



Latest from Italy and Europe

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CNR – Ivalsa



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CNR



- Public Research Organization
- Nationwide – the largest
- Established 1923 (16 y before F!)
- 107 Institutes

- www.cnr.it



Italy

Territory ~ 32 Mha, > 60 M people

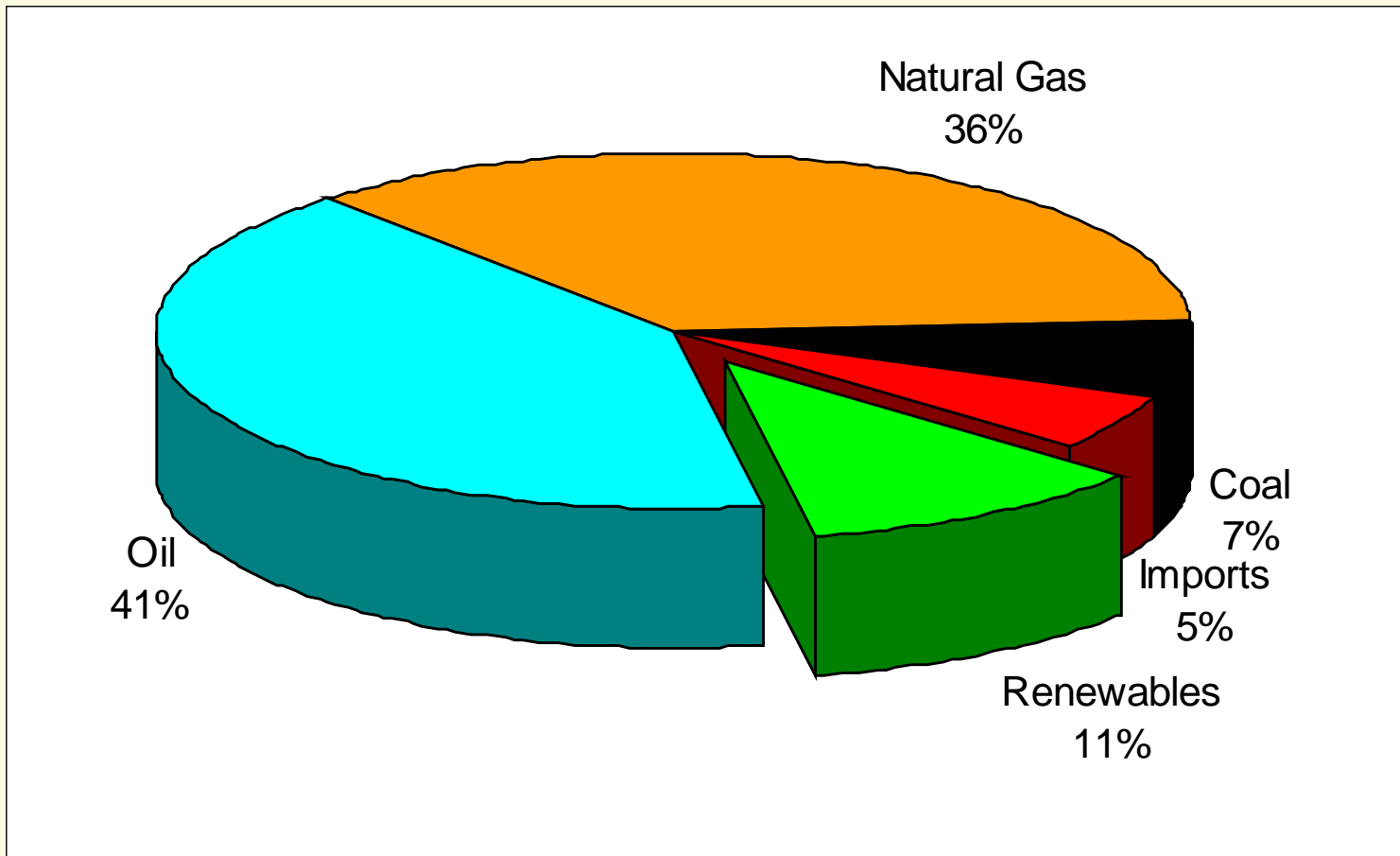


Forests and forestry in Italy

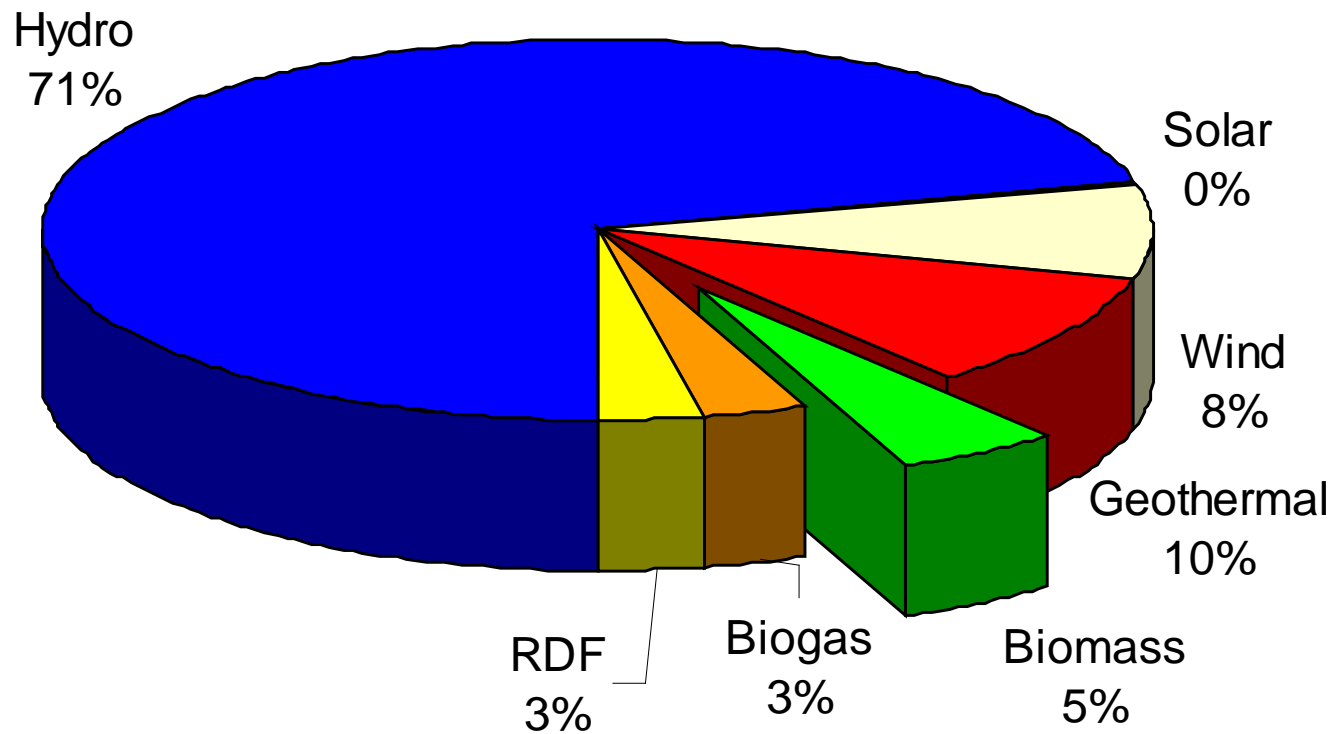
- 10.5 M ha - 1 bill. m³ growing stock
- Mountains and hills
- NIPF > 60 %
- Close-to-nature forestry
- Harvest 30 % of AAC



Energy consumption: 180 Mtoe



Renewables

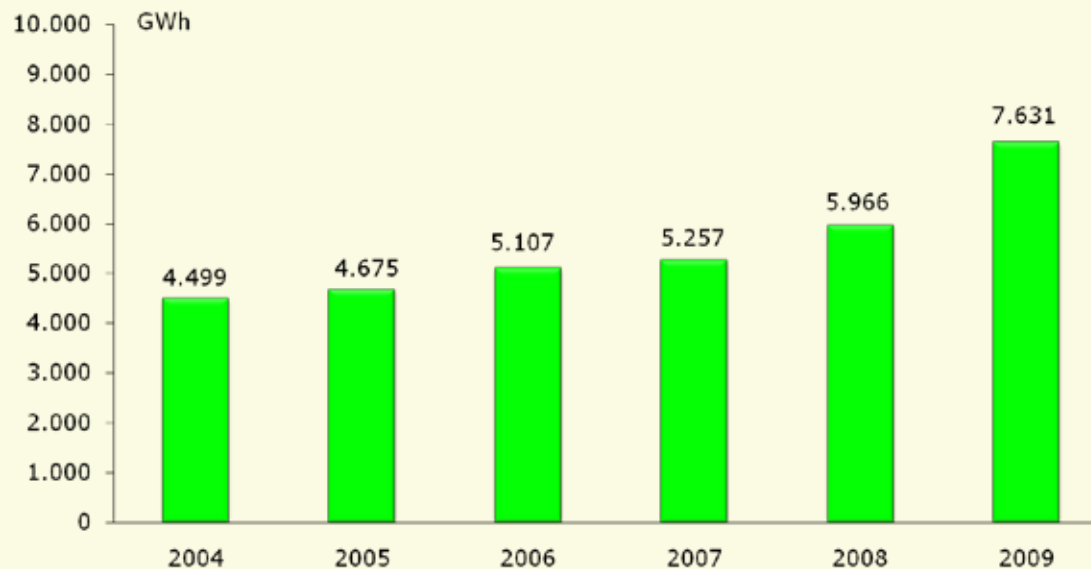


Targets

EU engagement 20-20-20

Biomass growth factor > 5

Feed-in tariffs



For the forestry sector...

Delivered price of chips from 30 to > 60 €/gt

Intense effort to expand the resource base

| Type | n | MW | t/year |
|------|-----|-----|-----------|
| DHP | 131 | 370 | 280,000 |
| CHP | 26 | 286 | 3,010,000 |



Historic competence

Particleboard factories (currently L!)



Chipcost

| Productivity Module | | Costing Module | | | |
|---|--|-----------------------------|--|--|--|
| | | Chipper | Tractor | Loader | |
| Chipper Power (kW) - deduct of loader and drivetrain losses | <input type="text" value="95"/> <input type="text" value="100"/> <input type="text" value="105"/> <input type="text" value="110"/> <input type="text" value="115"/> | | | | |
| Av. piece size (kg) | <input type="text" value="120"/> <input type="text" value="125"/> <input type="text" value="130"/> <input type="text" value="135"/> <input type="text" value="140"/> | | | | |
| Options | | | | | |
| <input checked="" type="checkbox"/> Chip on terrain | | | | | |
| <input type="checkbox"/> Self Propelled | | | | | |
| <input type="checkbox"/> Small Chipforwarder | | | | | |
| Results | | | | | |
| Net Productivity (gt/PMH) | 7.74 | | | | |
| Utilization rate | <input type="text" value="55"/> <input type="text" value="60"/> <input type="text" value="65"/> <input type="text" value="70"/> <input type="text" value="75"/> | | | | |
| Gross Productivity (gt/SMH) | 5.81 | | | | |
| Operation cost/SMH | 121 | | | | |
| Chipping cost/gt | 21 | | | | |
| | | Purchase price | <input type="text" value="35000"/> | <input type="text" value="80000"/> | <input type="text" value="60000"/> |
| | | Salvage value | <input type="text" value="7000"/> | <input type="text" value="16000"/> | <input type="text" value="12000"/> |
| | | Deprec. period (years) | <input type="text" value="8"/> | <input type="text" value="8"/> | <input type="text" value="8"/> |
| | | Scheduled hours/day | <input type="text" value="7"/> | <input type="text" value="8"/> | <input type="text" value="8"/> |
| | | Scheduled days/year | <input type="text" value="90"/> | <input type="text" value="180"/> | <input type="text" value="180"/> |
| | | Repair rate (% of Depr.) | <input type="text" value="80"/> <input type="text" value="90"/> <input type="text" value="100"/> <input type="text" value="110"/> | <input type="text" value="100"/> <input type="text" value="110"/> <input type="text" value="120"/> <input type="text" value="130"/> | <input type="text" value="100"/> <input type="text" value="110"/> <input type="text" value="120"/> <input type="text" value="130"/> |
| | | Interest rate (% Ann. Inv.) | <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> <input type="text" value="10"/> | <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="9"/> <input type="text" value="10"/> | <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/> |
| | | ITG rate (% Ann. Inv.) | <input type="text" value="10"/> <input type="text" value="11"/> <input type="text" value="12"/> <input type="text" value="13"/> | <input type="text" value="11"/> <input type="text" value="12"/> <input type="text" value="13"/> <input type="text" value="14"/> | <input type="text" value="11"/> <input type="text" value="12"/> <input type="text" value="13"/> <input type="text" value="14"/> |
| | | Power (kW) | <input type="text" value="0"/> | <input type="text" value="120"/> | <input type="text" value="85"/> |
| | | Utilization power (% Max.) | <input type="text" value="10"/> <input type="text" value="15"/> <input type="text" value="20"/> <input type="text" value="25"/> | <input type="text" value="80"/> <input type="text" value="85"/> <input type="text" value="90"/> <input type="text" value="95"/> | <input type="text" value="60"/> <input type="text" value="65"/> <input type="text" value="70"/> <input type="text" value="75"/> |
| | | Fuel price/litre | <input type="text" value="0.0"/> | <input type="text" value="1.2"/> | <input type="text" value="1.2"/> |
| | | Lube price/kg | <input type="text" value="0.0"/> | <input type="text" value="4.0"/> | <input type="text" value="4.0"/> |
| | | Labour wage/SMH | <input type="text" value="0.0"/> | <input type="text" value="15.0"/> | <input type="text" value="15.0"/> |
| | | Workload gt/year | 3659 | | |

Logging Residue



Thinning operations



Agricultural wood residues



Short Rotation Coppice



Tractor-based units?

⊖ *Claas* @ 250 €/SMH + 3 shuttles @ 70 €/SMH
] 460 €/SMH : 40 gt/SMH = **11.5 €/gt**

- *Spapperi* @ 100 €/SMH + 2 shuttles @ 70 €/SMH
] 240 €/SMH : 10 gt/SMH = **24.0 €/gt**



Size matters



Point of comminution (25% cost increase)



Does bundling pay?



Balancing the cost of bundling: scenario analysis

| Scenario | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|--------------------------------------|------|-------------|------|-----------------------------------|------|--------------|-------------|
| Bundler Productivity | Average (3.4 ODT SMH ⁻¹) | | | | Max. (4.4 ODT SMH ⁻¹) | | | |
| Bundles on road train | No | No | Yes | Yes | No | No | Yes | Yes |
| Storage cost = cost of roof | No | Yes | No | Yes | No | Yes | No | Yes |
| Bundling (€ODT ⁻¹) | 31.4 | 31.4 | 31.4 | 31.4 | 24.2 | 24.2 | 24.2 | 24.2 |
| Saving on transport (€ODT ⁻¹)* | 1.0 | 1.0 | 8.0 | 8.0 | 1.0 | 1.0 | 8.0 | 8.0 |
| Saving on storage (€ODT ⁻¹) | 12.1 | 3.8 | 12.1 | 3.8 | 12.1 | 3.8 | 12.1 | 3.8 |
| Saving on comminution (€ODT ⁻¹) | 16.4 | 16.4 | 16.4 | 16.4 | 16.4 | 16.4 | 16.4 | 16.4 |
| Balance (€ODT ⁻¹) | 1.8 | 10.2 | -5.1 | 3.2 | -5.3 | 3.1 | -12.3 | -3.9 |
| % bundling cost covered | 94 | 67 | 116 | 90 | 122 | 87 | 151 | 116 |

Notes: * calculated for an assumed one-way transportation distance of 35 km

Chipper trucks



Chipping vs. grinding?



Quality - Screening

Revenue 33.2 €/odt
– Cost 28.5 €/odt
= Profit 4.7 €/odt



| 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} |
| Crusher | Before | 2.1 ^a | 90.7 ^b | 7.2 ^b |
| | After | 1.3 ^a | 94.2 ^d | 4.5 ^c |

Pulp or Biomass Chips?

| | Pulp + Chips | | Chips only | |
|---|--------------|-------------|-------------|-------------|
| | Manual | Mechanized | Manual | Mechanized |
| Raw cost | | | | |
| Aligning Tops | 4.8 | 0.0 | 4.8 | 0.0 |
| Processing | 6.9 | 9.3 | 0.0 | 0.0 |
| Loading logs | 2.5 | 2.5 | 0.0 | 0.0 |
| Bunching residues | 1.9 | 0.0 | 0.0 | 0.0 |
| Chipping residues | 17.0 | 17.0 | 0.0 | 0.0 |
| Chipping tops | 0.0 | 0.0 | 11.0 | 11.0 |
| Pro-rated cost (60% pulp: 40% residue; or 100% chips) | | | | |
| Aligning Tops | 4.8 | 0.0 | 4.8 | 0.0 |
| Processing | 4.1 | 5.6 | 0.0 | 0.0 |
| Loading logs | 1.5 | 1.5 | 0.0 | 0.0 |
| Bunching residues | 0.8 | 0.0 | 0.0 | 0.0 |
| Chipping residues | 6.8 | 6.8 | 0.0 | 0.0 |
| Chipping tops | 0.0 | 0.0 | 11.0 | 11.0 |
| Total | 18.0 | 13.9 | 15.8 | 11.0 |
| Labour (h worker t ⁻¹) | 0.389 | 0.178 | 0.125 | 0.052 |



OH: Dust, Benzene, APH



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- Free book downloads
- www.biomassaforestale.org

