

Improvement of wood chips quality by means of a Fontana mechanical sieve



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Wood chips quality

- Moisture content
- Contamination
- Size distribution
 - Fines and oversize



Size distribution

Many factors involved

- Tree parts and species
- Chipper type
- Comminution device
- Chipping tool wear
- Chipper settings



Wood chips cost

| Plant | Type | Price € gt ⁻¹ | Price € odt ⁻¹ |
|----------------------|-------------|--------------------------|---------------------------|
| Enel Trade SpA | Industrial | 53 | 96 |
| SMB spa | Industrial | 45 | 83 |
| Scarlino Energia Srl | Industrial | 45 | 83 |
| Syndial SpA | Industrial | 44 | 79 |
| Biogenera Srl | Industrial | 50 | 91 |
| Bioenergia Fiemme | Industrial | 50 | 91 |
| Cip Calor | Residential | 80 | 114 |
| Villa Barigazzi | Residential | 80 | 114 |
| Comune Budoia | Residential | 85 | 121 |
| Floricoltura Chiara | Residential | 95 | 136 |
| Lefay Resort | Residential | 98 | 140 |
| Villa Spoiano | Residential | 67 | 96 |

Average price fuel delivered:

- industrial fuel

47.9 € gt⁻¹ (W 45 %) = 87 € odt⁻¹

- residential fuel

84.2 gt⁻¹ (W 30%) = 120.2 € odt⁻¹

CEN TS 14961 W30 P45



Fontana 170 C mechanical screening



Designed for agroindustry: sorting long parts from impurities
Opposite approach fits wood energy requirements
2 stage study: 1) productivity and 2) wood chips improvement

Sieve structure

- Vibrating bench
- 4 corrugated steel panes
- Panes distance 2-7 cm
- 5 kWe diesel generator



Productivity

| Operation | | Screen | Tractor |
|------------------------|------------------------------|-------------|-------------|
| Purchase price | Euro | 32000 | 50000 |
| Service life | years | 8 | 8 |
| Salvage value | % of new | 20 | 20 |
| Interest rate | % | 4 | 4 |
| Fuel consumption | litres SMH ⁻¹ | 2 | 4 |
| Crew | n | 0 | 1 |
| Depreciation | Euro year ⁻¹ | 3200 | 5000 |
| Annual usage | SMH | 1000 | 1000 |
| Total fixed cost | Euro SMH ⁻¹ | 4.9 | 7.6 |
| Repair and maintenance | Euro SMH ⁻¹ | 3.2 | 2.5 |
| Personnel cost | Euro SMH ⁻¹ | 0.0 | 16.0 |
| Total variable cost | Euro SMH ⁻¹ | 5.9 | 26.3 |
| Overhead (20%) | Euro SMH ⁻¹ | 2.2 | 6.8 |
| Total | Euro SMH⁻¹ | 12.9 | 40.7 |

- 1.9 odt SMH⁻¹
- Delays 25%
- 28.5 € odt⁻¹
- About 2% reject



Tested biomasses



Medium rotation poplar whole trees comminuted by disc chipper



Poplar pulpwood logs comminuted by drum chipper

Biomass quality

2 treatments
 10 replications
 3 samples:
 Unsorted
 Accepts
 Rejects



Pane distance:

- 3 cm
- 2.5
- 4
- 2.5

| Chipper | Process | Oversize | Accepts | Fines |
|---------|---------|------------------|-------------------|-------------------|
| Drum | Before | 1.3 ^a | 96.1 ^a | 2.7 ^a |
| | After | 0.6 ^a | 97.4 ^a | 2.0 ^a |
| Disk | Before | 1.3 ^a | 92.1 ^b | 6.4 ^b |
| | After | 0.6 ^a | 96.6 ^c | 2.8 ^{ac} |



Conclusions

| | |
|------------------|--------------------------|
| Price difference | 33.2 € odt ⁻¹ |
| Sieving cost | 28.5 € odt ⁻¹ |
| Profit | 4.7 € odt ⁻¹ |



Thank you!



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