Fuel briquettes from wastes

Sanu Kaji Shrestha, Foundation for Sustainable Technologies (FoST), P.O. Box 10776, Galkopakha, Thamel, Kathmandu, Nepal Tel: 4361574 and 2190473. Email: fost@ntc.net.np

Background

More than two billion people globally use biomass for cooking food. Smoke from burning biomass is one of the fourth leading causes of death and disease in the world's poorest countries (WHO, 2002). We are both suffering from indoor air pollution because of excessive use of fire wood in traditional stoves, whilst heavily depleting forest, converting it into deserts. The time is right for creating sustainable livelihoods in rural communities, through providing options to the traditional cooking habits of the people in Nepal which are incompatible with natural resource management, and are ineffective, costly and unhealthy.

The Foundation for Sustainable Technologies (FoST) has introduced a wide range of easily applicable, sustainable technologies to meet the daily needs of the urban and rural communities in Nepal. Due to shortages in kerosene, liquefied petroleum gas (LPG) and fire wood, resulting in substantial price rises, people are experiencing hardships in purchasing fuel. Since 2002, FoST has been designing, developing and disseminating sustainable technologies to relieve such hardships in a cost-effective way. *The process described in this article was demonstrated during the Sustainable Resources 2004 Conference in Colorado by the Legacy Foundation (see BP 49, 2003). FoST has taught this method to 60 women in the villages of Gamcha, Matatirtha and Machhe Gaon in Kathmandu in 2005. Of the 60 women trained under the programmes, one third of them have started producing briquettes for their use (Figure 1). FoST has interacted with the briquette producers in these villages to form a briquette cooperative in each village in order to run the briquette businesses smoothly.*

Figure 1 Women displaying a tray of briquettes (photo: FoST)

Availability of raw materials

According to the Solid Waste Management and Resource Mobilization Center of Kathmandu, there are about 600 tonnes of waste generated in Kathmandu and Lalitpur districts each day. The wastes contains 3% clothing, 4.5% construction materials, 8.5% paper, 9.5% plastic, 2.5% glass, 70% organic and 2% others. A briquette business using only paper wastes will have about 20,000 tonnes of raw materials in a year from which 16,000 tonnes of briquettes can be produced without mixing any other materials as binders. If sawdust is added in a 20:80 ratio, 100,000 tonnes raw material is available, which produces about 80% of this weight in finished products. Ultimately, ash produced from burning briquettes is used in enriching soil in farming. This activity generates lot of employment opportunities in the urban cities, reduces outdoor air pollution from burning the paper wastes, reduces garbage problems, minimizes possibility of blocking drains, reuses and recycles paper wastes into energy efficient fuel, and minimizes costly cooking fuels – kerosene and LPG.

The above data does not cover paper wastes generated by the publishing houses, printing presses, government and donor offices, or trading houses, because they are mostly collected by the scrap traders. So, there is an abundant source of paper wastes in the capital that is more than enough to set up a major briquetting plant in order to meet growing demand for alternative fuels in the Kathmandu Valley and also to create jobs.

An alternative energy source

Fuel briquettes are treated as an alternative energy source for household use. They are made from grass, leaves, saw dust, rice husk and any type of paper, all of which are compressed after processing in a lever press into the required sizes. Unlike charcoal, these fuel briquettes are made without polluting the environment, they are environmentally-friendly as they utilize waste materials (Figure 2). They provide an energy-efficient and cost-effective alternative energy source for cooking, water heating and room heating. *The briquettes can be used in any of the fan-operated stoves available in the market to reduce smoke. Using a gasifier stove is even more efficient*

Figure 2 Environmentally friendly drying of briquettes (*photo: FoST*)

Figure 3 Heavy-duty gasifier stove for cooking and room heating (*photo: FoST*)

than the fan-operated stoves to reduce indoor air pollution in the kitchen. This type of stove costs Rs.1200 to 1500 per stove.

Cost effectiveness

There are various types of briquettes produced in Nepal, mainly of two types: log briquettes from rice husk and bee-hive briquettes from charcoal. Log briquettes cost Rs.16 per kg, whereas bee-hive briquettes cost Rs.36 per kg. The briquettes from wastes described in this article cost Rs.12 to Rs.16 based on estimated wages of Rs.80 per day for women in the villages and paper waste costing Rs.4 per kg, dung Rs.2/kg, saw dust Rs.3/kg, and biomass (agri- and forest residues) Rs.2/kg. For cooking purposes, the average family of 4–6 people would need about 1.5 kgs briquettes in a day, which costs about NRs.22. If they used kerosene, they would need 750 ml – costing about NRs.38, and for gas they would pay NRs.32 for about half a kilogram. Thus communities see these new fuel briquettes as an environment-friendly, easily applicable modern fuel, and a good technology for generating employment in the community level.

Skills' training

No prior technical training is required other than a basic knowledge of accounting for starting the business. The process is one that rural women in the community can easily learn, and the briquettes can be used initially for cooking food, and subsequently for income generation once their skills are sufficiently developed. To date, the project has targeted deprived women of all ages, particularly those in the villages who have dropped out of education. Once they are trained at FoST, they will be the trainers in their locality.

Raw materials

There are plenty of sources for the necessary raw materials in the cities and in the rural areas to start a business locally. If the paper wastes are not sufficient in the villages, entrepreneurs can buy them in nearby cities or from scrap traders. Similarly, sawdust and rice husk or grasses are usually available locally or in surrounding villages.

Potential markets

There are plenty of potential markets for fuel briquettes in the cities and in the rural areas (Figure 4). The potential customers for the briquettes are initially the producers themselves, secondly, kerosene and LPG users, local small businessmen, tea shops, restaurants, thirdly, pop-corn bakers, barbeque stalls, trekking lodges, resorts, picnic spots, departmental stores, trekking stores, highway restaurants, boarding schools etc.

Figure 4 Briquettes for sale (*photo: Fost*)

Once the women groups are trained on briquette making process, they will be able to produce briquettes by using their own resources first, later collecting wastes from their neighbours and from other surrounding villages and cities. There appears to be a ready market for the briquettes, and the women themselves test the products and improve the quality to bring it to the market and make profitable business.

Impacts of the programme

- Proper use of household and agricultural wastes for producing fuel briquettes
- Paper waste will be well utilized in an economic way
- Consumption of costly kerosene and LPG will be heavily reduced
- Fire wood consumption at household level will be reduced
- Financial companies and cooperatives will be more active with the increased number of micro-enterprises based on briquette business
- A healthy environment in the villages and in the cities through proper management and earning from the waste can be achieved
- Less possibility of getting fire when cooking because of more controlled flame
- Reduction of indoor air pollution making the family free from smoke-borne diseases.

FoST believes that such a briquetting technology, which is new to Nepal, will spread rapidly as a small industry throughout the environs of the Kathmandu Valley and beyond to meet the daily energy needs for cooking in a cost-effective way. The small level of support for transferring the technology at community level will play a vital role in improving the quality of life for people in the rural areas.

Reference

Legacy Foundation, 4886 Highway 66 Ashland, Oregon, 97520 USA