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The role of indirect woody biomass sources in the Italian energy sector

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The context – the project

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- **MAIN GOAL** → **PREPAIR (Po Regions Engaged to Policies of AIR)** will build capacity and strengthen coordination among public authorities (such as Regions and environmental agencies) and private operators, in order to improve air quality in North Italy.
- **ROLE OF TESAF-UNIPD** → Involvement in Third pillar (Air quality and Biomass)

> ***ACTION C.8:*** *Analysis of the logistics of consumption and supply of woody biomass* → optimize the local supply chain management and production of biomass for energy use → starting from an analysis of potential woody biomass

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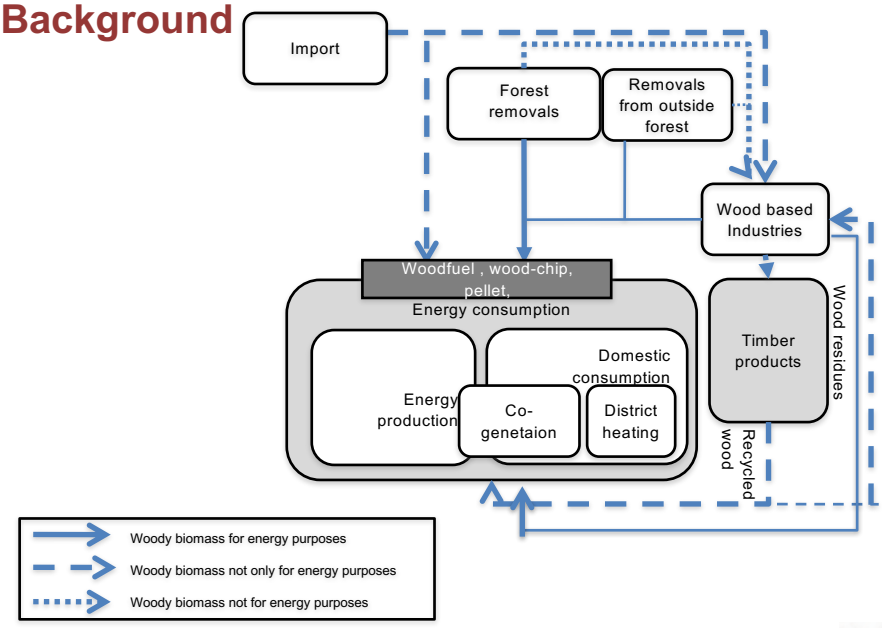
Outline

- **Background** → woody biomass consumption for energy and potential sources at Italian level

  → It represents the first source of renewable energy in Italy but it based on **not statistical reliable data** → a significant gap between sources and consumption

- **Objective** → identification of the role covered by the secondary biomass sources (recycled wood and industrial residues)
  - A comparison with other EU countries
  - A legislative context
  - The competition with other industrial sector
- **Conclusion**

Background



Background - The woody biomass consumption

At Italian context:

- **Residential use (for heating)** represents more than 75% of total consumption;
- **Use for CHP and electricity production** doesn't cover more than of 15% of consumption.

Heating production	Million of tons	Role covered
Domestic use - *fuelwood*	16.8	78%
Domestic use - *pellet*	1.9	
Industrial use (woodchips)	1.7	7%
Electricity and CHP	**Million of tons**	**Role covered**
Industrial use (woodchips)	3.3	15%
Total	**23.7**	

Our elaboration with GSE and ISTAT data

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Background - The potential woody biomass sources

Annual supplies	Quantities	Data source	Notes
1. Forest removals for energy purposes	2.7 M ton	Istat, 2012	Under-estimated*
2. Woody material from trees from outside the forest	3-4 M ton	Fiper, 2013	Potential
3. Imports of materials utilizable for energy purposes	3.8 M ton	Comtrade, 2016	Potential
4. Wood processing residues from forest-based industries	3.1 M ton	Extravalori, 2013	Potential
5. Post consumer wood (recycled wood)	4 M ton	Eurostat, 2014	Potential
Total potential sources	**16.6 to 17.6**		
Total Consumption	**23.7 M ton**		

Even if we assumed that all of the potential woody biomass was destined for energy production (not realistic scenario), the total amount of sources would cover around than 70-75% of total consumption → **role of unknown sources**

*Corona P., Giuliarelli D., Lamonaca A., Mattioli W., Tonti D., Chirici G., Marchetti M. (2007). Confronto sperimentale tra superfici a ceduo tagliate a raso osservate mediante immagini satellitari ad alta risoluzione e tagliate riscontrate amministrativamente. Forest@ 4 (3).

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Background - Classification of sources and main uses

Sources	Classified as (UNECE/FAO)	Main use
1. **Forest removals** for energy purposes	Direct sources	Mainly domestic use
2. Removals of **trees outside forest areas**		
3. **Imports** of materials utilizable for energy purposes		
4. **Wood processing residues** from forest-based industries	Indirect sources	Only industrial use
5. **Recycled** wood	Recovered sources	Only industrial use
6. **The rest** = Consumption less known sources	Unknown sources	Mainly domestic use

OBJECTIVE OF THIS STUDY

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A comparison with other EU countries

The consumption of woody biomass for energy in Italy a**ppears similar to the French consumption** and not so far from Germany consumption (Joint wood energy enquiry, UNECE/FAO)

Countries	Consumpt. per inhabitant (ton/inhab.) (JWEE data)	% families that use woody biomass for heating (studies at national scale)
Germany	0.40	19.1%
France	0.28	16.4%
United Kingdom	0.08	2.3 %
Italy	0.29	21.4%

Countries	Direct sources	Indirect sources	Recycled wood	Unknown sources
Germany	47.8%	29.5%	20.4%	2.3%
France	58.7%	33.2%	8.1%	0%
United Kingdom	28.5%	69.4%	2.1%	0%

Data from JWEE, 2015

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The secondary sources for the energy production

Main factors affecting the use of wood processing residues and recycled wood for energy purposes are (Keegan *et al*, 2013*):

1. technical and logistic barriers
2. **policies** concerning waste management → *EU strategies aim to reduce the environmental and health impacts of waste by* ***improving resource efficiency*** *and reducing the emissions of air pollutants*
3. **the competition** of the industrial sector for the same raw material, in particular for the use of non-coniferous chips → *between 2005-2015, according to Eurostat, prices for non-coniferous chips have increased by more than 70%, while prices of coniferous chips have increased by around 10%.*

**Keegan, D., Kretschmer, B., Elbersen, B., Panoutsou, C., (2013). Cascading use: a systematic approach to biomass beyond the energy sector. Biofuels, Bioprod. Bioref. 7:193–206*

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Waste management in EU policies

- According to its definition, **post-consumer wood** should be considered **waste**, since, this term refers to any substance or object that the holder discards or intends to discard.
- Directive 2008/98/EC on waste (Waste Framework Directive) **has set the main waste management principles within the EU**, including two specific targets to be achieved in EU-28 by 2020: **50%** reuse and recycling of waste **generated by household** and **70%** reuse and recycle of non-hazardous waste **in other sectors.**
- The EU Waste Directive prioritizes waste handling in a five-stage hierarchy: (a) prevention; (b) preparing for re-use; (c) recycling, (d) recovery (e) disposal.

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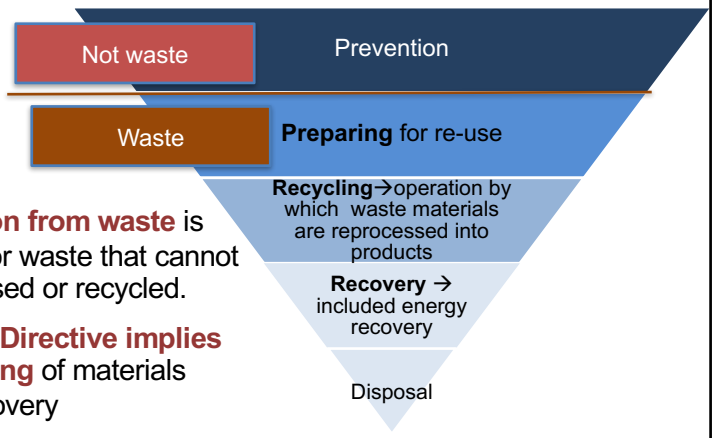
Waste management hierarchy



Energy production from waste is only appropriate for waste that cannot be prevented, reused or recycled.

→ **the EU Waste Directive implies reuse and recycling** of materials before energy recovery

→ Similar approach of **cascading concept** (EU Forest strategy)

Recycled wood in Italy (1/3)

- The collection, recovery and recycling of post consumer wood in Italy is mainly managed by Rilegno.
- At the end of 2017, Rilegno managed around **400 recovery platforms** and supplied its services to 4437 Italian municipalities, around **two-thirds of the Italian population**.
- Rilegno's services to municipalities have been fixed by an **agreement between the consortium and the National Association of Italian Municipalities** (ANCI)

  → This agreement states that Rilegno is also **responsible of collection of bulky wood waste, besides wood packaging waste**.

Recycled wood in Italy (2/3)

At the end of 2017, Rilegno, as members, included:

- **328** wooden packaging producers;
- **2029** wooden packaging transformers
- **13** companies specialised in **recycling** →**10 panel producers**, 1 paper producer, 1 building components producers, 1 eco-pallet producers
- **Among panel producers** → 7 of 10 are owned by three big groups

↓

More than 95% of post consumer wood recycled by Rilegno is re-used for **panel production**

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Recycled wood in Italy (3/3)

In Italy the recycled wood is by far the main raw material for the production of particleboard

Main raw material for particleboard production in selected EU countries

	Share of roundwood	Share of woody by-products	Share of recycled wood
Germany	20 %	46 %	34 %
France	41 %	37 %	22 %
United Kingdom	16 %	31 %	53 %
Italy	0 %	5 %	95 %

Use of wood and recycled wood in the production of particleboards in main EU economies and Italy (Meinlschmidt *et al.*, 2015) *

*Meinlschmidt, P., Mauruschat, D., Briesemeister, R., (2015). Altholzsituation in Europa und Deutschland. Chemie Ing. Tech. 10.1002

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Wood processing residues – an overview

- Wood processing residues very often are **not well defined** or harmonized among EU legislations → risk of confusing these materials with wood waste
- Wood processing residues **cover an increasing share of woody biomass** in the wood energy sector, but:

  → they are not still covered comprehensively by official statistics

  → **Why?** (i) **huge variety** of wood processing residues, (ii) **different parameters** to quantify their potential/use (iii) mainly used internally (**self-consumption**) for heating industries (producers) (Saal *et al.*, 2017)*.

* Saal U, Weimar H, Mantau U. (2017). Wood Processing Residues. Advances in Biochemical Engineering/Biotechnology. Springer, Berlin, Heidelberg

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Wood processing residues – in Italy

Different parameters, different data on utilization also at Italian level → an analysis of data and results of some studies

Author/organization responsible	Area of the study	Parameters identified	Notes
ISPRA (2010)	Italy	11.8 e 20.6 t/year for employee	This parameter is an elaboration of previous studies.
FLA (2010)	Italy	21.25 kg/m^3 roundwood input	
CTI (2005)	Lombardy	11.8 tons/year for employee	54% of forest-based companies utilize its processing residues for heating.
Udine University (2002)	Friuli	8 tons/year for employee	The energy utilization of wood processing residues covers around 40% of the total heating needs of companies that produce residues.
Notargenlo et al. (2015)	Trento	30% per m^3 roundwood input	6% of wood processing residues are used internally for heating companies that produces them. The rest of the residues are sold.

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Conclusions

At Italian context, secondary wood biomass sources we have observed two different situation:

- **Recycled wood** have a **very marginal role for in the energy production** → main final destination appears the panel production. This means:
  - the **distortive effects of economic support** of bioenergy are still **marginal;**
  - the predominance of panel production **is in line with the hierarchy proposed by Waste EU Framework** and concept of cascading use of wood.
- The **utilization of wood residues** appears to be common practice
  - we don't have reliable data on the availability of this resource and its utilization for energy production → **too different parameters, most of wood processing residues is used** for the self-consumption (impossible to intercept data)

Conclusions

There is the necessity to have an organic approach in data collection wood energy sector

→ essential for a more **effective implementation** of the renewable energy policy;

→ reliable data and a solid overview of the sector would **be an answer to criticism** (often fake news) to new Italian Forest Law


BIOMASSE AL POSTO DELLE FORESTE

L'Associazione Medici per l'Ambiente ISDE Italia e il Gruppo di Ricercatori e Scienziati di Energia per l'Italia esprimono la più profonda preoccupazione per la recentissima approvazione da parte di entrambi i rami del Parlamento del Decreto Legislativo 485: "Disposizioni concernenti la revisione e l'armonizzazione della normativa nazionale in materia di foreste e filiere forestali" attualmente alla firma del Presidente Mattarella.

Il Decreto favorisce in modo incondizionato e sistematico il taglio esteso di boschi e foreste, fino ad oggi protette, per l'utilizzo delle masse legnose a fini energetici nelle centrali a biomasse.

→ Reliable on forestry statistics appear fundamental to delineate a correct Italian baseline of LULUCF Regulation

Than you for your attention

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