improve them. Though government intervention is appropriate, it is unlikely that there will be a single best policy solution (for example, minimum efficiency standards) for establishing a thriving sustainable energy market within Curaçao. Instead, the best choice will be a “judicious mix” of multiple complementary approaches that are tailored to particular circumstances that seek to overcome market failures or reduce high transaction costs or both. In addition, the selected options must be based on a pragmatic assessment of the options and will therefore require suitable institutions with the appropriate technical capacity, as well as baseline data for judicious analyses to be conducted. The role of a defined Government ministry with portfolio responsibility for strategic planning and coordination within the energy sector is therefore critical.

A critical tool for the success of this ministry will be the pursuit of proactive measures in public-private partnership that engages a broad cross section of stakeholders in policy and strategy design; the coordination of external assistance from multilateral agencies and strategic regional partnerships is urgent and important.

The next step is dialogue among the principal decision-makers to agree on the acceptable recommendations and a suitable mechanism and timetable for pursuing same. In terms of the fiduciaries, priority should be given to the establishment of the energy portfolio within cabinet, followed by the simultaneous building of relationships and development of a National Energy Policy.



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