

Production and combustion of almond shell briquettes in Crevillent, Spain



Background

As a company working in the field of renewable energy Covaersa produces, and distributes almond shell briquettes. In 2009, the world production of almond reached 2.4 Mio t. About half of the world's total production, come from the United States (1,162,000 t, 49%) followed by Spain being the second world producer (282,000 t, 12 % of total production), Spain's production is located at the Mediterranean seaside communities: Catalonia Valencia, Balearic Islands (Mallorca), Murcia, Andalusia and Aragon. The annual almond production varies according to the changing weather conditions. Almond shells have a high heating value, and can be used for energy purpose and other industrial applications. Almond shells are already used as fuel for bakery furnaces, the ceramic industry and in heating facilities of livestock farming. In order to improve its marketing, the company BRIEC – COVAERSA has decided to use almond shell briquettes. This resulted in a series of difficulties which the company managed to overcome by means of its R&D department.

Raw material

For almond harvest and hulling a so-called "vibrator" is used which is fitted to the tractor truck. It resembles, once expanded, the shape of an inverted umbrella.

Before milling the almonds are placed on large open air surfaces to dry "under the sun". Once dried, they are sold to the miller where they are shelled and classified. The discarded shells are piled up and sold to farms and industries.

Raw material characteristics

Raw material	Almond shells
Moisture content wt.-%	2
Heating value, kJ/kg	18,640
Ash content % dry basis	1.52
Chlorine wt.-% on dry basis	0.021
Sulphur wt.-% on dry basis	0.01
Mercury, mg/kg	0.013
Amount, t/year	30,000

Pelletizing process

The BRIEC factory has a production capacity of 30,000 t/year. The shells are supplied with trucks, sieved to remove stones and then fed to a silo with a capacity of 45 t by a conveyor belt.



Drying tunnel

From the silo, almond shells are transported with a conveyor belt that is equipped to remove contaminants and metallic impurities to the washing facilities. The shells are washed in two tunnels by soaking in a water bath. Afterwards, the shells are dried in a drying tunnel-vibrating drum with a capacity of 10 t/h to reduce the moisture content to approximately 2 %. Consecutively, the almond shells are passed through a distribution silo where they are fed to the compacting/pressing and briquetting machinery.



Briquetting machinery



Transportation and storage

The briquettes can be packed either in boxes, big bags or shrink wrapped. The packing type depends on the format of the almond shell briquettes.



Almond shell briquettes

Combustion at the Retirement Home La Purísima in Crevillent



One of the BRIEC company's clients is Retirement Home La Purísima which is a private retirement home located in the municipality of Crevillent. It belongs to La Purísima Social Enterprise Organization and provides accommodation for 32 people. Its heating boilers have a total installed capacity of 235 kW (2 x 100 kW heating boilers + 1 x 35 kW boiler for hot water supply). The boilers are equipped with feeding screws that are able to disintegrate the briquettes and with a 1500 litres buffer tank.

The boilers have been installed three months ago. Thus, it is difficult to estimate the yearly consumption. From the replacement of the previous natural gas boilers 50 – 55 % lower costs are expected. So far, no technical problems during combustion have been observed.

Previously, boilers were running only 5 h/d due to cost restrictions and the old people used to be cold. Now, the boilers operate 24 h/d and the old people can spend their twilight years much more comfortable at a much lower price in comparison to gas.

Other uses for briquettes

Almond shell briquettes can also be used as fuel for bakery ovens as well as at the wood-fired ovens of pizzerias. When wood briquettes were replaced by almond shell briquettes in bakery ovens 30% smaller amount of fuel was required. Domestic heat appliances (e.g. fireplaces, wood boilers, fireplace inserts) seem to be further interesting options for the utilisation of almond shell briquettes. Due to its low moisture content and high heating value quick heat up can be achieved using very little fuel. Also, the flame image is really clean and attractive. It doesn't stain the glass of stoves or built-in chimneys.

Producer's view

Covaersa's aim is to achieve a leading position by means of its Briec brand, both at the national and international biomass markets using a high quality product endowed with such properties and characteristics which will distinguish it greatly from the rest of biomass fuels.



Supported by the European Commission under the EIE programme

The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.