



EIE-06-256 REEPRO

Intelligent Energy  Europe

# **Promotion of the Efficient Use of Renewable Energies in Developing Countries**

**Training equipment data sheet**

**Data sheet No.: 9**

## **Authors**

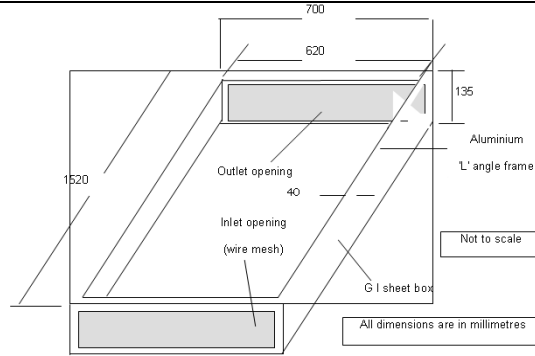
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|  |   |                              |                   |       |  |
|--|---|------------------------------|-------------------|-------|--|
| <b>Type of Equipment:</b><br>(tick off the type)   | PV  | Solar Thermal<br>(Hot Water) | Biomass to Energy |       |  |
|  |   | ✓                            |                   |       |  |
| <b>Name:</b>   | <b>Direct-solar box dryer</b>   |                              |                   |       |  |
| <b>Location of the equipment:</b>  | Fix for training show which is installed at ITC, Department GEE   |                              |                   |       |  |
| <b>Year of purchasing:</b>   | 2009  |                              |                   |       |  |
| <b>Operator:</b><br>(Name and address)   | ITC staff working at laboratory ITC at Electrical and Energy Engineering.   |                              |                   |       |  |
| <b>Planner:</b><br>(Name and address)  | ITC, Pochentong Blvd, Toul kok district, Phnom Penh   |                              |                   |       |  |
| <b>Detailed description of the installation:</b><br>(technology, function, benefit for training, etc. max 150 words) | A direct-solar box-type solar dryer suitable for household drying of agricultural products has been developed at ITC. The dryer can dry 4-5 kg of fish, bananas, and also for all kinds of vegetables in a single batch, at a temperature of about 35-58 °C. The performance of the box dryer was evaluated as per an evaluation procedure for solar dryers, which was also developed at ITC. A comparison of the test results with a solar cabinet dryer indicate superior performance of the dryer, considering not only the thermal performance but also factors such as loading/unloading convenience, operation and maintenance, quality of dried products, floor area requirement for dryer installation and cost of dryer. |                              |                   |       |  |
| <b>Generated Energy service:</b><br>(tick off the energy type)   | electricity   | heat                         | gas               | light |  |
|  |   | ✓                            |                   |       |  |
| <b>Power output of installation: (kWel, m<sup>3</sup> biogas, kW th, etc.)</b>                                       | Can dry 4-5kg of fish, banana, all kinds of vegetables in a single batch  |                              |                   |       |  |
| <b>Financing*</b><br>(tick off the financing type)   | private investment  | loan                         | donation          | grant |  |
|  |   |                              | ✓                 |       |  |
| <b>Investment costs in US\$*</b>   | 300US\$   |                              |                   |       |  |
| <b>Maintanance costs in US\$*</b>  | NA  |                              |                   |       |  |
| <b>Savings*</b>  | NA  |                              |                   |       |  |
| <b>Energy sale income in US\$*</b>   | NA  |                              |                   |       |  |
| <b>Comments</b>  | This equipment is use for student experiment only   |                              |                   |       |  |
| <b>Pictures and grafics</b>  |   |                              |                   |       |  |

System sizing



Solar dryer box



The fish in solar dryer box



**Possible practical exercises with Solar Dryer**

**Level 1 and Level 2 – Solar Dryer**

1. Purpose of this exercise  
 Measurement of temperature in inside solar dryer box and outside the box by using thermostat



**Fishes or banana**

2. Performance  
 The student measure temperature every hour from 9:00h to 16:00h

The student measure water temperature every hour from 9:00h to 16:00h and list it down in the table

| Time         | 9:00 | 10:00 | ..... | 16:00 |
|--------------|------|-------|-------|-------|
| Fish (5Kg)   |      |       |       |       |
| Fish (3Kg)   |      |       |       |       |
| Banana (5Kg) |      |       |       |       |
| Banana (3Kg) |      |       |       |       |

3. Moisture contain  
 The drying curves also considered the moisture content of the products.

Table for daily Moisture

| Day          | 1 | 2 | ..... | 7 |
|--------------|---|---|-------|---|
| Fish (5Kg)   |   |   |       |   |
| Fish (3Kg)   |   |   |       |   |
| Banana (5Kg) |   |   |       |   |
| Banana (3Kg) |   |   |       |   |

4. Drying curve  
 Drying curves were drawn for the samples taken from the sample trays in the drier comparing to the sun drying.

