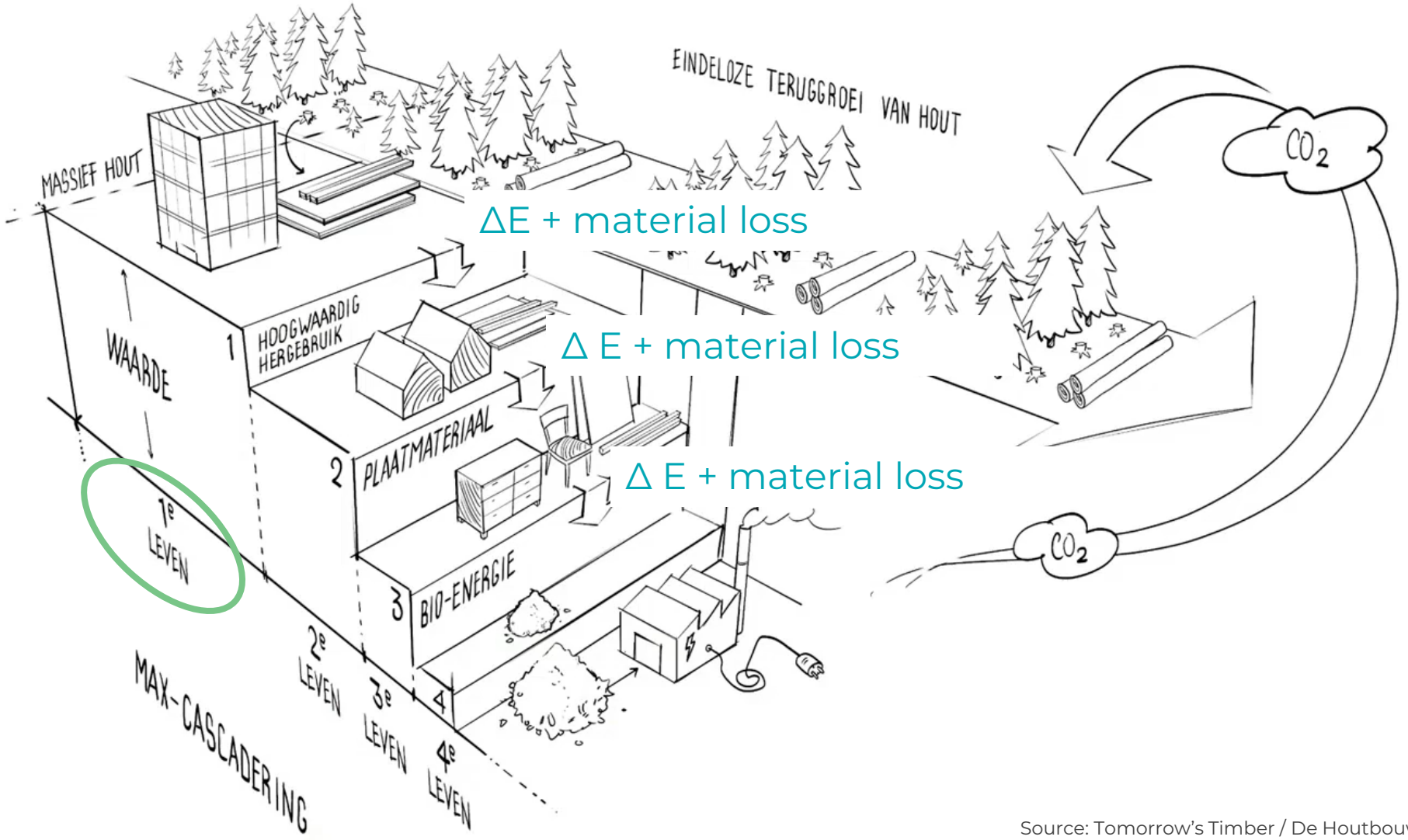
WOOD.BE

Thermally treated wood - Innovations

11th International Hardwood Conference,
Antwerp, 06/11/2026

Imke De Windt

Extending service life



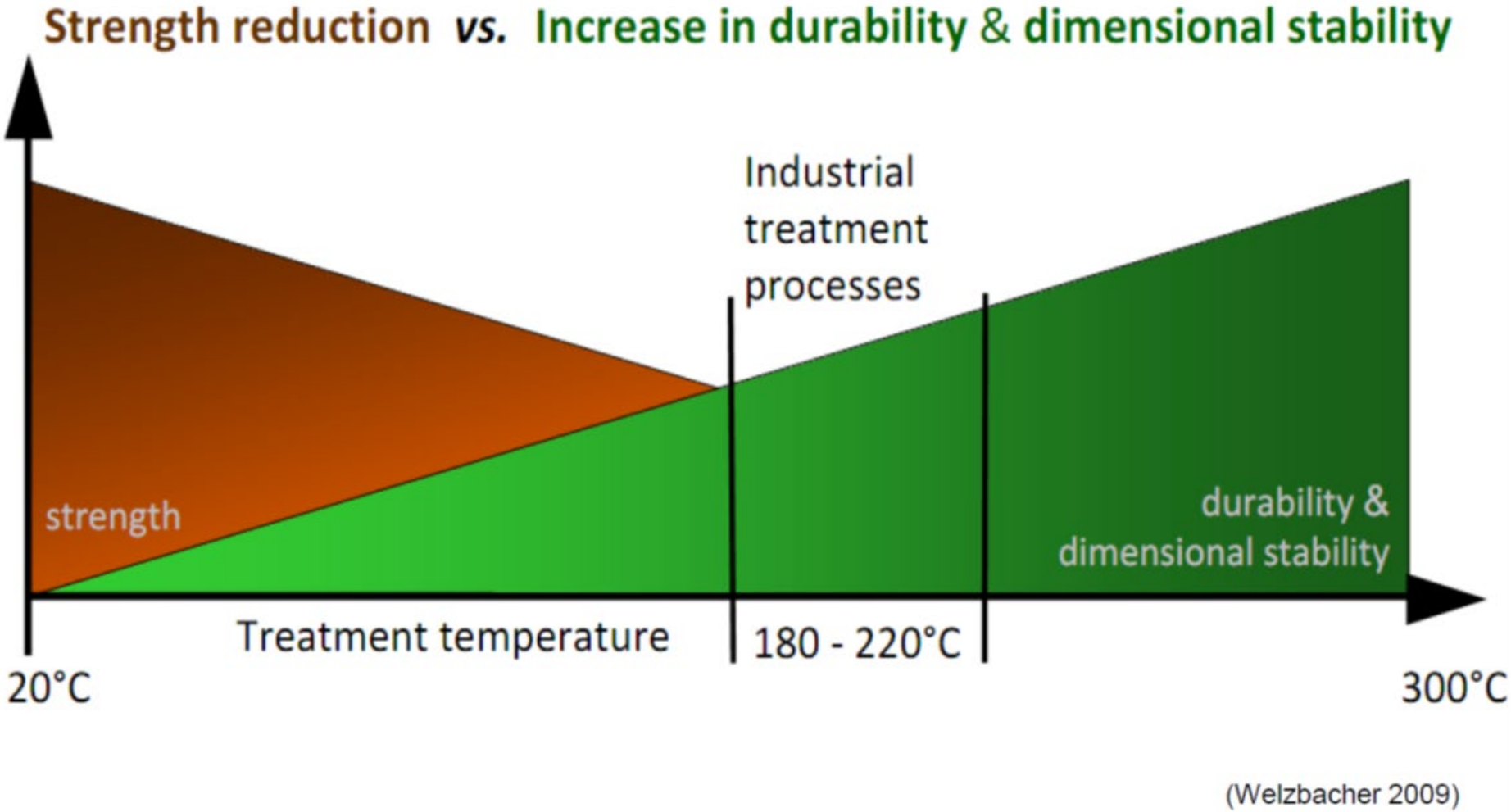
Source: Tomorrow's Timber / De Houtbouw revolutie
Pablo van der Lugt

Wood Modification

Callum Hill (2006)

Wood modification involves the action of a chemical, biological or physical agent upon the material resulting in a ***desired property enhancement*** *during the service life of the modified wood. The modified wood should itself be* ***non-toxic*** *under service conditions and, furthermore, there should be* ***no release of any toxic substances*** *during service, or at end of life following disposal or recycling of the modified wood. If the modification is intended for improved resistance to biological attack, then the* ***mode of action shall be non-biocidal****.*

Thermally Modified Timber
Finding the Optimum…



(Welzbacher 2009)

Unlocking the Potential of Ash *(Fraxinus excelsior)*



From non-durable hardwood to durable window frames

- Improved durability and dimensional stability
- Compatible with gluing, coating and industrial processing
- Full-scale window frame successfully produced

(Project “Bois Modifié Thermiquement” carried out in collaboration with Buildwise, funded by Fillière Bois Wallonie)

Benefits and Trade-offs…

Parameter	Relative difference
EMC @20°C-30%RH	**71 %**
EMC @20°C-65%RH	**67 %**
EMC @20°C-90%RH	**65 %**
Dry density	**Mass loss = 8.8 ± 4.3 %**
Maximal swelling	**ASE = 68 ± 5.5 %**
Durability	+3 classes durability
Color	ΔE* = 46.6 ± 2.9
Janka hardness	**-23.2 ± 10.0%**
Cleavage resistance	**-62.0 ± 6.0%**
MOE	No difference
MOR	**-42.4 ± 17.7%**
Screw withdrawal resistance	-18 ± 17%
Thermal Conductivity (λ)	-24%

Benefits for window frames

- Enhanced durability
- Enhanced dimensional stability
- Lower moisture uptake
- Improved thermal insulation

At the expense of mechanical performance:

- Lower bending strength
- Lower cleavage resistance
- Reduced hardness

Unlocking the Potential of Frake *(Terminalia superba)*



Initially



After ca. 12 months

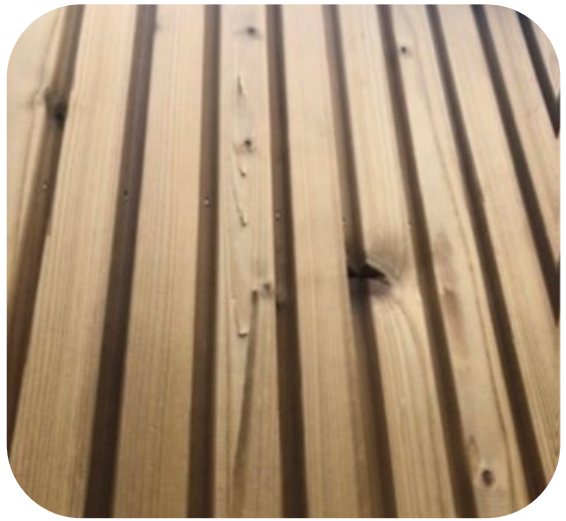
From non-durable hardwood to durable decking

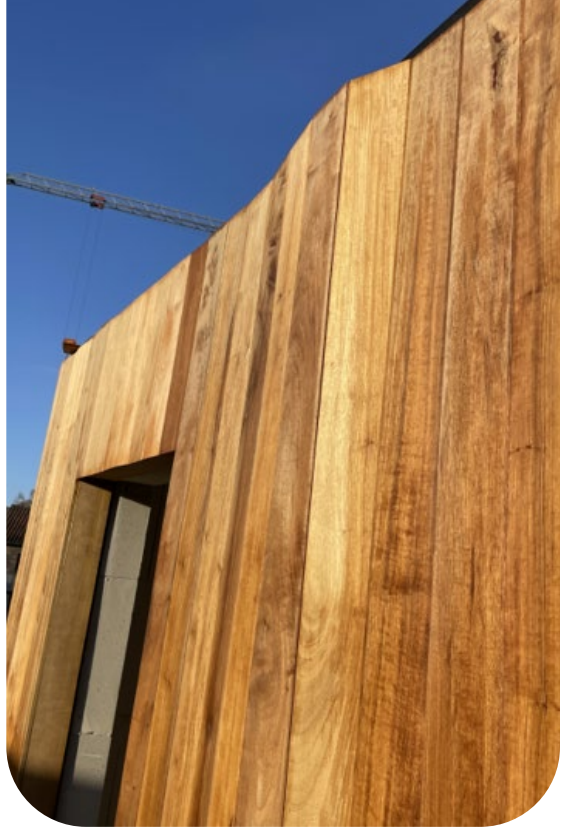
- Enhanced durability (DC2)
- Improved dimensional stability
- Good machinability and processability
- Uniform weathering behaviour
- Demonstrated in full-scale decking applications

(Project “ThermoFit”, funded by the Belgian Federal Public Service - Economy)

Predictable Performance?

Successful applications require predictable material performance.









Controlling Treatment Intensity

TD208 = Thermal dose above 208°C (temperature + time)

Core-temperature controlled steam process

- Consistent thermal dose between batches
- High batch-to-batch reproducibility

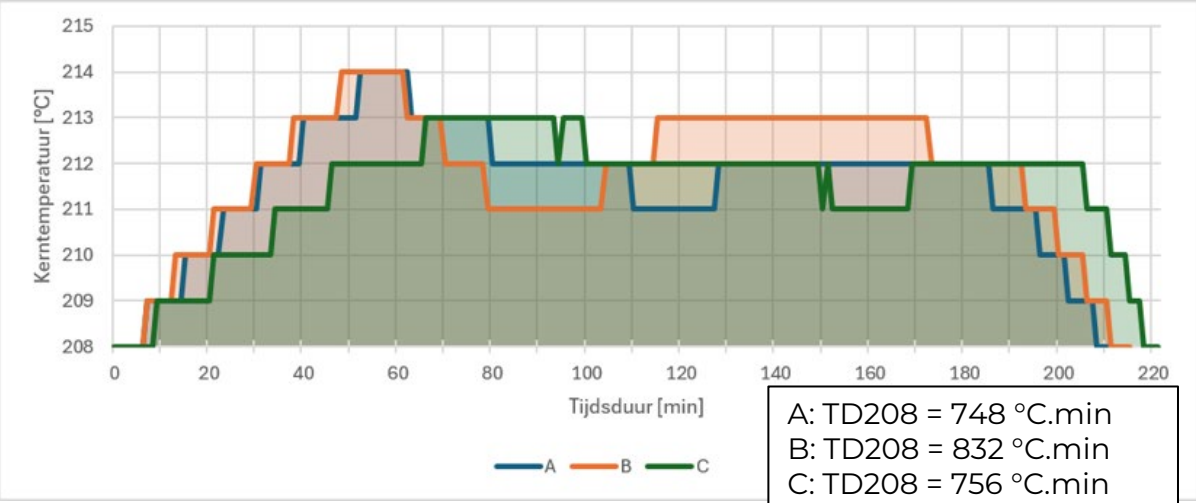
➔ Biological durability: predominantly DC1-2

Environment-temperature controlled vacuum process

- Larger variation in thermal dose
- Lower batch-to-batch reproducibility

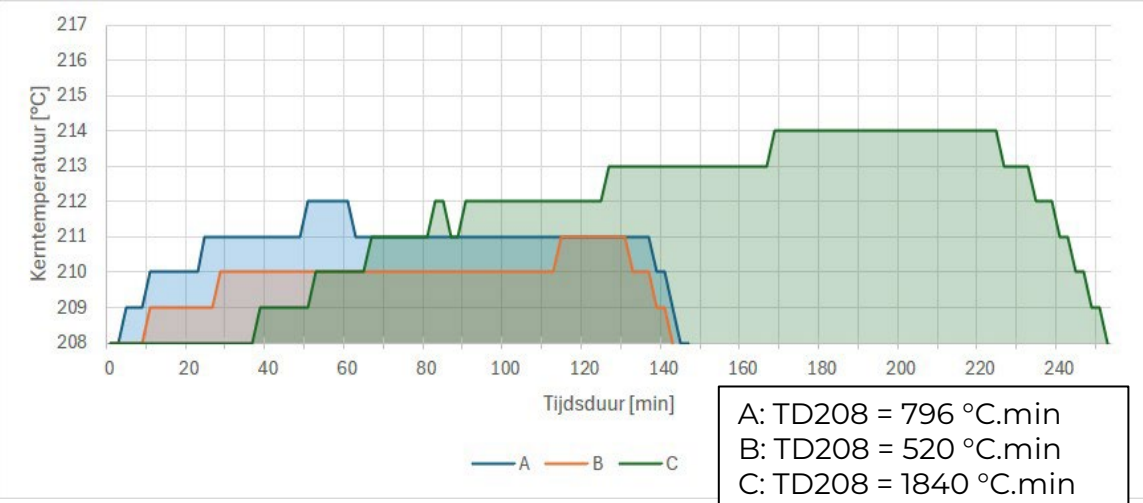
➔ Biological durability: DC1-4

Open system - saturated steam



A: TD208 = 748 °C.min
B: TD208 = 832 °C.min
C: TD208 = 756 °C.min

Closed system - vacuum



A: TD208 = 796 °C.min
B: TD208 = 520 °C.min
C: TD208 = 1840 °C.min

The opportunity is clear

More value from more wood species.

The challenge remains

Delivering performance as consistently as the promise.

Thank you for your attention !

www.wood.be | imke@wood.be | +32475444512