

Small-scale Pellet Production - Vertical Integration in the Forest-Wood Chain

Pierini is a small-scale family-owned logging firm operating in Umbria, at the borders with Tuscany and Lazio. Mr. Francesco Pierini is a fourth generation logger, and his son is going to continue with the family tradition. The firm harvests about 2000 t year⁻¹, with a total workforce of three. Pierini got into pellet production in 2013, in order to diversify and compensate for declining firewood demand and price. Until the most recent energy crisis, firewood demand kept decreasing because the aging rural population has continued migrating towards the more convenient pellet alternative. To make things worse, many people who lost their jobs after the financial crisis of 2008 started their own part-time firewood harvesting businesses, often unregistered and operating outside most of the legal constraints faced by regular operators.

Back in the good old times (pre-2000) firewood was sold at 50000-60000 Liras t⁻¹ (stacked at the landing) and loggers accrued nice profits. Today, the price is about 60 € t⁻¹ and is largely eroded by growing costs, estimated at 50 € t⁻¹, at least. In fact, the most recent energy crisis has determined a sharp increase of firewood cost, restoring profitability, even in the face of growing operating costs (mostly fuel). However, that increase is very small compared to the dramatic growth of pellet prices, which tripled within few months.

Since 2013, Pierini have commissioned a low-investment small-scale pellet plant, using modular industrial components manufactured by a number of different Italian manufacturers. Plant operation occupies one person, who is completely busy with loading the bunkers, transferring the product from the drier to the refiner, bagging, moving the bags etc. The total cost of the process is estimated at approximately 300 € t⁻¹, of which raw material represents about 20%.

Pierini are satisfied with the plant and the process. Local wood is suitable for pellet production: the only caveat is to try and remove as much bark as possible before entering the process. The area is rich with forests and the terrain is mostly hills, which can be accessed with a tractor. Small-scale pellet production may represent a viable opportunity for forest owners and operators confronted with a declining firewood market. The new product may support rural development more effectively than the massive import of industrial pellets does. In fact, the energy crisis of 2022 has shown the extreme vulnerability of a system that relies on imports for over 80% of its total raw material volumes. Under such conditions, local producers can accrue significant benefits, while supporting residents who can no longer supply their pellet boilers with suitable fuel.



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ADDITIONAL INFORMATION

The process is organized as follows:

1) STORAGE AND AIR DRYING. The feedstock is roundwood, generally 1/3 pine, 1/3 fir and 1/3 chestnut. Conifers are stocked for approximately 1 year, and chestnut is dried 3-5 months. All feedstock is reject logs, who cannot fulfil the specifications set for structural use or for traditional firewood. That material could only be used for producing boiler fuel.

2) CHIPPING. Logs are chipped by a local contractor using a Pezzolato PTH400 drum chipper.

3) ACTIVE DRYING. Chips are fed to a batch drier powered by a 350 kW chip-fed boiler. The drier is equipped with load cells, so that the chips will stay in the drier until their mass reaches the expected value. Drier capacity is 1.5 t per batch. The boiler is a Bio4 and uses ca. 55 kg of chips per hour. Chips are obtained from the lowest quality logs, which could not be used for pellet production. The investment cost for the drier was 30000 € in 2013;

4) REFINING. Refining. Chips are moved into the refiner (a MY M30 model), consisting of a drum chopper powered by a 15 kW engine;

5) PELLETIZING. An auger conveyor moves the wood particles to the press (model MI-304-S) with a capacity of 400 kg h⁻¹ and a 30 kW engine. Moisture content drops from 12% to 8-9% during the pelletizing process, which develops much heat. The investment cost for the refiner and the press was approximately 60000 € in 2013;

6) BAGGING. An automatic bagging line packs the pellets into standard 15 kg plastic bags. That system is semi-manual, so the operation is relatively labor-intensive. The investment cost for such simple bagging plant was 30000 € in 2013. In fact, one could purchase an automatic bagging plant, but the cost would be much higher and would be justified only by a significant increase of production volumes.



ABOUT BRANCHES

BRANCHES is a H2020 “Coordinaton Support Action” project, that brings together 12 partners from 5 different countries. The overall objective of BRANCHES is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.

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