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ARTICLE

Assessing Energy Cane Varieties for Renewable Biomass Energy: A Comprehensive Study of Economic Opportunities in the Dominican Republic

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ABSTRACT

The use of vegetable biomass as a source of renewable energy is a growing trend in line with the 2030 Sustainable Development Goals approved by the United Nations in 2015. Energy cane (*Saccharum officinarum*) appears to be an appealing alternative for this purpose due to its high agricultural yields (150–200 ton/ha), strong resistance to common diseases compared to sugar cane, the ability to grow on marginal or less suitable lands for other commercial crops, and the feasibility of using the same labour force and machinery used for sugar production from sugar cane. Our study's goal was the preliminary technical-economic opportunity study for an investment in a 100–hectare energy cane farm that produces energy cane bales (with 30% relative humidity) for use as fuel in biomass boilers in the Dominican Republic. The study showed that using energy cane as biomass feedstock for electricity production would result in profits from the third year onwards, making it highly financially attractive. The specific

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energy consumption to produce energy cane bales was 5.33 kW/t. The calculated Net Present Value was positive at US$ 128,742.50, the estimated Internal Rate of Return was 44.20%, and the payback period was just 2 years. These figures were higher than any possible bank interest rate.

Keywords: Energy Cane; Biomass Valorisation; Biomass Market; Energetic Woods; Saccharum; Biomass Boilers

1. Introduction

Sugar cane (*Saccharum officinarum*) cultivation in the Dominican Republic was introduced by Spanish colonizers in the 16th Century, but the sugar industry did not see significant development until the outbreak of the II World War. Since then, sugar has been a key component of the Dominican economy, serving as the nation's largest employer and the primary source of export earnings until the 1990s when a decline occurred due to both domestic and international factors [1]. Currently, the country's sugar production is carried out by four major producers, three of which are privately owned and one is state-owned. There is a high level of mechanical automation in land cultivation. Given this established tradition, it would be feasible to introduce new sugarcane varieties, such as energy cane, for land cultivation and processing using the needed machinery. Energy cane varieties have been developed through non-transgenic F1 hybridization, involving the crossbreeding of commercial sugar cane varieties with wild species of sugar cane from the genus Saccharum. This is done to obtain strains with higher dry fibre content (≥20%), which can be used as biomass for renewable energy production [2]. The cultivation of energy cane is intended for use as biomass for energy production rather than sugar. Energy cane is classified into two categories: Type I, which is similar to traditional sugarcane but with lower sucrose content and higher fibre, and Type II, which has minimal sugar content and very high fibre, making it suitable only for biomass generation.

The U.S. program for variety development maintains an interest in renewable energy from biomass. In Florida, several energy cane varieties have been developed, indicating that the first generation of hybrids (F1) is the most suitable for energy cane. The University of Florida, in collaboration with Louisiana centres and the U.S. Department of Agriculture Station in Canal Point, is developing high-yielding varieties of energy cane that are resistant to disease and low temperatures. Other countries, such as Brazil, Cuba, and the French CIRAD centre (Centre for International Cooperation in Agricultural Research for Development), which has stations on several Caribbean islands, are also working on energy cane applications. Saccharum officinarum is a plant that has the highest capacity to convert solar energy into biomass due to its C4 cycle. For sugar cane, bagasse is generated only during the 150-day harvest period, so other biomass sources are needed for year-round operation [3]. Currently, there is a plan to plant Leucaena forests and other crops for using their wood as fuel, but the results have been unsatisfactory. Energy cane is a promising option for ensuring a stable supply of biomass for electricity generation plants during the off-season when sugar cane is not cultivated.

The use of vegetable biomass as a source of renewable energy is a current trend aligned with the 2030 Sustainable Development Goals approved by the United Nations in 2015 [4]. Energy cane biomass has attracted interest as an alternative source of energy with the advantage of being a dedicated crop that may be grown exclusively as raw material for biomass boilers to produce electricity [5]. The Dominican Republic relies heavily on fossil fuels for electricity generation. However, the country has ample primary sources of renewable energy, particularly from agricultural activities. These resources should be harnessed to decrease the dependence on imported fossil fuels and play a crucial role in the global shift towards zero emissions and reduced reliance on fossil fuels. The country's biomass production for power generation has a significant domestic market, with 24% of available land for these crops, primarily including Acacia mangium [6]. Additionally, sugar cane bagasse is utilized for energy generation in sugar mills, mainly to fulfil the power needs of the mills and their surrounding areas during the harvest season.

The use of energy cane as a fuel for biomass boilers is not very common. It has been used in some cases as a replacement for firewood during the start-up of sugar mills. Additionally, it has been used as a feedstock in some cellulosic ethanol plants, as CO_2 sink forests, and as support structures in tomato plantations and other protected crops [7]. One of the main barriers to its use is the traditional practice of sugar cane farmers using the crop solely for sugar production. They are primarily interested in varieties with high sugar content. Another challenge is the unattractive pricing of energy cane, which does not incentivize farmers to cultivate it alongside or as a substitute for sugar cane.

The results of planting and characterizing four varieties of energy cane at an experimental farm in the Dominican Republic have been reported [8]. These varieties showed vigorous growth and tillering under rainfed conditions, with no signs of attack by pests and microorganisms. After 12 months, the average yield, expressed in dry biomass, was approximately 150–200 tons/ha. In this report, we present the findings of a preliminary technical-economic feasibility study for investing in a 100-hectare energy cane farm in the Dominican Republic. The farm will produce energy cane bales with 30% relative humidity, which will be used as fuel in biomass boilers. The aim of the study is to attract potential domestic investors in the biomass sector to promote a more significant role for renewable energies in the energy supply and reduce the dependence on fossil fuels. The study covers estimated energy consumption and efficiency, investment costs, production expenses, and working capital, as well as the calculation of Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Time of Investment (PBI).

2. Materials and Methods

2.1. Opportunity Study for the Investment in the Production of Energy Cane

To conduct a study on the potential for energy cane production in the Dominican Republic, was utilized UNIDO's guidelines for economic feasibility studies, using the COMFAR application [9]. This involved estimating parameters such as NPV, IRR, and PBI to determine the viability of the investment [10]. It's important to note that this was an opportunity study, and the data used were based on estimated and experimental results from small-scale studies.

2.1.1. Calculation Basis Used for the Opportunity Study

The calculation basis used to conduct the opportunity study is shown in **Table 1**.

While yields in the range of 150–200 tons/ha have been achieved [8], a yield of 100 tons/ha was chosen for the feasibility study. This takes into consideration that the reference yields were obtained in a small-scale experimental field and may not be achievable under large-scale production conditions.

2.1.2. Total Investments (TI)

Investments in Fixed and Nominal Assets

Fixed Assets (FA)

Fixed assets are tangible investments used for project execution, including economic depreciation for permanent use. This category includes:

A. Infrastructure, land, and civil works.

- Land.
- Civil works.
- Warehouses and workshops.
- Weighing equipment.
- Electricity, offices, and furniture.
- Contingencies.

B. Equipment for the production of energy cane.

- Preparation and packaging equipment.

The total value of Fixed Assets is calculated by adding the values of A and B.

Nominal Assets (NA)

- Start-up of the production process.
  It was estimated that the cost for land preparation, planting, maintenance, and harvesting of energy cane is US$250.00 per hectare [11]. For 100 hectares, the total cost would be US$25,000.00.
- Additional training of operations personnel.
  A three-month theoretical and practical course is planned to train operational and technical personnel at a cost of US$3,000.00.

Total investments in Fixed and Nominal Assets (TI)

The sum of Fixed and Nominal Assets was calcu-

Table 1. Calculation basis.

Item	Value	References
Area to be sown (ha)	100	-
Yield (tons/ha)	100	[3, 8]
Dry fibre yield (tons/ha)	60 (30% humidity)	[3, 8]
Annual production (tons)	6,000	
Cost of energy cane cultivation, including all operations (US$/ha)	250.00	[11]

lated according to Equation (1).

$$TI = FA + NA \quad (1)$$

Production Costs (PC)

A. Direct Costs (DC).

The following items were considered as Direct Costs:

- Direct labour: Required for 350 days of operation per year
- Electrical energy and Specific energy consumption[12–14]. Energy consumption for producing 6000 ton of solar-dried energy cane on 100 hectares of land was calculated including the power usage of electric machinery, energy for land preparation, and energy cane harvest.
- Raw materials: Energy cane cuttings needed to sow 100 hectares of land.
- Direct materials: This includes work tools, protective equipment, fertilizers, and other items used directly in production.
- Maintenance: Estimated at 10% of the equipment investment to cover annual maintenance needs.
- Other auxiliary equipment.

B. Indirect costs (IC) do not directly participate in the production process.

- Sales and administration costs: These are the costs associated with the administrative and commercial management of the product.
- Administrative expenses: These include costs related to communications, office expenses, and other miscellaneous expenses. It is estimated that these expenses account for approximately 10% of administrative salaries

C. Production Cost (PC): The PC It is the total direct and indirect costs as defined by Equation (2).

$$PC = DC + IC \quad (2)$$

Working Capital Investment

The investment in working capital represents the funds needed to produce the initial batch of energy cane in bales before receiving payment from its sale. The amount allocated to working capital is calculated using the "payback period" method[13], as shown in Equation (3).

$$WCI = ADC \times PB \quad (3)$$

where:

WCI: Working Capital Investment (US$).

ADC: Average daily cost. (US$/day).

PB (days): Payback period.

The average daily cost is calculated by dividing the Production Cost by the number of days worked in a year, according to Equation (4).

$$ADC = PC/d \quad (4)$$

where:

d: Days worked in a year (350).

Unit Cost

The unit cost is the sum of costs and investments required to produce one ton of energy cane in bales, according to Equation (5).

$$UC = (TI + PC + WCI/n)/p \quad (5)$$

where:

UC: Unit Cost (US$/t).

TI: Total Investments in Fixed and Nominal Assets.

PC: Production cost (US$/year)

WCI: Working Capital Investment (US$)

n: Planning horizon (years): 5

p: Expected annual production level (tons/year): 6,000

Credit Bank Application

To proceed with the investment, we need to request a bank loan, which encompasses the Working Capital and the Total Investments (TI) as per Equation (6).

$$CBA = TI + WCI \quad (6)$$

3. Results and Discussion

3.1. Total investments

3.1.1. Investments in Fixed and Nominal Assets

Fixed Assets (FA)

Land and Civil works.

Table 2 shows the breakdowns of expenses for infrastructure, land rent, and construction of civil works. The calculation is based on values obtained from literature and estimates derived from country-specific data. It considered the fact that the land needed for planting the energy cane would be rented. For investors who own the land and facilities, the need to construct buildings, and related expenses would not be necessary.

Table 2. Infrastructure, land and civil works.

Item	CostsUS$	Description
Land (100 ha)	10,000.00	Lease of agricultural land. 100 US$/ha.year [14]
Civil works	10,000.00	Estimated
Warehouses & Workshops	15,000.00	The warehouse for the machinery will be 800 m^2 and for the warehouse 1,000 m^2
Electricity	3,000.00	Estimated
Contingencies	2,500.00	The cost of contingencies throughout the life of the project is estimated at 10% of the cost of building the facilities.
Total Infrastructure (TIS)	40,500.00	

Production Equipment

Table 3 shows the expenses associated with acquiring the equipment needed for energy cane production. The most significant piece of equipment will be a medium-density baler for energy cane. An insurance cost of 10% for imported equipment was considered for the minimum equipment required. The purchase of refurbished equipment would reduce the cost of this item.

Table 3. Equipment for the production of energy cane.

Item	US$	Description
Medium Density Baler	35,000.00	Chinese Company Quotation
Portable Refractometer	500.00	Local market
Technical Scale	1,200.00	Technical scale 5 kg. Local market
Assembly	1.000.00	Hiring local staff
Insurance	3,670.00	10% of the imported machinery cost
Total equipment (TE)	41,370.00	

Fixing Assets (FA) = 40,500.00 + 41,370.00 = 81,870.00 US$.

The expenses for the nominal assets are shown in **Table 4**. A value of US$250.00/ha [11] was assumed for land preparation, planting, maintenance, and harvesting of the energy cane, which equates to US$25,000.00 for the 100 ha to be planted, including training costs. The nominal assets value was US$28,000.00.

Table 5 presents a summary of the investments needed to initiate energy cane production, comprising the total investments in fixed assets and nominal assets.

Table 4. Nominal assets.

Element	US$
Start-up costs	25,000.00
Personal Operations Training	3,000.00
Total Nominal Assets (NA)	28,000.00

Table 5. Summary of the investments at the beginning of the planning horizon.

Element	US$
Total Fixing Assets (FA)	81,870.00
Total Nominal Assets (NA)	28,000.00
Total Investments (TI)	109,870.00

3.2. Cost of Production

3.2.1. Direct Cost

The direct cost of production is the total expenses for direct labour, electricity used for production, and raw materials. **Table 6** details the direct labour costs for a farm manager, two operators, and two assistants. Wage values higher than those typically considered for these activities in the Dominican Republic were used.

Table 6. Direct Labour 350 days per year.

Position	No. Operators	Net Wage (US$/Month)	Total (US$/Year)
Farm manager	1	1,000.00	12,000.00
Operators	2	500.000	6,000.00
Assistants	2	400.000	3,600.00
	Subtotal		21,600.00
	Taxes (20%)		4,320.00
	Employer contribution (1%)		216.00
	Transportation (10%)		2,160.00
	Total Direct Labour		28,296.00

Table 7 displays the projected electricity costs and total energy consumption, enabling the calculation of the specific energy consumption per ton of energy cane produced. Our findings indicated that the specific energy consumption for producing energy cane bales was lower than that for producing pellets from agricultural residues and wood [12].

Table 7. Electricity and total energy consumption*.

Item	Value	Remarks
Preparation of the land	3600 kW	50 hour/year
Harvest of the energy cane	8750 kW	CH570 100 hour/year
Baling machine	19,600.6 kW	100 hour/year [13]
Rest of facility electric consumption	5,600 kW	Estimated. 8 hours. 350 days
Total energy consumption	31,950.6 kW	
Specific energy consumption	5.33 kW/t	Production of 6000 t energy cane/year
Electricity consumption	25,600.6 kW	(Bailing machine + Rest of facility)
Electricity Cost/Year (US$)	3,411.15	135.36 US$ /MWh [14]. (business rate)

*Reported rates for business consumers in the Dominican Republic were used.

Table 8 shows the cost of the raw materials (cuttings) required to plant 100 hectares of energy cane. We considered the opportunity cost associated with the value generated by the production of the cuttings as part of the investment. The estimated market value of energy cane cuttings was also considered.

The total direct production costs are shown in **Table 9**. In addition to direct labour, raw materials, and electricity costs, these expenses encompass direct materials, maintenance, and other related equipment costs linked to the investment. These costs are factored into the calculation of total production costs.

Table 8. Raw material.

Item	Cost	Reference
Opportunity Cost of Energy Cane Cuttings	50.00 US$/1000 cane cuttings	
Cane cuttings/ha	3000	
For 100 ha	300,000 cane cuttings	
Opportunity Cost in cane cuttings	15,000.00 US$	To sow 100 ha. 5 crops
Total	15,000.00 US$	

Table 9. Direct production costs (DC).

Item	Description	US$/Year
Direct Labor	Estimated for the operation of 350 days in the year.	28,296.00
Raw Materials	An opportunity price of US$50.00/1000 cuttings and the use of 3000 cuttings/ha.	15,000.00
Electricity [8]	A value of US$135.36 /MWh	3,411.15
Direct Materials	Includes tools, protection, fertilizers and other means of direct use in production. Estimated 0.5% of investment in infrastructure and equipment.	409.35
Maintenance	Estimated as the 10 % of the equipment investment	4,137.00
Other auxiliary equipment	Other auxiliary equipment	5,000.00
Total		56,253.50

3.2.2. Indirect Cost (IC)

Sales and administrative costs, including the salary of a business administration specialist, are shown in **Table 10**. When added to the Direct Production Costs, these expenses form the total costs associated with the production of energy cane, which are presented in **Table 11**.

Table 10. Sales and administration costs (Indirect Cost).

Position	Salary US$/Month	Annual Total US$
One Commercial Management Specialist	800.00	9,600.00
Subtotal		9,600.00
Taxes	20%	1,920.00
Employer contribution	1%	96.00
Transportation	10%	960.00
Total Administrative Salaries	US$	12,576.00
Administrative Expenses (10% of administrative salaries)	US$	1,257.60
Total Sales and Administration Expenses	US$	13,833.60

Table 11. Total production costs.

Item	US$/Year
Direct production costs	56,253.50
Indirect production costs	13,833.60
Total production costs (PC)	70,087.10

3.2.3. Investment in Working Capital

The investment in working capital represents the funds needed to produce the initial batch of energy cane bales before receiving payments for their sale. The amount allocated to working capital is calculated using the "payback period" method [15] as per Equation (3). The average daily cost is calculated by dividing the annual operating and administrative costs by the number of working days per year as per Equation (4).

ADC = US$ 70,087.10/350 days

ADC = US$ 200.25/day

Assuming the payback period (PB) is 90 days, the investment in working capital can be calculated based on the current commercial transaction conditions and payment forms. According to current conditions and forms of payment of commercial transactions, the calculation of working capital investment is expressed as follows:

WCI = US$ 200.25/day x 90 days

WCI = US$ 18,022.50

The initial loan to finance the project must include the amount for working capital investment.

3.2.4. Unit Cost (UC)

The unit cost is the sum of the costs and investments required to produce one ton of energy cane in bales. It is calculated using Equation (5).

UC: Unit Cost (US$/t).

TI: Total Investments = 109,870.00 US$

WCI: Working Capital Investment = 18,022.50 US$

PC: Production cost = 70,087.10 US$/year

n: Planning horizon: 5 years

p: Expected annual production level: 6.000 tons/year

UC = 30.59 US$/t.

It's important to note that the reported production cost for commercializing chipped wood in the Dominican Republic is US$ 50/ton [3], with a selling price of US$ 55/ton. Considering these values and potential increases due to forest protection regulations, a selling price of US$ 35.00/ton was set for the present study, covering the unit costs and being 36% lower than that of chipped wood. Other authors have reported a total cost of US$ 105–127/ton of energy cane biomass dry matter in the southern USA [16], and US$ 55.00/ton in Guadalupe [17], with the latter number being more suitable for comparison with our results.

3.2.5. Credit Bank Application (CBA)

The CBA consists of the sum of the WCI plus the TI, when applying the Equation (6)

CBA = US$127,892.50

The cash flow for the investment in the production of energy cane in 100 hectares is presented in **Table 12**. The project was assessed using a planning horizon of 5 years and a discount rate of 10%. It was assumed that all investments would be made in the first year of the project (year 0), and that all financing would be external, i.e., through loans. The loan covers all costs, including working capital, and must be agreed upon for 5 years, which aligns with the planning horizon of the project. The entire annual production will be sold within the country, primarily for use in biomass boilers. The overall revenue and cost structure is assumed to remain unchanged throughout the project planning horizon.

Table 12. Energy Cane Project Cash Flow. α=10%. Planning for 5 years. Bank credit is considered to be granted for 5 years.

Item	0	1	2	3	4	5
Selling Price (US$/ton)		35.00	35.00	35.00	35.00	35.00
Sales (US$/year)		210,000.00	210,000.00	210,000.00	210,000.00	210,000.00
Production Cost (PC) (US$/year)		−70,087.10	−70,087.10	−70,087.10	−70,087.10	−70,087.10
Gross Profit (US$/year)		139,912.90	139,912.90	139,912.90	139,912.90	139,912.90
Taxes (27% [1])		−37,776.48	−37,776.48	−37,776.48	−37,776.48	−37,776.48
Profit after tax (US$/year)		102,136.42	102,136.42	102,136.42	102,136.42	102,136.42
Credit Bank Application (CBA) (Total Investments (TI) + Working Capital Investments (WCI)) (US$)	−127,892.50					
Annual Interest [2] (8.00 %)		−10,231.40	−9,412.89	−8,659.86	−7,967.07	−7,329.70
Principal Payment (Credit/5) (US$/year)		− 25,578.50	−25,578.50	−25,578.50	−25,578.50	−25,578.50
Cash Flow (US$)	−127,892.50	66,326.52	67,145.03	67,898.06	68,590.85	69,228.22
NPV:US$ 128,742.50						
IRR: 44.2%						
PBI [3]: 2 years						

Notes:
[1] Country legal entities will pay twenty-eight percent (28%) on the net taxable income onwards the rate will be 27% (modified by Law 253-12) [18]
[2] Interest rates in the DR [19].
[3] Calculation of the payback period [20].

One of the advantages of cultivating energy cane is its ability to grow on marginal land unsuitable for traditional agriculture, without requiring irrigation—even on high-salinity soils—with yields reaching up to 60 tonnes per hectare. As a result, it does not compete with land used for food production [21].

According to an energy balance study [21, 22], a 12-month yield of 100 tonnes per hectare of energy cane, when used as fuel for biomass boilers, can save approximately 15 tonnes of oil, making a significant environmental contribution. Another potential application of energy cane is as energy forests and CO_2 sinks, given its high capacity to sequester CO_2 from the atmosphere. Unlike conventional sugarcane varieties, it does not have a fixed maturation period, providing additional flexibility.

The production of energy cane leverages the same cultivation infrastructure as sugarcane, meaning no new processes are required. Furthermore, it offers the advantage that it does not depend on a specific period for its use after 9–12 months of sowing and can be used directly as fuel for biomass boilers, without the need to be milled in a sugar mill in a period determined by its maturation as the sugar cane.

While the impact of energy cane cultivation on soil requires further research, evidence suggests that growing these varieties on degraded land unsuitable for food crops can enhance soil structure [3].

Some researchers have examined the potential of energy cane as a new energy source using simulation software [23]. They looked at model cases involving 5 and 10-MW production units. However, they found that the prices (ranging between 200 and 240€/MWh) were higher than those of fossil electricity generation, without factoring in subsidies to agriculture [24]. The researchers concluded that further investigation is necessary to explore the use of other biomass sources within the framework of a multi-source industry. Another alternative that has been explored is the production of biodiesel from energy cane, which is more feasible than using soybeans as feedstock [25], as well as the production of biogas [26].

The drying of energy cane was a crucial step in our study. We utilized a Forced-Convection Solar-Energy Dryer (FCSED), which demonstrated higher efficiency compared to passive or natural convection systems [27, 28]. The FCSED system achieved temperatures of 65 ± 5 °C, with a drying time of 24 ± 6 hours and a final water content of 30.0 ± 5.0%. These values can be compared to those reported for other cellulosic biomasses [29–31]. In countries with temperate climates, the viability of solar drying systems is limited by ambient conditions, allowing for a drying season of only 6–7 months per year. However, in tropical and subtropical regions like the Dominican Republic, it can be extended throughout the year. When comparing solar drying with other technologies such as vacuum freeze drying, solar drying demonstrates significantly higher energy efficiency (0.8 solar vs 0.5 vacuum freeze) [32]. The successful implementation of energy cane as an energy-producing biomass will require overcoming challenges related to land use, boiler technology, and overall structure, similar to the challenges faced by Food Waste Treatment [33].

The advantage of using a dedicated crop like energy cane for electricity production is that it does not compete with agricultural food production. Therefore, it can provide a significant energy input to the country's energy supply [34]. The largest producer of sugar cane in the world, Brazil, is focusing on expanding the current sugar cane land areas, including those dedicated to producing ethanol as fuel, by introducing the cultivation of energy cane for electricity production from its biomass [35]. Our results show that it would be economically feasible to introduce energy cane cultivation in the Dominican Republic as an alternative biomass for electricity production, considering the available land, without affecting agricultural food production. However, the potential of energy cane as biomass for energy production is not yet recognized worldwide, and more research is needed to increase its potential as a biomass source [36]. It also creates a significant opportunity to convert the sugarcane agroindustry into not only sustainable energy production but also modern refineries capable of producing a wide range of by-products [37].

4. Conclusions

The investment opportunity study for a 100-hectare farm focusing on the production of energy cane bales for use as fuel in biomass boilers has demonstrated that the project will yield profits from the third year of investment, with a positive Net Present Value (NPV) of US$128,742.50 and an Internal Rate of Return (IRR) of 44.2%. These figures surpassed any possible bank interest rate, which makes this project undeniably attractive from a financial standpoint for investors in the agricultural and renewable energy sectors.

It is crucial to seriously consider the potential for exporting energy cane bales to countries with high electricity consumption, such as the United States and the European Union, due to the current and projected growth of this material worldwide until 2030. Additionally, valuable technological development and know-how will be generated as additional products resulting from the investment.

The environmental impact of using energy cane as fuel for biomass boilers cannot be overstated. It will contribute significantly to the reduction of greenhouse gas emissions and promote environmental sustainability, while also creating job opportunities, developing skills within the local community, and improving the rural economy. Furthermore, the Dominican Republic's vast amount of unused land, particularly in areas of high salinity and semi-desert, presents an opportunity to utilize energy cane as an alternative use for these lands, potentially allowing them to be managed for the generation of carbon credits. The use of energy cane as fuel for biomass boilers has a significant positive environmental impact by reducing greenhouse gas emissions and promoting sustainability.

The cultivation of energy cane is a viable project because it meets the requirements for energy cultivation. These requirements include being easy to process biomass in a feasible way to power a boiler, having high energy density, high yield in dry matter per area per year, being available all year round, having a favourable production cost, being renewable, and not competing with food production.

Author Contributions

M.R.M., Coordination of research activities, including analytical determinations, and calculations. Manuscript writing and its revision; A.J.A.G., Participation in field research activities, including economic evaluation and manuscript writing; D.R.A.M., Participation in the studies on energy cane. Coordination of activities related to the development of the Energy Cane project. Participation in Manuscript writing; A.J.N.S., Participation in the search for data related to the economic opportunity study. Manuscript writing and revision.

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Conflict of Interest

All authors have disclosed that they have no conflicts of interest.

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