USING WASTE FROM CASHEW NUT PROCESSING IN BURKINA FASO

PROJECT'S AIM: TO DEMONSTRATE ENERGY SAVINGS AND PRODUCTIVITY GAINS FROM USING CASHEW PROCESSING WASTE, VIA THE INSTALLATION OF A GASIFIER AND STEAMING/DRYING UNIT IN A CASHEW NUT PROCESSING FACILITY

Location:
Dakoro, Western Burkina Faso

Technology:
Solid-biomass stove

Costs:
Total: € 65,150
WISIONS financial support: € 33,000

Partners Involved:
SNV – Netherlands Development Organisation
(www.snvworld.org)
ISOMET
(www.isomet-bf.com)
WOUOL – Association of agricultural producers
(www.wouol.org)

Duration:
04/2012 – 03/2013

Picture: SNV

Burkina Faso produces 35,000 tonnes of cashew products annually. A third of this is processed locally, while the rest is exported as raw product. There are 14 semi-industrial processing units in the country. As part of this demonstration project, a biogas-powered water steam system was installed at a cashew nut processing facility in Western Burkina Faso, with the ultimate aim of replicating the experience in other energy-intensive food and agricultural processing sectors in the region.

Coordinated by SNV, this project was hosted by WOUOL, an association of agricultural producers that owns a cashew nut production facility in Dakoro. The Burkinese engineering company ISOMET was in charge of the baseline data collection and the technical design, testing, installation and training phases.

Prior to this pilot, the Dakoro facility was highly dependent on the use of LPG (butane) and non-renewable wood fuel as power sources, and large amounts of waste cashew shells with high-energy content were going unused.

TECHNOLOGY, OPERATIONS & MAINTENANCE

The transformation process of the cashew nut into the cashew kernel comprises two energy-intensive steps: weakening and drying. In conventional processing, wood is used as a source of energy for the weakening step, while butane gas is used for the drying. The Dakoro pilot project uses waste cashew nut shells to produce the energy necessary for both steps. The system consists of a gasifier, a storage tank or boiler and three dryers. The gasifier and the storage boiler are equipped with fans and pumps powered by a solar photovoltaic system (with electrification rates as low as 15%, Burkina Faso's electricity grid does not reach rural locations such as Dakoro). The steam produced by the boiler is used to weaken the nuts and is a source of heat in the drying phase.

The system was successfully installed and resulted in 83% savings in energy costs compared to the baseline, essentially replacing all previous fuel demand. Moreover, the introduction of new components, such as a heat exchanger, resulted in a better quality product, while the optimisation of some steps (e.g. reduced time to soften the nuts) led to increased productivity.

Despite recording these positive initial results, at the time of reporting the installation was not operational due to governance challenges faced by the host organisation and plant owner.

DELIVERY MODEL & FINANCIAL MANAGEMENT

The main constraints to introducing this type of innovation into food processing industries in the region are the initial capital costs and lack of access to credit.

The WISIONS grant served to overcome this financial hurdle. The host organisation WOUOL also provided co-financing and in-kind contributions.

In order to ensure the long-term success of the initiative, WOUOL established a savings fund in which 20% of the savings from reduced energy costs were to be set aside for maintenance. A team was designated at WOUOL to manage the saving fund. Furthermore, five WOUOL technicians were trained to maintain the equipment.

ENVIRONMENTAL ISSUES

As well as the potential for the total replacement of fossil-based sources and non-renewable wood, and the productive use of the cashew shell waste, the unit also resulted in less smoke and heat being produced during the weakening process, which improved the working environment.

SOCIAL ISSUES

The project showed potential for real impact on the livelihoods of the local population. During the operation of the gas unit, the facility increased its processing capacity, resulting in more local women being hired daily for shelling and delaminating. On the other hand, plant technicians saw a reduction in their working hours, due to the lower maintenance requirements.

The Dakoro project provoked strong interest and involvement from local stakeholders and authorities. A promotional campaign was run by WOUOL, which included the capacity-building of female staff of the Dakoro unit in the areas of leadership, promotion of renewable energy and public speaking. A group of Dakoro's female staff later made a presentation at a nearby processing plant in Banfora.

RESULTS & IMPACT

During the months in which it was operational, the project achieved proof of concept and higher than expected energy savings. Despite the difficulties that the plant was facing at the time of reporting, the unit has become a showcase for investment in biogas solutions in the food processing sector, both nationally and internationally. It demonstrates the potential for reducing energy costs and improving productivity and product quality.

SNV has proposed that the equipment in the Dakoro unit is relocated to another WOUOL facility that is currently functional.

REPLICABILITY

Although this technology is available in other countries (mostly Asia and the US), this project was the first of its kind in Burkina Faso. It stimulated the interest of several agro-businesses, of which at least three have now replicated the technology in drying/processing plants for cassava, rice and mango in other parts of the country (Dano and Bama). A study carried out by SNV indicates that there is a potential market of over 100 processing units where the Dakoro experience could serve as a basis for learning. ISOMET has begun manufacturing similar gasification and processing systems and selling them commercially.

Other promising agricultural residues include cotton stalks, rice husks and peanut shells. SNV, together with its local knowledge institute the 2iE biomass and biofuel laboratory, are working to adapt the technology to these different types of biomass, as well as to further develop and adapt the technology to the local context in Burkina Faso.

Internationally, the Dakoro plant represents an important benchmark in the field of renewable energy and its links to food production processes in sub-Saharan Africa. To date, three cashew processing units in Mali and Côte d'Ivoire, as well as SNV Mali, have visited the Dakoro facilities. In the follow up to this project, SNV carried out an awareness-raising campaign targeted at the food processing sector in West Africa, hand-in-hand with a similar project in the rice sector which was funded by the Embassy of the Republic of China, OFID (OPEC Fund for International Development) and SNV.

LESSONS LEARNED

The Dakoro facility has served, and will continue to serve, for knowledge development and exchange, and this includes lessons on the challenges that were encountered. On the technical side, the design could be improved by including double piping to allow for continuous operation while maintenance is carried out. Moreover, a larger heat exchanger that allows the boiler to heat up faster would result in shorter turnover times. From a management perspective, the internal problems that had paralysed the unit's operation at the time of reporting also led to a number of trained personnel leaving the company. Future initiatives should ensure that the implementation approach streamlines training for new recruits and guarantees the maintenance of the unit when it is idle for non-technical reasons. Moreover, improved baseline surveys are required: fluctuations in production volumes and poor stock management often translate into unreliable production projections and rate-of-return calculations.

Source: Source: Final Report submitted to WISIONS by SNV in January 2016