

# Markets, Applications, and Processes for Wood Polymer Composites (WPC) in Europe

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# Content

- **Wood K plus**
- **Market survey 2009**
  - actors
  - market growth / outlook
  - raw materials
  - market & technology development – applications
  - production figures
  - trends
- **Characterization of the commercial product decking**
- **Aspects for end user**
- **Conclusions**
  - outdoor applications
  - market

# Wood K plus

- R&D Institute
- Founded 2001  
by the Austrian Government
- 80 scientific employees
- 50 projects
- Budget: 7.0 million p.a.
- 4 business units and  
one cross sectional field



# European Market Survey in June 2009

**Wood K plus** carried out a survey among the **WPC actors** in the **European market** in June 2009.

The results of this survey contributed to a **multi-client study** „*Market Information on Wood-Plastic Composite Decking and Siding in Europe, 2009*”.

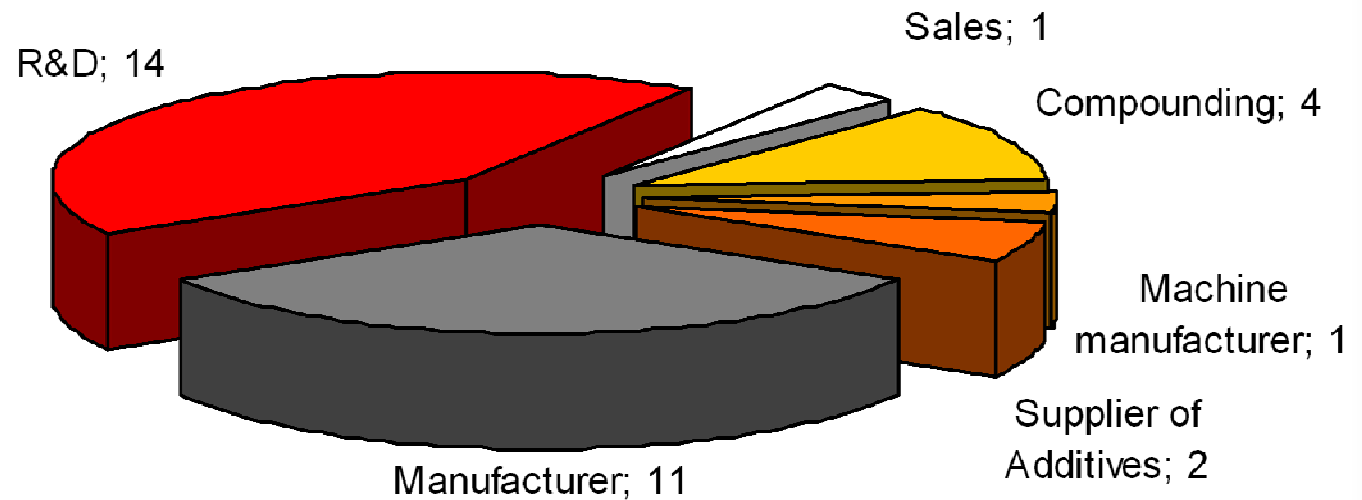
Please find some results of the study in following!



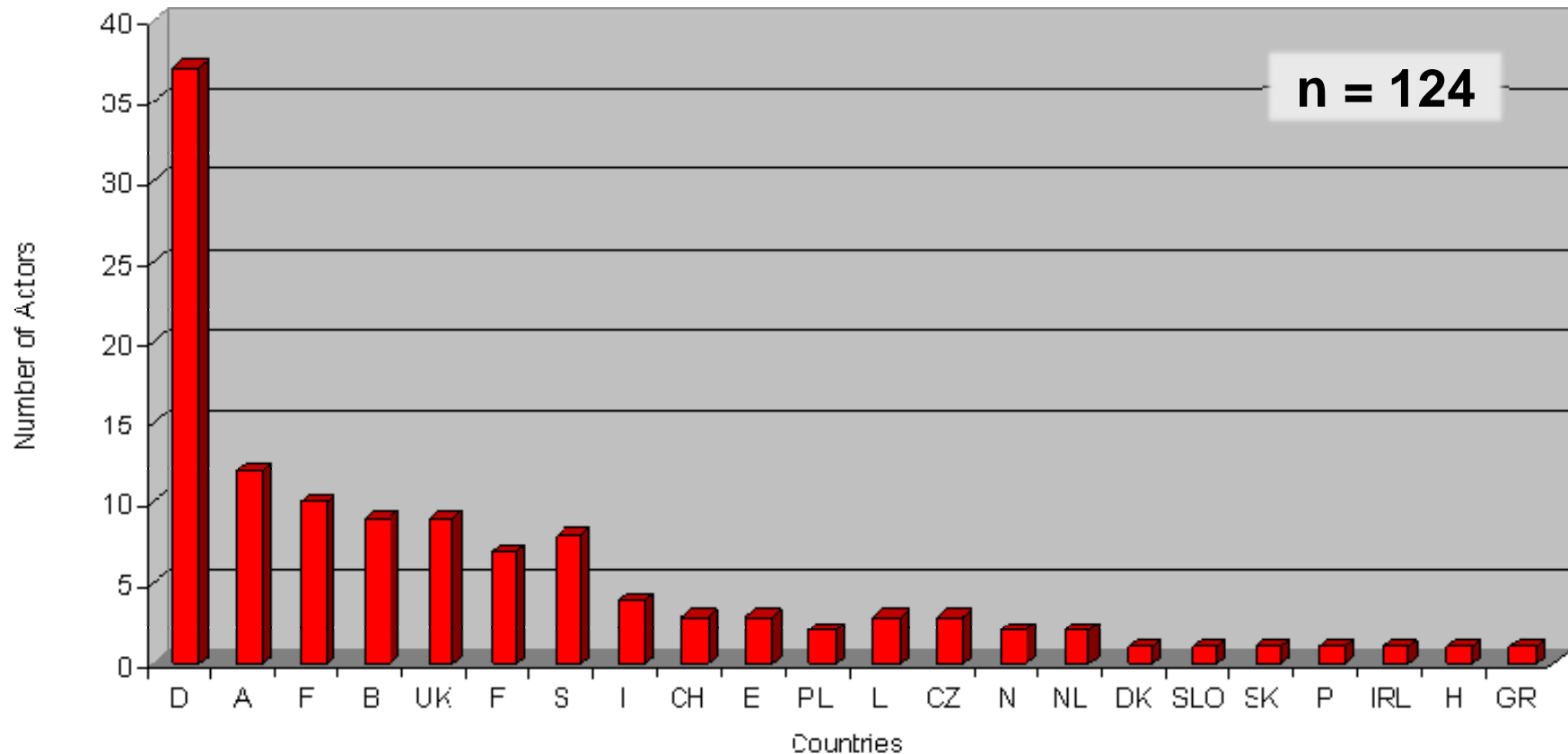
# Survey 2009

**121 European WPC companies** and **59 research institutes** in **13 countries** were approached by an email survey. An **answer rate of 18%** (19 companies and 14 R&D institutes) was achieved.

How is your company involved in the WPC business? (n=33)



# WPC-actors in Europe in 2009

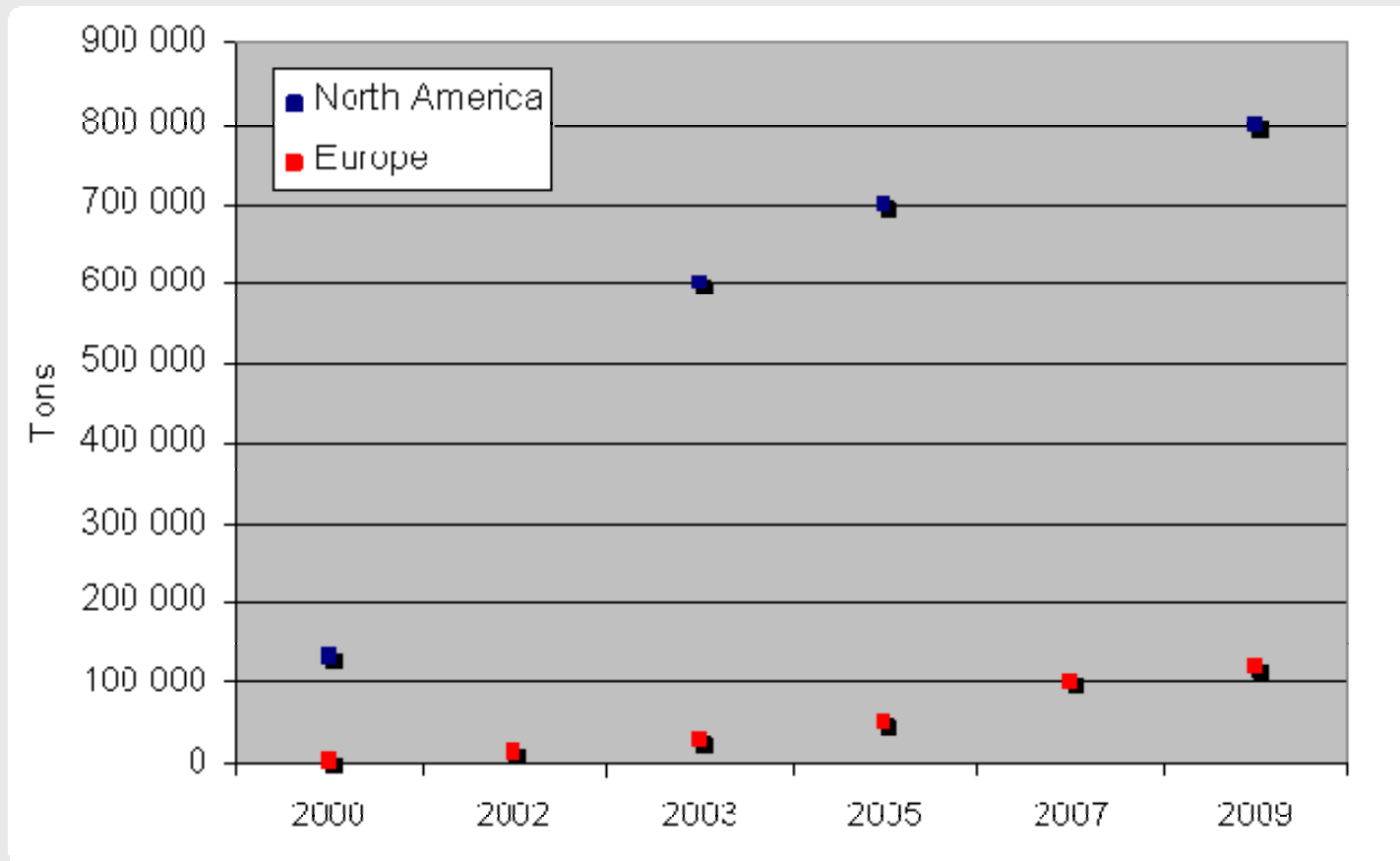


## Production figures and numbers of actors:

Germany – 30 % / Benelux – 12 % / Austria – 10 % / France – 6 %.

Scandinavia – 12 % of European actors – more tradition for decking and siding than in central Europe especially for solid wood.

# Development of WPC production 2000 - 2009



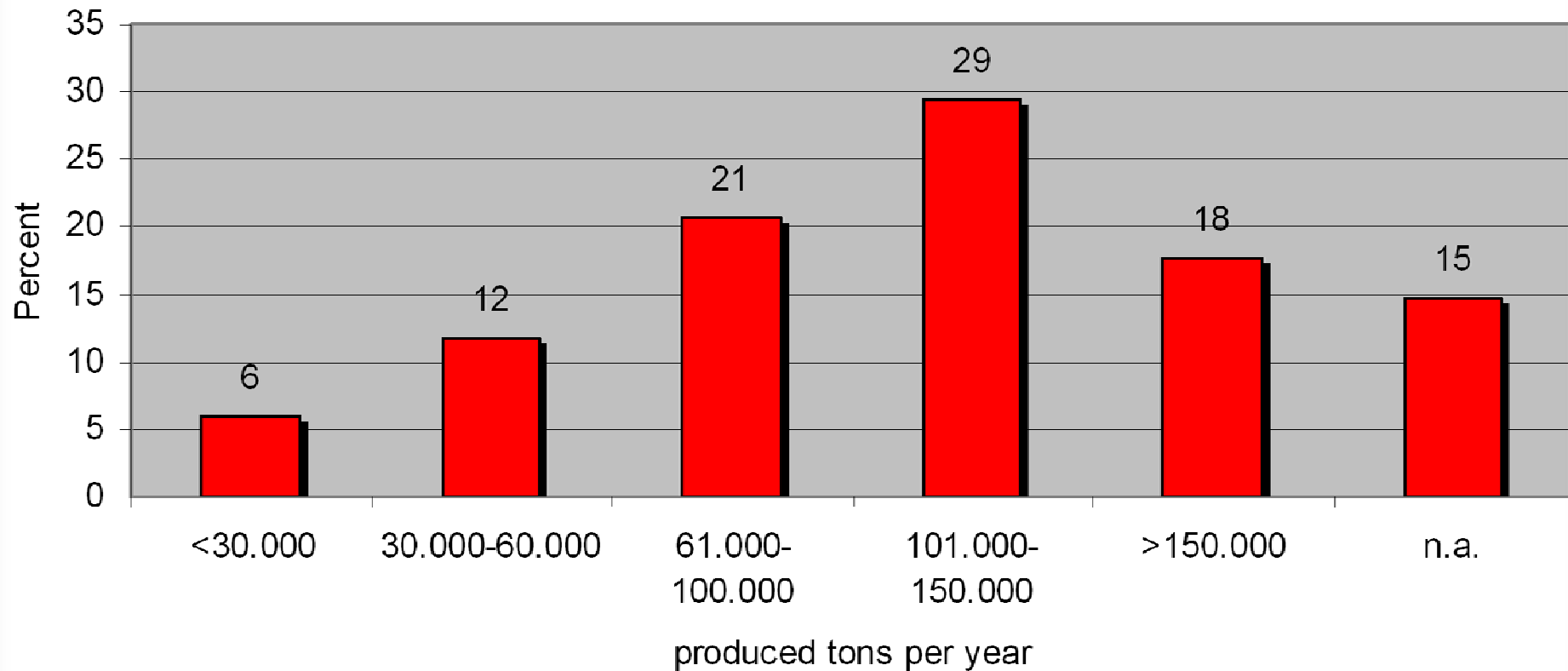
Market growth stage:  
Growth rate **North America 22 %**

Market intro stage:  
Growth rate **Europe 51 %**

**Sources:** nova, 2009; Milacron, 2009; Hackwell Group, 2006; own compilation

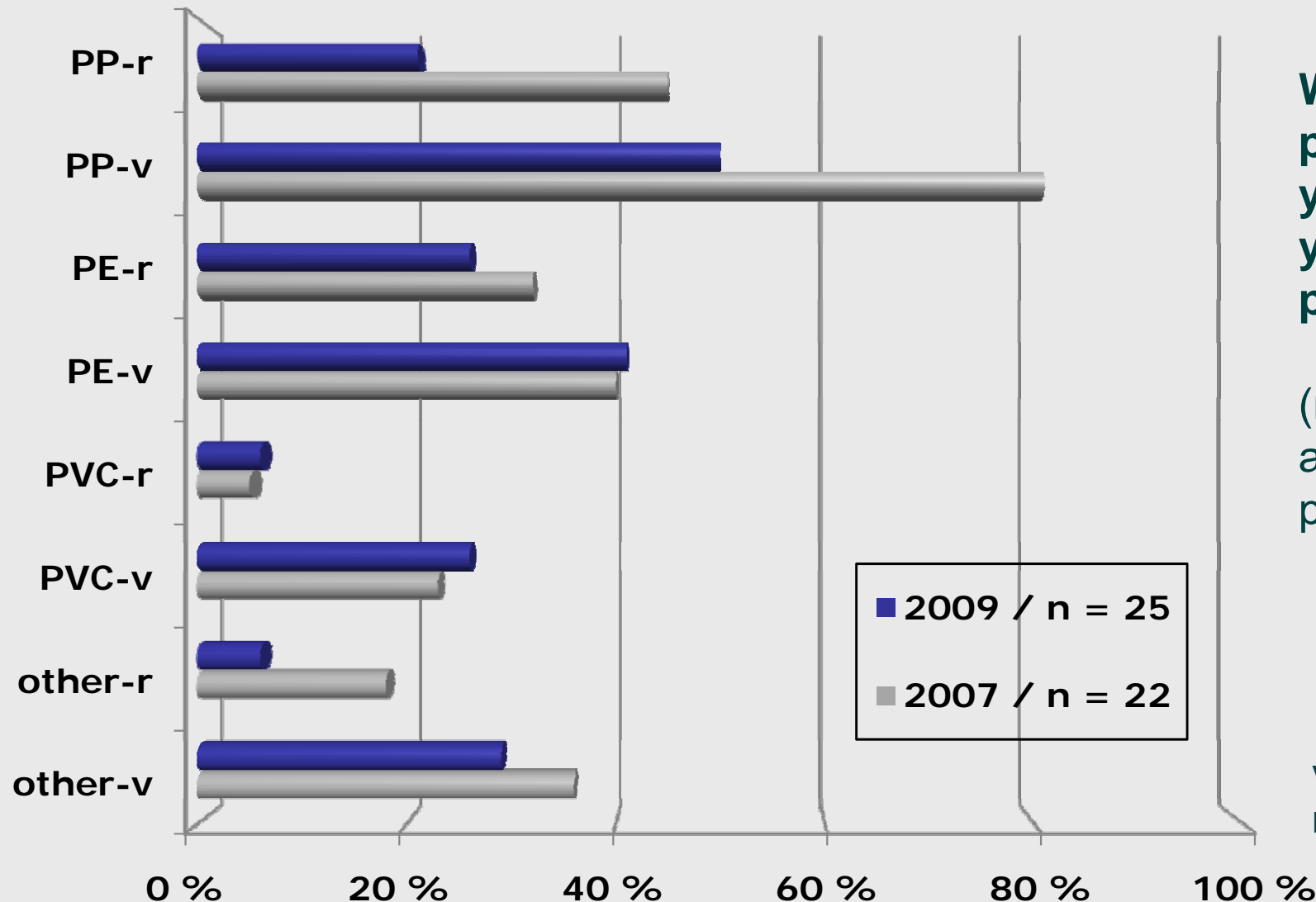
# Outlook WPC Decking in Europe

Which market volume do you think will WPC decking reach in 2015 in Europe? (n=34)





# Polymers used in 2007 / 2009

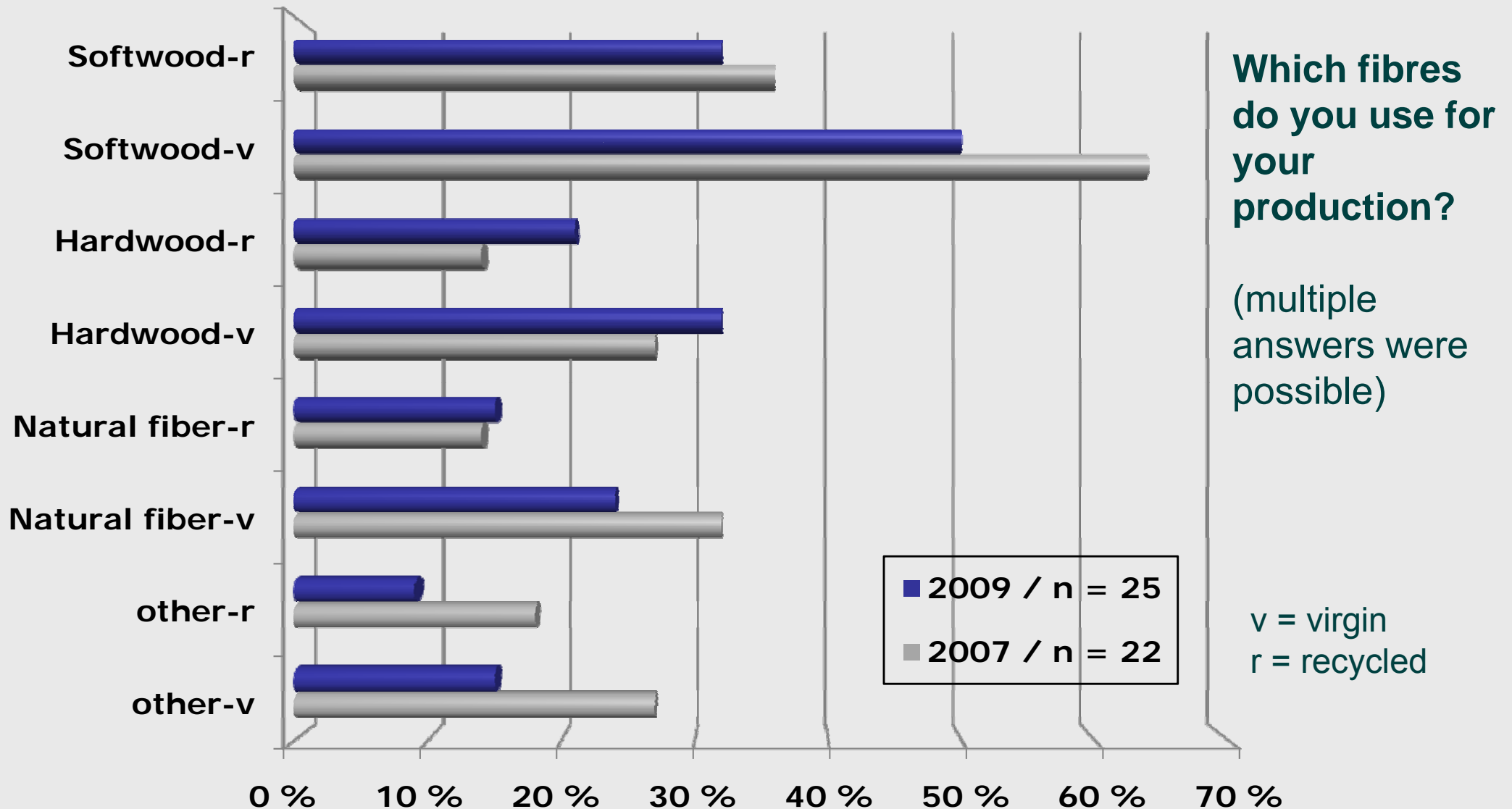


Which polymers do you use for your production?

(multiple answers were possible)

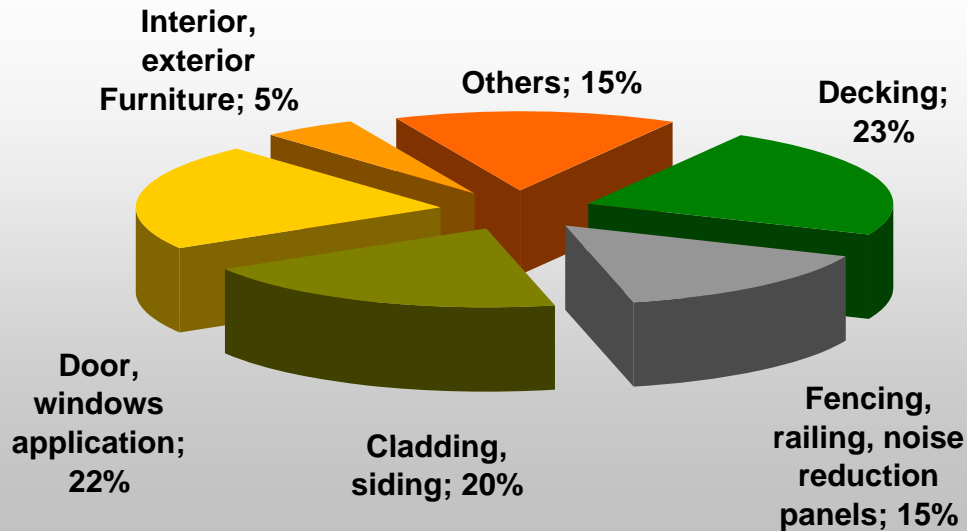
v = virgin  
r = recycled

# Natural fibres used in 2007 / 2009



# Market & Technology Development - I

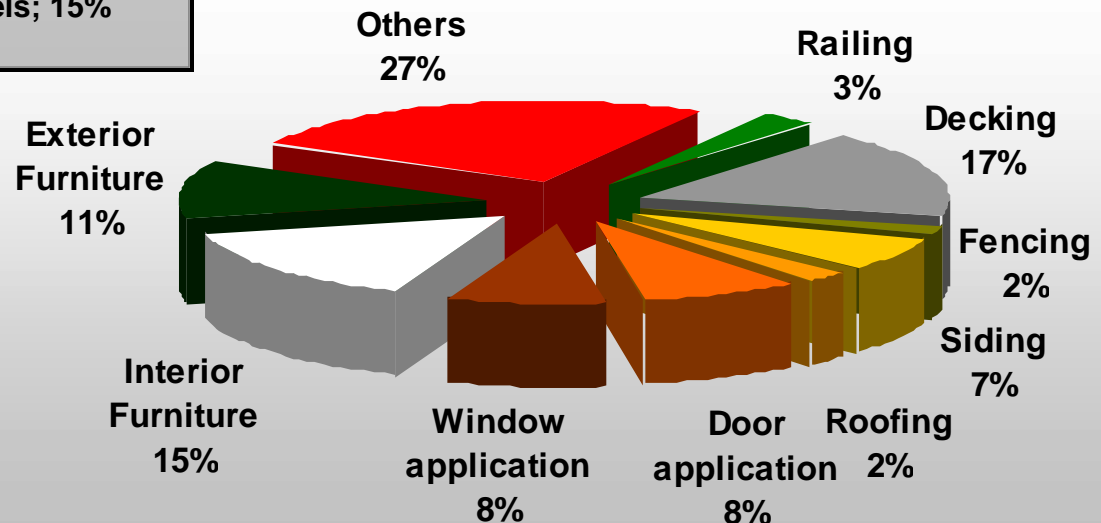
## European Applications of WPC in 2003



based on a survey of Hackwell Group in 2003, n companies = 25, Production 30,000 t

based on nova institute and own compilation, n companies = 61, n applications = 168, Production 70,000 – 100,000 t in 2007

## European Applications of WPC presented in Homepages 2008



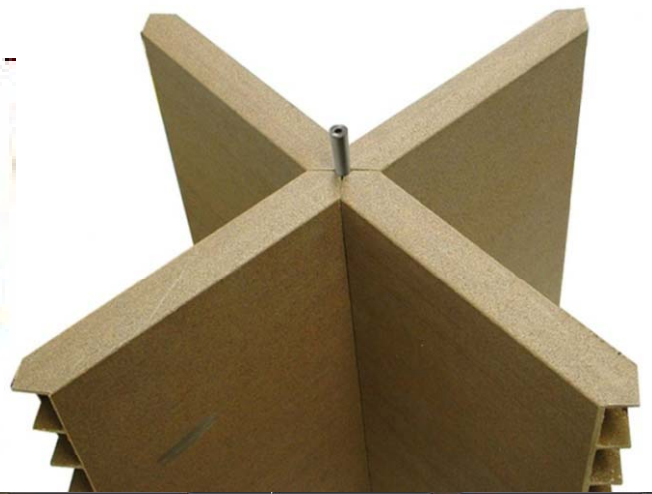
# Market & Technology Development - II



efficient  
for ecology



Werzalit, 2008



IKEA, 2008



Mehrwerk design, 2007

**Wood**  
K plus

# Market & Technology Development - WPC in exterior Furniture in Europe

There is replacement potential of wood but also of aluminum and plastics in garden furniture



**ARTEK, 10 Unit System**  
material UPM, 2010



**IKEA, 2008**

# Market & Technology Development - WPC in exterior siding

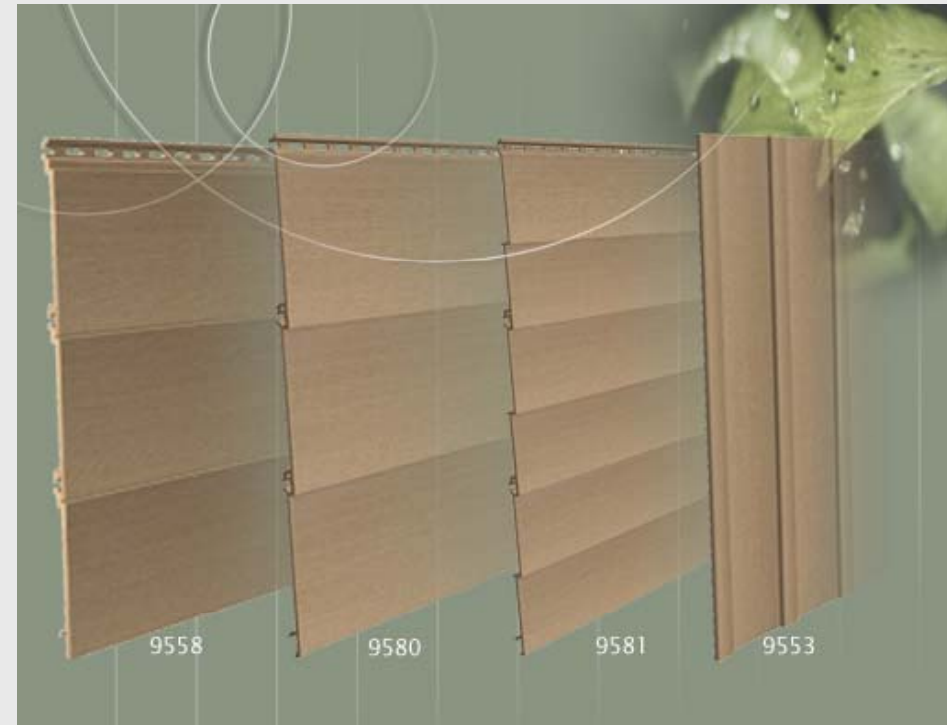


Kovalex from  
**Kosche, 2008**

Twinson-face,  
**Deceuninck, 2008**



**Tech-wood,**  
2008



# Niche Applications



Tecnaro used by Gucci, ECO PUMP, 2010



Hiendl NFC®



Karelina Composite used e.g. by Kupilka, Flaxwood and Fenron



Fasal composite used e.g. by Rödel and Babel

Babel Pico, 2010

GRENADILL-COMPOSITE  
Fa. Rödel, 2010



# European WPC Production Figures

- The European **WPC-decking** market currently amounts to about **68,000 t**, which amounts to **57 %** of the total market.
- The European **WPC-siding** market currently amounts to about **13,600 t (11 %)** and is at its **initial stage**.
- The production of **other WPC applications** amounts to about **38,400 t (32 %)**.
- **Total European Production** increased from 3,000 t up to **120,000 t** (without automotive), which means an annual **growth rate of 51 %**



# European Trends on Products & Technologies

- **Trend into decking** as a main product, all big producers produce decking although **new applications are permanent coming up**
- **Exterior siding** is also produced by all big producers
- Trend to **injection molded** products, e.g. furniture and furniture parts
- Trend to **consumer goods** and **music instruments**
- **Mainly virgin materials are used**, but trend to use of **recycled material ongoing**
- Trend to **development of own technology**, because of **expensive licenses**

# Characterization of WPC-deckings

- Why would one invest so much **research effort** in a **relatively simple product**?
  - **Despite** the interesting and promising **properties of WPC-materials**, **decking** (besides railing and fencing) is still the **only application** in which they have gained some **market penetration**

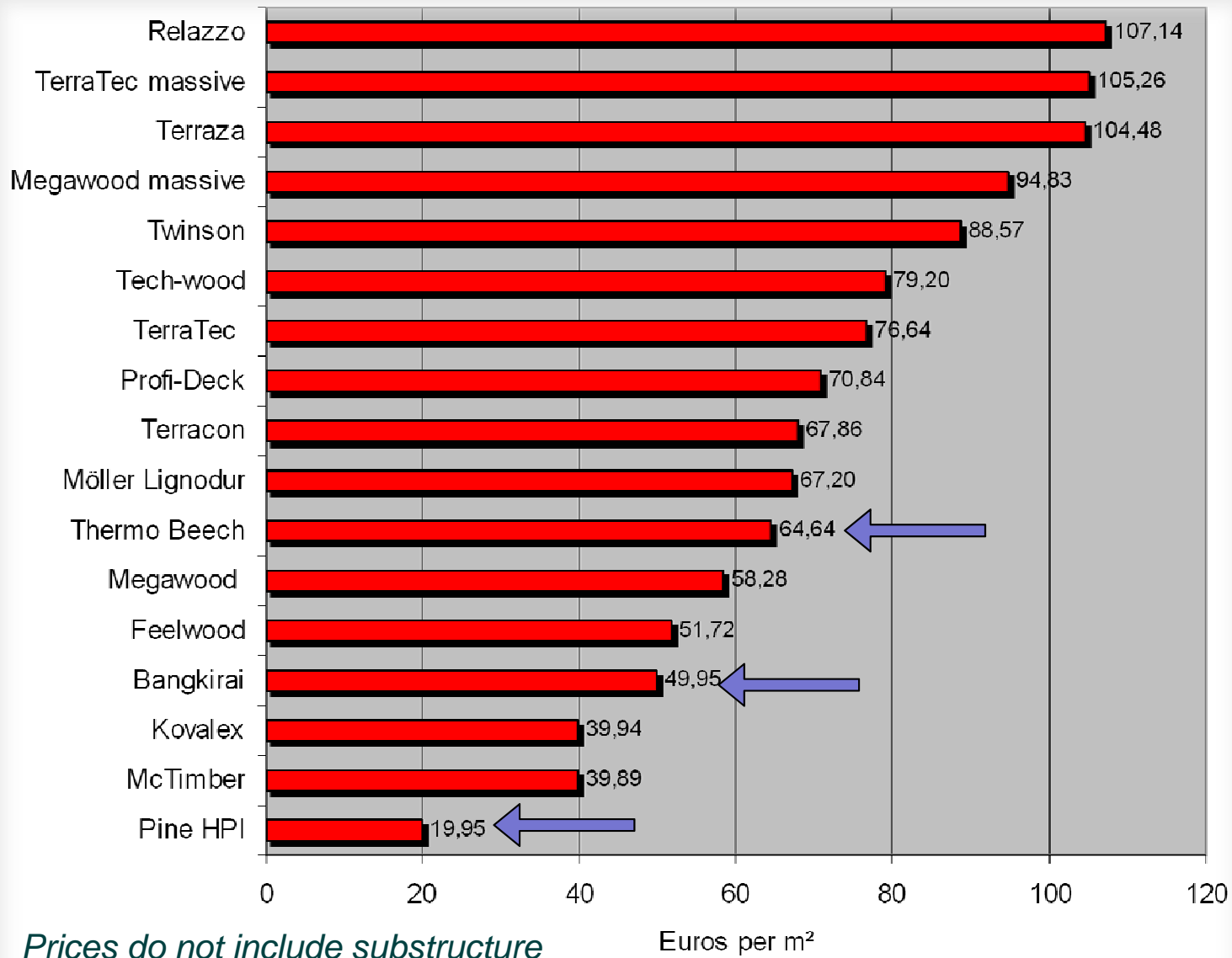
Therefore, if one wants to **know how real-world WPCs** (produced outside the lab) **perform**, one needs to **look into deckings**

# General information

- Numbers of brands and producers are permanently changing
- Autumn 2008: ~ **35 brands** from ~ **25 producers**
- WPC is a complex composite material
- Know-how is necessary for achieving good properties  
→ **a broad variance in quality has to be expected**
- Motivation for attempting a comprehensive characterization:
  - **Basis for further research**
  - **Help to avoid dissatisfying consumers with undelivered promises**
- Not all European products could be obtained – some are very difficult to get
- Consultation generally insufficient



# Prices of WPC in 2009



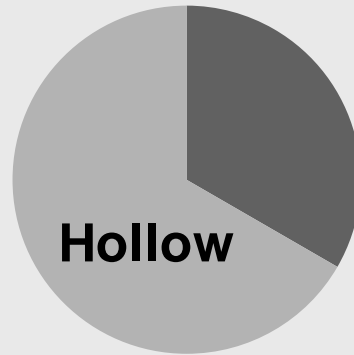
WPC are quite  
expensive



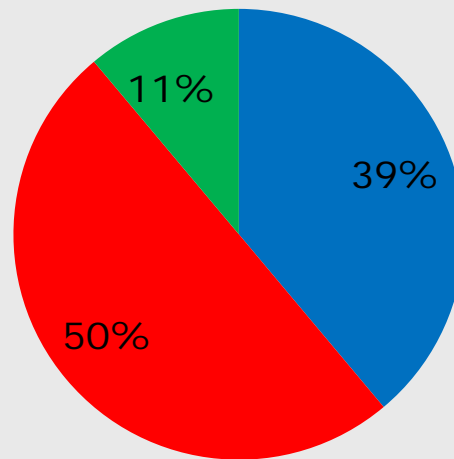
Customers will  
expect better  
properties !

# Composition - Geometry

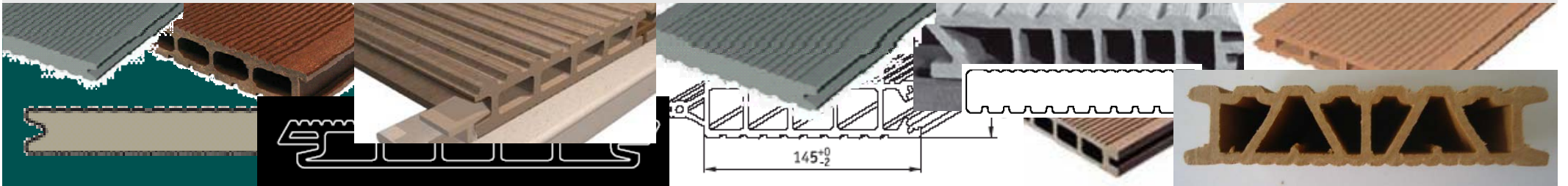
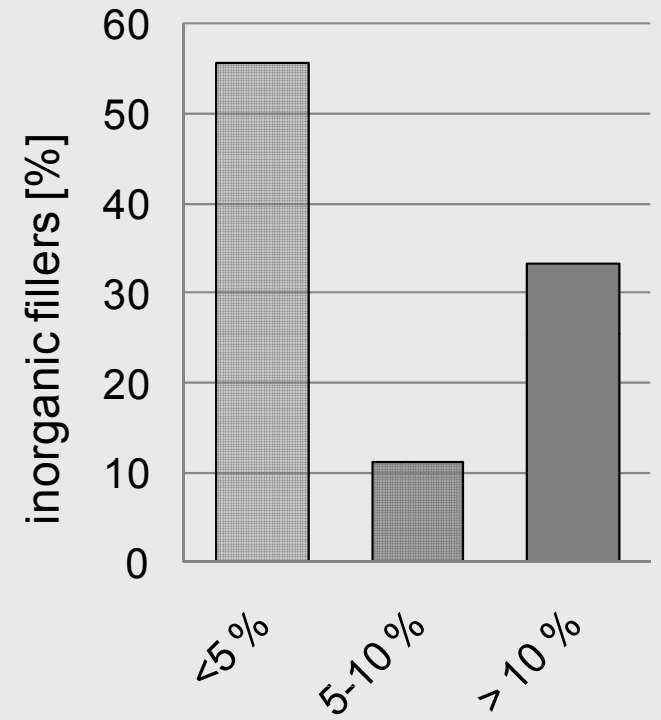
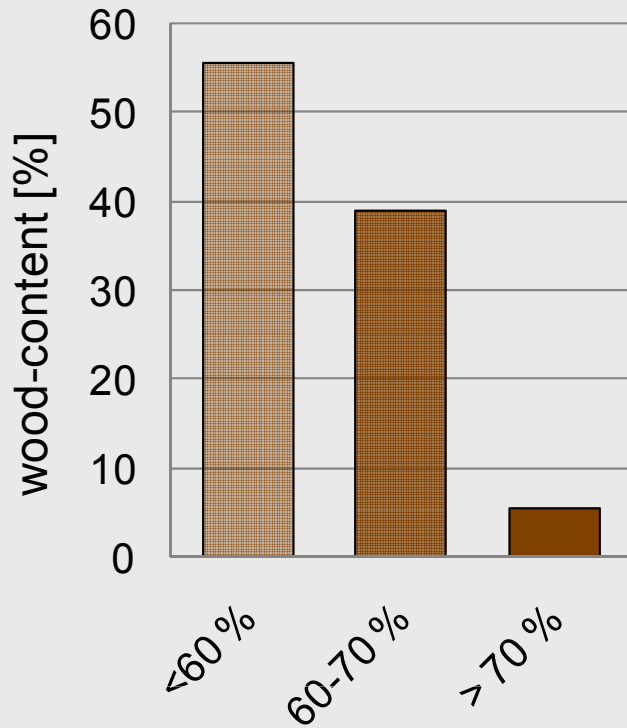
## Geometry



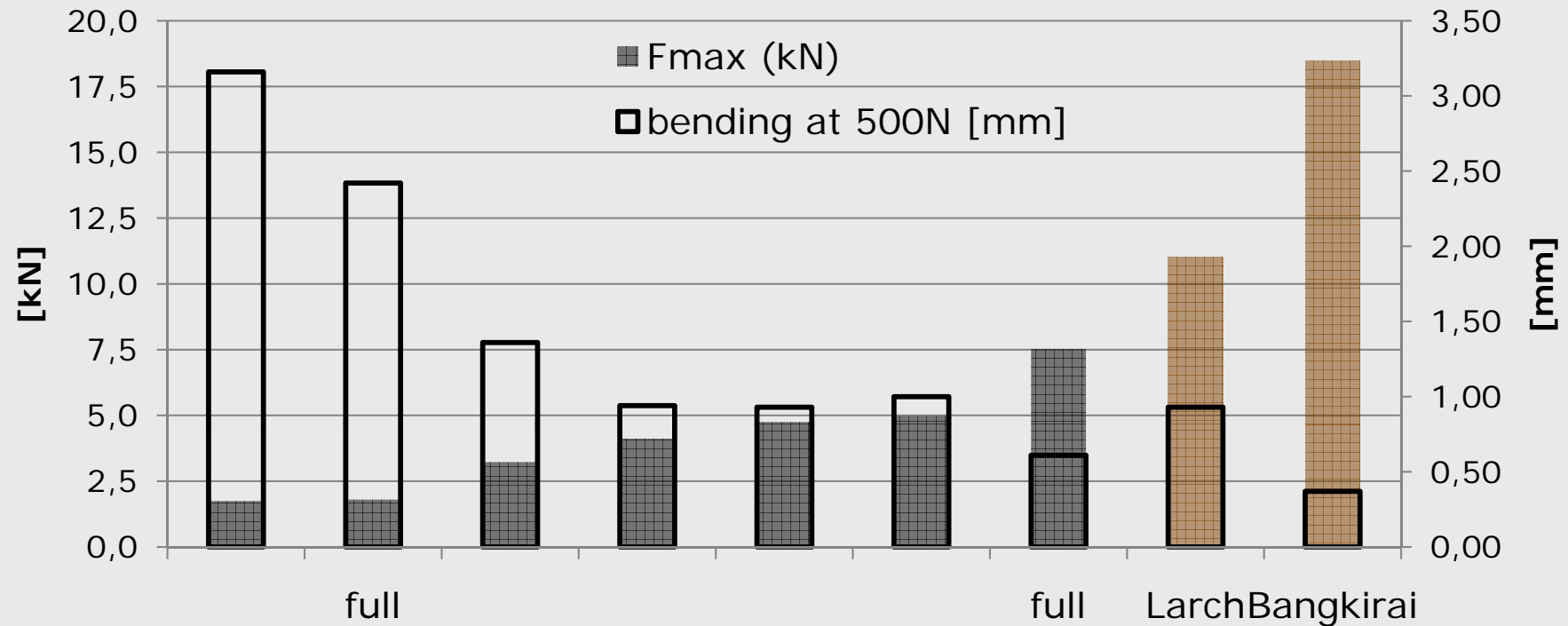
## Polymer-Type



■ PE ■ PP ■ PVC



# Component Fmax - bending



- Some of the deckings show **very high bending at only 500 N** → narrow-stepped support necessary
- As expected, bending is inv. proportional to  $F_{\max}$

# Xenon weathering

0 h

500 h

1000 h



- Xenon testing (1500 h) as **artificial weathering**
- Pictures taken before, and after 500 and 1000 h
- Total colour change less suitable to describe ageing than **Lightness**  
→ some deckings get lighter, some darker

# Advantages of WPC ...

**... for the customers (“end user”) – no ranking**

**do not splinter**

**do not warp**

**low maintenance**

**high dimensional stability**

**good weather resistance**

**good UV-resistance**

**free design and colors**

**simple to clean**

.....

**made from wood**

Open discussions are running in many diverse forums in the internet →

find topics for marketing and R&D and how to target the customers!!!

(key words i.e.: “wpc” “splitterfrei”)



# Market research: Multi-client Studies

## Consumer Perceptions of WPC Fencing, 2004

|                |                       |
|----------------|-----------------------|
| ++ durable     | + “warm”              |
| ++ innovative  | - expensive           |
| ++ comfortable | +/- elegant/exclusive |
| +/- natural    |                       |

## Several statements at forums, 2010

covers at end of profiles - circular cut-outs problematic

break through / hollow profiles

touch and feeling of “plastic”

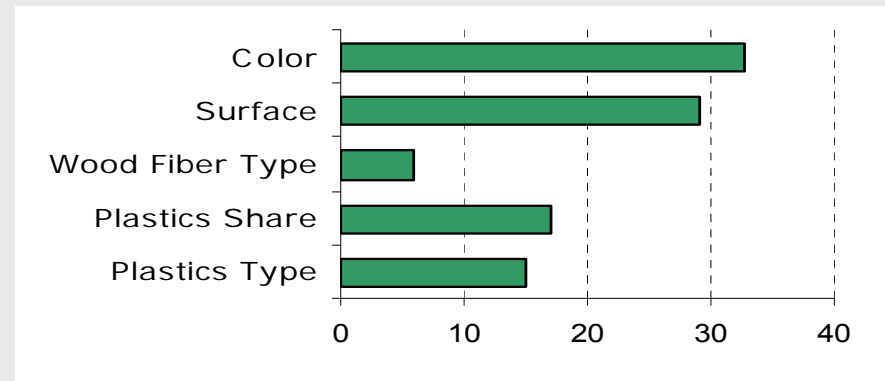
warming of the surface

do not splinter

consultation

price .....

## Consumer Perceptions on WPC Decking, 2004



Importance of WPC decking attributes in % (Conjoint Analysis)



# Conclusions – applications / outdoor

- Complex composite material → **Broad range of performances**
- High prices → need to deliver some **outstanding properties**
  - Point out the advantages !!!
- Wood is still superior for most mechanical properties
- **High weight**, especially of full profiles, **might be a disadvantage** for consumers
- **Low HDT-A** of some products **might be problematic** in the summer
- WPC show very **low water absorption** → should alleviate microbial decay
- Judged by OIT/Xenon results, **some deckings might not last long enough** → however, correlation with outdoor weathering trials necessary!

# Conclusions - market

- At the moment, marketing is taking place at a low level, although European public is very cautious toward new materials.
  - ↳ **Large WPC producers could change this through joint marketing activities!**
  - ↳ **WPC is far too unknown among the decision makers as well as the end consumers.**
- The wood-working as well as the polymer industry lack adequate knowledge about the use of WPC (wood or plastic side) and vice versa.
  - ↳ **Suitable Information is needed!**
- The prices of WPC licenses are high, and the alternative is to develop own recipes. Investments in product development should increase. Cooperating with different disciplines and companies is an appropriate tool for successful product development.
  - ↳ **Cooperate or loose!!!**

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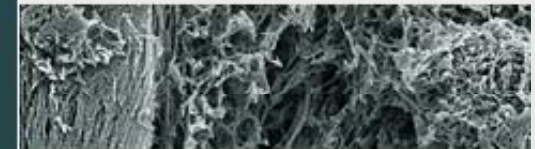
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Market Analysis & Innovation Research

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