

# Coffee Processing with Solar Dryers

PERU

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## Productive use of thermal energy

Alongside electricity and mechanical energy, thermal energy plays a key role in processing goods and offering services, particularly in remote areas where biomass and solar radiation are often the only source of energy available. Thermal energy – used for cooking, heating, drying and smoking – is an essential input for production processes in agricultural businesses, small industries and commercial services.

## Coffee Farmers in Peru

Peru massively exports coffee and earns significant revenue through its coffee exports. Coffee is the country's most important agricultural sector. The country has a large number of small-sized coffee plantations, meaning that coffee growers are often small farmers with an average plot size of 2.5 hectares. In remote areas, each hectare produces an average of 900 kg of coffee beans per year.





Coffee is harvested during the rainy seasons. As a first processing step, coffee beans are sun-dried, traditionally by spreading them out on the ground without further protection. Due to frequent interruptions by rain, the traditional drying process takes up to 12 days.

Small farmers usually have no access to national and international markets and sell their coffee beans on the local market at prices far below export price levels. To overcome the difficulties in market access, many small farmers are organised in associations. Evidence shows that farmers in associations generate higher production, and benefit from greater negotiating power and better sales prices. Farmers organised in associations can also afford commonly used solar dryers to produce a higher quality product.

### Promoting credits for solar dryers

EnDev Peru supports these farmers' associations and their members to gain access to thermal energy for coffee drying. The approach is two-fold along the value chain of coffee: EnDev Peru promotes the use of solar dryers in the first drying period, during which the humidity of the beans is reduced to ca. 25 per cent. The solar dryer prevents the coffee



## Micro loans enabling the investment into solar dryers

beans from getting wet from rain. It improves the drying process by filtering the UV radiation, concentrating heat, reducing the relative humidity of the air and thus drying the beans with constant and natural ventilation. The drying time is reduced to 2-3 days. To be able to afford these solar dryers, farmers need access to micro loans, which are often provided by the associations. In Satipo, in the region of Junín, the micro finance institution (MFI) 'Caja Huancayo' offers a specialised loan for the purchase of solar dryers to its clients. This has already enabled 77 farmers in Satipo to buy individual solar dryers.

However, coffee can only be stored and exported at a lower level of humidity. A second drying phase is therefore needed that reduces the humidity of the beans towards 12 per cent; this phase takes place in a bigger solar dryer with a capacity of up to 2 tonnes of coffee.

EnDev has so far supported six farmers' associations to acquire this technology. In addition, EnDev supports these associations in applying for public subsidies to improve their competitiveness. Within 20 months, 1,748 farmers have increased their productivity through the use of this improved thermal energy technology by their associations.

The investment costs for a solar dryer depend on the chosen configuration of the kit. The MFI offers a modular concept, which allows variations of the technology depending on the needs of the farmer. The investment costs vary between USD 100 if the farmer only needs to purchase the UV-resistant plastic foil and USD 1,100 if he acquires a complete solar dryer with a standardised metal structure and wooden modules for holding the beans. Because coffee farms are highly dispersed in remote areas, installation is usually done by the users.

The farmer receives precise instructions for the installation, usage and maintenance of the technology when he decides to take the loan. A supervision visit is conducted one month after the technology has been installed to ensure its functionality. Besides this, there is frequent interaction between the MFI and the farmer because of the monthly payments. This allows addressing usage or maintenance problems, if they occur. The functionality of the solar dryer relies on the possibility to dry the coffee beans under the UV-resistant plastic foil. After 2 years of usage the foil should be replaced with a new one. Accordingly, the term of the loan should be fixed to a maximum of 2 years. All other components can be repaired with local materials.



## Farmer Victoria's solar dryer increases her income

Victoria Esteban Fuentes has a farm of 2 hectares in Santa Anita, Satipo. She produces approximately 1,800 kg of coffee per year. The coffee beans usually have a moisture content of 50 per cent. To enable transportation and storage and to reach the export market quality standard, coffee beans need to be dried to an optimal moisture content of 12 per cent. Before the adoption of the new solar dryer, only approximately 70 per cent of Victoria's

coffee harvest met the export requirements. The solar dryer has increased this rate by 8 per cent. Since the kilo price of export coffee is approximately PEN 8 (USD 3), Victoria's revenue increased to PEN 0.20 for each extra per cent of exportable coffee. Victoria's income has therefore increased by PEN 2,400 (USD 885) per year – a 30 per cent increase.

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