

Issues Related to Durability and Protection Affecting the Acceptance and Use of Engineered Wood Composites in Europe

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Outline

- European wood-based products market
- Consumption patterns of wood-based products
 - “Traditional” products
 - Engineered wood products (EWP), Engineered wood composites (EWC), and other “new” materials
- Drivers and barriers
- Durability & protection
- Conclusions

EU Construction & Use of EWC

- The EU is diverse collection of cultures
- A history of “Fire Awareness” is deep and housing design reflects this deep-seated concern
- Classic residential construction varies across Europe
 1. France/Germany/Luxembourg
 2. UK
 3. Scandinavia

Traditional French & German

- Post & Beam
- Masonry In-fill
- Timber Roof
- Tile shingles



Current France & Germany

- Masonry
- Lumber Roof
- Tile shingles



United Kingdom

Circa 1400-1600



Circa 1800-1900



Today: Brick on Block (left) or Render on Block (right)

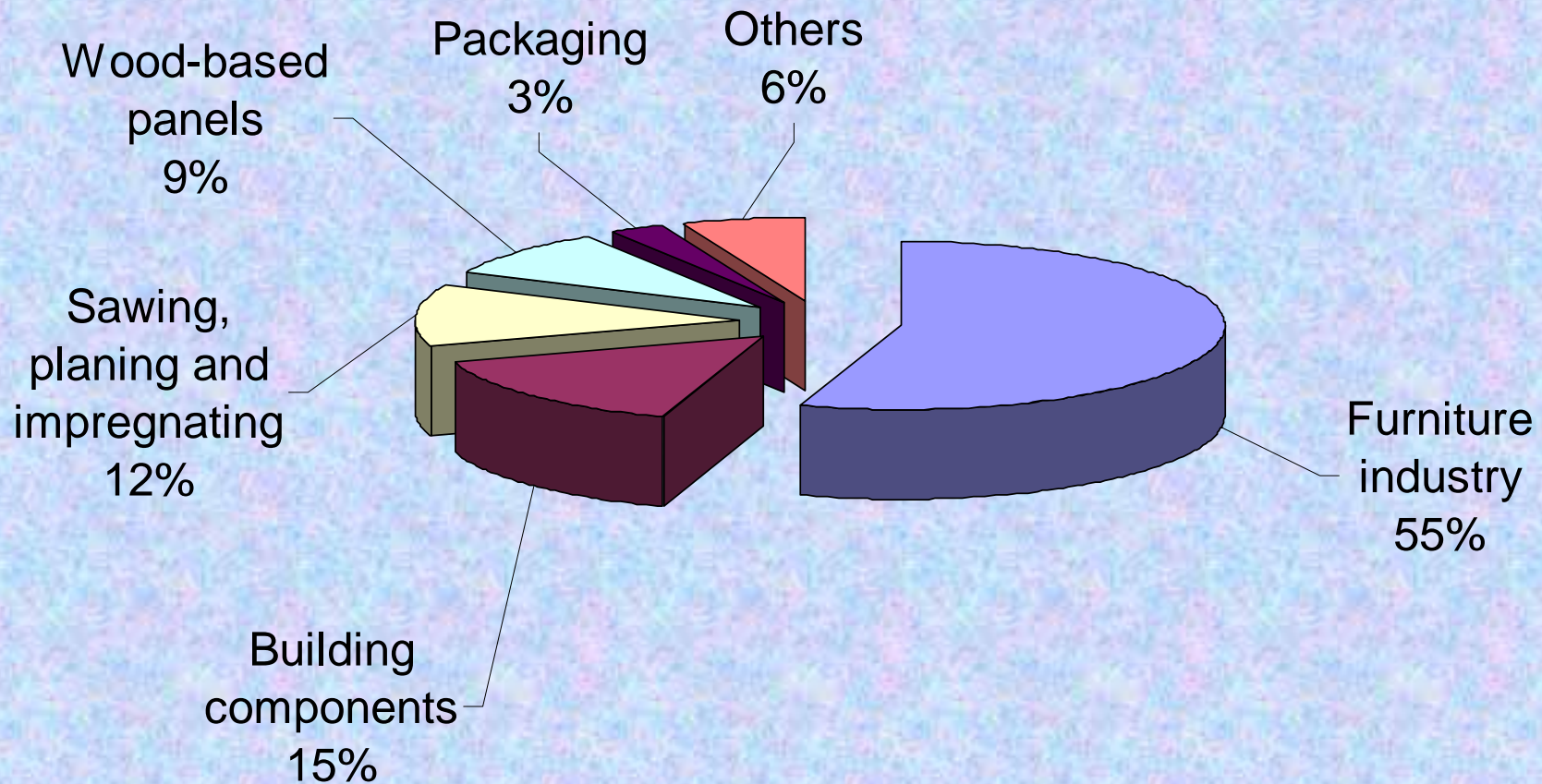
Finland



The EU wood-working industry

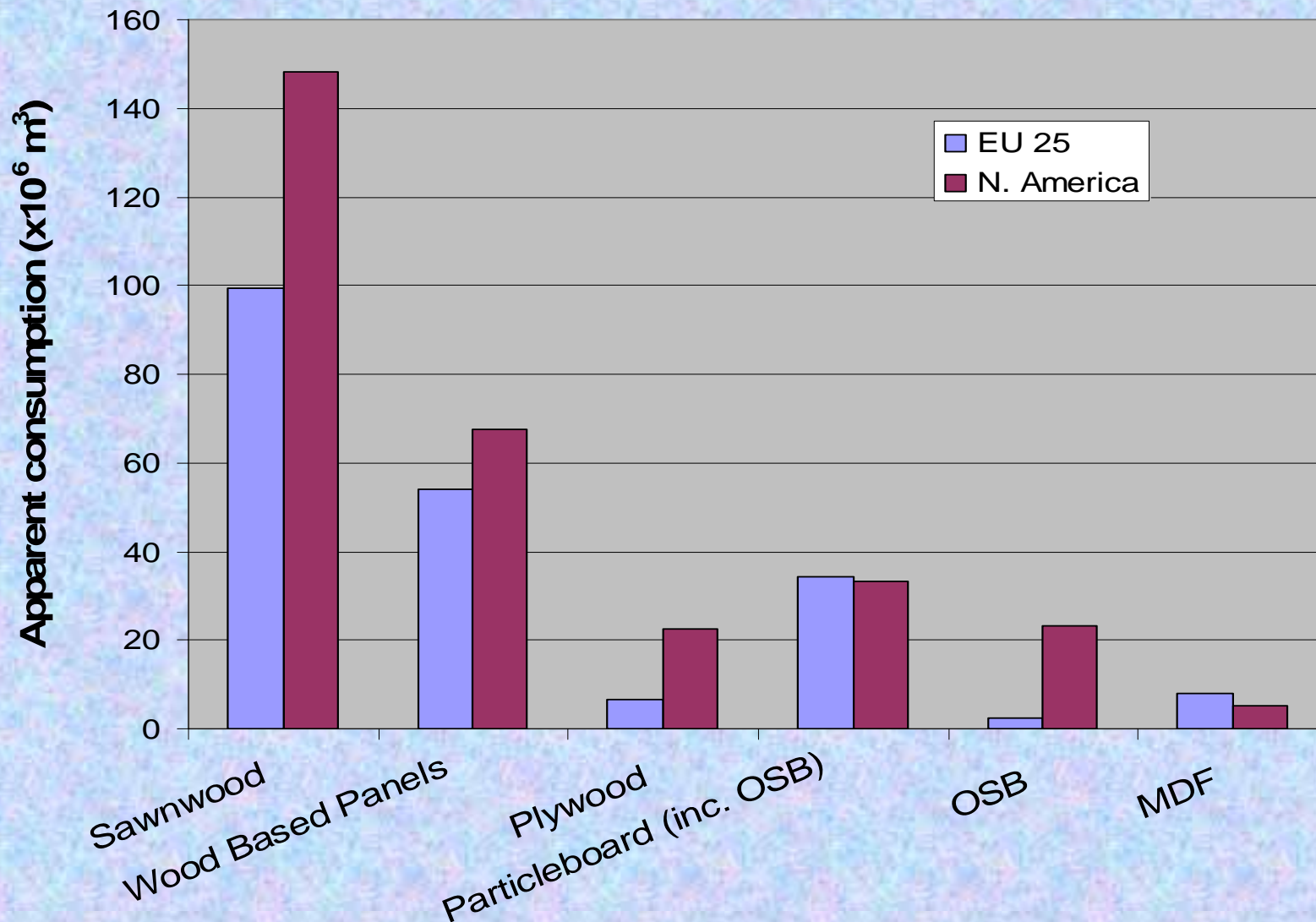
- Approximately €150 billion (US\$ 175 billion) of sales
- 1.6 million employed by wood industry
- Furniture industry accounts for 55% of sales
- Production and consumption dominated by sawnwood and wood-based panels (plywood, particleboard, MDF and OSB)
- Consumption of EWP currently small, but with expectations of future growth

European wood-working industry sales (2001)

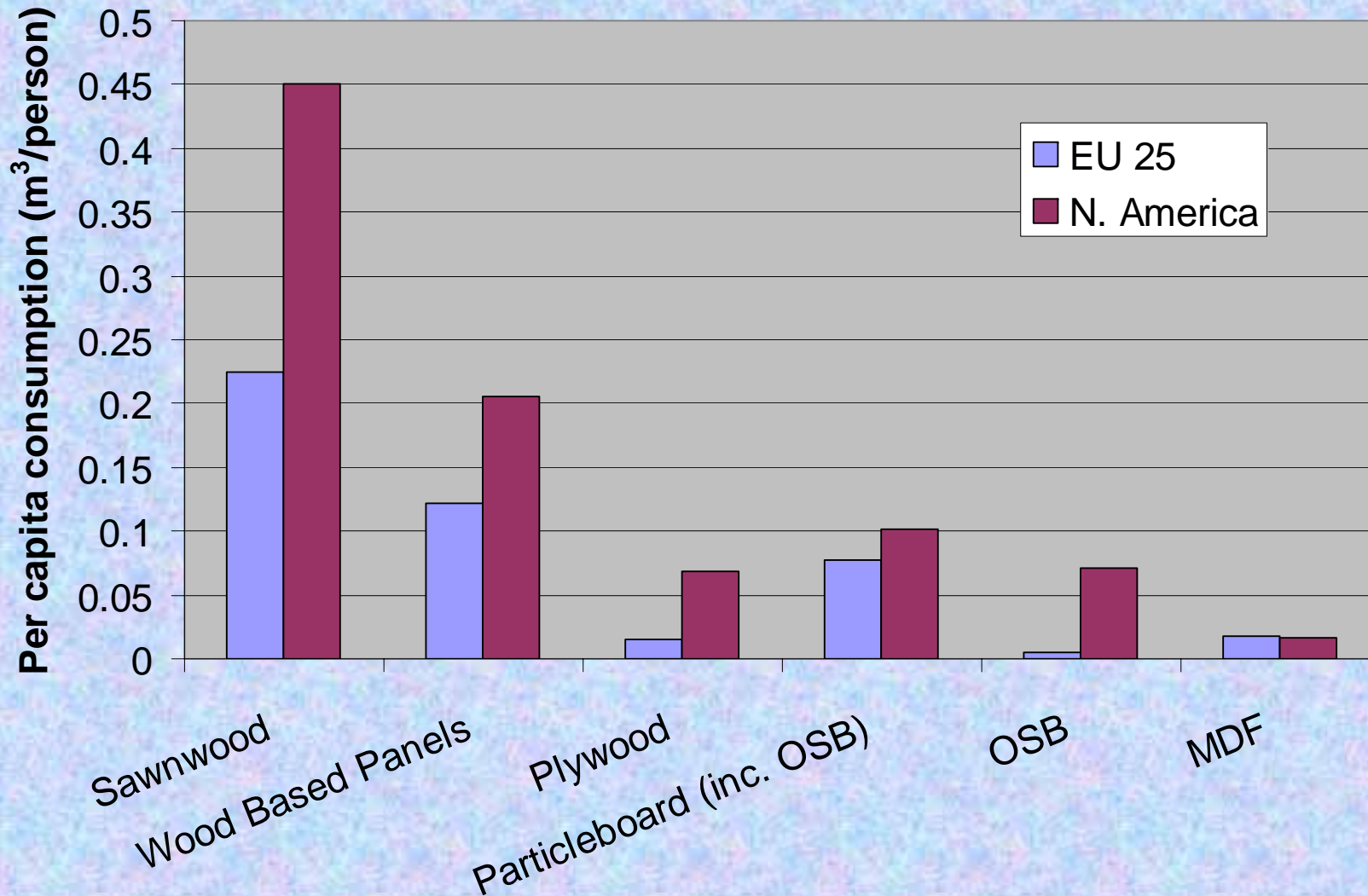


(Source: CEI-Bois, (2004): *Roadmap 2010 for the European Woodworking Industries*. European Confederation of Woodworking Industries, Bruxelles.)

EU production and consumption of wood-based products (2004)



Per capita consumption of wood-based materials (2004)



Differences in consumption patterns between the EU and N. America

- Overall consumption of wood-based materials far greater in N. America
- In EU only 5% of buildings are timber frame, compared with around 90% in N. America
- Reflected in the much higher relative consumption of plywood and OSB in N. America (around 5 times greater)

Consumption of “structural” panel products - plywood & OSB

- In the EU 75% of OSB panels are used in the building industry (European Panel Federation figures)
- About 3 times more plywood than OSB is consumed in the EU. This is all mainly used in construction
- Situation differs from N. America where volume of plywood is 40% and OSB is 60% of structural panels consumed

Consumption of Engineered Wood Products in the EU

- EWPs include: glulam, LVL, PSL, LSL etc
- Main EWP used in EU is glulam
- Production of glulam in 2000 was 1.5 million cubic metres in the EU, compared with 0.9 million cubic metres in N. America
- Around 20% exported.
- Many examples of large structures constructed with glulam

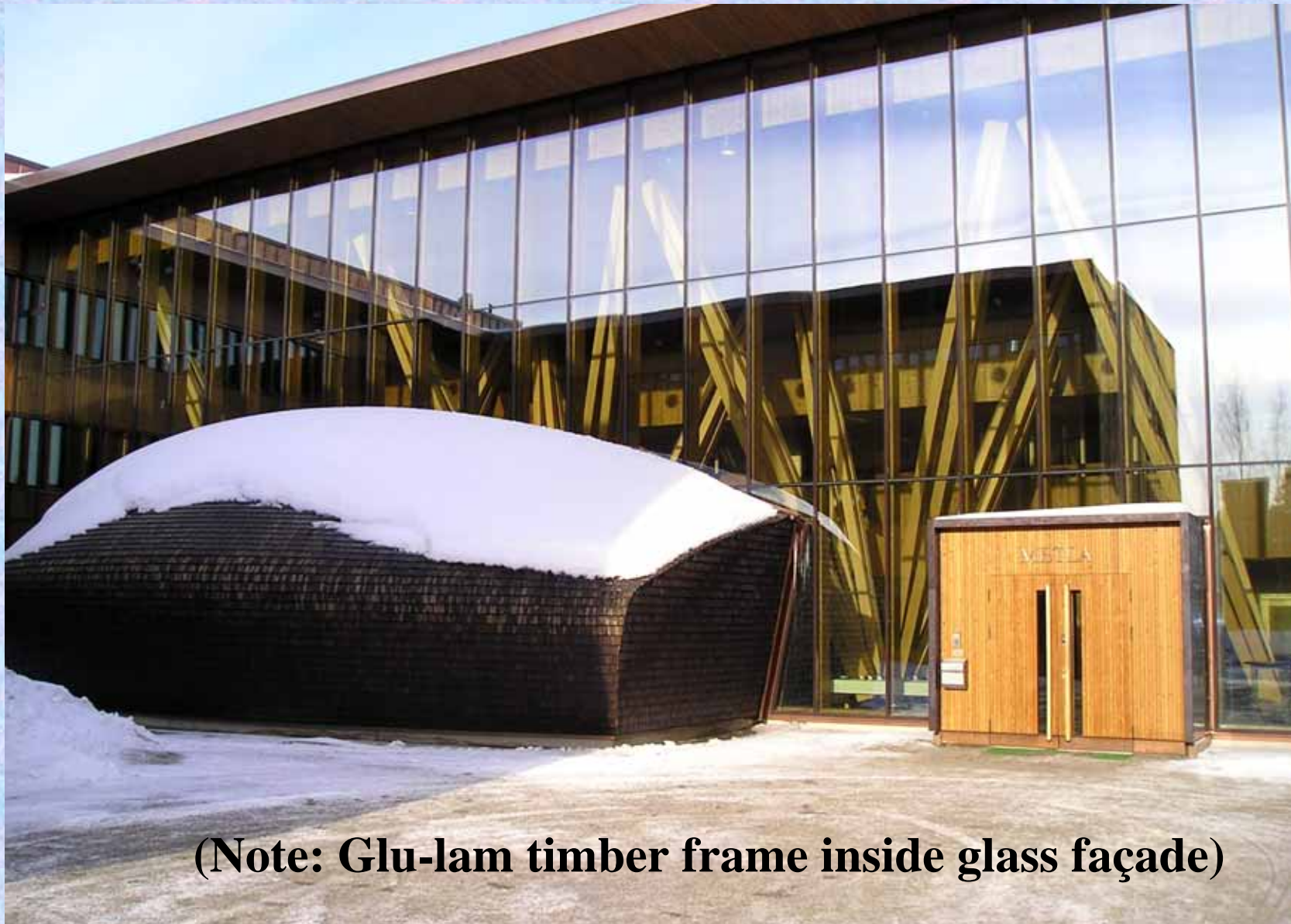
Sports hall
in Joensuu,
Finland

www.joensuuarena.fi



Metla Headquarters in Finland

(Finnish Forest Research Institute)



(Note: Glu-lam timber frame inside glass façade)

Ecole Supérieure du Bois, France



(Note: Glulam pole & roof system & EWP-rotarium inside glass façade)

Other engineered wood products

- Laminated Veneer Lumber - LVL:
production in 2002 was approximately
125,000 m³.
 - about *1/10th* of N. American production
- I beams: production at 8 million linear
metres.
 - about *1/30th* of N. American production
- Virtually no others EWPs produced

Other “engineered wood” composites

- Wood plastic composites (WPCs)
 - Established and growing market in N. America
 - Little EU production at the present, but high expectations
- Heat treated wood
 - Improved durability and dimensional stability, altered appearance of light coloured species
 - Increasing market for heat treated wood

Current situation in EU

- Significantly lower consumption of structural panel products in the EU than in N. America
- With the exception of glulam, little consumption of other engineered wood products, although interest is strong and EWPs seen as a product of the future
- Main application for these engineered wood composites in the building industry

Underlying factors

- Timber framing used mainly in domestic dwellings, but still most homes built in “bricks and mortar”
- EU home owners tend to be conservative. In the UK in particular many homes built to “traditional” designs
- Distinct regional differences; for examples, many timber dwellings and structures in Scandinavia, but relatively few in Mediterranean countries
- Perception of timber and wood-based products as old fashioned materials

EU drivers and barriers

- Renewable and potentially sustainable raw material.
- Generally good perception about wood-based products, but
- Concern about the fire performance of EWPs[#]
- No specific regulatory barriers, however the cost and time taken to certify products could be problematic[#]
- Of the technical barriers to the enhanced use of wood in general, durability was seen as the main issue[#]

[#]Source: Bregulla *et al.* (2004)

EU drivers and barriers continued

- Example: In 1983, a TV current affairs programme in the UK reported on rot problems in timber frame housing. The effects of this programme were quite devastating, so much so that it is still referred to today. The importance of avoiding a repeat of this is clear
- Engineered wood composites offer good scope for new products with enhanced functionality (e.g. improved durability/fire performance)

Durability

- Applications either “interior” or exterior”
- With exception of glulam, most engineered wood composites used in the EU are used in interior situations, thus little need to protect
- Improved durability could lead to enhanced uses in more demanding applications (e.g. exterior applications) or to greater service life, thereby increasing market share
- Improved durability could lead to greater consumer confidence in EWC

Influencing factors

- In the future Eurocode 5 (EN1995) will cover the design of timber structures
- Eurocode 5 employs the limit state concept, rather the permissible stress method as used in existing standards such as BS5268
- EC5 should potentially allow greater use of EWPs
- EC5 states that wood should be suitably treated if biological durability is to be extended

Conclusions

- With the exception of glulam the use of EWPs is at present limited in the EU
- EWP and EWC are generally considered as a future market-growth areas
- Increased durability and fire-resistance could lead to more demanding applications and thus greater acceptability/consumer confidence