ENBRI Technology Infrastructures

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May 2026

ENBRI & our Technology Infrastructures

The **construction sector** faces key challenges, including low productivity, labor shortages, affordability issues,limited digital transformation, and sustainability concerns. Addressing these requires a comprehensive strategy focused on leveraging **Technology Infrastructures**, TI's, to foster innovation and **target critical technologies** such as digital twins, AI, robotics, advanced materials and modular construction. The strategy emphasizes inclusivity across all construction segments, support for SMEs, start-ups/scale-ups, financial sustainability, accelerating time-to-market, integrating circularity principles, and learning from other sectors to build a greener, digitalized, resilient and **more competitive** construction ecosystem.

DG RTD publication "Towards a European policy for technology infrastructures: Building bridges to competitiveness", Feb 2025, stressed the fact that several **barriers** for using TI services exist. This includes **funding and pricing** issues, **long delivery times,** and **lack of knowledge** about available services. This is especially profound for the construction industry with 99% of the companies being SME's.

ENBRI focusses on **solving** these issues and making the TI's **accessible for all companies**, small and large from all over Europe.

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ENBRI & our Technology Infrastructures

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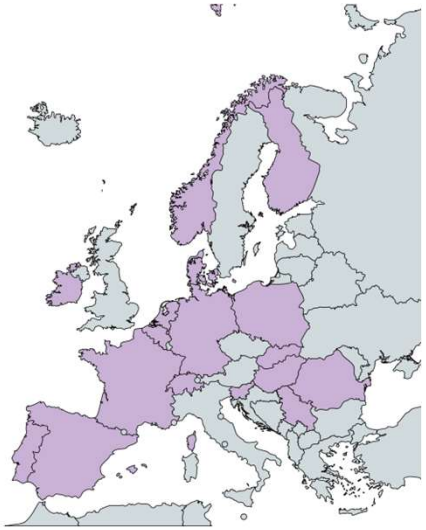
Technology infrastructures for advanced construction are defined as all **facilities, resources, and services that enable the construction industry to develop, test, validate and scale-up** new technologies. These may include pilot plants and demonstration sites for industrial processes, open-access research laboratories with advanced equipment, testbeds for integrating digital and physical systems, standards and shared platforms for innovation in materials, energy, and manufacturing.



Role of ENBRI members: Sharing of knowledge and Technology Infrastructures, identify gaps and joint developments (where needed), develop (co-)funding mechanism and to empower especially SME's, start-ups & scale-ups, therewith accelerating market uptake.

The current slide set represents typical examples of TI's present at the ENBRI partners. It is not intended to provide a complete overview, for specific questions please reach out to us. Contact details of the ENBRI Board members are included on the last page.

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ENBRI Technology Infrastructures

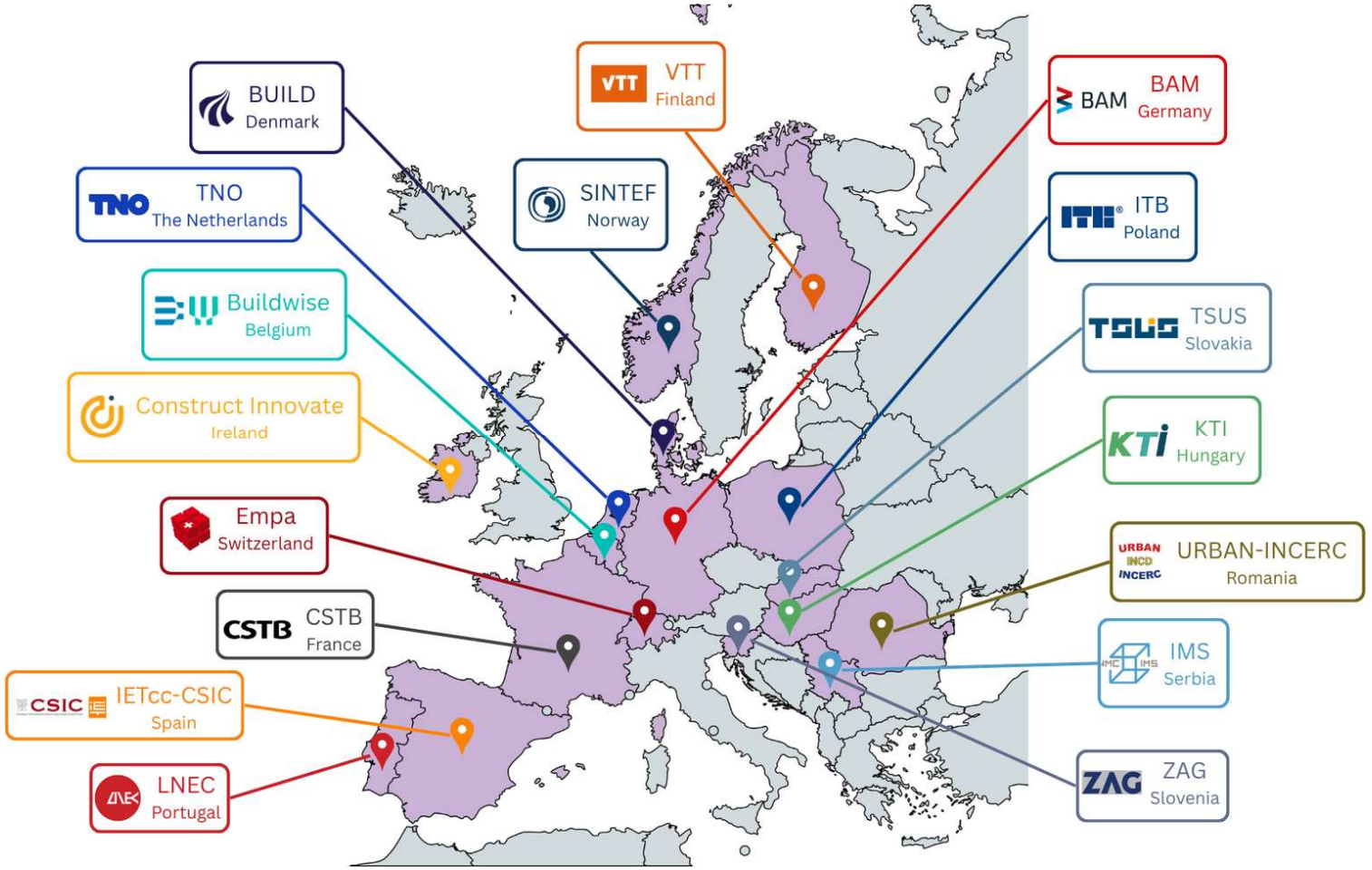
ENBRI

Network of Leading European Research & Innovation Facilities

17 partners

Across Europe

Connecting expertise, facilities & innovation for a sustainable built environment



TNO — Circularity . Validation . Innovation

BAM — Fire Safety . Materials . Structures

Buildwise — Construction Innovation . Performance . Digitalization

BUILD — Sustainable Buildings . Materials . Energy

Construct Innovate — Research . Innovation . Skills

CSTB — Building Performance . Durability . Environment

Empa — Advanced Materials . Energy . Circularity

CSIC — Construction Science . Heritage . Sustainability

ZAG — Fire Safety . Acoustics . Structures

ITB — Building Research . Safety . Physics

LNEC — Structures . Sustainability . Seismic

KTI — Infrastructure . Materials . Mobility

SINTEF — Sustainable Tech . Energy . Coastal

VTT — Smart Buildings . Energy . Digitalization

TSUS — Structural Testing . Geotechnics . Diagnostics

IMS — Seismic . Foundations . Geotechnics

URBAN-INCERC — Resilience . Structures . Innovation

Construction Technology Infrastructures

(Examples)

ENBRI

Tech infrastructure | Germany

BAM Bundesanstalt für Materialforschung und -prüfung

Fire Science

Focus areas

- Fire behavior of materials
- Fire resistance of structural elements
- Polymeric materials, flame retardants
- Lightweight constructions

Location

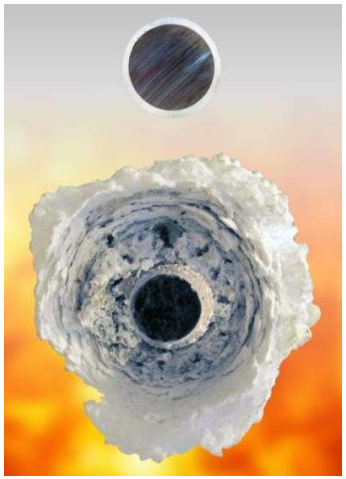
Unter den Eichen 87, 12205 Berlin, Germany

Point of contact

Andreas Rogge, +49 30 8104 1700,

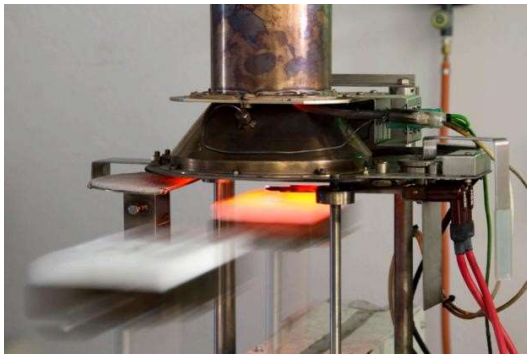
Description

BAM is a materials research and testing institute ensuring **safety in technology and chemistry**. As **safety creates markets**, BAM provides expertise that enables SME to develop, test and validate reliable and durable products and constructions.



Unique Facilities & Capabilities

- **Full-scale testing apparatus** for fire resistance tests at full scale (walls, ceilings, beams, columns, tension bars, modular constructions)
- **Bench-scale and intermediate-scale furnace**s to assess the reaction to fire of building materials and to conduct screening tests
- Devices for **thermal analysis**, weather exposure, **smoke and fire analysis**
- Testing machines to determine the **high-temperature material behavior**
- **Numerical simulation** methods to create digital twins (FEM and CFD)



How to support SMEs & start-ups/interaction with companies/industry

BAM conducts collaborative research projects with industry partners, particularly SMEs. Its unique testing facilities support the development of innovative building products, construction techniques, and standards.

- **Team of experts** with deep knowledge of structural and fire behavior
- **Extensive experience** in the field of fire safety
- **Notified body** and approved testing and certification institute
- **R&D support** providing test concepts and tailored solutions
- **Powerful network** across standardization and approval bodies

Tech infrastructure | Germany

BAM Bundesanstalt für Materialforschung und -prüfung

Green Intelligent Building

Focus areas

- Climate-friendly, reliable and durable building materials
- Resource conservation incl. bio-based materials
- Robust and efficient construction technologies f.e. additive manufacturing

Location

Unter den Eichen 87, 12205 Berlin, Germany

Point of contact

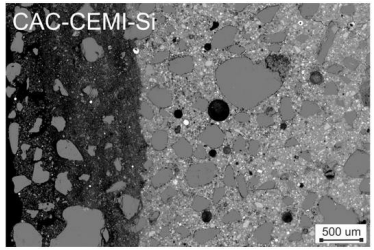
Andreas Rogge, +49 30 8104-1700,

Description

BAM is a materials research and testing institute ensuring **safety in technology and chemistry**. As **safety creates markets**, BAM provides expertise that enables SME to develop, test and validate reliable and durable products and constructions.

Unique Facilities & Capabilities:

- Chemical and mineralogical material analysis (thermoanalytical, pore structure analysis, ICP-OES, AAS, TIC/TOC, X-ray methods, etc.)
- Synchrotron-based methods (XAS, XRD, XRF)
- Binder development: automatic acid aging, carbonation chambers, coupled DTA/TG with IR-spectroscopy, micro-CT)
- Rheological and colloidal interactions (Twin-drive rheo-optical measurements in rotation, oscillation and linear motion, dynamic light scatter and electrophoretic mobility; texture and penetration tests; polymer adsorption)



How to support SMEs & start-ups/ interaction with companies/ industry

BAM conducts collaborative research projects with industry partners, particularly SMEs. Based on the in-depth knowledge and comprehensive experience of our experts, we contribute to the development of innovative building products and construction techniques

R&D: Joint development, investigation and validation of innovative solutions incl. access to state-of-the-art research infrastructures

Services: Testing, calibration, conformity assessment, expert reports

Technology transfer: Consulting, workshops, training and start-up support

Networking: Know-how transfer to specialist networks and committees incl. support for certification and contribution to standardization

Tech infrastructure | Denmark

BUILD, Aalborg University

Sustainable Materials and Constructions

Focus areas

- Circular, biobased and cementitious materials and constructions
- Performance characterization and modelling
- Structural health monitoring

Location

Department of the Built Environment, Aallborg

Point of contact

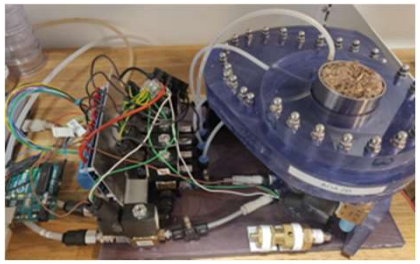
Jes Vollertsen, +45 99408504,
jesvollertsen@build.aau.dk

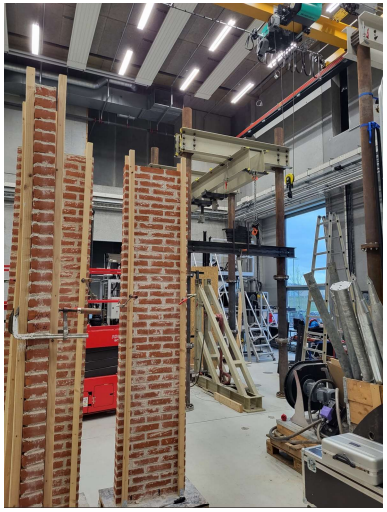
Description

BUILD offers collaboration on development, characterization, test, and performance validation of new building materials, constructions and envelope solutions.

Unique Facilities & Capabilities:

- Building Physics and Energy Laboratory
- Indoor Environmental Laboratory
- Building Material Characterization Laboratory
- Concrete Research Laboratory
- Structural Research Laboratory
- Geotechnical Engineering Labpratory
- Chemistry and Biology Laboratory
- Weather and climate laboratory





How to support SMEs/ interaction with companies/ industry

BUILD offers start-ups, scale-ups, and SMEs access through:

- Students projects, where 2-5 students work on development, testing and modelling
- R&D support offering independent validation, concept testing, and access to advanced labs & pilot facilities.
- Partnerships including collaboration in larger R&D programmes.

Tech infrastructure Belgium

Buildwise "Moving together. Wisely building tomorrow."

HAMSTER test facility

Focus areas

- Thermal insulation systems
- Hygrothermal durability
- Real hygrothermal performance

Location
Greenbizz, Brussels (BE)

Point of contact
Antoine Tilmans, at@buildwise.be

Description
HAMSTER is an **advanced experimental platform** designed to explore the **hygrothermal efficiency and robustness** of building systems, in particular insulation systems.

Unique Facilities & Capabilities:

- **Large scale** testing capability (3m x 3m)
- Realistic **internal and external climates** reproduction
- **Actual and future climates** assessments
- Precise **measurement of thermal performance**
- **Dynamic hygrothermal solicitations** for durability assessments

Support SMEs & companies of the construction sector
HAMSTER provides a unique way to validate the performance and the robustness of innovative systems and materials in real conditions

- (prefab) insulation systems
- robust installation techniques
- (bio-based) materials
- retrofit solutions
- efficient construction details

Tech infrastructure Belgium

Buildwise "Moving together. Wisely building tomorrow."

Focus areas

- Acoustic comfort in buildings
- Flanking sound transmission in buildings
- Vibration reduction in building junctions

Location
Buildwise Limelette (BE)

Point of contact
Lieven De Geetere, ldg@buildwise.be

Flanking-Lab test facility

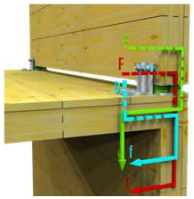
Flanking-lab is an advanced testing facility - unique in Europe - designed to investigate the phenomenon of **flanking sound transmission** in buildings under strictly controlled laboratory conditions. It further allows to evaluate the acoustic performance of **vibration-damping materials** and **connectors** in the connection between building elements and to measure the flanking sound transmission through **suspended ceilings, raised floors** and **curtain walls,** in full compliance with the latest ISO 10848 standards.

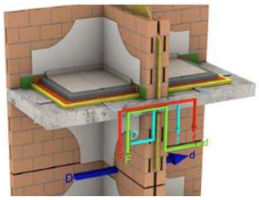
Unique Facilities & Capabilities:

- **Full scale** testing capability
- **Easy access** through 16t roller bridge
- **Loading** of walls possible up to 400 kN
- Both **horizontal** and **vertical** L, T and X-junctions

Support SMEs & companies of the construction sector
Flanking-lab allows to better understand and control flanking sound transmission, especially in lightweight buildings.

- Innovative **building concepts** in timber / lightweight steel frame construction
- More efficient **vibration damping** through resilient materials and connectors in building junctions





Tech infrastructure | Ireland

Construct Innovate "Built Environment Research Ireland"

Construct Innovate
Built Environment Research Ireland

Focus areas

- Building envelope systems
- Individual products/Building materials
- Up to 2.7 x 2.7 m façade build-ups
- Multi-parameter testing capability
- Commissioning & handover Q4 2026

Location

Alice Perry Engineering Building, University of Galway, Galway, Ireland

Point of contact

Dr. Magdalena Hajdukiewicz
magdalena.hajdukiewicz@universityofgalway.ie

O3BET Façade Test Facility + Water & Airtightness rig

The O3BET testing infrastructure is a European Open Innovation Test Bed facility which will enable manufacturers, SMEs & start-ups to develop, test and validate new façade and building envelope materials and products, and validate performance before investing or proceeding to certification.

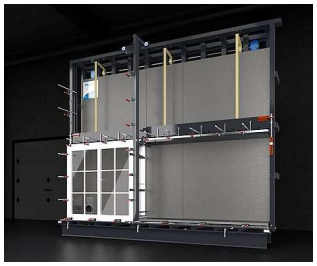
Unique facilities & capabilities:

O3BET testbed

- The 3-cell facility 16.5 m x 8 m in plan,
- Test samples: two 2.7 x 2.7 m façade elements and one corner façade,
- Temperature, humidity and pressure controlled indoors,
- Testing Capacity: ***Thermal performance, moisture transfer, airtightness, acoustics, solar and luminous characteristics, energy performance & indoor environmental quality.***

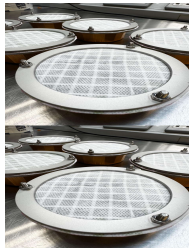
Water & airtightness rig

Test rig for windows, French windows, doors and façades/curtain walls to test for joint ***permeability, water tightness and wind loads*** to EN Standards; 3.6 m x 3.6 m clamping area.



Building membrane testing

Suite of standard laboratory tests for building membrane performance, including ***mechanical, waterproof and water vapour transmission*** properties, and ***impact of aging***.



Support Services

- **Access**: Collaborative research with experts, undergraduate/postgraduate teaching, supporting industry & Government projects.
- **R&D support**: Independent validation, concept testing and access to complementary labs & test facilities.
- **Funding & PM expertise**: Supports identifying appropriate funding pathways and PM support.
- **Partnerships**: Connecting to partners, networks, consortia.

Tech infrastructure Ireland

Construct Innovate "Built Environment Research Ireland"

Construct Innovate
Built Environment Research Ireland

Focus areas

- Advanced Manufacturing
- Robotics and Automation
- Autonomous Mobile Robot
- Multi-function testing capability
- Industry deployment potential

Location

Alice Perry Engineering Building,
University of Galway, Galway, Ireland

Point of contact

Dr. Noel Harrison
noel.harrison@universityofgalway.ie

Advanced Manufacturing Laboratory

The Advanced Manufacturing Laboratory is a dedicated teaching and research space within the School of Engineering for the development of advanced and automated manufacturing technologies. The laboratory hosts a suite of industry-grade robotics and automation infrastructure, providing a collaboration and practical development hub for multinational manufacturers, SMEs & start-ups.

Unique facilities & capabilities:

Autonomous Mobile Robot

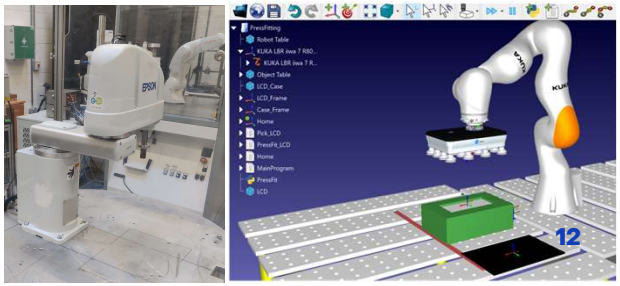
- MIR Enabled Robotics autonomous mobile base with 8 hrs battery life, 2 m/s max speed and 800 x 580 mm footprint.
- Integrated laser scanners, 3D cameras and proximity sensors for safe close, autonomous operation and wireless communications.
- Mobile base carries a Universal Robot UR15 collaborative robot with 6-DOF, 1300 mm reach and 17.5 kg payload
- Industry-grade & in-house developed tooling, grippers & vision systems

Robotics suite

- KUKA 6-DOF KR3 articulated robot arm
- KUKA IIWA 7-DOF collaborative arm
- Epson SCARA 4-DOF pick & place robot
- Dual arm UR7e (x2) robotic system
- Dell 256GB, 26-core simulation & programming workstation

Support Services

- **Access**: Collaborative research with experts, undergraduate/postgraduate teaching, supporting industry & government projects.
- **R&D support**: Concept development through design, simulation & optimisation, prototyping and practical testing.
- **Partnerships**: Connecting to partners, networks, consortia.



CSTB "Building the future"

Focus areas

- Qualification of anchors in concrete
- R&D on innovative Low-Carbon Concretes
- Fire Resistance of Bonded Fasteners
- Connections in bio-based supports
- Disassembly potential

Location

CSTB, Champs-sur-Marne, France

Points of contact

REGNIER Killian:

MERTZ Pierre-Yves:

PINOTEAU Nicolas:

ACHILLE Laboratory

CSTB "ACHILLE Laboratory" is a testing platform for anchors and connection systems for building and infrastructure applications. This state-of-the art laboratory ensures product qualification from innovation to market phases to support innovation in the field of connections for new construction technics.

Test Facilities:

- 5 test rigs
- 4 000 tests per year on different supports
- 400 m² laboratory
- -20°C à 1 000°C temperatures minimum (freeze-thaw tests) and maximum (fire tests)
- 1 000 kN maximal loading capacity
- 17 months duration of the longest test
- 300 Hz high speed Digital Image Correlation
- 0,1-0,8 mm crack opening, including cyclic seismic tests

Support for Start-ups and SME:

CSTB'Lab and public status gives start-ups, scale-ups, and SMEs fast access options.

- **Fast access**: Free intake, quick matching to CSTB experts (fasteners, concrete, timber, fire), co-funding options.
- **R&D support**: Independent validation, development of specific qualification methods adapted to new products.
- **Evaluation**: Technical and environmental justifications for accelerating time-to-market.
- **Partnerships**: Connecting to partners, networks.

CSTB "Building the future"

Focus areas

- From start-ups to industrial manufacturers
- Finetuning and optimization systems
- Dynamic test method
- Physical modelling and simulation
- Hardware-in-the-loop
- Systems from the R&D to the market
- Policy and regulation driven

Location

290 route des Lucioles, Sophia Antipolis, France

Point of contact

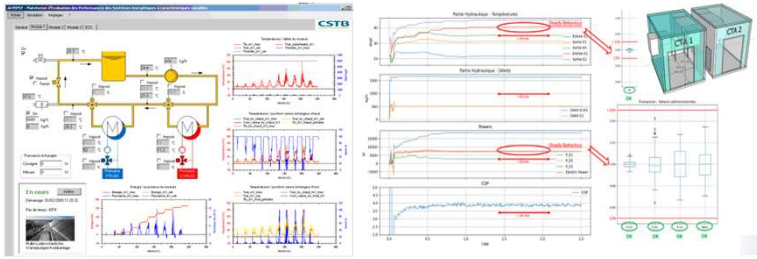
Simon BODDAERT – simon.boddaert@cstb.fr

PEPSY / Semi Virtual Laboratory

CSTB "PEPSY Lab" is a **Hardware-in-the-Loop Platform for Performance Evaluation of Energy Production, Storage and Distribution Systems for Buildings**. Supporting development from innovative concept to optimal solutions, energy-efficiency, market-driven, environmental sustainability and reliability.

Unique Facilities & Capabilities:

- Sufficient to **accommodate Hydraulic /aeraulic/electric** systems
- **2 climate chambers** to simulate all types of indoor and outdoor climates conditions
- **Testing capacity ranging** from 0,5 to 45 kW
- **Real-time test monitoring** and data processing using Python
- **Reduction** in testing lead times and **cost control**
- Multi-channel lab with up to 4, with control of thermal, power, humidity and ventilation conditions
- **Decision making output to drive development**



How to support SMEs/ interaction with companies/ industry

The CSTB ensures a high level of responsiveness, and the modular design of the equipment provides effective support in reaching the market.

- **Adaptability and flexibility:** The CSTB strikes the perfect balance between simulation and testing, based on a customer-focused approach.
- **R&D support**: Experts and equipment are available to support the development of projects that comply with regulatory and standard requirements .
- **Guided support**: results that meet policy requirements with support of CSTB's wide range expertise and labs.
- **Partnerships**: Private to cooperative research programs, networks

Tech infrastructure Switzerland

Empa's Built Environment Laboratories

Empa
Materials Science and Technology

Focus areas

- **Structures** — Advanced materials & systems, strengthening, health monitoring, digital fabrication
- **Construction materials** — Cement- & earth-based, bituminous, carbon-storing
- **Mechanical systems** — FRP composites & reuse/recycling, fatigue & durability

Location

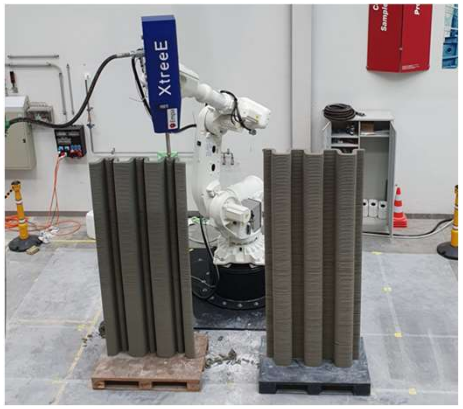
Empa Dübendorf, Canton Zurich, Switzerland

Point of contact

masoud.motavalli@empa.ch
pietro.lura@empa.ch
giovanni.terrasi@empa.ch

Empa's three Built Environment Laboratories combine **fundamental research, application-oriented R&D, and industry services** to advance sustainability, resilience, and performance across the built environment — from structural systems and construction materials and mechanical components.

Structural Engineering	Concrete & Asphalt	Mechanical Systems
Innovative solutions for waste reduction, CO_2 mitigation, service life extension, and extreme events preparedness. Robotic 3D Printing and WAAM facilities.	Research and product development on cementitious, earth-based, and bituminous materials to improve sustainability and functionality.	Innovative mechanical load-carrying products, composites, compounds and metals with a focus on sustainability, fatigue resistance, and reuse/recycling



Large-scale 3D concrete printing facility

Large-scale testing of timber walls

Unique Facilities & Capabilities:

- **Real-scale structural testing** — Strong floors (40×12 m & 14×7 m), multiaxial loading, quasi-static/dynamic/fatigue testing
- **World-leading materials laboratory** — One of the largest and most complete labs worldwide for testing cementitious and bituminous materials
- **Advanced mechanical & fatigue testing** — State-of-the-art facilities for quasi-static and multiaxial fatigue loading of mechanical systems in metals and FRP composites; one of the largest fatigue testing labs internationally
- **ISO/IEC 17025:2017 accreditation** across all three laboratories for a wide range of standardised tests

Empa's Demonstrator for the Built Environment

NEST | Empa eawag aquatic research

Focus areas

- Sustainable construction & energy systems
- Circular economy & materials re-use
- Digital fabrication & smart building tech
- Water innovation
- Asphalt & roads (blue/green infrastructure)

Location

Empa Dübendorf, Canton Zurich, Switzerland

Point of contact

Reto Largo, reto.largo@empa.ch

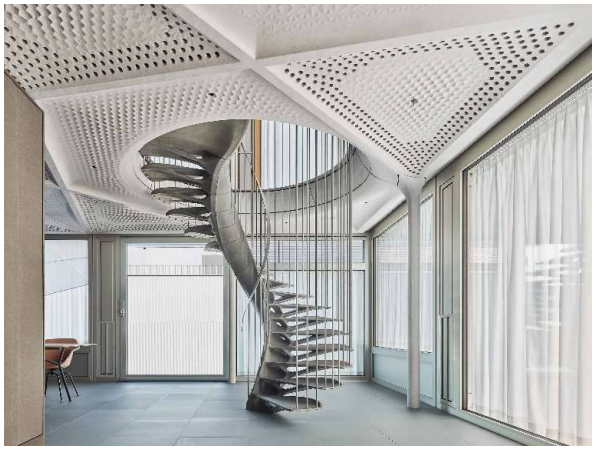
Accelerating innovation in construction

Description

NEST is a modular research & innovation demonstrator of Empa & Eawag. It validates new construction and energy technologies under real-world conditions, bridging lab research and market readiness.

Unique Facilities & Capabilities:

- Plug-and-play modular living and office units
- Energy District, Water Hub
- 150+ partners: research, industry & public sector



How to support SMEs/ interaction with companies/ industry

- NEST supports innovative companies in the **implementation** of their ideas and ensures that new knowledge from research and development flows into their products.
- NEST partners have at their disposal a **test environment with real-world conditions, allowing de-risking to accelerate the market entry** of new products, systems, or technologies.
- In addition, they gain access to **national and international experts**, technology and system providers and get to know interesting start-ups.

Eduardo Torroja Institute of Construction Sciences "IETcc-CSIC"

Mechanical Testing Laboratory (IETcc-CSIC)

Focus areas

- Mechanical tests and experimental research in structural engineering.
- High specialization in railway component testing.
- Structural monitoring.

Location

Serrano Galvache 4, 28033 Madrid, Spain

Point of contact

Sonia Martínez, phone: +34 911035242
soniamdm@ietcc.csic.es

Description

Laboratory specialising in full-scale testing, equipped with overhead cranes, mobile steel frames, high-capacity hydraulic systems and advanced instrumentation, and supported by a multidisciplinary team with expertise.

Unique Facilities & Capabilities:

- Labs with concrete slabs with anchor points of up to 1000 kN.
- Universal dynamic testing machines from 100 kN to 1000 kN with control by force, displacement and deformation.
- Test benches and static actuators from 100 kN to 10000 kN and dynamic ones from 50 kN to 630 kN.
- Several static tensile-compression and compression presses.
- Servohydraulic control desks of 250 Bar and 350 Bar.
- Permanent installation of quality control tests for slabs.

Support and Interaction with the Construction Industry:

- Support for R&D and technology transfer: experimental studies for public institutions and private companies.
- Conducting mechanical tests for CSIC research groups' projects in the field of structural engineering.
- Collaborations with other CSIC research centres.
- Public information available via the website: https://www.ietcc.csic.es/en/technical-units/t-u-experimental-evaluation-of-structures/
- Easy access via telephone or email.

Lab with ENAC accreditation (Nº 1194/LE2280)
Lab registered in REDLAB (registration number RLAB-083)

Eduardo Torroja Institute of Construction Sciences "IETcc-CSIC"

DIT Testing Laboratory (IETcc-CSIC)

Focus areas

- Mechanical tests and experimental research in assessment of innovative construction products.
- Technical assessment body (TAB) and notified body according to the European regulation 305/2011.

Location

Serrano Galvache 4, 28033 Madrid, Spain

Point of contact

Julian RIvera, phone: +34 913020440
julianrl@ietcc.csic.es

Description

Laboratory specialising in test for the assessment of innovative construction product both at National level as European level, whit a large range of different products:

- Waterproof system: roof, bridge, underground.
- Barrier of radon.
- External Thermal Insulation Composite System with rendering for use on building walls.
- Ventilated façade.
- Concrete anchors.
- Thermal insulation products for buildings with radiant heat reflective components.
- Additive for concrete.
- Cellulose fibre microgranules for the manufacture of bituminous mixtures.
- Rendering intended for Fire Resisting Application of building elements.
- etc

Unique Facilities & Capabilities:

- Chamber for durability tests (UV radiation, heat, water, salty flog, etc.).
- Universal dynamic testing machines with control by force, displacement, fatigue and deformation.
- Chamber of wind loads and rain conditions.
- Equipment to determinate the mechanical damage.
- etc.

Support and Interaction with the Construction Industry:

- Support for R&D and technology transfer: experimental studies for public institutions and private companies.
- Conducting tests for CSIC research groups' projects in different fields.
- Issued more than 400 ETA (European technical assessment) and 600 DIT (National assessment)

Tech infrastructure Serbia

Institute IMS

"Field-Scale Testing and Validation of Foundation Systems"

Focus areas

- Testing & Validation of Construction Systems
- Field-Scale Testing Infrastructure
- Deep Foundation Systems
- Dynamic Load Testing Technologies

Location

Institute for Testing of Materials IMS, Belgrade, Serbia

Point of contact

Dr Mladen Cosic –
mladen.cosic@institutims.rs

Autonomous Modular System for Dynamic Pile

A novel field-scale testing technology for deep foundations, enabling autonomous, crane-free dynamic pile testing with high precision and significantly reduced operational constraints.

Unique Facilities:

- Autonomous testing infrastructure for crane-free dynamic pile testing.
- Field-scale validation platform for deep foundation systems.
- Modular and scalable energy input system (mass & drop height control).
- Deployment in complex and access-limited construction environments.
- Rapid mobilization and reduced operational footprint.
- Supporting cost-efficient and high-quality foundation testing.

Support to SMEs & Industry

Providing accessible, cost-efficient, and field-deployable testing solutions to support SMEs and industry in validating and deploying advanced foundation systems.

- **Open access** to advanced testing infrastructure for SMEs and contractors.
- **Cost-efficient** and flexible on-site pile testing services.
- **Validation, certification, and performance** assessment of foundation systems.
- **Pilot projects** and demonstration activities for innovative solutions.
- **Lowering** entry barriers to advanced testing technologies.
- **Accelerating** market uptake of innovative foundation engineering solutions.

ИНСТИТУТ ИМС IMS INSTITUTE

Tech infrastructure Serbia

Institute IMS

"THE GUARDED HOT PLATE FOR TESTING THERMAL CONDUCTIVITY OF BUILDING MATERIAL"

Focus areas

- Testing & Validation of thermal conductiviy of building material
- Guarded Hot Plate apparatus with fluxmeters
- Steady state conditions

Location

Institute for Testing of Materials IMS, Belgrade, Serbia

Point of contact

PhD Milica Mirkovic Marjanovic–
milica.mirkovic@institutims.rs

THE TECHNICAL CHARACTERISTIC OF THE GUARDED HOT PLATE:

• The Guarded Hot Plate is constructed according to the design method with a protected hot plate with the aim of achieving temperature uniformity of a heating palte.

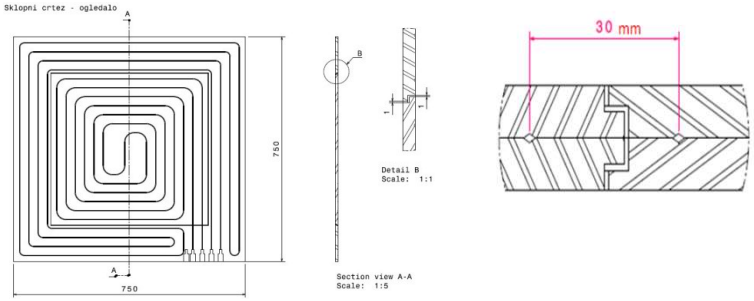
• Guarded Hot Plate has been applied for measuring thermal conductivity using heat flow meter

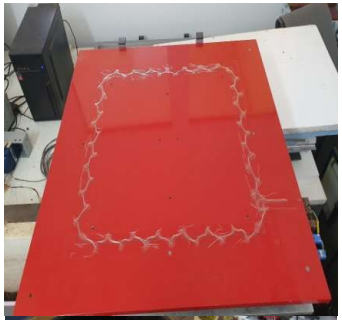
•The design of this Guarded Hot Plate has two new characteristics: different width of thermal barrier and the gap between hot and guard plates have been filled with insulation glue.

• Heaters inside hot and guard plates are built from wire for thermocouples and their geometry is optimized inside plates to achieve uniform temperature distribution along the specimen surface.

• Temperature uniformity on the surface of plates and specimen was checked and experimentally validated.

• All results were approved according to standards SRPS EN 12667 and SRPS EN 1946-3.





ИНСТИТУТ ИМС IMS INSTITUTE

Tech infrastructure | Poland

Instytut Techniki Budowlanej "Innovation Safety Resilience" Resilience

Focus areas

- Offsite construction technologies
- Wood constructions
- Wind-responsive architectures and Wildfires resilience
- 3D printed modules

Headquarters location

Poland, Warsaw, Filtrowa 1 str.

Point of contact

ci@itb.pl

Technology infrastructure

ITB: Support of competitiveness in safety, resilence and sustainability of construction through research, testing, environmental and technical assessment

ITB Pionki - Unique Facilities & Capabilities:

- Wide range of large furnaces for fire-resistance testing
- Full scale demonstration studies
- Variable Density Turbulence Tunnel
- CFD Modelling

How to support industry

- One stop shop – testing, assessment and certification
- Tailor made innovative testing methodologies
- Unique experience on assessment of environmental performance within the framework of international accreditation
- Knowledge dissemination - publications and trainings for all stakeholders
- National, European, global cooperation

KTI “Research, quality & innovation”“for mobility & the built environment”

Tech Infrastructure

Focus areas

- Smart construction & digital infrastructure (BIM, digital twins)
- Testing & quality control of building products, structures and materials
- Sustainable & circular construction solutions
- Intelligent transport systems (ITS) & mobility

Location

Than Karoly utca 3-5, Budapest + regional labs

Point of contact

info@kti.hu

Description

KTI is Hungary's only accredited research institute combining transport infrastructure and quality control in building, testing and R&D under one umbrella. Concerning the expertise and knowledge background of 2 former non-profit Llc. (EMI and KTI), the new merged institute offers end-to-end TI services from material testing to digital twin development for the construction and mobility sectors.

Unique Facilities & Capabilities:

- Accredited material testing labs (concrete, steel, asphalt, plastics)
- Road pavement & structural testing track
- Building acoustics & energy performance testing
- ITS / intelligent mobility testbed
- Fire testing laboratory – reaction to fire / fire resistance / large-scale facade tests
- Technical assessment & certification of building products (EMI heritage)

SME support & industry collaboration

75% non-refundable grant for SME R&D access; Horizon Europe & RRF co-funding programmes; fast-track intake, expert matching, single-window certification

Tech infrastructure Portugal

LNEC "Engineering for Society"

LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL

Focus areas

- Compatible covering materials for the conservation of built heritage
- Mineral- and bio-based thermal insulating coverings
- Rendering and plastering mortars incorporating recycled aggregates and supplementary additions
- Durability of façade claddings in marine environments

Location

LNEC's Campus, Lisbon

Point of contact

Rosário Veiga – rveiga@lnec.pt

Wall Coverings Laboratory (WCL)

Description

LNEC's Wall Coverings Laboratory is part of the Construction Behaviour and Technology Unit. It carries out studies on the **performance and durability of innovative wall covering systems**, supporting **public and private stakeholders** and contributing to **research projects**.

Unique facilities & capabilities:

- **Large-scale hygrothermal chamber** for weathering cycles on wall specimens up to 3×2 m
- Equipment for determining the **dynamic modulus of elasticity** by resonance frequency
- **Pull-off** testing equipment
- **Universal testing machine with two load cells**, ensuring accuracy over a wide range of capacities

Support for SME's, start-ups/scale-ups

WCL works closely with SMEs in the field of wall coverings by providing:

- Support for the development of innovative and sustainable products and systems
- Technical assessment services for products and systems
- Collaborative research with innovative SMEs
- Consultancy work on the pathology and rehabilitation of wall coverings

LNEC "Engineering for Society"

LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL

Focus areas

- Innovative anti-seismic construction methods and retrofitting systems and products
- Seismic hazard, damage and loss assessment, and risk mitigation solutions
- Evaluation of seismic vulnerability of new and existing structures and lifelines
- Aerodynamic stability, ventilation conditions and wind comfort and safety

Location
LNEC's Campus, Lisbon

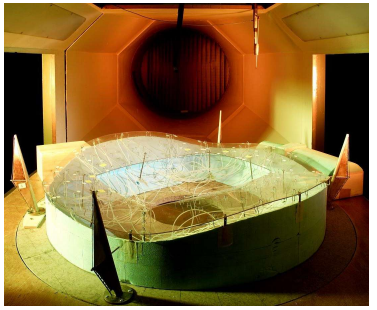
Point of contact
António A. Correia – aacorreia@lnec.pt

Structural Dynamics Laboratory (UDinE)

UDinE is integrated in the Earthquake Engineering and Structural Dynamics Unit of LNEC and includes a seismic testing facility and an aerodynamics laboratory. It is dedicated to research on **Earthquake and Wind Engineering**, offering services in **experimental testing, structural monitoring, risk assessment, numerical modelling, building code development and consultancy**

Unique facilities & capabilities:

- **Large-scale triaxial shaking table** (6×6 m) able to perform seismic tests on quasi-full-scale structures up to collapse
- **Uniaxial shaking table** and strong floor for **hybrid** physical/numerical **simulations**
- **Four wind tunnels**, including a closed cycle aeronautical one and an open cycle boundary layer one, with accreditation for anemometers' calibration



Support for SME's, start-ups/scale-ups
UDinE works closely with the industry for:

- **Experimental assessment and assisted development** on Earthquake and Wind Engineering
- Collaborative research with innovative SMEs, namely for **modular construction** development
- **Qualification tests** of equipment and innovative solutions for reduction of seismic vulnerability
- Consultancy studies on **seismic risk management**, from hazard to exposure and vulnerability, including preparedness and mitigation

Tech infrastructure Country: Norway

SINTEF – Technology for a better society

Focus areas

- international competitive industrial development,
- a research arena for developing zero emission buildings,
- risk reduction when implementing zero emission building technologies,

Location

Høgskoleringen 13, Trondheim, Norway

Point of contact

Einar Bergheim, Laboratory Manager, SINTEF
einar.bergheim@sintef.no

The ZEB Laboratory

Description

The ZEB Laboratory is built with focus on adaptability and flexibility. The envelope can modified, fitted with new materials, components and technologies and investigate building envelope and building of large-scale building envelopes and the effect of material and envelope properties on whole building energy use and user comfort.

Unique Facilities & Capabilities:

- full-scale office building where building façades, components and technical systems can be modified and replaced
- Grid integrated: possible to experiment on interface between buildings (ZEBs) and grids (smart power grids, district heating and cooling grids

How to support SMEs/ interaction with companies/ industry

Systems testing, interplay, needs analysis and application, together with industry

An arena for risk reduction linked to system implementation in zero-emissions buildings

Construction co-funded by National research council of Norway in addition to SINTEF and NTNU

Educational purpose

E-infrastructure Country: Norway

SINTEF – Technology for a better society

Smart Building Hub

Focus areas

- Enabling smarter and greener cities with detailed building data
- Enabling data sharing and analysis across the sectors

Location

Point of contact

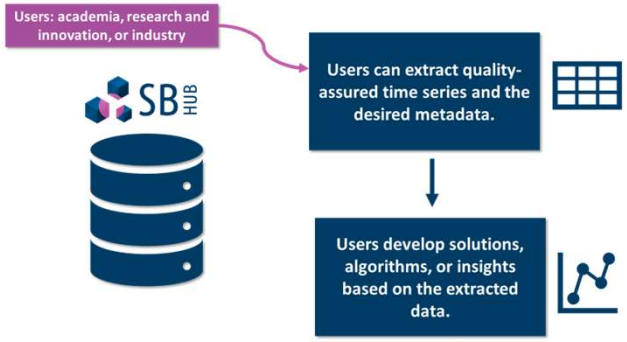
sbhub-project@sintef.no

Description

The Smart Building Hub (SBHub) is a digital infrastructure designed to make detailed data from buildings publicly accessible for research and Innovation. SBhub will collect, curate and provide access to high-resolution building data to support innovation, knowledge development and more data-driven decisions in the building sector.

Unique Facilities & Capabilities:

- Aggregated timeseries of electricity and district heating at municipal level.
- Detailed time-series data from public and private buildings.
- Weather, spot price data and the Norwegian Cadastre



How to support SMEs/ interaction with companies/ industry

Energy system planning for neighbourhood and cities
Smart control of buildings and neighbourhoods
National statistics
Collect, curate or provide access to data in national and international research projects

Tech infrastructure | The Netherlands

TNO "Innovation for life"

Focus areas

- Circular & biobased construction
- Waste-wood valorisation
- Recycled CLT production
- Fibre-based building materials
- Pilot-scale biobased product development

Location

Werner Von Siemensstraat 17, 2712 PN
Dutch Tech Campus, Zoetermeer (ZH)

Point of contact

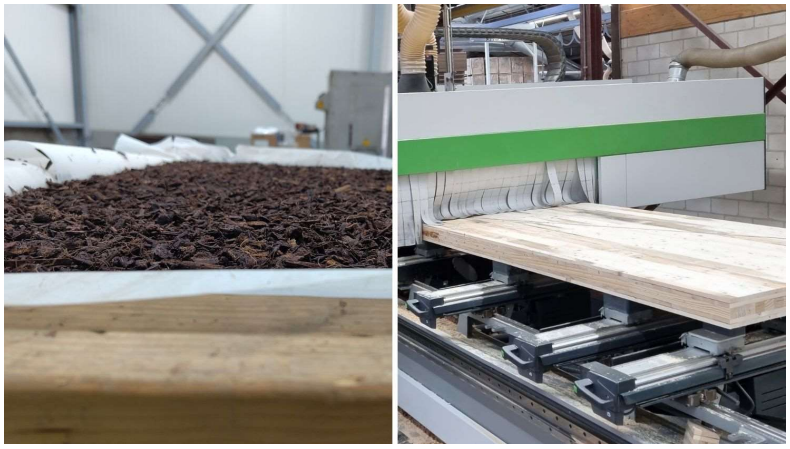
Ron Oorschot – ron.oorschot@tno.nl

BioBuilt/ BBMIC

TNO BioBuilt is a **pilot plant for innovative circular and biobased building materials**, enabling companies, SMES', start-ups, to develop, test, and validate new products before investing in industrial production.

Unique Facilities:

- **Large-format CLT production** from recycled pallet wood– Elements up to 8 × 3 m, up to 40 cm thick
- **3D X-ray CT scanning** of reclaimed wood (dimensions, density, metal detection)
- **Automated metal removal** & moisture screening
- **Vacuum-press gluing** for building element
- **Pilot-scale fibre-to-board processing**, including **binderless pressing** and biobased adhesives using agricultural residues (tomato, pepper plant fibres)
- Integrated **prototype testing & validation** via TNO's Building Innovation Lab



Support for SME's, start-ups/scale-ups

TNO Fast Track gives start-ups, scale-ups, and SMEs fast access and co-funding options.

- **Fast access**: Free intake, quick matching to TNO experts, co-funding options.
- **R&D support**: Independent validation, concept testing, and access to advanced labs & pilot facilities.
- **Guided development**: Expert sessions (standard/XL/lab) and routes into larger R&D programmes.
- **Partnerships**: Connecting to partners, networks, fieldlabs.

Tech infrastructure | The Netherlands

TNO "Innovation for life"

Building Innovation Lab

Focus areas

- Structural testing
- Building materials performance
- Indoor climate & heat pump systems
- Damage & durability assessment
- Road and infrastructure behaviour

Location
Molengraaffsingel 8, 2629 JD Delft

Point of contact
MEC-bouwlab@tno.nl
+31 88 866 30 00

The TNO Building Innovation Lab is a **3,000 m² full-scale testing and validation facility** for construction innovations, combining **three-storey-high test halls**, advanced laboratories and climate chambers. It enables companies to **test materials, components and systems under realistic mechanical and climatic conditions**, supporting safe, reliable and scalable innovation in the built environment.

Digital Twin Lab

Support for SME's, start-ups/scale-ups: TNO Fast Track

Unique Facilities:

- **Large-scale structural testing**: Full-scale halls with high-capacity static & dynamic load setups (up to ~500 tonnes).
- **Climate chambers & HPAC**: Dual indoor/outdoor climate chambers with hardware-in-the-loop testing of heat pumps and ventilation systems.
- **Chemical laboratory**: FT-IR, ICP, DSR, microscopy and thermal analysis for material composition, ageing and failure mechanisms.
- **Damage & durability assessment**: Facilities for fatigue, failure and safety analysis of materials and structural systems.
- **Digital inspection & model validation**: Advanced sensors, high-end data acquisition and configurable test setups linking tests with models.

TSUS, npo „Institute with a tradition since 1953“

Focus areas

- Thermal insulation materials
- Insulation composite systems (ETICS)
- Processing and providing the construction works
- Stability and durability of installed systems

Location

821 04 Bratislava, Studená 967/3

Point of contact

Zuzana Sternova – sternova@tsus.sk

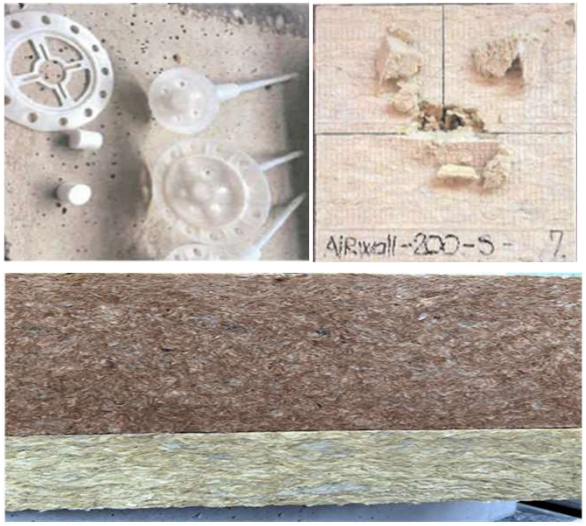
Technology infrastructure

Description

Testing and assessment thermal insulation products and ETICS composed of mineral wool boards

Unique Facilities & Capabilities:

- Testing of essential mechanical characteristics of ETICS component / thermal insulation mineral wool board according to EN 13162 and EAD 040083-01-0404 (see www.eota.eu)
- Testing of ETICS according to EAD 040083-01-0404, e.g. dynamic wind uplift test, fixing strength transverse displacement test with tension load or without tension load, pull-through resistance and static foam block tests– relevant tests for stability of ETICS



How to support SMEs/ interaction with companies/ industry

- Support manufacturers through Voucher – financial support from state, funds
- Support by the implementation at the production process
- Support by providing and installing the products/systems on-site

TSUS, npo „Institute with a tradition since 1953“

Technology infrastructure

Focus areas

- Construction materials
- Cement and Concrete
- Engineering structures
- Mechanical and Chemical properties, Durability

Location

821 04 Bratislava, Studená 967/3

Point of contact

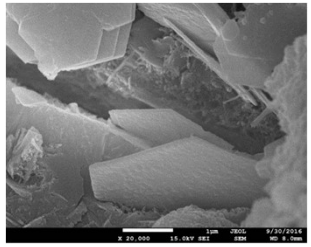
Michal Capay – capay@tsus.sk

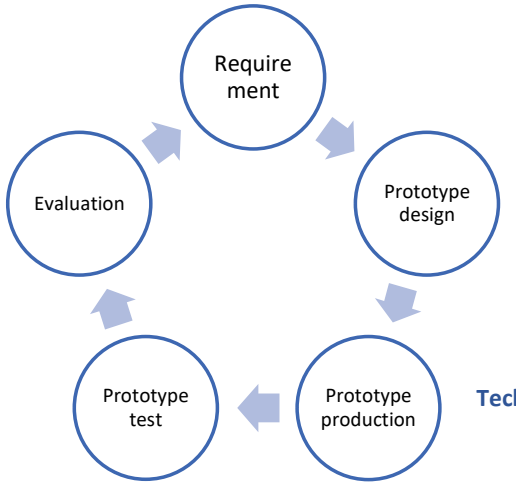
Description

Research activities focused on silicate materials, mainly cement-based.

Unique Facilities & Capabilities:

- production of test mixtures, production of test samples and performance of tests according to STN, EN, EAD, ISO, ASTM
- options of exposing samples to environments in controlled temperature and humidity stress or in chemical stress (Co_2, sulfates, Cl^-)
- preparation of analytical samples, performance of chemical tests and TG-DTA tests with evaluation
- Testing of mechanical and chemical properties on finished products





How to support SMEs/ interaction with companies/ industry

- Support for recycling by encouraging the use of waste materials in construction products.
- Support through training and consultation.
- Support in the implementation of new testing procedures.

VTT "Beyond the obvious"

Clean Air Solutions Lab

Focus areas

- Indoor air quality and condition management and testing
- Air purification and filtering
- Decontamination studies
- Advanced flow simulations

Location
VTT Tampere

Point of contact
Hannu Salmela, hannu.salmela@vtt.fi

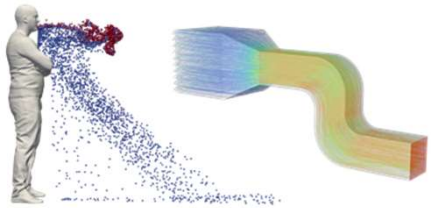
VTT's Clean Air Solutions Lab and related competences are based on long-term experience in airborne contamination control, advanced air filtration technologies, and airflow analysis, as well as modelling, simulation, and measurement.

Unique Facilities:

- Facilities and capabilities for the development of sustainable ventilation, air filtration, and air purification concepts.
- Ensuring healthy and productive indoor environments and market-leading industrial processes
- Tailored filter and ventilation performance evaluation in laboratory facilities or field conditions
- Advanced simulations to resolve and visualize flow and aerosol phenomena
- Tailored measurement systems for in-house R&D needs

Interaction with SMEs/ companies/ industry

- **R&D support**: The aim is to optimize industrial processes for better efficiency and effectiveness, to promote health, well-being and productivity of individuals, and to co-create novel concepts, cleantech products, services and systems.
- **Partnerships:** The joint research with our partners has contributed to improving reliability of industrial processes and to reducing people's exposure to airborne contamination in variety of indoor environments.



VTT "Beyond the obvious"

Focus areas

- Intelligent buildings and energy
- Building automation & control systems
- Monitoring and analysing IEQ and people flow
- Support for circular economy and sustainable construction

Location

VTT FutureHub, Espoo

Point of contact

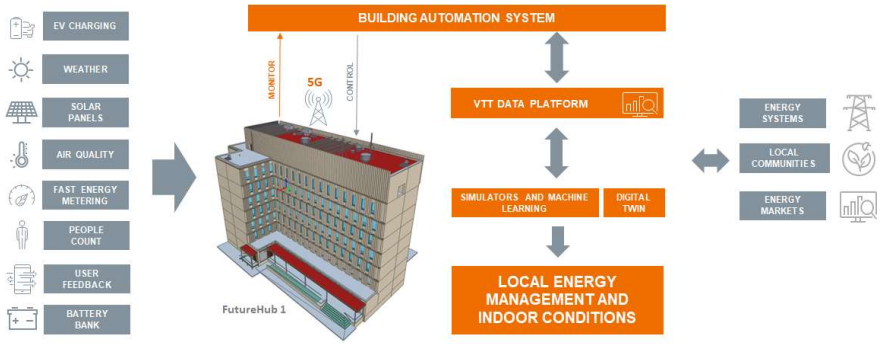
Jari Shemeikka, jari.shemeikka@vtt.fi

FutureHub Living Lab

Located at VTT's head office, a permanent piloting and showcase environment forms a living lab for creating solutions for healthy, comfortable, adaptable, resilient and energy efficient buildings which can reduce CO2-emissions and optimize local energy production, storing, selling & buying energy and operate in the energy markets.

Unique Facilities & Capabilities:

- The lab utilizes digital enabling technologies like AI, 5G, sensors, edge computing, IoT, BIM, and DLT along with digital twins, data analytics, online simulators, smart algorithms, monitoring and control systems, forecasts, and data integration tools.
- Digital infrastructure enabling the analytical digital services in the building research, turning building performance data into decisions.
- 3D BIM based digital twin for monitoring and analysing IAQ.



Interaction with SMEs/ companies/ industry

- **R&D and partnerships:** Together with companies and partners, FutureHub Living Lab acts as a research instrument for developing new replicable AI and digital twin powered digital solutions for smart grid connected buildings in numerous co-financed and commercial (R&D) projects.

Tech infrastructur Slovenia

ZAG "Knowledge that leaves a trace"

GreenHer CENTRE OF EXCELLENCE

ZAG

Focus areas

- Heritage & Sustainable Transition
- Resilience of Structures
- AI for Infrastructure Management
- Circular Economy in Construction

Location
Dimičeva ulica 12, 1000 Ljubljana
Slovenia

ZAG representative to ENBRI
Andrej Anžlin – andrej.anzlin@zag.si

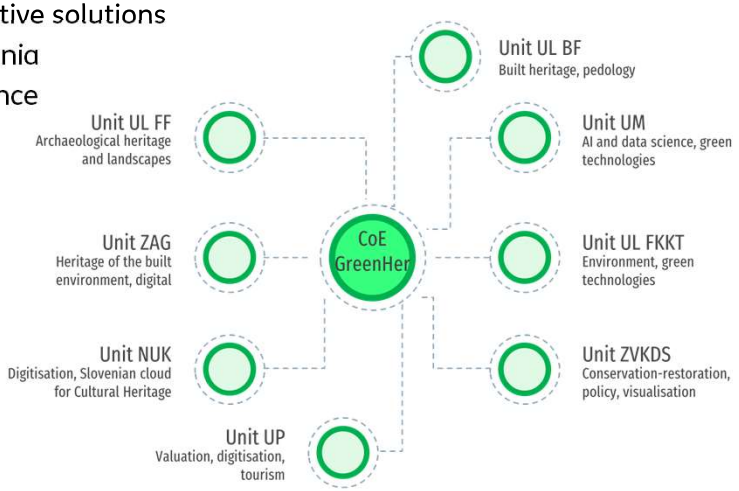
Becoming leading European hub!

1st Slovenian Research Centre dedicated to interdisciplinary green heritage science | est 2025/10

Research Cores

- **Green Conservation & Built Heritage**
- **Sustainable Landscapes & Heritage Management**
- **Values & Participatory Engagement**
- **Digital Heritage**

- Pilot project environment enabling testing, validation and scaling of innovative solutions
- 8 partners from Slovenia
- International Excellence
  - UCL London
  - CNR Italy



ZAG "Knowledge that leaves a trace"

Focus areas

- Heritage & Sustainable Transition
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- AI for Infrastructure Management
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Location
Dimičeva ulica 12, 1000 Ljubljana
Slovenia

ZAG representative to ENBRI
Andrej Anžlin – andrej.anzlin@zag.si

Fire Laboratory and Fire Engineering

- **Largest Fire Laboratory in the Region"**
  - 3,500 m² facility — the only one of its kind in this part of Europe
  - Total investment: ~€11 million
  - Vertical furnace up to 3×3 m and horizontal furnace up to 3×4 m
  - Hydraulic loading system for full-scale structural element testing

ENBRI Board Members

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ENBRI