



*Club of Bologna*

# **TECHNOLOGIES FOR BIOMASS CONVERSION**

## **AN OVERVIEW AND ASPECTS TO BE DEVELOPED**

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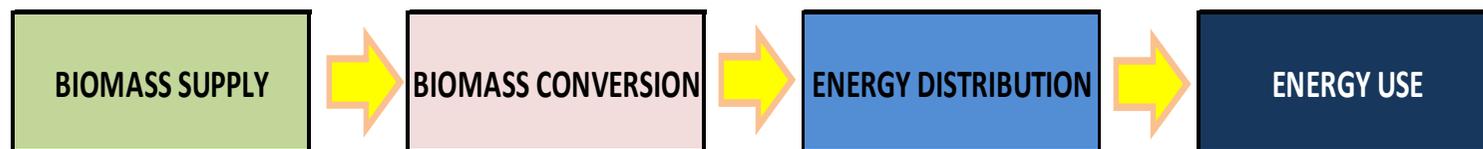
*Hannover, 13 November 2011*



## SCOPE OF THE PRESENTATION

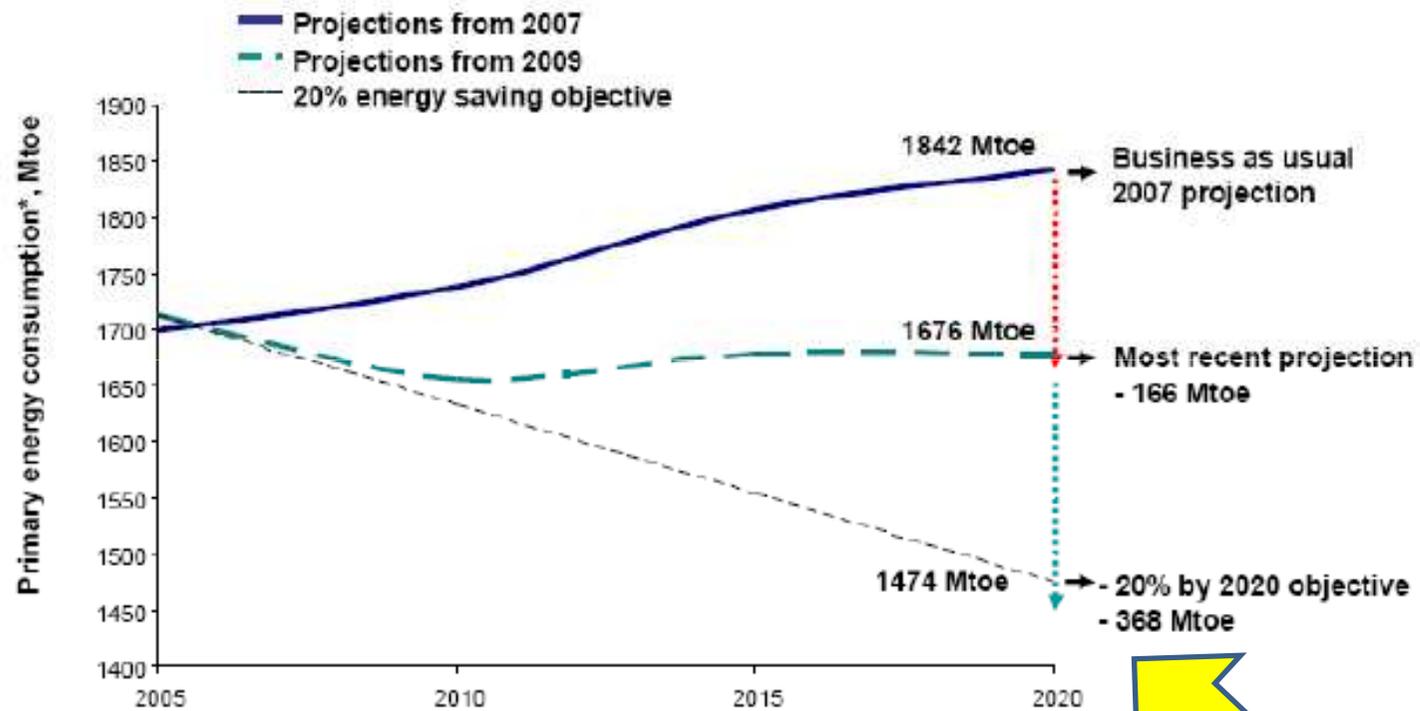
General overview that highlight some aspects related of the energy use of biomass that *may interest the industry of agricultural equipment*. Main context of reference: EU

- Importance of the biomass source in the EU-27 and relevant problems
- Which biomasses are more interesting
- Possible aspects to be developed





## The role/potential role of biomass in the EU-27 energy balance (A)

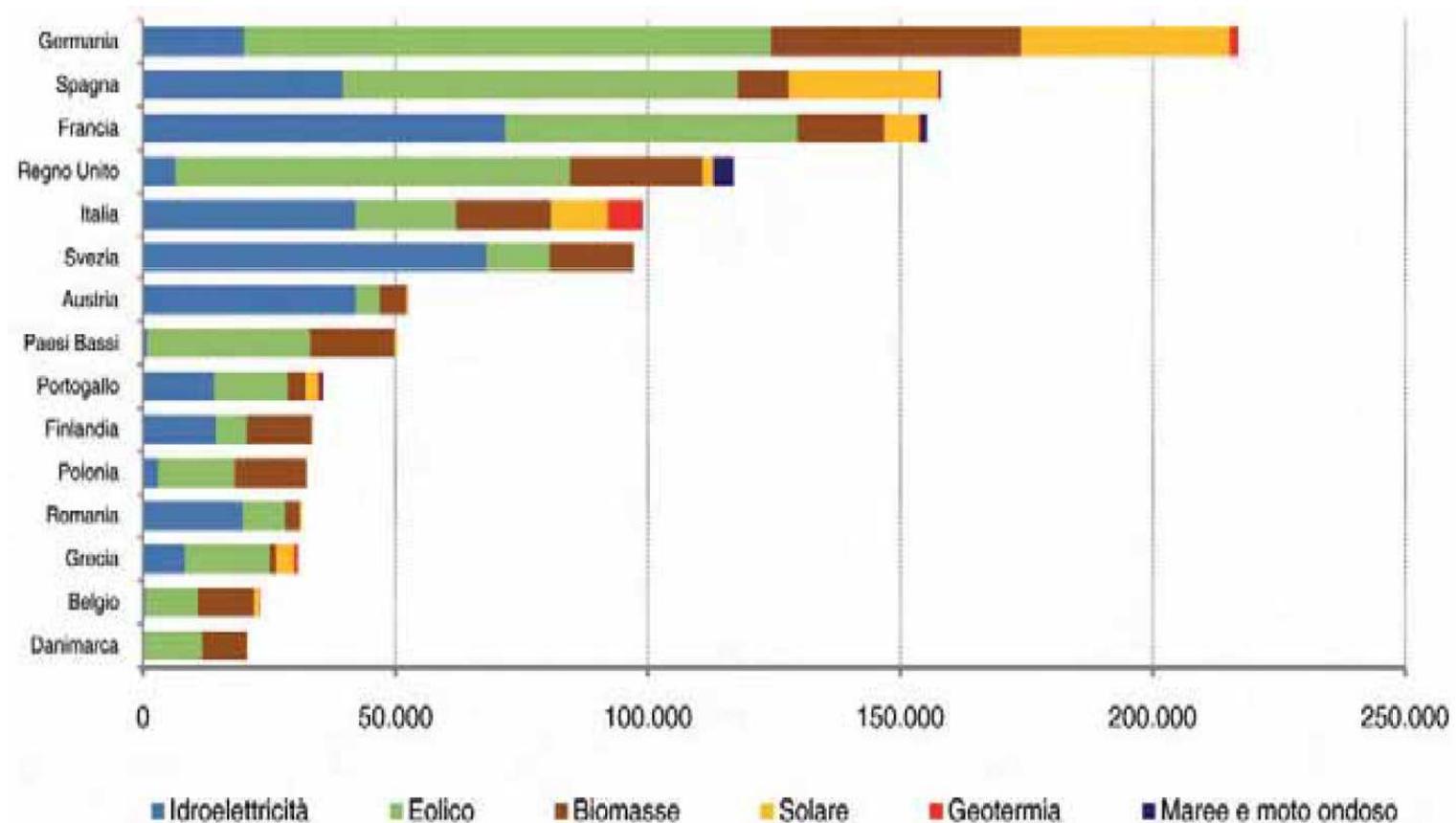


Source: Eurostat - 2011



# The role/potential role of biomass in the EU-27 energy balance (B)

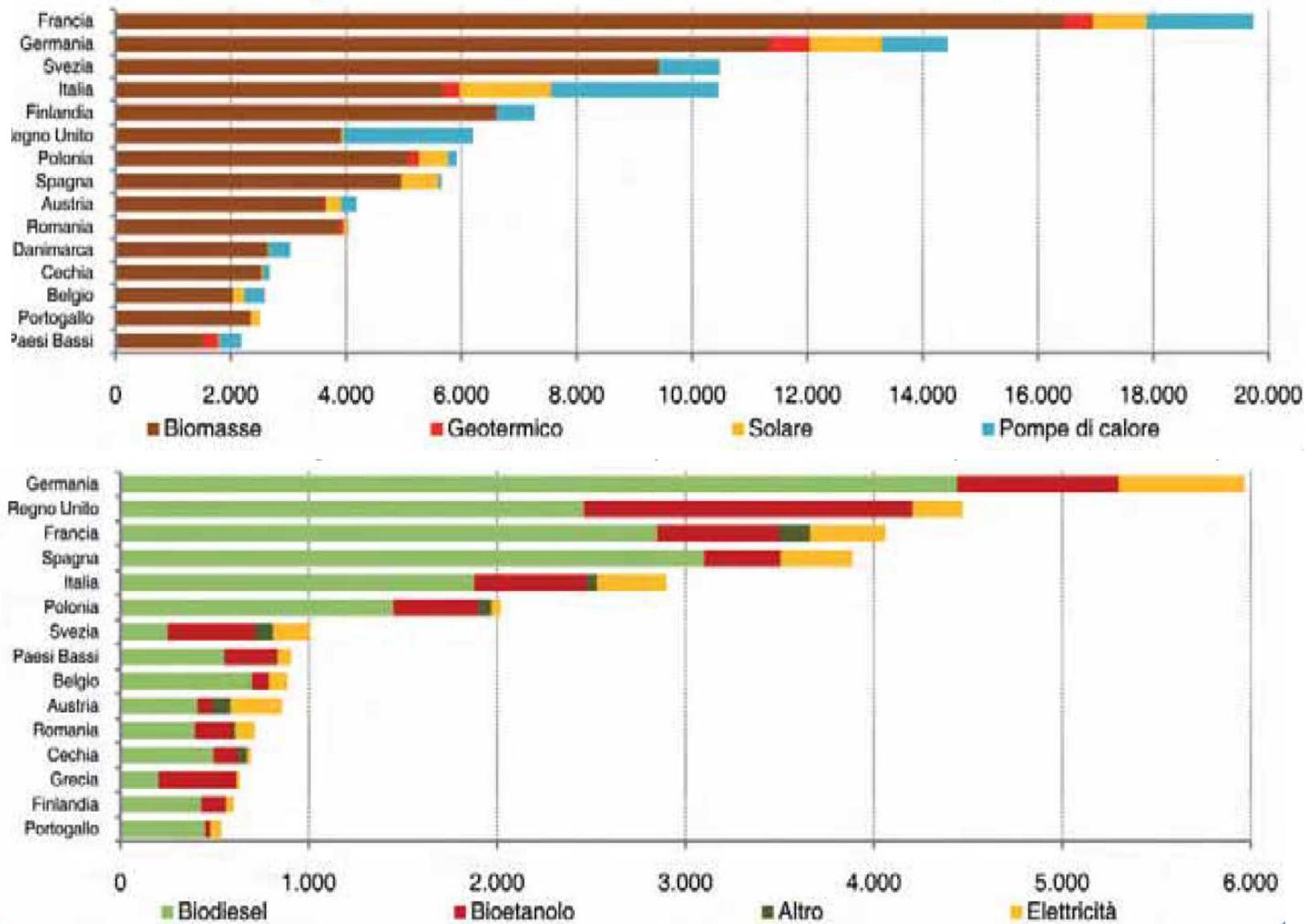
## Renewable electricity (target at 2020; GWh)



Source: GSE - 2011



## Renewable heat and biofuels (target at 2020; ktoe)

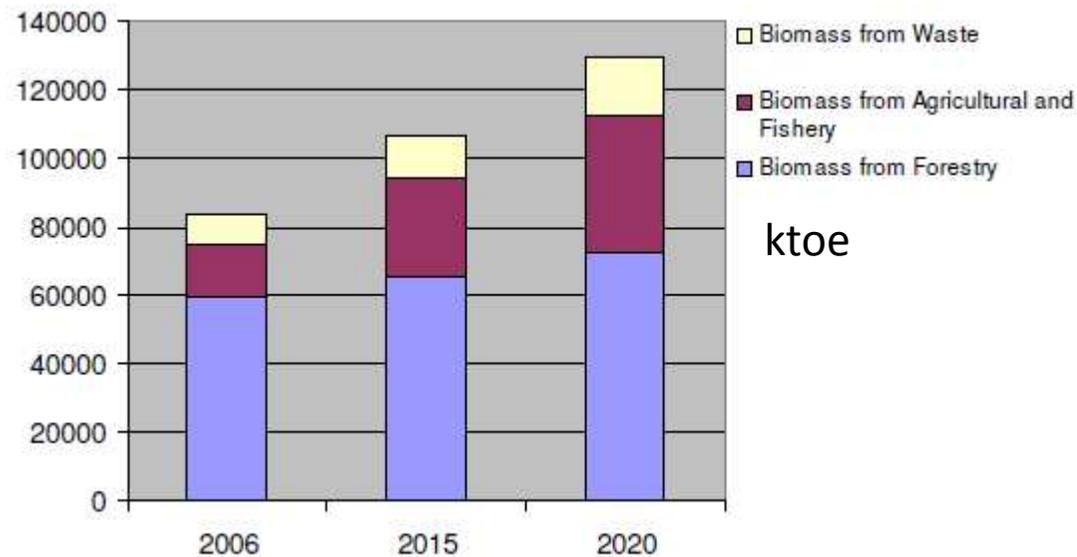


Source: GSE - 2011



## The role/potential role of biomass in the EU-27 energy balance (c)

RES	RES Total (Mtoe)		Biomass (Mtoe)		Biomass / RES Total	
	2005	2020	2005	2020	2005	2010
Electricity	41.1	103.1	5.8	19.9	14%	19%
Heating/Cooling	54.7	111.6	49.4	86.5	90%	78%
Transport	3.9	32.0	2.9	28.4	74%	89%



Source: Pilzecker, DG Agriculture- 2011



## CONCLUSIONS (1/3)

- 1 – In the EU the targets for the renewables are very interesting for the market
- 2 – The biomass source plays a important role (>50%)
- 3 – The more attractive sectors appear, in terms of quantity of biomass to be used, both the heat production (and the CHP) and transport



## SOME COMMON QUESTIONS (FAQs)

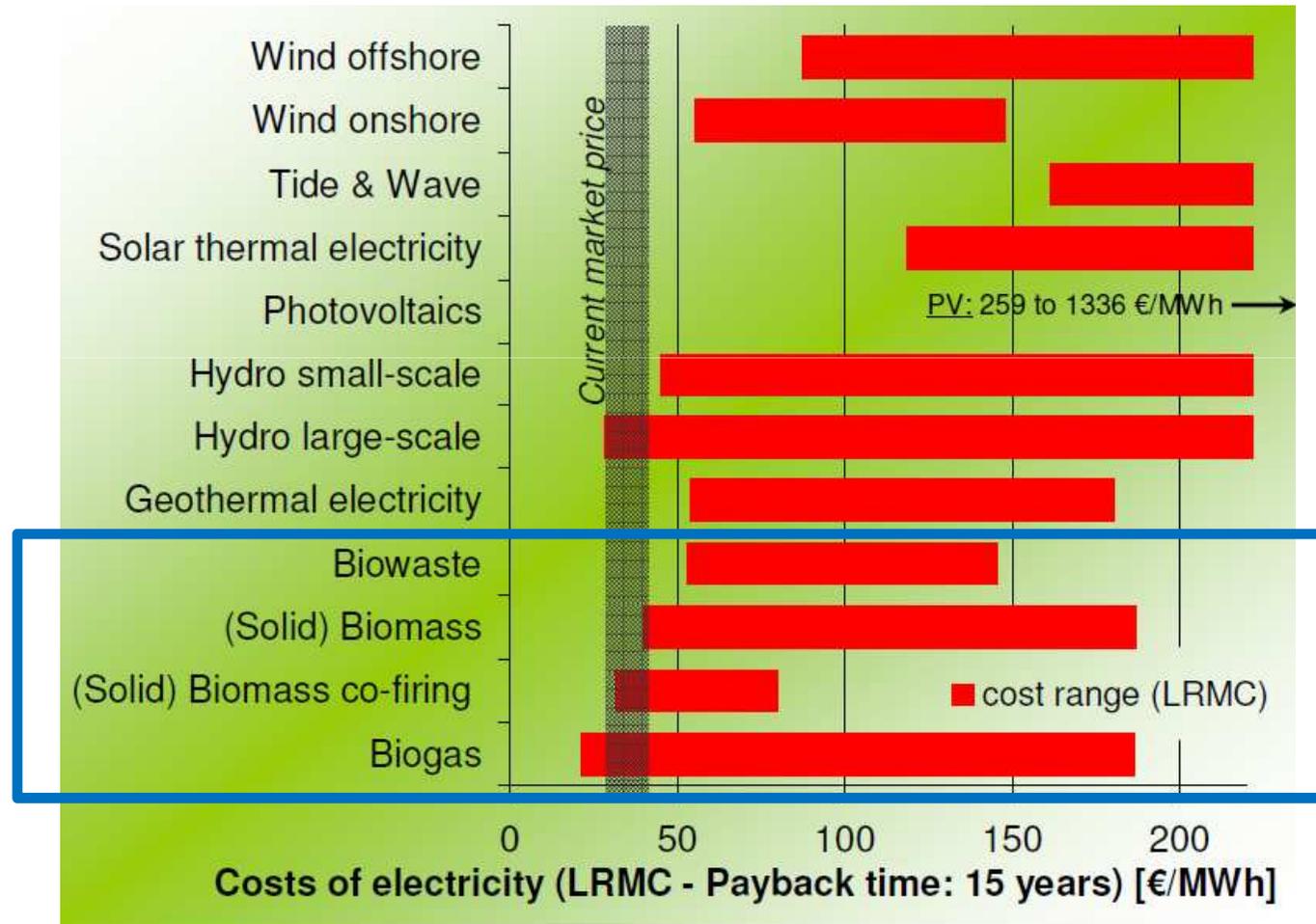
- Q1 - Is biomass competitive with fossil fuels or it needs heavy incentives?
- Q2 - What will happen to the biomass prices/costs?
- Q3 - What people think about biomass energy use?
- Q4 - Which type of biomass is more “affordable” from a general point of view?



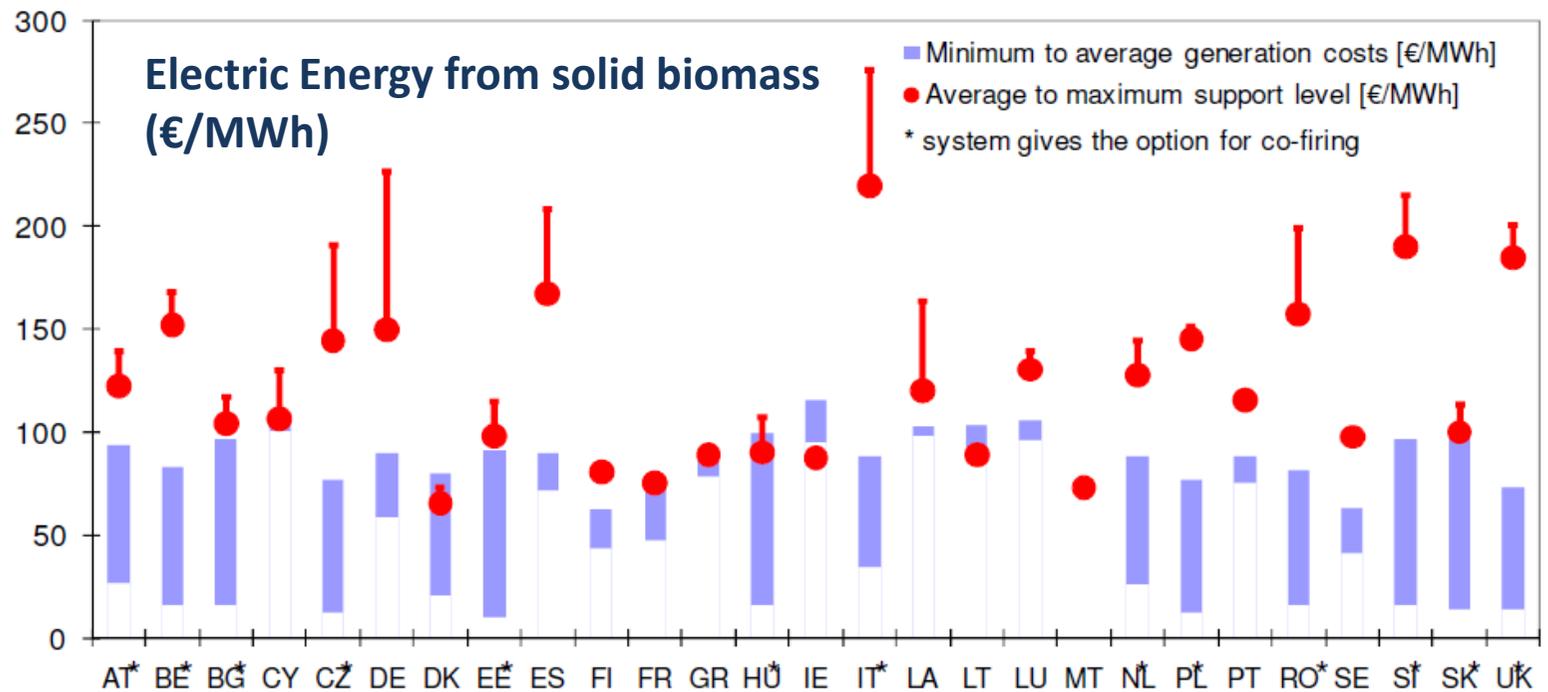
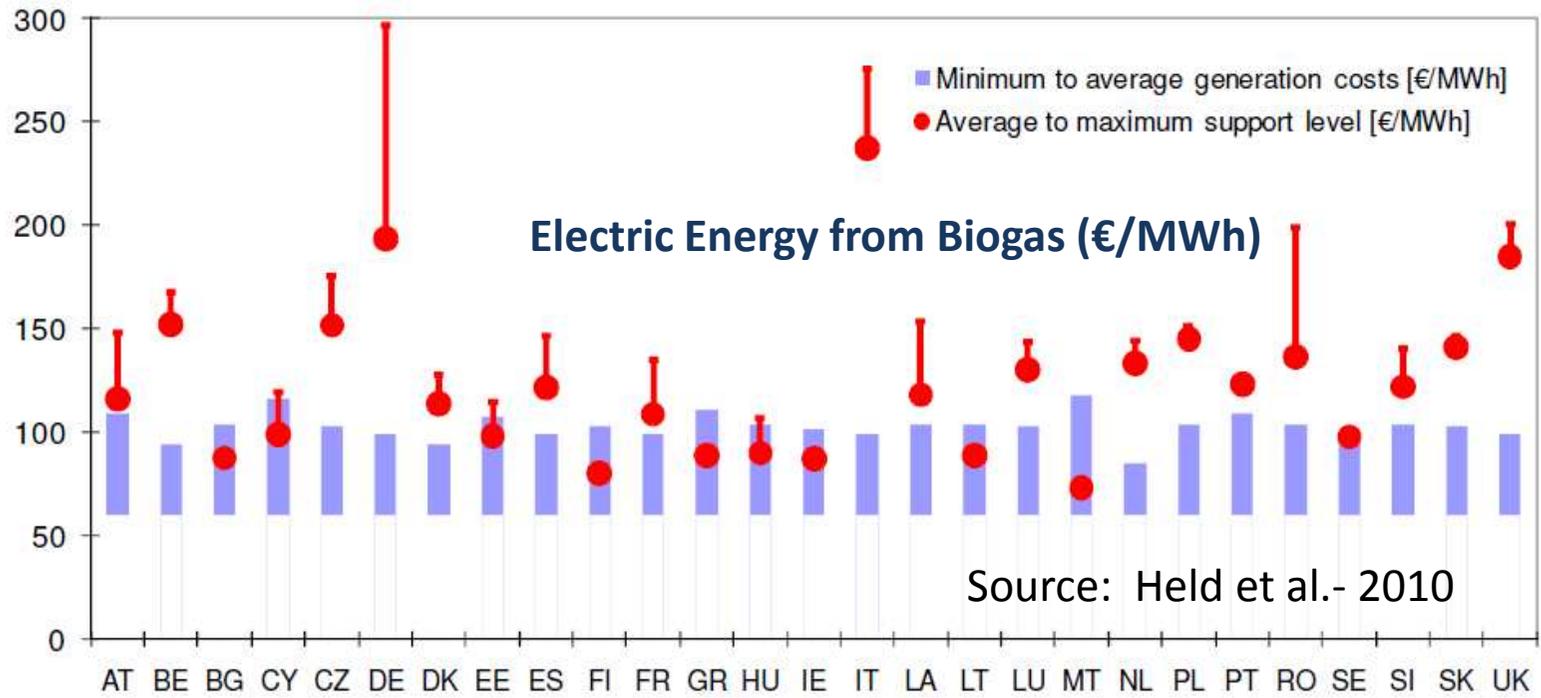
# Question 1: Is biomass competitive? (A)

*(Translation: real or "artificial" market?)*

## Case of the renewable electricity



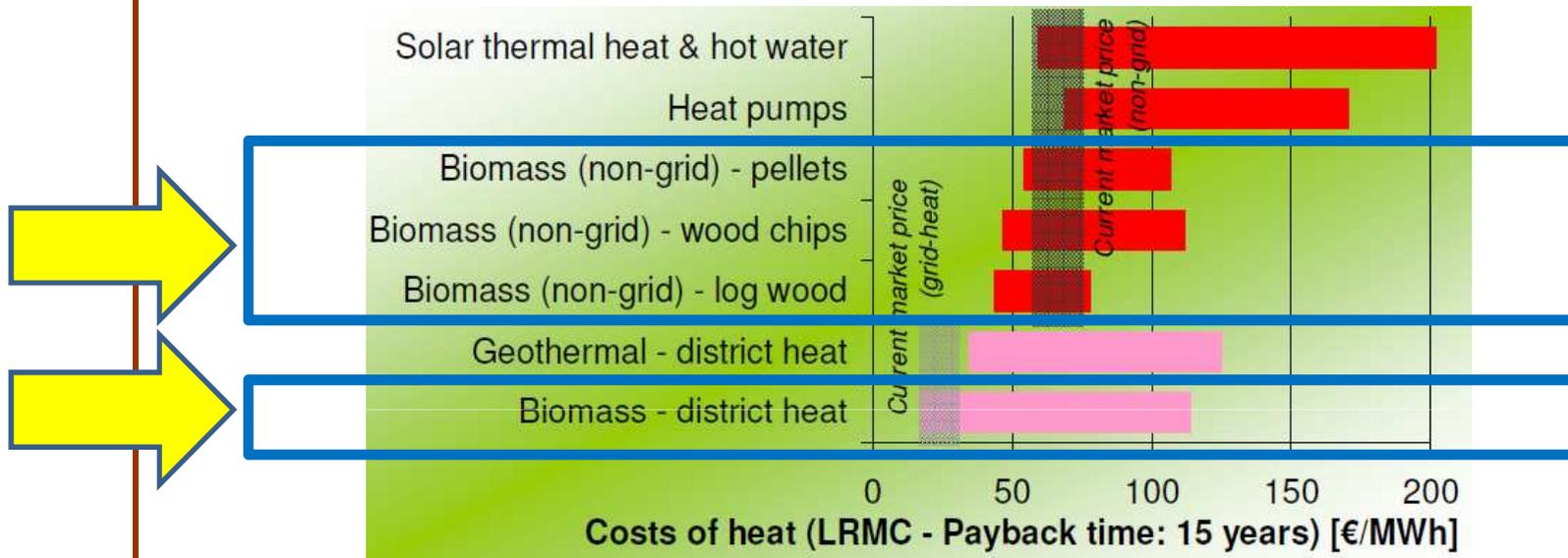
Source: Ecofys- 2011





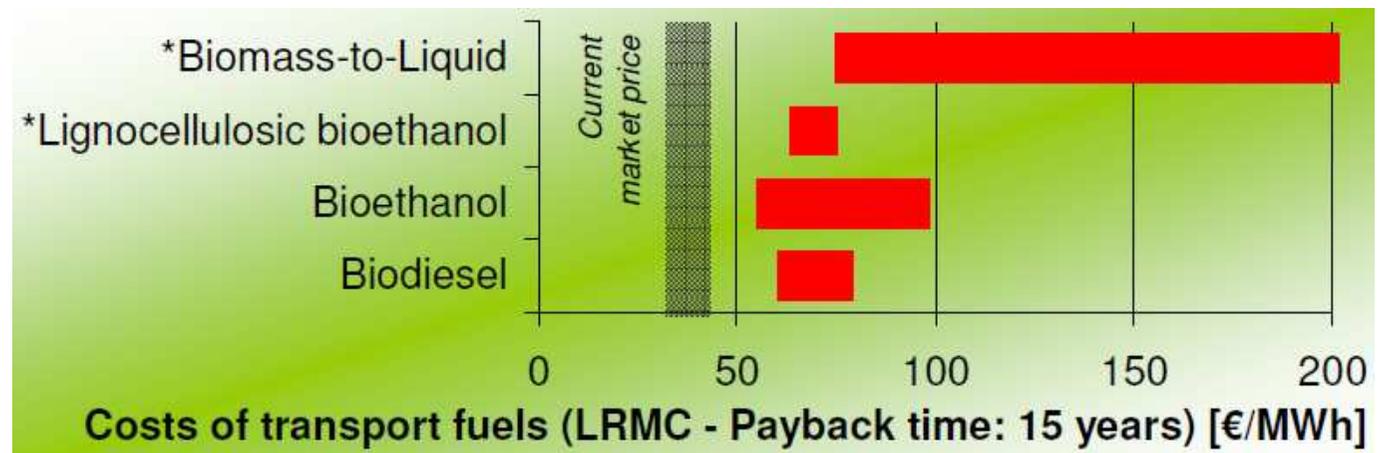
# Question 1: Is biomass competitive? (B)

## Case of the renewable heat



## Case of biofuels

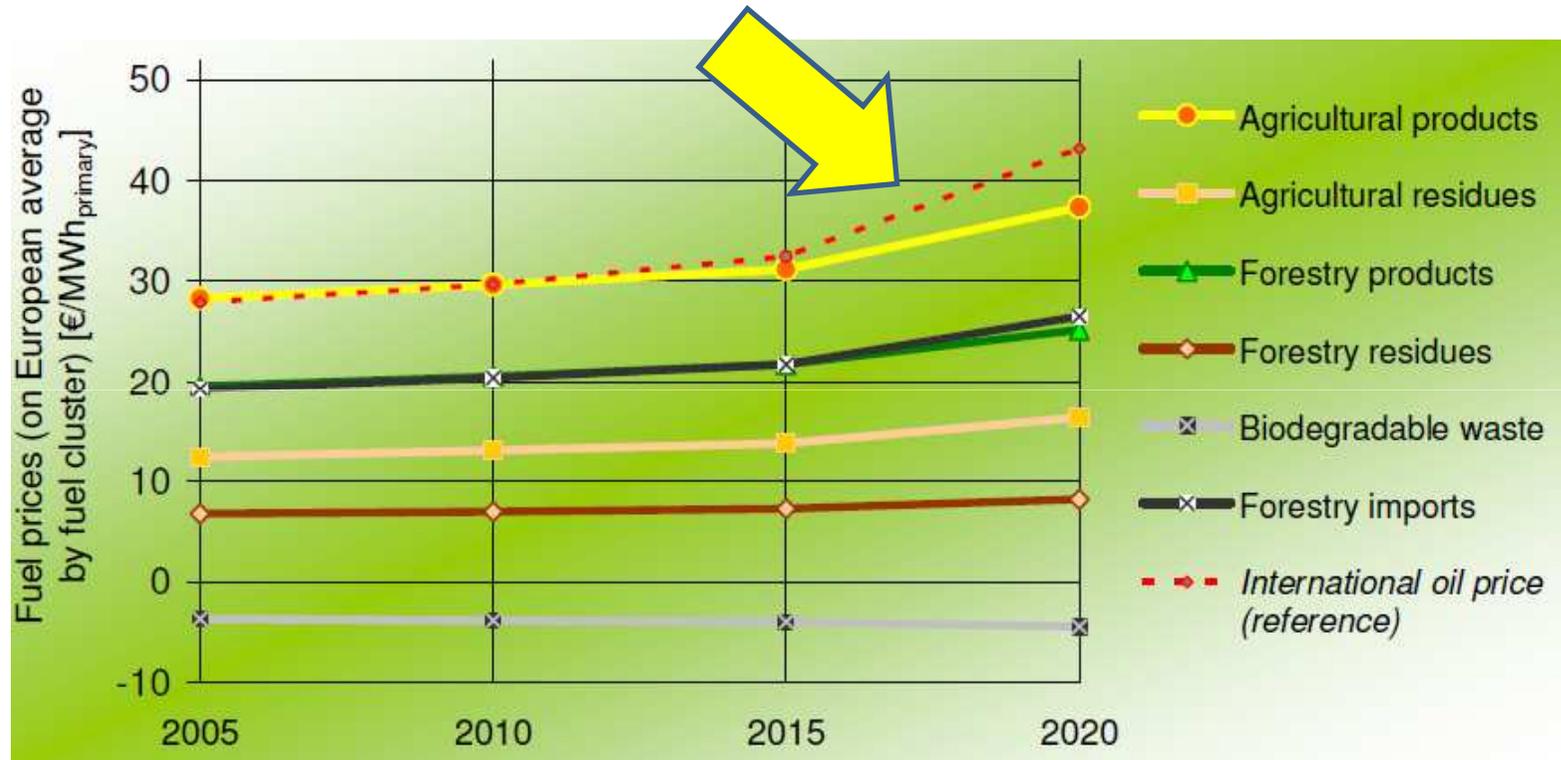
Source: Ecofys- 2011





## Question 2: What will happen to the biomass prices/costs? (A)

*(Translation: the projects will lose or gain competitiveness in the time?)*



Source: Ecofys- 2011



## Question 2: What will happen to the biomass prices/costs? (B)

A strategic issue: the standarization of biofuels



European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**CEN/TC 383**

### CEN/TC 335 - Structure

Secretariat  
SIS

Chairperson  
Mr J.Wilde

Secretary  
Mr L.Sjöberg

SC/WG	Title
CEN/TC 335/WG 4	Physical and Mechanical Test Methods
CEN/TC 335/WG 5	Chemical Test Methods
CEN/TC 335/WG 3	Sampling and sample reduction
CEN/TC 335/WG 1	Terminology, Definitions and description
CEN/TC 335/WG 2	Fuel specifications, classes and quality assurance



International  
Organization for  
Standardization

TC 238 - Solid biofuels



## CEN/TC 335 - Published standards

Standard reference	Title
CEN/TR 15569:2009	Solid biofuels - A guide for a quality assurance system
CEN/TS 15149-3:2006	Solid biofuels - Methods for the determination of particle size distribution - Part 3: Rotary screen method
CEN/TS 15370-1:2006	Solid biofuels - Method for the determination of ash melting behaviour - Part 1: Characteristic temperatures method
EN 14588:2010	Solid biofuels - Terminology, definitions and descriptions
EN 14774-1:2009	Solid biofuels - Determination of moisture content - Oven dry method - Part 1: Total moisture - Reference method
EN 14774-2:2009	Solid biofuels - Determination of moisture content - Oven dry method - Part 2: Total moisture - Simplified method
EN 14774-3:2009	Solid biofuels - Determination of moisture content - Oven dry method - Part 3: Moisture in general analysis sample
EN 14775:2009	Solid biofuels - Determination of ash content
EN 14778:2011	Solid biofuels - Sampling
EN 14780:2011	Solid biofuels - Sample preparation
EN 14918:2009	Solid biofuels - Determination of calorific value
EN 14961-1:2010	Solid biofuels - Fuel specifications and classes - Part 1: General requirements
EN 14961-2:2011	Solid biofuels - Fuel specifications and classes - Part 2: Wood pellets for non-industrial use
EN 14961-3:2011	Solid biofuels - Fuel specifications and classes - Part 3: Wood briquettes for non-industrial use
EN 14961-4:2011	Solid biofuels - Fuel specifications and classes - Part 4: Wood chips for non-industrial use
EN 14961-5:2011	Solid biofuels - Fuel specifications and classes - Part 5: Firewood for non-industrial use
EN 15103:2009	Solid biofuels - Determination of bulk density
EN 15104:2011	Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods
EN 15105:2011	Solid biofuels - Determination of the water soluble chloride, sodium and potassium content
EN 15148:2009	Solid biofuels - Determination of the content of volatile matter



## Question 2: What will happen to the biomass prices/costs? (C)

the independent platform for the energy sector

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Report 7 November 2011   

### Power and gas exchange APX-Endex branches out into wood pellets

## Dutch launch world's first biomass exchange

*By Karel Beckman*

The Dutch power and gas exchange APX-Endex has opened the world's first Biomass Exchange in Amsterdam. The new Exchange will serve as a platform for trade in standardized industrial wood pellets, which are increasingly used as a renewable alternative for coal in coal-fired power stations. 'We hope that our Exchange will bring long-term security and stability to this growing market', says Pieter Schuurs, COO of APX-Endex.

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## Question 3: What the people think about biomass? (A)

*(Translation: is easy to get an authorization for a project?)*



## No coal, no oil, no nuclear, no biomass

On a grey morning in Rome four years ago, in November 2007, delegates to the World Energy Congress were met by Greenpeace protesters carrying signs with an unmistakable message: "No coal, no oil, no nuclear!" What did these demonstrators think? That we could live on air?

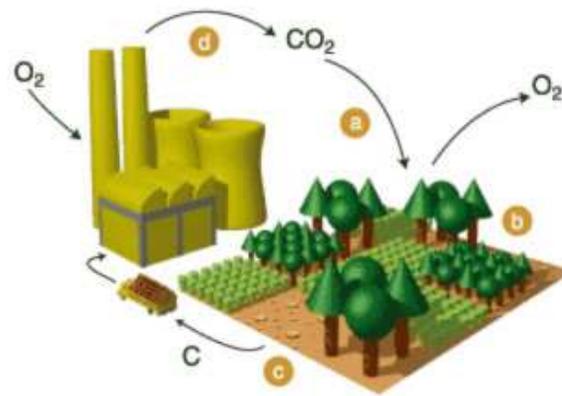
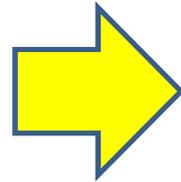
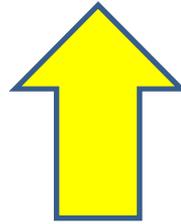
Whatever they thought, they have now added another no-no: "No biomass!" Or as Greenpeace puts it: "No biomass!" Last Thursday Dutch power and gas exchange APX-Endex opened the world's first Biomass Exchange in Amsterdam, a new trading platform, and Greenpeace was there again, claiming that EU policies to boost



## Question 3: What the people think about biomass? (B)

LUC/ILUC: Direct/Indirect land use impacts of biofuels

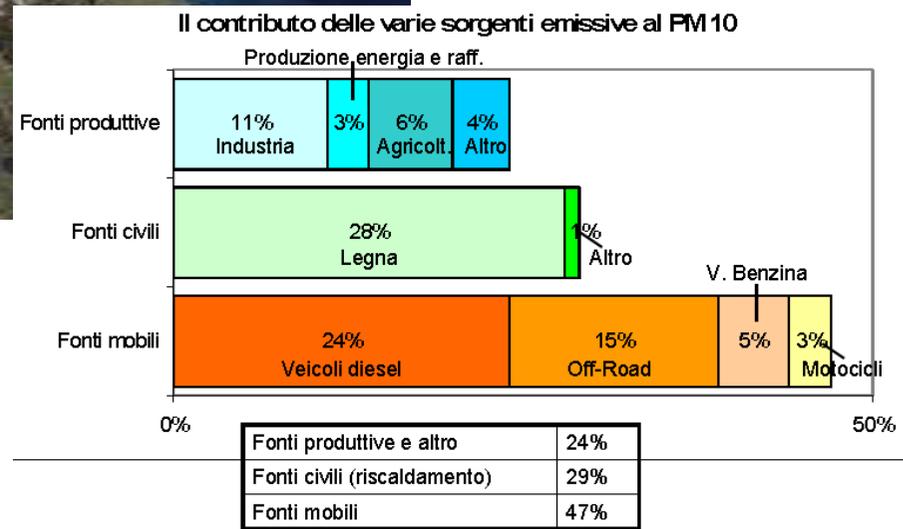
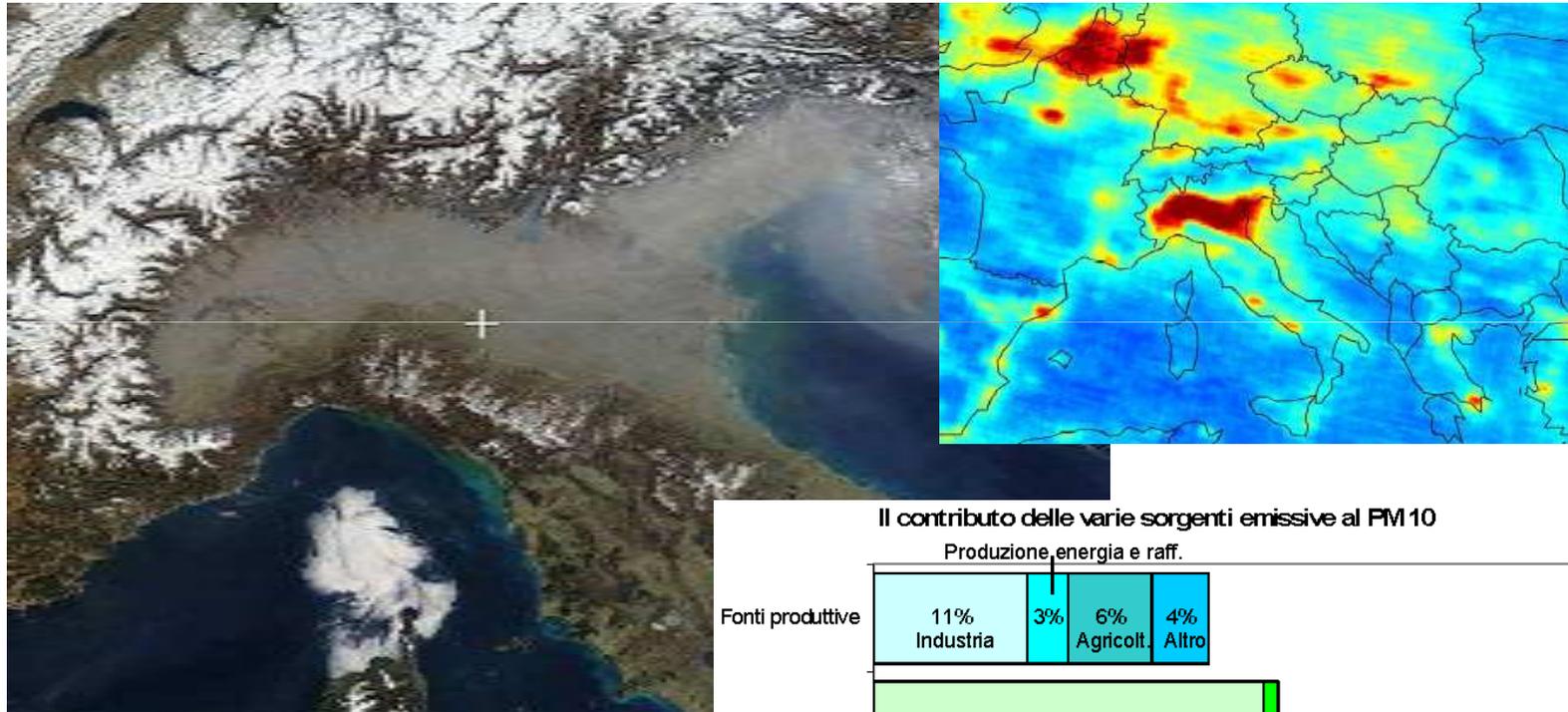
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# Question 3: What the people think about biomass? (C)

## Regional environmental impact: PM + VOC

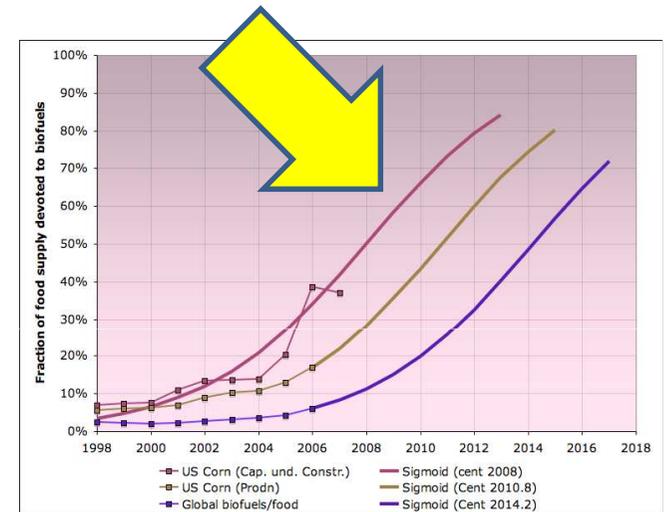




# Question 3: What the people think about biomass? (d)

## Socio-economic aspects

Food or Fuel?



Land for local people or for foreign companies?

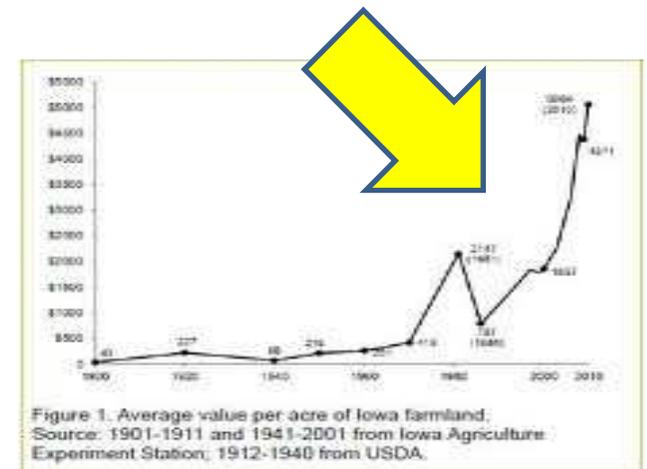
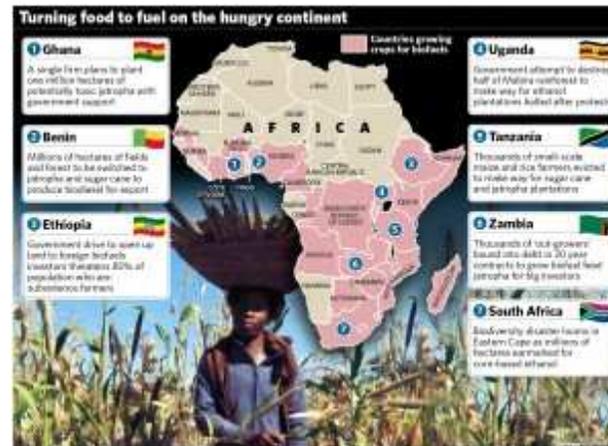
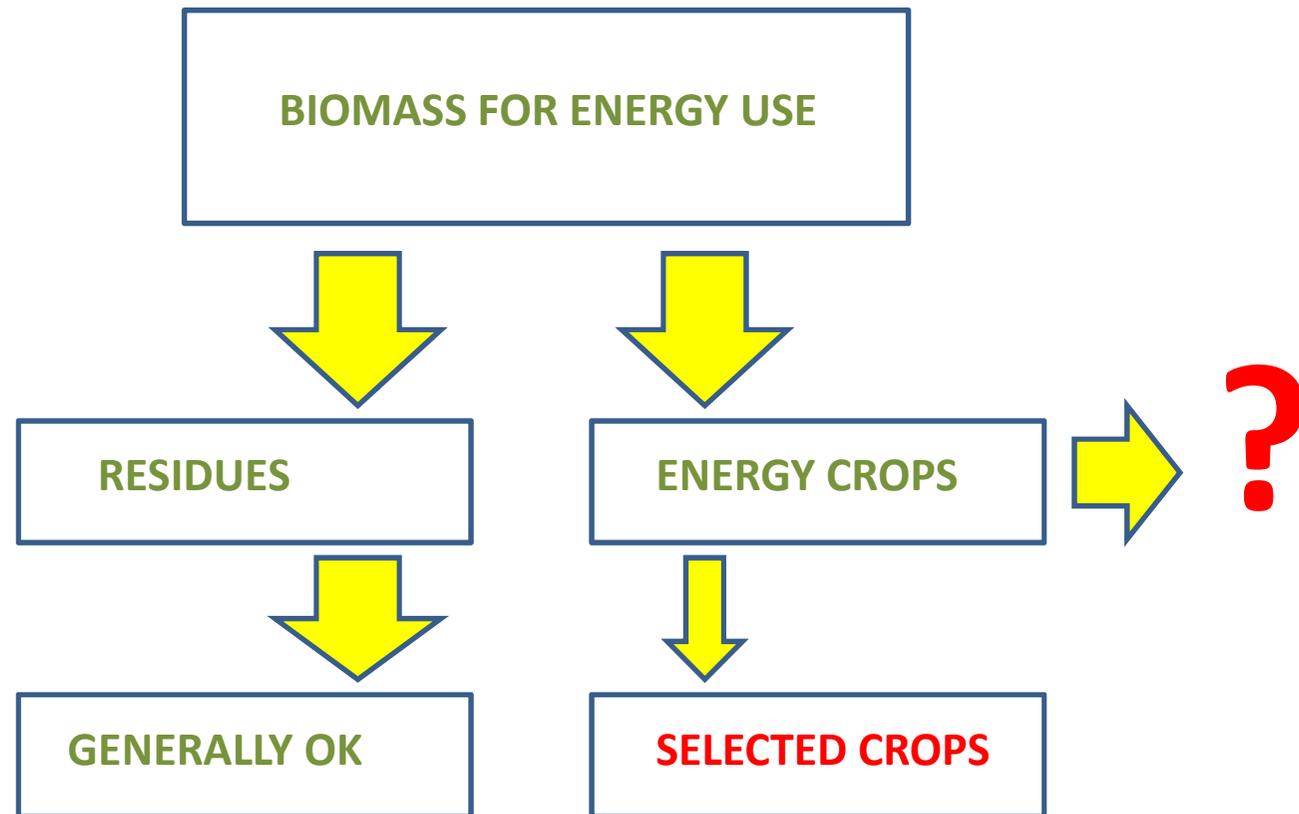


Figure 1. Average value per acre of Iowa farmland; Source: 1901-1911 and 1941-2001 from Iowa Agriculture Experiment Station; 1912-1940 from USDA.



## Question 4: Which type of biomass is more “reliable” from a general point of view?

*(Translation: where invest resources?)*





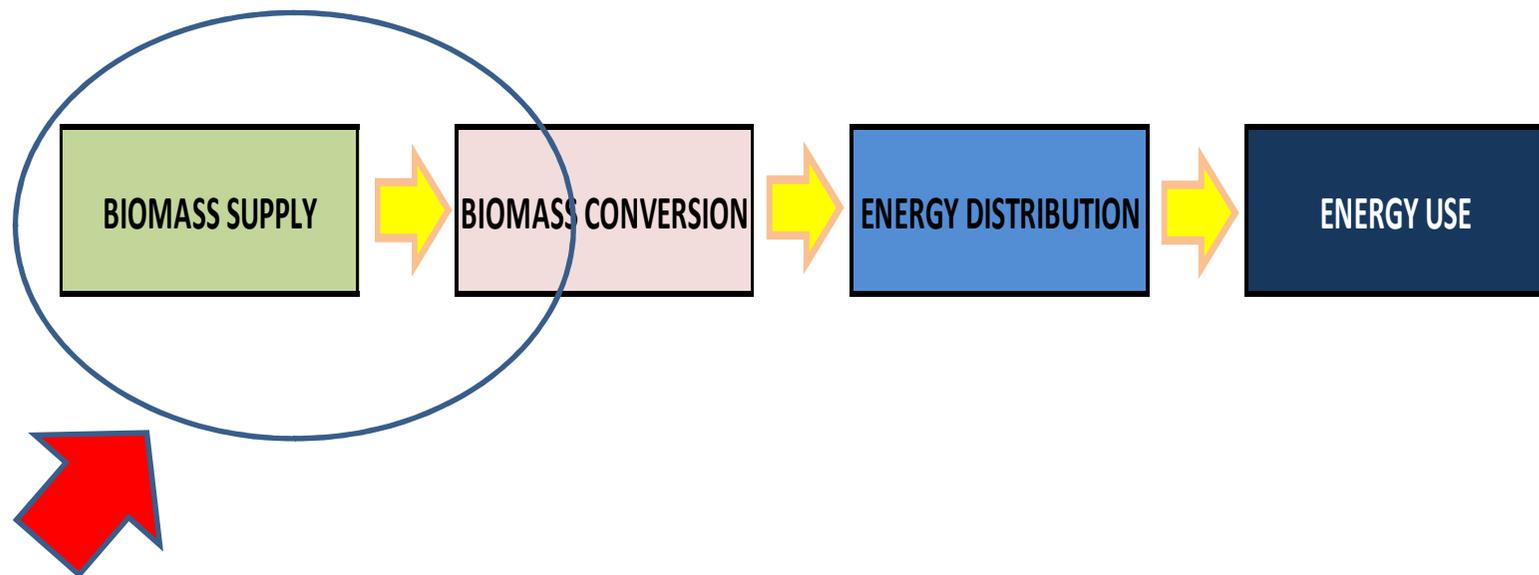
## CONCLUSIONS (2/3)

- 1 – The biomass source is competitive for the heat productions and generally needs less incentives than other renewable sources (apart the biofuels case)
- 2 – Biomass prices should increase less than prices of fossil fuels
- 3 – Biomass source is not considered very “friendly”
- 4 – The utilization of **selected energy crops** and of **residues** presents less risks in terms of general acceptance



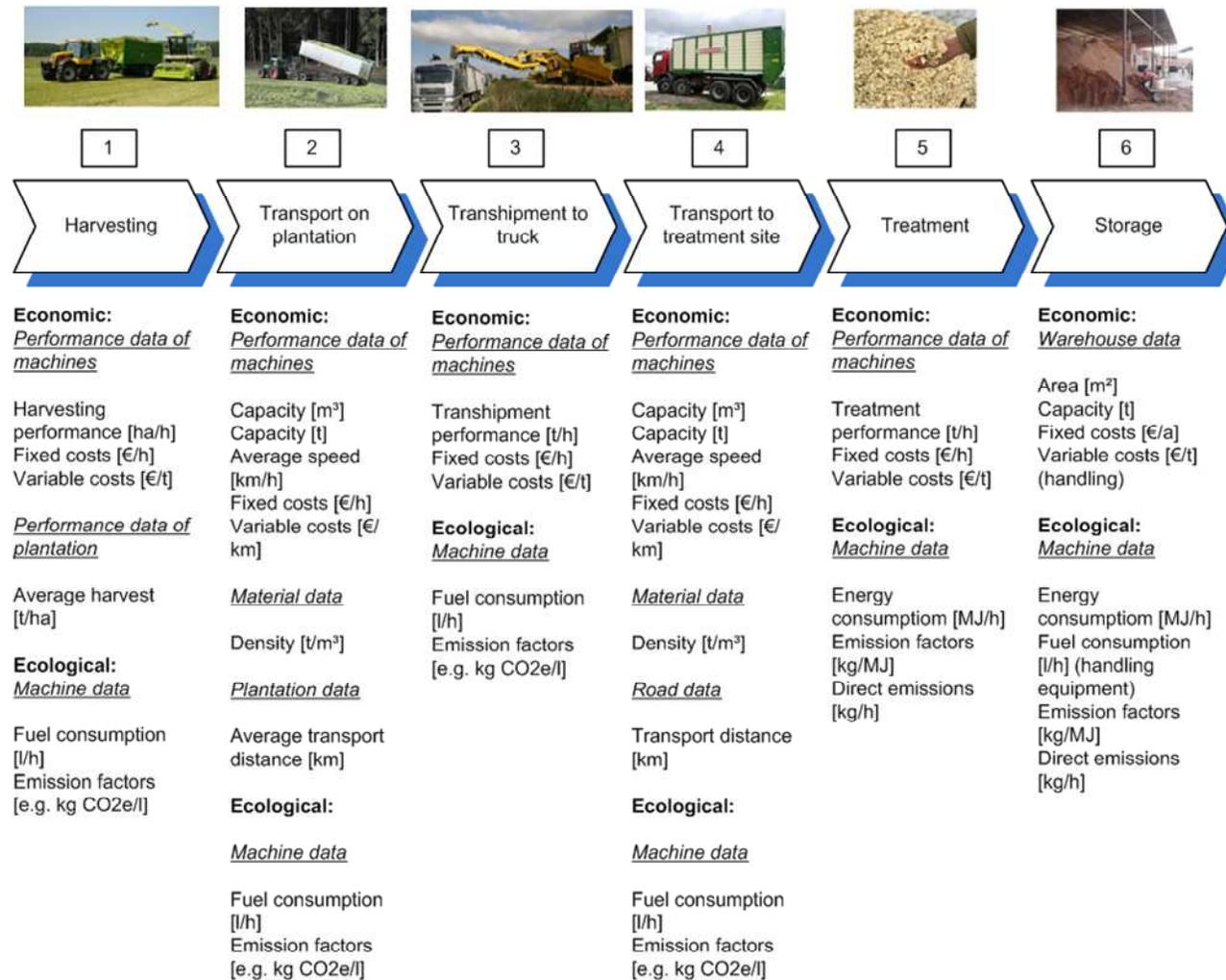
## Which chains/technologies?

- 1- Small-scale production of thermal energy for industrial or residential sectors
- 2- Small/medium energy conversion systems based on biochemical or thermochemical processes for the use of residues/selected energy crops
- 3- Complex systems for the production of raw materials (bio-refineries), biofuels and/or energy to be distributed by networks





# Some details about biomass supply (A)



Source: Fraunhofer- 2011



## Some details about biomass supply (B)

### THE MAIN TARGET IS THE REDUCTION OF COSTS

**Harvesting:** clean biomass from the field or forest to be collected. Existing machinery is generally unable to meet the capacity, efficiency required by the energy chains

**Handling and transportation:** high volumes and flow rates of material to be moved (low density, fibrous nature and the irregular physical characteristics of the raw biomass).

- existing machinery is generally unable to meet the capacity, efficiency required by the energy chains
- logistic must be developed



## Some details about biomass supply (C)

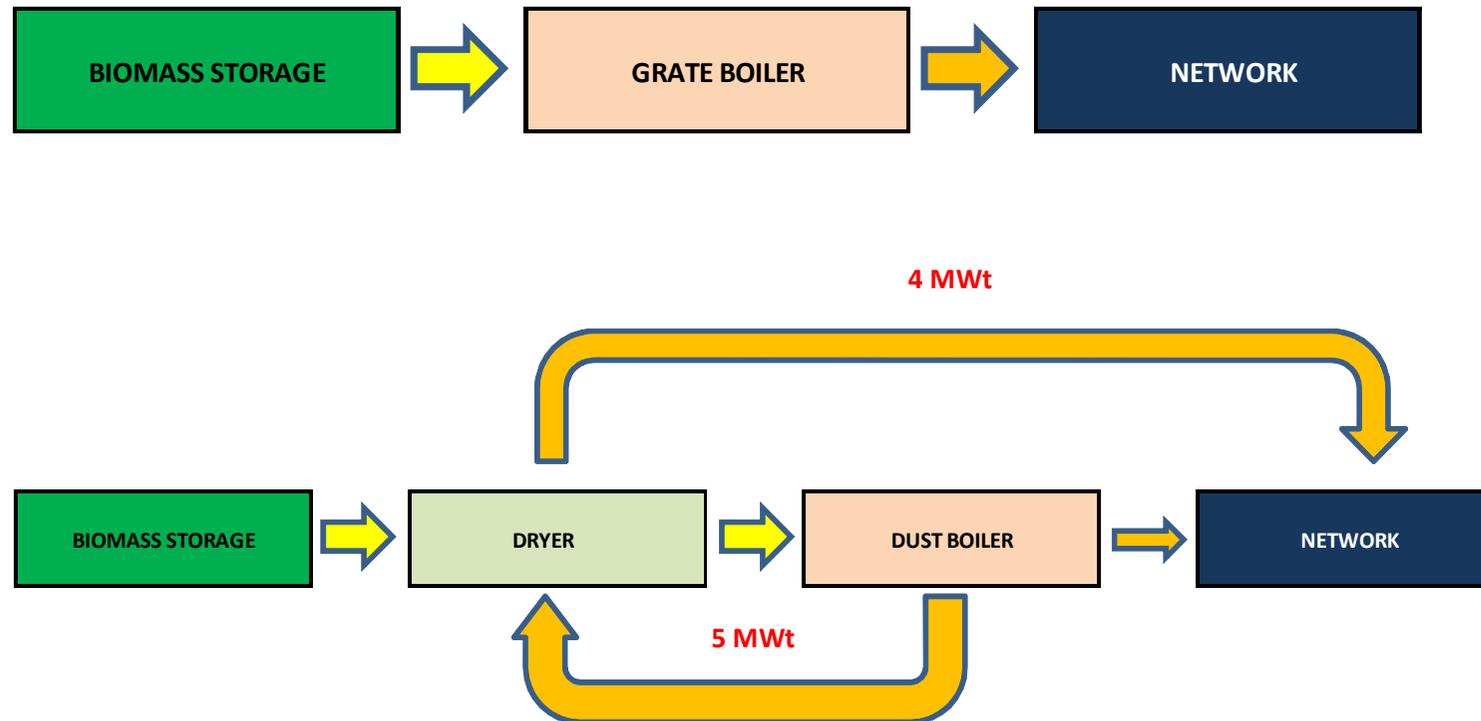
**Storage:** high volumes of seasonal materials to be preserved minimizing degradation and losses.

**Pre-treatments** (if required): to improve biomass storability, handling and transport, to prepare the raw material for final conversion into fuels or energy (electricity and/or heat) or, in the case of bio-refineries, chemicals. Examples:

- Densification (industrial pellets or other)
- Flours and fluids with different densities (facilitating the use of more conventional equipment)
- Cleaning, separating, sorting; mixing or blending
- Partial chemical pre-treating
- Reduction of moisture



## An example: drying with superheated steam





## An example: chain for vine prunings





## Some details about biomass supply (D)

Need to increase knowledge on characteristics of residual biomass and energy crop.

Examples:

- chemical/physical characteristics
- behavior during storage (i.e.: possible alteration of the physical state).



## CONCLUSIONS (3/3)

- 1 – The biomass remains an interesting energy source from a technical and economical point of view. The heat production appears as the more concrete sector, biorefineries represent the future evolution
- 2 – The sustainable use of residues and of some selected applications of the energy crops is socially and environmentally acceptable. A lot to work to do to reduce PM and VOC emissions of the combustion plants (small/medium size)
- 3 – The industry of agricultural machinery can give an important contribution improving the mechanization for the biomass collection and its transformation in intermediate products