Bagasse Drying and Pelletising: Fuel and Steam Gain

Pellets made by drying bagasse to a lower moisture, the energy to pelletise and the steam gained per kg of original bagasse, after Hugot's preface.

Method: Hugot; Handbook of Cane Sugar Engineering; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Bagasse	30.000	t/h
Bagasse moisture	48.000	%
Pellet moisture	8.0000	%
Pelletising energy per tonne of pellets	80.000	kWh/t
Steam per kg of pellets	4.8000	
Steam per kg of bagasse	2.2000	

Calculated results

Parameter	Value	Unit
Pellets	16.957	t/h
Pellets per kg bagasse	0.56522	
Water removed	13.043	t/h
Pelletising power	1,356.5	kW
Gross steam gain over burning the bagasse (drying heat and pelletising power not deducted)	23.320	%

Notes for this case

- Hugot: about 560 g of pellets per kg of bagasse, 80 kWh per tonne of pellets, and 4.8 kg of steam per kg of pellets against 2.2 per kg of bagasse: about 22 % more steam.

Formula and method

$$y = \frac{1 - w_0}{1 - w_1}, \quad \dot{m}_p = yB, \quad P = e\,\dot{m}_p, \quad \text{gain} = \frac{y\,r_p}{r_b} - 1$$

Variables

B	Bagasse	kg/s
w_0	Bagasse moisture	-
w_1	Pellet moisture	-
e	Pelletising energy per tonne of pellets	J/kg
r_p	Steam per kg of pellets	-
r_b	Steam per kg of bagasse	-
$\dot{m}_p$	Pellets	kg/s
y	Pellets per kg bagasse	-
$\dot{m}_w$	Water removed	kg/s
P	Pelletising power	W
$y r_p / r_b - 1$	Gross steam gain over burning the bagasse (drying heat and pelletising power not deducted)	-

Method and standards

Dry-solids balance with Hugot's figures.

Assumptions and limits

- Same boiler conditions for both fuels.
- The steam gain is gross: the heat to dry the bagasse (about 0.4 kg of water per kg of bagasse at the defaults) and the pelletising power are not deducted. It is a real gain only if the drying heat would otherwise be wasted (flue gas).
- Steam per kg of pellets and of bagasse are your inputs; the pellet figure is not tied to the pellet moisture.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- preface to the third edition (bagasse pelletisation)
- Dry-solids balance

Report details

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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/sugar-ethanol/steam-power/bagasse-pelletising

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Reopens the calculator with the inputs of this report.