

Case Study

Bush to Power project

Foibe Nghoongoloka - fnghoongoloka@mfmr.gov.na

Gonçalo Murta - mail@gmurta.com

Time of interview: 70 minutes

Recorded interview

Dr. Detlof von Oertzen, private-sector consultant, VO. Consulting

No restrictions on use of information

The Biofuel/energy supply chain

The value chain in the bush to electricity business model have a number of different steps to treat the biomass before it can be used in the power plant. These are harvesting, drying, transporting, crushing, preparation of biofuel to be used at the power plant, power plant and energy distribution to the power grid. Until the distribution of the power, all the steps might be done by the same entity, making it easier to manage all the system, but with increasing of risk. Or maybe done with in cooperative system, where the farmer would supply the wood, a second team would be responsible for the harvesting and drying of the biomass, a third team transport the biomass from the farms to the power plant, a fourth team would be managing the power plant. The distribution would be done by existing entities that already have the infrastructure to distribute and supply the power to the national grid.

The current project was built inside a commercial farm in the Northern region of Namibia, at Outjo. At this farm, all the steps until the distribution are undertaken by one single identity. The power is produced and is then fed into the existing power and distribution line, operated by the local energy distributor.

The biomass target is the encroachment invader bush, that it is considered a serious problem that needs to be solved in order to maintain biodiversity and agricultural viability in Namibia. The harvesting process would ideally be highly selective, using a combination of both manual and mechanised harvesting. The focus of this business was not only the profitability of the business, but as well the increase of jobs and reduction of the invasive bush in rural Namibia.

The power plant technology was imported from an Indian supplier and the energy produced is by wood gasification.

The expansion of the project and the separation of the steps into separated businesses would have to be assessed.

The case study.

The project started in 2007 with the collaborative efforts of three organizations: the Desert Research Foundation, where Dr. Detlof von Oertzen, was at the time the Executive Director; the Namibia Agricultural Union and Namibia National Farmer's Union. The project was funded by the European Union under the Rural Poverty Reduction Programme. The grant acquisition was a long process, as it is normal for projects that use grant funded money.

By early 2009, the appropriate technology, location and funding aspects had been decided on. Later that year all criteria and decisions were finalised and the first trench was dug and the concrete was poured.

The business model created was identified as a small scale project, that has all the requirements to work for twenty or more years. It is used to demonstrate *in situ* how it is possible to reduce existent constraints in rural Namibia, such as bush encroachment, jobs creation, energy supply and value added to the harvesting process. The grant funds were used to set up a system that once the fund finished it was possible to maintain the running costs under control and the operation was able to keep working.

At the harvesting level, the project established a semi-mechanised harvesting process. This process consists in a selective thinning of the invasive bush species by manual and mechanised work. However, it is recognised that future projects and business models could be either fully mechanised or fully manual, with advantages and disadvantages in both scenarios. The project wants to present the benefits of proper harvesting to the farmers, since it is recognised that de-bushing and thinning certain bush species improves the agricultural business. It is also a goal of the project to present to the farmers that an activity they do at the moment can be less costly.

The technology used at the energy production was a wood gasification method technology, imported from India. The contract made with the Indian supplier included the installation and start-up of the power plant, as well training to the local team at the plant power location.

Drivers.

The drivers that allowed to initiate the project was the will of the three organisations that started the project. The organisations had a clear idea how the project would be using the rural adversities, constrains and the existing un-linked chain processes. The technology that was envisaged needed to be properly adapted to rural and national conditions. Needed to be advance robust technology with low level of electronics and specialised technical components. Maintenance, repairs and creation of parts needed to be possible to be done in local conditions. Similar technology requirements were identified to exist in India and other parts of the world. Being the most financial accessible technology available in India, contacts with suppliers in this country were made until the final contract.

The national energy provider and the local energy distributor were also important drivers that allowed the start up of the project. Without these identities the distribution of the energy would not be possible. However, the importance on overcoming electricity distribution challenges such as poor power factors on distribution lines was not properly addressed. It is recognised that more effort and quicker replies should have been made by all stakeholders to ensure that once the power plant was running would not had been delays in providing the energy into the power grid.

The environmental footprint, especially the water use in a country where water is a very limited resource is of extreme importance for the viability of projects. It was understood that in terms of water usage projects like this would have an impact in the ground water levels. At the tender phase for the project, one of the criteria was the optimisation of the water usage by the power plant.

Regarding the de-bushing and thinning of the invasive bush, is recognised that this action reduces the evapotranspiration, allowing the water to penetrate in the ground and refill the aquifers. At the same time, a selective de-bushing improves the biodiversity and also provides better ground to the agricultural practice. The actual de-bushing practices of the project occurs with selective technologies and the biomass harvest is gasified. As biomass feedstock contains previously bound carbon dioxide, this will be released during the gasification process.

Support.

European Union, Rural Poverty Reduction Programme - The financial support received was mainly from the EU. With this fund was possible to proceed to an international tender where some 35 interested parties responded initially, leading to an eventual short-list of 3 suppliers.

Desert Research Foundation - The team at the foundation supported and drove the project forward. They had a competent team for the different stages where the project was. It had access to people with different skills and knowledge that allowed them to negotiate with the rural community, with the farmers, with the different tenders. The Foundation had knowledge in the different technology proposed and what would be better adapted to the rural Namibia.

Namibia Agricultural Union and Namibia National Farmer's Union - The Union's allowed the communication bridge between the labour force, the rural community and commercial farmers. Increasing the process of negotiation and understanding the project since the implementation strengthens the project.

NamPower and local distributor - The support of the national energy supplier, with a power purchase agreement and the local energy distributor were one of the key supports to allow the project to start and quickly show a positive result. Knowing also they would deal with known and unknown problems since this project would be pioneer in proving an alternative source of energy into an establish power grid. They still agree in supporting the project on what they could do. However, being aware of certain problems and difficulties from the energy distributor side, the delay in solving and the efficacy of the solution delayed the improvement of the project.

Indian supplier - The Indian supplier had an impact on the sustainability of the process, their knowledge in adaptation of the power plant to rural conditions, was of importance for the viability of the project. Some technical issues did impact in the evolution of the project as some faulty equipment gave problems once the first rains started, and the water requirements that were much higher than expected.

Commercial farmer - Several sites were identified, within communal land and on commercial farm. Once all criteria were provided a commercial farmer was selected. The long term commitment, the ability to manage different setups and levels of the energy supply chain, the ability to fix and repair locally and quickly any component of the power plant needed to be achieved for viability of the project. All these criteria and management capacity to run the project would have to be done by the owner of the farm.

Jobs.

The job creation may vary between the type of business model chosen. In either situation the majority of job creations are on the harvesting side. The drying and transport sector also provide some jobs, as well at the power plant level. In the power plant the job creation is limited and requires more skilled workers. Potential jobs in indirect business might be associated, either with contractors and specialised suppliers or even with secondary business (use of excess heat for drying fruit or vegetables). The development of the project did not allow to create the secondary businesses.

The initial labour force were of fifteen workers, where four were women, being all paid. At the present a couple of extra workers were employed. Mainly because the knowledge of the business work increase with experience and it were identified specific work positions that were not foreseen at the beginning of the project.

All the jobs did require training and skills improvement, from harvesting to power plant operation. The effort of training did vary between a couple of hours in the harvesting until a full week of training at power plant operation. The training was focused on being practical and hands-on, the theory was explained while practical exercises with the workers were being done.

Business targets and wealth creation.

The business model adopted was to allow exposure of the technology that can be established to provide job creation, energy and environment benefits. The return of investment for similar projects are expected to be in long term. In the particular case of this project, the grant funded programme that the project was based on, make it more difficult to reasonable judge the actual returns of investment achieved.

The quantification of job creation in rural Namibia and the overall impacts are not easy to measure in economic terms but that was one of the objectives of the project. Besides that another aim was to measure the wealth created for the local community and the environment benefits that the harvesting of invader bush has.

Un-accomplished targets that are having an impact on the business is the unsatisfactory power factor on the distribution line and the higher than expected use of water.

Training.

The training for the complete operation of the business was agreed in the contract with the technology supplier. In the contract the supplier would bring, install and start-up the different apparatus required to the full operation of bush to electricity business.

Un-skilled labour was identified to receive training for manual harvesting and treatment of biomass required to feed the power plant. For the mechanised harvesting, workers with skills in heavy duty truck driving were identified. Workers with some background in technical subjects received training for managing and maintaining the power plant. Specific training was also provided to the local plant operator.

Training was focused on operating the equipment in the local environment where work was going to be done. There was no classroom, only practical training with theory and questions being given immediately, with practical information. The technicians were in the field so the workers had the opportunity to observe how professional technicians operated the different apparatus. The training was only finish once it was observed by the technician that the worker was able to independently operate the machine.

The training was successful and the workers that received the training were able to train others. From the initial group, some workers left the project, they either moved to other location or went for other jobs, and were replaced by other workers that received training from the original manager and technical group. At present there is enough capacity in house to continue the process of training.

Local community stakeholder groups.

The process of engagement with stakeholders started with the beginning of the project while discussing whether the project should be implemented in communal or commercial lands/farms. The overall time in selecting and identified the stakeholders group, as well the location to implement the project took around nine months.

Communal land group - The initial idea of the project was to implement it in communal land. The places were visited and meetings at the different locations took place with the local communities and responsible. In general, people were often very interested and the outcome of the meetings was positive, since bush encroachment is also a problem in communal areas. It was agreed between the chief's, responsible for communal land that would be very difficult to tie a long-term project to a structure that is diffuse and there would be no one taking liability to manage the project.

Commercial farmer's group - While the meetings were happening for the communal land possibility, a number of interested commercial farmers were also approach. The process was lengthy, more than 50 applicants were identified as potential farm locations for the project. Using pre-establishment criteria the number of applicants was reduced to five farmers, that were all visited. The project criteria took the farmer's own capacity into account, as well as the willingness to engage with the project, since the daily routine of the project would had to be managed by the farmer. Once the project would be establish there was no return, so the identification of the most appropriate location needed to be ensured from the beginning. The process of selection brought the number of candidates for three, and in conjunction with the Namibia Agricultural Union and Namibia National Farmer's Union a final selection process was undertaken which identified the most suitable commercial farmer to establish the project.

Concerning the potential of opportunities that the project would bring to the community, it was always avoided to promise more than what was going to be delivered. The project team was aware that often the rural community take any sign of development has the solution for removing them out of poverty and bring development to their region.

Impact on agricultural practice

A baseline of criteria and factors were identified at the beginning of the project to allow a more precise analysis of the impacts of the project in the community, knowing that this would be very difficult to measure and identify after the start of the project. Any impact of the project would only been seen in a long term and would be observed in a variety of impacts. At present there is no definite quantitative evidence that would allow the establishment of a relation between community livelihood improvements and the implementation of the project.

There was a positive impact on some of the workers that before the project were unemployed, and this is the only variable on poverty impact that the project would be able to identify with certainty. There are a number of factors that contributes to an outcome and influences the behaviour of the community.

In theory, in what concerns to agricultural land impact, the way that the project is built would allow to improve land for agricultural proposes. The harvesting does occur at the present to allowed farmers to maintain their cattle and farming landing productive. In reality, to confirm if there was an improvement in farming due to the implementation of the project has not been attempted. The natural extreme conditions of the Northern Namibia agricultural environment changing continuously year after year; the natural fluctuations in farm production; new machines that are bought to improve farming; years where expenditures are higher than others all make it very difficult to make statements about long term effects of a single aspect. It is not easy to establish the direct benefits for the farmer responsible for the operation of the project, but it seems likely that the farmer has benefitted from the project.

Future growth plans and recommendations.

The engagement with the energy supplier and the local distributor should have been done differently. Stronger binds from these stakeholders to the project needed to be guaranteed before the project was ready to delivery power to the grid.

The identification of stakeholders that are willing to invest in the development of the project, rather than just establish the project with grant funded money.

Promote the actual project within the Namibian government, presenting real solutions to constrains that rural Namibia is facing. Spread similar projects or links of the supply chain in several regions of Namibia.