The Status of Biofuels Projects in Zambia

Draft Report for Overseas Development Institute

Jessica Chu, March 2013

Introduction

As with many countries throughout sub-Saharan Africa, Zambia experienced a surge of interest for the production of biofuels in the mid-2000's. In particular, a number of investments for the production of jatropha were seen in Zambia. Using outgrower models, such projects attempted to emphasize not only their contribution to poverty reduction and economic growth, but also, as a means to reduce the dependency on external sources of fuels. Outgrower schemes were also favoured as a less-capital intensive means of boosting production figures, while companies attempted to implement vertically-integrated models of biofuel (primarily biodiesel) production. These projects were additional bolstered by the government, who showed interest and commitment in the National Energy Policy (2008), and a number of non-governmental organisations (NGOs), such as SNV and DAPP, who worked in conjunction with investors to promote and coordinate outgrower schemes.

However, since 2008, the biofuels bubble in Zambia has largely burst. While significant amounts of money were initially invested, a number of the projects failed to achieve the scales which they envisioned. External (international) funding for such projects became harder to acquire, and thus many of the outgrower schemes, still awaiting their first harvest, failed to extend their financing to the development of processing facilities. A number of the projects opted to downsize, while a number of investors have simply left.

Today, there remains no significant large-scale biofuels investors in Zambia. A number of small projects continue to support jatropha outgrowers or small commercial projects, while the processing of biodiesel remains small and localised. A number of large-scale projects are rumoured to be in the works, but have yet to materialise. Yet, there remains a legacy of legislation to support biofuel production (both bioethanol and biodiesel), so future production remains possible. There has been on-going research and interest in the viability of other feedstocks, notably research in sweet sorghum. Sugarcane and palm oil are existing and expanding industries, therefore there remains the possibility of the expansion of bioethanol and biodiesel production.

Methodology and Approach

The basis for the information for the report was gathered via a number of sources. As a number of the projects operating have since ceased, the information for the intentions of the projects remain from unconfirmed and often speculative media sources. When possible, the information presented was derived from sources from the company itself, rather than the media. The projects were checked against records from the Zambia Development Agency (ZDA), who play a role in attracting investment into Zambia. However, beyond the registration of the company, they seldom keep detailed or up to date records. Representatives were sought from the two key government ministries are the Ministry of Agriculture (MOA) and the Ministry of Mines, Energy and Water Development (MEWD). While they were familiar with the big names, they too were unsure of any further details, as no one body has been placed in charge of regulating or monitoring the biofuels industry, particularly when projects fall under both ministries, as is the case of most agrofuels. Rather, the MOA have only been concerned with the growth of jatropha by smallholders, while MEWD have played a role in legislating for biofuel production. Lastly, two civil society organisations have been involved in monitoring the progress of the development of the biofuels industry: the Biofuels Association of Zambia (BAZ), who represent the industry, and the Civil Society Biofuels Forum (CSBF), formed by a number of NGOs. Both organisations have been vocal about the growth of the industry and have worked with government on issues such as the creation of legislature and regulations. A number of other academics and NGOs have also published useful summaries on Zambia, in particular: SNV (2009), CIFOR (German et al, 2011a; 2011b), and Andreasson and Richard (2011). Representatives from ZDA, MOA, MEWD, BAZ, and CSBF were contacted for information.

Gathering recent information on the status of the industry in Zambia remains a challenge, as most of the literature available dates from the 2005-2008 period, at the height of the investment interest. With the collapse of many projects came the decline of interest to research the impacts of these projects (and their failures). Fieldwork reports are limited to this time period, and the most detailed record to date remains from BAZ (2008). A large proportion of the information made available on projects that have since failed or downsized (such as Oval Biofuels, D1 Oils or Marli Investments) has derived from the company itself; thus the information available is selective and has often involved over exaggerations of their successes (in particular, to do with the number of outgrowers recruited and land planted), as was the case with the early history of D1 Oils (BAZ, 2008). Little information could be found on planned output levels, particularly as few projects ever reached the processing stage in significant volumes.

Status of Biofuels Projects

15 projects have been found or have been rumoured to be interested in the production of biofuels. These projects have been summarised in Appendix 2. Of these projects, 13 are for biodiesel (9 jatropha, 3 palm oil), while 3 have are for bioethanol (all sugar cane). However, of these 15 projects, only 6 are thought to be, or have been, operational in the production of biofuels (namely: D1 Oils, ETC Bioenergy, Marli Investments, Oval Biofuels, Kansanshi Mining, and Southern Biopower – all in jatropha for biodiesel).

Table 1: Project Summary

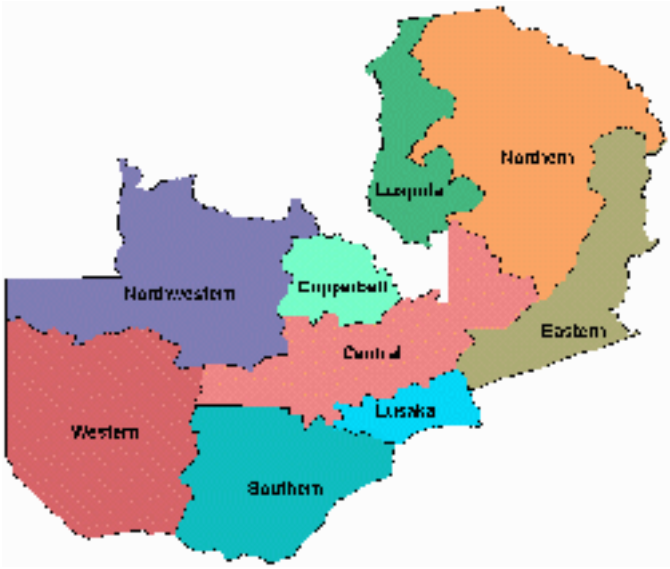
	Ethanol	Biodiesel	Total
Number of projects authorised	3	12	15
Number of projects implemented	0	6	6
Total area authorised (ha)	53,383	600,173	653,556
Current area under cultivation (ha)	0	30,325 (3,925)	30,325 (3,925)
Planned area for cultivation (ha)	58,383	927,049	985,432
Current output of biofuel (specify tonnes/litres)	0	0	0
Planned output of biofuel (specify tonnes/litres)	28,000,000	66,815,000	94,815,000

The hectarage of total area authorised and planned area for cultivation remain significantly large; however, these figures are unreliable, as most are derived from company literature and are often over-exaggerated. This figures are often inclusive of land intended for cultivation by outgrowers, and are not indicative of the land that fell under ownership by the investors themselves. With regards to the areas under cultivation, the figure of 30,325ha represents the reported production hectarage at the peak of all cultivation; however, as only 2 projects remain in production today (Kanasanshi Mine and Southern Biopower), it is assumed that the maximum levels of areas under cultivation presently are 3,925ha. However, the figures under total cultivation throughout the country may be slightly more, as figures for smallholder production, not associated with large investments, are not tallied. The same caveats can be applied for the figures of planned output of biofuel; it is assumed that the actual current level of biofuel output is negligible, as there are no significant processing facilities in Zambia.

Table 2: Feedstock Summary for Biofuel Production

Crop	Current area under cultivation (ha)	Planned area for cultivation (ha)
Jatropha	30325 (3925)	847,049
Palm Oil	0	80,000
Sugar	0	58,383
Total	**30325 (3925)**	**985432**

Figure 1: Map of Zambia, with 9 provinces. In 2011, Northern Province was divided into 2 provinces, Muchinga and Northern Provinces.



While jatropha has been the only feedstock under significant biofuel production, the figures of actual overall production remain low in comparison to palm oil (for edible oil) and sugar cane (for processed sugar). Both sugar cane and palm oil production are set for expansion, but still the number of expansions remain in the planning stage. Geographically, sugar production remains limited to Southern Province (Mazabuka District) and Northern/Muchinga Provinces, while palm oil is only viable in regions of Luapula, Northern, and Muchinga Provinces. However, jatropha schemes were attempted by several companies in all 9 provinces; the remaining producers are spread throughout (with Southern Biopower operational in Southern Province, Kansanshi Mines in Northwestern Province, and numbers of smallholders spread out through Lusaka, Central, and Copperbelt Provinces). There has been little evidence that jatropha has been more viable in any particular region.

Biodiesel Projects:

Of the projects (12) intended for biodiesel, 9 are for jatropha production and 3 are for palm oil. Of these 12, only 6 were realised, all jatropha projects. Of the palm oil projects, one remains a rumour (Biomax; rumours date to 2008, so it is likely that the project has not come into fruition), while the other 2 are for companies that have existing operations. Gourock is a producer of ropes and edible oils; they were rumoured to be interested in sourcing palm for their own production and possibly for biodiesel. Zampalm is beginning production of palm oil for edible oil; they have not directly voiced intentions to produce biodiesel, although many have speculated so. Amongst the jatropha projects, 6 began production, while 3 have not. Kaidi Biomass remains in the planning stage (stalled by land negotiations with the government) while both Ferrostaal and Bedford Biofuels projects did not survive past the research stage. Ferrostaal began trial plots but did not move beyond these, while Bedford Biofuels were operational in Kenya, but did not plant significant amounts in Zambia. Instead, they based their research and development offices in Zambia.

The 6 that achieved significant production levels, did so primarily through outgrower schemes, with small nucleus estates (with the exception of Kansanshi Mines, whose jatropha productions were limited to their outgrower corporate social responsibility project, with intentions for expansion). The Kansanshi Mines and Oval Biofuels projects are linked

with mining companies (First Quantum Minerals and Albidon respectively), whose venture into biofuels were meant to supply energy for their mining operations. ETC Biofuels took over an existing commercial agricultural operation, and grew jatropha in addition to food crops. However, ETC Bioenergy, Marli Investments, and Oval Biofuels have since ceased operations (with ETC selling their assets to Zambian agribusiness, Zambeef); Southern Biopower remains in operation in a small form (they are now a small commercial agricultural venture with forays in sustainable energy), while it is believed that the Kansanshi outgrowers project remains in operation. D1 Oils have stopped their outgrower schemes and remained registered as a research and development office. No significant amounts of biodiesel were produced.

Bioethanol Projects:

Only three projects were reported for bioethanol production; all involved are for sugar cane feedstock. Recent rumours (2011) emerged about an investment from AgZam, although they are rumoured to still be in the negotiation stage for land holdings. The company voiced specific interest in the production of bioethanol. Meanwhile, Puzzolana is an existing company providing imports of machinery from India; early rumours emerged of an interest to diversify into bioethanol through sugar cane, but little evidence of a project was found. Zambia Sugar remains the largest sugar estate in Zambia (and the largest sugar producer); they have recently voiced intentions in exploring the option of converting molasses by-products into bioethanol and are in research stages. No bioethanol has been produced yet.

Factors Affecting the Status of Biofuels Projects

Many large-scale biofuel projects were short-lived; the majority saw investment interests beginning in 2005-2006, while by 2009 most had either ceased or downsized, while a number were never able to move into the producer stage. There are a number of external (international) factors that resulted in the decline of available funding for such projects, which will not be discussed here. In addition to external factors, there have been a number of domestic factors that have affected biofuels production.

National Policy

At the height of the interest in biofuels, the Government of the Republic of Zambia (GRZ) demonstrated their commitment to exploring biofuels as an alternative to imported fuel, through their National Energy Policy (2008). The National Energy created standards for liquid biofuels (ZS E100 for bioethanol and ZS B100 for biodiesel); in 2011, the GRZ further issued blending ratios (5 percent for biodiesel and 10 percent for bioethanol). However, while these efforts demonstrated a commitment to the biofuels industry, the progress to achieve these milestones were notably slower than the progress of the industry itself. In addition, the standards for biofuels are meant to be monitored through the use of one main blending plant (The Indeni Oil Refinery in Ndola, Copperbelt Province). However, the government continues to provide subsidies for fossil fuel, thereby hampering the price competitiveness of biofuels. ZDA continue to promote investments in the biofuel sector, although for them it is not a priority sector.

Financing:

According to a Marli Investments presentation (2009), the difficulty in obtaining funding for their project did not necessarily lie in the lack of funding for the construction of processing facilities (which have yet to expand in Zambia), but rather, the lack of financing available to fund the agronomy side. The uncertainties associated with the lack of land ownership and guaranteed production, as well as the length of the gestation period, in the jatropha outgrower model meant that financial institutions were hesitant to invest in such biofuel projects. Additionally, the costs of transportation and distribution throughout Zambia remains high due to the poor infrastructure of roads and rail networks.

Target Markets:

The target market for biofuel production in Zambia, particularly for the large-scale investors, appears to be to supply domestic demand. As production levels remained in early stages, it was not yet competitive to export feedstock, although some companies with regional reach (such as D1 Oils) did, or do have facilities in neighbouring countries. Domestic demand and the need to reduce dependence on external sources of fuel has been one of the prime motivations for national policy.

Land Issues:

With regards to land rights, there have been two distinct trends in biofuels investments in Zambia thus far. While the majority of jatropha projects have employed the use of outgrower schemes (thereby not acquiring land directly, with the exception of land acquired for nucleus hubs), other feedstocks such as sugarcane and palm oil would require the use of extensive plantation schemes. Outgrower schemes have often worked with organized groups of farmers, either through NGOs or through farmers organisations. Projects such as Marli Investments and D1 Oils began in an area of a resettlement scheme (the Kasosolo Settlement), indicating that they may have worked with farmers who might have titled deeds to their lands. The majority of commercial level estates (land over 100ha), for both nucleus hubs and plantations, have been negotiated either through the government (primarily ZDA), or through local governments and traditional leaders. There has been some evidence (such as the Zampalm case and D1 Oils) that local stakeholders (including traditional leaders and local governments) have had the ability to renegotiate with companies when it was through that their land demands were too high.

Capacity Constraints:

While biofuels investors were able to find more than enough interested farmers to join outgrower schemes, it remains to be seen to what degree such schemes can be profitable in conjunction with the factor of costs for transportation. Most of the attempted schemes envisioned a central nucleus, with a separate farm for seedlings and processing facilities. Interest and funding for such facilities appeared available, although the construction and realisation appears to not have taken place. It remains a factor of the availability of international finance for the production side, which may see the favouring of other feedstocks (palm oil, sugarcane), rather than the out-of-favour jatropha. The ability for the industry as a whole to become profitable will depend on the competitiveness of such feedstocks in terms of pricing. Little research is available on that front, although research continues on the viability of other feedstocks to contribute to biofuels production such as soya and sweet sorghum.

Lastly, technology and expertise continues to be a constraint for the expansion of biofuels production. Machinery and equipment are sourced elsewhere and are expensive to transport to Zambia; meanwhile, research and development facilities are still limited. A number of projects sourced expertise from elsewhere (notably through the recruitment of British or South African management and technical staff, as in the case of Ferrostaal, ETC Biofuels, D1 Oils, Marli Investments, and Oval Biofuels).

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- Gourock Zambia - http://www.gourockzambia.com/
- Puzzolana Zambia - http://www.puzzolana.net/index.php
- Thomro Biofuels - http://www.thomrobiofuels.com/
- Southern Biofuels - http://www.southernbiopower.com/
- Verus South Africa (ETC Biofuels) - http://www.verus.co.za/beiprojects.html

Representatives Contacted:

- Professor Thomson Sinkala – President, Biofuels Association of Zambia; Vice Chairman, Kaidi Biomass; President, Thomro Biofuels
- Mr. Kakoma Mudenda – former employee, Oval Biofuels; member, Biofuels Association of Zambia
- Mr. Marriot Nyangu – coordinator, Civil Society Biofuels Forum
- Ms. Harriet Zulu, Biomass Project Officer, Ministry of Mines, Energy and Water Development
- Dr. Kayoya Masuhwa, Chief Agricultural Officer (Tree Crops), Ministry of Agriculture
- Mr. Lovemore Simwanda, Land Banks Technical Advisor, Zambia Development Agency
- Ms. Nsama Nsemiwe, Acting Director, Zambia Land Alliance
- Mr. Raphael Chikwampu, former employee, Zambia Land Alliance

Appendix 2: List of Known Biofuels Activities in Zambia

Name of Company	Status	Type	Feedstock	Notes:
AgZam	Planned	Producer	Sugar cane	Investment signed, 2011; not yet operational.
Bedford Biofuels	Planned – ceased	Producer/ Processor	Jatropha	Planned partnership with D1 Oils, 2010. No evidence of production.
D1 Oils	**Operational - Downsized**	**Producer/ Processor**	**Jatropha**	**Renamed NEOS in 2011. In 2011, Re-oriented operations towards research and development.**
ETC Bioenergy	**Ceased**	**Producer/ Processor**	**Jatropha**	**Production achieved. Sold land and production to Zambeef, 2011.**
Ferrostaal	Planned – ceased	Producer/ Processor	Jatropha	Planted trials, 2010; ceased operations, 2011
Gourock	Other	Producer/ Processor	Palm Oil	Company produces a range of products, which includes cooking oil and margerines.
Marli Investments	**Ceased**	**Producer/ Processor**	**Jatropha**	**Began outgrower scheme. Downsized. 2011 - looking for funding.**
Oval Biofuels	**Ceased**	**Producer/ Processor**	**Jatropha**	**Ceased operations, 2009**
Puzzolana	Other	Producer/ Processor	Sugar cane	Indian-based company, exports machinery into Zambia.
Kaidi Biomass	Planned	Producer/ Processor	Jatropha	Still negotiating land holdings (January, 2013)
Biomax	Planned	Producer/ Processor	Oil Palm	Conducted EIA and scoping in 2008. No evidence of production.
Zambia Sugar	Other	Producer/ Processor	Sugar cane	Zambia's largest sugar producer. Owned by Illovo (South Africa)
Zampalm	Other	Producer/ Processor	Palm Oil	Produces palm for cooking oil. Owned by Zambeef.
Kansanshi Mine (First Quantum Minerals)	**Operational**	**Small-scale/NGO**	**Jatropha**	**Small-scale outgrower programme with some production**
Southern Biopower	**Operational - Downsized**	**Producer/ Processor**	**Jatropha**	**Small-scale production of biodiesel and biogas**

Other Players:				
Mkushi Holdings		Biodiesel Production	Jatropha	Listed by ZDA
Environmental Biofuels	Operational	Biodiesel Production	n/a	Operates commercial centre for biodiesel distribution and smallscale processing.
Thomro Biofuels	Operational	Producer/ Processor	Jatropha	Smallscale farm (105ha) for research and development
Macha Works		Small-scale/NGO	Jatropha	NGO – Choma District (Southern Province)
AfricaWorks		Small-scale/NGO	Jatropha	NGO – Mongu (Western Province)

Conservation Farming Unit		Small-scale/NGO	Jatropha	NGO – Mumbwa (Central Province)
SNV		Small-scale/NGO	Jatropha	NGO – Supported jatropha outgrowers
DAPP		Small-scale/NGO	Jatropha	NGO – Supported jatropha outgrowers
Zambia Agricultural Forest Extension Project		Small-scale/NGO	Jatropha	NGO – Initially funded by D1 (2005) – lost funding in 2008 – to start jatropha nursery for outgrowers.
Isubilo Oil Palm Outgrower Scheme		Small-scale/NGO	Oil Palm	Local government supported project for oil palm (42ha) in Luanshya District (Copperbelt Province)
Bruno Jatropha Nurseries		Nursery	Jatropha	Jatropha Nursery, Central Province
Roger Sheriff		Nursery	Jatropha	Farmer – Jatropha nurseries, Serenje District (Central Province) – also involved in other companies attempting to start biofuels processing facilities.

* Planned - means recent investment, no progress made on production yet.
* Ceased - means research/production was started, but project has quit or since sold assets
*Unsure - means company rumoured to be looking to move from another field into biofuels, or move into biofuels in addition to current projects
* Other - means firm is producing feedstock for other purposes and could (or is rumoured to want to) move into biofuels
* Downsized - means firm initially began with large operations in biofuels, but has since re-oriented production or downsized.

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