Ongoing R&D projects in COST member countries

January 2014

COST FP1303: Performance of bio-based building materials

Norway

January 2014

Norwegian Insititute of Wood Technology

Norwegian Forest and Landscape Institute

Norwegian University of Life Sciences

SINTEF Byggforsk (Building & Infrastructure)

Mycoteam AS

Paper and Fiber Research Institute

Norway
Research institute

January 2014

Norwegian Institute of Wood Technology (Treteknisk)

WEEE
Wood – Energy Emissions Experience

KLIMATRE
-TREBRUK FOR BEDRE KLIMA OG ØKT VERDISKAPING

<u>WEEE (Wood – Energy Environment Experience)</u>

- Energy- and moisture buffering capacity of wood
- Emissions from wood
- Consumer perception

<u>Innovative wooden building materials - climate change and improved service life</u>

- Consumers esthetical expectation towards wooden terrace boards and cladding
- Field trial established to assess esthetic properties of different products
- Aim: determine critical climatic conditions for development of staining fungi

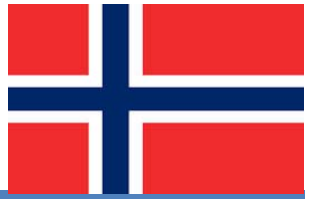
<u>KlimaTre (Utilization of wood to improve climate and added value)</u>

- Documentation of environmental and economical role of forest based value in Norway
- Assess environmental impact of wooden constructions, derive improvements (LCA, EPD…)

Treteknisk

Norway
Research institute

January 2014



Norwegian Forest and Landscape Institute (NFLI) (project partners in brackets)

WOOD/BE/BETTER - Increased use of wood in urban areas (UMB, AHO, OSU et al.)

- Overall aim: produce and publicise knowledge that will facilitate increased use of wood in buildings in urban areas

DURAWOOD - Superior bio-friendly systems for enhanced wood durability (Uni Poznan)

- Overall aim: develop sustainable, durable and eco-friendly systems as alternative to traditional systems

KlimaTre - Utilization of wood to improve climate and added value (Treteknisk, PFI, UMB et al.)

Wood surface protection by wood modification systems under different climatic conditions (Uni Göttingen)

- Overall aim: to investigate the behavior of modified wood surfaces under different climatic conditions in mid- and northern Europe

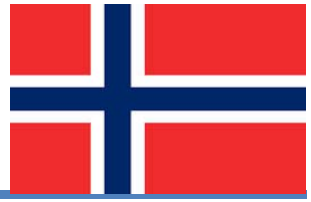
Natural durability of Norwegian wood species – long term field testing (Treteknisk)

- Aim: determine the durability of Norwegian species in and above ground

skog+ landskap

Norway
Research institute

January 2014



Norwegian Forest and Landscape Institute (NFLI)

Decay mechanisms – effects of wood modification and climate

- Aim: obtain information about the protection mode of modified wood and to reveal the biochemical mechanisms utilized by decay fungi upon wood decomposition following climatic changes and changes in process parameters of modified wood

Detection of mould and blue stain fungi on coated and uncoated wood (UMB)

- Aim: Identify and quantify mould and blue stain fungi on coated/uncoated wood using hyperspectral skanner

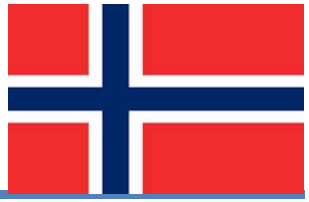
LCA - as a tool to analyze climatic and environmental effects of forest managment, management of area resources and use of wood

Past projects: WoodBuild, WoodExter, Enhanced service life for coated wooden facades, ClimateLife, Mould growth on surface coated wood, Mould growth on wooden facades and more

skog+ landskap

Norway
Uni

January 2014



Norwegian University of Life Sciences (NMBU)

Partner in WoodBeBetter, together with Norwegian Forest and Landscape Institute and Oslo School of Architecture

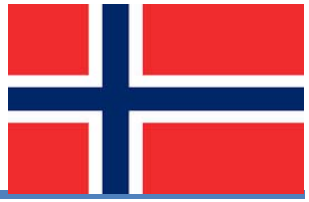
- Wooden architecture
- Wood structures
- Performance of wooden building materials

Partner in WEEE (Wood – Energy Environment Experience) together with Norwegian Institute of Wood Technology

Norwegian University of Life Sciences

Norway
Research institute

January 2014



SINTEF Building and Infrastructure (SBI)

Tall Facades, 3 year research project in the Wood Wisdom programme, TU Munich coordinator - The main objective of the project is to facilitate the confident design of durable and therefore cost-effective solutions for tall timber facades. A risk based design concept for wooden facades is developed from existing computational fluid dynamics models for wind driven rain, coupled with heat and moisture (HAM) transport models and mold- and fungi development models. In addition, a simplified semi-probabilistic design framework is developed that enables easy utilization of the results of this project by practitioners.

Wood Fiber based insulation materials, R&D project for a Norwegian Company on the use of wood fiber based insulation materials in nordic/cold climate with focus on building physics, fire regulations, and environmental evaluation.

Fire regulations for cross laminated timer elements, pre project, industry project.

SINTEF

Norway
Company

January 2014

Mycoteam AS (MT)

Advisory firm with focus on:

- biological damage in building structures
- water / moisture damage in buildings
- damage by insects
- interior climate
- product testing

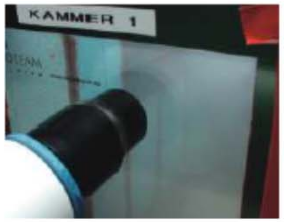
Environment A:
Fungus growth on plaster boards in ceiling.

Environment B:
Fungus growth in coating membrane from bathroom.

Environment C:
Growth of mould on cladding.

Each chamber can take 20 sampels, and MYCOTEAM has capacity for testing 120 samples at each run.

The materials are placed in a separate assembly frame and applied whit a suitable suspension. of fugus spores. The sample have a size of 150x70x20 ± 2 mm, which corresponds with European standard (CEN 2000)

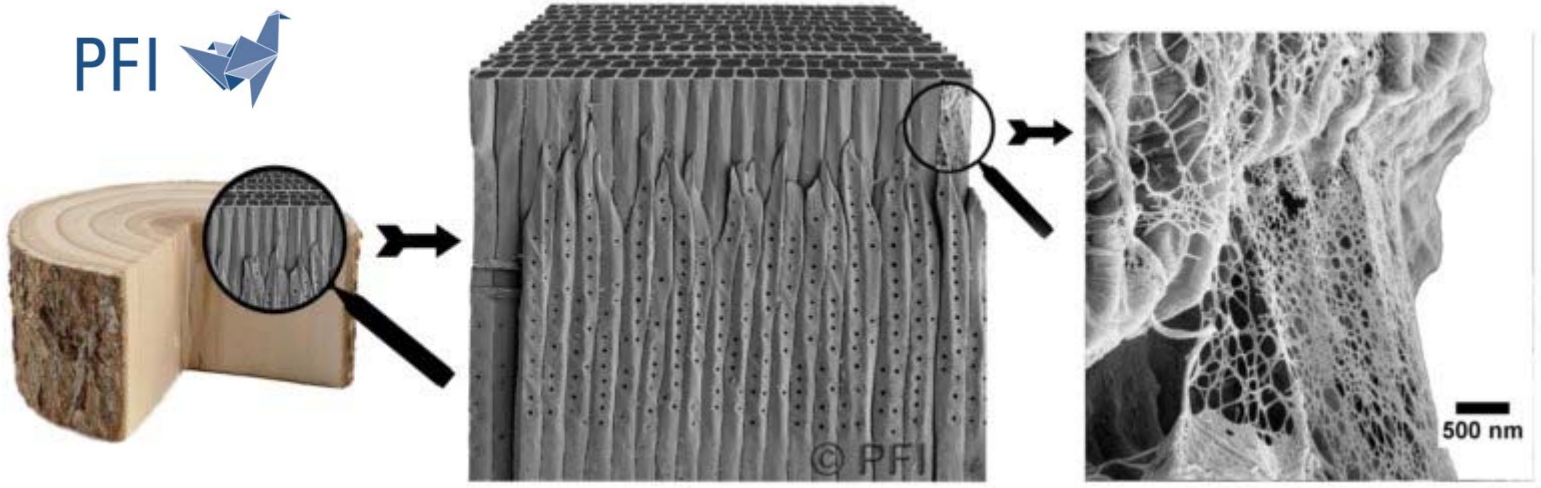


MYCOTEAMs moisture and fungus chamber has a computer controlled application of moisture. The camber can be set to time intervals or to given marginal values in the test material.

The samples are analysed using magnifying glass and microscope. Qualitative and quantitative determination of fungus is performed.

MYCOTEAM

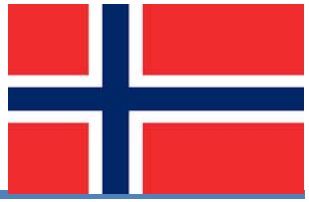
- PFI has developed a series of techniques for characterising fibrous structures
  - Wood, Pulp fibres, Nanocellulose
  - This includes e.g.: FESEM, X-μCT, light microscopy



Wood Fibre Nanocellulose

Specialist equipment

January 2014

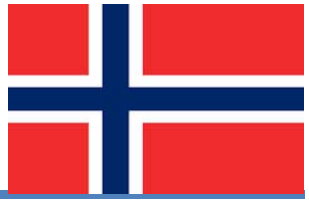


Device	Location
QUV-chamber/ Atlas UVtest (accelerated weathering)	Treteknisk; NFLI; SBI
Spectrophotometer, Gloss meter	Treteknisk
Data logger moisture measurement	Treteknisk; NFLI
Outdoor test field	Treteknisk; NFLI; NMBU
Pilot scale scientific impregnation plant	Treteknisk; NFLI
Bomb calorimetry for energy measurements	NFLI
FT-IR, FT-NIR, HPLC	NFLI
TGA, ICP, STA-GCMS*	NFLI
Real-time PCR, ION Torrent (gene expression)	NFLI
Nuclear magnetic resonance (NMR)	NFLI

*Simultaneous thermal analysis with gas analyses with Gas chromatography-mass spectroscopy and Fourier transform infrared spectroscopy

Specialist equipment

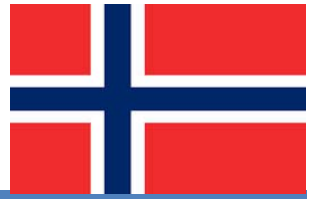
January 2014



Device	Location
Access to CLSM, SEM, TEM, EDX	NFLI
Hyper spectral imaging camera	NMBU
Large scale weathering equipment (sample size 3x3m) wind driven rain, solar radiation, temperature and RH)	SIB
DigiEye (Color measurement and digital image analysis)	SIB
Climate chambers (coop with NTNU), building physics	SIB; NTNU
MYCOLOG chamber (testing products for mould susceptibility under various climates)	MT
Load cells	Treteknisk

Specialist equipment

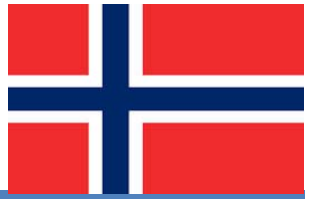
January 2014



Device	Location
MOISTUREIog (monitoring and documenting moisture behaviour of products)	MT
GC, HPLC, GC/MS, PY-GC/MS, ATD-GC/MS, FTIR, SEM, X-μCT	PFI

Specialist equipment

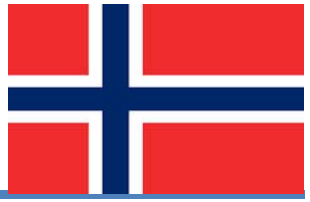
January 2014



INSTITUTE	Properties						Environmental				
	Natural Durability	Moisture / sorption studies	Resistance to mould	Fire resistance / reaction to fire	Insect /termites / pests	Dimensional stability	Life Cycle Assessments	Whole Life evaluations	Product accreditation	Emission testing	Environmental Product Declaration (EPD)
Treteknisk						X	X	X		X	X
NFLI	X	X	X	X		X	X	X			
NMBU		X	X								
SBI	X	X	X		X	X	X	X	X	X	x
MT	X		X								

Specialist equipment

January 2014



INSTITUTE	Laboratory tests						Field tests				
	Natural Durability	Mould resistance	Insect /termite testing	Leaching / weathering	Sorption studies	Dimensional stability	In ground contact tests	Out of ground contact tests	Natural weathering	Surface performance / coatings	Moisture data logging
Treteknisk				X		X	X	X	X	X	X
NFLI	X	X		X	X	X	X	X	X	X	X
NMBU									X	X	X
SBI		X		X	X	X			X	X	X
MT	X	X						X		X	X