



## **Q&A: Addax Bioenergy sugarcane ethanol project in Makeni, Sierra Leone**

Addax Bioenergy, a division of the Swiss-based energy corporation Addax & Oryx Group (AOG), is developing a Greenfield integrated agricultural and renewable energy project in Sierra Leone to produce fuel ethanol and electricity. The project will consist of a sugarcane plantation, ethanol distillery and biomass power plant and related infrastructure.

Feedstock	:	Sugarcane
Plantation size	:	10'000 hectares
Milling capacity	:	200 Tons of cane per hour
Distilling capacity	:	350'000 litres of Ethanol per day
Power capacity	:	15 MW or 100'000 MWh per annum for export
Total investment	:	about 200 million Euros
Workforce	:	> 2000 direct employees
Production start	:	2012

The Addax Bioenergy project is supported by the [Government of Sierra Leone](#), by the Chiefdom Councils and by the land landowners in the three chiefdoms who have welcomed Addax Bioenergy to develop its project in their area. The project is supported by European Development Finance Institutions and the [African Development Bank](#) and this is one of the reasons why [IFC Performance standards](#) and [Equator Principles](#) are applied. In order to meet [EU law on sustainability criteria](#), the industrial and agricultural operating procedures adopt international best practices from the sugar industry and principles and recommendations from the [Roundtable on Sustainable Biofuels](#) (RSB) and the [Better Sugarcane Initiative](#) (BSI) of which Addax Bioenergy is a member.

Addax Bioenergy is also developing the cogeneration and composting parts of its project as a [Clean Development Mechanism](#) at [Gold Standard](#) (CDM). The co-generation project uses renewable sources of energy (bagasse and trash and, in a second phase, bio-gas) for power generation and will be based on more efficient boilers than prevalent in the region. The more efficient boilers aid higher power generation, which when supplied to the grid displaces high [GHG emission](#) intensive power from other sources of power generation (e.g. Diesel generators). Likewise the future composting project will prevent methane emissions that would have happened in the absence of the project through anaerobic decomposition of vinasse. The Gold Standard CDM assigns an additional label of quality on emission reduction.

Land rights in Africa and [biofuels](#) have been the subject of debate in the media and have raised many legitimate questions.

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Addax Bioenergy has analyzed the concerns and from the beginning integrated the environmental and social sustainability criteria in its business model and project design. This was witnessed by the ESHIA process performed by [Coastal Environmental Services](#) and other independent consultants and as reviewed both through a public disclosure process as well as by independent international E&S consultancy [Nippon Koei UK](#). The draft ESHIA report and specialist studies can be visited under [www.cesnet.co.za/publicdocs.htm](http://www.cesnet.co.za/publicdocs.htm)

The below Q&A will hopefully allow readers to better understand the background and features of the Addax Bioenergy project.

## **I. Biofuels, Ethanol and Sugarcane**

### **Q1: What is sugarcane ethanol?**

[Sugarcane](#) is a grass-like plant that grows mainly in tropical climates. It is a perennial crop, i.e. once it is planted, it re-grows after each harvest. Sugarcane is one of the feedstock (such as grains, maize, beet) that can produce both sugar and ethanol.

[Ethanol](#) is another word for alcohol. It is used for the beverage and chemical industries as well as an engine fuel. Ethanol can be blended with gasoline without engine modifications up to a share of 10-20%. Since 2009, the ethanol share in gasoline 95 sold in the EU is 10%.

### **Q2: Where does sugarcane grow?**

Sugarcane grows best in sunny, hot and humid climates and is grown in over 110 countries. The best conditions in the world are found in the [Sao Paulo region](#) in Brazil but it also grows well in sub-saharan Africa, the Caribbean, Indian Ocean islands, India and South-East Asia.

### **Q3: Why is ethanol used as a fuel?**

In recent years, many countries have introduced mandates for biofuels to be mixed with gasoline and diesel. The reasons behind the biofuel policies are many: combat climate change; energy independence from oil producing countries; replacement of finite oil reserves; support to agriculture.

### **Q4: Does bio-ethanol really help fight climate change?**

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Plants which are converted to energy release no more CO<sub>2</sub> greenhouse gas than they absorb through photo-synthesis when they grow, so they should be carbon neutral. However, in many cases, the energy to grow and convert the crops comes from fossil sources (oil, gas, coal) and that can largely offset the benefits. Addax Bioenergy will use biomass for power generation and organic fertilizers to achieve highest carbon savings.

### **Q5: What is the difference between sugarcane and corn ethanol?**

[Corn ethanol](#), as produced in the United States, requires fossil fertilizers and external sources of power for the conversion process. Usually that power is generated from fossil energy sources, therefore the average greenhouse gas savings do not exceed an average 15% compared with gasoline. In terms of energy efficiency, corn ethanol requires 1 unit of energy input to produce 1.3 units of energy. One hectare of land yields on average 3000 liters of ethanol.

Sugarcane produces three by-products: Sugar juice for either sugar or ethanol; [bagasse](#) fiber that is used to generate electric power; [vinasse](#) water residues that are used as fertilizer.

[Sugarcane ethanol](#) refineries do not need fossil energy as the bagasse fiber is used instead. With high-pressure boilers, modern power plants generate enough power for the whole process and also export excess power to the grid. Vinasse is highly nutritious and therefore completely replaces fossil potassium fertilizer.

As a consequence, sugarcane ethanol on average saves about 80 % of greenhouse gases in comparison with gasoline. Only 1 energy unit input is required for 9 units energy output. Sugarcane on average yields 6000 liters of ethanol per hectare of land.

Unlike wheat or corn, sugarcane is not a staple feedstock and therefore its conversion to energy is not in [competition with food](#).

## **II. Addax Bioenergy and the Makeni project in Sierra Leone**

### **Q1: Who is Addax Bioenergy ?**

Addax Bioenergy is an affiliate of the [Addax & Oryx Group](#) (AOG), a Swiss-based, private oil & gas company founded in 1987 with a focus on the energy sectors in sub-saharan Africa. Addax Bioenergy was created in 2007 with the objective to develop renewable energy sources in Africa. AOG has more than twenty years of experience investing in Africa including Sierra Leone.

### **Q2: Why Sierra Leone?**

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[Sierra Leone](#) has suitable lands and climate to grow sugarcane. Less than one fifth of its arable lands of more than 5 million hectares are used for agriculture. The climate is favourable for sugarcane with high rainfall, year-round hot temperatures and sunshine. A distinct dry season allows for a long harvesting period but means that supplementary irrigation is required.

Sierra Leone is a partner country of the European Union and benefits from duty-free access to the EU market.

AOG was one of the first private companies to invest in Sierra Leone after the civil war by renovating the Kissy Oil terminal in Freetown which has developed into a regional hub for petroleum products.

[The Government of Sierra Leone](#) has set up a policy framework to attract investments in agriculture and renewable energy and the local communities of Makeni have welcomed the Addax Bioenergy project.

### **Q3: Is Sierra Leone a safe place?**

Sierra Leone suffered a terrible civil war which was ended by the intervention of the United Nations and the UK in 2001. Sierra Leone is now a democracy and the current president, former opposition leader Mr. Ernest Bai Koroma, was elected in September 2007. The international community, [United Nations](#), [European Union](#), [World Bank](#) etc continues to support Sierra Leone in its reconstruction effort but the country is still at the bottom of the [UN development index](#). The security situation has improved tremendously and it is possible to travel safely anywhere in the country. The rebel groups have all been dismantled and the Sierra Leone armed forces are trained by the British army. However, youth unemployment is high and poses a potential security risk. Therefore substantial private investment is required to create jobs and lift the population out of poverty.

### **Q4: What is the Addax Bioenergy project all about?**

Addax Bioenergy intends to develop a plantation of about 10'000 hectares of sugarcane close to the town of [Makeni](#) in central Sierra Leone. The sugarcane will be processed in an ethanol factory to be built inside the plantation area. Addax Bioenergy will produce ethanol for export to the EU market and generate about 15 MW of excess power for the national grid.

### **Q5: Is the Addax Bioenergy project going to threaten bio-diversity?**

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As Addax Bioenergy intends to export the bulk of its production to the EU market, it has factored in the EU biofuel sustainability criteria which ban deforestation and the use of bio-diverse lands. Addax Bioenergy has therefore designed the plantation development to comply with these rules. The plantation area is a savannah-type land with very little tree cover and only small pockets of biodiversity which will be protected. An environmental impact assessment (ESHIA) according to World Bank standards was conducted by an independent consultancy and found the project to comply with EU criteria on biodiversity. There are no species of fauna and flora in the project area that would fall under the [IUCN](#) list of endangered species.

**Q6: Will the land conversion lead to the release of carbon stock?**

A soil and surface sample analysis was conducted and the carbon stock was found to be very low. The carbon debt was factored into a [life-cycle assessment](#) which still yields close to 70% carbon savings, which is well in excess of the EU minima of 35%.

**Q7: Will the plantation displace existing agricultural production and therefore cause indirect land use change and additional release of carbon?**

The plantation avoids the main cultivation areas in the project area; therefore carbon emissions from indirect land use change will be very limited at best.

**Q8: Sugarcane harvesting is sometimes associated with bad labour conditions, what is Addax Bioenergy doing about it?**

Addax Bioenergy has opted for mechanical harvesting. Manual harvesting is being phased out in many countries because it requires flash burning of sugarcane leaves before cutting, which causes emissions and releases CO<sub>2</sub> into the atmosphere. Cane cutting by hand requires thousands of unskilled migrant workers which can cause social problems.

**Q9: Will the sugarcane be planted in food producing areas and therefore threaten food security?**

Addax Bioenergy has conducted an independent social impact assessment according to World Bank standards. Presently, only small parts of the project area are used for food production. A land use analysis has concluded that the most valuable food production are permanent rice paddies which are located in land depressions which capture run-off water and are therefore easy to manage by the local farmers. Addax Bioenergy has designed its plantation to get around the rice paddies which will continue to be farmed and be accessible by the local population.

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**Q10: What will Addax Bioenergy do to ensure food security in the project area?**

Addax Bioenergy will establish a “Smallholder / Outgrower” (SHOG) division which will directly assist local farmers to work their fields and improve their yields. Current productivity is very low because the farmers have no means to improve it. SHOG will offer training and support farmers with agricultural equipment (tractors, ploughs etc) and inputs (fertilizer).

**Q11: Who will pay for the agricultural support services?**

The SHOG services will be free of charge whenever they are used as compensation to secure food production. If farmers want to take advantage of SHOG to develop commercial activities, the services will be charged at cost.

**Q12: There are not only rice paddies in the area, what about other crops?**

Other crops, like cassava and sorghum are planted in rotational agriculture. Because of the low productivity, farmers have to rotate their fields in a long cycle (5-10 years) which means that a lot of land is left to rest. Some of this will be converted to sugarcane. To ensure that the remaining lands will still produce at least the same amount of food, SHOG will directly assist farmers to grow their crops by offering the above services as a compensation measure.

**Q13: What about the villages, are people going to be moved?**

The plantation design takes into account the villages and development corridors around them. Therefore, no village will have to be resettled. Some isolated settlements may be asked to move but they will be offered compensation, i.e. either Addax Bioenergy will re-build the settlement somewhere else or offer cash compensation if that is preferred.

**Q14: So where will Addax Bioenergy grow sugarcane then?**

The project area is a large plain with so-called “bolis” – the swamp-type depressions where most of the local rice production takes place -, and the “uplands” – gently undulating hills which are only sparsely used. Addax Bioenergy will develop its sugarcane plantations with a focus on the uplands.

The sugarcane plantations are not going to be one big square but rather many small plots (50-70 ha each) in a radius of up to 20 km around the factory.

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**Q15: Will Addax Bioenergy need to irrigate the sugarcane fields and where will the water come from? Isn't that a waste of a valuable natural resource?**

Sierra Leone is a tropical country with very high rainfall patterns. In the Makeni area they average about 2500 mm per annum which is about 3 times the water required for good sugarcane growth. However that rainfall is unevenly spread and the long and totally dry period means that supplementary irrigation will be required. The necessary water will be pumped from the Rokel river, a large stream that flows along the plantation area. A new hydro dam upstream of the project (the Bumbuna hydro-electric dam built by the Italian government was commissioned in 2009) will regulate the water flow throughout the year so the water abstraction will have no impact on the water regime downstream.

Addax Bioenergy will use sophisticated overhead irrigation systems to ensure that water is applied efficiently and economically.

**Q16: Are there any dangerous emissions or effluents from the project?**

Waste-waters will be treated before being discharged and therefore cause no harm to the environment. Vinasse will be applied to the fields as fertilizer via the irrigation network, with precision application and minimal run-off.

**Q17: How did Addax Bioenergy acquire the lands?**

The lands don't belong to Addax Bioenergy, they are being leased from the traditional landowners for a period of 50 years. Addax Bioenergy has from the start adopted a bottom-up approach, liaising directly with the communities and individual landowners. The landowners and the chiefdom councils were assisted by the reputable [Franklyn Kargbo & Co](#) law firm of Freetown in order to make sure their rights are secured. Government has played no role in the lease process other than making sure that the land law and the legal procedures are respected.

**Q18: What is the compensation offered to landowners?**

Addax Bioenergy has adopted the land lease price recommended by the Government of Sierra Leone for agricultural lands of 5 USD per acre or about 12 USD per hectare. According to World Bank standards, the land lease fee has to properly reflect the value of the lands. As this differs from plot to plot, a thorough assessment will be done in the implementation phase to assess if and what supplementary compensation is required.

**Q19: Can people refuse to lease their lands?**

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Most landowners have already indicated which parts of their lands they are ready to lease out to the project and which parts they want to keep for their own use. In general, landowners keep the boliland areas for their own food production and lease the less valuable uplands for the project.

As the land leases are a private transaction, nobody is forced to lease out their lands if they don't want to.

**Q20: What about the landless people? Will their rights be protected?**

According to World Bank standards, nobody in the project area should be worse off than before. This aims at protecting vulnerable people like so-called land tenants who have been farming land or raising cattle on lands belonging to traditional landowners. Addax Bioenergy will make sure that these people can continue to live off alternative lands in the neighborhood or offer other compensation measures.

**Q21: Are people properly informed about the Addax Bioenergy project?**

Numerous public townhall meetings, formal presentations and consultations have been held in the project area during the last two years to inform the local communities and other [stakeholders](#) about all the features of the Addax Bioenergy project. People in the project area are continuously invited to ask questions and comment on the project. A formal [grievance mechanism](#) has been established which include working committees as well as letter boxes installed throughout the project area.

**Q22: What is in it for the local population? Aren't they going to sacrifice their livelihoods?**

The feedback received from the local population is overwhelmingly positive. They are not farmers by choice but by necessity and many young people leave the rural areas for urban centres. The people of the Makeni area hope to get lifted out of poverty by getting stable employment and training opportunities and benefiting from service demands through the project. Over 2000 people will be directly employed and trained by the company to work in the factory and the plantation. The project will become a major economic centre and generate many business and further employment opportunities for local businesses and outgrowers.

**Q23: Why do you intend to export all of the ethanol – shouldn't the local market benefit?**

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The African Development Bank, Addax Bioenergy and the Government have engaged in discussions on how to establish a biofuels policy and a blending mandate for Sierra Leone. However the potential local market is still very small so most of the production will have to be exported.

The entire excess power production will be delivered to the national grid.

**Q24: Who is going to buy the excess power production?**

Until the recent commissioning of the Bumbuna dam, only the capital Freetown benefited from public power supply whereas the rest of the country had to rely on generators. The Addax Bioenergy power supply will supplement the hydro-power as most of it will be produced during the dry harvesting period when the dam capacity is reduced. Addax Bioenergy will feed its excess power into the main high voltage line which crosses the plantation area. The distribution network is managed by the National Power Authority who will purchase the power on behalf of its end-users.

**Q25: There is a lot of reference made to World Bank standards – what are these all about?**

The World Bank, that is to say its International Finance Corporation IFC, has issued a series of investor guidelines, the so-called [IFC Performance Standards](#). These are adhered to by Addax Bioenergy. They encompass the following topics: Social & Environmental Assessment and Management Systems; Labour and Working conditions; Pollution prevention; Community health, safety and security; Land acquisition and involuntary resettlement; Biodiversity conservation; Indigenous peoples, Cultural heritage.

**Q26: All of the above sounds like good intentions – how can one be sure that they will be applied in the long run?**

Addax Bioenergy has incorporated the IFC performance standards in its business model and CSR policies. It is also in the process of securing financing from development financing institutions which ensure that the IFC performance standards are adhered to and tie their disbursements to the implementation of the environmental and social management plans.

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