

# RESYNTEX



**Textiles residues in Wood-based panels industry**

**BIR 2018 - World recycling convention & Exhibition  
Barcelona, 30 May 2018**

***Dimitris Moutousidis, Electra Papadopoulou***

# Summary of activities

## CORE Business

- 1 Development & Application of Industrial Technology for Binders & Additives
- 2 Engineering Services & Equipment Supply for resin plants
- 3 Technical Support & Training Services for resin & panel manufacturers
- 4 R&D Services for 3<sup>rd</sup> parties
- 5 Participation in EU research projects

## Specialty SERVICES

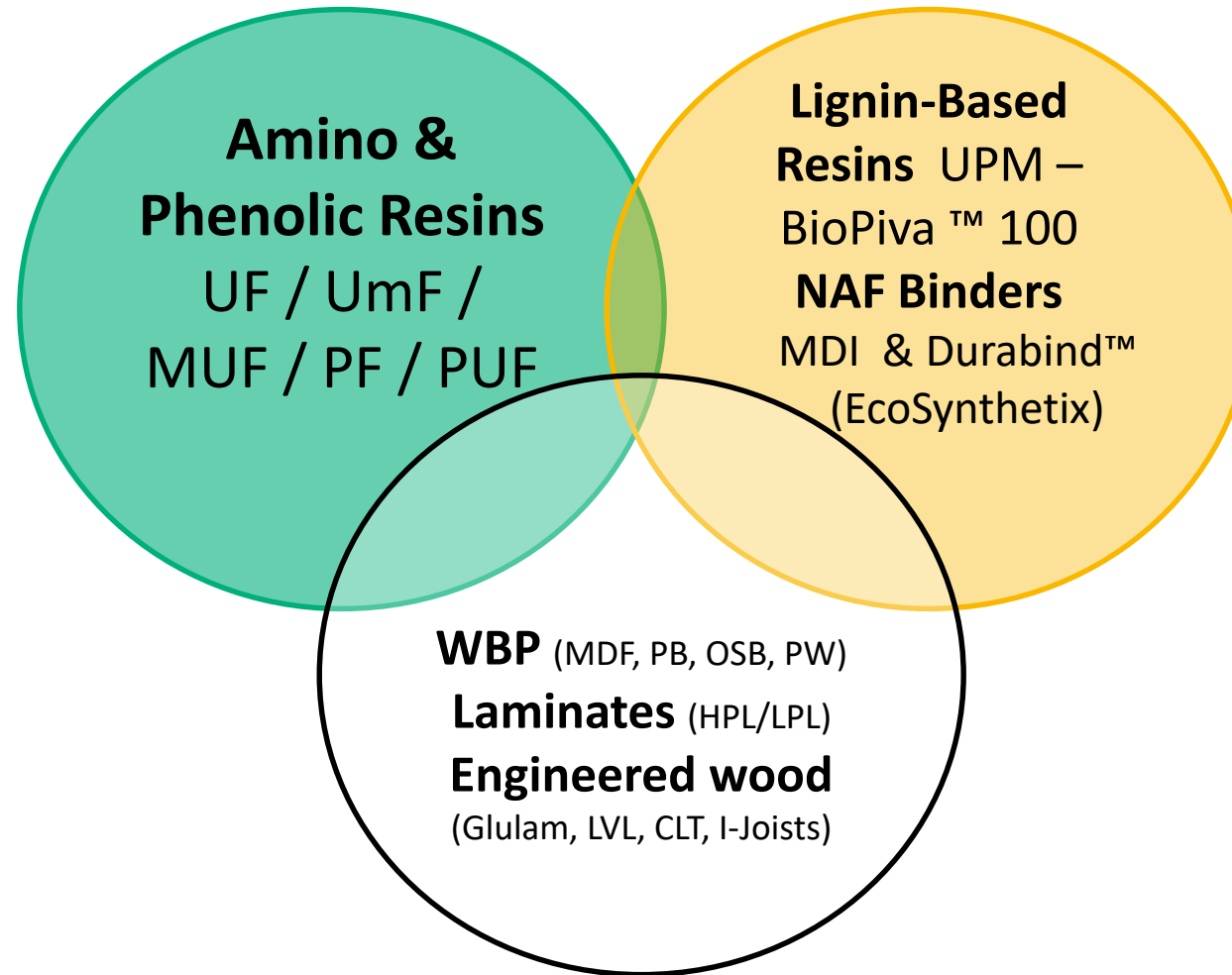
- 1 Chemicals production upon request
- 2 Accredited testing (EN 17025)
- 3 Resin, Additives & Board testing and evaluation
- 4 Equipment Representation

# CHIMAR in figures

- Since 1977 with presence in 40+ countries
- Know-how applied in 100+ industrial sites
- Over 1.4 Million Tons/year of resin produced by customers under CHIMAR technology
- Over 10% of global wood panel production uses CHIMAR services (PB & MDF)
- Engineering/Procurement of more than 15 turn-key formaldehyde & resin plants worldwide
- Over 20 patent families in >50 countries
- Participation in 50+ EU funded projects & scientific networks
- Strong team of 30 highly motivated experts
- Customers follow CHIMAR since the company's day 1

# Industrial Technology

For the production AND APPLICATION of binders:



# Third party R&D

CHIMAR undertakes R&D projects for:		
Extracting the binding potential of biopolymers and biomass-derived chemicals like:	Lignin	Tannin
	Starch	Glycerin
	CNSL	Pyrolysis Oil
	Sugars/Saccharides	Proteins
Developing Novel Composites such as:	Boards from Annual Plant Residues (Fibers or Chips) e.g. Light weight panels	
	Panels from Recycled Materials	

**CHIMAR advantage: 40 years sustainable development**

# Funded Research Projects/Networks

- **Participation in:**
  - 45 European Funded RTD Projects and
  - 10 Science and Technology Networks
- **Cooperation with numerous Industrial Partners, SMEs, Research Institutes, Universities, Associations, NGOs from all over Europe and beyond**



# *CHIMAR IN RESYNTEX*

## Target

Use protein hydrolysates for the development of adhesives suitable to be used in the production of wood-based panels.

## Samples tested

- a) protein juice from sheep's wool and textiles
- b) Textile fibers (mix of denim and wool)

## Use

- a) Proteins: Replace phenol in phenol-formaldehyde (PF) resins. – max 30%
- b) Textile fibers: wood substitute – max 20%



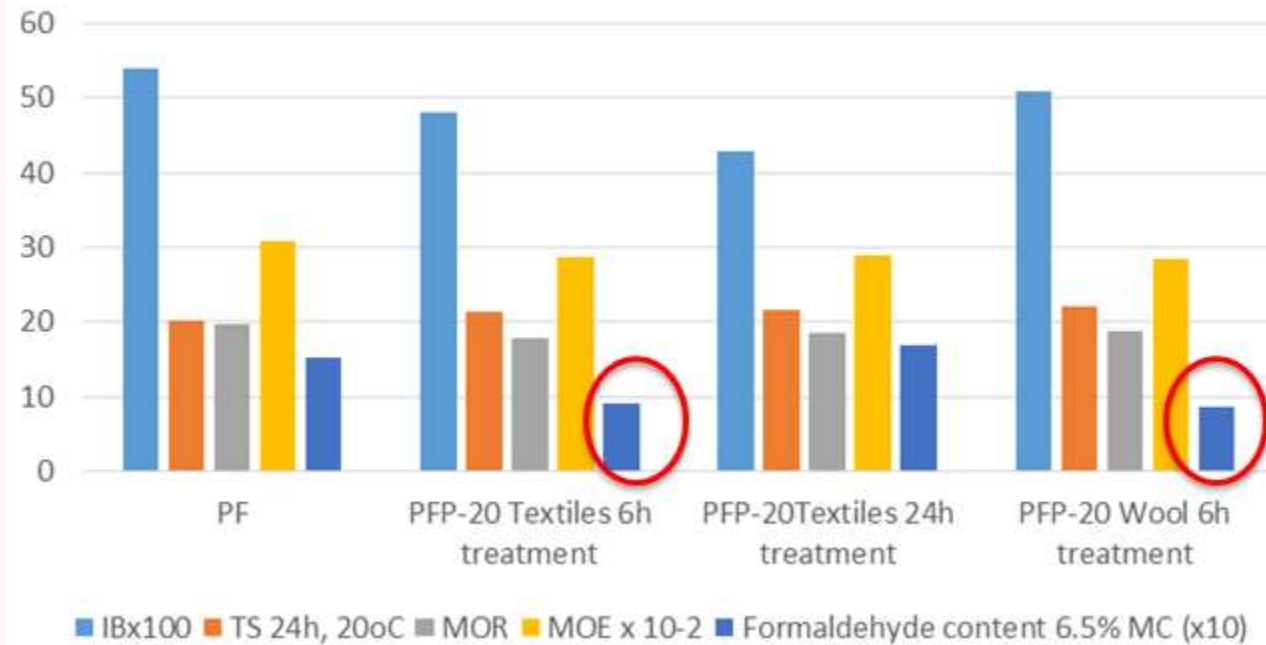


a) **Proteins:** Replace phenol in phenol-formaldehyde (PF) resins. – max 30%



# Particleboards with protein samples

*Bonding material: 20% phenol replacement in PF resins*



Evaluation of Protein Valagro samples from textiles and sheep's wool in PB

*IB= Internal Bond (EN 314-01)*

*TS = Thickness Swelling (EN 317)*

*MOR = Modulus of Rupture (EN 310)*

*MOE = Modulus of Elasticity (EN 310)*

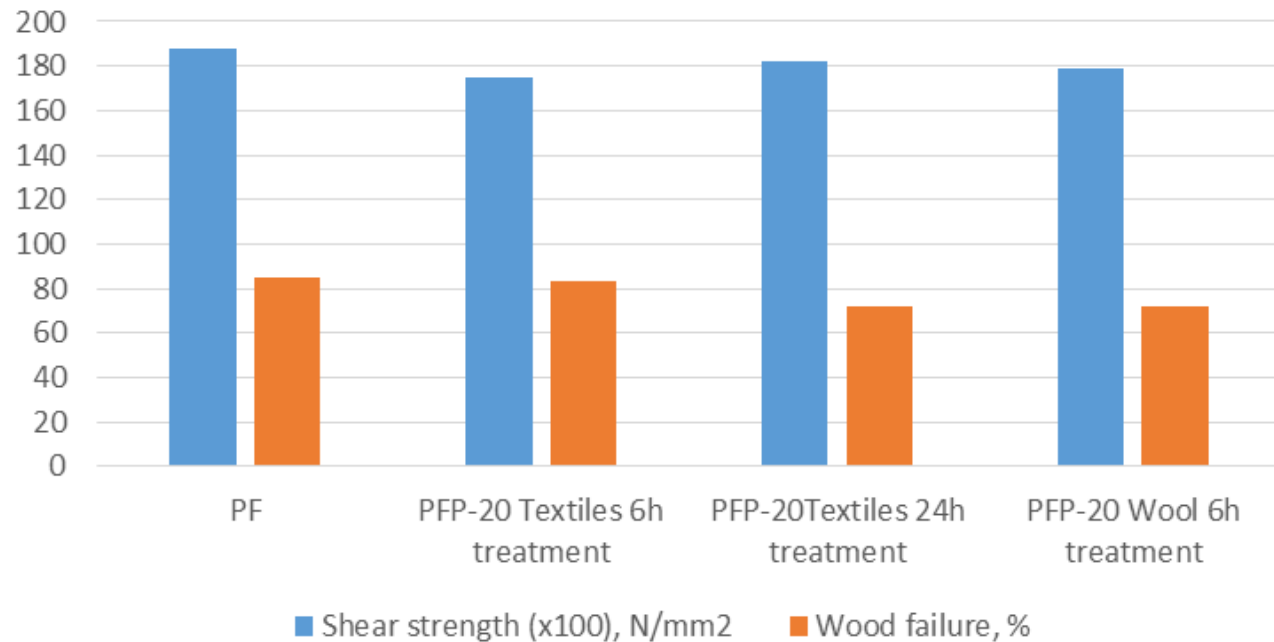
*Formaldehyde Content 6.5% MC (ISO 12460-3)*



# Plywood with protein samples

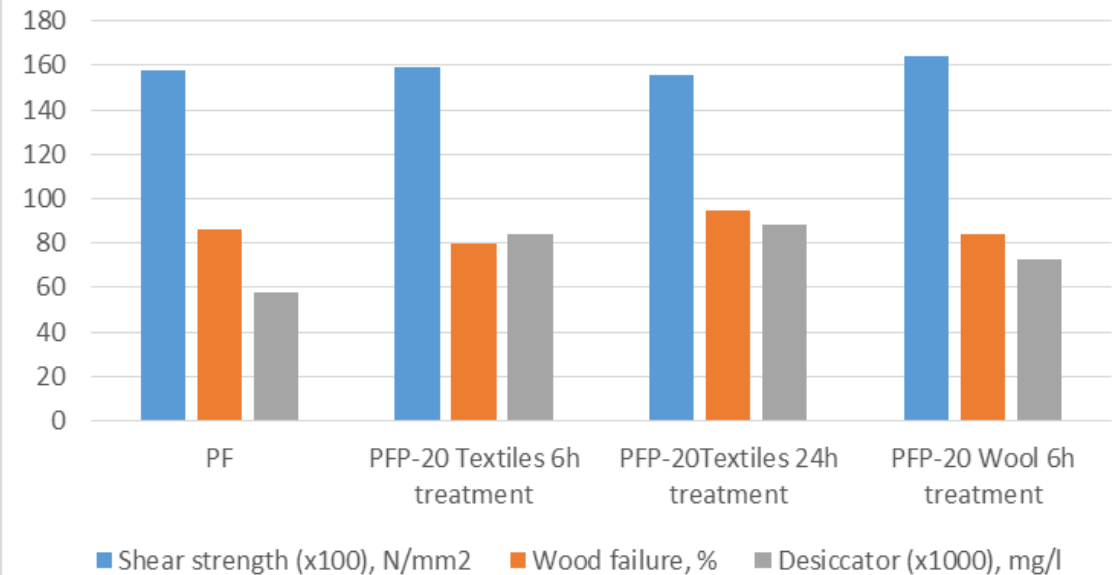
*Bonding material: 20% phenol replacement in PF resins*

Plywood - pre-treatment 5.1.1



**Evaluation of Protein Valagro samples from textiles and sheep's wool in PW**

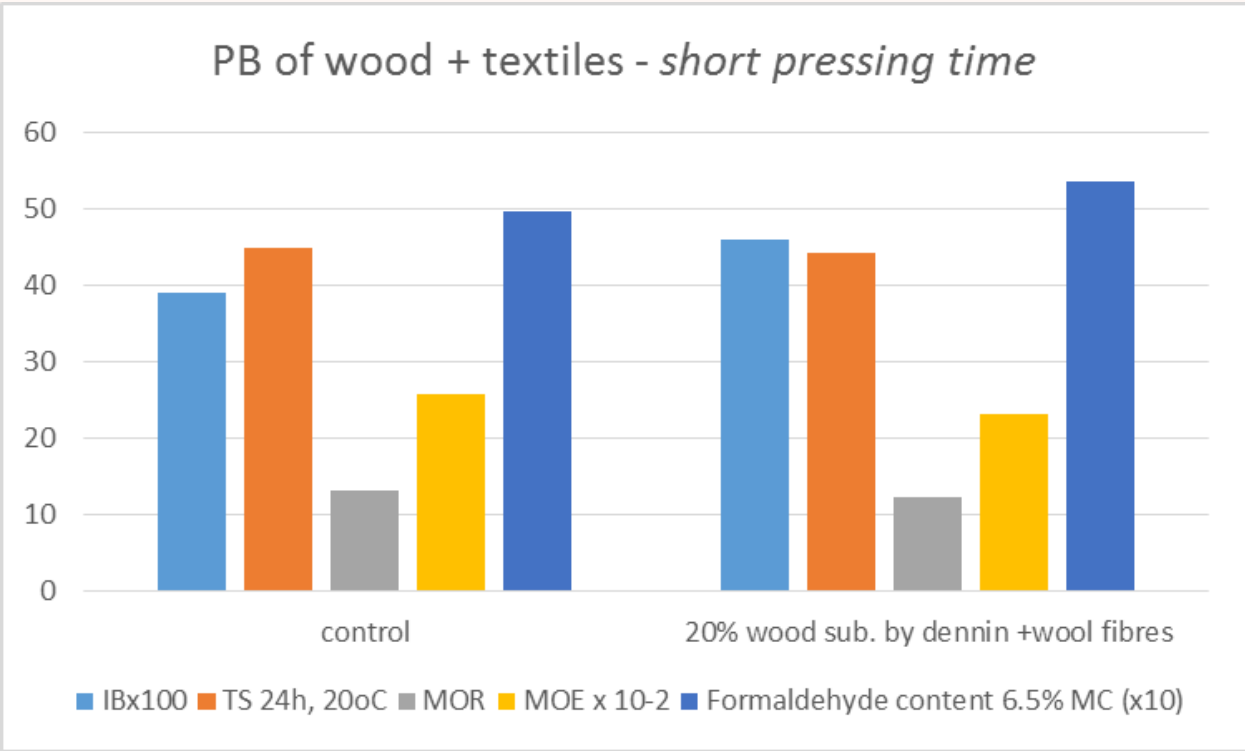
Plywood - pre-treatment 5.1.3 & Desiccator



Co-funded by the European Union's Horizon 2020 research and innovation programme

*Shear strength (EN 302-1)*  
*Wood failure (EN 314-01)*  
*Desiccator (ISO 12460-4)*

20% wood replacement by textile fibres



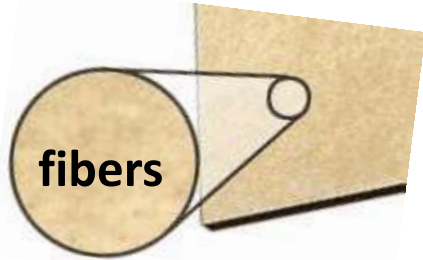


# *APPLICATIONS AND MARKET*

# Typical wood-based panels

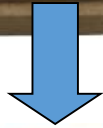
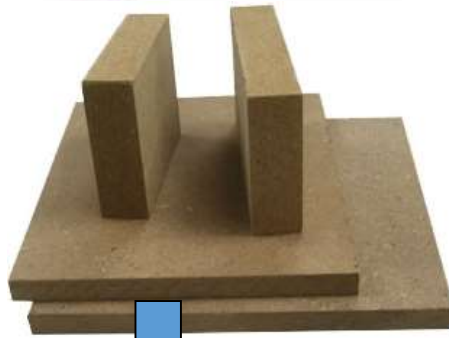


**Fibreboard  
(HDF, MDF, LDF)**



## Grades

- Standard
- MR
- FR

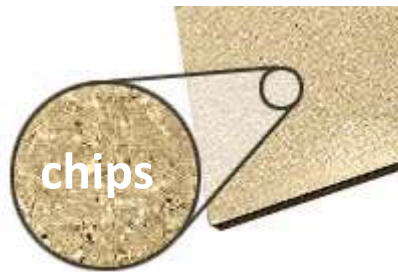


UF,  
MUF



Thickness: 4 - 60 mm  
various densities

**Particleboard**



UF,  
MUF



3 mm to > 40 mm  
various densities

**OSB**



UF,  
MUF,  
PF,  
pMDI



6 - 40 mm (min 3 layers)  
smaller range of densities  
than particleboards

**Plywood**



UF,  
MUF,  
PF



# EU Woodworking industries – production value



Source: EPF 2017

# Figures in EUROPEAN PANEL FEDERATION countries

	production	x1000m <sup>3</sup>	consumption	x1000m <sup>3</sup>
	16/15	2016	16/15	2016
Particleboard	0.8%	30,250	2.9%	29,178
MDF	2%	12,000	3.4%	11,100
OSB	6.9%	5,400	↑ N/A	N/A
PW	3.4%	7,159.5	-4.3%	7,528.8

In 2016, the total production of European wood-based panels increased by **1.8%**, reaching a total of **55.6 million m<sup>3</sup>**.

particleboards	MDF	OSB	plywood
<b>66% furniture</b>	<b>45% furniture</b>	85% OSB/3 structural panels used in humid conditions	40% construction
22% building industry including doors & floors	32% laminate	15% other	<b>28% furniture</b>
12% packaging	16% flooring		14% transport
	7% other (frames, toys, etc.)		9% packaging
			9% other



# Global furniture scenario

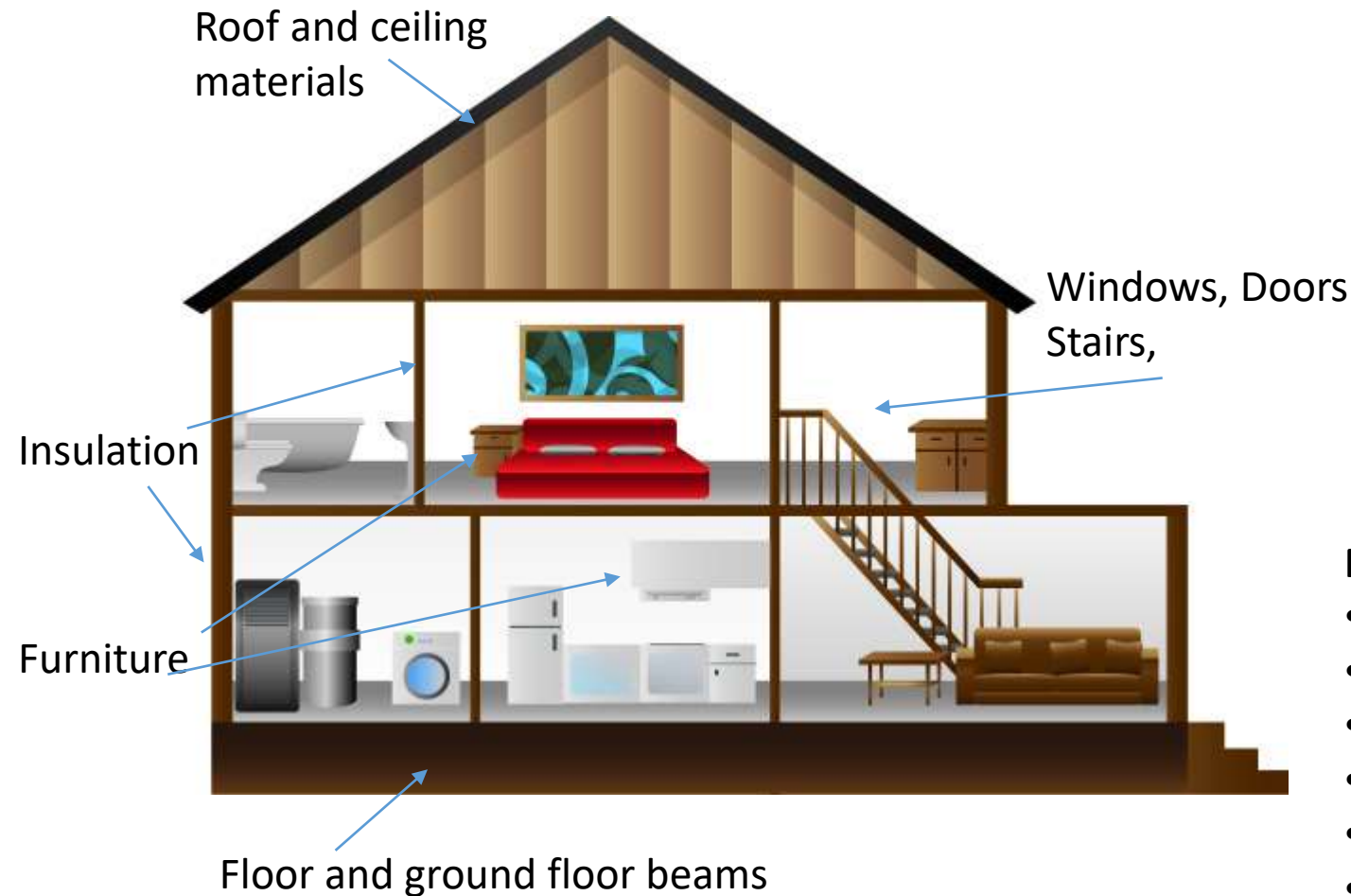
- **US\$ 430 bn** world furniture production **in 2016**
- **Asia-Pacific** the largest furniture producer
- **China, India and Vietnam** the main producers of **50% of world furniture**

Europe: total furniture production, 2010-2015 - € million and %



Source: CSIL

# Wood-based panels: common applications & market trends



❖ Global consumption of wood-based panels: mainly **building construction** and **furniture** industries

❖ **3% average growth/year on the demand for wood-based panels in Europe**, according to the Pöyry market research institute's prognosis

## Market trends\*:

- Formaldehyde-Free wood-based panels
- **Decorative surfaces** with new properties
- Lightweight panels
- **Non-toxic resins**
- Recycling of panels
- Fast and low cost production
- Efficient manufacturing and automation

\*<http://www.hbfuller.com/north-america/innovation-and-experience/blog/Interesting-trends-in-the-woodworking-industry.html#.Vtg65vmLTIU>



This research was carried out within the project “A new circular economy concept: from textile waste towards chemical and textile industries feedstock — RESYNTEX” that is funded by the European Union’s Horizon 2020 research and innovation programme under grant agreement No 641942.

***Thank you very much!***



**Dimitris Moutousidis**

Sofouli 88, 55131 Thessaloniki, Greece

Tel: +30 2310 424167, Fax: +30 2310 424149

e-mail: [Dimitris.Moutousidis@ari.gr](mailto:Dimitris.Moutousidis@ari.gr); [office@ari.gr](mailto:office@ari.gr);

[www.chimar-hellas.com](http://www.chimar-hellas.com)



Co-funded by the European  
Union's Horizon 2020 research  
and innovation programme

