Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal

uP_running: Success cases for mobilization of wood from agricultural prunings

ADVANCEFUEL WORKSHOP
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Coordination and support action

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- **APPR biomass** – What is it, how much is there, why is it not used as much?
- **The uP_running project** – A tool for the sector take-off
- **Successful value chains** – keys for success and real examples
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- **Pellets and chips for the market** - Pelets de la Mancha
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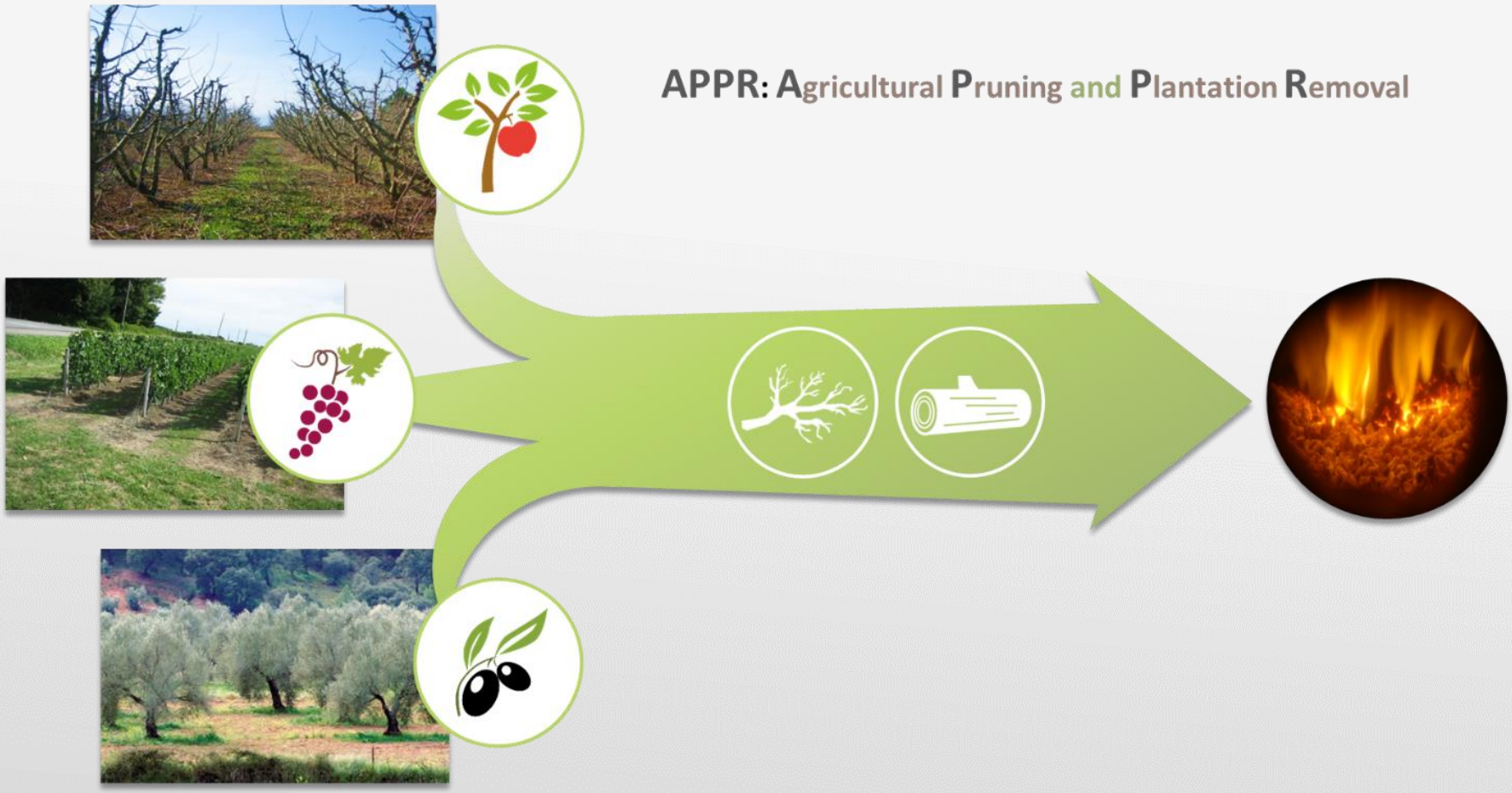
Woody biomass from permanent crops (olive groves, vineyards, fruit orchards)

…Agrarian Pruning and Plantation Removal (APPR)



The European APPR biomass potential is huge

TOTAL pruning potential

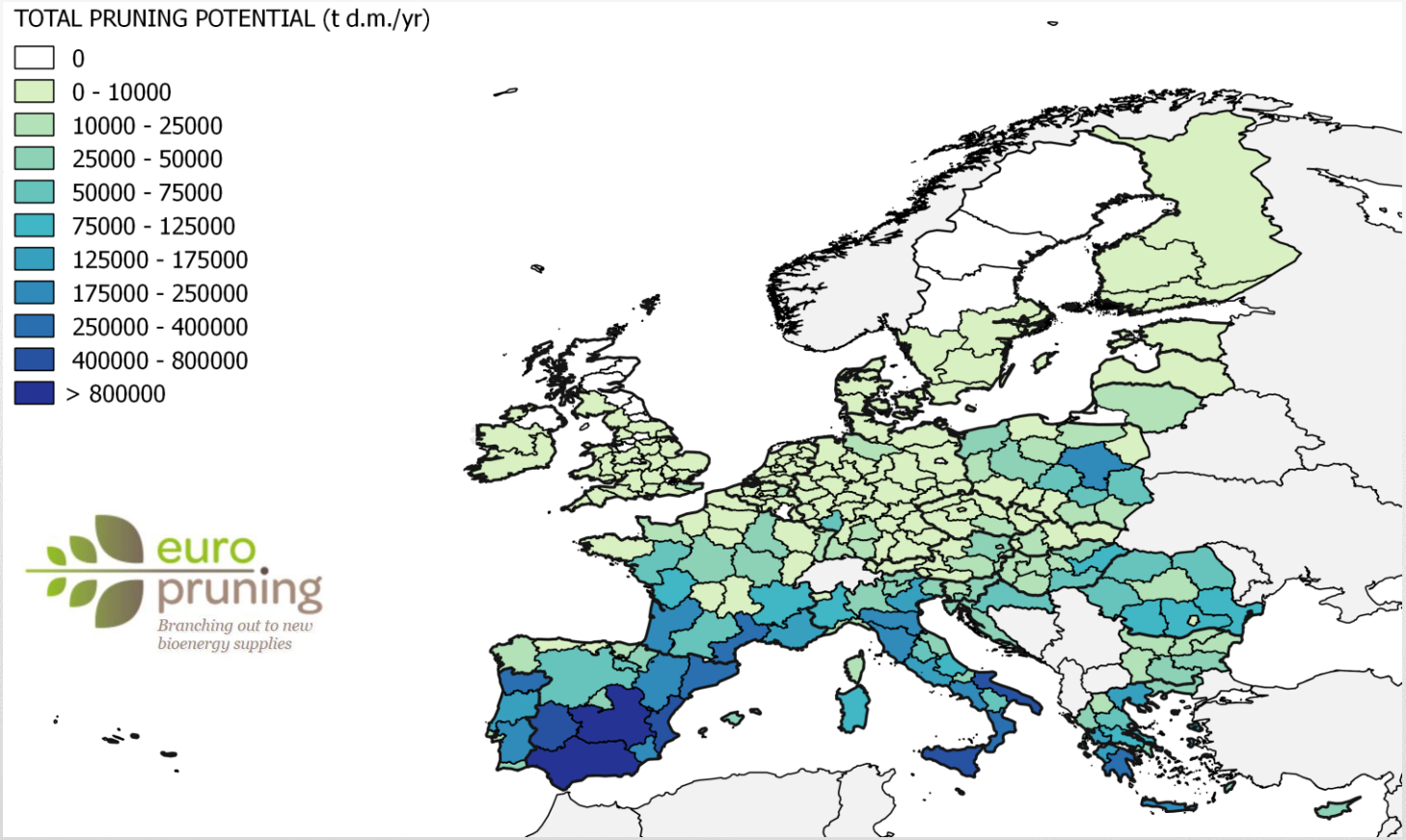
> 13 Mt (dry matter) pruning

(eq. to 26 Mt of fresh matter)

TOTAL APPR potential

> 20 Mt (dry matter)

(eq. to 40 Mt of fresh matter)



If there is a huge potential why isn't it used?

uP_running

EXISTING BARRIERS

- APPR largely spatially dispersed
- Low economic value of pruning
- Energy Policy unstable
- Lack of market driven incentives
- General scepticism of market actors
- Matter of secondary interest for society and policy makers

POTENTIAL DRIVING FORCES

- Greening the economy
- Circular economy
- Large potentials available
- Diversifying rural economies
- Improve air quality and reduce CO2 emissions
- Public initiatives exemplifying

Our mission

uP_running project aims to unlock the EU strong potential of APPR wood and promote its sustainable use as energy feedstock

uP_running project

uP_running partners

sector

Who are we?


UkrainianAgribusinessClub
ServicesCOOP DE FRANCE
Union de Coopératives Agricoles
BIOMASS
SEC Biomass
ASAJA HUESCA
circe
RESEARCH CENTRE FOR ENERGY RESOURCES AND CONSUMPTION
HPK
HRVATSKA POLJOPRIVREDNA KOMORA
CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
INASO-PASEGES
INSTITOUTO AGROTIKIS & SYNETAIRISTIKIS OIKONOMIAS
Università di Foggia
DAREPUGLIA
Distretto Tecnologico Agroalimentare
CONFAGRI
Confederação Nacional das Cooperativas Agrícolas e do Crédito Agrícola de Portugal, CCRL

http://www.up-running-observatory.eu

Observatory map of biomass from agrarian pruning and plantation removal

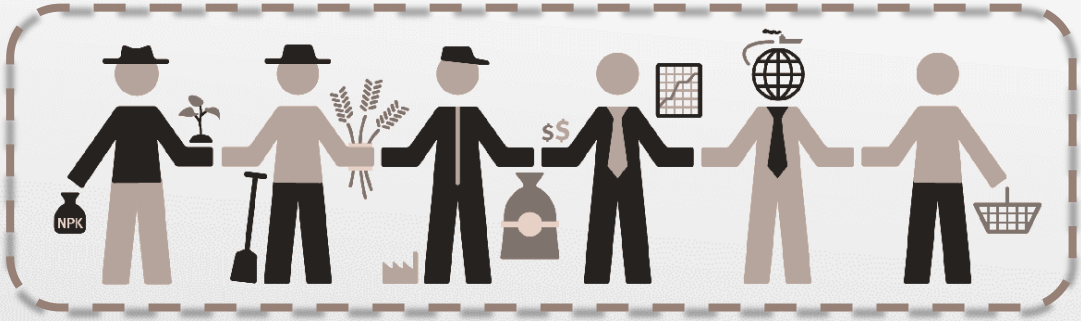
- **20 existing value chains** identified so far
  - Visualized on the uP_running Observatory using a standardized template
  - More cases to be recorded
- **5 flagship cases** studied in detail
  - At least 5 more to be selected and studied till end of project

APPR biomass mobilized per case (t/y)	# cases	Type of cases	Flagship cases
< 500	12	Domestic heating (self-consumption) or other heating applications (e.g. municipal heating, small agro-industries)	Domaine Xavier Muller (FR), Vineyards4heat (ES)
500 – 2,100	3	Heat production in larger agro-industries, co-firing fuel for biomass CHP / power plants	ITC Shabo (UA)
8,000	1	Power production (exclusively from APPR)	Fiusis (IT)
Up to 20,000	2	Large-scale pellet / chip production (exclusively from APPR)	Pelets de la Mancha (ES)
> 84,000	2	Power production (APPR biomass as co-firing fuel)	

Policies, regulations, incentives

Social perception favorable

All value chain actors should obtain a benefit



Benefits

- **Tangible**
  - New incomes
  - Economic savings
  - Time savings, *etc.*
- **Intangible**
  - Avoid pests
  - Avoid fire risks
  - Reduce CO_2
  - Image of sustainable business
  - Differentiation from competence
  - Independence from fossils, *etc.*

The Vineyards4heat case

Developing APPR biomass utilization in the frame of a public-private partnership

- Location: Vilafranca del Penedés, Spain
- Private and Public actors join forces for the production of heat from vineyard prunings
- Initiated in 2015
- APPR biomass mobilization: 225 t/y (vineyard prunings) during the project
  - Potential can be up to 30,000 t/y
- Biomass sourcing radius: 15 km
- Total investment: 600 k€
- Job creation: 4 permanent jobs in the logistics chain
- GHG emissions avoidance: 125 t of CO_2 in 2016
- **Best LIFE project award, category "Climate Action"**

Manual pruning and preparation of branches	Integrated collection with shredding	Download on truck at field side	Storage in a roofed facility	Transport to final users	On-site storage and energy conversion

Farmers — NOU VERD — Vilarnau, EMAVSA

Benefits

Tangible

- Save time and money in pruning residues management
- Get economic margin
- Diversify activities
- Lower energy cost
- Reduced municipal taxes

Intangible

- Avoid risks of fires and diseases
- Avoid pollution due to open-field burning of prunings
- Improved air quality
- Promote successful utilization case of prunings
- Job creation

District heating of Vilafranca del Penedes

- Storage of hog fuel (1,000 m^3 annually) during November- June in roofed and paved area in piles of 100 m^3
- Cost of vineyard pruning 70 €/t at 20 % moisture (4.72 €/GJ)

Conversion technology

- Hog fuel consumed: 20 % moisture, 6 % ash (dry basis), LHV 14.8 MJ/kg, PSD G50

<u>District heating located in Vilafranca del Penedes</u>

- Supply heat and hot water to 4 public buildings
- Boiler Heizomat RHK-AK-500 (500 kW)
- Boiler runs on 100% vineyards prunings hog fuel

Success factors – Innovations during the implementation

- Alliance among diverse local key actors boosted the starting of pruning utilization (private/public consortium to use pruning for heating in public schools)
- Expansion of role and status of the local water management public company to provided of energy services
- Adapted technology to burn 100% hog fuel from vineyard pruning
- Prototype of “pre-prunner”, but failed during pilot tests (too many losses of material)

The Pelets de la Mancha flagship case

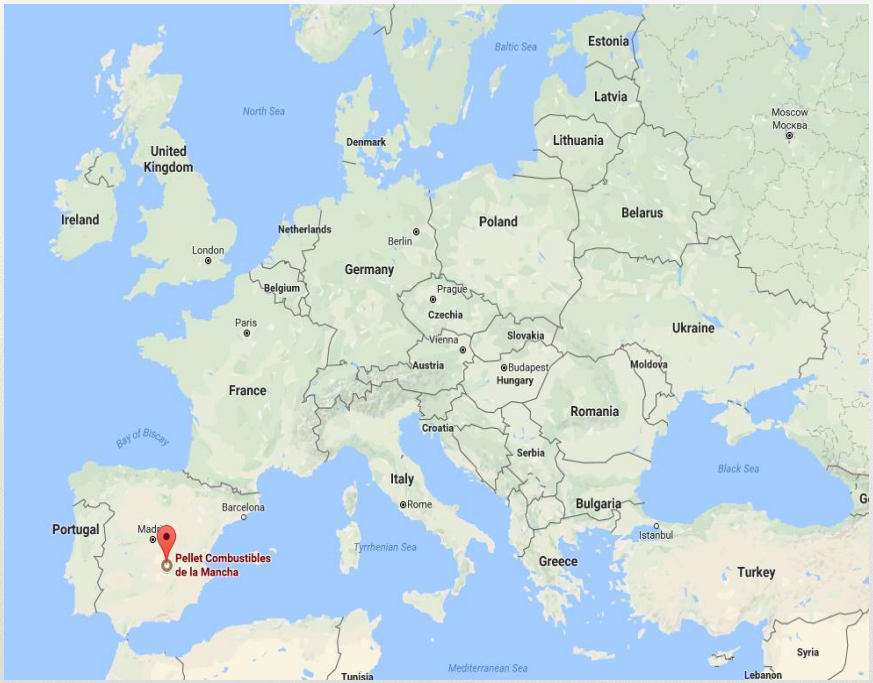
Using APPR biomass to produce upgraded fuels (pellets and chips) for the market

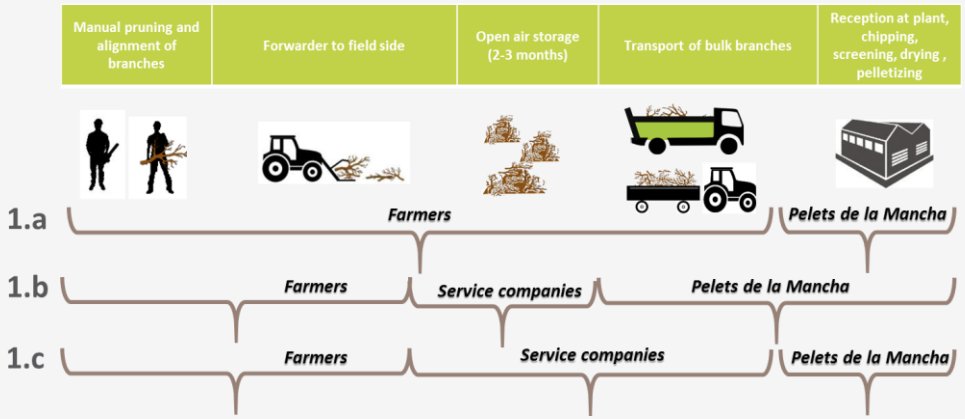
- Location: Socuéllamos, Spain
- Largest pellet plant from APPR biomass in the world
- Initiated in 2011
- Production of wood pellets & **wood chips** from 100% vineyard prunings
- Up to 20,000 t/y APPR mobilized
- 15 jobs created
- Sourcing radius: 30 km
- Total investment: 5.8 M€ (initial cost)

el calor del campo pellet combustible de la mancha

ATHISA GROUP

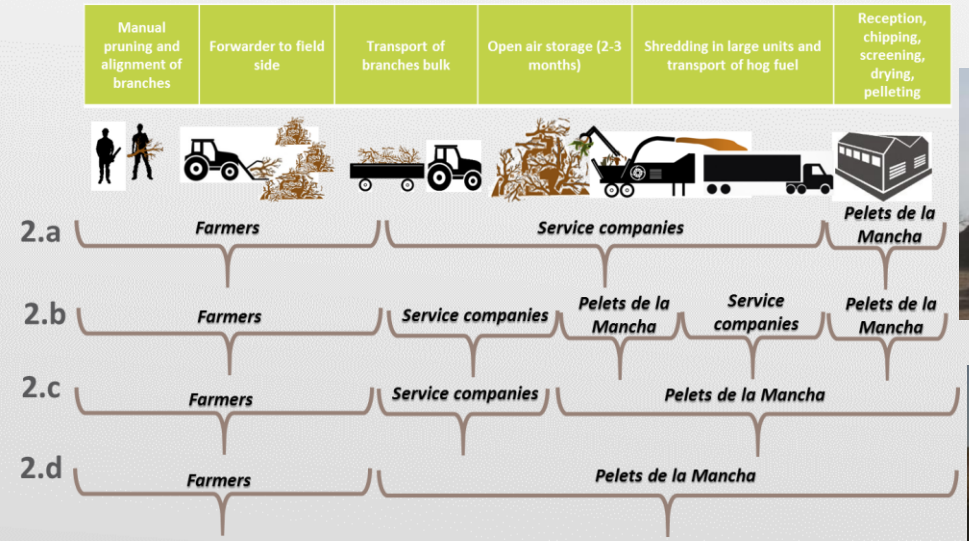
ATHISA BIOGENERACIÓN



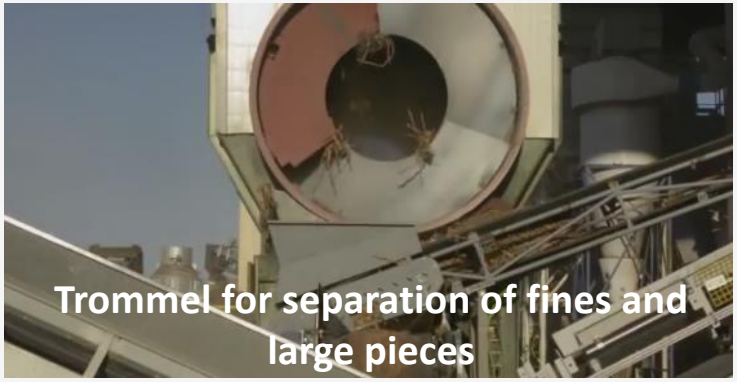


Logistics operations for loose branches

Prunings left for 60 – 90 days on the field to reduce moisture content to 30 %



Logistics operations for pruning piles


Trommel for separation of fines and large pieces


Rotary dryer


Pelletizer

Extensive pre-treatment required to lower soil and fine materials in the final products

100 % use of vineyard prunings (no other wood sources or even vineyard stocks)

Pellets

- Mostly for public / private customers for heating purposes and industrial units
- About 30 % cheaper than alternative industrial pellets

Wood chips

- Mostly for biomass power / CHP plants
- Different particle sizes (P20, P40 or larger) and moisture content depending on customer specifications

Other markets for pellets and chips: horse bedding, barbeques


Vineyard pruning pellets

Success factors – Innovations during the implementation

- Development of the logistics system together with farmers and local service companies. It had to be a compromise between farmer needs and capabilities, and the final product requirements.
- Development of the pre-treatment process to remove the inorganic material collected during biomass harvesting. Several steps, complex process: not disclosed by the company.

The Fiusis power plant flagship case

Using APPR biomass as a fuel for power production

FIUSIS
ENERGIA DAL LEGNO

- Location: Calimera, Italy (“Grecia salentina”)
- First power plant in the world (1 MWe) fueled **exclusively** by olive tree prunings
- Initiated in 2010
- APPR biomass consumption: 8,000 t/y (olive tree prunings)
- Sourcing radius: 10 km
- 60 % (1,200) of the local farmers are involved in the scheme
- Total investment: 8 M€
- Job creation:
  - 6 permanent jobs created at the energy plant
  - 10 permanent and 5 seasonal jobs for the logistics chain
- GHG emissions avoidance: ~ 5,300 tCO_{2eq}/y

Logistics operations for fields < 400 trees

Manual pruning and preparation (windrowing) of branches	Integrated harvesting with pick-up of branches and shredder with direct download on truck or agricultural trailer. Direct transport to power plant.	On-site storage and energy conversion

Farmers ***Ligna*** ***Fiusis***

The FACMA harvester used by Fiusis

Three FACMA TR200 harvesters in operation

Each capable of up to 20 – 25 tons of prunings per day (usually 18 t/d considering movement times)

Results in hog-fuel production

Logistics operations for fields > 400 trees

Manual pruning and preparation of branches	Forwarding prunings to piles	Biomass piles at field side	Chipping: static chipper fed with hydraulic arm mounted on spider. Direct discharge on truck or trailer	Transport to plant	On-site storage and energy conversion

Farmers — *Ligna* — *Fiusis*

Caravaggi shredder

Work platform with hydraulic arm and a spider grabber

Caravaggi shredder, production capacity of 10 t/h

Results in more uniform particle size

Success factors – Innovations during the implementation

- Power plant fueled by 100% olive pruning. Profitability supported by a high feed-in tariff (28 c€/kWh) for 15 years
- “Ligna” subsidiary established to avoid expensive external contractors for logistics operations. Two main logistic operations (with different machinery) depending on the tree density in the olive groves.

Concluding remarks

To sum up

- Wood from APPR is a relevant renewable energy source, but still not used or **largely under-used**
- Setting up APPR value chains requires significant efforts and a **change in agronomic practices**
- APPR value chains are very versatile. **Many different models** exist and depend on local conditions and peculiarities:
- APPR value chains are mostly **local**, with a geographical sourcing radius below 30 km
- Involvement of local actors and local acceptance is a prerequisite for success
- APPR **value chains constantly evolve**, adapting to local and changing market conditions, refining business model and logistics, and developing new products.

More to be found…

Many more success cases are to be found all over Europe!

Work with us to visualize your case at the uP_running Observatory and – maybe – become the **next "flagship" case**!

uP_running

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Thank you very much for your attention!

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