

iv. DOWNDRAFT GASIFIER FOR WATER PUMPING



A downdraft gasifier along with a gas cleaning system retrofitted with a 5 Hp diesel engine coupled with a centrifugal pump for pumping water for irrigation applications. In order to supply producer gas for running the 5 Hp engine on dual fuel mode, a 10 kg/h capacity downdraft gasifier is required. A maximum of 50 percent diesel can be saved by substituting 50 percent of diesel with the producer gas obtained from biomass. And the cost of operating the gasifier coupled water pumping system is around Rs.50/h.

v. SOLAR TUNNEL DRYER



The solar tunnel dryer is commercially used dryer for drying agro food products. Solar tunnel dryer is working based on Green House Effect principle. It results that 15-20°C increase in temperature above ambient temperature inside the solar tunnel dryer to dry the product from initial moisture to safe storage moisture. It mainly consists of semi-cylindrical tunnel structure, solar collector and cement concrete floor with absorber surface (Table 1). The semi cylindrical pipe structure covered with U.V. stabilized semi-transparent polyethylene sheet of 200-micron thickness. Drying floor with absorber

surface is a cement concrete flooring laid at a gradient of 5° along the length with special black coating. The dryer is walk-in type and to facilitate loading and unloading of the product to be dried. The trays made of 8 SWG thick galvanized iron mesh with dimension of 1m x 1m can be used to increase the capacity. The dimensions of drying chamber (LxWxH) is 18m x 3.75m x 2.0m. The length can be varied depending upon capacity of the products to be dried.

vi. BIOMASS HOT AIR GENERATION SYSTEM INTEGRATED WITH SOLAR TUNNEL DRYER



Renewable energy integrated drying system using solar thermal and biomass hot air with controlled environment can be used for continuous drying of agro-products.

- Solar mode is used for drying during sunshine hours and biomass mode is used during off-sunshine hours, cloudy weather.
- Suitable to dry coconut, turmeric, chillies, medicinal plants, vadam (food) products etc., with hygienic environment and enhanced quality compared to conventional open sun drying.
- Efficient (19 %) biomass combustor with heat exchanger is suitable for various biomass fuel such as coconut husk, coconut shell and wood logs.
- The integrated drying system attains the drying temperature ranged from 45 to 65°C and has controls to maintain desired RH and temperature.
- Loading capacity is 500 kg to 2 tonnes per batch
- Drying time for coconut in integrated dryer is 48-52 h and 4-5 days in Solar tunnel dryer
- Cost of installation of integrated dryer is Rs.6.0 lakhs for 500 kg and Rs.8.0 lakhs for 2 tonnes/batch
- Reduces 35% drying time over solar tunnel dryer and 70 % over conventional open sun drying method.