Ministry of Foreign Affairs

Final Report
'Cuba Sustainable Energy Forum 2018'

Commissioned by the Netherlands Enterprise Agency

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FINAL REPORT

'Cuba Sustainable Energy Forum 2018'

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1 Introduction

In the past decade, Cuba has been undergoing a political and economic transformation. A key area of transformation is the country's energy sector, given the current fossil fuel (import) dependency on one hand and the rising energy demand on the other hand.

The '*Cuba Sustainable Energy Forum 2018*' [1] is one of the events organized in Cuba aimed at accelerating the achievement of the 24% renewable energy target for 2030. The forum was jointly organized by the Ministry of Energy and Mines of the Republic of Cuba and the European Union with two main objectives:

- For the Cuban authorities to present their new energy and foreign investment policies along with the portfolio of investment opportunities in the fields of renewable energy and energy efficiency in Cuba;
- For the EU to showcase technologies and lessons learnt from the European experience and present the range of available financing instruments in Cuba.

RVO facilitated the participation of two Dutch experts (separately) in the Cuba Sustainable Energy Forum in order to promote the Dutch renewable energy capabilities once more with the Cuban authorities and to identify concrete business opportunities for Dutch companies operating in the field of renewable energy.

This report lays down the findings of the desk research prior to the visit to Cuba and the observations from the visit to the Sustainable Energy Forum 2018 that took place at the PABEXPO Exhibition Centre in Havana.

[1] Originally the 'Cuba Sustainable Energy Forum 2017' scheduled to take place in September 2017, had to be rescheduled by the organization and the Cuban authorities due to the devastation caused by hurricane Irene a few weeks before the event

2. Objectives and scope

2.1 Purpose of the assignment, activities and results

The purpose of the assignment was to assess how the Netherlands can assist in reaching the goal to produce 24% of all Cuban energy sustainably from renewable sources by 2030 and to promote the Dutch energy sector with the Cuban authorities.

For business development purposes in the Netherlands, GMSP was asked to look into the basic supply and demand characteristics of the renewable energy market in Cuba and match the findings against the relevant Dutch renewable energy capabilities. This led to the following specific results:

- Identified main characteristics and needs of the Cuban sustainable energy sector
- An assessment of the possibilities to involve the Netherlands in this field
- Contact established with key players within the local context (list of contact details, Annex 1)
- A list of Dutch companies/institutions paired to the (business) identified opportunities (Annex 2).

Besides preparing for and participating in the Cuba Sustainable Energy Forum 2018, GMSP was asked to draft a report consisting of concrete business opportunities for Dutch companies operating in the field of renewable energy and disseminate this report through the RVO website and other relevant websites/social media.

2.2 Execution time

The execution period was originally from 1st September 2017 to 1st November 2017. Due to the devastating passing of hurricane Irma over Cuba shortly before the Cuba Sustainable Energy Forum 2017 was scheduled, the event was postponed until 30th and 31st January 2018. The weeks after the visit to the forum were used to write down the observations and match those with the inventory of the potential renewable energy knowledge and services suppliers from the Netherlands. The final report containing concrete business opportunities for Dutch companies is made available beginning of April 2018 in order to allow for planning of follow up activities in 2018.

3. Status of and opportunities in the renewable energy sector in Cuba

3.1 General status of the energy sector in Cuba

The majority of Cuba's (electric) power, over 95%, is generated with fossil fuels. A great part of it (37%) is imported oil, mostly from Venezuela. Additionally, imports of subsidized fossil fuels from Venezuela have been reduced drastically in the last as a result of Venezuela's deep economic crisis. Simultaneously, Cuba's energy consumption is increasing with the Cuban economy opening and tourism expanding.

The Cuban energy sector faces several other critical issues besides the high dependency on (imported) fossil fuels, the most evident being the high cost of power supply to final consumers (in the range of approx. 0,22-0,27 CUC/KWh), low energy efficiency (of power generation, transmission and use) and high emissions of greenhouse gases[2].

The overall installed energy production capacity in Cuba consists of a combination of thermoelectric and combined heat and power (CHP) baseload, diesel and fuel oil decentralized power generation, bioenergy from sugarcane bagasse as the currently largest sustainable energy source and some power from biogas, hydro, solar and wind sources.

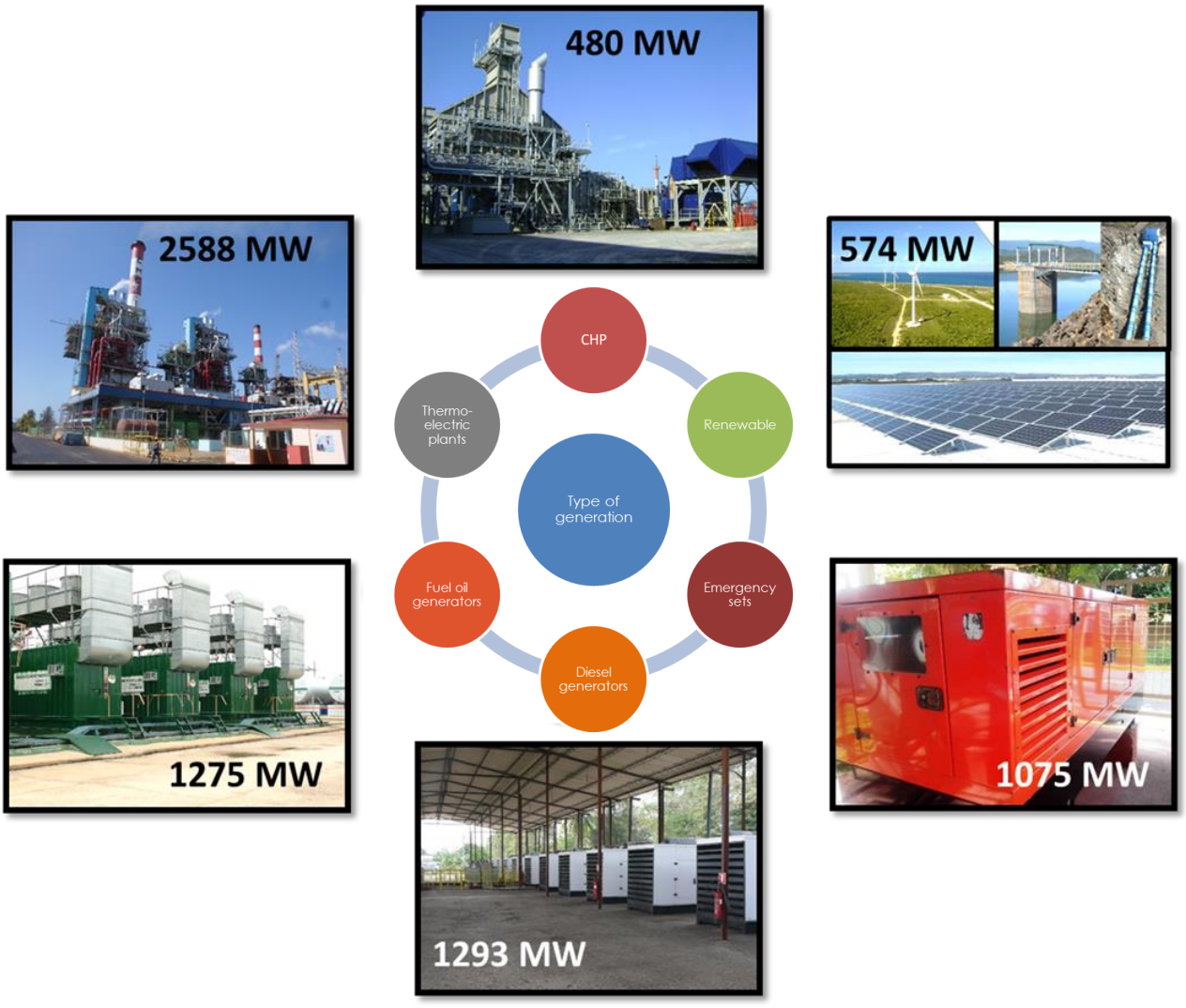


Figure 1: Cuban electricity generation capacity (Source: UNE/MINEM, 2017)

It is expected that with an increased share of renewable energy in the Cuban energy matrix, reliance on (imported) fossil fuels for power generation will be significantly reduced.

[2] *Information note on sustainable energy*, MINEM 2017; http://www.cuba-sustainableenergyforum2017.eu, 2017

3.2 The renewable energy sector in Cuba

3.2.1 Policy environment

The Cuban government has taken policy measures to roll-out an ambitious program to significantly increase its total power generation from renewables. In June 2014, the government approved a new policy for development of renewable energy and energy efficiency in Cuba [3].

The policy sets out the following goals:

- Produce 24% of electricity using renewable energy sources by 2030 (Note: from 4,3% in 2013)
- Renewable energy will be more than 50% of the increased power generation capacity[4] by 2030
- Not increase dependence on fuel imports for energy generation
- Reduce the costs of the energy delivered by the national energy system
- Reduce environmental pollution.

Furthermore the policy and main guidelines of the "*Economic and Social Policy of the Party and the Revolution that prioritize the perspective development of Renewable energies and Energy Efficiency in Cuba*" state the following:

- 242. Significantly increase the efficiency in electricity generation, dedicating the necessary attention and resources to the plants in operation
- 246. Promote cogeneration and trigeneration in all activities with possibilities to do so. In particular, the generation of electricity by the sugar agroindustry will increase
- 247. To promote the use of different renewable sources of energy, mainly the use of wind, hydroelectric, biomass, solar, biogas and others, prioritizing those that have the greatest economic effect
- 248. To give priority to the achievement of the savings potential identified in the state sector and work towards tapping the efficiency reserves of the residential sector.

Note: For more relevant policy related information please also refer to other sources, e.g. Foreign Investment Law 118, Decree-Law 313 on the Special Development Zone of Mariel, 'Cuba Investor Guide' (issued by CCC- the Chamber of Commerce of the Republic of Cuba, ProCuba and MINCEX) and 'Doing Business in Cuba 2016' (issued by the Embassy of the Kingdom of the Netherlands).

3.2.2 Institutional organization of the renewable energy sector in Cuba

Several governmental entities are involved in the development and implementation of renewable energy sources in Cuba. The institutional organization of the renewable energy sector is as follows[5]:

- **Organizations that develop Renewable Energy Sources**
  - Ministry of Energy and Mines (**MINEM**)
    MINEM is responsible for the development of the wind, solar and hydropower renewable energy programmes.
  - Sugar Industry Company Holding (**AZCUBA**)
    AZCUBA develops the overall bio-energy programme in the national sugar industry.
  - Ministry of Agriculture (**MINAG**)
    MINAG is responsible for the production and use of biogas from livestock production and the exploitation of the forest resource for energy. They are in charge of Breeding and Agroforestry Company Holdings respectively.
  - Ministry of Food Industry (**MINAL**)

[3] "*Política para el Desarrollo Perspectivo de las Fuentes Renovables y el Uso Eficiente de la energía 2014 – 2030*" of 21st June 2014, Source: MINEM 2017; http://www.cuba-sustainableenergyforum2017.eu, 2017

[4] Currently the installed power capacity is 5636 MW based on conventional fuels and 574 MW based on renewable energy technology). Total annual power consumption is in the order of 20 TWh, Source: MINEM 2017; http://www.cuba-sustainableenergyforum2017.eu, 2017

[5] "*Who's who in Cuba's renewable energy sector - Institutional organization of renewable energy sector in Cuba*", EU/MINEM 2017, http://www.cuba-sustainableenergyforum2017.eu

MINAL is tasked with the utilization of the potential for biogas production and application of renewable energy sources in the food industry through the Food Industry Company Holding.

- **Ministries that regulate and contribute to the development of Renewable Energy Sources**
  - Ministry of Energy and Mines (**MINEM**)
    MINEM establishes policies, directs and controls the energy activity of the country.
  - Ministry of Economic and Planning (**MEP**)
    MEP is in charge of directing, executing and controlling the application of the State's and the Cuban Government's policy on economy, planning and communal services. MEP is also in charge of the implementation of the investment policy in whose regulations special attention is given to the incorporation of renewable energy solutions and to increase the energy efficiency of new facilities.
  - Ministry of Industry (**MINDUS**)
    MINDUS has the mandate of proposing, directing and controlling the implementation of policies and strategies for the country's industrial development. In the field of renewable energies, its mission is to promote the highest possible incorporation of the national industry in the production of equipment and technologies for the use of renewable energy sources.
  - Ministry for Foreign Investment and Cooperation (**MINCEX**)
    MINCEX is the central government's body responsible for directing, executing and controlling the implementation of State and Government policy regarding the activities of trade, foreign investment and collaboration. With regard to the development of renewable energy in the country, MINCEX:
    - Participates in the promotion of economic associations or other forms of participation of foreign investment in Cuba, as well as in the analysis and evaluation of proposals and the results of their management
    - Defines and standardizes, in coordination with the agencies concerned, the international commercial bidding activities that are carried out in Cuba.
  - Ministry of Science, Technology and Environment (**CITMA**)
    CITMA directs, executes and controls the State and Government's policy in the field of science, technology and environment, the use of nuclear energy, standardization, metrology and quality control. Relevant to the development of renewable energies, CITMA:
    - Proposes and evaluates scientific and technological strategy and policies
    - Prepares and proposes, in coordination with the corresponding agencies, the environmental policy and control their compliance.
    - Establishes and controls policies aimed at the development of clean production, economic use of waste, promotion for the use of renewable energy and the introduction of certification systems and other forms of environmental recognition.

Zooming in again on the role of the Ministry of Energy and Mines with regard to renewable energy development and deployment, it is important to look at its organizational structure. MINEM establishes the policies, directs and controls the energy activity of the country through three directorates and an attached entity:

- **Directorate General of Electricity**

  It's mission is to direct, coordinate, execute and control the compliance with the policy approved by the State and Government for the sustainable development of the activities of the electric sector in the country.

- **General Directorate of Oil and Gas**

  It's mission is to direct, coordinate, execute and control compliance with the policy approved by the State and Government for the sustainable development of the activities of the oil and gas sector in the country.

- **National Office for the Control of the Rational Use of Energy.**

  Being an entity attached to MINEM, it is the National Office's mission to regulate and inspect the

process of operation, consumption and control of the energy carriers in all the entities of the country. One of its responsibilities is the regulation of energy standards for the import of equipment, as is also the supervision of demand management activities of large power consumers.

- **Directorate of Renewable Energy**
  The Directorate of Renewable Energy is the directory within MINEM that directs, coordinates, executes and controls compliance with the policy approved by the State and the Government aimed at promoting the use of renewable energy sources in the country.

Furthermore, MINEM oversees the following company holdings under its assignment:

- **Electricity Union of Cuba (UNE)**
  UNE is the Cuban state organization that directs the generation, transmission, distribution and sale of electricity.
- **Petroleum Union of Cuba (CUPET).**
  CUPET is the Cuban state organization in charge of assuring an efficient supply of fuels and lubricants to the national market. CUPET furthermore develops activities for exploration, extraction, refining, distribution and selling of petroleum and its derived products.

The following figure summarizes MINEMS structure:

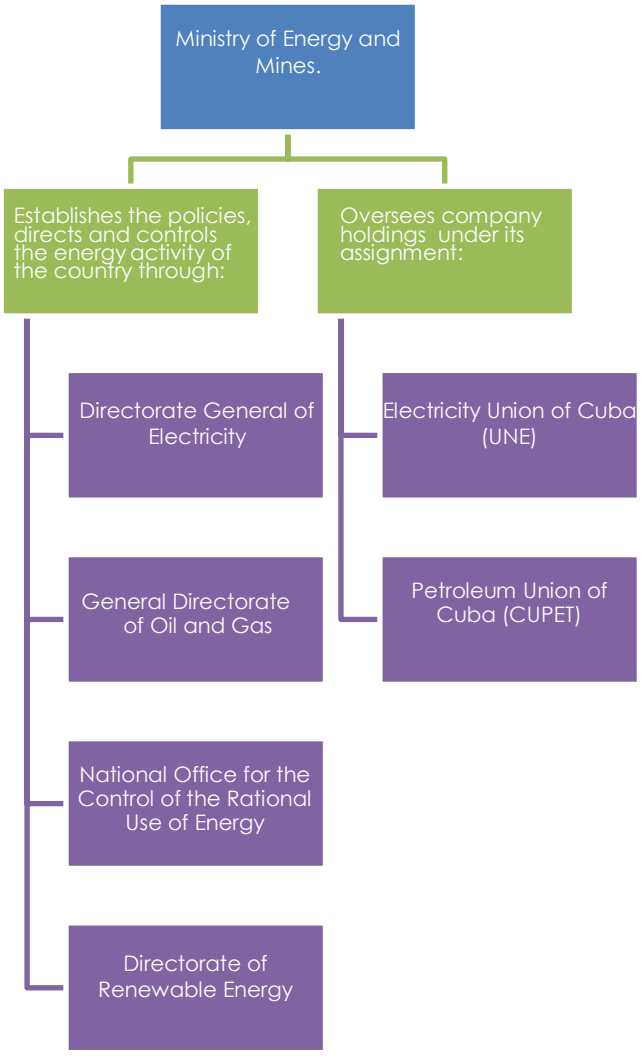


Figure 2: Ministry of Energy and Mines (Source: MINEM , http://www.cuba-sustainableenergyforum2017.eu, 2017)

3.2.3 Current supply of renewable energy

The current renewable energy supply in the Cuban energy system represents 4.65% of the total energy matrix and consists of 3,7% biomass, mainly from sugarcane bagasse, 0,5% hydropower, 0,2% solar photovoltaic and 0,1% wind energy.

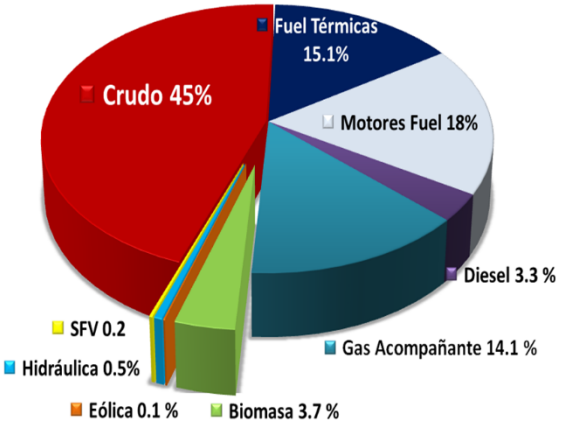


Figure 3: Current renewable energy supply in the total Cuban energy matrix (Source: UNE/MINEM, 2017)

3.2.4 New renewable energy projects portfolio

Renewable energy investment opportunities include new installations for[6]:
- Power from agroindustrial waste such as sugar cane, forestry and scrub (Marabú) biomass
- Solar photovoltaic energy
- Wind energy
- Small hydro energy
- Biogas energy

The government's sustainable energy programs target investments in both renewable energy and energy efficiency[7]:

New renewable energy power capacities. Investments opportunities include:
- 755 MW from 19 bioenergy plants fueled by sugar-cane residue
- 633 MW from 13 wind parks
- 700 MW from photovoltaic parks
- 56 MW from 74 small hydropower plants

Additionally, there are opportunities for investments in other renewable energy sources for example in biogas, forestry biomass and agroindustrial residues and municipal solid waste.

Investments in energy efficiency. Investments will be needed to increase energy efficiency in generation, transmission and distribution of power as well as to improve energy efficiency of power consumption. Investment opportunities include:
- Replacement of old and low efficient (CHP) power plants with new and high efficient power generation facilities
- Introducing mass roll-out of high efficient lighting devices (LED), induction stoves and solar water heaters.

To achieve the renewable energy target of 24% alone, it is estimated that over €3 billion EUR in capital investments are needed. Cuba is aiming to attract foreign investments to achieve its renewable energy targets[8].

Note: Please refer also to the Cuba Portfolio of Opportunities for Foreign Investment 2016-2017.

[6] Cuba portfolio of opportunities for foreign investment 2016-2017

[7] *Information note on sustainable energy*, MINEM 2017; http://www.cuba-sustainableenergyforum2017.eu, 2017

[8] *Information note on sustainable energy*, MINEM 2017; http://www.cuba-sustainableenergyforum2017.eu, 2017

4. Renewable energy services supply opportunities from the Netherlands

4.1 Relevant renewable energy capabilities present in the Netherlands

This section first presents relevant renewable energy (related) capabilities available from the Kingdom of the Netherlands in general. Then, the most applicable opportunities in specific sectors, energy sources and knowledge areas are summarized from the desk research and visit findings.

Available expertise and technologies within the Kingdom of the Netherlands:
Energy expertise within the Kingdom of the Netherlands is found in a diverse array of areas of expertise and technologies:

- Wind industry
- Waste management
- Solar industry
- Biomass
- Hydro power
- Energy efficiency
- Smart energy systems
- Geothermal energy
- Aerothermal heat
- Deep-sea cooling
- Electric transport

These areas of expertise, available from companies and institutions, apply to the domains of:
- Policy management
- Knowledge development (R&D – fundamental and applied)
- Infrastructure management
- Economic structuring
- Hardware & integrated solutions

Figure 4: Relevant energy areas of expertise and technologies in the Netherlands (Source: GMSP BV 2016)

The following table provides a further specification of the areas of expertise in each one of the energy sources and technologies implemented and readily available from an array of companies and institutions within the Kingdom of the Netherlands.

Energy source / technology	Area of expertise
Wind energy	On shore
	Off shore
Solar energy	Photovoltaic
	Thermal
Waste management	Solid & liquid waste-to-energy
	(see also biomass)
Biomass	Municipal waste incineration
	Biogas from waste and agriculture
	Co-firing of solid biomass
	Residential use of biomass
	Liquid biofuels for transport
Hydropower	Energy from flowing water
Geothermal energy	<500m Heat & cold storage
	>500 Heat within the earth
Aerothermal heat	Outdoor air heat pump
Ocean energy	Tidal
	Deep-sea Water Air Conditioning (SWAC)
	Ocean Thermal Energy Conversion (OTEC)
Energy efficiency	Industrial residual heat and by products recuperation
	Built environment: offices
	Built environment: residential
Smart energy systems	Smart grid services (data handling, planning tools, other)
Electric transport	Electric vehicles infrastructure - Charging - Energy storage - Smart grids

Table 1: Areas of expertise from companies and institutions in the Kingdom of the Netherlands (*Source: GMSP BV 2016*)

4.2 Opportunities for companies (and institutions) from the Netherlands

Supply opportunities are most promising in the areas of renewable energy domains of biomass and solar.

This holds especially true given the relevant knowledge and implementation experiences gained in the past years in the Kingdom of the Netherlands and readily available for export in the region in the form of (integrated) consultancy, services and equipment provision. The type of services can range from technology specific issues and grid integration experiences, general energy project advice, awareness creation campaigns, to sustainable energy policy making and implementation.

In the following paragraphs the main opportunities will be presented, from a technology-, knowledge- and engineering perspective, mapping them against the previously mentioned areas of expertise. Given the specific (enabling) nature of policy making for the adoption and deployment of renewable energy, the opportunities in this area are presented separately.

4.2.1 Opportunities from a technology perspective

Proven technologies

- Biomass use in CHP installations, biogas production from biomass, biofuel production
- Other biomass: Waste-to-energy: Municipal solid waste treatment (solid & liquid)
- Solar: PV and thermal (residential, businesses, industrial)
- Hybrid systems
- Energy efficiency (industrial, office space, residential)
- Electric transport: Charging and energy storage infrastructure

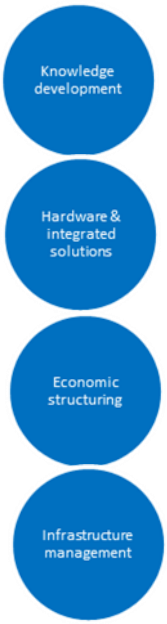
4.2.2 Opportunities from a knowledge transfer and engineering perspective

Knowledge institutions (R&D)

- Capacity building in and assignments on biomass, solar, (smart) energy systems, energy efficiency, infrastructure development, (downstream) processing
- Support with methods and tooling / hardware for laboratories and testing facilities in the fields of (smart) energy systems, waste and biomass processing (incineration, biogas production from waste, green chemicals)
- For geothermal development specific knowledge is available in the areas of resource mapping, resource assessment, geothermal information systems, reservoir studies, and geo-mechanics.

Other engineering/consultancy firms

- Operations & maintenance services in all domains.
- Waste management (adequate waste handling, separation, landfilling, recycling)
- Solar (PV and thermal)
- Energy efficiency (industrial residual heat and by products recuperation, buildings and residential)
- (Smart) energy systems
- (Economic) project structuring, Technical Assistance (TA) program for developing economic structuring/risk analysis (credit assessment) capabilities relating to renewable energy projects
- Sustainability certification



4.2.3 Opportunities from a policy review support perspective

In case the Cuban government would be interested in government to government co-operation, the following opportunities could be taken advantage of:

- Technical Assistance (TA) for institutional capacity building
- Policy development/writing and anchoring within the national governmental agencies
- Policy implementation support in all areas of renewable energy development
- Governmental Technical Assistance (TA) program for developing economic structuring/ risk analysis (credit assessment) capabilities relating to sustainable energy initiatives

4.3 Specific opportunities gathered at the Cuba Sustainable Energy Forum

The main takeaway from the forum is that the participation of **bio-energy** (with 755MW planned at 19 sugar mills), mainly co-generation from **sugarcane bagasse** is key for the Cuban government towards a sustainable increase to 24% of renewable energy sources in the national energy matrix. Alongside biomass from sugarcane bagasse, there is interest in utilizing the residual biomass streams from **other crops** as well as the **Marabú** plant. With the need to increase the use of biomass as sustainable energy source, there are opportunities for providers of services and equipment in the whole chain of sustainable biomass, i.e. the production, transformation, logistics and use (combustion/conversion technology). Investments need to come from **foreign investment**, subsidies or other international (cooperation) funds.

Alongside the importance of solid biomass utilization as renewable fuel[9] for co-generation, there is a role for **biogas production** from other residual streams, such as (**poultry, pig and cow) manure** and **waste water**. The use of biogas is currently being considered interesting for both **electricity** generation, for the (rural) **transport** sector and domestic **cooking**. Besides the energy application of biogas, the **digestate** resulting from the anaerobic digestion process to obtain it is also welcomed as a **bio-fertilizer**. The Dutch capabilities in the sector of biogas (production, use and upgrading) services and equipment seem to be relevant in the current Cuban context. Two specific entities which asked specifically for following up on Dutch capabilities in biogas infrastructure development were UCLV - Universidad Central Marta Abreu de las Villas) and Estación Experimental Indio Hatuey.

Similarly, there seems to be a need and applicability of waste treatment, more specifically **waste-to-energy** services and technology, which is a sector in which the Dutch excel. Waste to energy could become another interesting baseload source for the national energy system.

[9] Biofuels from Jatropha are mentioned on several occasions, however the available information does not indicate a specific opportunity

Although **Wind** energy is considered of great interest in the Cuban energy context and a significant portfolio of projects is made available by the Cuban government, our observation is that there are no real opportunities for Dutch wind energy technology providers. There is **local production capacity** in Cuba, however there is also a need for **foreign investment** for the further deployment of the wind power infrastructure. Wind farm projects are authorized to have a100% foreign ownership, which forms an exception. The plan is to expand the existing experimental wind turbines (alongside the **existing small wind mills** used mainly in agriculture) in order to tap into the potentially 1100 MW of wind power that could be achievable in Cuba using mostly 1.5MW wind turbines. MINEM indicates the need to **increase the wind power generation** capacity significantly (up to 150GWh per year) in the years to come.

Investments in **solar energy**, both **photovoltaic and thermal** are needed in order to achieve the growth in solar power generation that is possible with an average radiation of 5KWh/m^2 per day . Currently there is over 11MW PV capacity installed and over 10.000 sun boilers for thermal power. The plans include the **expansion of the PV** capacity with 400MWp electric and to increase the implementation using the maximum **local production capacity** for both PV panels and thermal tubes. Cooperation in solar and wind energy from the Netherlands seems therefore more viable in ancillary services (e.g. looking into issues such as testing / grid integration), given also the interest and presence of companies and governments of other countries in this segment in Cuba.

Although there is already **hydropower** implemented in the country, the growth and hence the opportunities for cooperation in this area seem **limited**. However, there is a plan for 74 small hydroelectric plants with over 56 MW using mostly national small hydroelectric turbines. The Cuban authorities foresee modernizing the existing production plant in partnerships with foreign partners.

Harvesting energy from the **ocean** is a concept known to the Cubans. There are 6 areas of deep waters around the island, which make **OTEC** (ocean thermal energy conversion) potential interesting for the Cuban government. This is an area in which the Dutch capabilities could be an interesting opportunity, taking into account the enormous potential coupled with the growth in **tourism** and hence in energy demand for **cooling** infrastructure.

Along the line of **innovation and R&D** driven interest in cooperation by the Cuban government and academia, there is interest from the UCLV - Universidad Central "Marta Abreu" de las Villas in **creating a 'National Renewable Energy Center'**. This idea would incorporating **R&D capabilities** and implementation of **renewable energy solutions and innovations** into the premises of the center itself, given the large population it hosts: 14.000 in total, with 5.000 living on campus. UCLV furthermore already has experience with international cooperation, which might be interesting from the perspective of (the capabilities in) accessing international financing for this plan.

The **Energy efficiency** policy addresses cross-cutting issues applying to electricity **generation**, **distribution** and final **use** in Cuban homes, institutions and industry. There are **several programs** in place in Cuba to promote and improve the energy efficiency by introducing more efficient equipment and technologies in the generation, distribution and use. **ONURE**, an entity attached to MINEM, regulates, provide training, promotes and carries out energy efficiency inspections. Opportunities in the field of energy efficiency can be found in conjunction with ONURE's activities. **Dutch services and equipment** for **energy audits**, **energy recovery**, energy **labelling** and **awareness** creation could well fit into the different energy efficiency programs of the Cuban government.

4.4 Potential suppliers of renewable energy products and services from NL

See Annex 2* – Selection of potential benefitting companies and organizations in the renewable energy sector in the Kingdoms of the Netherlands. * **Note: Separate document for RVO use only.**

5. Dutch Embassy support

Cuba's economic transformation undoubtedly creates an opportunity for companies and institutions from the Kingdom of the Netherlands. Specifically related to renewable energy business development, the embassy's economic diplomacy services are key for Dutch SME's entry to the Cuban market and for liaising with existing and new initiatives, nationally and internationally.

Since the main target market for Dutch SME's at this moment mainly consists of Cuban state entities and state controlled companies, reaching out to and engaging with governmental, renewable energy specific entities and knowledge institutions is important for business development and hence the Embassy's economic department's involvement key.

The Kingdom of the Netherlands has an array of economic diplomacy and business development instruments[10] at its disposal which might prove key for enhancing business opportunities, as well as facilitate knowledge (K2K) and governmental (G2G) cooperation aimed at paving the road towards economic and commercial cooperation development.

The Embassy, jointly with RVO, can also play an important role in actively identifying interesting tenders and calls for proposals from the Cuban government and/or international agencies active in Cuba by facilitating and endorsing the participation of companies and institutions from the Kingdom of the Netherlands.

[10] Business partner scan, Starters International Business, Partners for International Business, Demonstration Projects, Feasibility Studies & Investment Preparation Studies, Dutch Trade and Investment Fund

6. Conclusions and recommendations

6.1 Conclusions

1. The Cuban energy sector faces several critical issues: A high dependency on (imported) fossil fuels, the high cost of power supply to final consumers, an increase in its energy demand, low energy efficiency and high emissions of greenhouse gases.
2. The energy sector in Cuba has undergone large policy reforms. The 2014 policy regarding the development of renewable energy and energy efficiency in Cuba in order to produce 24% of electricity using renewable energy sources by 2030 while significantly increasing the efficiency in electricity generation, creates opportunities for investments in the renewable energy and energy efficiency sector.
3. The current renewable energy supply in the Cuban energy system represents 4.65% of the total energy matrix and consists of 3,7% biomass, mainly from sugarcane bagasse, 0,5% hydropower, 0,2% solar photovoltaic and 0,1% wind energy.
4. Several governmental entities are involved in the development and implementation of renewable energy sources in Cuba.
5. The development of renewable energy projects is initiated and by the Cuban government.
6. The projects portfolio is publicly available. However, interested project developers and foreign investors need an invitation by the Cuban government to participate in tenders.
7. Renewable energy investment opportunities include new installations for power from agroindustry waste such as sugar cane bagasse, forestry and scrub (Marabú) biomass, biogas, solar photovoltaic and thermal energy, wind energy and small hydro energy. The government's sustainable energy programs target investments in both renewable energy and energy efficiency.
8. Regarding the opportunities for suppliers of services and equipment from the Kingdom of the Netherlands in the renewable energy sector, those can be found in:
    a. Biomass installation construction, operations & maintenance
    b. Waste-to-energy installation construction, operations & maintenance
    c. Waste water treatment installation construction, operations & maintenance
    d. Solar PV installation construction, operations & maintenance
    e. Biogas upgrading for transport infrastructure installation construction, operations & maintenance
    f. Hybrid systems installation, construction, operations & maintenance
    g. Small hydropower installation construction, operations & maintenance.
    h. OTEC installation construction, operations & maintenance.
    i. Energy efficiency tooling, equipment, consulting and engineering services.
9. Relating to the Dutch energy sector familiarity and experience, the following areas of expertise are available from corporates and institutions:
    a. Policy management
    b. Knowledge development (R&D – fundamental and applied)
    c. Infrastructure management
    d. Economic structuring
    e. Hardware & integrated solutions
10. As to the availability of finance for project development, it is observed that project finance is scarce and depends ultimately on foreign investment, subsidies, international (cooperation) funds or support programs.

6.2 Recommendations

1. It is recommended to provide a broad support to companies and institutions from the Kingdom of the Netherlands in the development of renewable energy project initiatives in Cuba, given:
   a. The growth potential of renewable energy initiatives in Cuba.
   b. The abundance of renewable energy resources.
   c. The favorable fit of the renewable energy initiatives in Cuba and the potential supply capabilities from the Kingdom of the Netherlands.
   d. The complexity of navigating as foreign (commercial) entity in a state controlled renewable energy sector.
2. The Embassy's economic department's involvement when reaching out to and engaging with Cuban governmental entities and knowledge institutions is key for business development by Dutch companies and institutions.
3. To enhance business opportunities, as well as facilitate knowledge (K2K) and governmental (G2G) cooperation aimed at paving the road towards economic and commercial cooperation development, make use of the development instruments available to the Embassy (via RVO and the Ministry of Foreign Affairs) such as the Business partner scan, Starters International Business, Partners for International Business, Demonstration Projects, Feasibility Studies & Investment Preparation Studies, Dutch Trade and Investment Fund.
4. Integrate innovation into the Dutch-Cuban cooperation.
5. The Embassy, jointly with RVO, should be empowered to actively (help) identify interesting tenders and calls for proposals from the Cuban government and/or international agencies active in Cuba, to facilitate and endorse the participation of companies and institutions from the Kingdom of the Netherlands in those tenders and calls for proposals.
6. Create an in depth inventory of the 'Dutch experiences and capabilities' in sustainable / renewable energy and energy efficiency, preferably in the form of a 'map' in order for the Cuban clients / stakeholders to understand quickly the Dutch solutions portfolio.
7. W.r.t. the approach to government institutions it is recommended not to 'come with the solution', but to seek the government's involvement. Governmental organizations often need knowledge support, sometimes just due to the limited number of staff at relevant state departments, so providing technical support, e.g. in the preparation of terms of reference for [RE] projects might enhance the opportunities for Dutch providers of technology and services.

Annexes

Annex 1 List of contact details of selected key organizations in Cuba.

List of contact details of selected key organizations in the renewable energy sector in Cuba.

MINEM
Overall contact person:
Mr Rosell Guerra,
Director of Renewable Energy, Ministry of Energy and Mines
E-mail: rosell@oc.minem.cu
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- The engineering company INEL of the Unión Eléctrica
- Grupo Empresarial de la Industria Sideromecánica companies of the Ministry of Agriculture and the Ministry of the Foods Industry

BIOGAS
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Annex 2* List of potential matching companies and organizations in NL

Selection of potential benefitting companies and organizations in the renewable energy sector in the Kingdoms of the Netherlands. * **Note: Separate document for RVO use only**.

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