



## Pushing back the barriers to sustainable development An example from Mali, West Africa

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The press (left) and the motor (right).

The Markala Dam, in the Segou region of central Mali, West Africa was constructed by the French during the years 1933 to 1949. It was built across the Niger river for the purpose of 'taming' the annual floods and to irrigate fields that could be used for growing rice for consumption in other West African colonies. Another feature in Markala which survives from colonial times, however, is the military workshop, originally constructed by the French and which, since independence in 1960, has been run autonomously by Mali.

### The Colonial diaspora

French influence does still hold strong today in Mali, where the governance of the nation-state, using the French model continues to compete with traditional forms of governance where it is the village elders who make community decisions at village level with the consent of the population.

The military workshop in Markala is a hive of activity. Some of the military stationed here work alongside civilian technicians industriously putting their time and skills into constructing furniture, satellite TV dishes and vehicle spares which are then sold in Bamako. The army also uses its resources where it can, in helping Mali's development, with skills, knowledge and equipment. It is for this reason that I was to find myself at the Ateliers Militaires Centraux de Markala (Markala Central Military Workshop). It was there that a team of metal workers were helping an independent NGO which works with renewable energy, Mali-Folkecenter, in fulfilling the aims of one of its projects by transferring Nepalese plant-oil press technology to Mali. The press is a robust steel construction which makes a vegetable based fuel (biofuel) that can be used to run engines, generators and vehicles.



Mill for grinding Shea nuts.



**The operator with the plant oil engine (left) and the press (right).**

## **About Mali-Folkecenter**

Mali-Folkecenter is the Southern partner of a Danish NGO, which is called Folkecenter for Renewable Energy. The Danish Folkecenter's primary aim is to develop new renewable energy technologies and transfer them to small and medium Danish companies for commercialisation, but it also uses its technical expertise in development projects, and has been working with rural people in Africa since 1986 (projects have been in Zambia, Mauritania, Gambia, Ghana and Nigeria). Technologies adapted for developing countries have been practised at Folkecenter since the early 1980s and their technical and practical experience is considerable. Mali-Folkecenter opened in July 1999, following an invitation from the Malian President, Alpha Oumar Konare. Mali-Folkecenter has projects involving plant-oil fuel, solar rural electrification, household biogas installations, environmental education, combating desertification and sustainable management of natural resources and works closely with Government, industry, research institutions and other NGOs to promote the use of renewable energy in Mali and within West Africa.

## **Why Renewable Energy in Mali?**

Renewable energies could be vital to the sustainable development of a country like Mali. Mali is located in the environmentally fragile Sahel region of Africa. About one third of the territory is actual desert, the

Sahara, and the other two thirds is semi-arid savannah land vegetated with bushes, grasses and baobab trees. Desertification is a reality for people who live in the Sahel region. Mali's predominantly rural population (70%) depend directly on the land for water provision, fuel and for a food supply. Environmental change does not go unnoticed in such circumstances and the cutting of trees for domestic fuel causes soil deterioration and erosion and alters the climate in large areas of the country. In turn, this means that yields are reduced, and women must walk further on a daily basis to collect firewood and to reach a water supply. Renewable energy could be a great help in daily lives to reduce the Malian dependence on firewood, which is causing deforestation.

Renewable energy could also be a great help in a country like Mali, which has a 2.8 billion dollar debt, which it is always struggling to service. Mali's principal export is the cash crop of cotton, of which 99% is exported for processing elsewhere in the world. It is therefore other richer nations who add value and reap profit from Malian raw materials. The widespread use of renewable energy in an indebted country that at present imports all its hydrocarbons, 400 000 tonnes oil equivalent each year, would reduce the imbalance of payments, and might allow Malians to increase their energy usage. In addition, the development of renewable energy is development following the lines of the Kyoto Agreement and sets Mali in good stead for an environmentally sensible, as well as more self-sufficient future.



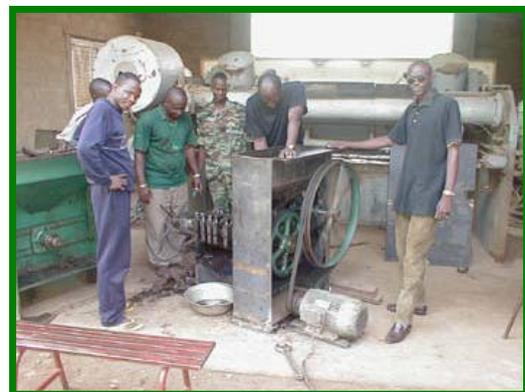
**A living hedge of jatropha, used to keep animals out of fields, protect against wind and erosion.**

## **Removing the barriers to sustainability – what it takes**

In November 2000, a small team from the UNEP-initiated Sustainable Energy Advisory Facility (SEAF) approached Mali-Folkecenter about one of their projects which aims to remove the barriers of sustainability by placing small cash injections into existing projects at crucial moments in order to allow them to continue. The world of development NGOs is a splendid arena for tales of dramatically failed projects. One particularly celebrated story in the NGO world in Mali, and I know nothing of its source or of its accuracy, is that of a village which had an electric water pump fitted to its well. The NGO workers returned some months later to find that the pump had been broken. On enquiry, they learnt that it was in fact the women of the village who had broken the pump. With the rapid speed at which the new pump drew water, the women no longer had their valued time to meet and chat at the pump and so they carried out this Luddite act. In this case, there was resistance shown against a

technology which disrupted the existing social norms and habits of the village people. If there is no perceived need for a technology by those who are intended to use that technology, it seems inevitable that once the development agency withdraws, the new technology will have a limited lifespan.

It is not, however, only projects that are seen by the local populous as superfluous that fail. What is more, it could easily be argued that those projects that are not considered valuable by the people who are supposed to be the beneficiaries do, in fact, deserve to fail. What is the point in spending vast amounts of cash on a water pumping project if the villagers are not going to enjoy the benefits that are supposed to be provided. But equally there do exist projects that are considered useful by the beneficiaries, that are valued because of the reduced workload that they bring about or because of the new income generating possibilities provided, and yet the projects still do encounter problems somewhere along the way. Some projects do not put enough energy into encouraging structures of management that will care for the new facilities, whereas others make insufficient provision for the maintenance of the facilities, perhaps through insufficient availability of funds or through lacking a skills base or simply through lacking the ability to obtain spares for equipment. The idea of having a fund available to help solve such difficulties, seems to me, truly inspired because it builds on investments of time and money that have already been made and will save many projects that would otherwise collapse.





## Testing the prototype press with an electric motor

### A project in need

In 1991, the Malian government through the CNESOLER (National Centre for Renewable Energy, part of the Ministry of Energy) initiated a project to educate rural Malian women in the possibilities of renewable energy. During the project, however, project workers soon saw that their work could be a little futile simply because the 90 villages with which they were working really did not have the financial capacity to purchase the renewable energy technologies about which they were being educated. This stimulated another project, 'Women & Renewable Energy', which was then to provide these villages with some renewable energy technologies. The type of technology installed varied from village to village according to what the villagers felt would be most useful to them, but it did involve the installation of four Nepalese plant-oil presses. Now, 10 years on, one of the presses was broken and there was no foreseen solution. Poor financial management meant that the Village Associations had insufficient funds to replace old worn out engines and it was not a realistic option for small community groups to order presses or spares from Nepal. It was at this stage that Mali-Folkecenter, specialising in renewable energy in Mali, was approached knowing that if the plant-oil system was to move beyond project phase and into commercial viability, this problem must be addressed. Using their experience of working with rural people, Mali-Folkecenter set about to revive the project that had not been achieving its sustainability and development objectives.

### Plant-oil presses – working in Mali

Plant-oil presses, as mentioned above, are pieces of machinery which are used to extract oil from vegetable matter. Although any nut bearing plant can be used in the press, the press only really makes sense if it makes oil from something that is not useful for other things. Here, in Mali, jatropha, an inedible oil-rich plant is used as it grows all over Mali, even in very dry conditions and is often found close to

villages as it is used as a hedging around fields to act as a windbreak, reduce soil erosion and to keep animals out. The oil produced from jatropha can be used as a diesel substitute and in rural Mali, where fuels are transported vast distances from the coast of West Africa - from Senegal or from the Ivory Coast, the idea of producing one's own fuel is very exciting. The multi-function jatropha concept used in the above mentioned projects involves a small diesel engine which is fuelled by the oil and which can then be used to drive the press, a generator (for rural electrification - only 1% of rural Mali is electrified), a mill (for grinding shea nuts, maize, millet etc.) and a compressor (for inflating tyres, especially for widely-used donkey carts). Only 10% of the oil produced is needed to run the press and the process also creates useful by-products - the residue produced when the seed is pressed can be used as a high grade organic fertiliser or it can be made into a soap which has excellent dermatological and insecticidal properties. This allows women to start micro-enterprises to generate income and to make better provision for their families.

### The Mali-Folkecenter sustainability solution

Mali-Folkecenter, in dialogue with UNEP, decided that the best thing to do to eliminate this limit to sustainability would be to create a prototype to be manufactured in Mali, from which spare parts for the existing presses could be provided as necessary. In a country such as Mali, where there is very little manufacturing, it is not easy to find a company that would be equipped to do the work and so for this reason, Mali-Folkecenter approached the military, who were glad to help and worked very hard to successfully effect the transfer of the Nepalese press technology, to allow local production of presses and much needed spares. The next step of the project will be for the military to manufacture a simplification of the Nepalese press, which will be cheaper to produce and can be put to use widely in Mali. Mali will then have its own supply of plant-oil presses so that plant-oil fuel will have the possibility of fulfilling its potential in rural Mali, where other fuels are so difficult to obtain.



# MALI - FOLK CENTER



The original Nepali press (left) and the Malian prototype (right).



The mill for grinding Shea nuts (left), the battery charger (adjacent), the motor (centre) and the jatropa press (far right)

The military at Markala certainly have a genuine interest in the well-being of the Malian nation and its people. It has been calculated that were pourghère plant-oil to be exploited to its greatest potential in Mali, the amount of fuel produced would be equivalent to a million dollars worth of diesel each year, a small fortune for a country like Mali. With international agencies, domestic NGOs and public services working together to overcome barriers to sustainability, the future for Mali's sustainable development looks hopeful.