



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

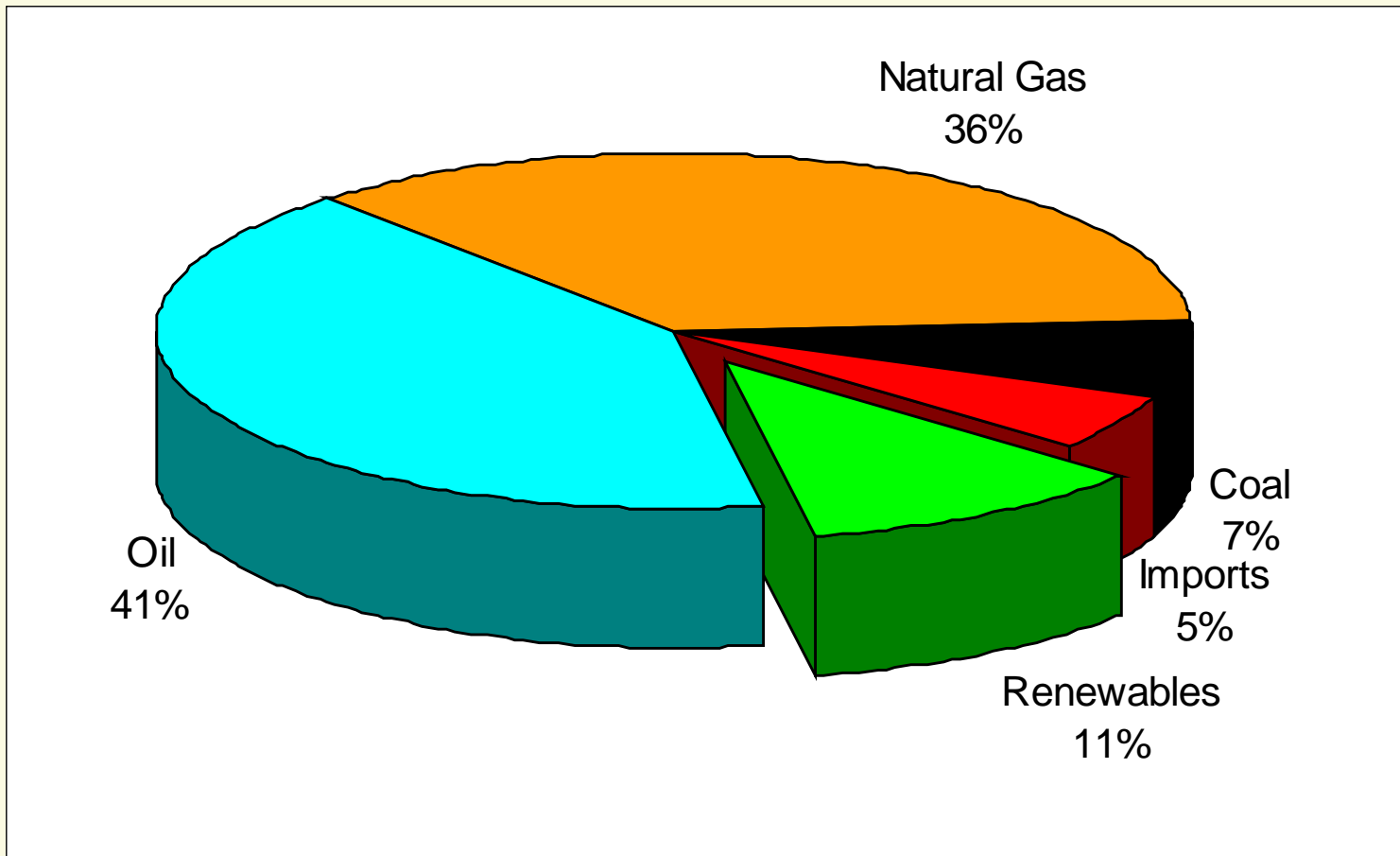


Forests and forestry in Italy

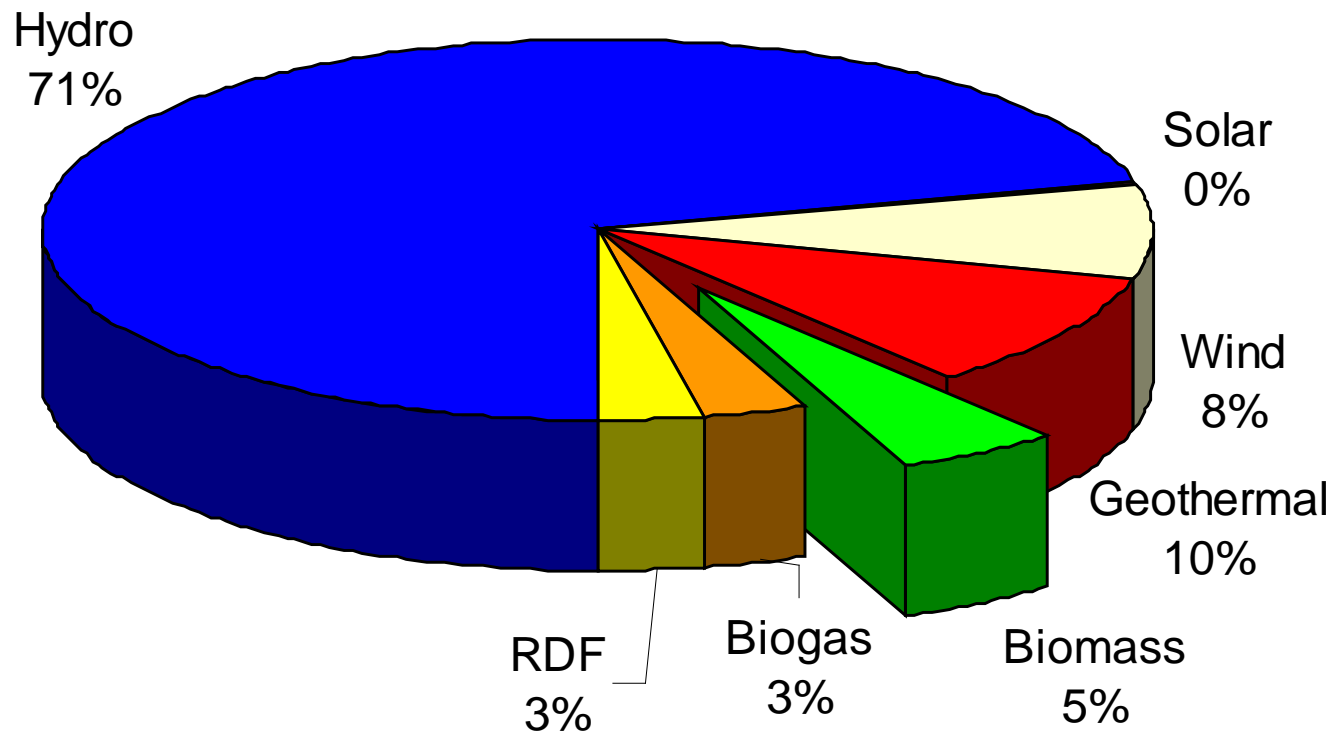
- 10.5 M ha - 1 bill. m³ growing stock
- Mountains and hills
- NIPF > 60 %
- Close-to-nature forestry
- Harvest 30 % of AAC



Energy consumption: 180 Mtoe



Renewables

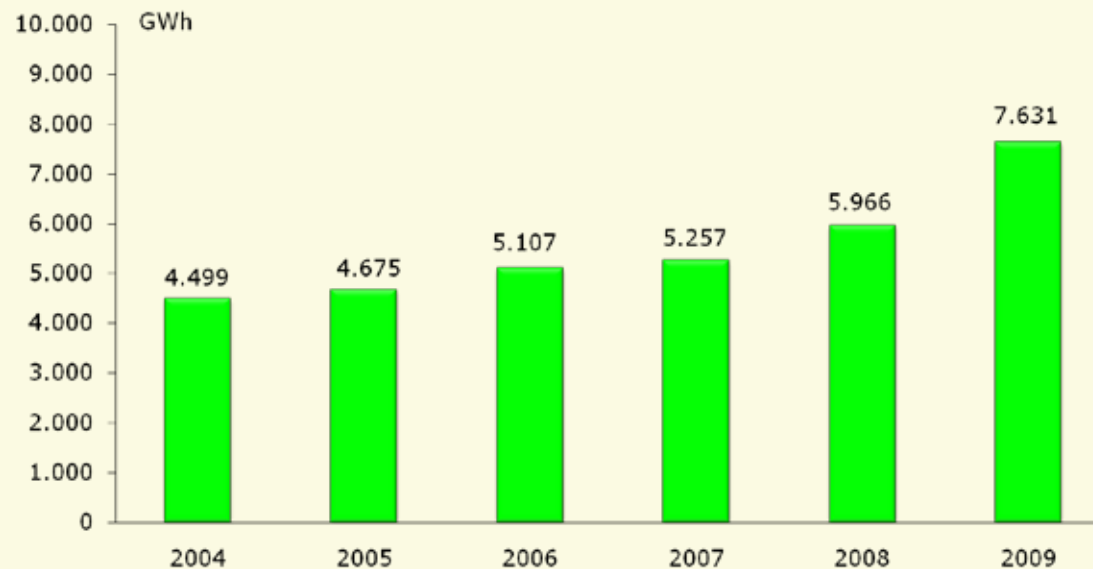


Targets

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



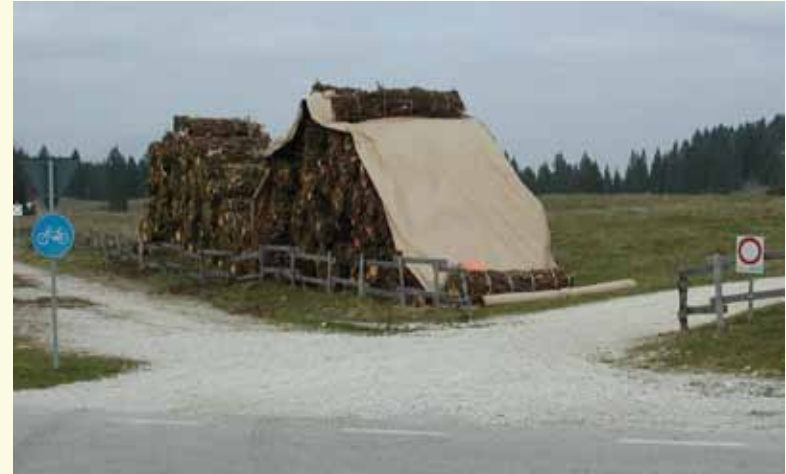
Size matters



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



