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# Inception Workshop Report

A Strategic Framework for the  
Production of Biofuels in Suriname

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# 1 Introduction

The Surinamese energy sector faces many challenges; a few examples are the dependence on fossil fuels for power generation and the use thereof in the transport sector and the difficulties in providing affordable and reliable electricity access and supply to its inhabitants. Moreover, if the emphasis is on electricity supply, issues affecting it, just to mention a few are, poorly defined roles and responsibilities of various stakeholders, an ineffective and inefficient decision-making process, the lack of focus on production excellence and consumer-side efficiency, et cetera.

On the one hand, climate change concerns, considerations regarding energy supply security and sustainability, the reliance on oil of various sectors of the economy combined with its high price volatility provides an impetus to transition from a centralized energy system using primarily fossil fuels as energy source to one which is an interconnected and decentralized network with a diversified energy source mix. Yet, on the other hand, due to the recent addition of 160 MWe electric power generation via thermal power plants, the energy source mix has shifted into one whereby the share of renewable energy in the form of hydro energy, for example, has changed from 25 % in 2012 to about 13 % in 2015, thereby becoming more dependent on one specific fuel source. The fortuitous situation is that during this year, the crude oil price has steadily and significantly declined and most probably it shall remain low for the coming years, however, as history has shown, further price increases will eventually occur. The abovementioned illustrates that there is a driving force towards the inclusion of renewable energy sources and systems, like solar thermal, photovoltaic, wind, hydro, and biomass-derived power systems, into the local energy mix. Herein, biofuels are put into focus accounting for the fact that there are three differentiating discourses: “(a) The environmental policy discourse considers bioenergy, and thus biofuels, as a contribution to climate protection, but it also increasingly serves as a platform for skeptical voices criticizing the actual carbon footprint of biofuels and their impact on food production and nature conservation. (b) A second discourse focuses on the argumentation figure of energy security and regards biofuels as an alternative to the importation of oil. (c) Finally, a discourse focusing on rural development is identified, which emphasizes opportunities for growth and development that biofuels can create in the agricultural sector and in rural areas more general (WBGU, Future Bioenergy and Sustainable Land Use, Earthscan, London (2009): 21–23)” [K. Selbmann, T. Ide, Energy for Sustainable Development, Vol. 29, 2015, pp. 118–126].

Due to the abundant availability of land — albeit that land reform is necessary as well as a change in the land-use patterns shall occur depending on government policy regarding the agricultural and power sector — of water and labor, Suriname has the theoretical potential for a commercial biofuels industry. Examples include the cultivation of specific energy crops, like sweet sorghum, cassava or tropical sugar beets, or the possibility to produce lignocellulosic bioethanol using crop residues such as rice straw and rice husk without

competing with the supply of food or animal feed. Biofuels can be used in the electricity and transport sector.

Given the three differentiating discourses and the local context, a strategic framework with goals and a combination of short-to-medium-term, as well as long-term strategies, is needed to support the development of the (commercial) biofuel sector. The framework aims to identify the current strengths, weaknesses and general and specific challenges, and subsequently used those as a point of departure to identify opportunities and what needs to be in place, such that the full potential and benefits of developing biofuels in Suriname are realized. The framework is to be an element of a national program on renewable energy and part of a national energy policy. Information which is necessary for this task is gathered through, among other things, a workshop of stakeholders. The workshop objectives are twofold, namely i) to bring together stakeholders and ii) to give stakeholders active participation/voice in:

- ❖ Identifying what is needed to support policymakers to guide investments in and production of biofuels,
- ❖ Developing a local strategy for the sustainable production of biofuels,
- ❖ Getting input regarding the baseline situation, i.e., an assessment on what is going on in the field, like:
  - What is the government's vision concerning biofuels?
  - What are the relevant features which are beneficial to or which rather hamper biofuel production in Suriname?
  - What is needed to create an equal level of participation and involvement of stakeholders?

## 2 Minutes of the inception workshop

### 2.1 Opening Speech by the Ministry of Natural Resources

Mr. Dave Abeleven opens the workshop by stating that the general policy of the Ministry of Natural Resources focuses on a sustainable and responsible management of our natural resources, which should be at the service of our economic and social development. In this context the environment plays an important role and therefore policy must be developed from an environmental perspective. Roughly speaking, the Ministry of Natural Resources is engaged in three policy areas, namely i) energy, ii) water, and iii) minerals. The energy policy deals with the following aspects, i) energy access for all, ii) energy efficiency, and iii) renewable energy resources. With these aspects the Ministry of Natural Resources wishes to give substance to the 7th SDG of the UN.

Mr. Abeleven continues by saying that in the near future the Ministry of Natural resources will focus on the following:

- a) Set up a clear framework, strategy and policy with respect to renewable energy;
- b) Develop the necessary legislation to ensure clear guidelines and regulations;
- c) The establishment of an energy authority, which will primarily fulfill the function of a watchdog;
- d) Phased liberalization of the energy production sector with an emphasis on renewable energy;
- e) Restructuration of the current public energy company;
- f) Identification of an optimal energy mix per region in Suriname, consisting of thermal, bio, wind and solar energy;
- g) Interconnection of all stand-alone electricity networks in the coastal area from east to west;
- h) The development of a policy aimed at improving energy efficiency and reduction of energy consumption, e.g., with the use of LED technology for lightning;
- i) A clear cost recovery policy with respect to energy.

Mr. Abeleven also mentions that two draft laws regarding energy have been submitted to the Parliament for treatment, i.e., i) the Electricity Law 2016, and ii) the law on the energy authority. There is a commitment made that these draft laws will be discussed in the first quarter of 2016. Moreover, several other laws, e.g., a law regarding renewable energy and electrification in the inland, will be developed. The Ministry of Natural Resources will, with respect to renewable energy and special focus on biofuels, address the following aspects:

- a) An optimal Public-Private Partnership (PPP), when it comes to renewable energy;
- b) Develop a triangular relationship between educational institutes, the Ministry of Natural Resources and organizations such as the IDB, UNDP and CI, that has benefits for all parties, e.g., development of knowledge, and research for study purposes and policymaking at the Ministry;

- c) The formulation of a clear and strategic framework in which policies, standards and regulations are taken account of;
- d) Identification of the risks, advantages and disadvantages of biofuels by means of extensive research in this area;
- e) Analysis and implementation of business models for biofuels; market development, investment climate, etc.
- f) Identification of tools and mechanisms for operationalization of biofuels enterprises.

Furthermore, Mr. Abeleven points out that in the past many studies have been conducted, but there is almost never any implementation, which is regrettable; the Ministry of Natural Resources will now take genuine action in this respect. He concludes his speech by congratulating Suriname, and particularly the Faculty of Technological Sciences, of which dr. Ryan Nannan is the dean, with the accreditation of the Masters Programs in PG, SMNR, MG, and the start of the Masters program in Renewable Energy Technology in January at the IGSR.

## 2.2 Introduction Speech

The presentation was aimed at providing succinct information to the participants and it treated the following enumerated items in the order listed herein below and:

1. Introduction to the project
2. Purpose of the framework
3. Objectives of the inception workshop
4. The team
5. Participating stakeholders
6. Agenda and work plan
7. Workshop-specific instructions

Suriname has many favorable conditions for the production of biofuels. Examples of such conditions include the abundant availability of land, water and (qualified) labor. Yet, i) the limited information concerning suitable crops, specifically regarding data under local conditions (e.g., data regarding crop yields, information on the potential negative environmental and socio-economic impacts, matters related to land-use patterns), ii) the lack of an overarching energy strategy and policy which is a key driver for the biofuels industry, iii) the lack of clarity of roles and responsibilities of various stakeholders, and iv) the unavailability of data and of an assessment of risks and benefits for investments in biofuels and the production thereof on a commercial scale, , are disadvantageous conditions for (commercial) biofuels production.

It is therefore relevant to develop a biofuel framework with the purpose to consider issues, challenges, and opportunities (and what needs to be in place to capitalize on these) to realize

the full potential and benefits of developing biomass systems and/or technologies in Suriname. This framework is part of a renewable energy policy which is in itself is part of an overarching energy policy for Suriname. Information which is necessary for this task is gathered through, among other things, a workshop of stakeholders. The workshop objectives are twofold, namely i) to bring together stakeholders and ii) to give stakeholders active participation/voice in:

- ❖ Identifying what is needed to support policymakers to guide investments in and production of biofuels,
- ❖ Developing a local strategy for the sustainable production of biofuels,
- ❖ Providing input regarding the baseline situation, i.e., an assessment on what is going on in the field, such as:
  - What is the government's vision concerning biofuels?
  - What are the relevant features which are beneficial to or hamper biofuel production in Suriname?
  - What is needed to create an equal level of participation and involvement of stakeholders?

Furthermore, during the presentation, dr. Nannan gives a short resume of the consultancy team making the case of their involvement in this project to the participants. Also an overview of the participating stakeholders is displayed, and the agenda for the day, the work plan for the duration of the project and workshop-specific instructions are presented. This is followed by a summarizing list of keypoints that shall be the focus of discussion among group members. The grouping of members has been done a priori to get a balanced input of various stakeholders and entities in one group. This session is closed by a short Q&A session.

### 2.3 Presentation on Energy Security

“Energy” is the cornerstone of modern civilization; it lies at the basis of our homes, mobility, jobs, public services, etc. Abundant and affordable energy (services) therefore lie at the heart of proper functioning of the economy and providing the ability for upward social-economic mobility of people. Furthermore, since it constitutes one of the components of the input for the delivery of products and services, having affordable access to sufficient energy resources plays to the competitive strength of those services and products an economy brings forth.

In other words, the disturbance in the delivery of affordable and abundant energy services provides a serious threat to society. To this end, the concept of energy security has arisen, which constitutes:

- Energy availability: the ability to access energy (services);

- Energy affordability: the energy services need to be within payable reach of the customer, while still providing sufficient returns for energy generating / transforming, and transporting / transmitting and distributing entities to remain in financially sound shape while remaining competitive;
- Energy reliability: the frequency and magnitude of disturbances in the quantity and quality energy services (e.g. electricity voltage fluctuations, interrupted gasoline supply).

Lately, two concepts have been added to “energy security”:

- Social acceptability: to what extent do people that are stakeholder in the production and delivery of the energy service accept their exposure;
- Sustainability: the degree to which the provision of energy services has (long term) effects and humans and the environment.

In many countries, energy strategy and energy policy has been biased towards energy availability; if there is insufficient access to energy, you want to address that first because of its importance to the functioning of societies before turning to the other components of energy security. Suriname is no exception to this. However, the last decades an increasing amount of evidence has surfaced which points to the unpredictability with respect to the direction in which the climate is traversing because of global warming and pollution. This also rings true for Suriname (see region-specific reports by IPCC and OAS); it is difficult to ascertain whether in time the country will experience (on average) more or less precipitation, how temperatures profiles will alter, how wind patterns will evolve, when the so-called climate change “tipping point” will actually occur, etc. etc.

This uncertainty implies that the impact of climate change on the energy infrastructure can’t be estimated, both qualitatively and quantitatively, which in turn essentially means that energy reliability can’t be guaranteed. For instance, a change in temperature patterns can affect biocrop yield, increasing frequency of extreme weather events will increasingly deteriorate the energy infrastructure, prolonged droughts will impact hydropower potential, etc. etc.

Worldwide, there is an increasing awareness that a transition needs to be made from the existing energy system (confined within a particular design and business model paradigm) to an energy system which is able to safeguard energy reliability through the deployment of the following concepts within its architecture:

- Decentralization: energy producing / transforming units needs to be geographically dispersed in order to spread risk;
- Portfolio: energy needs to be fed within the transportation / transmission system from the widest set of different energy sources possible, in order to spread risk with respect to the nullification of a particular energy technology rendered by climate change;



- Energy efficiency and conservation: respectively providing the same service using less energy inputs and annihilating services altogether;
- Production excellence: lean manufacturing preventing waste through cash bleeding by ensuring an optimum procurement, engineering, operations, maintenance process;
- Real-time data exchange: producers and consumers exchange real-time data to create information which is used to improve (some of) the components of energy security.

The research, development, demonstration, and deployment of biofuels within the Surinamese context adds to the energy portfolio and has the potential to decentralize production / transformation. However, though the energy system is seen as a technical system because of its infrastructure, it is rather so-called socio-technically in nature, a nexus that encompasses the fields of technology, behavior, legislation, business models, etc. If biofuels need to be part of the energy system, it is therefore elementary that it is viewed as a socio-technical addition that therefore requires attention on the earlier mentioned fields.

The inception workshop is therefore paramount for providing (potential) stakeholders in the (bio-) energy sector the opportunity to offer their input in each of these different fields encompassed by the system in order to support the market-scale commercialization of biofuels in Suriname, while safeguarding or even improving mid- and long-term energy security.

## 2.4 Presentation on Utilization Technologies and Valorization

The aim of this presentation is to provide the participants with basic knowledge concerning biomass and biofuels in general and with information concerning key technologies for biomass conversion and or direct utilization. The presentation starts by giving a short overview of the primary energy conversion in the world and focuses briefly on the role played by fossil fuels in energy supply, the distortion in energy consumption in developed and underdeveloped nations and CO<sub>2</sub> emissions, given the fact that biomass (and biofuels) are considered as nearly CO<sub>2</sub>-neutral fuels. The summary displays that the USA accounts for about 20 % of the world's total primary energy consumption and that the developed, so-called OECD countries, and the so-called BRICS nations (Brasil, Russia, India, China and South Africa) account for close to 80 % of the total primary energy consumption. Furthermore, the presented pie charts show that China is the largest single producer of CO<sub>2</sub> chiefly because of the use of bituminous coal (and other fossil fuel sources like oil and natural gas).

Then, relevant definitions are presented, namely that biomass is material of organic origin be it living or dead, whereby the distinction between what can be classified as biomass and what as fossil fuels starts with peat, which is not considered as biomass. What is more is that biofuels are fuels derived from biomass. Relevant examples are also given. Moreover, it is

presented that biomass, at this moment, provides 10 % of the primary energy supply and in underdeveloped nations it is mainly used for providing thermal energy for cooking or space heating, e.g., through burning of wood. The relevancy of biomass in electric power generation is also illustrated whereby in 2012, 1.5 % of the electricity generation came from biomass and it is forecasted to increase its share in power generation by 10 fold by 2050 to 3000 TWh.

Biomass has various definitions concerning its potential as a fuel, and this can be classified according to:

- “the total or theoretical potential, which describes the total accumulated biomass
- quantity,
- the technical potential, which is the quantity that could actually be used, and
- the economic potential, which indicates the yield that can today, or within several years, economically compete with other fuels (i.e., fossil fuels).” [H. Spliethoff, “Power generation from solid fuels”, Springer-Verlag, Berlin, 2010, e-ISBN 978-3-642-02856-4].

Biomass can be used as fuel for heat and power generation (utilization technologies were listed, e.g., organic Rankine cycle engines, gas turbines and gas engines, etc.) or, when converted to a liquid fuel, e.g., to fuel ethanol, it can be used in the transport sector. In the case of bioethanol it can be employed as either a fuel octane number enhancer or as a substitute of gasoline, be it that the engine must undergo modifications. Biomass can also be characterized in various ways, and illustrations hereof are given for Surinamese rice husk whereby proximate and ultimate data are presented as well as results on its ash analysis. Information was also provided, unfortunately in a very succinct manner on the thermal characterization of biomass, specifically Surinamese rice husk.

The presentation also provided an overview of biomass conversion pathways, as illustrated in Figure 1.

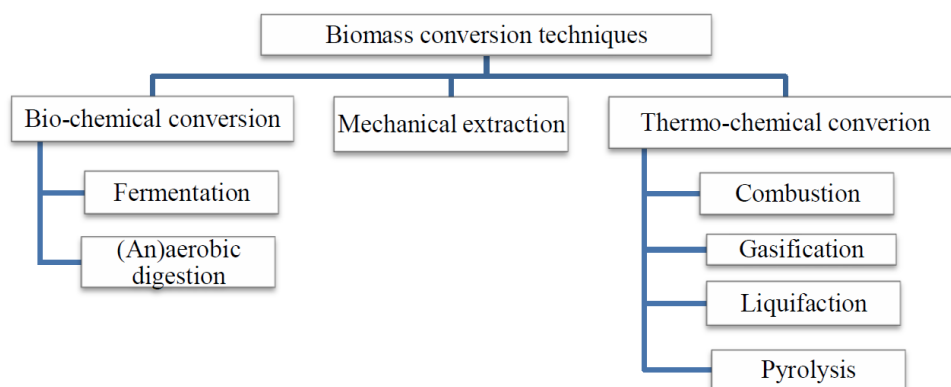


Figure 1. Biomass conversion pathways with the aim of extracting a fuel in gas or liquid form.

Details and selected examples were provided concerning the thermochemical route, e.g., combustion, gasification and pyrolysis, as well as the biochemical route, e.g., through digestion and fermentation, whereby the example of cellulosic bioethanol was given.

Biomass must often undergo pretreatment prior to a conversion pathway and for this reason, given its potential of value adding in the local context, torrefaction of biomass was discussed, since experiments in this regard have been conducted on Surinamese rice husk. Finally, the presentation discusses in short valorization and items hampering this crucial step.

## 2.5 Workshop Findings on Specific Study Keypoints

### 2.5.1 Introduction

The information provided in the group sessions should provide (after plenary Q&A session) input for the final deliverable, i.e., the biofuel framework, which touches upon all the keypoints and thus presents itself as a roadmap which is firmly rooted in the local context and which is supported by the majority of the stakeholders. The following content of this section is a succinct description of the presentations during the plenary Q&A session.

### 2.5.2 Study Keypoint 1: The role of the Government and the Private Sector

Participants	Organization
Roy Kong Jong Foek	Suriname Green Energy N.V.
Nataly Plet	Nationale Coördinatie Milieubeleid (National Coordination Environmental Policy)
Janelle Caupain	Ministry of Natural Resources
Angelique MacIntosh	Ministry of Natural Resources
Ursila Amatsahla	Ministry of Natural Resources

#### Workshop Questions:

1. What role should the government have in order to invigorate the commercialization of biofuels via private investors?
2. What elements does this role comprise of, and how are they defined?
3. What are the sequential steps which the government should take in order to get this role?

#### Workshop Findings:

The primary task the government has is to create an enabling environment in which procedures are clearly described, and investing has been made attractive, e.g., through:

- Tax incentives for starting energy companies, e.g., initial tax exemption;
- Remission of import duties regarding start-up equipment;

- Initiation of an energy authority;
- Accelerated approval of legislation;
- Expedited visa procedures, and altered regulations concerning residence and work permits for non-experts. Currently the said permits do not grant adequate and competitive possibilities (e.g., short-stay initial visa and work permission) in comparison with regional countries;
- Stable currency rate;
- Provision of self-obtained data concerning the availability of biomass. The goal hereof is to obtain a clear perspective of the availability of biomass; data has to be made readily available for potential investors. Keeping this in mind, legislation has to be in place regarding the integrity, handling and distribution, and publication of this data.

### 2.5.3 Study Keypoint 2: Gap Analysis of Policies, Standards and Regulations

Participants	Organization
Bipat, Armand	N.V. EBS
Donk, Peter	N.V. EBS
Khoen Khoen , Anuradha	UNDP
Bipat, Soenita	Ministry of Agriculture, Animal Husbandry and Fisheries
Deel, Henk	Ministry of Regional Development

#### Workshop Questions:

1. Make an inventory of which elements of the **POLICY, REGULATIONS, STANDARDS, INSTITUTIONAL SUPPORT, and NETWORKING** in Suriname, when it comes to biofuels, i) **lack**, ii) **hinder commercialization**, iii) **must change**, iv) **should be developed and implemented**.

Also indicate, i) how the energy supply security can be quantified, and, ii) the role of biofuels in the said quantification.

2. Which parts of the government, including the semi-public institutions, must be involved specifically?

#### Workshop Findings:

- ❖ Regarding **POLICY**, when it comes to biofuels the following
  - **Lacks:** i) A clear roadmap and targets (e.g., in 2025 10% of the energy production should come from renewable energy sources), ii) a central coordinating authority in the area of biofuels, iii) a public awareness plan, iv) business incentives (e.g., tax discounts, duty-free imports), v) climate standards and emissions requirements (this, for example, is something that should be developed by NIMOS).

- **Hinder commercialization:** i) Low energy tariffs (these are now modified, which is positive in this regard), ii) entering into supply agreements with N.V. EBS/Government, iii) the lack of an energy policy/energy authority, iv) subsidies in the energy sector; the price offered to consumers may not be competitive.
- **Must change:** i) Good policies should be developed, ii) political opposition/unwillingness, iii) social acceptance; it is important that people are aware of the pros and cons of biofuels, since they are the biggest stakeholders.
- **Should be developed and implemented:** i) A renewable energy strategy developed by a regulator which can be the government (or a separate entity), supported by laws; the latter is important since it gives a certain amount of security to investors, ii) enforcement of existing laws.

There is a comment made by Danny Lachman during the plenary Q&A: “The regulator should not develop strategies, but is only responsible for the execution thereof.”

❖ Regarding **REGULATIONS**, when it comes to biofuels the following

- **Lacks:** There are no regulations in force.
- **Hinder commercialization:** There is no policy on energy mix, energy diversification and decentralization of energy production.
- **Must change:** Assuming there are laws and policies regarding energy in general, these should be modified/adapted/supplemented to also account for biofuels (and therefore renewables). Even in the draft “Energy/Electricity Law” the latter is not comprehensively addressed.
- **Should be developed and implemented:** See the above. It is important that all stakeholders are involved when developing regulations.

❖ Regarding **STANDARDS**, when it comes to biofuels the following

- **Lacks:** Normally IFC standards are used in the absence of other ones. However, it is better to apply the standards which are streamlined to the Surinamese context. These should be developed, for example, by NIMOS.
- **Hinder commercialization:** N.A.
- **Must change:** Instead of using solely international standards, Suriname should develop its own standards.
- **Should be developed and implemented:** See the above. Particularly in the transport sector there are still many standards that are lacking and therefore should be developed. NIMOS is responsible for this.

- ❖ Regarding **INSTITUTIONAL SUPPORT**, when it comes to biofuels the following
  - **Lacks:** Human capacity; there is not enough workforce and knowledge available in Suriname.
  - **Hinder commercialization:** The availability of data to assess the feasibility of a biofuels production plant in Suriname is very little, i.e., a lack of feasibility indicators.
  - **Must change:** i) There are people in Suriname with a degree in Science/Engineering which do have the knowledge in the field of biofuels, however these people are often not consulted or not deployed at key positions where their contribution is needed. Instead, these positions are filled in by politicians or political appointees, ii) data sharing; data is not always readily available to the public.
  - **Should be developed and implemented:** i) Studies should be conducted at higher levels, and, ii) relevant stakeholders should mobilize people to participate in research.
- ❖ Regarding **NETWORKING**, when it comes to biofuels the following
  - **Lacks:** A central coordinating authority in the area of biofuels that brings stakeholders together.
  - **Hinder commercialization:** N.A.
  - **Must change:** It is important that there is political willingness, otherwise development in this area will never be taken into consideration in the National Assembly, let alone be realized.
  - **Should be developed and implemented:** At all times relevant stakeholders should be involved.

With reference to the second part of the first question it may be concluded that a measure for energy security is the extent to which energy mix, energy diversification and decentralization of energy production is present in a country. Biofuels can contribute to the energy security in Suriname by considering that there is enough potential (biomass, land, etc.) present in this regard and that there are advantages related to their use with respect to fossil fuels (which are of course not only applicable to Suriname). For example:

- Conversion of rice husk in Nickerie for electricity production. The electric power that could be generated using rice husk in Nickerie is estimated to be 5.5 MW.
- In Brokopondo there is a large presence of wood waste as a result of the forestry activities there. It is a fact that a large part of the trees (about 60% of their biomass) is not suitable for the export or processing, and consequently waste products are left behind. These “waste” products however have a great potential to produce energy. The regulations should account for these aspects and should oblige the collection and use of wood waste.

- Compared to conventional fuels, biofuels have many advantages in terms of the impact on the environment and public health.
- An opportunity is created for the rehabilitation of mined-out areas, from which useful products (biofuels) can be derived.

Of course, before proceeding to the production of biofuels it is a must to quantify the potential of biofuels that is present in Suriname (resource mapping; energy crops, waste products, etc.).

With respect to the second question; governmental and semi-public institutions, which should be involved regarding biofuel production are:

- Ministry of Natural Resources
- Office of the President
- Staatsolie Maatschappij Suriname N.V.
- SPCS
- Anton de Kom University of Suriname
- CELOS
- NIMOS
- Ministry of Agriculture, Animal Husbandry and Fisheries
- Ministry of Spatial Planning, Land and Forrest Management
- Ministry of Regional Development.

The current situation is that many policies are developed at the cabinet, hence its inclusion in the list above. However, this is not favorable and ideally it should not be like this at all. The Ministry of Natural Resources should be the policy maker in this regard since they are currently the energy authority in Suriname; the knowledge available at this Ministry is far more relevant than that available at the Office of the President.

Given the fact that there is a lot of confusion with respect to responsibilities, it is advisable that these must be distinctly defined and made clear to all stakeholders involved.

#### 2.5.4 Study Keypoint 3: Identifying Risks, Advantages and Disadvantages of Biofuels

<b>Participants</b>	<b>Organization</b>
O. Kasijo	Ministry of Agriculture, Animal Husbandry and Fisheries
H. Bhagwandin	Consultancy team
Q. Tjon-Akon	NIMOS
F. Hausil	WWF

### **Workshop Assignment:**

Identify the major risks and benefits of the operationalization and commercialization of bio-fuel, which are related to the Surinamese context, while explicitly taking into account the sustainability of these operations. The identified risks should encompass, but not be limited to, certain areas such as, the economy, trade, employment, biodiversity, agriculture, health, land and water utilization, and the impact on other sectors.

Complete this task while considering several scenarios of which the impact of relevant parameters on risks and advantages of biofuel, differ from each other.

### **Workshop Findings:**

- ❖ The identified risks and advantages of biofuel operationalization and commercialization on the **ECONOMY** are respectively:
  - Higher production price in comparison with regional competing countries, which may be induced by high investment costs and the fact that these countries are more experienced in the sector (e.g., Brazil), and the decreasing price of fossil fuels; biofuels may not be a competitive substitute price-wise (e.g., Wageningen ethanol project of STAATSOLIE).
  - Diversification of the economy and a possible contribution to the Gross Domestic Product (GDP).
- ❖ The identified risks and advantages of biofuel operationalization and commercialization on **TRADE** are respectively:
  - Trade of existing stocks of oil and vehicles, may be compromised. Fuel system conversion (fossil to bio-fuel, or blend) is a possibility, but will require investment. Furthermore, based on the current market, the competitiveness with import fuels is questionable.
  - Development of export markets, and the opportunity to provide for local need.
- ❖ The identified risks and advantages of biofuel operationalization and commercialization on **EMPLOYMENT** are respectively:
  - Lack of adequate know-how locally, which obligates external purchase hereof. That being said, there may also be a preference for large quantities of immigrant workers.
  - Development of local know-how, by means of knowledge exchange via e.g., training locally (on the job) and abroad.
  - Spin-off companies enable additional employment.
- ❖ The identified risks and advantages of biofuel operationalization and commercialization on **ENVIRONMENT, BIODIVERSITY, LAND AND WATER UTILIZATION** are respectively:



- i) Deforestation and possible change of ecosystems, ii) introduction of non-endemic occurrences, iii) the possibility of weak policy concerning irrigation of fuel crop grounds, and the use of fertilizer and pesticides. The adverse influences of climate change may have a significant effect on cultivation.
  - i) Mitigation of greenhouse gas emission, which may also imply, compliance with liabilities to environmental treaties and guidelines for reporting and monitoring of environmental phenomena, ii) acquisition of environmental data, which could also be of value for future projects and decisions, ii) optional method for the rehabilitation of mining affected areas, and deserted plantations.
- ❖ The identified risks and advantages of biofuel operationalization and commercialization on **AGRICULTURE** are respectively:
- The possible use of agricultural grounds for the cultivation of biofuel crops, which may contravene with the objective of making Suriname a major player in the food industry (agriculture). Large scale cultivation of the latter may cause exhaustion of fertile ground.
  - Crop diversification and the use of by-products in others sector e.g., processing hereof for food production of livestock.
- ❖ The identified risks and advantages of biofuel operationalization and commercialization on **HEALTH** are respectively:
- Impact on health as a result of biofuel-plant emission.  
Increased use of pesticides, which in combination with uncontrolled use could lead to health complications.
  - Less emission of air polluting substances, in comparison with fossil fuel utilization.  
By-products which have been processed to food for cattle or fish, may contribute to the provision of healthy food source.
- ❖ The impact of biofuel operationalization and commercialization on **OTHER SECTORS** are respectively:
- Small scale companies of which the profit relies on the import of fossil fuel, will be affected.
  - Research opportunities for several institutes such as the University of Suriname.
  - The rise of new industries, which are specialized in: the production of bioplastics, pulp processing and the production of cattle and fish food.

In conclusion, a proper study has to be conducted in order to obtain a clear pathway that will lead to the commencement of bio-fuel production in Suriname. The use of the expertise from regional biofuel producing countries should benefit to the realization hereof.

Furthermore, considering the current economic situation in Suriname, the initiation of such projects will face several financial difficulties. Nevertheless, the establishment of partnerships with relevant organizations and institutes could be a possible solution.

#### 2.5.5 Study Keypoint 4: Analysis of market trends, the investment climate and business models for biofuels

Participants	Organization
C. M. Chin	AdeKUS / FTeW
R. Premcharan	Ministry of Agriculture, Animal Husbandry and Fisheries
A.Yorks	Ministry of Natural Resources
R. Oemrawsingh	Ministry of Finance
G. Kromoredjo	Polytechnic College

#### Workshop Questions:

1. Give your analyses on market developments in the area of biofuel production, both locally and internationally. What trends do you predict? What assumptions do you make as a group?
2. Provide an analysis of the investment climate and the business models to be created for the development of a sustainable biofuel industry in Suriname.

#### Workshop Findings:

- ❖ The analysis on the **LOCAL** market developments in the area of biofuel production has led to the following outcomes:
  - There have already been some initiatives by N.V. Staatsolie regarding the production of ethanol. Apparently this project is (temporarily) shut down. It would be beneficial for Suriname if this project would be restarted, not necessarily by N.V. Staatsolie. However, an important aspect hereby is that the energy crops should not be cultivated on agricultural land that is intended for cultivating rice.
  - Recently a number of studies have been conducted in the field of energy production using rice husk. In these studies several biomass conversion technologies are proposed. Unfortunately, these studies and project proposals are not used to actually proceed to produce energy from rice husk or to (at least) valorize the product by for example torrefaction.
  - Currently some research is conducted by IICA on the cultivation of Miscanthus on mined out areas by Suralco at Moengo, which is definitely a positive development. It is however probably better to first produce crops

with soil-improving properties. These crops should, just like Miscanthus, produce a lot of biomass in order to be feasible for biofuel production.

Given these outcomes it is to be expected that in about 10 to 15 years the biofuel industry will be established in Suriname, assuming that by that time biofuels are cost-competitive versus fossil fuels.

- ❖ The analysis on the **INTERNATIONAL** market developments in the area of biofuel production has led to the following outcomes:
  - The Netherlands and Brazil are producing biofuels (biodiesel) from soybeans, whereas in the United States and Venezuela corn is the main feedstock to produce bioethanol.

Regarding the analysis of the investment climate for a biofuel industry in Suriname the following can be said:

- In order to be attractive for investors, the possibility to sell electricity produced from renewable energy sources to companies like the N.V. EBS should be present. At the moment this is not the case and consequently the laws and regulations that support said proposal must be developed. The same applies to consumers who produce their own electricity in excess and want to inject a certain amount thereof into the grid.
- Following on from the previous point, it can be concluded that the energy market should be liberalized in Suriname in the interest of creating more competitive markets and reductions in price by privatization.
- There are not enough incentives for starting a biofuel production plant in Suriname.

Business models that should be created for the development of a sustainable biofuel industry in Suriname are listed below. It is however important that legislation and policy in the field of renewable energy production must be developed prior to every proposed business model.

- Energy from rice husks: A production chain in which the following actors are respectively involved, i) rice farmers ii) rice processors; these produce rice husks as a waste product, iii) energy producers, iv) energy distributors, iv) consumers.
- The establishment of biofuel production company (based on a renewable energy law and/or energy efficiency law).
- Diversification of the biofuel industry; outlining a biofuel sector per energy crop. In addition to the previously mentioned use of rice husks, one may also

use sugarcane, corn, Miscanthus, or even the water plants that are regularly removed out of sewers, to produce energy.

- Monitoring system by the government through established institutes for the production of biofuels (monitoring of quantity, quality, safety and security).

With reference to the development of laws, it is, moreover, important that implementing decrees are determined as well. History shows that there is often put a lot of time and effort into developing laws that are afterwards not used or applicable.

**Question:**

Given the fact that there are both pros and cons, is it economically preferred to initiate the biofuel production by means of small-scale companies with upscaling afterwards, or by means of large-scale companies via e.g. partnerships?

From an economical viewpoint, large scale partnerships are probably the preferred option primarily because of the fact that there will be no need for governmental subsidy.

**2.5.6 Study Keypoint 5: Identification of Tools and Mechanisms**

<b>Participants</b>	<b>Organization</b>
J. Narain	AdeKUS/ FTeW
K. Lieuw	IPS
S. Legiman	UNDP
D. Demidof	IICA

**Workshop Questions:**

Projects regarding commercializing of energy technology are carried out in a typical manner i.e. fundamental and applied research, pilot projects and commercialization. Nevertheless, there are certain tools and mechanisms needed, which are of positive influence on the said process:

- a) Investment and commercialization should be made attractive;
- b) Operationalization of bio-fuel business should, from a viewpoint of efficiency, health, safety and environment compliance and financial compliance, be performed at benchmark level;
- c) Commercialization should lead to a spillover of knowhow, technology and business processes, while safeguarding intellectual assets at a certain level;
- d) Safeguarding, maintenance and possible expansion, via for example biofuel mandates, of sales of the commercial institution;
- e) Valorization.

Bearing in mind the above, now the next questions:

1. Which **TOOLS** and **MECHANISMS** are required within the given context?
2. What **EFFECT** should these tools and mechanisms bring about?
3. Which **(GOVERNMENTAL) INSTITUTES** should have a role herein?
4. Which **INCENTIVES** should there be for these institutes in order to retain the competitiveness of these tools and mechanisms with regional countries?

### **Workshop Findings:**

- ❖ Regarding the essential **TOOLS** and **MECHANISMS**, and their **EFFECT**:
  - A biofuel mandate by means of which the government compels and promotes the use of bio-energy via transparent subsidy schemes (e.g. tax exemptions, feed-in tariffs). Furthermore, this mandate should also oversee plans concerning mined areas.
  - Renewable energy portfolio standard (REPS), is considered a mechanism for benchmarking the performance of bio-energy companies, and will subsequently give incentives for development.
  - A knowledge platform, which will serve as an information-bank. This enables information concerning bio-fuels and bio-energy to be available in a central location and will thus improve accessibility, communication, partnership, knowledge spillover, community development, commercial development.
  - A partnership between research/educational institutes and the bio-energy industry.
- ❖ Regarding **(GOVERNMENTAL) INSTITUTES** which have an active role:
  - Educational institutes and research centers e.g. the Anton de Kom University of Suriname, Polytechnic College;
  - International organizations such as the UNDP,
  - Bureau NGO, which coordinates and monitors the activities of all NGO's in Suriname;
  - National Institute for Environment and Development;
  - Ministries i.e. i) Trade and Industry, ii) Agriculture, Husbandry and Fishery, iii) Natural Resources, iv) Finance, v) Regional Development, vi) Spatial planning, Land and Forest Management;
  - Bureau for standards;
  - The private sector;
  - Community councils.
- ❖ Regarding **INCENTIVES** for retention of competitiveness with regional countries:
  - **Tax exemptions** e.g. reduction of revenue tax, abrogation of import tax;

- Considering the fact that the CO<sub>2</sub> emission from bio-fuel utilization is part of a near neutral cycle, **income via carbon credit trading** is a possibility;
- **Legislation** in which is included feed in tariffs, environmental standards and operational standards. Considering environmental standards, this will also include the correspondence with the providers of biomass e.g. purchase of rice-husk from local farmers, in which there is agreement that this biomass is only utilized in an environmentally friendly way by designated institutions;
- Reduced government take on bio-fuel;
- Concerning point (d) in the workshop assignment, a bio-energy mandate could indeed be a mechanism to conquer the energy market. Nevertheless, doing so may cause sole dependence on a fuel that is even more expensive than fossil fuels, with or without a government take.

### 2.5.7 Study Keypoint 6: Criteria for a biofuel production strategy

Participants	Organization
R. Ramsukul	NIMOS
A.Nandlal	Suralco
F. Bondhla	BIS
V. Sabajo	BIS
Chotkan	Ministry of Spatial Planning, Land and Forrest Management

#### Workshop Questions:

1. Which (as detailed as possible defined) criteria should be used to create a framework wherein strategy development for biofuels should take place?
2. Who is responsible for implementing, maintaining, and monitoring the compliance of these criteria?
3. The formulation of strategies is difficult when conditions are constantly changing. What plausible scenarios could lead to the revision of the criteria for strategy development?

## Workshop Findings:

Regarding the criteria that should be used to create a framework wherein strategy development for biofuels should take place, a subdivision in **SOCIAL**, **TECHNOLOGICAL**, **ECONOMIC**, **ENVIRONMENTAL** and **LEGAL** aspects can be made:

### ❖ **SOCIAL** aspects:

- The land rights should be scrutinized whereby account is also taken of the economic zones; conflicts with the local population where activities will take place is the last thing that investors want.
- Investors should be required to provide employment to the local community, i.e., a fixed percentage of the total number employees in the company must be local workforce. In this way a situation is created that has advantages for both parties.
- A social impact assessment must be conducted; In Suriname, NIMOS has the capacity and experience to carry out such a study.

### ❖ **TECHNOLOGICAL** aspects:

- Although automation of processes is attractive and often cost-effective, caution needs to be taken with impact on the (direct) environment of the technologies used. It is therefore important that the local community and the government, as some of the biggest stakeholders, are all consulted in the process of selecting technologies.

### ❖ **ECONOMIC** aspects:

- A portion of the revenue of the biofuel company should flow back to the local communities for the benefit of sustainable development, of course, within the legal framework. For this, a development fund can be established with clearly defined goals that are streamlined with, among others, the needs of the community.
- The investment climate in Suriname should be made more attractive; at many meetings/workshops regarding the investment climate in various fields, quite a lot shortcomings are identified. Unfortunately, there is little done to increase the incentives for investors.
- There must be a good balance between automation of activities and employment creation. It is thereby also important to use as much as possible Surinamese work force; if necessary, intellectual capacity can be increased by additional training of locals abroad. Guest workers should be the last resource.

- ❖ **ENVIRONMENTAL** aspects:
  - An Environmental and Social Impact Assessment (ESIA) should be conducted. At the NIMOS there is a special division dedicated to conducting ISIA's according to proper guidelines.
  - It is important that if the investor would terminate its activities, the lands used must be returned at least in their initial condition. Of course the latter does not apply to the activities in the mined out areas. A suggestion is to require investors to provide a financial security for the rehabilitation of land used, which is in accordance to the activities they will undertake.
- ❖ **LEGAL** aspects:
  - There are a number of draft laws in the area of energy, environment, mining, land use, but these have still not been taken into consideration in the Parliament. It is important that these laws must be accepted very soon, given the major shortcomings in the current legislation, which provide opportunities to investors that may be undesirable for Suriname.
  - There must be authorities which monitor that the investor is operating within the framework of legal laws in Suriname.

With regard to the second question on who is responsible for **IMPLEMENTING**, **ENFORCEMENT**, and **MONITORING** the compliance of the criteria mentioned before, the following results:

- ❖ **IMPLEMENTING**: The Cabinet of the President. It should be noted that ideally the Cabinet should not be involved in the decision making at all, as is also previously pointed out.
- ❖ **ENFORCEMENT**: An energy authority should be created that is responsible for the enforcement of the criteria. Regarding the members that take place in such an authority two options are proposed: i) The Ministries of LVV, RO, RGB, HI, Finance en Labor, and NIMOS. The inclusion of the Ministry of Finance is due to remittances, rates and taxes, which are all related to the production of biofuels, ii) an independent body that operates outside of the political spheres, in order to prevent potential incompetent politicians at key positions. Moreover, it is not desirable to have the system influenced by politics. A critical follow-up analysis of institutions and persons to serve in this authority is needed
- ❖ **MONITORING**: The Ministry of Natural Resources. This Ministry may appoint an authority which consists of several institutes for monitoring of the identified criteria.

It is concluded that the amount of authorities and institutes that an investor must deal with in order to start a business in biofuels is very high, which may not be very attractive, even more because of its time consuming nature which is typical in Suriname. It is suggested to have a central coordinating authority, serving as a "one-stop-shop" for investors.



Plausible scenarios that could lead to the revision of the criteria for strategy development are:

- Changing legislation (both international and national). As have been said earlier, it is however difficult to engage in scenario planning in this regard, since draft laws are not always taken into consideration in the Parliament.
- People that are not relevantly educated on key positions in the politics; this is a common phenomenon in Suriname.
- Changing international market conditions; dropping prices of raw materials, competition, etc.

### 3 Conclusion & Closing Remarks

The objective of the inception workshop was to create a platform for stakeholders and consulting them in the process of identification of the requirements to support policymakers in biofuel related investments and production; furthermore, initiating a strategy for the sustainable production of biofuels, and achieving broad input regarding the project baseline situation. For this purpose a key stakeholders' analysis was carried out and from various entities and groups, representatives were invited. Representatives from the government, academia, the industry, private companies, semi-government and multinationals actively participated on the workshop. The number of stakeholders attending the workshop was significant, in total 42 persons.

With this broad attendance an initial step has been made towards project awareness which is essential in the process of the ongoing exchanges of information and views which will be required for formulating the strategic framework for the production of biofuels in Suriname.

With the input received from the working groups on the formulated study key points it should be concluded that baseline information has been obtained and on some components additional information will be required. The information will be gathered through individual meetings with key stakeholders. The information from the final baseline report will function as an ingredient in formulating the strategic framework for the production of biofuels in Suriname.

The next major step according to the timeline is the second stakeholders workshop where the draft framework will be presented and discussed. The second workshop is planned for the first week of February 2016.

The deadline for finalizing the project framework is set for the first week of March 2016 where the final strategic framework will be presented. The team of consultants will be responsible for the drafting of the full project document based on inputs received from stakeholders.

Finally, it should be concluded that with the execution of this project with the main deliverable to be formulated: "the strategic framework for the production of biofuels in Suriname", the initial step is given towards mapping the feasibility of biofuels production. Thus, depending on the outcome in case of being feasible, is to shift the potentials towards actual sustainable green energy production.

#### **Closing of workshop**

The workshop was closed with words of thanks by Dr. Nannan and Mr. Bhagwandin on behalf of the consultancy team. All in all, participants seemed to be satisfied with the meeting and were looking forward to the next opportunity to meet for the second workshop scheduled for the first week of February 2016. This conclusion can be drawn based upon the input obtained by the consultancy team from a poll conducted amongst said participants.

The reader is referred to Appendix E for a summary of the poll results. Note that just three individuals filled in the relevant form which was sent around by email.

## Appendix A: Structure and Plan

<b>RN</b>	Ryan Nannan																											
<b>HB</b>	Henk Bhagwandin																											
<b>CS</b>	Corrado Siriani	<b>Month:</b>	<b>Nov</b>	<b>December</b>				<b>January</b>				<b>February</b>				<b>March</b>				<b>April</b>								
<b>DL</b>	Danny Lachman	<b>Week:</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Milestone</b>	<b>Activity</b>	<b>Resp.</b>																										
	<b>Workplan submission</b>	RN																										
	<b>Progress meeting</b>	All																										
	<b>Inception Workshop</b>																											
	Workshop set-up	All																										
	Review workshop set-up	UNDP																										
	List stakeholders	RN / HB																										
	Send invitation	UNDP (?)																										
	Workshop	All																										
	Summary of workshop findings	CS																										
	<b>Study keypoints</b>																											
	Set up up-to-date baseline (1)	CS/DL																										
	Interviews	CS																										
	Provide overview of ec	HB/RN/DL																										

	and tech potential of biofuel (1)								█	█										
	Review gov and private sector role in RE sector, especially biofuel (2)	DL/RN/HB							█	█										
	Review existing policies (3)	DL/CS								█										
	Identify risks and benefits of biofuel production (4)	DL/RN/HB									█									
	Analyze market outlook, investment climate, business models (5)	DL/RN/HB										█								
	Tools and mechanisms to guide biofuel investment (6)	DL/RN/HB											█	█						
	Develop criteria for a strategy (7)																			
	policy+scenario analysis	DL																		
	production standards	RN																		
	specificities regarding mined out and degraded lands	HB																		
	full day review of all deliverables	All																		
	<b>Second Workshop</b>																			
	Prep docs and presentations on assigned	All										█	█	█						
	Workshop set-up	All												█	█					
	Review workshop set-up	UNDP																		
	List stakeholders	RN / HB																		
	Send invitation	UNDP (?)																		

	Workshop	All																					
	Summary of workshop findings	CR																					
	<b>Finalizing Framework</b>																						
	Review workshop findings	All																					
	Adjust study keypoints	All																					
	Final Framework and Strategy write-up	All																					
	Final make-up	RN																					
	Presentation	CS/RN																					
	Provide and present deliverables	All																					

## Appendix B: Workshop Agenda

Time-Time	Activity
8:00 – 8:30	<b>Entrance / Registration</b>
8.30 – 9:00	<b>Opening Speeches</b> <i>Ministry of Natural Resources</i> <i>UNDP</i>
9:00 – 9:30	<b>Introduction of consultancy team / Outline of the Biofuel Framework</b> <i>dr. ir. Nawin R. Nannan</i>
9:30 – 10:00	<b>Presentation on Energy Policy, Energy Security &amp; Energy Density</b> <i>Daniël A. Lachman, PhD.</i>
10:00 – 10:30	<b>Presentation on Biofuels and Utilization Technologies</b> <i>dr. ir. Nawin R. Nannan</i>
10:30 – 10:45	<b>BREAK</b>
10:45 – 12:45	<b>Group discussions on specific study keypoints of the Biofuel Framework</b> <i>Groups:</i> <ul style="list-style-type: none"> <li>- <b>Group 1:</b> Review the role of government and the private sector in the renewable energy sector with special focus on the biofuels sector</li> <li>- <b>Group 2:</b> Review the existing policies, regulations and standards in Suriname. Also map any institutional support, Public-Private Partnership constructions, the gaps and barriers</li> <li>- <b>Group 3:</b> Identify the risks and benefits for (commercial) biofuel investment and production. This shall include, but not necessarily be limited to economic, trade, employment, environmental, agricultural, cross sectorial benefits/ risks, human health and land-use aspects</li> <li>- <b>Group 4:</b> Analyze the market outlook, investment climate and biofuel business models.</li> <li>- <b>Group 5:</b> Recommend viable and effective tools and mechanisms like e.g., regulations/standards to guide (commercial) biofuel investment and production plans.</li> <li>- <b>Group 6:</b> Develop criteria for a strategy for sustainable biofuel production in Suriname with a focus on mined out or degraded lands</li> </ul>
12:45 – 13:30	<b>LUNCH BREAK</b>
13:30 – 15:00	<b>Plenary Group Presentations</b> <i>3 groups</i>
15:00 – 15:15	<b>BREAK</b>
15:15 – 16:45	<b>Plenary Group Presentations</b> <i>3 groups</i>
16:45 – 17:15	<b>Closing Remarks: Path Forward, Feedback, Timeline</b> <i>ir. Henk Bhagwandin</i>
17:15 – 17:45	<b>Closing Speeches</b> <i>Ministry of Natural Resources</i> <i>UNDP</i>

## Appendix C: List of Attendees

<b>ORGANIZATION</b>	<b>NAME REPRESENTATIVE</b>
<b>Bauxiet Instituut Suriname</b>	Sabajo, V. Bondhla, F.
<b>Conservation International</b>	Marhe, S.
<b>Consultancy Team</b>	Nannan, R. Lachman, D. Sirianni, C. Gemerts, E. Bhagwandin, H.
<b>District Commissaris Marowijne</b>	Hanswijk, C.
<b>Integrated Professional Services</b>	Lieuw, K.
<b>Kabinet van de President, Nationale Coördinatie Milieubeleid</b>	Plet, N.
<b>Ministerie van Financien</b>	Oemrawsingh, R.
<b>Ministerie van LVV</b>	Bipat, S. Kajjjo, O. Premcharan, R.
<b>Ministerie van Natuurlijke Hulpbronnen</b>	Abeleven, D. Cooman, M. Saridjan, C. Wongsonadi, U. Mackintosh, A. Caupain, J. Djoehari, S. Yorks, A
<b>Ministerie van RO</b>	Deel, H.
<b>Ministerie van ROGB</b>	Chotkan, J.
<b>Ministerie van Financien</b>	Harnam, S.
<b>N.V. EBS</b>	Donk, P. Bipat, A.
<b>N.V. Staatsolie</b>	Ramautar, R.
<b>NIMOS</b>	Ramsukul, R. Tjon-Akon, Q.
<b>PTC</b>	Kromoredjo, G.
<b>Studierichting Agrarische Productie, FTeW, AdeKUS</b>	Orie, L. Chin, C. M. Tjien Fooh, R.
<b>Studierichting Werktuigbouwkunde, FTeW, AdeKUS</b>	Narain, J.
<b>Suralco</b>	Nandlal, A.
<b>Suriname Green Energy</b>	Kong Yong Foek, R.
<b>UNDP</b>	Khoenkhoen, A. Legiman, S. Drakenstein, B.
<b>University of Guyana</b>	Abdullah, A.



## Appendix D: Handouts Study Keypoints (6)

### Study Keypoint 1

#### De rol van de overheid en de private sector

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Momenteel is er geen overkoepelend energiebeleid met daaruit afgeleid een strategie om met voortvarendheid over te gaan tot onderzoek, ontwikkeling en deployment van ondermeer duurzame en hernieuwbare energiebronnen en utilisatie technologieën, met, binnen het raamwerk van deze workshop, de focus op biobrandstoffen. Daarenboven is er enerzijds een vooringenomenheid vanuit het juridische en institutionele perspectief voor zogenoemde conventionele systemen die gebruikmaken van of thermische installaties of grootschalige waterkrachtwerken in de elektrische energievoorzieningssector alsmede het gebruik van fossiele brandstoffen in de transport sector, terwijl anderzijds er geen coherentie is, binnen een zeker sturend raamwerk, in de aanpak op het vlak van onderzoek via de relevante instituten. Verder zijn de rollen van de diverse actoren onduidelijk.

Aan de ene kant dienen er zijdens de overheid diverse acties ondernomen te worden op beleids- en strategisch niveau waarbij is meegenomen de duidelijke uitwerking van incentieven, om zodoende een zogenoemde “enabling environment” te creëren die de energiesector in een zekere richting stuurt. Gedacht kan worden aan transparantie in procedures, het opstellen van biobrandstofstandaarden en een bijbehorend mandaat, het opstellen van prestatie indicatoren standaarden, het richtinggeven aan onderzoeksinstituten, aandacht voor financiering, et cetera.

Aan de andere kant dient ook de private sector de capaciteit te hebben en die te tonen om internationale en nationale partnerschappen aan te gaan, durven te investeren in onderzoek en ontwikkeling, razendsnel te geraken tot commercialisering, etc.; natuurlijk dient deze private sector geprikkeld te worden door de eerdergenoemde “enabling environment” van de overheid.

Workshopvragen:

- Welke rol dient de overheid te hebben om biobrandstoffen relatief snel tot commercialisering te laten komen via private investeringen?
- Uit welke elementen bestaat deze rol, hoe worden deze elementen (SMART: specifiek, meetbaar, acceptabel, realistisch en tijdsgebonden) gedefiniëerd? Geef belangrijke prestatie indicatoren die de overheid hiervoor kan gebruiken.
- Wat zijn sequentieel de stappen die de overheid moet nemen om tot deze rol te geraken?

## Study Keypoint 2

### Gap analyse van het beleid, de standaarden, en regelgeving

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Momenteel is er in Suriname geen aangenomen langetermijn strategie en energiebeleid betreffende onderzoek, ontwikkeling, demonstratieprojecten en commercialisering van hernieuwbare energiebronnen en –systemen, met in het bijzonder biobrandstoffen in ogenschouw genomen. Daarenboven is er vanuit het perspectief van de juridische, institutionele aspecten en het beleid meer bevooroordeeldheid naar de reeds bestaande energietechnologieën en –bronnen in Suriname, te weten waterkracht, thermische electriciteitsopwekking, en fossiele brandstoffen in de transport sector.

Echter heeft de overheid de serieuze intentie om het potentieel aan biobrandstoffen te ontwikkelen en te commercialiseren ten einde 1) de energievoorzieningszekerheid te waarborgen middels energie bronnen en technologie diversificatie, en 2) uitgemijnde gebieden een nieuwe bestemming te geven ten dienste van het eerstgenoemde item. Hiervoor is het nodig om beleid te ontwikkelen met betrekking tot biobrandstoffen dat bovendien moet passen binnen een overkoepelend energiebeleid.

Alhoewel dit lijkt op het spreekwoordelijke “het paard achter de wagen spannen”, vloeit de urgentie uit 1) het bewaken van energievoorzieningsveiligheid, 2) het laag houden van de impact door gebruik te maken van uitgemijnde gebieden, en 3) de lokale klimaatsomstandigheden die biobrandstoffen aantrekkelijk zouden moeten maken (hierbij die klimaatverandering in acht genomen te worden). Bovendien zijn er elementen van beleid, regelgeving, standaarden, netwerken, voortgangsbewaking, et cetera met betrekking tot biobrandstoffen welke zeker zondermeer opgenomen kunnen worden in een energiebeleidsdocument.

Workshopvragen:

- Inventariseer welke elementen van het beleid, regelgeving, standaarden, institutionele hulp, en netwerkvorming in Suriname, als het gaat om biobrandstoffen, 1) ontbreken, 2) een belemmering vormen voor commercialisering, 3) moeten veranderen, 4) ontwikkeld en geïmplementeerd zouden moeten worden. Geef tevens aan hoe de energievoorzieningszekerheid gekwantificeerd kan worden en wat de rol is van biobrandstoffen in de kwantificering.
- Welke onderdelen van de overheid, inclusief de semi-overheidsinstellingen, moeten hierbij specifiek in beeld komen?

## Study Keypoint 3

### Identificeren van risico's en voor- en nadelen van biobrandstoffen

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Zowel de Verenigde Staten als Brazilië zijn wereldwijd leiders op het gebied van biobrandstof productie, in het bijzonder ethanol. Momenteel is er in dit kader een trend waar te nemen van opkomende Aziatische en Afrikaanse markten zoals India, China, Indonesië, Thailand, Maleisië, Zuid Afrika en Zimbabwe. De redenen hiervoor zijn een verhoogde toename van subsidiekosten voor fossiele brandstoffen en olieimporten; grote markten als de EU en Amerika die relatief minder gaan produceren en de stimulans in de genoemde landen om de agrarische sector te ontwikkelen. De huidige wereldproductie van biobrandstoffen bedraagt 130 miljard liters. Voor 2040 wordt door de 'International Energy Agency (IEA)' een productieniveau van 140 miljard liters verwacht. Gedurende de afgelopen 12 maanden zijn de wereldmarktprijzen van aardolie dramatisch gedaald. Nieuwe bronnen van energie komen tevoorschijn zoals schaliegas, ultradiepwater aardolie en de hernieuwbare energiebronnen oftewel de 'renewables'. Overige factoren die de vraag en aanbod van energie beïnvloeden zijn de economische status, complete disruptie zoals extreme weersomstandigheden tot het uitbreken van oorlogen. Voorts wordt er nieuw beleid uitgestippeld om energiezekerheid te garanderen en om bijvoorbeeld klimaatverandering in te dammen.

Workshopopdracht:

De opdracht is om te inventariseren welke de – voor de Surinaamse context – belangrijkste risico's en voordelen zijn van de operationalisering van biobrandstof commercialisering. Er dient expliciet rekening gehouden te worden met de duurzaamheid van de operaties. De risico's moeten de volgende gebieden behelzen (maar zijn niet daartoe gelimiteerd): economie, handel, werkgelegenheid, milieu, biodiversiteit, landbouw, gezondheid, land- en watergebruik, impact op andere sectoren.

Probeer hierbij uit te gaan van een aantal scenarios, welke onderling verschillen op basis van parameters die risico's en voordelen van biobrandstoffen sterk bepalen. Voorbeelden zijn: vluchtigheid/onvoorspelbaarheid van olieprijs, toename in extreme weersomstandigheden, de ondoorzichtigheid van de richting waar klimaatverandering naar toe trendt en doorbraak in "fringe" technologieën (bijvoorbeeld olie uit algen, biowaterstofgas).

## Study Keypoint 4

### Analyseer de marktontwikkelingen, het investeringsklimaat en bedrijfsmodellen voor biobrandstoffen

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Gedurende de afgelopen 12 maanden zijn de wereldmarktprijzen van aardolie dramatisch gedaald. Nieuwe bronnen van energie komen tevoorschijn zoals schaliegas, ultradiepwater aardolie en de herwinbare energiebronnen oftewel de 'renewables'. Overige factoren die de vraag en aanbod van energie beïnvloeden zijn de economische status, complete disruptie zoals extreme weersomstandigheden tot het uitbreken van oorlogen. Voorts wordt er nieuw beleid uitgestippeld om energiezekerheid te garanderen en om bijvoorbeeld klimaatverandering in te dammen.

Workshopopdrachten:

- Geef uw analyses m.b.t. de marktontwikkelingen op het gebied van biobrandstof productie zowel lokaal als internationaal. Welke trends kunt u hierbij voorspellen? Welke aannames doet u als groep?

De Surinaamse overheid heeft de serieuze intentie om het potentieel aan biobrandstoffen te commercialiseren ten einde 1) de energiezekerheid te waarborgen middels energie technologie diversificatie, en 2) uitgemijnde gebieden een nieuwe doelstelling te geven ten dienste van 1).

Typisch in de energiesector is dat projecten een vaste cyclus kennen als het gaat om de commercialisering van energietechnologieën. De commercialisatie van biobrandstoffen kan positief beïnvloed worden middels:

1. Het creëren van een aantrekkelijk investeringsklimaat (in financieel en belastingtechnisch opzicht, netwerkvorming/clustering, etc.;
2. De operationalisatie van de biobrandstofonderneming die richting benchmark performance gestimuleerd moet worden, vanuit het oogpunt van efficiëntie, health, safety en environmental compliance en financial compliance.

3. Initiatieven die leiden tot een significante spill-over van knowhow, technologie, en business processen, terwijl intellectuele eigendommen tot op een bepaald niveau beschermd worden;
  4. De afzet van de commerciële instelling moet gehandhaafd worden en daar waar mogelijk, bijvoorbeeld door biobrandstof mandaten, vergroot worden.
- Geef een analyse van het investeringsklimaat en de bedrijfsmodellen die gecreëerd dienen te worden voor de ontwikkeling van een duurzame biobrandstofindustrie in Suriname.

## Study Keypoint 5

### Identificeren van tools en mechanismen

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Typisch in de energiesector is dat projecten een vaste cyclus kennen als het gaat om de commercialisering van energietechnologieën: (fundamenteel en toegepast) onderzoek, (product- en proces) ontwikkeling, demonstratie/proefprojecten, commercialisatie. Dit staat nu natuurlijk niet op zich, alsmede zijn er tools en mechanismen nodig die de investeringen in en de commercialisatie van biobrandstoffen op een aantal punten positief moeten beïnvloeden:

1. de investering en commercialisering moet aantrekkelijk gemaakt worden (in financieel en belastingtechnisch opzicht, netwerkvorming/clustering, etc.;
2. de operationalisatie van de biobrandstofonderneming moet richting benchmark performance – vanuit het oogpunt van efficiëntie, health, safety and environmental compliance, financial compliance – gestimuleerd worden;
3. alle fasen tot en met de commercialisering van het biobrandstof initiatief moeten een significante spill-over van knowhow, technologie, en business processen bewerkstelligen, terwijl intellectuele eigendommen tot op een bepaald niveau beschermd moeten worden;
4. de afzet van de commerciële instelling moet veilig gesteld en gehandhaafd worden en daar waar mogelijk, bijvoorbeeld door biobrandstof mandaten, vergroot worden;
5. Valorisatie.

Workshopvragen:

- Welke tools en mechanismen in het leven gebracht moeten worden (beschrijf deze zoveel als mogelijk in detail) binnen het eerder geschetste kader.
- Welke effecten moeten deze rangschikken (en zijn er voorbeelden daarvan)?
- Welke instituten en overheidsinstanties zouden hierbij een rol moeten of kunnen spelen?
- Welke (SMART gedefinieerde) incentiven zouden er moeten zijn voor deze instituten en overheidsinstanties om het concurrentievoordeel van dit stelsel aan tools en mechanismen hoog te houden ten op zichte van landen in de regio?

## Study Keypoint 6

### Criteria voor een biobrandstof productie strategie

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Vaak genoeg verward met allerlei andere concepten als “management” en “leiderschap”, is “strategie” niets anders dan een keuze die men maakt met betrekking tot een te nemen pad dat in staat stelt om uitdagingen in de toekomst aan te gaan en te kapitaliseren op het potentieel dat zich aanbiedt. In Suriname is er op het moment geen aangenomen langetermijn strategie met daaraan gekoppeld een energiebeleid als het gaat om onderzoek, ontwikkeling, demonstratieprojecten en commercialisering van hernieuwbare energiebronnen en –systemen, met in het bijzonder biobrandstoffen. Echter zijn er überhaupt elementen van een biobrandstof strategie welke zeker zonder meer opgenomen kunnen worden in een (hernieuwbare) energie strategie.

De hamvraag hierbij is nu welke – voor de Surinaamse context belangrijke – criteria zouden gehanteerd moeten worden voor het concipiëren van een biobrandstoffen strategie (in het bijzonder in uitgemijnde gebieden). Deze criteria kunnen volgens het STEEPL principe gecategoriseerd worden, t.w., Social, Technological, Economic, Environmental, and Legal criteria. Bijvoorbeeld, bij de categorieën “Social” en “Economic” kan er een criterium komen dat aangeeft dat de strategie zodanig gekozen moeten worden dat deze niet ten koste gaat van de voedselzekerheid (dus voedselbeschikbaarheid, –betaalbaarheid, en –betrouwbaarheid/ veiligheid/voorzieningszekerheid).

Workshopvragen:

- Welke (zo gedetailleerd mogelijk gedefinieerde) criteria moeten worden gehanteerd, zodat deze het kader vormen waarbinnen strategievorming voor biobrandstoffen moet plaatsvinden?
- Wie is verantwoordelijk voor het implementeren, handhaven en toezien op de naleving van de criteria?
- Strategieën formuleren is moeilijk onder steeds veranderende omstandigheden. Welke plausibele scenario's zouden ervoor kunnen zorgen dat de criteria voor strategievorming gereviseerd moeten worden?

## Appendix E: Qualtrics Survey Report

### 1. Het consulententeam is erin geslaagd om de doelstellingen van de workshop naar u helder en duidelijk te communiceren.

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	2	67%
3	Neutraal	1	33%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
<b>Total</b>		<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	3
Mean	2.33
Variance	0.33
Standard Deviation	0.58
Total Responses	3

### 2. De inleidende notitie voor de keypointopdrachten waren voldoende ter voorbereiding op de workshop.

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	2	67%
3	Neutraal	1	33%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
<b>Total</b>		<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	3
Mean	2.33
Variance	0.33
Standard Deviation	0.58
Total Responses	3



**3. U heeft voldoende tijd gehad tijdens de groepssessie om uw bijdrage aan de discussie te leveren.**

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	3	100%
3	Neutraal	0	0%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
	<b>Total</b>	<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	2
Mean	2.00
Variance	0.00
Standard Deviation	0.00
Total Responses	3

**4. U bent niet beperkt geworden tijdens de plenaire sessie om uw bijdrage te leveren.**

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	2	67%
3	Neutraal	1	33%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
	<b>Total</b>	<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	3
Mean	2.33
Variance	0.33
Standard Deviation	0.58
Total Responses	3

## 5. Het consultantenteam heeft voldoende feedback gegeven op vragen uwerzijds.

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	2	67%
3	Neutraal	1	33%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
<b>Total</b>		<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	3
Mean	2.33
Variance	0.33
Standard Deviation	0.58
Total Responses	3

## 6. De workshop kan als succesvol worden beschouwd.

#	Answer	Response	%
1	Helemaal eens	0	0%
2	Eens	1	33%
3	Neutraal	2	67%
4	Oneens	0	0%
5	Helemaal oneens	0	0%
<b>Total</b>		<b>3</b>	<b>100%</b>

Statistic	Value
Min Value	2
Max Value	3
Mean	2.67
Variance	0.33
Standard Deviation	0.58
Total Responses	3

7. Graag hieronder de criteria opnoemen, minimaal twee, op basis waarvan u tot het waardeoordeel bent gekomen bij de vorige vraag.

Text Response

\* doelgericht werken \* effectief discussiëren \* time management

Statistic	Value
Total Responses	1

8. Heeft u verdere aanbevelingen? U kunt die hieronder plaatsen

Text Response

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Statistic	Value
Total Responses	1