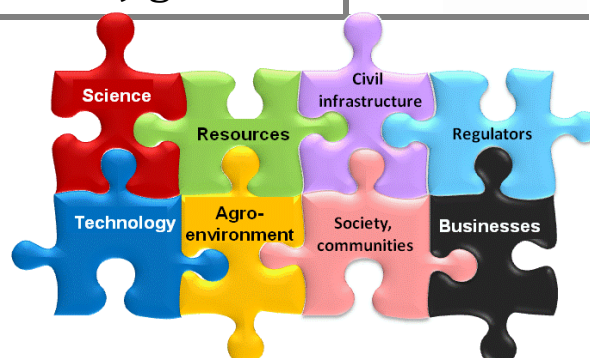


## Biofuels Putting together the Green Jigsaw

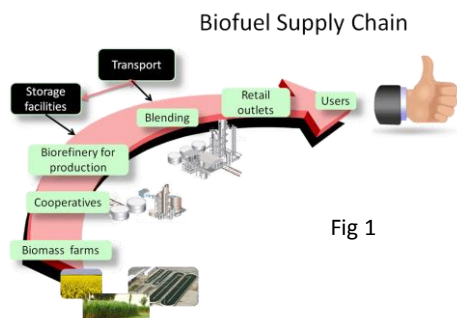


Project Title:	Capacity Building in South Africa, Namibia and Ghana to Create Sustainable, Bio-oil Supply Chains
Lead	University of Greenwich
Partners	Turner & Townsend (Pty) Ltd, South Africa University of Namibia, Namibia University of Ghana, Ghana Jatropha Africa Ltd, Ghana Goldex 35 (Pty) Ltd, South Africa Consorzio di Ricerca per lo Sviluppo di Sistemi Innovativi Agroambientali (CoRiSSIA), Italy Marine Biological Association, United Kingdom

### Italy Case Study



Case Study title	Cà Spinazzino (Scaramagli)
Name of reporter	Raffaele Leone
Contact details	University of Palermo, Dept. of Agronomy and Forestry Sciences
Time period of interrogation	January 2013
Methods used in interrogation	Direct interview (Skype)
Stakeholders interviewed- title, position in organisation	Owner and creator of project is the farmer himself, Mr Remo Scaramagli, MSc in Agronomy.
Any permissions / restrictions on use of information	Spoken permission to print after final draft approval



## The Biofuel/energy supply chain

*With reference to fig 1, give an overview of the full biofuel supply chain that the case study forms a part, both as it exists now and/or as is planned.*

*Include details of*

- Biomass feedstock – locations of biomass farms,*
- transportation methods to ship biomass to processing units;*
- key technologies used in biorefineries / blending operations;*
- Retail outlets and end-users, including any international export markets involved.*

The **Ca' Spinazzino project** is a **50 ha energy farm** in the North of Italy owned by Dott. Remo Scaramagli. The farm uses various renewable resources to produce energy and is also the end user in part. Renewable resources on the farm include photovoltaic panels, wind energy and biomass. In our case study, we focused solely on energy production from biomass.

The biomass feedstock is sourced from two crops: sunflower and rapeseed. The seed is subsequently cold pressed to obtain oil. The processing plant (pressing and filtering) is in close proximity to the biomass production sites, thereby limiting transport costs; transport is carried out almost exclusively by the farm itself.

The press is owned by the farmer and the seed cake which remains is sold as a soil fertilizer or as animal feed.

As regards energy production from oilseed cultivation directly on the farm, the end user is currently the farmer himself; he feeds a small amount of filtered pure vegetable oil (PVO) into a diesel engine CHP unit. However, energy production from plant oil is still in its 'experimental stages' and the company is not yet authorized to sell any of the energy it could potentially produce given the farm's total PVO production. The farmer is also waiting for permission to use the PVO to fuel his tractors and other farm machinery. Currently, the farm sells most of the oil on the vegetable oil market and not for use in energy production.

However, although the farm is not in full energy production from biomass, the system is up and running for energy production from other renewable resources (PV and wind) and the electricity is fed back into the grid.

*The case study. Give a brief overview of the case study, its size of operation, the business model, when it was initiated and by whom, and how long it was/has been operational for. Indicate the sources of funding, any written or contractual agreements with suppliers of either equipment supplies, or of biomass sources as relevant.*

### **The biomass farm**

The 50 ha of farmland is dedicated entirely to oilseed cultivation.

The biomass feedstock is sourced from two crops: sunflower and rapeseed. Several crops have been trialed over the years, including *Brassica carinata* and soya, but, in recent years, the farmer has settled upon sunflower and rape. Soya was abandoned due to limited oil yields (10%). *Brassica Carinata* is viewed by the farmer as a relatively new crop and, following trials, he would recommend it for use in rotation with a grain crop in warmer climates. In the north of Italy, rape has higher yields and genetic research is more advanced than for Brassica. Furthermore, Brassica needs to be harvested quickly or loss is too high and humidity levels also have to be carefully checked. The farmer found that Brassica was problematic due to low resistance to water logging following heavy rains and the seed presented greater resistance to crushing during oil extraction. Brassica was originally grown on the farm as an experiment aimed at guaranteeing a constant feedstock supply, were there to be problems with the rapeseed or sunflower harvest. The resultant oilseed meal is high in glucosinolates (especially if enriched with the sludge resulting from the second pressing) and is excellent as a weed management tool with fertilizing properties.

Jatropha has also been tried on the farm (seeds acquired from Senegal) but, as it will not grow successfully in Europe, it is unlikely ever to be a financially viable feedstock.

Oilseed production is currently 30-35quintals/ha for both sunflower and rape, and the oilseed is cultivated exclusively to produce oil from cold pressing.

### **Transportation:**

Part of the rapeseed cultivation is located in close proximity to the pressing unit. The other oilseed fields are located within a 15km radius of the press. Seed is harvested directly in the field requiring only the seed to be transported to the press. Prevalently farm trucks are used to transport the seed; other trucks may be hired to help with transport if the threshing rate is particularly high.

## Processing: - key technologies

The automatic cold press (mechanized cleaning and 1<sup>st</sup> press) is owned by the farmer. The rape and sunflower seeds yield 33% oil from 1<sup>st</sup> press; the residue undergoes a further cold press from which an additional 7% of oil is obtained. From a technical point of view, the cold temperatures in the North of Italy represent a problem as the oil is dense and does not filter easily. It needs to be heated to 70°C before being fed into the CHP unit.

The oilseed meal which remains following 2<sup>nd</sup> press is considered by the farmer to be of higher quality due to its increased protein-meal ratio and longer 'shelf life', however, it is not perceived as such on the market and sells at a lower price than 1<sup>st</sup> press seedcake.

The longer shelf-life makes handling easier; the seedcake is stored without the need to give much consideration to humidity levels or temperatures, thereby allowing the farmer to sell when prices are attractive.

The farm produces energy from PV and wind resources and this electricity is fed back into the main grid.

Energy production from the oilseeds produced on the farm is limited to date and is wholly consumed by the farmer himself. He is unable to use all the energy he produces, but, as production is still in an 'experimental stage' and as he has not yet applied for registration, he is unable feed it into the grid.

The farm uses a **20 kW diesel engine CHP unit which runs on filtered PVO** (water-cooled EC Power model XRGI 15G).

## The business model

Mr Scaramagli is creator and distributor. He defines himself as a highly environmentally-aware businessman, however, he maintains that, primarily, it is the business element which must work first.

The energy farm as it is today is the result of a gradual transition over the last ten years from more traditional farm crops to energy crops. The farm has been producing energy from renewable sources for approx. 6-7 years, including from biomass feedstock in a 'pilot' form.

He created the energy production project in order to diversify from traditional production on the farm. State incentives for renewable energy production were, undoubtedly, a substantial driver (see below).

Sources of funding: The project has been almost entirely self-funded. The only funding he received was 50% for the cost of the seed press from Italian PSR Measure 3 funds (ERDF).

*Drivers/Anti-drivers. Describe any external drivers that were important for initiating the case study and for its forward progression e.g. government mandates, subsidies, tax exemptions, legislation, local pressure groups. Analyse the data to highlight the enabling and constraining factors. Describe how these may have influenced the way in which the project has developed.*

*Describe any relevant technology drivers for example, was established technology adopted, was local or internationally led technology adopted?*

*Indicate knowledge and attitudes to the concept of an environmental footprint*

The most important driver for the initiation of energy production on the farm was, undoubtedly, the Italian state incentive of €0.28 per kW of energy produced from renewable resources and fed into the grid.

The GSE (Gestore Servizi Energetici - Energy Services Agency in Italy) offered (up until 31/12/2012) an incentive for energy production from alternative energy sources of €0.28 per kWh of energy produced (0.10 for electricity and 0.18 incentive - all inclusive).

Italy has a well-developed system of incentives for renewable energy generated from solar, wind and biomass.

For all NEW renewable energy plants (established after 1st Jan 2013) a new feed-in tariff system will be introduced for biogas and biomass plants in January 2013. The ministerial decrees that will implement this new system will take into consideration the origin and the traceability of the raw materials in order to channel each specific product toward its most productive use. The decrees will also consider how to promote the efficient use of waste products, the construction of co-generation plants, and the construction of micro and mini co-generation plants.

The new incentive schemes are based on fixed tariffs for small plants (up to 5MW).

The Italian legislation, in line with European legislation, defines biomass as 'the degradable part of products, waste and residue from agriculture (including plant and animal matter), and from forest and connected industries....'

All new plants from May 2013 will be able to use the new incentives, which are divided based on the size of the plant, the type of biomass used and the level of technology of the plant.

A further incentive is that offered by Italian excise laws on biofuels which allows for a reduction or exemption on excise taxes for vegetable oils used in energy production.

The exemption aims to bring the price of PVO in line with the market price on similar non-sustainable fuels (fossil fuels) used in agriculture, which already enjoy a lower price.

However, Scarmagli has also encountered a series of 'anti-drivers' or hindrances. One such is the EC and Italian bureaucracy surrounding energy production.

Production in Italy does require registration with the Italian 'Agenzie delle dogane' (Customs Office), and is subject to certain regulations. In order to use the oil as PVO for energy production/fuel in farm machinery, the producer needs permission from the EU (up to 5 tonnes per year). Italian Law allows you to produce your own raw materials to power farm machinery but ratification by the EC is required.

Dott. Scarmagli managed to get authorization 18 months ago from the EC after a struggle lasting 4-5 years, but the UMA (Utenti Macchine Agricole /Farm Machinery Users) is not able to authorize use as a transport fuel.

Farms are eligible for a certain quota of fuel (non sustainable) per year at a reduced price. Scarmagli would like to acquire only half of that quota and use his own rapeseed oil for the remaining amount. However, the problem is ascertaining the equivalent in rapeseed oil of 100 quintals of farm machinery/transport fuel based on an equivalent KJ level. As the UMA does not have a conversion chart, they do not know how much rapeseed oil to authorize and so they are holding off authorization!

Another anti-driver has been that the farm has had substantial problems getting ENEL to hook up production to the main grid. The farm would be able to supply all of its electrical needs and then feed the extra into the grid. However, to date, the farm has not yet registered to use the oil for energy purposes; the project is still in an 'experimental phase'.

Scarmagli is looking for a slightly lighter fuel than oil but he needs research facilities.

## **Environmental footprint**

Remo Scarmagli is primarily a businessman but is aware of the reduction in the farm's environmental footprint and was happy that caring for the environment could run side by side with his business interests. He is a farmer working in the countryside; it is clear that he also feels a great desire to preserve the land both for his own enjoyment and future generations.

At present he uses municipal water for his press. He could use purified water for his system, the more demineralised the better. The PVO is mixed with water at a rate of 14% water /oil without harming the generator.

**Support.** Describe any support (or lack of support) from Investment Promotion Agencies, export promotion agencies, trade associations, government agencies etc that has had an impact on the sustainability of the case study. Include here any impact that this may have had on the way the business plan evolved.

The 50% funding of the seed press by the Italian PSR Asse 3 programme was perceived by Scarmagli as being fairly easy to obtain. However, he did wish to emphasize that the funding under measure 3 created a series of limiting factors for a period of 10 years, such as having to use the oil produced from pressing for energy production only, which, due to authorization difficulties, he is unable to do.

The PSR funds could not be granted for the acquisition of the CHP unit because funds are only granted for brand new machinery. The CHP unit used on the farm, however, was not eligible as it was bought second hand from Germany.

He has received no support, financial or technical, from any other sources, for which he was particularly disaffected. He was keen to collaborate with research organizations, such as the local University, but no interest has been shown in his project (see stakeholders below).

**Jobs.** Describe the case study expectations in terms of jobs planned/created, and how far these expectations have been met from initial position. Include details of the percentage of jobs that required training, and percentage of jobs and nature of these jobs given to women. Describe whether the mix of paid and unpaid activities changed after the project began

The farm has had to take on 1 full time person to help with the de-oiling, in addition to one worker who was already employed on the farm. 24hr shifts are required so there are 3 people including he the farmer himself currently

running production.

Initially, the workers did not show a great deal of interest in the project, however, their outlook changed radically when they saw the success of the project. They are now enthusiastic employees, fully committed to the project.

Training was carried out entirely by the farmer. He is self-taught from the internet, reading manuals etc, and has had to take on the onus of translating all the information from English and French to Italian.

There seems to be no CHP producers on the market who sell complete energy production systems and who will come in and set up the whole chain, including training. He has had to put the pieces together himself. He concludes that the sector is totally abandoned.

There are no women employed on the farm because it is often hard, manual work. He handles all administrative work himself.

**Business targets and wealth creation.** *Describe the case study expectations in terms of business targets and wealth creation, and how far these expectations have been met from initial position*

Seed to oil does not give a good return on investment. Oil to electricity is slightly more profitable but not hugely.

1ha of sunflower produces 3tonnes of seed; this produces 1 tonne of oil (PVO) and 1 tonne of seed cake.

The seed cake sells at €25/100kg cake. Oil sells for €1000 per tonne.

From 50 ha of land he can produce 50-60 tonnes of oil a year.

## **Electricity**

The farm can receive €0.28 as an incentive per kW produced. He can earn more or less the same whether he sells it as oil or uses it to make electricity.

Costs for the co-generator, water consumption, costs of hooking up to the net and maintenance costs also have to be taken into consideration. The farmer was unable to give an estimate of those costs as the project is still trialling.

**Training.** *Describe how knowledge of the processes involved was gained and then communicated to employees, and whether expert opinions were sought.*

## **Local community stakeholder groups.**

*Describe the stakeholder groups that the case study engaged with, the order of engagement and whether the stakeholder groups changed with time, and if so, explain why.*

*Describe the methods used to engage with stakeholders and the representatives chosen, for example whether women were actively involved, whether communities were represented by their tribal chief, or by democratically elected leaders etc.*

*Describe how frequently case study operatives engaged with community stakeholders.*

*Explain whether there were any conflicts along the way, describe what they were and how they were resolved if at all.*

*Describe the perceptions of surrounding communities about what the project would bring and what perceptions the stakeholders had over their rights and whether this coincided with current legislation.*

*Describe whether there were any notable unintended consequences, for example, whether women's access to land water and fuel and household access was affected, and whether long-term income increases were enough to compensate all households for reduced access to land and increased prices*

He is the businessman and the creator of the project. He has had no help and has done all the research 'at home', as it were. The farm has received a great deal of attention from all over the world and all sorts of groups, including a delegation from Brazil which came over to for a visit and an ambassador from Chinhoyi in Zimbabwe, who was interested in replicating his model for energy production. He has tried untiringly to involve experts, but no one has shown any interest.

The Universities of Bologna, Torino, Udine came to have a look but no help was offered. He was especially interested in funding from the University to carry on experiments with their expertise.

He even invited ENEL to visit the farm as one of the only places making energy from renewable sources in Italy.

He tried to get politicians involved, but no one has been interested to date.

When he initially presented his application to the EC for authorization, it took them 4-5 years to ratify the SVO for use as a fuel in farm machinery. He has had great problems ascertaining authorization and communicating with public offices.

Other producers have come to see his farm but they get 'frightened off' when they see all the Don Quixote 'windmills' he is tilting.

He has been working with the stakeholders approx. every 2-3 months, contacting them to get answers or information. He did not feel able to intensify contact with the relevant authorities as he found that it worsened matters as they felt 'harassed'.

### Impact on agricultural practice

*Describe whether the availability and type of food on local markets changed after the project began and whether there was any impact on localised supply of or demand for food and fuel and if there were any credibly attributable impacts on prices*

*Describe whether there were any changes in land use as a result of e.g. new biomass farms being established.*

Future growth plans and recommendations. *Describe what the future growth plans of case study are, if any, and what the perceived opportunities and threats might be for future growth.*

Remo gained huge satisfaction in learning how easy it is to produce your own electricity within the farming sector. He has invented another living for himself which he feels is his own, one which is successful economically, technically and, above all, environmentally friendly.

If he were to re-do it, he would look for better financial support before launching into the sector.

Did he do his homework before he began, did he look into market forces? No, it was all new and he learnt on the job.

He would like to preserve his skills by feeding it into a network. He would love to be able to direct operations in a similar project in Africa.