Combustion of vine pruning pellets at Orientación Sur

Background

The region of Valdepeñas has a wine growing area of 30,000 hectares, producing 20,000 tons vine prunings each year. Most of this biomass is burned on the premise without being used for heating purposes. This practice is subject to sanctions by the Common European Agricultural Policy. Furthermore, it does not produce any benefit for the farmer. At the moment, on lay a minor part of the vine prunning is used to produce a solid fuel suitable for boilers.
The combination of available biomass resources and an underdeveloped biomass market as it is in Spain offers great opportunities which is the background basis for the initiative of Orientación Sur.

Southern Spain can be considered as a sub-desert area. Therefore, the possibilities for an agriculture-based energy market is limited to wine growing. Similarly, forestry areas undergo a growth stage and are not a suitable fuel source at the moment.

Vine pruning pellets

Pellets were produced from vine prunnings. However, they do not fulfill the EN product standards. Thus, the properties and the origin of the utilised raw material should be included in the fuel trade name increasing the consumer's awareness. Similarly, the boilers should be labeled according to the fuel types they could be used for.

Pellets made from vine pruning.

Characteristics of the vine pruning pellets

Water content, %	8 - 10
Lower heating value, MJ/kg	17.86
Bulk density, kg/m^3	650
Ash content, %	3 - 5

1) The available vine pruning within Spain is 500.000 tons/year

Combustion process

The lack of information about the various types of pellets that exist and the different available combustion technologies is a major deficit in Spain. The private or professional owner of a pellet boiler would look for the cheapest fuel without taking into account if the technology is suitable for the fuel. Thus, boiler malfunction and user dissatisfaction is a common problem. Generally, these types of fuels have a clear industrial application. However, users don't see why they shouldn't benefit from this low-cost fuel.

The Spanish boiler & stove market is mostly covered by Austrian as well as Italian manufacturers. A common feature of these boilers is the lack of suitable ash removal systems to transport the ash into the ash box. This is because these boilers are designed for high quality wood fuels with low ash content. Medium scale boilers are usually equipped with moving grates which remove the ash by pushing new fuel in and moving the ashes towards the ash box.

This equipment is able to use low quality fuels. However, the user has still to clean the equipment more frequently. Boilers with horizontal heat exchangers require more maintenance than boilers with vertical heat exchangers. The efficiency during combustion at this equipment is mostly low, as combustion control is generally quite limited. Large scale boilers offer an exceptional combustion control, though they have been designed for fuels in the shape of pellets with very low ash content. Therefore, fuels with higher ash content can cause reduced efficiency and demand long-term stops to clean the equipment, as access to its inner part is very limited or even impossible.

mixBioPells
Market Implementation of extraordinary biomass pellets
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Orientación Sur made several combustion tests, and finally found a technology which was suitable for vine prunning pellets.

Biokompakt AWK (www.biokompakt.com)

The Austrian manufacturer Biokompakt has a especially designed boiler, which is able to use any type of solid fuel while maintaining combustion efficiency. The AWK Biokompakt boiler proved successfully the combustion of vine pruning pellet, rape pellet, fruit stones, woodchip, straw pellets, bark, etc. The boiler allows regulating combustion efficiently while ensuring an efficient function of the system and keeping a low consumption of the locally obtained fuel.

Pellet ashes from rape pellets (left) and pellet ashes after adjusting combustion parameters with alternative fuels (right).

The combustion tests proved that the pellet ashes in the combustion system don't cause any malfunction problems. However it is possible to optimise the functioning of the boiler adjusting the combustion parameters.

Conclusions

The production of solid fuels as pellets and its local use for heat production is a real alternative to the creation of local jobs and contribution to the waste management of the Spanish agriculture sector.

However, fuels produced with local biomass resources are unable to fulfill the actual requirements of the solid biofuel market under the European standard framework.

If a solid fuel standard is established, it should include every possible solid fuel that may exist in order to create an open market, which can be competitive and offer various options to the final consumer.

The price paid by the final consumer for alternative fuel can range from 15 to 35% less than for solid fuels subject to the European Standard.

The pellet, which is produced from waste is energy and can be used for saving. There are developed commercial technologies ready for use.

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