



Framework for smart condition reassessment of **Reclaimed Timber** to **eXtend** the service life of long-lived wood products using non-destructive testing and automated data postprocessing.

ForestValue2



ZAVOD ZA
GRADBENIŠTVO
SLOVENIJE

SLOVENIAN
NATIONAL BUILDING
AND CIVIL ENGINEERING
INSTITUTE



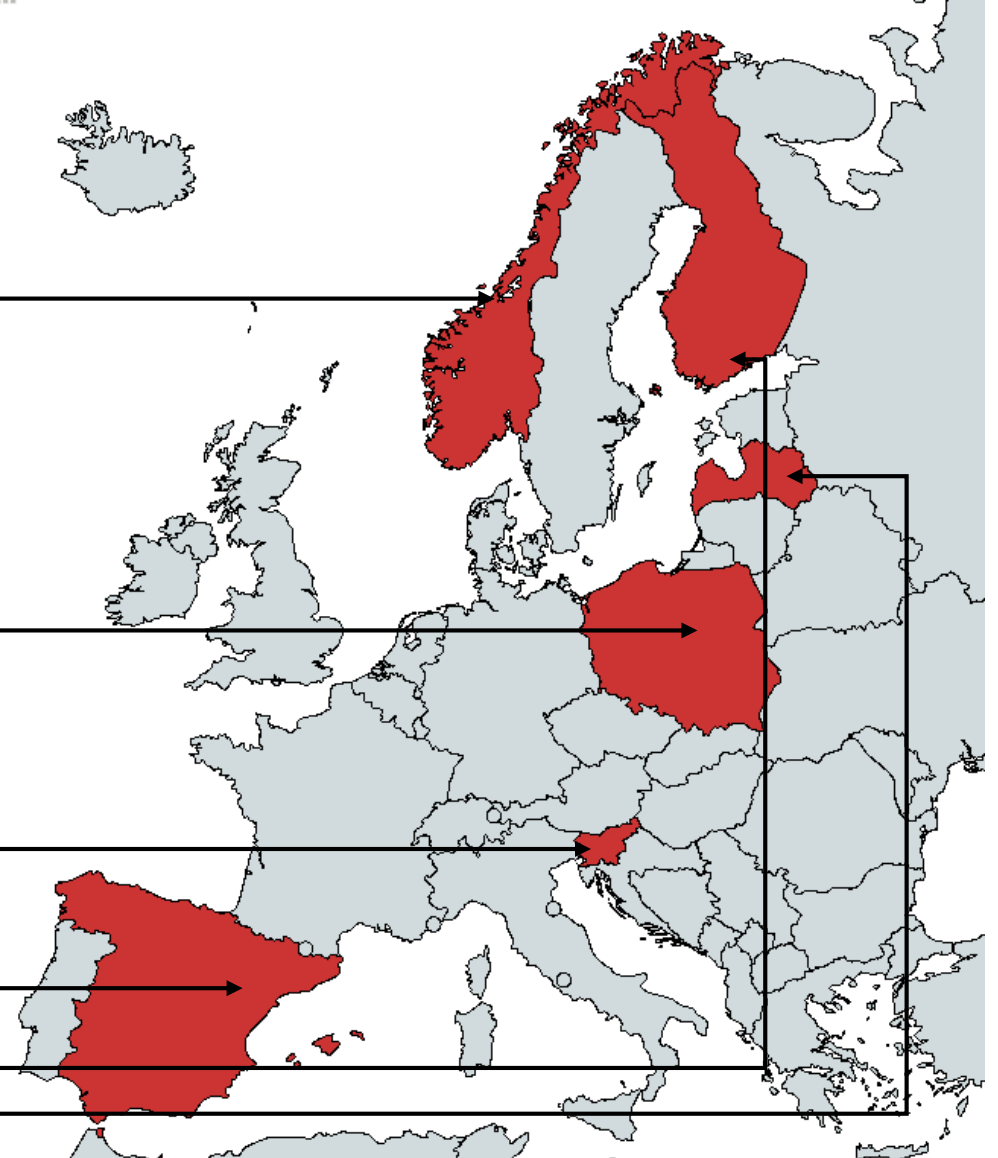
POLITÉCNICA



Aalto-yliopisto
Aalto-universitetet
Aalto University



VIDZEME UNIVERSITY
OF APPLIED SCIENCES

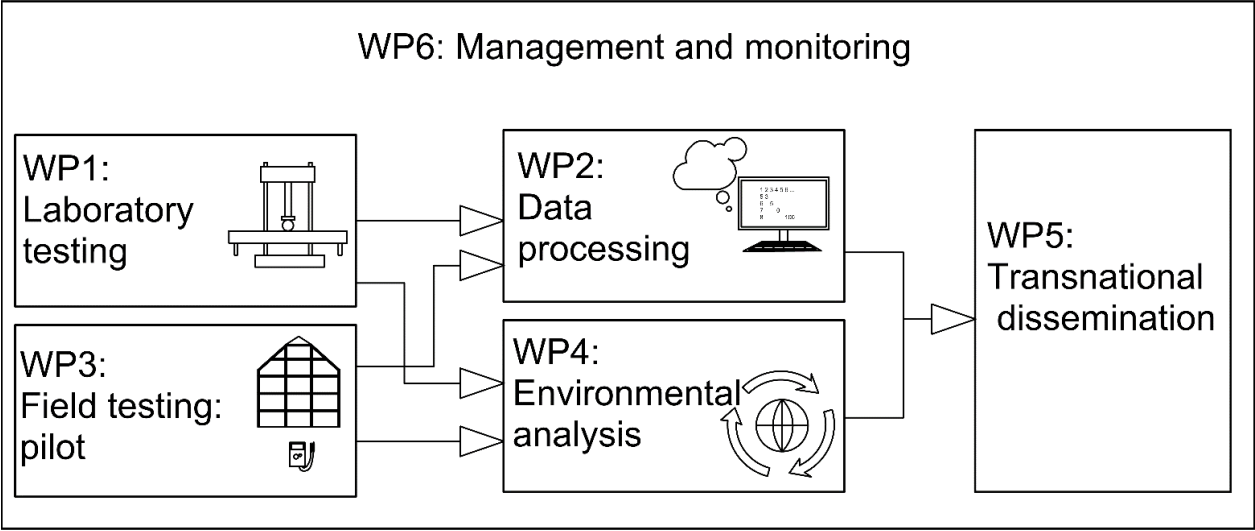
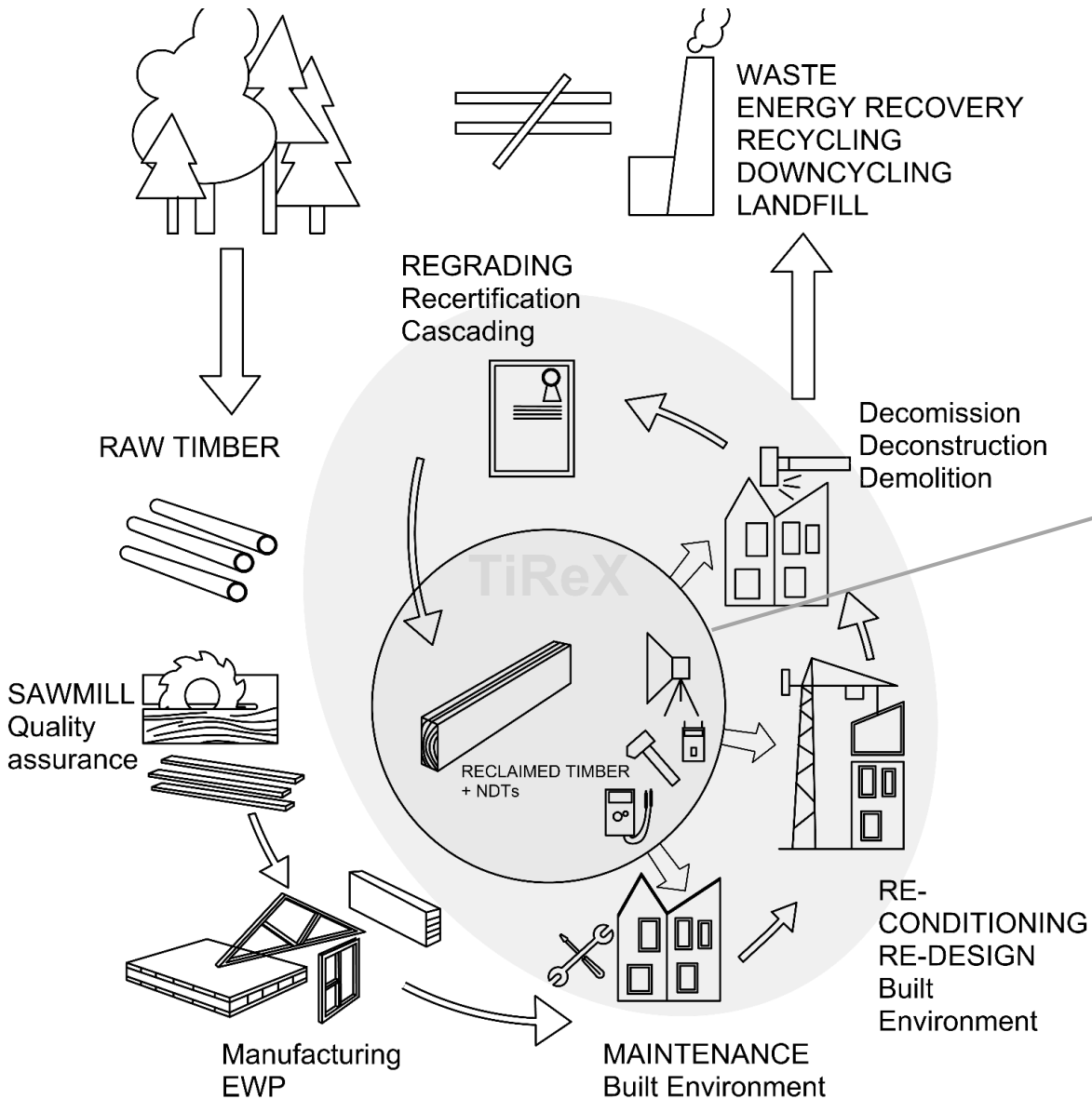


- Budget: 1.36 MEUR
- Eight partners from 5 countries:
 - Norway** – SINTEF, coordinator,
Rambøll (industrial partner),
Trondheim Municipality (public partner)
 - Poland**: Warsaw University of Technology,
 - Slovenia**: Slovenian National Building and Civil Engineering Institute,
 - Spain**: Universidad Politécnica de Madrid
 - Finland**: Aalto University
 - Latvia**: Vidzemes University of Applied Sciences



The essential goals of the proposed **TiReX** project are:

- identifying the **set of non-destructive tests (NDTs)** that are most suitable for comprehensive and efficient **condition assessment** (i.e., density, stiffness, strength, fire resistance, defects, moisture content, fibre direction) in wood that is feasible for in-situ as well as laboratory setting
- developing procedures for the **data postprocessing** from NDTs for the highest information value output and combined **risk/reliability quantification** with an extensive metadata template for data repositories
- testing the developed methodology on a **real case study for the adaptive reuse of a 5-story timber office building**
- establishing **circularity quantification** based on the real potential and Life-Cycle Assessment procedure for long-lived timber products, including risk quantification over multiple reuse and recycling/recovery – **timber cascading**.
- developing documentation and a **re-certification guideline** for reclaimed timber as the basis for European standardization



WP1. Laboratory testing of reclaimed timber specimens. *UPM*

- T1.1 Reclaimed timber inventory
- T1.2 NDTs procedure
- T1.3 Grading criteria
- T1.4 Performing NDT and destructive testing
- T1.5 Fire testing: ignition, fire spread, charring rate
- T1.6 Test data processing, digitalisation and sharing for WP2 tasks

WP2. Advanced data processing *WUT*

- T2.1 Numerical wood material model for assisting in NDTs result interpretation
- T2.2 Timber test models for simulation of NDTs and destructive testing
- T2.3 Analytical and simplified models for NDTs result interpretation and data processing
- T2.4 Statistical analysis of the data, result visualisation

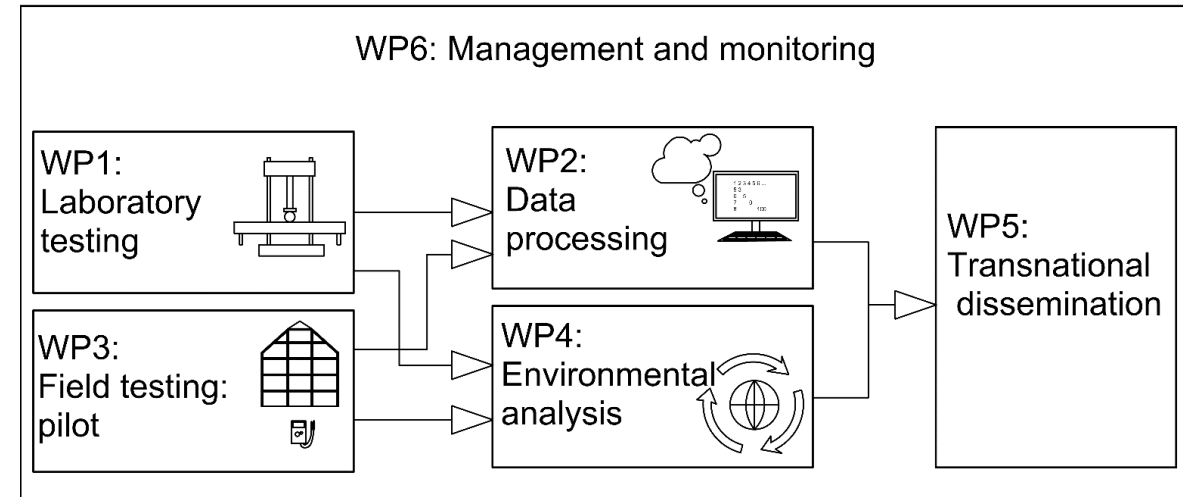
WP3. Pilot project: adaptive reuse *SINTEF*

- T3.1 Field NDT measurement plan and implementation
- T3.2 Laboratory sample testing
- T3.3 Performance evaluation based on test data
- T3.4. Environmental analysis

WP4. Environmental analysis: life cycle assessment (LCA), *Aalto*

- T4.1: Materials stock and flow analysis
- T4.2: Inventory data analysis
- T4.3: LCA and LCC for recovered wood and primary wood
- T4.4: Impact of the cascading utilisation

WP5. Dissemination and communication *VUAS*



WP6. Project monitoring and management. *SINTEF*

WP1. Laboratory testing of reclaimed timber specimens.

T1.1 Reclaimed timber inventory

Product	Origin/age	N	Species	Dimensions approx. (mm)	Source	Provenance
?	?	> 100	Softwood	?	A	North (Norway)
?	?	> 100	Hardwood	?	B	
?	?	> 100	Softwood	?	C	East (Poland)
?	?	> 100	Hardwood	?	D	
Large cross section reclaimed sawn timber	Post-Beam, > 100 years	> 100	Softwood (<i>Pinus sp.</i>)	150 x 150 x 4.000	E	South (Spain)
Large cross section reclaimed sawn timber	Post-Beam, > 100 years	> 100	Hardwood (<i>Quercus sp.</i>)	150 x 150 x 4.000	F	
		> 600 (800)				



WP3. Pilot project: adaptive reuse

T3.2.1 NDTs of pilot structure samples



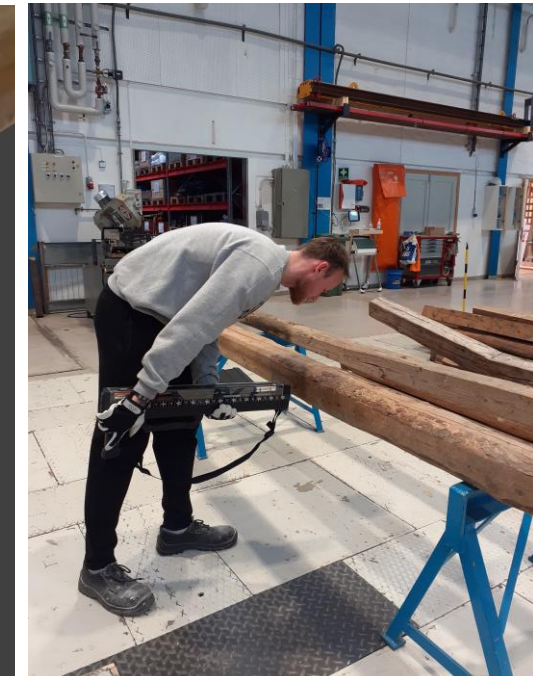
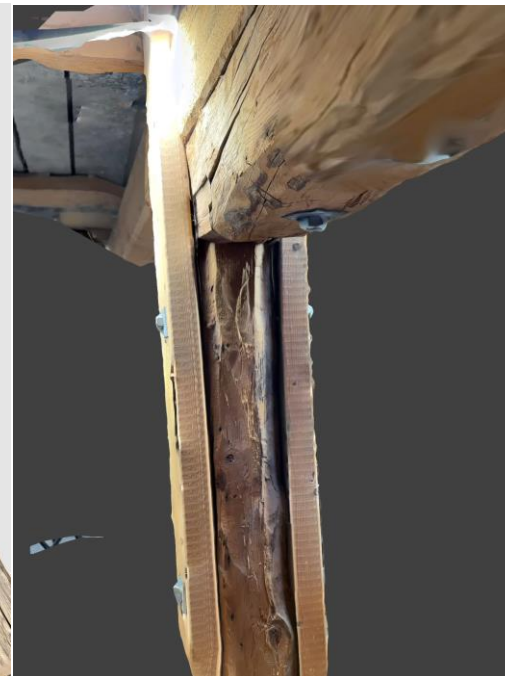
Vibrations



Ultrasound



LIDAR



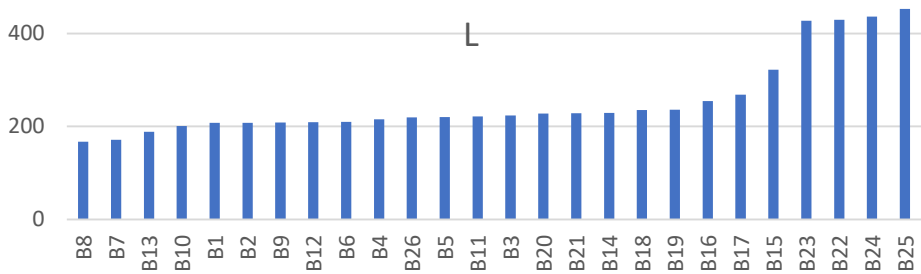
Resistograph

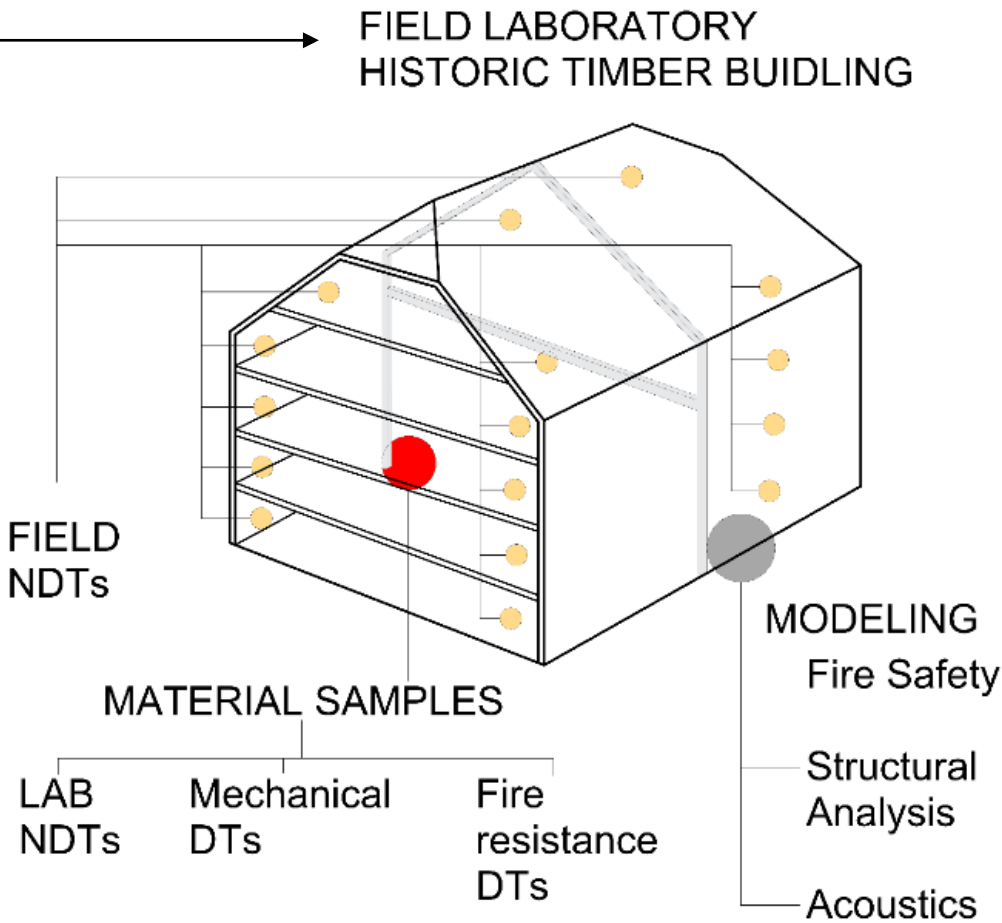
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Laboratory equipment: Ultrasound (54, 100, 500 i 1000 kHz), modal hammer, impact-echo, Schmidt sclerometer, Ground Penetrating Radar, thermographic camera, LIDAR scanner, resistograph



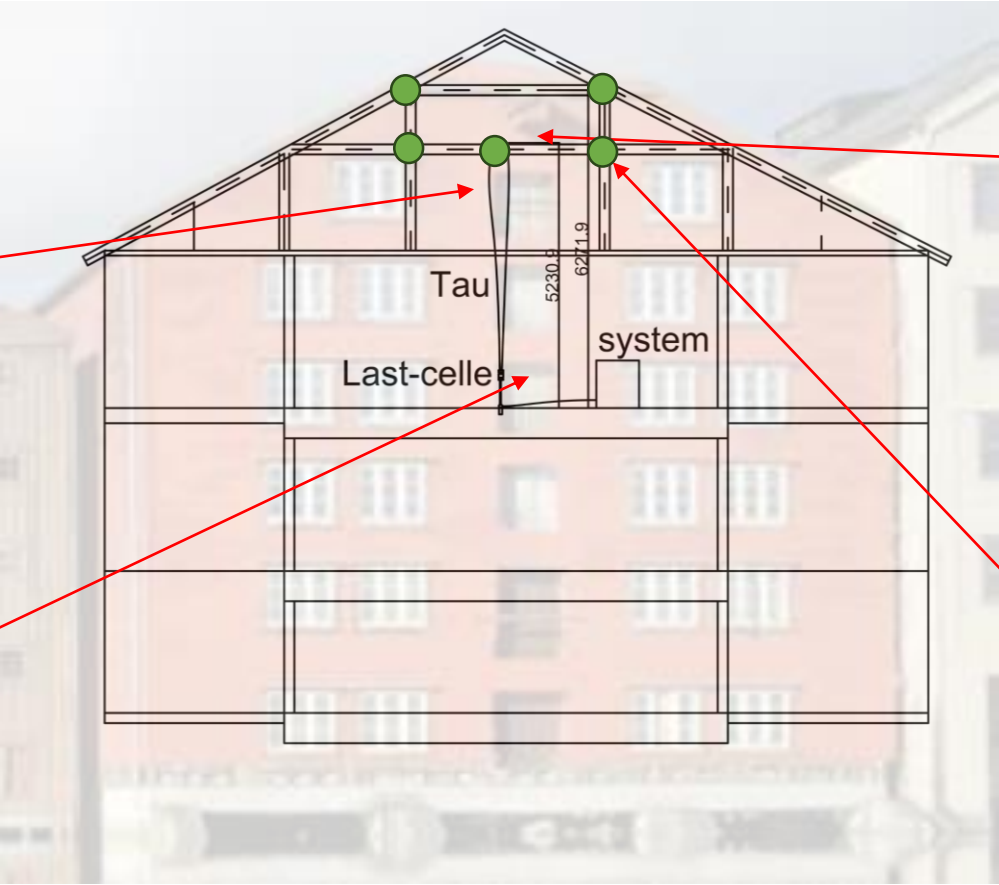
WP3. Pilot project: adaptive reuse
T 3.2.2 mechanical destructive testing of pilot structure samples





WP3. Pilot project: adaptive reuse

T 3.1 Field NDT measurement plan and implementation







Added **long-term IMPACTS** of the improved techniques for condition assessment of salvaged/waste/reclaimed timber:

- Higher **forestation rate** through stabilizing demand
- Better **quality of forests** (utilized for more durable products)
- More **reliable forest products** (better utilization of their value)
- Prolonged **CO₂ storage** in wood products: long-lived products (lower emissions)
- **Stable** wood product **prices** (within the circular economy)

Thank you!

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