Reporting Parallel Session 2

Forests, agroforestry and bioenergy

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Session 2

Forests, agroforestry and bioenergy

Keynote, Prof. Scarascia Mugnozza, *Consiglio per la Sperimentazione e la Ricerca in Agricoltura, CRA, Italy*

Conifer afforestations in Italy: an opportunity for wood energy and forest restoration

Bagnato S., University of Reggio Calabria, Italy

Multidimensional sustainability assessment of forest resource supply chain

Martire S., University of Milano Bicocca, Milano, Italy

Manual and mechanized thinning of walnut plantations

Nati C., Ivalsa, CNR, Florence, Italy

Potentialities and uncertainties of novel agroforestry systems in the European CAP: farmers' and professionals' perspectives in Italy

Pisanelli A., Institute of Agro-environmental and Forest Biology, National Research Council

Plan Supply and Biomass Cycle Eco-Efficiency

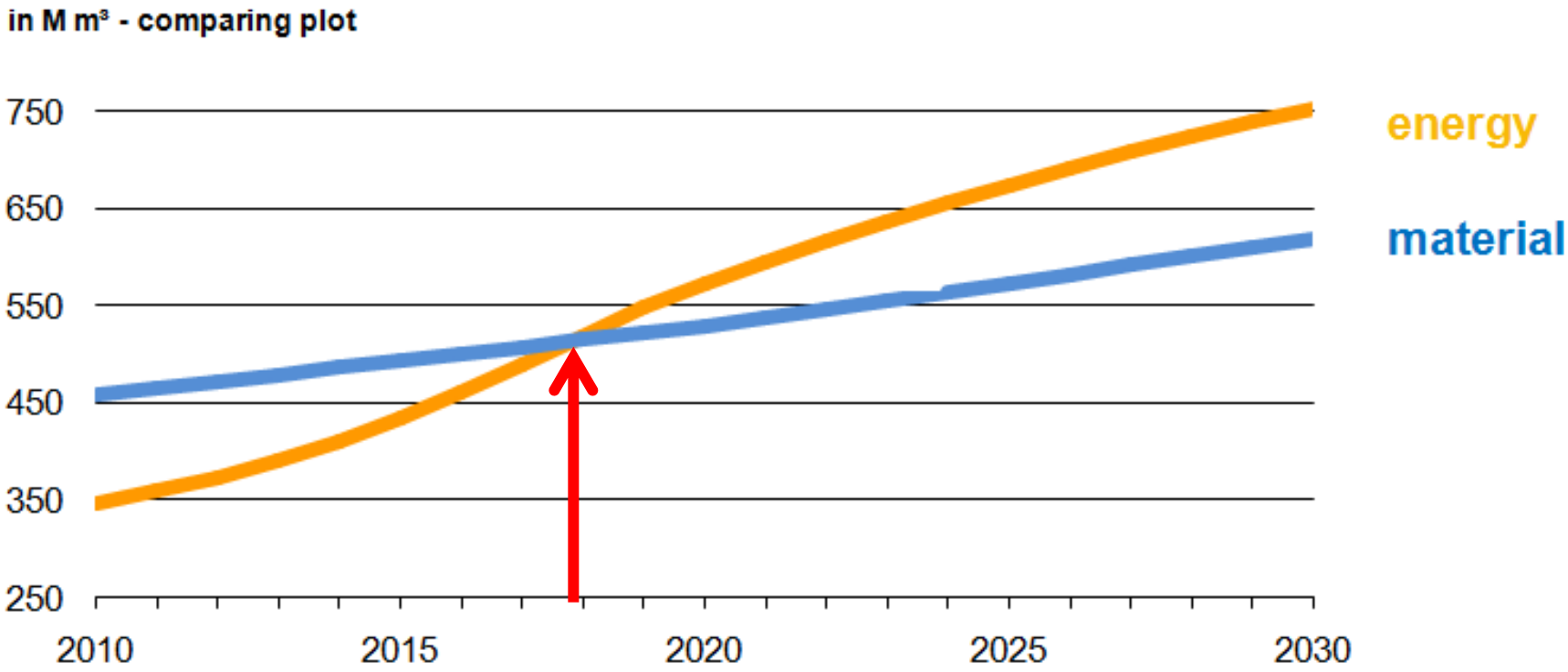
Grohmann F., Regione Umbria, Italy

Key note (Scarascia Mugnozza)
setting the scene
Possibilities of using wood for energy production?

Bioenergy in EU/27 and in Italy (2008)

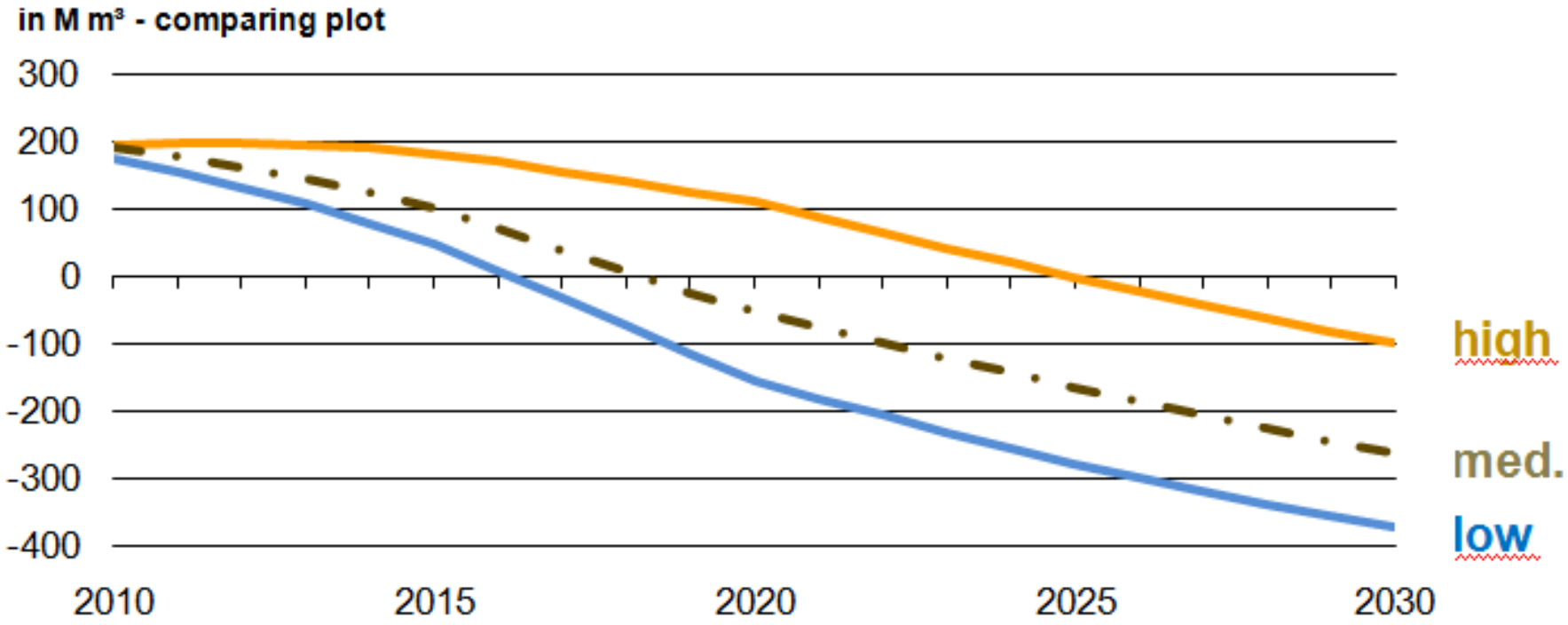
Total energy need	=	1850 Mtoe (183 IT)
Renewable energy	=	185 Mtoe (12.8 IT)
RE/TE	=	10.3% (7.0% IT)
RE/TE in 2020	***=***	***20% (17.0% IT)***
Bioenergy/RE	=	51% (30% IT)

The challenge:
energy for wood will exceed material demand in the upcoming years



From Matau 2010

Difference between potential demand and potential supply of wood



From Matau 2010

How to mobilise the demanded wood?

3 Case studies presented experiences and perspectives for Italy

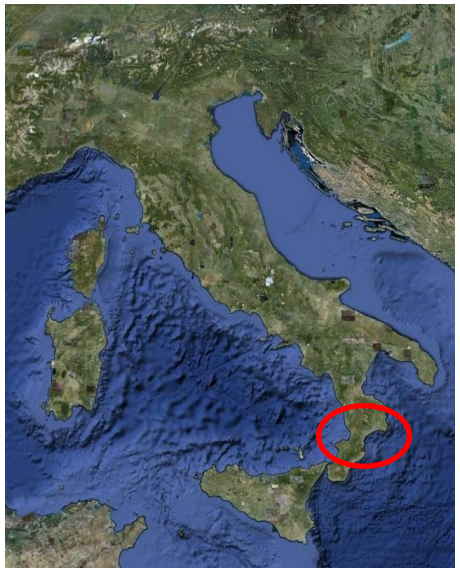
1. opportunities for wood energy production from regeneration logging of conifer afforestations
2. Thinning of walnut plantations
3. Perspective to expand the area of novel agroforestry systems by measure 2.2.2 RDP

Conifer afforestations in Italy: an opportunity for wood energy and forest restoration

Bagnato S., Mercurio R., Scarfò F.

Afforestion with pines, initially established for soil protection and/or wood production, cover large areas in Italy

The case study focuses on afforestation of '50s with *Calabrian pine*, that due to ageing processes, insects and fungi outbreaks is in an unsteady state of biological equilibrium



A silvicultural system based on natural regeneration opening canopy gaps has been experimented

large

medium

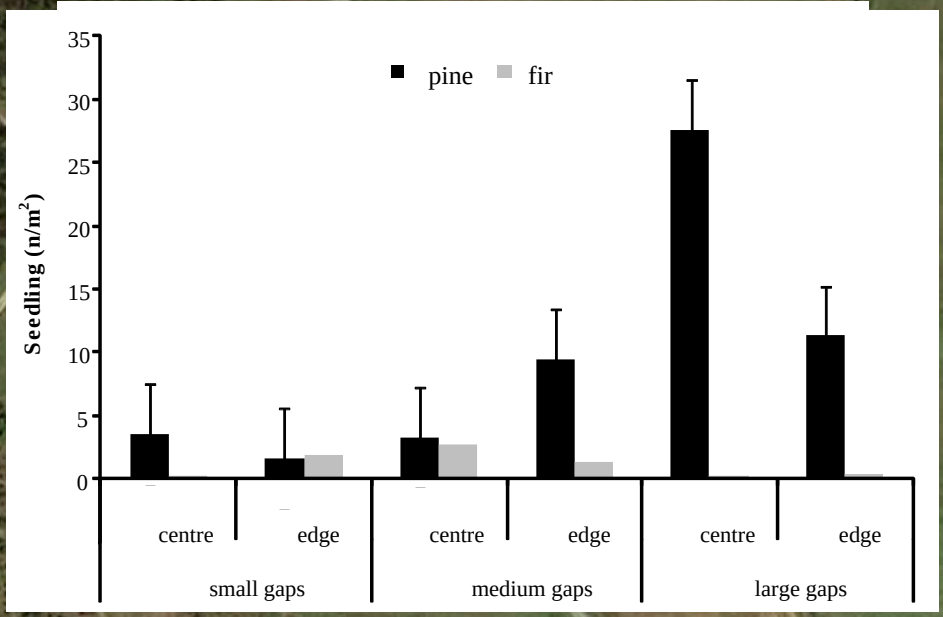
large

small

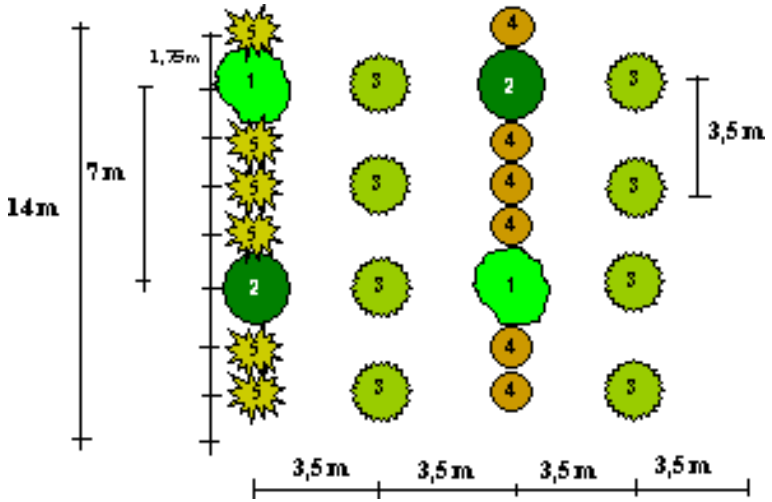
medium

small

7 yrs between cuttings
Cycle complete in 21 years
About 30% of the forest removed
15-70 m3 gap, 140 m3/ha
50% can be used for energy supply
50% wood material



Manual and mechanized thinning of walnut plantations (Nati C., Magagnotti N., Spinelli)



-1990-2000s farmers established over ***140,000 ha*** of forest plantations on former agricultural land, under the provisions of EU Directive 2080/1992, and of regional grant schemes

Plantations are often intercropped with nurse trees (alder, ash) to be removed after a few years

Which harvesting system?

What about damage (valuable trees, soil)?

Chips or firewood

Findings
(2 case studies in Veneto & Lombardia)

The removal of nurse alder from walnut plantations is economically sustainable, and ***it can also offers some revenue*** if the stand and market conditions are favorable

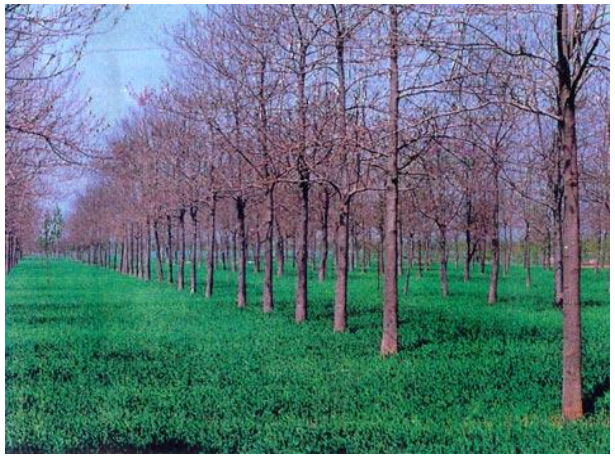
The average DBH of removal trees ***should not be smaller than 12 cm***

Best results are obtained with ***mechanized harvesting***, which does not seem to cause heavier stand and soil damage than manual harvesting

Potentialities and uncertainties of novel agroforestry systems in the European CAP: farmers' and professionals' perspective in Italy (Pisanelli A., Perali A., Paris P.)

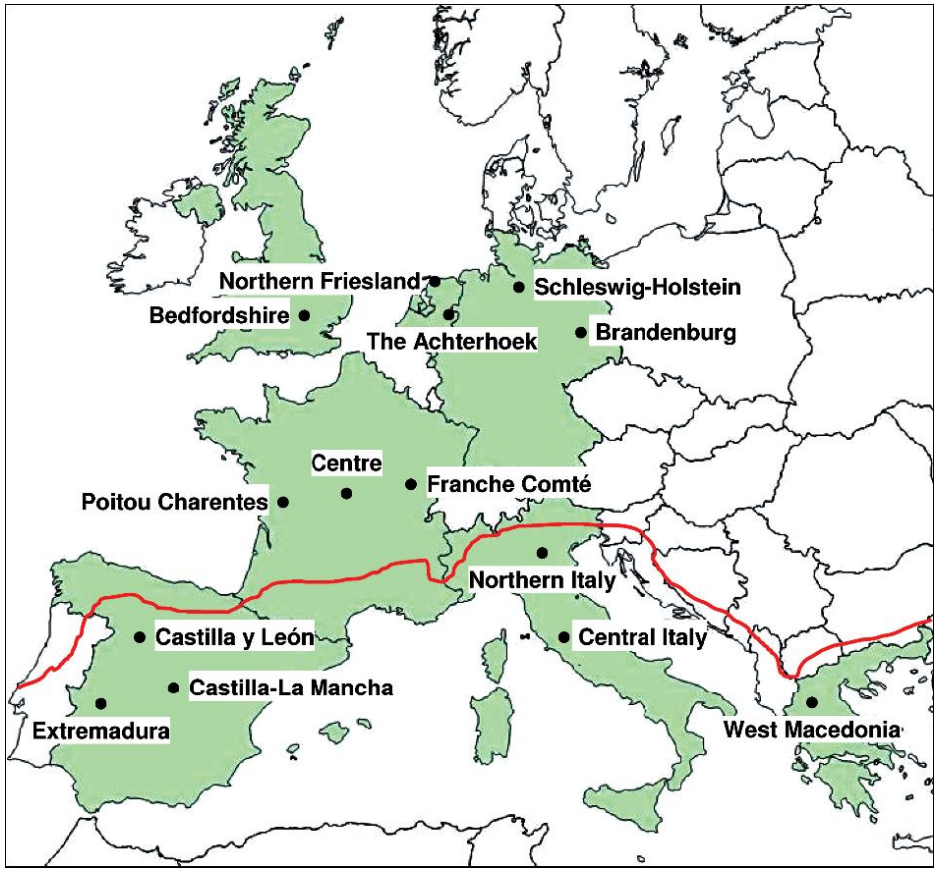
Promoted by 2.2.2. RDP

- **Increase of overall productivity and profitability;**
- **Control of soil erosion and nutrients leaching;**
- **Increase of carbon sequestration;**
- **Improvement of landscape biodiversity**


On farm survey

Objective: to assess farmers' awareness of silvoarable systems and to understand their interest in establishing silvoarable systems into the farmlands



14 areas in 7 countries; face to face interview to farmers:

- **Knowledge of agroforestry**
- **Perception of silvoarable systems (+/-)**
- **Design silvoarable systems**

A. R. Graves, *et al.:* Advances in Agroforestry, Vol. 6, pp 67-86.

Agroforestry and Single Farm Payment

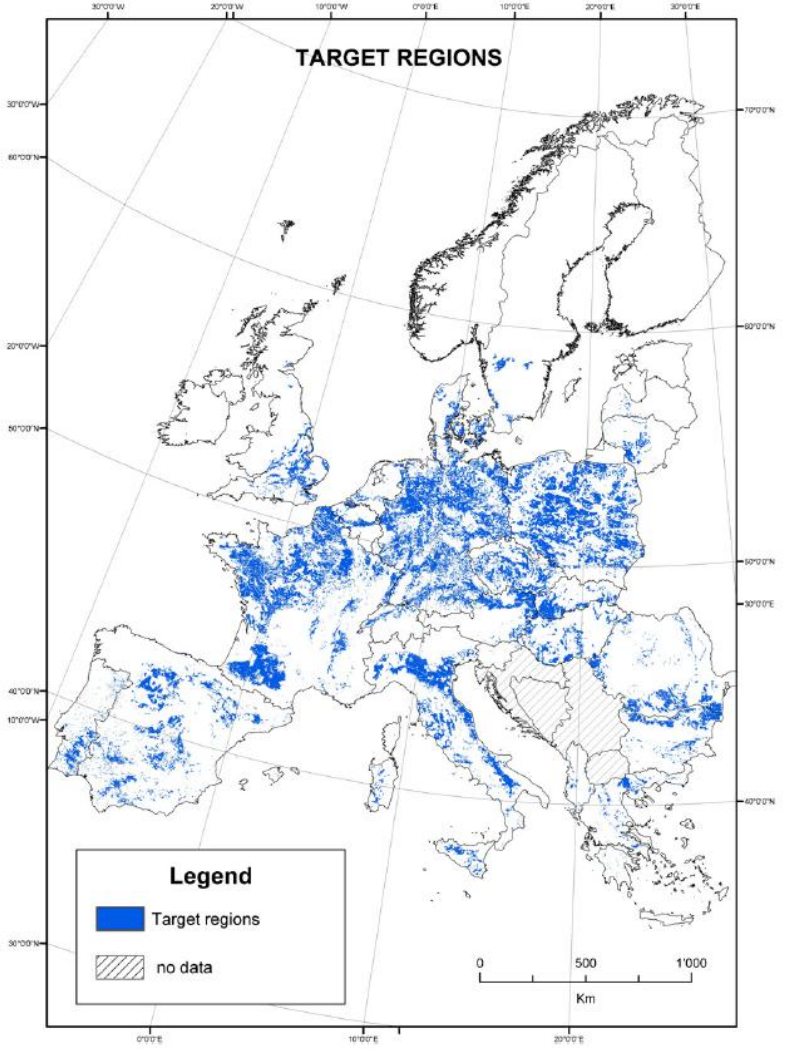
Problem: reduction of SFP due to the presence of agroforestry systems

Linear systems: width > 2m

Scattered trees: density > 50 trees/ha

Findings

- Potential interest of farmers, but management constraints limit the adoption (labour, poor intercrop yield)
- Contrasting approaches in CAP: Meas. 222 vs. Single Farm Payment
- Strong need for technical extension of agroforestry knowledge among professionals and stakeholders



Target regions for silvoarable agroforestry in Europe, from: Reisner *et al.,* Ecological engineering 29 (2007) 401–418

Multidimensional sustainability assessment of forest resource supply chain (*Martire S., Sala S., Castellani V., Storni A.)*

The areas of two local authorities: CMLI and CMTL in the Como Province (ITALY)

Energy Action Plan of Como Province

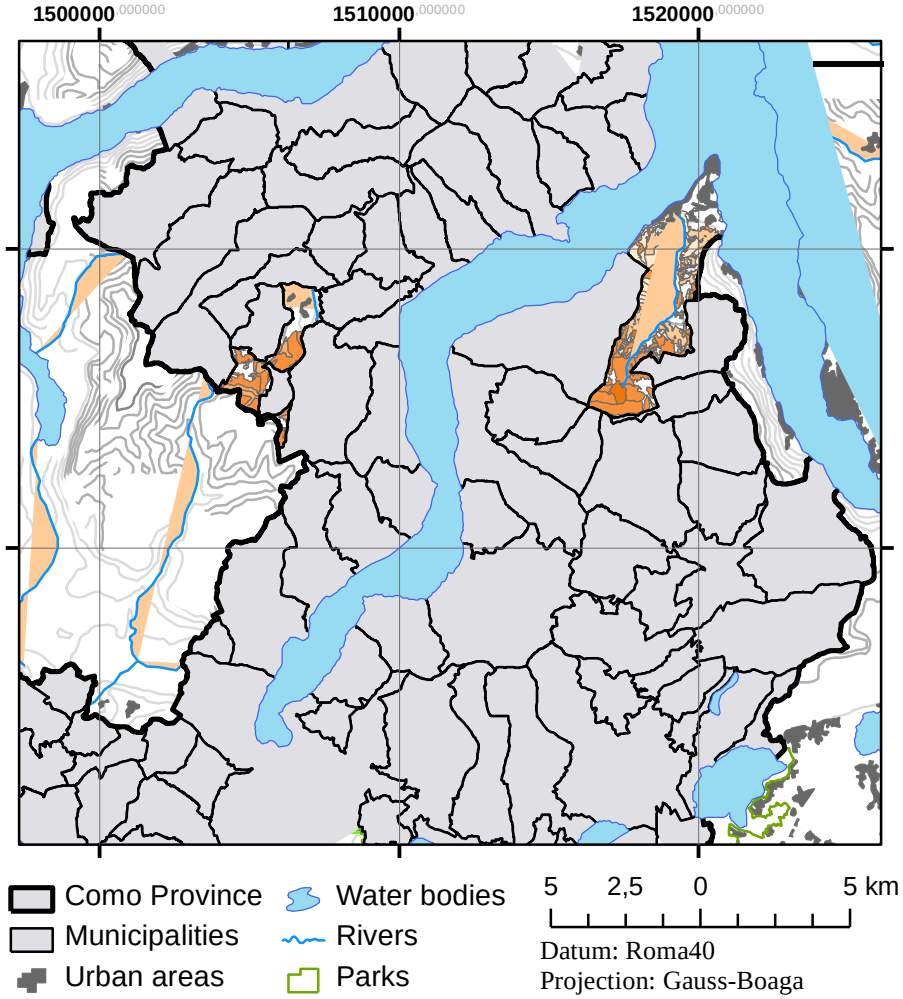
- Saving energy and energy efficiency
- Renewable sources
- Energy market and energy efficiency certificates
- Administrative and regulatory measures, voluntary agreements, R & D

Local Forest-Energy Supply Chain

Rural Areas of Como Province

- Abandonment of rural areas
- Underutilized forests
- Few and small forestry enterprises

RESULTS



POTENTIAL AVAILABLE BIOMASS

TREE SPECIES FEATURES

- Renewal rate
- Functions (protective, productive, …)
- Humidity content: 20% - 40%

SPATIAL FEATURES

- Spatial distribution
- Accessibility Road network

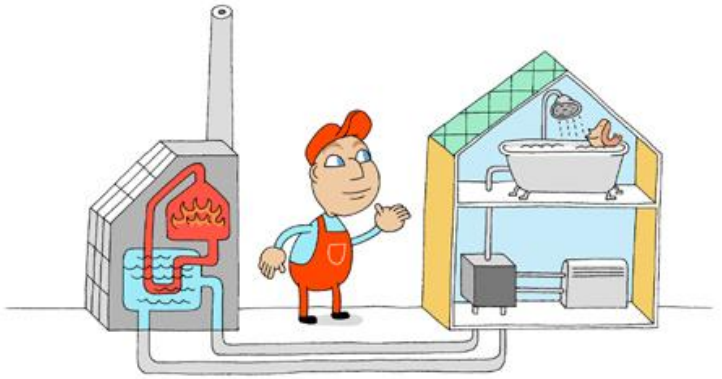
RESULTS

Local authority area	Energy potential* (GJ)	Replacement of fossil fuel* (toe)
CMLI	89 486	2 138
CMTL	98 395	2 351

Province of Como's Policies: small biomass plants (<1 MW) as optimal solution.

Thermal power plant of CMLI	
Power	240 kWt
Fuel	Forest chips
Utilities	Swimming pool

x40 (CMLI + CMTL)



*medium values.

Supply Plan and Biomass Cycle Eco-Efficiency

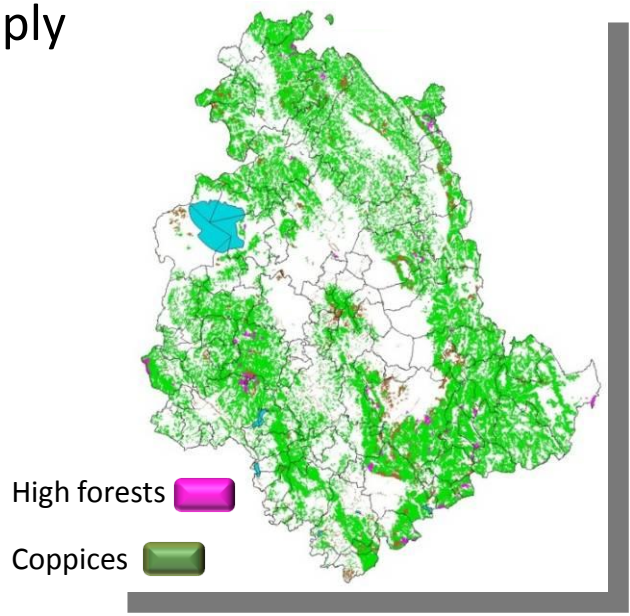
(Savini P., Grohmann F., Frattegiani M.)

Criteria:

- knowledge and planning of forest resources in the supply basin as an indispensable element (MEASURE 122 RDP)
- real available energy, as an output of silvicultural intervention plan including in SP, it's the key factor for heaters sizing
- choice and sizing of heaters must be based on eco-efficiency of biomass cycle

SP phases:

1. planning of forest resources
2. heater choice
3. available energy calculation
4. eco-efficiency supply

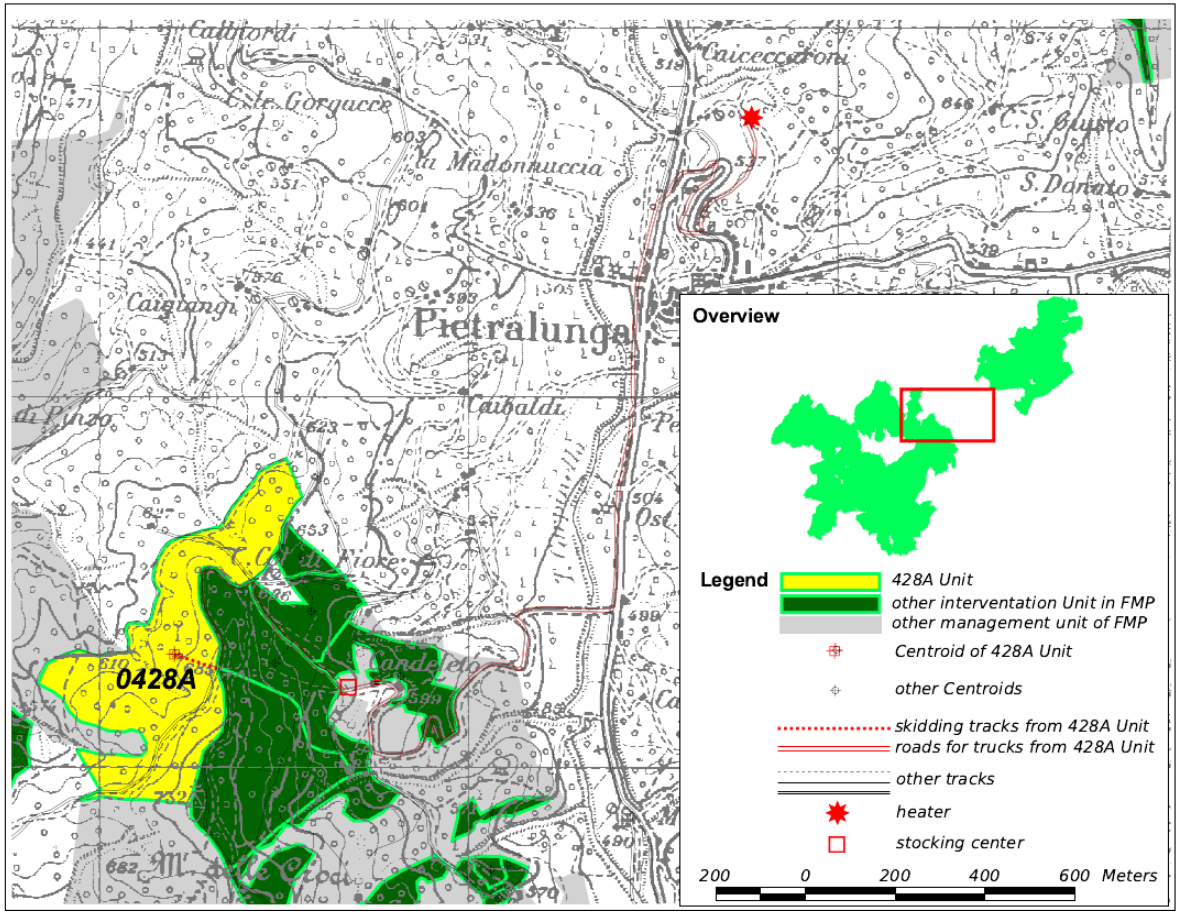


Umbria Region, central Italy

3.1 Regional Property of Alta Umbria

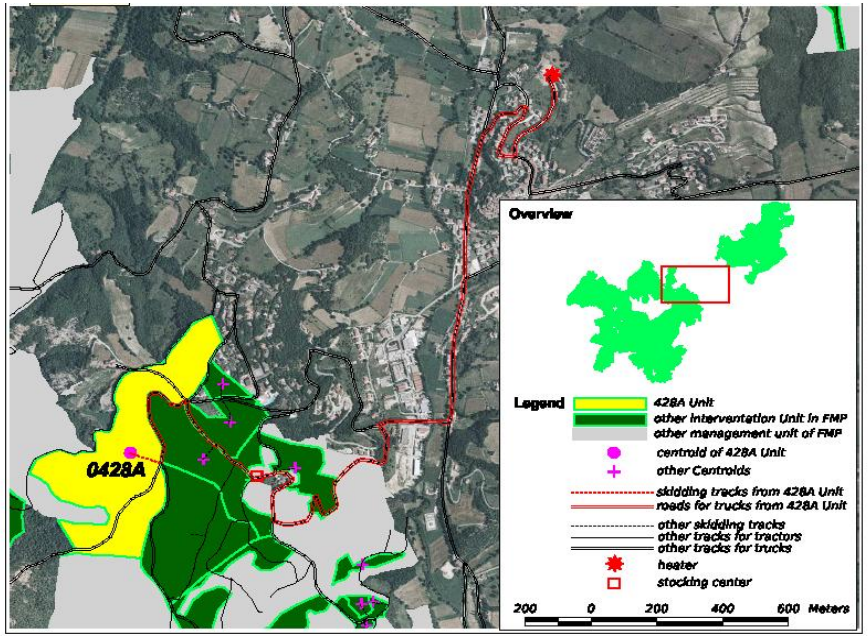
Silvicultural interventions areas 846 ha

- 753 ha high forests
- 93 ha coppices
- 15.055 t thinning
- 11. 734 t coppicing
- **15.055 t biomass available during the period of FMP implementation**
- **60.220.00 kWh heat potentially available from planned interventions**
- **4.517 kW maximum power supported depending on supply basin availability =**
- **14 heaters**



highest eco-efficiency locations for new heaters

- High eco-efficiency: CO_2 emissions between 0 and 6 g / kWh
- Middle - high eco-efficiency : CO_2 emissions between 6 and 12 g / kWh
- Middle eco-efficiency: CO_2 emissions between 12 and 18 g / kWh
- Low eco-efficiency: CO_2 emissions between 18 and 24 g / kWh



Final remarks

Potential supply of wood for energy can be increased in Italy also with the support of RDP measures (planning 122, agroforestry 222, support to mechanization)

Wood supply can meet locally energy demand through sustainable supply plans

Key points for the future developments:

1. **close links between institutions, research and farmers**
2. **Improvement of efficiency of use of wood and harvesting techniques**
3. **Development of the biomass-bioenergy-environment chain**