

Use of biomass in farming for heating poultry houses

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Biomass heating: an interesting alternative to propane gas

Heating plays a crucial role in poultry farming, as it is essential to maintain high temperatures in the poultry houses to ensure the thermal comfort of the birds, especially during the start of the batch (32-34°C) until they are fully feathered. Propane gas heating has been widely developed and adopted in poultry farming, mainly due to its ease of use (transport, storage, initial investment cost,

maintenance, efficiency). However, gas represents one of the main variable costs alongside feed and chicks, with fluctuating costs depending on market prices. For this reason, and in response to the challenge of better energy management for environmental sustainability, biomass heating emerges as an interesting alternative to propane gas, with lower carbon footprint and equivalent efficiency.



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The types of biomass and boilers

There are several types of biomass heating resources, requiring different types of boilers. The most common types used in livestock farming in France are:

Wood boiler:

- Wood chips (shredded wood)

Multi-fuel boiler:

- Straw
- Miscanthus

Poultry litter combustion is prohibited in France.

If the resource used as biomass is not available on the farm, its purchase must be considered in addition to the cost for handling, grinding, and drying. According to a farmer data, one must, for example, account for €100/t (€30/MWh) for wood chips before their storage in a silo, compared to €50/t (€15/MWh) when the wood is available on the farm. One ton of gas (3 kWh/t) is equivalent to 4 tons of wood (12 kWh/t raw).



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Installation of biomass heating

The boiler operates in a closed circuit and produces hot water delivered to a heating network (air heaters, underfloor heating, spiraled pipes such as Spiraflex). To heat his two poultry houses of 1500 m² each, Stéphane Dahirel, a broiler chicken farmer from the French BroilerNet network, invested in a 350 kWh wood boiler (ETA) coupled with three hot water air heaters (MultiHeat) per poultry house. The air heaters are vertically adjustable and equipped with fans that distribute heat evenly throughout the poultry house. This installation required the creation of a dedicated technical room and a wood storage silo (50 m³).

INVESTMENTS

COST ITEMS	IN € excl. tax
Technical room and storage silo (pre-existing building foundations)	✓ €25,000
Wood boiler, peripherals and connection	✓ €250,000
Electricity and hydraulics in the house (hot water distribution)	✓ €50,000
■ TOTAL INVESTMENT	✓ €325,000
■ GRANTS FROM ADEME "FONDS CHALEUR" AND BRITTANY REGION	✓ €163,000
REMAINING COST TO BE PAID	✓ €162,000



Biomass heating benefits according to the farmer

Biomass heating offers many advantages over propane gas heating:

- Lower carbon footprint
- Energy self-sufficiency and local energy use (possibility of using wood from hedges)
- Improved air quality within the poultry house due to the absence of CO₂ emissions and humidity associated with gas combustion in the poultry house
- Improved litter quality: drier and more friable
- Reduced need for litter additions
- Less pododermatitis
- More active animals, which feed and drink faster due to improved air quality within the poultry house
- Likely improvement in Feed Conversion Rate (FCR)
- Better control over energy costs (protection against fluctuating gas prices): no compromises made on heating, ensuring optimal levels for the birds throughout the batch duration
- Savings after payment of installation costs
- Comfortable working conditions in the poultry house which contributes to the improvement of

References :

https://www.planboisenergiebretagne.fr/app/uploads/2022/01/fiche_rex_lanouee-56_exploitation-agricole.pdf, <https://www.paysan-breton.fr/2018/05/une-ambiance-saine-avec-la-chaudiere-a-biomasse/> and <https://www.itavi.asso.fr/publications/la-chaudiere-a-biomasse-air-eau>

Video presentation by the farmer of one of his biomass heating systems from 2:50 to 4:15: https://www.youtube.com/watch?v=IK-3D_BOLi8

Limits and precautions according to the farmer regarding biomass heating

Limitations:

- Installation cost: €80-110/m² of poultry house (possible grants from ADEME, the region, and the farmer's affiliated company)
- Return on investment: 7-10 years
- Preparation time duration of the dossier to unlock funds for installation (1.5 years for the farmer)
- Labor and equipment required for the boiler supply
- Wood boiler maintenance higher than gas

Precautionary points on usage:

- To optimise the boiler's efficiency, the wood's moisture content should be below 30%
- Prior to investment, it is crucial to consider the quality and quantity of wood supply
- Do not underestimate the additional workload (boiler supply)
- In the case of a multi-fuel boiler, the combustion point varies depending on the resource used, which can affect system performance when the point is not well calibrated

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