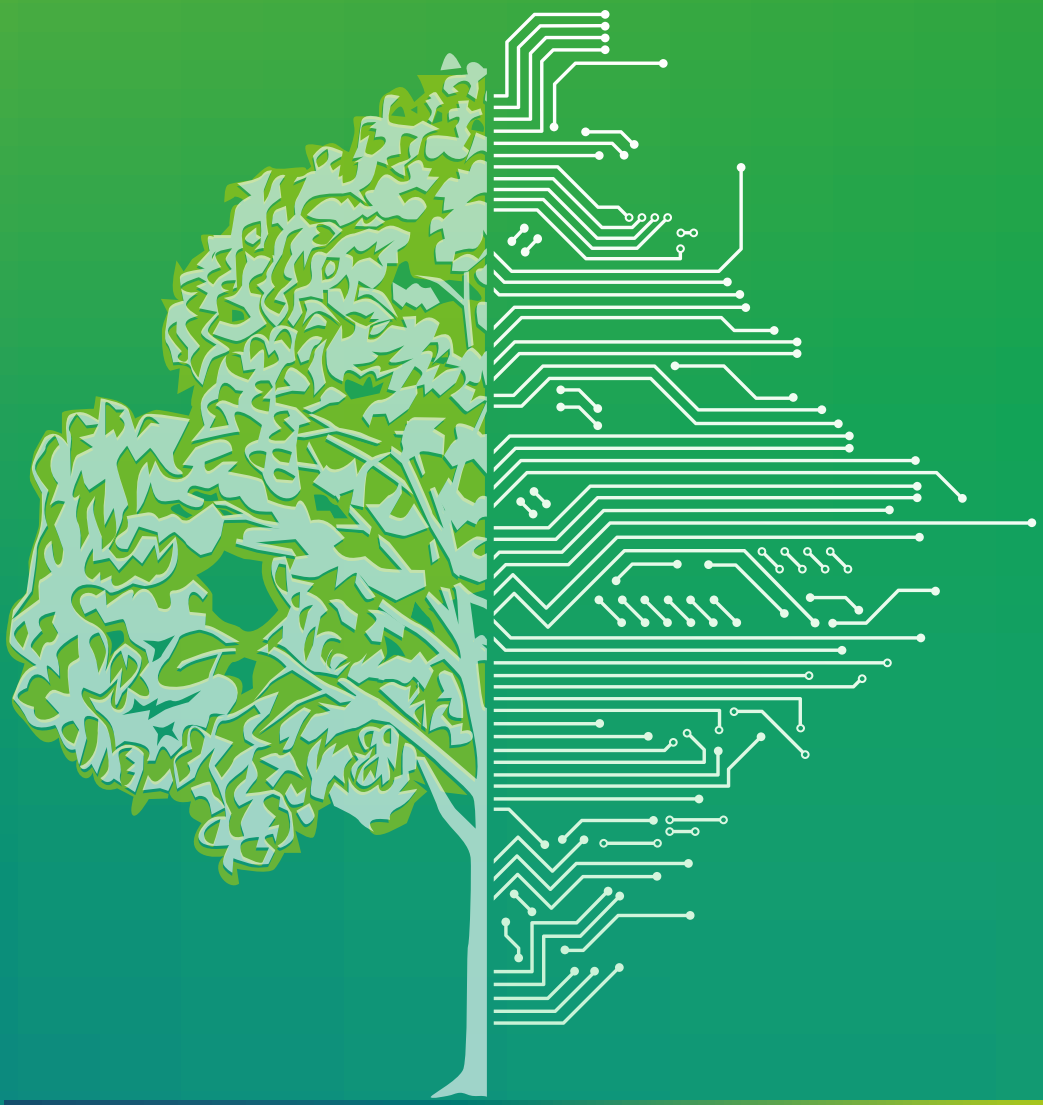
Fraunhofer WKI



Annual Report 2025/26 | Tätigkeitsbericht 2025/26

80 years and counting



Annual Report 2025/26 | Tätigkeitsbericht 2025/26

Wood is durable – just like us

Holz ist langlebig – so wie wir



Greeting

Dear colleagues and partners,

In 2026, the Fraunhofer WKI celebrates its 80th anniversary. Initially, the WKI was established as a research institution of the Association for Technical Issues Related to Wood (VTH, now iVTH), founded in 1946. In the 1970s, the Wilhelm-Klauditz-Institute WKI, named after our founding director, became a member of the Fraunhofer-Gesellschaft.

Anniversaries inspire retrospection and foresight, intertwined with questions about what has been and what lies ahead. Recently, I have been captivated by the concept of "Wood Intelligence" when reflecting on the future. We discussed this during our last meeting of the "HolzForschung Deutschland" network – a new initiative aimed at increasing visibility as a scientific association – in relation to the funding body DFG. By "Wood Intelligence," we mean an old utopia of capturing all the essential properties of wood as a material and resource, in all its heterogeneity and inhomogeneity, across length scales from nanometers to centimeters, in a machine-readable database. In the digital age and with modern AI methods such as RAG (Retrieval-Augmented Generation: applying the principles of large language models to extensive but specific knowledge sources such as databases and documents), this utopia can now evolve into a vision – and perhaps a concrete goal – to make engineering work with wood even more efficient by integrating old and new knowledge into a digitally usable framework.

In the context of both retrospection and foresight, "Wood Intelligence" also continues to embody the unique functional integration of material and structure for me. From the passive reaction mechanisms resulting from this, such as the anisotropic swelling and shrinking of wood, knowledge has historically been derived to turn "deficiencies" into usable properties. The principle of turning "flaws" into technological added value and ultimately into innovations is an old approach that is as modern as ever.

Wood was a scarce resource at the time of the WKI's founding, and it remains scarce today – an in-demand commodity as an essential part of our ecosystem and a central pillar of a value-creating, circular bioeconomy. Research questions will not diminish in the coming years and at the same time, we are well-advised to value, teach, and make the knowledge of the past usable.

While forewords may touch on possible futures, activity reports address the here and now. I hope you enjoy reading a selection of our current project reports.

With best wishes,

Raoul Klingner
Director of the Fraunhofer WKI

Grußwort

Liebe Leserinnen und Leser,

im Jahr 2026 feiert das Fraunhofer WKI sein 80-jähriges Bestehen. Als WKI wurde es seinerzeit ausgegründet als Forschungsstelle des ebenso 1946 gegründeten Vereins für technische Holzfragen (VTH heute iVTH). In den 70er Jahren ist das nach unserem Gründungsdirektor benannte Wilhelm-Klauditz-Institut WKI dann Mitglied der Fraunhofer-Gesellschaft geworden.

Jubiläen inspirieren zu Rückschau und Vorausblick, verbunden mit der Frage, was war und was noch kommen wird. Im Vorausblick verfing bei mir zuletzt der Begriff »Wood Intelligence«. Wir haben diesen diskutiert bei unserem letzten Treffen der »HolzForschung Deutschland«, einem jungen Netzwerk, das u. a. das Ziel verfolgt, als wissenschaftliche Vereinigung im Sinne einer Fachgesellschaft gegenüber dem Fördergeber DFG sichtbarer zu werden. Unter dem Begriff »Wood Intelligence« verstanden wir dabei die alte Utopie, alle wesentlichen Eigenschaften von Holz als Material und Werkstoff, in all seiner Heterogenität und Inhomogenität über Längenskalen vom Nanometer bis zum Zentimeter, maschinenlesbar in einer Datenbank abzubilden. Im digitalen Zeitalter und mit modernen KI-Methoden wie RAG (Retrieval-Augmented Generation: Anwendung der Prinzipien großer Sprachmodelle auf umfangreiche, aber konkrete Wissensquellen wie Datenbanken und Dokumente) kann aus dieser Utopie heute eine Vision, womöglich das konkrete Ziel werden, ingenieursmäßiges Arbeiten mit Holz noch effizienter zu machen, indem altes und neues Wissen vereint und digital nutzbar gemacht wird.

Im Kontext einer Rückschau und eines Vorausblicks bedeutet »Wood Intelligence« für mich auch weiterhin dessen einzigartige Funktionsintegration in Material und Struktur. Aus daraus resultierenden passiven Reaktionsmechanismen wie dem anisotropen Quellen und Schwinden wurden bereits in der Vergangenheit durch Wissen aus »Mängeln« nutzbare Eigenschaften abgeleitet. Das Prinzip aus »Fehlern« technologische Mehrwerte und letztlich Innovationen zu machen, ist ein altes, das moderner nicht sein könnte.

Holz war ein knappes Gut zur Zeit der Gründung des WKI und es ist heute ein knappes Gut, ein nachgefragter Rohstoff: als essenzieller Teil unseres Ökosystems ebenso wie zentraler Pfeiler einer wertschöpfenden, zirkulären Bioökonomie. Uns werden die Forschungsfragen in den kommenden Jahren nicht ausgehen, und gleichzeitig tun wir gut daran, das Wissen aus der Vergangenheit zu schätzen, zu lehren und nutzbar zu machen.

Während Vorworte mögliche Zukünfte streifen können, befassen sich Tätigkeitsberichte mit dem Hier und Jetzt. Viel Freude bei der Lektüre einer Auswahl unserer aktuellen Arbeiten.

Mit besten Grüßen,

Ihr Raoul Klingner
Institutsleiter des Fraunhofer WKI

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Flax fibers and sensor wire

... for condition monitoring of asphalt roads
» Page 23.

Institute with Profile

Since its establishment in 1946, sustainability has always been a key focus of the Fraunhofer WKI.

The founder and eponym of the Fraunhofer WKI, Dr. Wilhelm Klauditz, sought innovative ways in which to make optimal use of the available raw wood, which was in short supply due to the war, and to make waste wood and low-quality wood technically usable. He is considered a co-founder of the modern wood-based materials industry.

The founding principles of that time are more relevant than ever today, although the circumstances have changed. Resource scarcity and climate change are altering the supply of raw materials and compelling us to transition from a linear to a circular economy – to a circular bioeconomy. "Reduce, Reuse, and Recycle" are today's buzzwords when addressing scarcity.

At the Fraunhofer WKI, we take a holistic approach to renewable resources, covering their entire lifecycle from production to recycling. We develop and optimize biomaterials and other materials derived from renewable resources and analyze their environmental impact. Our research focuses on hybrid systems, fiber-reinforced biocomposites, innovative adhesive systems, and functional coatings. Our services range from materials, component and process development, material-recycling technologies and lifecycle analysis, to indoor quality. Our goal thereby is always to successfully translate the solutions we develop – often in collaboration with partners – into practical applications and bring them to market.

The Fraunhofer WKI client base encompasses companies from a wide range of industries, including wood and furniture, construction, chemicals, packaging, and automotive. Our research and development activities help strengthen their competitiveness, and we provide support through research-intensive services and consulting, as well as knowledge transfer via our **WKI | AKADEMIE®**.

As an accredited testing body, the Fraunhofer WKI performs tasks related to materials testing and quality control. It assesses damage cases and provides advice on issues concerning damage restoration. For quality assurance and the examination of wood products and other materials, a unique portfolio of sophisticated testing methods is available.

Through our collaborative networks in Hanover and Wolfsburg, we address the important field of fiber-reinforced composites. The Center for Light and Environmentally-Friendly Structures ZELUBA® in Braunschweig serves as our platform for intensive and strategic collaboration with the Technische Universität Braunschweig in the field of timber construction. In close proximity, all relevant academic expertise sources and institutes are united here with the services offered by the Fraunhofer WKI in order to collaboratively develop future-oriented solutions and to jointly offer a unique range of services for the construction industry.

Since October 2024, Professor Dr. Raoul Klingner has headed the Fraunhofer WKI; since May 2026, he has held the full professorship in Organic and Wood-Based Materials at the TU Braunschweig. Professor Dr. Tunga Salthammer serves as his deputy. The Institute was incorporated into the Fraunhofer-Gesellschaft in 1972 and, with currently around 170 employees and an operating budget of just over 19.6 million euros, is one of the largest institutions for applied wood research in Europe. Set on a site of approximately 9,000 m², the Institute comprises offices, laboratories, a technical center, and workshops for conducting contract research.

The Fraunhofer WKI is a member of, amongst others, the Fraunhofer Group for Materials and Components - MATERIALS and the Fraunhofer Building Innovation Alliance. Within the Fraunhofer-Gesellschaft, the Fraunhofer WKI occupies a unique position thanks to its holistic research approach to the material utilization of wood and lignocellulosic materials.

Nachhaltigkeit steht seit seiner Gründung im Jahre 1946 im Fokus des Fraunhofer WKI.



Gründer und Namensgeber des Fraunhofer WKI, Dr. Wilhelm Klauditz, suchte nach innovativen Wegen, um das kriegsbedingt knappe Rohholzangebot optimal zu verwerten und Abfall- und Schwachholz technisch nutzbar zu machen. Er gilt als Mitbegründer der modernen Holzwerkstoffindustrie.

Die Gründungsthemen von damals sind heute, unter anderen Vorzeichen, aktueller denn je. Ressourcenknappheit und Klimawandel verändern das Rohstoffangebot und zwingen uns zu einer Transformation vom linearen zum zirkulären Wirtschaften, zu einer zirkulären Bioökonomie. »Reduce, Reuse and Recycle« sind die heutigen Schlagworte für den Umgang mit Knappheit.

Am Fraunhofer WKI betrachten wir nachwachsende Rohstoffe in diesem Selbstverständnis von der Produktion bis zum Recycling. Wir entwickeln und optimieren Biomaterialien und Werkstoffe aus nachwachsenden Rohstoffen und analysieren deren Umweltwirkung. Wir forschen zu hybriden Systemen, faserverstärkten Biokompositen, neuartigen Klebstoffsystemen und funktionalen Beschichtungen. Unser Leistungsangebot reicht von der Material-, Bauteil- und Prozessentwicklung, werkstofflichen Recyclingverfahren bis zu Lebenszyklusanalysen und der Innenraumluftqualität. Es ist dabei stets unser Ziel, die von uns oft mit Partnern entwickelten Lösungen erfolgreich in eine konstruktive Anwendung und den Markt zu überführen.

Zu den Kunden des Fraunhofer WKI zählen Unternehmen aus der Holz- und Möbelwirtschaft, der Bauwirtschaft, der chemischen Industrie, der Verpackungs- und der Fahrzeugindustrie. Wir stärken mit Forschung und Entwicklung ihre Wettbewerbsfähigkeit, unterstützen mit forschungsintensiver Dienstleistung und Beratung sowie Wissenstransfer über unsere **WKI | AKADEMIE®**.

Als akkreditierte Prüfstelle nimmt das Fraunhofer WKI Aufgaben der Materialprüfung und Qualitätsüberwachung wahr. Es begutachtet Schadensfälle und berät in Fragen der Schadenssanierung. Zur Qualitätssicherung und Untersuchung von Holzprodukten und anderen Materialien steht ein einzigartiges Portfolio anspruchsvoller Prüfmethoden zu Verfügung.

An unseren Standorten und Kooperationsnetzwerken in Hannover und Wolfsburg bearbeiten wir den wichtigen Bereich der Faserverbundwerkstoffe. Das Zentrum für leichte und umweltgerechte Bauten ZELUBA® in Braunschweig ist unsere Plattform für eine enge und strategische Zusammenarbeit mit der Technischen Universität Braunschweig im Bereich des Holzbaus. In unmittelbarer räumlicher Nachbarschaft kommen dort alle relevanten universitären Kompetenzen und Institute mit dem Leistungsangebot des Fraunhofer WKI zusammen, um kollaborativ an Zukunftslösungen zu arbeiten und gemeinsam ein einzigartiges Leistungsangebot für die Bauwirtschaft anzubieten.

Seit Oktober 2024 leitet Professor Dr. Raoul Klingner das Fraunhofer WKI, seit Mai 2025 hat er die ordentliche Professur für Organische Baustoffe und Holzwerkstoffe an der TU Braunschweig inne. Als sein Stellvertreter fungiert Professor Dr. Tunga Salthammer. Das Institut wurde 1972 in die Fraunhofer-Gesellschaft aufgenommen und gehört mit derzeit rund 170 Mitarbeitenden und einem Betriebshaushalt von gut 19,6 Millionen Euro zu den größten Einrichtungen für angewandte Holzforschung in Europa. Auf rund 9 000 m² stehen Büros, Labore, Technikum und Werkstätten zur Bearbeitung der Forschungsaufträge zur Verfügung.

Das Fraunhofer WKI ist u. a. Mitglied im Verbund Werkstoffe, Bauteile – MATERIALS und in der Allianz Bau. Innerhalb der Fraunhofer-Gesellschaft verfügt das Fraunhofer WKI mit seinem ganzheitlichen Forschungsansatz zur stofflichen Nutzung von Holz und lignocellulosen Materialien über eine Alleinstellung.

Our DNA

Vision

The Fraunhofer WKI is a globally recognized research partner for the utilization of wood and renewable raw materials within a circular bioeconomy.

Mission

We develop sustainable materials and components from renewable resources.

Co-operation

The dynamics of change and the future prospects of today's society are driven by the transformative megatrends of sustainability and digitalization.

Since its founding in 1946, the Fraunhofer WKI has conducted applied research in the field of sustainable material utilization of renewable raw resources and, drawing on the knowledge thereby gained, has collaborated with industry to develop new materials, products, services, and technologies.

Wood – like many other naturally occurring lignocellulosic materials – combines exceptional performance with a tremendously high degree of complexity in its biological, chemical, and physical structure and behavior. In all their facets – from chemical applications, through industrial and structural uses, and on to recycling – these materials are key components for sustainable development. In increasingly digitalized value chains, digital representations now enable entirely new interdisciplinary solutions.

The effective use of complex materials based on these raw resources requires highly specialized expertise encompassing a broad spectrum of disciplines in the natural and engineering sciences. The Fraunhofer WKI therefore pursues a consistently collaborative approach, working across disciplines internally, in close local partnership with the TU Braunschweig, with sister institutes within the Fraunhofer-Gesellschaft that offer complementary expertise, and through selected international excellence partnerships in order to develop interdisciplinary, holistic solutions at the highest level.

Unser Selbstverständnis

Vision

Das Fraunhofer WKI ist weltweit anerkannter Forschungspartner für die Nutzung von Holz und nachwachsenden Rohstoffen in einer zirkulären Bioökonomie.

Mission

Wir entwickeln nachhaltige Werkstoffe und Bauteile aus erneuerbaren Ressourcen.

Kooperation

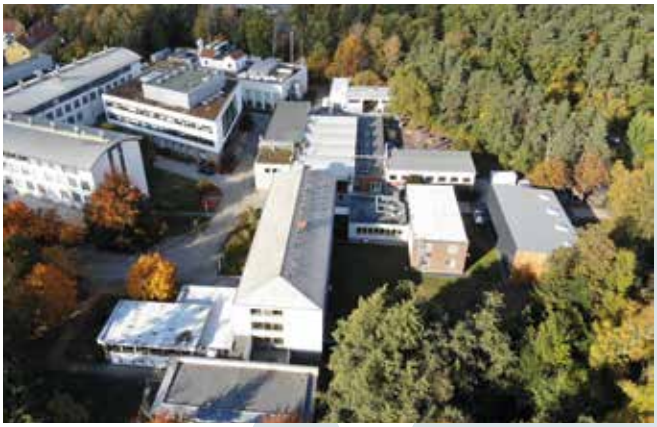
Die Veränderungsdynamik und Zukunftsperspektive unserer heutigen Gesellschaft werden geprägt durch die transformativen Megatrends der Nachhaltigkeit und Digitalisierung.

Das Fraunhofer WKI forscht seit Institutsgründung 1946 anwendungsorientiert an der nachhaltigen stofflichen Nutzung nachwachsender Rohstoffe und entwickelt aus den gewonnenen Erkenntnissen gemeinsam mit der Industrie neue Materialien, Produkte, Dienstleistungen und Technologien.

Holz - wie viele weitere lignocellulosehaltigen Materialien der Natur - verbindet eine enorme Leistungsfähigkeit mit höchster Komplexität in dessen biologischer, chemischer und physikalischer Struktur und Wirkung. Die Materialien sind in allen Facetten, von der chemischen Anwendung, über die industrielle und konstruktive Nutzung bis zum Recycling, Schlüsselwerkstoffe für eine nachhaltige Entwicklung. In zunehmend digitalisierten Wertschöpfungsketten ermöglichen digitale Abbilder heute völlig neue interdisziplinäre Lösungsmöglichkeiten.

Zur effektiven Nutzung komplexer Materialien auf Basis dieser Rohstoffe sind hochspezialisierte Kenntnisse nötig, deren Spannbreite viele Disziplinen der Natur- und Ingenieurwissenschaften umfasst. Das Fraunhofer WKI verfolgt daher einen konsequent kollaborativen Ansatz, um intern fachübergreifend, in enger lokaler Zusammenarbeit mit der TU Braunschweig, mit komplementär aufgestellten Schwester-Instituten der Fraunhofer-Gesellschaft sowie in ausgewählten internationalen Exzellenz-Partnerschaften interdisziplinäre und ganzheitliche Lösungen auf höchstem Niveau zu erarbeiten.

Our locations | Unsere Standorte



Fraunhofer Institute for Wood Research

Wilhelm-Klauditz-Institut WKI
Riedenkamp 3
38108 Braunschweig



Fraunhofer Center Circular Economy for Mobility (CCEM)

c/o Open Hybrid LabFactory e. V.
Hermann-Münch-Str. 2
38440 Wolfsburg

Hannover

Wolfsburg

Braunschweig



Fraunhofer WKI

HNT Group ZirTex
Heisterbergallee 10A
30453 Hannover



Fraunhofer WKI

Center for Light and Environmentally-Friendly Structures
ZELUBA®
Beethovenstraße 51 F
38106 Braunschweig

Organization Chart | Organigramm

Director

Prof. Dr.
Raoul Klingner

Deputy Director

Prof. Dr.
Tunga Salthammer

Technology for Wood and Natural Fiber-Based Materials
Dr. Dirk Berthold

Material Analysis and Indoor Chemistry
Dr. rer. nat. Alexandra Schieweck

Binders and Coatings
Dr. Steven Eschig

Quality Assessment
Harald Schwab

Center for Light and Environmentally-Friendly Structures®
Prof. Dr. Libo Yan

Communication
Raoul Klingner

General Administration
Ulrike Holzhauer

Information Technology
Andreas Schlechtweg

Technical Services
Stephan Thiele

Board of Trustees | Kuratorium

The Board of Trustees of the Fraunhofer WKI, which consists of qualified scientists and experts from industry, authorities and institutions, examines the research activities and advises the Institute's Management as well as the Executive Board of the Fraunhofer-Gesellschaft.

Das Kuratorium des Fraunhofer WKI, dem kompetente Wissenschaftlerinnen und Wissenschaftler sowie Expertinnen und Experten aus Industrie, Behörden und Institutionen angehören, begutachtet die Forschungsaktivitäten und berät die Institutsleitung sowie den Vorstand der Fraunhofer-Gesellschaft.

Dr. Markus Boos
CEO Bernhard Remmers Institut für Analytik, Löningen | Germany

Christine Dübler
CSO ZwickRoell GmbH & Co. KG, Ulm | Germany

Dorothee Flötotto
CEO Sauerländer Spanplatten GmbH & Co. KG, Arnsberg | Germany

Prof. Dr. Eva Frühwald Hansson
Lund University, Faculty of Engineering | Sweden

Dipl.-Ing. Kai Greten | Chair
CEO Leitz GmbH, Oberkochen | Germany

Prof. Dr. Joachim Hasch
Eberswalde University for Sustainable Development, Eberswalde | Germany

Dr. Jörg Hasener
Innovation Manager, Fagus-GreCon Greten GmbH & Co. KG, Alfeld (Leine) | Germany

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Head of Division, Ministry for Science and Culture of Lower Saxony, Hanover | Germany

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President of the Technical University of Braunschweig | Germany

Dr. Helge Kramberger
CEO Dr.-Robert-Murjahn-Institut GmbH, Ober-Ramstadt | Germany

Prof. Dr. Andreas Krause
Head of Thünen Institute of Wood Research, Hamburg | Germany

Larissa Kuntz, M. Sc.
CEO elka-Holzwerke GmbH, Morbach | Germany

Dr. Klaus Merker
President, Niedersächsische Landesforsten, Braunschweig | Germany

Prof. Dr. Holger Militz
Georg-August-Universität Göttingen, Wood Biology and Wood Products, Forest Science and Forest Ecology | Germany

Prof. em. Dr. Klaus Richter
Technical University of Munich | Germany

Anemon Strohmeyer
CEO German Wood-Based Panel Association (VHI), Berlin | Germany

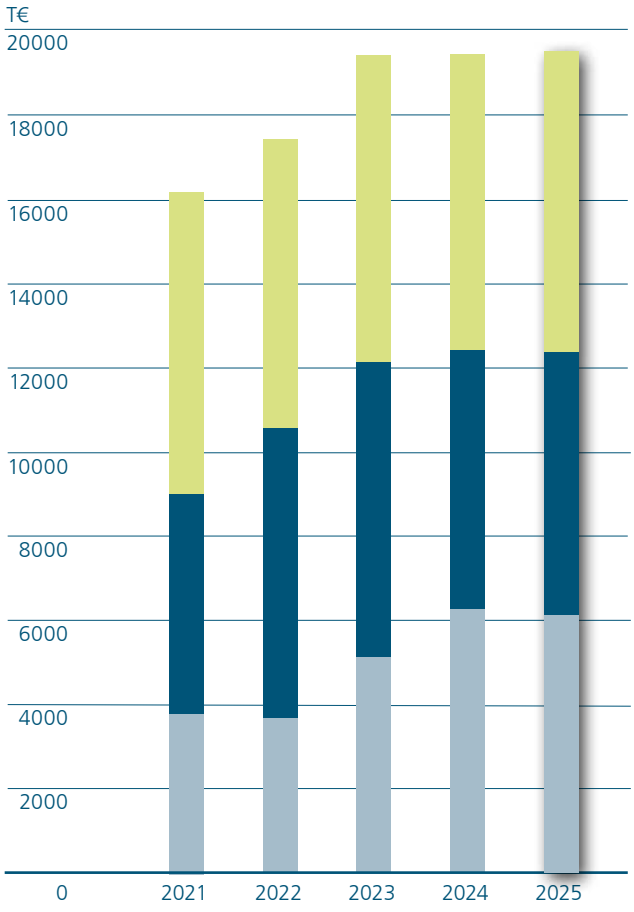
Dr. Stephan Weinkoetz
BASF SE, Ludwigshafen | Germany

MR'in a. D. Dr. jur. Birgit Wolz
Bonn | Germany

Status: April 2026

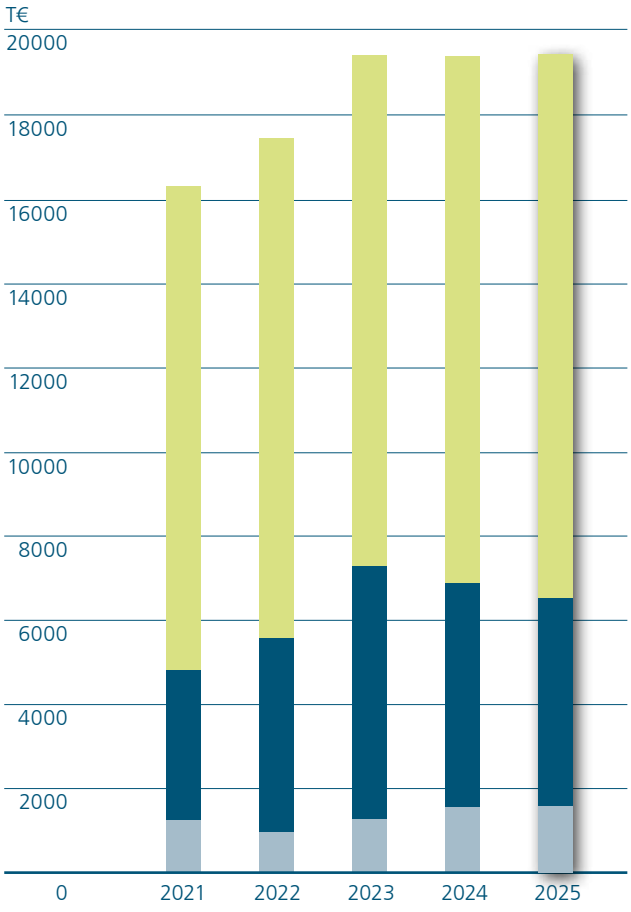
Figures / Data / Facts | Zahlen / Daten / Fakten

Revenue Structure | Ertragsstruktur



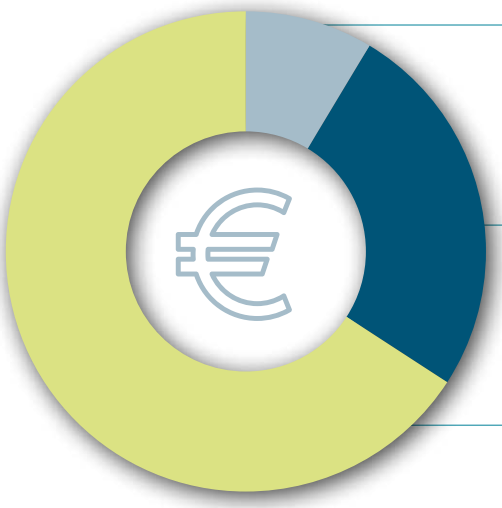
Industrial revenues | Wirtschaftserträge
Public revenues | Öffentliche Erträge
Internal programs and base funding | Interne Programme und Grundfinanzierung

Budget and Investments | Betriebshaushalt und Invest



Personnel | Personalkosten
Materials | Sachkosten
Investments | Investitionen

19.6 Mio. €
Overall budget
Gesamthaushalt

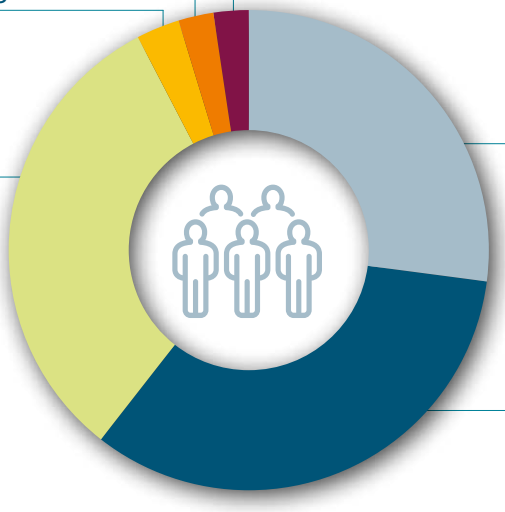


1.7 Investments
Investitionen

5.0 Material costs
Sachkosten

12.9 Personnel costs
Personalkosten

170
Employees
Mitarbeitende



Communication 4
Kommunikation

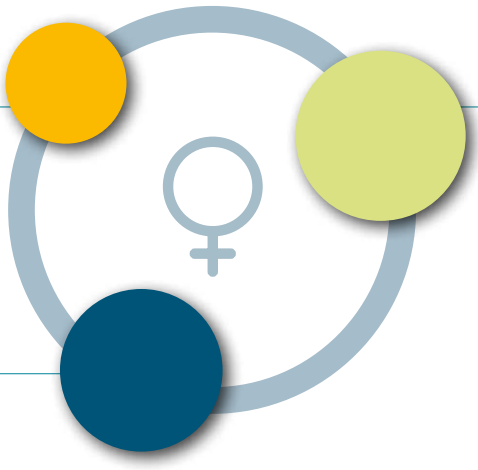
Information Technology 5
Informationstechnologie

Non-academic staff 54
Nicht-wissenschaftliches Personal

4 Apprentices
Auszubildende

46 Scientists
Wissenschaftler:innen

57 Laboratory and Technology
Labor und Technik



Female research associates 31 %
Wissenschaftliche Mitarbeiterinnen

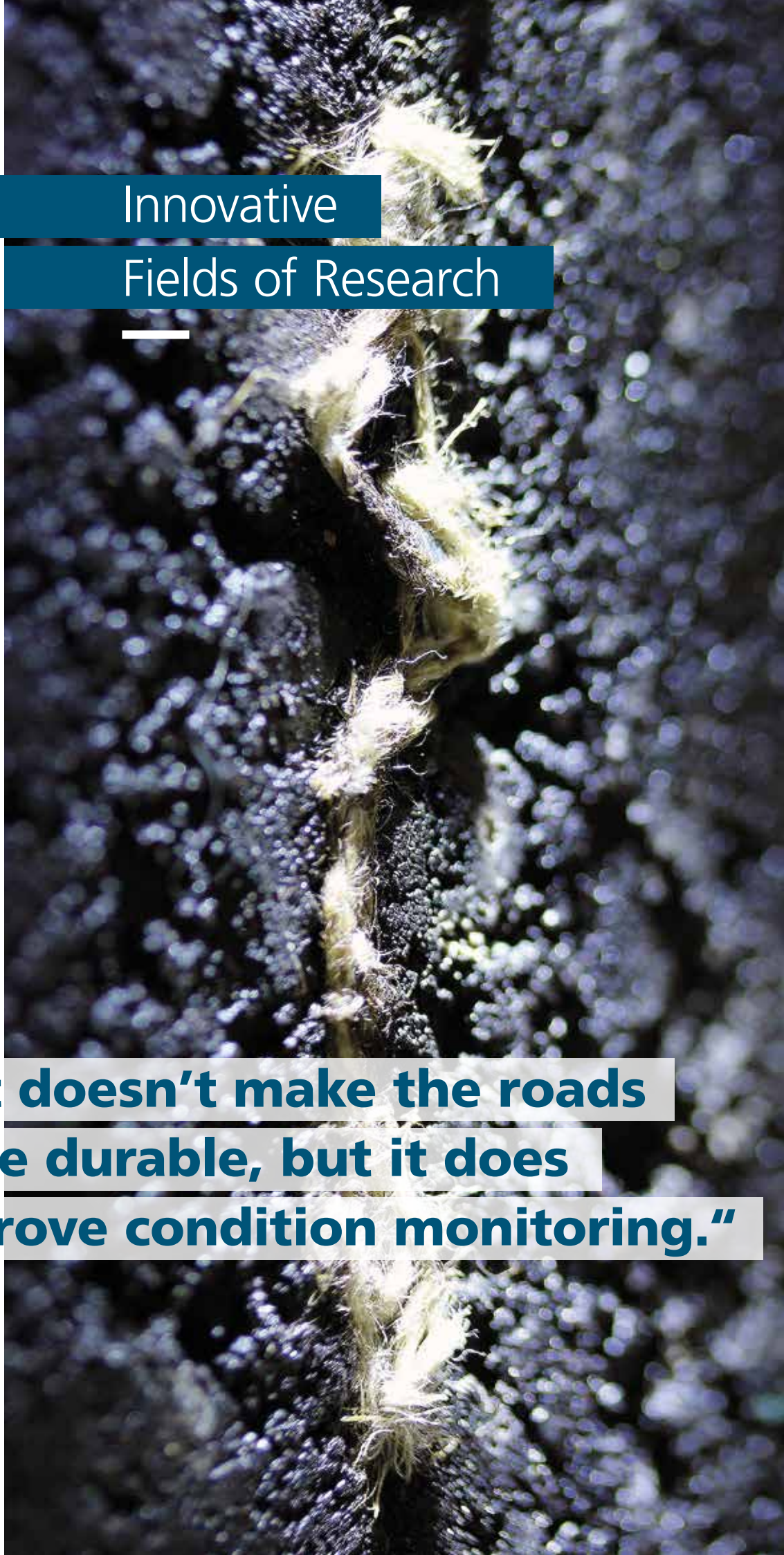
Women in leadership positions 43 %
Frauen in Führungspositionen

45 % Total percentage
Frauenanteil gesamt

45 %
Women Frauen

Status: December 2025

Innovative Fields of Research



“That doesn’t make the roads more durable, but it does improve condition monitoring.“

Christina Haxter

Fraunhofer WKI
Project Manager

Materials made from wood and natural fibers – sustainable, functional and future-oriented



In our "Technology for Wood and Natural Fiber-Based Materials" department (HNT), we work with you on the development of tomorrow's materials. Whether classic wood-based materials, hybrid materials, biocomposites or 3D-formed components – we design sustainable solutions with superior functionality.

Our research spectrum ranges from raw-material characterization, through material development, and on to complex overall solutions for products, components and semi-finished goods. We thereby provide support throughout the entire development process – from the selection of suitable raw resources, through the production and processing of materials, and on to material-appropriate design, simulation, ecological evaluation and product maturity.

Since January 2026, the former Application Center HOFZET at the external site in Hanover has been part of the Technology for Wood and Natural Fiber-Based Materials department, as a new group under the name Circular Composite Materials and Textiles "ZirTex".

Our main focuses:

- Process engineering for wood-based materials and alternative raw materials
- New, hybrid (bio-) composite materials
- Development of thermoplastic, extruded, short-fiber-reinforced compounds and components
- Production and processing of textile semi-finished products into thermoset and thermoplastic composites
- Application of cellulose-based fibers, yarns and fabrics, biopolymers and recyclates
- Formaldehyde-free bonding of wood-based materials
- Recycling of waste wood and (bio)plastics and composites
- Measurement technology
- Raw-material analysis and modification

What set us apart:

- Holistic approach: From raw-resource preparation through to the finished material, we map the entire process chain – with a practical and industry-oriented approach.
- Focusing on sustainability: We research formaldehyde-free binders, efficient recycling processes for waste wood and biocomposites, and non-destructive testing methods.
- Technology meets practice: Our technical facilities enable realistic developments and tests – ideal for the transfer to industrial applications.
- Keeping an eye on quality: We utilize image-processing methods in order to ensure process stability and product quality.

You would like to develop materials that are both ecological and efficient?
Then we are the right partner for you.

Head of Department

Dr. Dirk Berthold
Phone +49 531 2155-452
dirk.berthold@
wki.fraunhofer.de



Indoor air quality – product emissions

Head of Department

Dr. Alexandra Schieweck
Phone +49 531 2155-924
alexandra.schieweck@
wki.fraunhofer.de



Our Material Analysis and Indoor Chemistry department is dedicated to the pollutants in indoor environments and in measurements of emissions from consumer-oriented products. We thereby examine a wide range of items – from wood-based materials, through plastics and construction products, and on to components from the automotive, electronics, aviation and food industries.

What we do?

- Analysis of indoor air: We examine real environments in homes, public buildings, schools, museums and means of transportation – with a focus on indoor climate, indoor air quality, (bio-)aerosols, particles and odours.
- Development of innovative test methods: This includes analytical procedures and sampling methods for emerging indoor pollutants (such as VVOCs, PFAS), and olfactory testing.
- Measurement of particles and (bio)aerosols: We record the size, model the distribution of (bio)aerosols in indoor air and evaluate the efficiency of air cleaning technologies.
- Simulation of complex indoor environments: We develop and modify model systems to simulate indoor air quality based on climate data, building physics, indoor emission sources, and chemical-physical interactions.

We actively contribute our expertise through participation in expert committees and maintain close collaborative relationships with national and international research institutions.

Sustainable binding, protection and design

Head of Department

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In our "Binders and Coatings" department, we develop innovative, bio-based solutions – from paints and adhesives, through printing inks, and on to materials for 3D printing. Our raw materials: vegetable oils, sugar, lignin and other plant-based residual materials. Our aspiration: sustainability, functionality and practicality.

Our range of services – your added value

- From synthesis through to application: We provide you with support throughout the entire development process – from formulation through to processing.
- Focusing on wood: In addition to adhesives for wood and wood-based materials, we also develop coatings that protect wood against weathering, abrasion and fire.
- Damage analysis included: We clarify cases of damage to coated wood, adhesives and wood-based materials – quickly and reliably.
- Rethinking printing inks: We replace health-endangering components with environmentally-friendly alternatives – for the most diverse printing processes.
- Additive manufacturing: We develop innovative polymers for UV-curing and thermoplastic 3D printing processes.

Our developments are supplemented by standardized testing procedures, damage analyses and methods for the evaluation and optimization of weather resistance. In collaboration with our partners, we are working on the binding agents of the future – for a bio-based and recyclable world of materials.

Reliable quality – tested, developed, disseminated

Our "Quality Assessment" department combines three strong pillars: Testing, monitoring and certification; research and development; and knowledge and technology transfer. The focus is on load-bearing bonded joints, wood-based materials and formaldehyde. As a certified testing, monitoring and certification body, we are in demand both nationally and internationally.

Our main focuses:

- Certification and monitoring in the fields of: Wood-based materials and solid wood, timber construction, and building elements
- Testing of adhesives for load-bearing timber components
- Mechanical properties and formaldehyde determination in wood and wood-based materials
- Proof of suitability for load-bearing bonded joints – including in-house testing and construction-site monitoring in accordance with DIN 1052-10
- Damage analyses, testing and expert assessment reports for wood and wood-based material

Our scientific expertise provides the foundation for R&D projects in the areas of:
Load-bearing bonded joints and mechanics and formaldehyde test methods. We evaluate and optimize bonding processes in load-bearing timber construction and develop new wood-based hybrid materials – thereby always keeping safety, sustainability and practicality in mind.



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Lightweight, sustainable, future-oriented – responsible construction

At the "Center for Light and Environmentally-Friendly Structures ZELUBA®", we develop sustainable solutions for the construction industry. In collaboration with our partners from the wood-based materials, construction and manufacturing sectors, we design new materials and components for the buildings of tomorrow.

What we do for you – from research through to application:

- Science meets practice: Our focus is on the transfer of fundamental research into practical applications in the construction sector.
- Holistic thinking: We combine building-physics and structural-engineering methods, thereby taking into consideration the entire life cycle of a product.
- Digital and dynamic: With the aid of modern computer models, we analyze structural behavior and vibrations.
- Diverse solutions: Our spectrum ranges from innovative materials, through complex questions of detail, and on to comprehensive construction-material systems – including recycling.
- Rethinking fire protection: We develop reactive fire-protection systems that improve the behavior of construction materials in the event of fire and increase the fire resistance of building elements.



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“Lignin-based foam harnesses lignin's natural bonding properties to combine strength and lightness”

Dr. Stefan Friebel

Fraunhofer WKI
Project manager

Lignin-based foams

The efficient utilization of wood residues as a raw material is increasingly becoming the focus of attention in materials research. Through the chemical pulping of plant fibers, lignin is produced, which serves as a raw material for soft foams for bumpers and as a hard foam for furniture construction and as an MDF substitute. These bio-based materials offer promising properties that represent a sustainable alternative in the automotive, furniture and construction industries.

The chemical treatment of plant fibers produces pulp, which consists predominantly of cellulose and is a key raw material in paper production. 90% of the pulp created worldwide is made from wood. The efficient use of wood also entails the development of concepts for the use of by-products that arise during processes involving this renewable raw material, such as kraft lignin, hydrolysis lignin or lignin sulfonate. With the development of lignin foams as flexible foam for application as the core material in bumpers or as rigid foam for the furniture industry, a product innovation is being created that provides a contribution towards optimally exploiting the potential performance capabilities of wood and developing an economically favorable and, at the same time, bio-based foam material for the global growth industries "automotive, furniture and construction".



Lignin foam as a core layer for a sandwich element.

In order to be able to use different types of lignin for foaming, a comprehensive requirements profile for the subsequent foams must be defined at the beginning of the project. Among other things, this involves the strength, the energy absorption and the resistance to various environmental influences. The first step is the examination of the parameters that influence the foaming and the cross-linking of the lignins. Lignin is thereby used as a polyol component in a two-component (2C) polyurethane foam. In order to achieve the required properties of a specific compressive elasticity, various modifications are also made to the lignin. One focus is on different formulations in order to develop both soft foams for bumpers (Project 1: Lignin Foam) and hard foams for the core layer of furniture or shoes (Project 2: Lignolight). The fundamental difference between the foams lies in their lignin modification. This allows the production of viscoelastic soft foams and thermoset rigid foams.

The foams should ultimately be produced as three-dimensional molded bodies with complex geometries. For this purpose, a specialized tool for the pedestrian protection is being developed, with which the mold-filling capacity and the replication accuracy of the foam will be determined. The tests are to be carried out on a laboratory scale. For the implementation of the preferred foaming process at full scale, the project partners will develop a corresponding concept and will construct a system for the manufacturing of demonstrators: By the end of the project, both a bumper and rigid foams will have been developed, the latter being usable – thanks to a lignin coating – as an MDF substitute for applications in furniture manufacturing.

Funding | "Ligninschaum" and "Lignolight"
Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) via Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

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Flame protection for wood coatings – transparent and sustainable

Building with wood is extremely popular and is experiencing rapid growth. Wood is also increasingly being utilized in the visible areas of interior design, as the appearance, haptic and acoustic properties of this natural material are highly valued. At the same time, stringent requirements are being imposed in terms of fire protection, particularly in public areas.



Single Burning Item test with a fire-protection coating for wood.

The overall objective of the "InnFla" project was the development of fire-protection coatings on the basis of bio-based acrylates and polyurethanes that can be used for solid wood, veneer-based materials (molded parts, laminated veneer lumber, plywood) and other wood-based materials for decorative purposes in interior applications. In these coatings, (partially) bio-based flame retardants on the basis of alkoxyamines/imides and phosphinates were applied. One advantage of these flame retardants is that smaller quantities are required than with other materials. Through covalent binding to the bio-based binder, a permanent flame-retardant effect should be achieved.

In the project, three new bio-based monomers were synthesized and their suitability for the polymerization of binders was evaluated. Acrylate-based binders with a bio content of more than 50% (relative to the carbon content) were successfully polymerized and up-scaled to 18 kg. Furthermore, flame retardants were chemically bonded to the polymer in a polyurethane dispersion.

For the formulation of the bio-based wood coatings on the basis of acrylates, conventional flame retardants and new (partially) bio-based flame retardants produced in the project were utilized. The durability of the flame-retardant properties was determined in tests using the cone calorimeter, both before and after artificial aging. Contrary to expectations, the flame-retardant performance did not decrease following exposure to UV and moisture. This is attributed to the good compatibility of the flame retardants with the binder polymer.

The challenge was to develop formulations that combined transparency and flame-retardant performance. The final formulations were translucent and were subjected to a Single Burning Item (SBI) test. In the best case, the building material classification C-s2, d0 was achieved. This corresponds to a classification as "flame-retardant", whereby further optimization steps are necessary in order to achieve the desired classification B-s1, d0.

A modular demonstrator that visually showcases the project results was presented at Ligna 25 in Hanover and is available for further trade-fair appearances. The paints produced in the project contain no formaldehyde sources, and the coatings exhibit reduced emissions of formaldehyde, formic acid and acetic acid compared to uncoated wood-based materials.

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Funding | "InnFla"
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via Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

Recovered wood sorting using machine learning

Wood is an important raw material for many industries. The supply of untreated wood is limited by slow growth cycles and finite cultivation areas. In addition, it is becoming increasingly scarce due to climate change and associated extreme weather events. These factors result in raw-material shortages and rising prices. It is therefore becoming increasingly relevant to utilize waste wood as a secondary material and to keep it in circulation for as long as possible.

The main goal of the "AHOY" project is to combine multi-energy X-ray transmission (ME-XRT) and near-infrared (NIR) imaging spectroscopy for use in a sorting system for removing impurities and wood particles contaminated with preservatives.

Therefore, the project aims at (1) setting up a measurement system combining NIR and ME-XRT, (2) postprocessing the acquired data, (3) gathering ground truth for each sample, (4) developing and training machine learning (ML) classification models and (5) quantifying the model's performance.

The German Waste Wood Ordinance classifies wood components that, due to their origin, could be contaminated with wood preservatives (such as beams from demolished buildings) into waste wood category A IV, regardless of their actual contamination. These wood components can only be thermally utilized and are excluded from the intended recycling process, even if they are not contaminated at all. Furthermore, the interior of contaminated beams is usually free of wood preservatives. Processed into wood chips, they yield a large quantity of clean material that can be recycled. Thus, a system able to detect and remove contaminated parts could increase the yield of recyclable wood.

To assess whether a piece is contaminated, data from NIR and ME-XRT sensors are classified using machine learning methods. For this purpose, a three-phase approach for dataset generation was used:
First phase: Sensor-based measurement of clean and contaminated wood.
Second phase: Localization and annotation of individual samples detected and matched between both sensors.
Third phase: Transformation of sensor data into a format that allows the data from both sensors to be used individually or simultaneously. This includes image registration. The resulting data and labels are fed into a machine learning model.

The results of three sensor modalities for copper-contaminated wood show the mean balanced-accuracy-achievable contamination level to be between 75% and 77%, based on the classification results. The sensor modalities perform similarly in terms of balanced-accuracy. However, regarding contamination level, NIR performs best with a remaining contamination of the "clean" wood of 9 ppm. This is a good result, as the Waste Wood Ordinance requires a copper contamination below 20 ppm.

Funding | "AHOY"
Own research project

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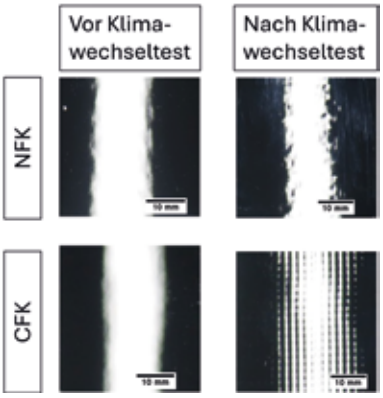


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Bio-based resins for the serial processing of fiber-reinforced components

In the "Sustainable biohybrid lightweight construction for future-oriented mobility" project, series production of natural-fiber-reinforced plastics (NFRP) in automobiles was achieved for the very first time. With the development of biogenic matrix systems, the follow-up project "BioResinProcess" resolutely pursued the further development of NFRP. Two epoxy systems with up to 85% biogenic content were successfully implemented and tested in a door and a roof hatch.



Reflection of a light bar on the painted NFRP (above) and CFRP surface (below) before (left) and after (right) exposure to an alternating-climate test.

Due to the mechanical and weather-related component requirements, thermosets – in particular epoxy resins – have become established for continuous-fiber-reinforced or long-fiber-reinforced plastics for vehicle body shells. A number of partially biobased epoxy resins are available on the market, while suitable curing components are still petroleum-based. The aim of the project was, in collaboration with Hobum Olechemicals GmbH, to develop a bio-based resin-hardener system that offers potential for the production of automotive components.

The development was oriented towards the quality requirements for fiber-reinforced plastics (FRP) for Porsche production vehicles (PTL 5580). Furthermore, a manufacturing process by means of resin transfer molding (RTM) should be possible.

At the end of the project, an amine-curing and an acid-curing system were implemented in a vehicle door and a roof hatch respectively. The components were then tested on a vehicle. In the NFRP component, a bio content of > 80% and a glass transition temperature of > 100°C were realized.

The components were coated with a bio-based 2C polyurethane coating system developed at the Fraunhofer WKI. For better adhesion, the components were first flamed and then coated with a layer of hydro filler primer and a pigmented intermediate layer. A bio-based solvent-containing topcoat was used as a finish. The total layer thickness is 111 µm with a bio content of 53%. The coated parts were exposed to artificial weathering (γmax = 340 nm) for 2016 hours, and to outdoor weathering for 12 months. Furthermore, the coated components were subjected to an alternating-climate test (DIN EN 60068-2-38) and hot storage (PTL 5580). The bio-based component fulfilled the requirements of the cross-cut test (gt=0) and gloss retention (> 80 GU). Following artificial weathering, the bio-based paint exhibited a barely visible shift towards yellowing (b* = 3-4 units higher).

One particular challenge is presented by the implementation of high-quality surfaces, the so-called Class A, with fiber-reinforced plastics. Temperature and moisture cause the material to expand and, after a certain amount of time, lead to fiber structures becoming visible on the surface of the component. With natural fibers, this effect is differently pronounced compared to carbon fibers. The exact causes for this are as yet unknown. In the internal project "OptiSurf", the WKI is working on obtaining a better understanding of this phenomenon and developing effective measures to prevent it.

Funding | "BioResinProzess"
Federal Ministry of Agriculture, Food and Regional Identity (BMLEH)
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Data-based degradation monitoring of asphalt base layers

At present, road-maintenance measures are predominantly dependent on the condition of the road surface. The condition of the lower-lying asphalt base layer is not taken sufficiently into account, as suitable measurement methods do not exist. The monitoring system to be developed in "SenAD2" can detect damage at an early stage and can monitor the condition of the asphalt base layer across the entire area – continuously and non-destructively.

In the project "Machine learning-based degradation monitoring for asphalt road surfaces – SenAD2", an intelligent, data-based monitoring system is being developed for the continuous, non-destructive and comprehensive degradation assessment of asphalt base layers. Currently, condition assessments are predominantly based on cost-intensive core extractions which, due to the additional damage they cause to the road, are not suitable for regular large-scale monitoring. SenAD2, in contrast, focuses on the development and utilization of innovative sensor technology and machine learning in order to record, analyze and predict road damage.



Sensor fabric from the SenAD2 project, embedded in asphalt in the first demonstrator section.

The basis for the concept is formed by the development of a sensor fabric made from a bio-based carrier material in combination with electrically conductive components, which can be embedded directly in the asphalt base layer. The sensor technology can detect changes in the road structure caused by stretching and loading, and measurement signals are created that correlate with the progressive degradation of the surrounding area. This approach makes it possible – for the first time ever – to collect near-real-time, large-scale condition data from a deep asphalt layer without the need for road closures or additional damage to the affected roads.

By means of machine learning and algorithms developed specifically for this purpose, the recorded measurement signals are evaluated in order to be able to provide information on the current condition as well as forecasts regarding the course of the degradation. The powerful analysis models and the monitoring system to be developed from them form the basis for a more sustainable and efficient road-maintenance management. As a result, authorities and planning offices will be able to make decisions regarding necessary measures at an early stage and to implement them both economically and in a temporally optimized manner. The project also aims to develop the system towards practical applicability by integrating the components into realistic test routes and visualizing the dashboard for decision-makers.

Through the synergy of sensor technology, the large-scale acquisition of measurement data, and advanced AI methods in SenAD2, a comprehensive, non-destructive and predictable analysis of the condition of asphalt base layers will be possible for the very first time. The project is being developed in collaboration with the partners Uhlig & Wehling GmbH, Asphalt- und Betonstraßenbau GmbH, Hannover University of Applied Sciences and Arts, Magdeburg-Stendal University of Applied Sciences, and Time4Innovation UG within the framework of mFUND funding through to 2027.

Funding | "SenAD2"
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Extractives and their influence on bonding

The "ExtractImpact" project was aimed at evaluating the types and proportions of extractives in four wood species, each from four locations, by means of chemical analyses. Attention was hereby focused on the influence of the location of the species on the variability of the composition and quantity of the extractives. In addition, the influence of the extractives on the bonding properties was analyzed using four different adhesives. An evaluation was thereby performed with regard to the quality of the bonding.

The investigations do not provide a definitive assessment of the influence of extractives on the quality of the bond (QoB) – expressed as longitudinal tensile shear strength – of spruce, Douglas fir, beech and oak. Generally valid correlations between extractives content and QoB cannot be established. Within a wood species, the extractives content varies more strongly between individual trees than between locations, as a result of which no significant differences can be derived. Due to the wide variety of parameters, the identification of individual significant influencing variables proved challenging, as there is no single dominant factor for each wood species. For users, this means that adhesives adapted to each wood species can be used as, due to numerous additional influencing parameters, the growth location does not appear to be a decisive selection criterion.

With regard to the selected adhesives (1C-)PUR, MUF, PF and PRF-L, both PUR and MUF proved to be very robust against the influence of extractives and, in some cases, growth. Particularly in dry testing (EN 302-1, A1), the values for hardwoods and softwoods lay well above the requirements or were at least within the shear-strength range of the respective wood species. This represents a relevant finding for industrial manufacturing. However, this very important result could only be confirmed to a limited extent in the parallel wet tests (EN 302-1, A4), despite the use of approved adhesives.

Regarding the question as to whether upper or lower sections are fundamentally more suitable or less suitable, the tests conducted on individual trunk sections do not allow any general conclusions to be drawn. Where significant differences were discernible, there was, at best, a tendency in favor of lower trunk sections. In some cases, the quantity of available test material was not sufficient to enable standardized sorting following drying and conditioning. As a result, compromises had to be made with regard to growth characteristics (branches, straightness of grain, annual ring position), which impaired the bonding tests both qualitatively and quantitatively and diminished the samples available after bonding. In addition to the gentle drying of the test material carried out in the project, a conventional drying program (at higher temperatures) should have been performed for comparison. Based on this comparison batch, it would have been possible to investigate the effects on extractive content and bonding performance, in order to compare these findings with the results obtained.

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Funding | "ExtractImpact"
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Technical production of ammonium phytates as bio-based flame retardants

The aim of this project is to develop a cost-effective and economical manufacturing process for ammonium phytates from corn steep liquor (CSL) and their application as bio-based flame retardants. A wood-polymer composite (WPC) consisting of bio-HDPE and wood particles is used as a model system for assessing the flame-retardant properties.

Commercial phytic acid is reacted with various amines in water as green solvent. The parameters such as concentration, number of equivalents, pH value, and solubility are optimized in the process. The amines are selected so that they are either bio-based or inexpensive basic chemicals. The ammonium phytates produced in this way are processed in combination with bio-HDPE, wood particles, synergists, and additives in a laboratory measuring kneader. The resulting thermoplastic mixtures are ground into granulate in a mill and processed into test rods using mini-injection molding. The ammonium phytates and granules are characterized using a micro cone calorimeter and thermogravimetric analysis (TGA). The injection-molded test rods are tested using the UL94 test, and the oxygen index is measured to assess the flame-retardant effect. Selected mechanical properties as well as the water absorption and swelling of the materials are determined for the most promising formulations.

The findings obtained from the aforementioned investigations form the basis for the technical implementation. As part of corn-starch production, an essential pre-swelling process takes place before the corn kernels are wet milled, in which almost all water-soluble components, including phytic acid, are extracted, resulting in corn steep liquor. The active ingredient phytic acid is extracted from the regionally available residual material corn steep liquor, which is provided by our associate partner Cargill on a 100 kg scale. The technical production and comprehensive raw-material analysis is carried out by our project partner, the Fraunhofer IAP. In this process, various procedural steps are used to separate phytic acid from further components of the corn steep liquor, which is then converted into ammonium phytate.

Technical consulting is provided by our other associated project partner, Clariant Plastics & Coatings.



From corn cob to corn steep liquor to bio-based flame retardants to flame-retarded test specimens made from bio-HDPE and wood flour.

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Funding | "ScaleAmP"
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Are air fryers a problem for indoor air quality in kitchens?

Air fryers have become increasingly popular in recent years and are now found in almost 20% of all German kitchens. These compact and relatively inexpensive appliances are advertised as allowing quick and low-fat meal preparation. They fit even into small kitchens and match current lifestyle trends. However, this raises the question of whether these devices release pollutants into indoor air – and whether this could affect users.



Commercially available air fryer.

In our study, we examined several commercially available air fryers, including a brand-new appliance, some with only a few operating cycles, and several that had already been in use for a while. In environmental test chambers, we measured the release of fine and ultrafine particles as well as volatile organic compounds (VOCs). To enable better comparability, we applied a standardized test protocol: first, the cleaned, empty air fryer was operated with a standard program (180°C for 15 minutes) and emissions were measured. In a second step, 15 ml of olive oil was used, and in a third step, 100 grams of frozen French fries were fried without any additional fat.

The experiments showed that even without any food in the basket, a noticeable number of particles were released into the indoor air. When oil was used, increased emissions of organic compounds were detected, particularly aldehydes, ketones, and carboxylic acids. The presence of food sometimes had a dampening effect on emissions, presumably because the frozen food reduced the temperature.

We repeated the experiments under more realistic conditions in a kitchen. Here, a single frying cycle raised the concentrations of ultrafine and fine particles to several times the background level. The release of volatile organic compounds led to a clearly perceptible odor in the room, but the concentrations of individual substances remained well below guideline values for indoor air. This is due to dilution in the 50 m³ room volume; in the immediate vicinity of the appliances, however, significantly elevated concentrations of substances such as formaldehyde, acetaldehyde, acrolein, methacrolein, butanal, and heptenal were observed.

The formation of particles and of the substances mentioned is typical for food preparation in hot fat and also occurs during conventional frying. Cooking hobs are, however, usually equipped with a range hood that removes or filters particles and VOCs from the air. Air fryers, by contrast, are often used away from the hob. This can lead to higher indoor air pollution, as the released contaminants can spread throughout the room.

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Funding | "Own Research"

Guideline for constructing multi-story buildings from wood

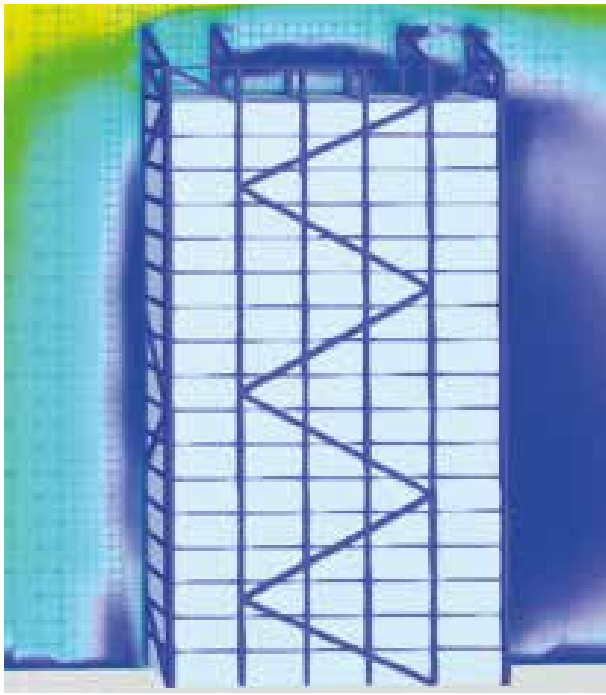
The objective of the "LeiWind" research project is the development of a guideline for the realization of tall buildings made from wood. Specifically, the issue of ensuring the serviceability of tall timber buildings subjected to wind loads acting as external dynamic influences will be examined.

Timber construction offers significant environmental advantages, and the recent rise of timber buildings, culminating in record-setting high-rises, demonstrates a growing trend toward tall timber structures. However, the low self-weight of timber material makes high-rise timber buildings particularly vulnerable to wind-induced vibrations, which often governs design. Compounding this challenge, the principal design codes and criteria do not offer comprehensive, specific provisions for combined wind-vibration effects from the perspective of timber building.

This study aims to

- evaluate the design of timber buildings against wind-induced vibration to provide practical guidance,
- catalog current serviceability criteria (i.e., ISO 10137, ISO 6897, AIJ-Guidelines, NBCC-Guidelines, ASCE 7–22, AS/NZS 1170.0 and 1170.2, Eurocode 5) for wind-generated accelerations and displacements of buildings,
- identify gaps in wind-induced vibration design methods outlined in leading international codes (i.e., Eurocode 1–4, ASCE 7–22, AIJ-RBL, NBCC, AS/NZS 1170.2) from regions actively engaged in timber construction, and
- analyze the wind-design strategies employed in five completed high-rise timber-building projects.

Results show that current code methods are constrained by simplified assumptions with strict requirement on building dimensions and profile, lacking timber-specific parameters, e.g. damping and natural frequency. Existing codes do not yet provide sufficiently comprehensive methods for evaluating combined vibration effects, and most realized projects have only partially considered the serviceability requirements, although theses are not mandatory in current design practice. By integrating these criteria, highlighting the limitations of existing codes, and drawing lessons from existing tall timber structures, this study offers clear guidance for engineers seeking to evaluate and mitigate wind-induced vibrations of timber buildings, thereby supporting the reliable design of future high-rise timber buildings.



Wind-velocity field of the Mjøstårnet building (85.4 m tall, Brumunddal, Norway: 2nd tallest timber building in the world) under numerical simulation.

Funding | "LeiWind"
Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) via Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

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Correlation between building-product emissions and indoor air quality

Chemical substances, released by building materials and products, influence the indoor air quality and can lead to unpleasant odors. Within the scope of certifications and product monitoring, solely individual materials are tested for their emission potential. But do the emission behavior and the odor impression change when individual materials are combined to create a construction (wall, floor, ceiling) and are incorporated into a room?



Loading of a 30 m³ emission test chamber with a wall construction.

Construction and furnishing materials utilized in indoor environments are some of the most important causes of indoor air pollution and unpleasant odors. Within the framework of quality assurance measures and certifications, the emission behavior of individual materials is examined; the results, however, do not allow any statements to be made regarding subsequent indoor air quality when the material in question is utilized in a real room. In order to gain insight into whether emission behavior and odor impression change when materials are installed, the following were characterized in terms of their time-dependent emissions: (i) commercially available materials, (ii) wall, floor and ceiling constructions built from these materials, and (iii) (30 m³) model rooms built from these constructions. The measurements encompassed the entire spectrum of (very) volatile organic compounds as well as odor assessments (perceived intensity, hedonic tone, odor type, and acceptability). In addition, numerical simulations were performed in order to model the emission behavior of a material assembly and the expected air quality in an indoor room based on the known emission profiles of the individual materials thereby used. The constructions and model rooms investigated represented sustainable, wood-based construction types that are currently being used in public buildings and apartment blocks. The results showed that

- the installation of high-emitting and/or odor-intensive materials did not necessarily lead to high-emitting and/or odor-intensive constructions (composite structures, model rooms),
- model rooms can be a lower source of emissions than the composite structures that make up the room in question,
- the composite structures can, in turn, be a lower source of emissions than the (sum of the) individual materials from which they were built.

These conclusions are limited to the investigated constructions and to a test period of 28 days and are therefore not representative. The extent to which they can also be applied to other types of construction, longer test intervals and real construction projects should be the subject of further investigations. Irrespective of this, emission tests remain an important tool for manufacturers regarding product monitoring and quality assurance and provide end users with guidance in the selection of products.

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Funding | "RefoPlan IAQ"
Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuklear Safety (BMUKN), represented by the German Environment Agency (UBA)

Highly fire-retardant wood-based drywall construction

In a previous project, the Fraunhofer WKI developed a hybrid plywood panel that is classified as non-combustible in shipbuilding in accordance with the FTP Code 2010 Part 1. In addition to several layers of veneer (Ceiba), the panel features a central layer made from foam glass. At the beginning of the TroBau project, it was not possible to pass the fire tests for building construction in accordance with DIN EN 13501-1, as more stringent requirements apply there than in shipbuilding. As part of the TroBau project, the structure was modified to fulfill the requirements for building construction.

The overall objective of this research project was therefore the utilization of plywood in building sections subject to heightened fire-protection requirements. For this purpose, a drywall was developed within the project with a fire resistance of at least 60 minutes, i.e., highly fire-retardant, in which the stud frame is clad with non-combustible plywood. Various veneers and plywoods were impregnated and tested with regard to their combustion heat. For a number of Ceiba plywoods, it was possible to reduce this from 16 MJ/kg to 11 MJ/kg; the normative requirements of DIN EN 13501-1 (H < 3 MJ/kg) for construction material class A2 were, however, not achieved. As, according to the DIBt (German institute for structural engineering), plywood is considered an inhomogeneous construction material, all its components – such as adhesive and veneer – must be tested individually. Furthermore, the individual products were tested with regard to their non-combustibility. The requirements for classification in class A2 in accordance with DIN EN 13501-1 were thereby not fulfilled. The classification in accordance with DIN 4102-1 was therefore applied, which utilizes a different non-combustibility furnace and does not stipulate any differentiation between homogeneous and inhomogeneous materials. In this procedure, the non-combustibility test was successfully passed.



Demonstrator of the highly fire-retardant wall structure.

On this basis, a highly fire-retardant wall structure was developed, consisting of a flame-retardant stud frame, mineral wool and two 12-mm-thick birch plywood panels, which were fastened with LIGNOLOC® wooden nails. Within the scope of a standardized fire-resistance test, it was proven that the structure fulfills the requirements for "highly fire-retardant".

The utilized birch plywoods also achieve bonding class 1, which is relevant for the classification. In addition, pull-out tests using LIGNOLOC® nails made from birch plywood were performed; the determined pull-out forces confirm literature values and demonstrate that their use in plywood is feasible.

Furthermore, the wall structure was tested for emissions of volatile organic compounds (VOC), C1-C4 aldehydes, odor intensity and hedonics, and was evaluated in accordance with the AgBB assessment scheme. This test was not passed on account of increased concentrations of acetic acid.

Funding | "TroBau"
Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) via Fachagentur Nachwachsende Rohstoffe e. V. (FNR)

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WKI | AKADEMIE®

The **WKI | AKADEMIE®** is the central training facility of the Fraunhofer WKI and has, in the past year, once again established itself as a competent partner for the woodworking and wood-processing industry as well as for students of civil engineering. With a wide-ranging portfolio of specialized courses, compact courses and on-demand training, the **WKI | AKADEMIE®** addresses both the current and future requirements of the industry.

The continuous further development of the course content and the balanced division into theoretical and practical units not only facilitate the practice-oriented transfer of knowledge but also promote interdisciplinary exchange among interested parties from the wood-based materials, prefabricated house, glued laminated timber and renovation industries.

The training courses focus in particular on the topics of bonding in timber construction, quality control in the production of wood-based materials, solid-wood sorting and formaldehyde testing methods.

Bonding in timber construction

Two specialized courses are offered within the topic of "Bonding in timber construction": "Specialist in the manufacture of bonded, load-bearing timber construction products" and "Specialist in the repair of bonded, load-bearing timber components". Both courses are held as attendance events in Braunschweig and impart comprehensive fundamental knowledge for the execution of bonding work, which is relevant for both the manufacture and the repair of load-bearing timber components. The theoretical and practical content is closely interlinked, as a result of which the participants not only acquire the necessary specialist knowledge, but also learn how to apply it in practice.

Participants generally receive a certificate of attendance. For both courses, we also offer a written examination. This provides proof of successful participation in accordance with DIN 1052-10 and is certified by the Fraunhofer WKI as a recognized testing body for the bonding of load-bearing timber components. The **WKI | AKADEMIE®** thereby creates an important foundation for quality assurance in timber construction.

The four-day specialized course "Specialist in the manufacture of bonded, load-bearing timber construction products" consists of three compact courses: Sawn-timber sorting in accordance with DIN 4074-1; Fundamentals of bonding technology in timber construction; and Factory production control and external monitoring in the manufacture of bonded, load-bearing timber construction products.

The three-day specialized course "Specialist in the repair of bonded, load-bearing timber components" consists of two compact courses: Recognizing, evaluating and documenting damage to adhesive joints on bonded, load-bearing timber components, and Fundamentals for the repair of bonded, load-bearing timber components. The compact courses can also be booked individually.

Quality control in the production of wood-based materials

The four-day course provides general normative and material-specific basics on the production and application of wood-based materials. In addition, the focus is directed towards factory production control (FPC) as well as the requirements and detection methods regarding emissions and mechanical properties of wood-based materials. A further emphasis is placed on the methods of statistical data evaluation as an instrument of quality control. The course is divided into five modules, whereby selected teaching content is supplemented by practical units in the Fraunhofer WKI laboratory and test field.



Specialist in solid-wood sorting

In Germany, the demand for timber for construction purposes is increasing constantly. In order to ensure that timber can be utilized for load-bearing purposes, the dried sawn timber must be visually sorted in accordance with DIN 4074-1. For this purpose, a company requires trained personnel. Our one-day compact course imparts the essential theoretical and practical fundamentals for the visual sorting of sawn timber and is officially recognized by the accredited bodies in Germany. The theoretical and practical elements are closely coordinated with one another. The practical exercises take place in the laboratories at the Fraunhofer WKI.

Formaldehyde testing methods

A further central training field at the **WKI | AKADEMIE®** is on-demand training in formaldehyde testing methods. In Germany and also worldwide, numerous different legal requirements now exist with regard to the production and utilization of low-formaldehyde wood-based materials.

At our testing body for formaldehyde, we offer companies services for the certification and testing of wood-based materials in Europe and America. We utilize our expertise and many years of experience for the further and new development of formaldehyde testing methods.

During needs-oriented training courses at the **WKI | AKADEMIE®**, we share this know-how by providing targeted answers to individual questions from the industry.

Future prospects

The **WKI | AKADEMIE®** offers further training for specialists from the wood industry and promotes the exchange between research, industry and practice. Through practice-oriented training and the combination of theory and application, current developments and requirements are addressed and networking within the sector is supported.

With a wide range of training courses on bonding in timber construction, quality control, solid-wood sorting and formaldehyde testing methods, the **WKI | AKADEMIE®** remains a trustworthy partner for companies and specialists.

Further information and current event dates can be found on our website: https://www.wki.fraunhofer.de/en/departments/qa/wki-akademie.html

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Research Facts



The good thing about science is that it's true whether or not you believe in it.”

Neil deGrasse Tyson

Astrophysicist and cosmologist



65

Publicly funded projects



62

Participation in standardization committees



46

Publications



33

Presentations



4

Courses, trainings and seminars



8 | 3

Lecturer | Doctorates

Project overview | Projektübersicht

On the following pages you will find an overview of all ongoing and finished publicly funded projects during the reporting period. In total 65 projects generating € 6.3 Mio of public revenue in 2025.

Auf den folgenden Seiten finden Sie eine Übersicht über alle laufenden und abgeschlossenen öffentlich finanzierten Projekte im Berichtszeitraum. Insgesamt 65 Projekte, die im Jahr 2025 6,3 Mio € an öffentlichen Einnahmen generierten.

Project Title | **Projekttitel**	Promoted by | **Förderstelle**	Project leader | **Projektleitende**
European sustainable biobased nanomaterials community	EU	Dr. Tobias Robert
Zusammenhang zwischen Bauproduktemissionen und Innenraumluftqualität: Experimente in Referenzprüfräumen und numerische Simulation	BMUKN über UBA	Dr. Alexandra Schieweck
Langzeitverhalten von klebstoffgebundenem Holz mit Faser-Kunststoff-Verbund(FKV)- und Holz-Beton-Verbund(HBV)-Hybridsystemen für gebaute Nachhaltigkeit	BMLEH über PT FNR	Dr. Libo Yan
Altholzgewinnung aus Sperrmüll durch künstliche Intelligenz und Bildverarbeitung im VIS-, IR- und Terahertz-Bereich; Teilvorhaben: Erkennung von Holz und Holzwerkstoffen in Sperrmüll mittels Farbbildverarbeitung und bildgebender NIR-Spektroskopie	BMLEH über PT FNR	Dr. Jochen Aderhold
Nachhaltige Nutzungspotentiale für Kiefernstarkholz – eine ganzheitliche Betrachtung ihres Aufkommens, Waldbaus, der Holzernte und ihrer Verwertung; Teilvorhaben: Furnierbasierte 2d- und 3d-Verbundwerkstoffe für lasttragende Anwendungen auf Basis von Kiefernstarkholz	BMLEH und BMUKN über PT FNR (WKF)	Dr. Dirk Berthold
Optimierung der CO_2-Bilanz durch naturfaserverstärkte Verbundwerkstoffe auf Zementbasis für ein nachhaltiges Bauen; Teilvorhaben: Entwicklung anorganisch gebundener, naturfaserverstärkter Werkstoffe	BMFTR über PT DLR	Dr. Dirk Berthold
Formteilautomaten zur energieeffizienten Herstellung komplex geformter, leichter Holzprodukte; Teilvorhaben 1: Mischung, Verklebung und Prüfung verschiedenster Hybridwerkstoffe	BMLEH über PT FNR	Dr. Julia Belda
Stoffliche Verwertungsmöglichkeiten für stehend gelagertes Kalamitätsholz der Baumart Fichte in Abhängigkeit von Schadfortschritt und Holzqualität; Teilvorhaben 1: Holzwerkstoffherstellung und -evaluation	BMLEH über PT FNR	Dr. Carola Ueckermann Peter Meinlschmidt
RECREATE – Recycling technologies for circular reuse and remanufacturing of fiber-reinforced composite material	EU	Leon Freitag Peter Meinlschmidt Dr. Steven Eschig
Entwicklung von Einwegprodukten mit biobasierten Beschichtungen aus regionalen Agrarrestströmen der Lebensmittelindustrie	BMFTR über PT PTJ-FZJ	Dr. Arne Schirp
Verbundvorhaben: Aufbau einer Pilotanlage zur Nutzung und Evaluierung von Buchenholzfasern als Ziegel-Dämmstoff; Teilvorhaben: Optimierung und Evaluierung von Buchholzfaserdämmstoffen	BMLEH über PT FNR	Dr. Nina Ritter Dr. Torsten Kolb
Verbundvorhaben: FSCM - Future Sustainable Car Materials; Teilvorhaben: Entwicklung von PLA-Formulierungen für Monomaterial-Composite und PLA-Holz-Materialsysteme für den Fahrzeuginnenraum	BMWE über PT TÜV Rheinland Consulting GmbH	Claudia Burgold

Project Title | **Projekttitel**	Promoted by | **Förderstelle**	Project leader | **Projektleitende**
Digitale Wertschöpfungskette für den kieferbasierten Holzbau in Berlin-Brandenburg; Teilvorhaben: Integrationsmethodik und Referenzmodell für die digitale Vernetzung der Wertschöpfungskette auf Basis kiefernbasierter Werkstoffe	BMLEH über PT FNR	Dr. Nina Ritter
Biobasierte, schaltbare Klebstoffe für wiederformbare Holz-Holz- und Holz-Metall-Lagenverbunde zur Anwendung im Mobilitätsbereich; Teilvorhaben 4: Klebstoffentwicklung und -herstellung	BMLEH über PT FNR	Dr. Steven Eschig
Verbundvorhaben: Förderung der Verwendung von Holzprodukten in Gebäuden des Gesundheitswesens; Teilvorhaben: Funktionalisierung von Polymeren zur Herstellung von antimikrobiellen Bindemitteln zur Verwendung in Holzbeschichtungen	BMLEH über PT FNR	Dr. Claudia Schirp
Verbundvorhaben: Entwicklung biobasierter Fassadenanstriche mit IR-aktiver Oberfläche zur Vermeidung von mikrobiellem Bewuchs auf WDVS-Fassaden; Teilvorhaben 2: Biobasierte Fassadenbeschichtungen	BMLEH über PT FNR	Dr. Claudia Schirp
SMARTWOOD - Innenausstattungen, Möbel und Arbeitsflächen aus Holz mit elektrischen Funktionselementen in Form integrierter Dünnschichten	BMLEH über PT FNR	Dr. Stefan Friebel
Einsatz von Holz für den Trockenbau in Gebäudebereichen mit hohen Anforderungen an den Brandschutz; Teilvorhaben: Koordination, Materialcharakterisierung und Entwicklung der Trockenbauwand	BMLEH über PT FNR	Dr. Torsten Kolb Dr. Alexandra Schieweck Mathias Belda
Entwicklung eines ökologischen und ökonomischen Getränkekastens	BMFTR über PT PTJ-FZJ	Moritz Micke-Camuz
Co-Injektion-Spritzguss für elektrostatisch ableitfähige Transportbehälter; Teilprojekt: Fertigung von Prüfkörpern im Co-Injektions-Spritzguss und deren mechanische Charakterisierung	BMFTR über PT KIT	Carsten Aßhoff
Verbundvorhaben: LignoLight - Kombination verschiedener Lignin-materialien zur Anwendung in modularen Leichtbaumöbeln; Teilvorhaben: Ligninmodifizierung und Verarbeitung zu Schäumen und Lederimitaten	BMFTR über PT PTJ-FZJ	Dr. Steven Eschig Dr. Steffen Sydow Dr. Natalie Vellguth
Verbundprojekt: Entwicklung biobasierter Haftklebstoffe (PSA) für Klebebandanwendungen; Teilprojekt: Synthese UV-härtender Haftklebstoffe auf Itaconsäure-Basis	BMFTR über PT DLR	Dr. Tobias Robert
Pyrolyse dickwandiger Faserverbundwerkstoffe als Schlüsselinnovation im Recyclingprozess für Rotorblätter von Windenergieanlagen; Teilvorhaben: Mikrowellenpyrolyse, Beschichtung rezyklierter Fasern und FVK-Prüfung	BMWE über PT PTJ-FZJ	Leon Magnusson Peter Meinlschmidt
Prozesssichere Herstellung von geklebten Holz-Beton-Verbund Bauteilen	BMWE über PT AiF/DLR PT über iVTH	Malte Mérono
Schäume aus Ligninsulfonat für den Einsatz als Kernmaterial in Stoßfängern; Teilvorhaben 1: Entwicklung von Ligninpolymeren	BMLEH über PT FNR	Dr. Steffen Sydow Dr. Steven Eschig
Lignin-Hydroxymethylfurfural-Kondensationsharze zur Herstellung formaldehydfrei gebundener Spanplatten	BMLEH über PT FNR	Dr. Steven Eschig Dr. Julia Belda Dr. Alexandra Schieweck Mathias Belda
Reduktion von (V)VOC-Emissionen aus NawaRo-Dämmstoffen unter besonderer Berücksichtigung neu aufkommender Schadstoffe	BMLEH über PT FNR	Dr. Jan Gunschera Peter Meinlschmidt
Digitalisierung und Steigerung der stofflichen Verwertung von Altholz durch interoperable und materialerkennende Sortierung und innovative Zerkleinerungsverfahren; Teilvorhaben 1: Erkennung von Störstoffen in Altholz mittels bildgebender NIR-Spektroskopie	BMLEH über PT FNR	Dr. Jochen Aderhold

Project Title | **Projekttitel**	Promoted by | **Förderstelle**	Project leader | **Projektleitende**
Verbundvorhaben: Erstellung eines Leitfadens zum Bauen mehrgeschossiger Gebäude mit Holz unter expliziter Berücksichtigung von Windlasten; Teilvorhaben 1: Projektkoordination, experimentelle und numerische Untersuchungen zum Schwingungsverhalten	BMLEH über PT FNR	Prof. Dr. Libo Yan
Verbundvorhaben: Höhere Wertschöpfung von Betonschalungen durch internes Recycling zur Herstellung von Holzschäumen für Anwendungen bei der Betonfertigteilherstellung; Teilvorhaben 1: Herstellung Holzschaum und EPS-Ersatz	BMLEH über PT FNR	Dr. Steffen Sydow
Nachhaltige Erzeugung und Verwertung von Rohrkolben auf Niedermoorstandorten in Niedersachsen; Teilvorhaben 4: Entwicklung, Prüfung und Herstellung sowie Materialeigenschaften Typha-basierter Bauprodukte	BMLEH über PT FNR	Dr. Steffen Sydow
Innovative biobasierte Organobleche mit erhöhter Thermostabilität und Wasserresistenz für Leichtbau-Anwendungen	MWK Niedersachsen	Ole Gonnsen
Entwicklung eines Verfahrens zur Herstellung von nichtbrennbaren Formteilen für die Dämmung von Heizungsanlagentechnik; Teilprojekt: Materialcharakterisierung, Entwicklung eines Recyclingkonzeptes und Begleitung der Entwicklungen mittels statistischer Versuchsplanung	BMFTR über PT KIT	Dr. Tosten Kolb
Bioökonomie International 2022: BioSwitch-it – Biobasierte CO_2-schaltbare Polymere aus neuartigen Bausteinen auf Itaconsäurebasis	BMFTR über PT PTJ-FZJ	Dr. Tobias Robert
Entwicklung von schnellen, hindernisfreien, umweltschonenden und sicheren Analyseroutinen zur eigenständigen Anwendung durch die unmittelbar an Altholz-Wertschöpfungsketten Beteiligten; Teilvorhaben 2: Probenvorbereitung insbesondere Homogenisierung, ICP-Analytik, Validierung und Dokumentation	BMLEH über PT FNR	Dr. Alexandra Schieweck
Recyclingfähige Materialien für Rotorblätter und deren Wiederverwertung; Teilvorhaben: Fertigung und Prüfung von Rotorblattkomponenten vor und nach der Solvolyse sowie der Aufbereitung der Materialien	BMFTR über PT PTJ-FZJ	Peter Meinlschmidt Leon Magnusson
Verbundvorhaben: Bewertung und Aufbereitung von Altholz zur Rückführung in den Kreislauf im Rahmen eines Wiederverwendungskonzeptes; Teilvorhaben 2: Chemisch-physikalische Materialanalyse der Holzbauteile	BMLEH über PT FNR	Peter Meinlschmidt Dr. Jan Gunschera
Verbundvorhaben: Gesellschaftlicher Dialog und Qualitätssicherung bei der Nutzung von Altholz entlang der Wertschöpfungskette; Teilvorhaben 2: Qualitätsanforderungen an Möbel aus Altholz und Handlungsempfehlungen für die Etablierung eines Qualitätskonzepts	BMLEH über PT FNR	Mathias Belda Peter Meinlschmidt
Verbundvorhaben: Leichte und heizbare Materialien für den Möbel- und Innenausbau gezeigt am Beispiel der Caravaning-Industrie; Teilvorhaben 1: Herstellung geschäumter PLA-Halbzeuge-Hybridmaterialien aus Furnieren und PLA sowie die Material-Produktentwicklung begleitende Emissionsprüfungen	BMLEH über PT FNR	Peter Meinlschmidt Dr. Alexandra Schieweck
Upgrade of the Centre of Excellence LignoSilva	EU	Dr. Dirk Berthold
Verbundvorhaben: Pappelanbau in Agroforstsystemen und darauf basierende Wertschöpfungsketten; Teilvorhaben 3: Hochwertige Nutzung von Pappelholz aus Agroforstsystemen für nachhaltige Werk- und Baustoffe	BMLEH über PT FNR	Dr. Moira Burnett-Barking
REGULUS-Verbundvorhaben: REHA – Regionalstudie Harz: Entwicklungsszenarien für die Wiederbewaldung und ihre sozioökonomischen Auswirkungen, Teilprojekt: 3	BMFTR über PT PTJ-FZJ	Claudia Burgold

Project Title | **Projekttitel**	Promoted by | **Förderstelle**	Project leader | **Projektleitende**
Entwicklung eines Dämmstoffschaums aus heimischem Seegras und Treibsel	BMFTR über PT PTJ-FZJ	Dr. Steffen Sydow
Verbundvorhaben: Biobasierte Flammschutzmittel aus erneuerbaren Rohstoffen für den Brandschutz von Brettsperrholz; Teilvorhaben 1: Synthese biobasierter FSM, flammgeschützte Beschichtungen, Koordination	BMLEH über PT FNR	Dr. Arne Schirp Dr. Claudia Schirp Malte Mérono
Die Umsetzung des hochschulspezifischen strategischen Konzepts »Zukunft FH-Prof« zur nachhaltigen Gewinnung und Entwicklung professoralen Personals; Teilvorhaben Fraunhofer WKI	BMFTR über PT PTJ-FZJ	Dr. Dirk Berthold
Verbundvorhaben: Numerische Beschreibung der Innenraumluftkonzentration in Holzhäusern in Abhängigkeit von klimatischen Rahmenbedingungen; Teilvorhaben 2: Untersuchungen im Labor und in einer Doppelklimakammer	BMLEH über PT FNR	Dr. Jan Gunschera
Verbundvorhaben: Verwendung von Itaconsäure als zyklischer Baustein für Alkydharze mit Anwendung für biobasierte Malerfarben; Teilvorhaben 1: Monomersynthese und Formulierung/Applikation Malerfarben	BMLEH über PT FNR	Dr. Tobias Robert
Verbundvorhaben: Recycling for Future – Konzepte zur recyclinggerechten Herstellung von Konstruktionen in Holztafelbauart; Teilvorhaben 5: Second-use-Konzepte	BMLEH über PT FNR	Dr. Norbert Rüther
Verbundprojekt: Machine Learning-basiertes Degradationsmonitoring für Asphaltstraßenbefestigungen; Teilvorhaben: Fraunhofer-Gesellschaft	BMV über PT TÜV Rheinland Consulting GmbH	Christina Haxter
Geöffnetes Flachsmehrlagengewebe als nachhaltiges Gestaltungselement	BMFTR über PT PTJ-FZJ	Christina Haxter
Verbundprojekt: Post-Consumer Recycled Plastics for Exterior in Automotive; Teilvorhaben: Charakterisierung, Entwicklung und Ökobilanzierung von Post-Consumer Rezyklaten für Exterieurbauteile	BMWE über PT TÜV Rheinland Consulting GmbH	Carsten Aßhoff

"Wood-foam door as an example of successful research"

At Hannover Messe 2026, the layer structure of a door from Rodenberg Türsysteme AG could be seen, in which wood foam has been utilized as a structural element. The partners Fraunhofer WKI and Butterweck Holzstoffe GmbH & Co. KG were thereby demonstrating an application possibility for wood foam in combination with classic wood-based materials. The wood foam developed and patented by the Fraunhofer WKI is produced and distributed by Butterweck Holzstoffe GmbH & Co. KG.

The wood foams developed at the Fraunhofer WKI are comprised of 100% wood, as they do not require any binding agents. They are a lightweight wood-based material (density 45 to 200 kg/m³) with an open-pored structure. Their strength results from the wood's own binding forces, as a result of which the utilization of synthetic adhesives is not necessary.



Front door filled with wood-foam panels.

Project Title | **Projekttitel**	Promoted by | **Förderstelle**	Project leader | **Projektleitende**
Verbundvorhaben: in-situ glue: Klebstoff aus biobasierten Präadhäsiven und aktivierten Holzfasern während des Heißpressens. Neue Verklebungstechnologie zur Herstellung von MDF; Teilvorhaben: isiGlue: Synthesen und Verfahrensentwicklung, Koordination	BMLEH über PT FNR	Dr. Julia Belda Dr. Tobias Robert
Entwicklung eines porösen nicht brennbaren Dämmstoffs mit anorganisch gebundener Holzfasermatrix	BMLEH über PT FNR	Dr. Torsten Kolb Dr. Steffen Sydow
Technische Herstellung von Ammonium-Phytaten (AmP) als biobasierte Flammschutzmittel	BMLEH über PT FNR	Dr. Matthias Bischoff Dr. Arne Schirp
Laubholz im Bauwesen: Ein Weg zu Nachhaltigkeit und Klimaanpassung	BMFTR über PT DRL	Filip Majstorovic
Nachhaltige Bambusverwertung: Fortgeschrittene Qualitätsbewertung und Abfallintegration für innovative Bauprodukte	BMFTR über PT PTJ-FZJ	Filip Majstorovic
Innovative integral approach for wood waste depollution and multi-sector valorisation	EU	Dr. Kirsti Krügener
Entwicklung eines Prüfverfahrens für Luftreiniger zur Bewertung der Geruchsabscheidung	BMWE über PT DLR über IUTA	Dr. Alexandra Schieweck
Thermisches Design für Faserkunststoffverbund-Metall-Hybride in Batteriegehäusen mittels biobasierter Phase Change Materials (PCM) und dem Biopolymer Lignin	BMWE über PT DLR über FAT	Dr. Claudia Schirp
Alterung von Harnstoffharzverklebungen unter Berücksichtigung von General-/Universal-Keilzinkenstößen	DIBt	Malte Mérono Dr. Steven Eschig
Myzelbasierte Materialien mit zielgerichtet selbstwachsender Oberflächenbeschichtung als Ersatz für Plattenkalk im Innenausbau	BMFTR über PT PTJ-FZJ	Dr. Henrik-Alexander Christ
Zukunftsorientierte Entwicklung myzelbasierter Wärmedämmstoffe durch Einsatz von Rohwolle	BBSR	Dr. Henrik-Alexander Christ Dr. Steffen Sydow
Entwicklung eines Gewebes für klebtechnische Anwendungen im konstruktiven Holzbau	BMLEH über PT FNR	Mathias Belda Leon Magnusson
Interdisziplinärer Ansatz zur Bewertung und Gestaltung von GFK-Rezyklat	BMWE über PT VDI|VDE|IT	Ole Hansen

Public funding sources | Öffentliche Fördermittelgeber

AIF	Allianz für Industrie und Forschung e. V.
BBSR	Federal Institute for Research on Building, Urban Affairs and Spatial Development
BBR	The Federal Office for Building and Regional Planning
BMV	Federal Ministry of Transport
BMLEH	Federal Ministry of Agriculture, Food and Regional Indentity
BMFTR	Federal Ministry of Research, Technology and Space
BMUKN	Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
BMWE	Federal Ministry for Economic Affairs and Energy
BÖLN	German Federal program for organic farming and other forms of sustainable agriculture
DIBt	Deutsches Institut für Bautechnik
DLR	German Aerospace Center
DLR PT	German Aerospace Center - Project Management
DVS	Forschungsvereinigung Schweißen und verwandte Verfahren
EBA	Federal Railway Authority
EU	Commission of the European Union
FAT	Forschungsvereinigung Automobiltechnik e. V.
FNR	Agency of Renewable Resources
FZJ	Forschungszentrum Jülich GmbH
IUTA	Institut für Umwelt und Energie, Technik und Analytik e. V.
iVTH	International Association for Technical Issues related to Wood e. V.
KIT	Karlsruher Institute of Technology
MWK	Ministry of Science and Culture of Lower Saxony
PTJ	Project Management Jülich
TÜV	TÜV Rheinland Consulting
UBA	German Environment Agency
VDI|VDE|IT	VDI|VDE Innovation + Technik GmbH
WKF	Waldklimafonds

Standardization committees | Normungsausschüsse

Fraunhofer WKI heavily engages in standardization activities. We believe in the added valued and transfer of research into practise via this pathway.

Das Fraunhofer WKI engagiert sich stark in der Normung. Wir glauben an den Mehrwert und den Transfer der Forschung in die Praxis auf diesem Weg.

DIN – Standards Committees | **DIN – Normenausschüsse**		**Contribution by the Fraunhofer WKI**
NA 002-00-15 AA	Bautenbeschichtungen	Sandra Hofmeister, Dr. Claudia Schirp
NA 005-01-36 AA	Erhaltung des kulturellen Erbes (SpA zu CEN/TC 346)	Dr. Alexandra Schieweck
NA 005-04-01 AA	Holzbau (SpA zu CEN/TC 124, CEN/TC 250/SC 5, ISO/TC 165)	Harald Schwab
NA 005-04-01-03 AK	Holzwerkstoffe/Schnittholz DIN EN 13986 und DIN EN 14081	Harald Schwab
NA 005-04-01-04 AK	Geklebte Produkte DIN EN 14080, DIN EN 14374, DIN EN 15497 und DIN EN 16351	Malte Mérono, Harald Schwab
NA 005-04-01-05 AK	Vorgefertigte Bauteile	Harald Schwab
NA 005-04-01-08 AK	Prüfnormen charakteristische Werte	Harald Schwab
NA 005-11-42 AA	Partikelmesstechnik (SpA zu ISO/TC 24/SC 4)	N.N.
NA 005-53 FBR	Fachbereichsbeirat KOA 03, Hygiene, Gesundheit und Umweltschutz (SpA zu CEN/TC 351, CEN/TC 351/WG 3, CEN/TC 351/WG 4 und CEN/TC 351/WG 5)	Dr. Erik Uhde
NA 005-53-02 GA	Gemeinschaftsausschuss NABau/KRdL: Innenraumluft (SpA zu CEN/TC 351/WG 2)	Dr. Erik Uhde
NA 042 BR	Beirat des DIN-Normenausschusses Holzwirtschaft und Möbel (NHM)	Harald Schwab
NA 042-02-01 AA	Faserplatten – Spiegelausschuss zu CEN/TC 88/WG 17	Harald Schwab
NA 042-02-15 AA	Holzwerkstoffe – Spiegelausschuss zu CEN/TC 112 und ISO/TC 89	Harald Schwab
NA 042-02-16 AA	Spiegelausschuss zu CEN/TC 249/WG 13 Holz-Polymer-Werkstoffe (WPC)	Dr. Arne Schirp, Harald Schwab
NA 042-03-01 AA	Holzschutz Grundlagen	Dr. Dirk Lukowsky
NA 042-03-02 AA	Baulicher Holzschutz	Norbert Rüther
NA 042-03-03 AA	Vorbeugender chemischer Holzschutz	Dr. Dirk Lukowsky
NA 042-04-05 AA	Spiegelausschuss zu CEN/TC 193/SC 1 Holzklebung	Malte Mérono, Harald Schwab
NA 042-05-20 AA	Zirkularität von Möbeln	Bettina Meyer
NA 134-04-04-01 UA	Planung von Innenraumluftuntersuchungen	Dr. Erik Uhde
NA 134-04-04-02 UA	Emissionen aus Materialien und Produkten	Dr. Erik Uhde
NA 134-04-04-03 UA	Bestimmung organischer Stoffe in Luft	Dr. Erik Uhde
NA 134-04-04-06 UA	Innenraum von Straßenfahrzeugen	Dr. Alexandra Schieweck
NA 134-04-04-07 UA	Spiegelgremium zu ISO/TC 146/SC 6/WG 24	Dr. Erik Uhde
NA 134-04-04-08 UA	Spiegelgremium zu ISO/TC 146/SC 6/WG 3	Dr. Erik Uhde
NA 134-04-04-16 UA	Olfaktorische Bewertung von Bauprodukten und Innenraumluft	Dr. Erik Uhde
NA 134-04-04-18 UA	Prüfkriterien für mobile Luftreiniger	Dr. Erik Uhde

CEN – European Standards Committees | **CEN – Europäische Normenausschüsse**		Contribution by the Fraunhofer WKI
CEN/TC 89	Thermal performance of buildings and building components	Harald Schwab
CEN/TC 112	Wood-based panels	Harald Schwab
CEN/TC 112/WG 2	Plywood	Harald Schwab
CEN/TC 112/WG 4	Test methods	Harald Schwab
CEN/TC 112/WG 5	Regulated dangerous substances	Bettina Meyer, Harald Schwab
CEN/TC 112/WG 7	Semi-finished and finished products	Harald Schwab
CEN/TC 112/WG 8	Oriented strand boards (OSB)	Harald Schwab
CEN/TC 112/WG 11	Particleboards and fibreboards	Harald Schwab
CEN/TC 112/WG 13	Mandate	Harald Schwab
CEN/TC 124/WG 1	Test methods	Harald Schwab
CEN/TC 124/WG 7	Preparation of the revision of harmonised standards	Harald Schwab
CEN/TC 139/WG 2	Coatings systems for wood	Dr. Claudia Schirp
CEN/TC 193/SC 1/WG 4	Test methods, classification and performance requirements for adhesives other than phenolic and aminoplastic, for load-bearing timber structures	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 6	Test methods and requirements for adhesives for glued-in rods and on-site repair of load-bearing structures	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 8	Revision of EN 301 and EN 302	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 12	Adhesives for non-loadbearing timber structures	Malte Mérono
CEN/TC 193/SC 1/WG 13	Performance of wood adhesives at elevated temperatures - Test methods and evaluation	Malte Mérono, Harald Schwab
CEN/TC 193/SC 1/WG 14	Testing and requirements for hardwood bonding and chemically modified wood substrates	Malte Mérono
CEN/TC 207/WG 9	Emission from furniture	Bettina Meyer
CEN/TC 249/WG 13	Wood Plastic Composites (WPC)	Dr. Arne Schirp
CEN/TC 351/WG 2	Emissions from construction products into indoor air	Dr. Erik Uhde

ISO – International Standards Committees | **ISO - Internationale Normenausschüsse**		Contribution by the Fraunhofer WKI
ISO/TC 89	Wood-based panels	Harald Schwab
ISO/TC 89/WG 5	Test methods	Bettina Meyer, Harald Schwab
ISO/TC 89/SC 3	Plywood	Harald Schwab
ISO/TC 146/SC 6	Indoor Air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 3	Determination of volatile organic compounds (VOCs) in indoor air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 10	Microbial contaminants	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 13	Joint ISO/TC 146/SC 6 – ISO/TC 22 WG: Determination of volatile organic compounds in cars interiors	Dr. Alexandra Schieweck
ISO/TC 146/SC 6/WG 17	Sensory testing of indoor air	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 18	Flame retardants	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 20	Determination of phthalates	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 23	Determination of amines	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 24	Indoor Air Quality management systems	Dr. Erik Uhde
ISO/TC 146/SC 6/WG 25	Testing air cleaners by the assessment of perceived air quality	Dr. Erik Uhde
ISO/TC 296	Bamboo and rattan	Harald Schwab

Collaboration with expert committees and working groups | **Mitarbeit in Fachausschüssen und Arbeitskreisen**	
AK Analytik des RAL Güteausschusses »Imprägnierte Holzbauelemente«	Dr. Jan Gunschera
Arbeitskreis Faseranalytik der Industrievereinigung Verstärkte Kunststoffe e. V. (AVK)	N.N.
AK Flammschutz der Forschungsgesellschaft Kunststoffe e. V.	Dr. Arne Schirp
BMUKN/VCI-Kooperationsprojekt »Human-Biomonitoring«	Dr. Tunga Salthammer
Sektorgruppe 18 Holzbau der Gruppe der notifizierten Stellen in Europa gemäß Bauproduktenverordnung | Sector group 18 Structural timber products	Harald Schwab
Sektorgruppe 20 Holzwerkstoffe der Gruppe der notifizierten Stellen in Europa gemäß Bauproduktenverordnung | Sector group 20 Wood-based panels	Harald Schwab
Spiegelausschuss zu SG 18/20 Holzbau/Holzwerkstoffe - Erfahrungsaustausch der notifizierten Stellen Deutschlands	Harald Schwab
Technische Ausschüsse Brettschichtholz der Studiengemeinschaft Holzleimbau e. V.	Harald Schwab
ErfA Prüfertagung der RAL Gütegemeinschaften Holzhausbau	Harald Schwab
ErfA Prüfertagung Qualitätsgemeinschaft Deutscher Fertigbau QDF / BMFcert	Harald Schwab
ErfA PÜZ-Stellen pure live	Harald Schwab
ErfA CETPC CARB approved European third party certifier	Bettina Meyer, Harald Schwab
ErfA CPR-GNB deutscher SpA zur Advisory Group of NB for the CPR	Harald Schwab
ErfA Geklebte Produkte EN 14080, EN 14374, EN 15497 und EN 16351	Harald Schwab
Verein zur Förderung der Normung im Bereich Holzwirtschaft und Möbel e. V. (VFNHM)	Harald Schwab
Fachausschuss Holzschutz der Georg-August-Universität Göttingen	Dr. Dirk Lukowsky
Fachgremium des VFF zu Holzfenstern	Dr. Dirk Lukowsky
Umweltbundesamt »Innenraumlufthygiene-Kommission«	Dr. Erik Uhde, Dr. Tunga Salthammer
VDA Verband der Automobilindustrie, AK Innenraumemissionen	Dr. Alexandra Schieweck
IEC International Electrotechnical Commission, IEC/TC59 SC59N JWG2	Dr. Erik Uhde

Publications | Publikationen

The scientists of Fraunhofer WKI published 46 scientific papers in peer-reviewd journals in 2025, an important activity to dissiminate research results and prove scientific excellence besides our main focus on contract research for industry.

2025 veröffentlichten die Forschenden des Fraunhofer WKI insgesamt 46 wissenschaftliche Arbeiten in Peer-reviewed Journals. Dies ist neben unserem Hauptaugenmerk auf Vertragsforschung für die Industrie eine wichtige Maßnahme, um Forschungsergebnisse zu verbreiten und wissenschaftliche Exzellenz zu belegen.

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"The Rapid Progress of Climate Change Requires Effective Concepts for Protecting People Indoors"

Tunga Salthammer, Lidia Morawska

Professor Tunga Salthammer from Fraunhofer WKI and Professor Lidia Morawska from Queensland University of Technology recently published an article in the journal WIREs Climate Change, in which they examine an important question: What does climate change mean for indoor air quality, i.e., in homes, offices, schools and other buildings?

The authors base their findings on the latest report from the Intergovernmental Panel on Climate Change (IPCC). According to this report, global warming is expected to reach 2.7 °C or more by 2100. At the same time, the Atlantic Meridional Overturning Circulation, an important ocean current system, is weakening. Together, these two factors are likely to lead to more drastic climate and weather events than previously assumed. This also increases the demands on buildings in which people live, work, and seek shelter.

The article is available online under the DOI number 10.1002/wcc-70043.



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Presentations | Vorträge

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Mehr als 30 Präsentationen auf wissenschaftlichen Tagungen und Konferenzen zeigen unser Engagement für den Transfer unseres Wissens an unsere Partner und die Öffentlichkeit.

Eschig, S.; Koch, C.: Biobasierte, schaltbare Klebstoffe für wiederverformbare Holz-Holz- und Holz-Metall-Lagenverbunde zur Anwendung im Mobilitätsbereich. 25. Kolloquium: Gemeinsame Forschung in der Klebtechnik, 18.-19.2.2025, Köln

Eschig, S.: Kombination verschiedener Ligninmaterialien zur Anwendung in modularen Leichtbaumöbeln. 12. Forum Leichtbau des Bundesministeriums für Wirtschaft und Energie (BMWE), 25.9.2025, Berlin

Eschig, S.; Koch, C.; Böhm, S.; Henneken-Horster, H.: Switchable adhesives for reshapeable wood-wood and wood-metall composites. 15th European Adhesion Conference, 1.- 3.10.2025, Valencia, Spain

Eschig, S.; Neure, F.; Belda, J.; Fronig, F.; Schieweck, A.; Omelan, A.: Formaldehyde free condensation resins from lignin and hydroxymethylfurfural. International Conference on Wood Adhesives, 22.-24.10.2025, Vancouver, Canada

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Lukowsky, D.: Technical feasibility and ecological impact of wooden endplates for PEM fuel cells. Hydrogen Sustainability and Circularity Conference, 26.2.2025, online

Lukowsky, D.: Spuren lesen. Holzschutz in der Denkmalpflege – moderne Methoden, Teil 5. Holzschutzüberwachungsverband e. V., 16.10.2025, Cloppenburg

Lukowsky, D.: Fassaden aus Holzwerkstoffen. Sachverständigen-Seminar für Anwärter und ö.b.u.v., Landesinnungsverband des Bayrischen Zimmerhandwerks, 4.11.2025, Regensburg

Meinlschmidt, P.: Stoffliche Nutzungsmöglichkeiten von Fichten-Kalamitätsholz. NUKAFI – Nutzung Kalamitätsholz Fichte, 13.2.2025, Futurium Berlin

Meinlschmidt, P.: Recycling von Holzbalken aus alten Gebäuden für die erneute Nutzung. Symposium »re*loop – circular by design«, 13.11.2025, Darmstadt

Meinlschmidt, P.: Technologische Eigenschaften von Holzwerkstoffen. Fachtagung Nutzung Kalamitätsholz Fichte - NUKAFI, 26.11.2025, Olsberg

Meinlschmidt, P.: Leichte und heizbare Materialien für den Möbel- und Innenausbau gezeigt am Beispiel der Caravaning-Industrie. FNR-Statusseminar »Innovative Furnierwerkstoffe«, 27.11.2025, Göttingen

Meinlschmidt, P.: Selbsttragende Freiformflächen aus Laubholzfurnier – Hybridwerkstoffe für den Einsatz in Fußgänger- und Fahrradbrücken. FNR-Statusseminar »Innovative Furnierwerkstoffe«, 27.11.2025, Göttingen

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Mérono, M.: Geklebte Verbindungen im Holzbau. Verbindungsmittel im Holzbau, 27.3.2025, Olsberg

Mérono, M.; Dehlinger, C.: Geklebte Anschlüsse für die neuen Windkraft-Türme von Modvion. 6. Deutscher Holzbau Kongress, 20.-21.5.2025, Berlin

Mérono, M.: Klebungen von modularen holzbasierten Türmen für Windenergieanlagen am Beispiel des Modvion-Konzepts und Möglichkeiten der Umsetzung in Deutschland. Hybrid-Fachtagung »Windenergieanlagen aus Holz«, 25.9.2025, Olsberg

Robert, T.; Malitowski, N.; Pérocheau Arnaud, S.; Papadopoulos, L.; Arendes, L.; Beuermann, S.: Itaconic acid as versatile building block for bio-based polymers. Chemiedozententagung, 17.-19-3.2025, Braunschweig

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Salthammer, T.: About aerosols, ventilation, and climate change. Success story: 25 years of joint indoor-related research by Queensland University of Technology and Fraunhofer WKI. Fraunhofer Network Australia Days, 13.3.2025, München

Salthammer, T.: Microplastics in the indoor environment – a topic of emerging concern? Health Canada, EHSRB Seminar Series, 19.3.2025, online

Salthammer, T.: Online particulate matter monitoring to track and control air quality in public transport. The 6th Workplace and Indoor Aerosols Conference, 6.5.2025, Gaeta, Italy

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Schieweck, A.: Einfluss des Klimawandels auf die Innenraumluftqualität. 14. Forum Wohnungslüftung, 26.11.2025, online

Schirp, A.: High pressure laminates (HPL): Paths to a greener future. Interzum Trend Stage, 22.5.25, Köln

Schwab, H.: Bewertung von Klebefugen an eingebauten, tragenden Holzbauteilen. Deutsche Sachverständigentage, 21.3.2025, Erfurt

Trautwein, J.-F.; Mérono, M.: Technologische Eigenschaften von Holzprodukten aus Kalamitätsholz. Hybrid-Fachtagung »Von der Kalamität zur Wertschöpfung: Lagerung, Nutzung und Holzverarbeitung nach Großkalamitäten«, 26.11.2025, Olsberg

Yan, L.: Natural fibres and their FRP composites in Civil Engineering. International Institute for FRP in Construction (IIFC), 10.9.2025, online

"Formaldehyde Free Condensation Resins from Lignin and Hydroxymethylfurfural"

Dr. Steven Eschig

International Conference on Wood Adhesives, 22.-24.10.2025, Vancouver, Canada

From wood-based materials and polymeric biocomposites to high-performance timber structures and bio-based multi-material structures: bonding is a key technology for transforming the economy into a sustainable bioeconomy. At the "International Conference on Wood Adhesives", more than 200 experts from industry and science came together to exchange the latest findings on binders, adhesives, and bonding technologies for wood and biomass.



Dr. Steven Eschig

Events



Trade shows are where ideas come to life – and where innovations give rise to genuine partnerships.”

Federico Böhm

Fraunhofer WKI
Event Manager

LIGNA Fair 2025

LIGNA 2025 in Hanover – the world's leading trade fair for the woodworking and wood-processing industry – celebrated its 50th anniversary from May 26 to 30 and, over an area of 114,078 m², brought together 1,433 exhibitors from 49 countries. Around 78,000 visitors from 156 countries confirmed the trade fair's role as the most important platform for the global woodworking community. The focus was thereby on CONNECTIVITY, SUSTAINABLE PRODUCTION and ENGINEERED WOOD – encompassing topics such as digitalization, automation, AI, networked production and sustainable construction with wood.

At LIGNA 2025, the Fraunhofer WKI exhibits included a new type of curtain-wall façade element as a sustainable solution for the renovation and modernization of buildings. Not only durable raw materials such as robinia wood were thereby utilized: Enhancement through the application of bio-based coatings enabled the use of less durable wood species such as spruce, poplar and kiri. As a result, the entire application spectrum of wood-based materials for building façades was demonstrated.

In addition, bio-based, formaldehyde-free flame-retardant coatings for wood and hybrid materials were presented. These offer durable fire protection, reduce the application of petrochemical raw materials, decrease emissions, fulfill strict regulations and open up new market opportunities. Bio-based flame retardants provide a contribution towards a more sustainable and healthier method of construction that conforms to the needs of today's society.

Furthermore, the Fraunhofer WKI and the Institute of Building Construction and Timber Structures at the TU Braunschweig also presented solutions for resource-conserving, climate-friendly construction with wood and other renewable raw materials – from natural-fiber insulation materials, through timber-concrete composite systems, and on to the circular economy. Recyclability had already been taken into account during the development of the materials: a wall demonstrator showed second-use and secondary raw materials in timber frame construction. Further focal points were the improved recyclability of wooden panels through the removal of pollutants and metal residues, and classification rules for reutilization. In addition, guidelines for tall timber buildings under wind load were developed and then visualized in a film.

LIGNA 2025

Die LIGNA 2025 in Hannover – die Weltleitmesse der holzbe- und -verarbeitenden Industrie – feierte ihr 50. Jubiläum vom 26. bis 30. Mai und vereinte 1.433 Aussteller aus 49 Ländern auf 114.078 m². Rund 78.000 Besucher aus 156 Ländern bestätigten ihre Rolle als wichtigste Plattform der globalen Woodworking Community. Im Fokus standen CONNECTIVITY, SUSTAINABLE PRODUCTION und ENGINEERED WOOD – mit Themen wie Digitalisierung, Automatisierung, KI, vernetzter Produktion sowie nachhaltigem Bauen mit Holz.

Das Fraunhofer WKI zeigte auf der LIGNA 2025 unter anderem ein neuartiges Vorhang-Fassadenelement als nachhaltige Lösung für die Sanierung und Modernisierung von Gebäuden. Eingesetzt wurden nicht nur dauerhafte Ausgangsrohstoffe wie das Holz der Robinie. Darüber hinaus wurden weniger dauerhafte Holzarten wie Fichte, Pappel und Kiri durch biobasierte Beschichtungen ertüchtigt. Damit wurde das gesamte Einsatzspektrum holzbasierter Werkstoffe für Gebäudefassaden demonstriert.

Zudem wurden biobasierte, formaldehydfreie Flammschutzbeschichtungen für Holz und Hybridwerkstoffe präsentiert. Diese bieten dauerhaften Brandschutz, reduzieren den Einsatz von petrochemischen Rohstoffen, senken Emissionen, erfüllen strenge Vorschriften und eröffnen neue Marktchancen. Biobasierte Flammschutzmittel tragen zu einem nachhaltigeren und gesünderen Bauen bei, das den Bedürfnissen der heutigen Gesellschaft entspricht.

Weiterhin präsentierten das Fraunhofer WKI und das Institut für Baukonstruktion und Holzbau der TU Braunschweig Lösungen für ressourcenschonendes, klimafreundliches Bauen mit Holz und anderen nachwachsenden Rohstoffen – von Naturfaserdämmstoffen über Holz-Beton-Verbundsysteme bis zur Kreislaufwirtschaft. Recyclingfähigkeit wurde bereits in der Materialentwicklung mitgedacht; ein Wand-Demonstrator zeigte Second-Use- und Sekundärrohstoffe im Holztafelbau. Weitere Schwerpunkte waren die verbesserte Rezyklierbarkeit von Holztafeln durch Entfernung von Schadstoffen und Metallresten sowie Klassifizierungsregeln für die Wiederverwendung. Zudem wurden Leitlinien für hohe Holzgebäude unter Windlast entwickelt und per Film veranschaulicht.

Fairs and other Events | Messen und andere Veranstaltungen

BAU Fair | Messe BAU

3rd - 17th January 2025 | Munich

At the BAU trade fair, the Fraunhofer WKI presented innovative solutions relating to the use of wood and other renewable raw resources in materials. The display featured a building construction made from high-quality pinewood components, a wooden beam made from reconditioned waste wood, insulation materials made from renewable raw materials, and insulation materials using fungal mycelium as an innovative binding agent. With this model, the researchers are able to demonstrate resource-conserving innovations for construction using recycled materials such as waste wood or hemp hurds. In addition, a project aimed at developing innovative aerogels from waste wood was also presented. From these sustainable materials, the researchers are developing, among other things, pollutant-adsorbing air filters and recyclable insulation materials. Furthermore, the Institute's expertise in the field of bonding was demonstrated through the development of a wood-concrete composite element – just one example of how the Institute can provide the industry with possibilities for support.

Hanover Fair | Hannover Messe 2025

31st March - 4th April 2025 | Hanover

At Hannover Messe 2025, the Fraunhofer WKI presented 3D lightweight structures made from foamed spacer fabrics. This was a free-form, sustainable sandwich component made from natural-fiber-reinforced plastics.
Furthermore, a miniature replica of the wind-power tower "Wind of Change Tower" was presented. Within the framework of the project, the Fraunhofer WKI provided support and advice regarding the bonding of the 105-meter-high wooden tower erected in Sweden. Including the turbine mounted on top, the tower measures more than 150 meters in height, making it the world's tallest wooden wind-power tower.

Science Salon | Salon der Wissenschaft

18th June 2025 | Braunschweig

The "Salon der Wissenschaft" is an event format that provides the public with the possibility of engaging in conversation with researchers from the Braunschweig region. Dr. Henrik Christ presented his research on fungal-mycelium-based materials as biological binders.

HighTex Fair | Messe HighTex

4th November 2025 | Münchberg

During the HighTex trade fair, the Fraunhofer WKI organized a workshop within the scope of the Research Area Technical Textiles. Among other things, current developments from textile research were presented – from bio-based synthetic fibers and adhesive-free prepregs through to innovative sensor and multilayer fabrics.

ELMIA Subcontractor

11th - 13th November 2025 | Jönköping, Sweden

Within the framework of the "SMART Material Lab" exhibition, the Institute presented a bio-based sandwich component for lightweight construction. The innovative sandwich component, made from lignocellulose and bio-based epoxy resin, replicates the cross-section of a caravan wall structure with inner and outer walls. The material could be used, for example, for sleeping cabins in mobile homes. Furthermore, a sustainable bio-foam made from lignin sulfonate for car bumpers was demonstrated. Researchers at the Fraunhofer WKI are developing a high-performance bio-foam from lignin, a by-product of pulp and paper production. In order to demonstrate its market potential, the lignin foam is being processed into molded parts for the automotive industry. In the future, these will be utilized as cores in car bumpers, thereby replacing petrochemical foam materials with climate-friendly lignin foam.

International Timber Construction Forum | Internationales Holzbau-Forum 2025

3rd -5th December | Innsbruck, Austria
The "International Wood Construction Conference" offers experts from the timber construction industry a platform where they can obtain and exchange comprehensive information regarding building with timber supporting structures and timber constructions. The Fraunhofer WKI presented its expertise in the field of "Bonding in timber construction" and in its ability to provide support to the industry in the development of sustainable and innovative solutions in the field of adhesives and timber construction.

Honor | Ehrung

Bettina Meyer of the Fraunhofer WKI received a major honor on December 11, 2025, at the 16th Wood-Based Panels Colloquium hosted by the Institut für Holztechnologie Dresden gGmbH (IHD).

Following her presentation on the new European REACH Regulation for formaldehyde-emitting articles, she received a certificate of honor from the DIN Standards Committee Timber and Furniture (NHM). With this, the NHM recognized her extraordinary professional achievements, which have significantly shaped the development and harmonization of testing methods for wood-based materials in Germany and beyond. The laudatory speech was delivered by Professor Steffen Tobisch, Director of IHD. The Fraunhofer WKI extends its warmest congratulations to Bettina Meyer on this award.



Bettina Meyer, Fraunhofer WKI, and Professor Steffen Tobisch, IHD

Girls's Day | Zukunftstag

On April 3, 2025, 24 girls and boys visited Fraunhofer WKI as part of the nationwide Girls' Day to gain a one-day insight into the daily life of a research institute. They learned interesting facts about the Fraunhofer-Gesellschaft and the diverse research conducted at Fraunhofer WKI. They were invited to design a pattern for a colorful particleboard panel and then produce and process it themselves in our technical workshop. Afterward, they had the opportunity to try out IR spectroscopy and search for traces using an electron microscope. The event was organized for the 19th time by the institute's equal rights officers.



Girls' Day 2025



Groups, Alliances and Networks | Verbünde, Allianzen und Netzwerke

Institutes with different areas of expertise cooperate within Fraunhofer Groups, Alliances, Research Fields and Networks in order to collaboratively work on and market a business area. The Fraunhofer WKI is an active member in some of them.

Institute mit unterschiedlichen Kompetenzen kooperieren in Fraunhofer-Verbünden, -Allianzen, -Forschungsbereichen und -Netzwerken, um ein Geschäftsfeld gemeinsam zu bearbeiten und zu vermarkten. Das Fraunhofer WKI ist in einigen davon aktives Mitglied.

Fraunhofer Group for Materials and Components

Fraunhofer materials research covers the entire value chain, from new material development and improvement of existing materials through manufacturing technology on a quasi-industrial scale, to the characterization of properties and assessment of service behavior. The same research scope applies to the components made from these materials and the way they function in systems. In all these fields, experimental studies in laboratories and technical institutes are supplemented by equally important numerical simulation and modelling techniques – across all scales, from individual molecules up to components and process simulation. As far as materials are concerned, the Fraunhofer MATERIALS group covers the full spectrum of metals, inorganic non-metals, polymers and materials made from renewable resources, as well as semiconductor materials.
The Group's expertise is concentrated specifically in the fields of energy and environment, mobility, health, machine and plant construction, building construction and living, microsystems technology and safety. Innovative systems are developed using materials and components customized for specific applications, and based on the assessment of the behavior of a material or component under specific conditions of use. Strategic forecasts promote the development of novel, future-oriented materials and technologies.
www.materials.fraunhofer.de

Fraunhofer Building Innovation Alliance

With its 14 member institutes, the Fraunhofer Building Innovation Alliance offers the market the first single point of contact for integral system solutions in the field of construction. The alliance sees itself as an indicator and initiator of new and innovative topics relating to construction research. It strives to tackle all scientific and research-related construction issues by framing them within the context of its own in-house capabilities and developing one-stop solutions within the Fraunhofer-Gesellschaft.
www.bau.fraunhofer.de



Fraunhofer Research Field Lightweight Construction

The participating institutes of the Fraunhofer Research Field Lightweight Construction offer conceptual and technical solutions in manufacturing as well as testing and evaluation along the value chain of lightweight products.
Customer-specific questions are met by taking into account ecological and economical requirements. Merging the competencies of 15 Fraunhofer institutes complex solutions can be developed.
The portfolio is rounded off by a comprehensive range of further training courses for "Composite Engineers".
www.leichtbau.fraunhofer.de

Fraunhofer Research Area Technical Textiles

Several Fraunhofer institutes have teamed up in order to map the entire textile value creation chain from textile machinery, fiber production, preform and semi-finished product manufacture, textile functionalization, smart textiles, process and product simulation, sustainability – life cycle assessment and recycling, all the way to fiber composite components by bundling individual competences. The Fraunhofer institutes of the Research Area Technical Textiles work together in an interdisciplinary manner to generate optimal, application-specific, product-specific developments of textile-based technologies and plant systems.
www.textil.fraunhofer.de

Fraunhofer Business Unit Vision

The Vision Business Unit at Fraunhofer is an association of specialist departments from several Fraunhofer institutes that work together and pool their expertise in the fields of industrial image processing, machine vision and optical measurement and testing technology especially for use in manufacturing and quality assurance. The central office in Fürth is available as the first contact point for potential interested parties and customers on the topic of image processing.
www.vision.fraunhofer.de

Cultural Heritage Research Alliance

The top priority of this interdisciplinary alliance is the preservation of cultural heritage through material-analysis research and innovation. Written documents, paintings, sculptures and historical buildings are not only invaluable to society in an idealistic sense – they also represent an enormous economic factor.
www.forschungsallianz-kulturerbe.de

Fraunhofer Sustainability Network

The Fraunhofer Sustainability Network aims to focus research and the application of research findings more strongly on the principle of sustainability and, to that end, to raise awareness within the Fraunhofer Gesellschaft of the many different sustainable developments taking place.
www.fraunhofer.de

Fraunhofer Network Science, Art and Design

How can science be inspired by art and design - and vice versa? What do researchers, artists and designers have in common? How can they enter into a creative dialog and take a stand, side by side, on overarching issues? The Fraunhofer Network "Science, Art and Design", which was founded in early 2018, addresses these and other questions.
www.art-design.fraunhofer.de

International Association for Technical Issues Related to Wood e. V. | Internationaler Verein für Technische Holzfragen e. V.

The shortage of wood as a raw material and the obligation to use the available timber economically provided the impulse for the founding of the Association for Technical Issues related to Wood in Braunschweig in 1946. Through its activities, the Association, renamed as iVTH – International Association for Technical Issues Related to Wood e. V., continues to contribute towards the deepening and sharing of knowledge concerning wood as a material as well as its utilization.

The aim of the association is to transfer the knowledge from research projects practice-oriented into the timber industry, in order for procedures and products to be newly-developed or enhanced. The competitiveness of SMEs should thereby be strengthened. The focus of our activities is, after all, placed mainly upon small and medium-sized companies in the timber industry and their suppliers. Nationally and internationally, we maintain close contact with research bodies and businesses with practical involvement.

Our services at a glance

- The iVTH promotes research and development work in the forestry and wood industries and associated fields, both nationally via Industrial Collective Research (IGF) and internationally via CORNET (in each case BMWE via DLR Projektträger)
- allocates research projects with currently-relevant objectives,
- organizes scientific events,
- awards the Wilhelm Klauditz Prize for wood research and environmental protection,
- contributes to advisory committees,
- is member of the AIF - Alliance for Industry and Research, the Austrian Society for Wood Research ÖGH, the Joint Committee on Adhesive Technology GAK, the Hardwood Research Interest Group IGLHF and
- is a cooperation partner for initiatives concerning wood as a resource.

Die Knappheit von Holz als Rohstoff und die Pflicht, das verfügbare Holz wirtschaftlich zu nutzen, gaben 1946 den Impuls für die Gründung des Vereins für Technische Holzfragen e. V. in Braunschweig, dem heutigen iVTH – Internationaler Verein für Technische Holzfragen e. V. Durch seine Aktivitäten trägt der Verein auch heute noch dazu bei, das Wissen rund um den Werkstoff Holz und die Möglichkeiten seiner Verwendung zu vertiefen und weiterzugeben.

Ziel des Vereins ist es, das Wissen aus Forschungsvorhaben praxisgerecht in die Betriebe der Holzwirtschaft und angrenzender Bereiche zu transferieren, damit Verfahren und Produkte neu- oder weiterentwickelt werden können. Hierdurch soll die Wettbewerbsfähigkeit des Mittelstands gestärkt werden, denn im Fokus seiner Aktivitäten stehen hauptsächlich kleine und mittelständische Unternehmen der Holzwirtschaft und ihre Zulieferer. National und international pflegt der Verein enge Kontakte zu Forschungsstellen und Betrieben aus der Praxis.

Die Leistungen auf einen Blick

- Der iVTH fördert Forschungs- und Entwicklungsarbeiten in der Forst- und Holzwirtschaft und angrenzenden Bereichen sowohl national über die Industrielle Gemeinschaftsforschung als auch international über CORNET (jeweils BMWE über DLR Projektträger),
- vergibt Forschungsaufträge mit aktueller Zielsetzung,
- organisiert wissenschaftliche Veranstaltungen,
- verleiht den Wilhelm-Klauditz-Preis für Holzforschung und Umweltschutz,
- wirkt in Beratergremien mit,
- ist u. a. Mitglied der AIF - Allianz für Industrie und Forschung e. V., der Österreichischen Gesellschaft für Holzforschung ÖGH, des Gemeinschaftsausschusses Klebtechnik GAK, der Interessengemeinschaft Laubholzforschung IGLHF und
- ist Kooperationspartner für Initiativen rund um den Rohstoff Holz.

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The Fraunhofer-Gesellschaft | Die Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, headquartered in Germany, is a leading organization for applied research. It plays a pivotal role in innovation by focusing on cutting-edge technologies and transferring research results to industry in order to strengthen Germany as a business location and benefit society. Since its founding as a nonprofit in 1949, Fraunhofer has held a unique position in the German research and innovation ecosystem.

Die Fraunhofer-Gesellschaft mit Sitz in Deutschland ist eine der führenden Organisationen für anwendungsorientierte Forschung. Im Innovationsprozess spielt sie eine zentrale Rolle – mit Forschungsschwerpunkten in zukunftsrelevanten Schlüsseltechnologien und dem Transfer von Forschungsergebnissen in die Industrie zur Stärkung unseres Wirtschaftsstandorts und zum Wohle unserer Gesellschaft. Seit ihrer Gründung als gemeinnütziger Verein im Jahr 1949 nimmt sie eine einzigartige Position im Wissenschafts- und Innovationssystem ein.

With more than 30,000 employees at 74 institutes and independent research units in Germany, Fraunhofer operates with an annual budget of 3.6 billion euros. Contract research, Fraunhofer's mainstay, generates 3.2 billion euros of this budget. Unlike other public research organizations, institutional funding from federal and state governments accounts for no more than one-third of Fraunhofer's contract research budget. Institutional funding is thus merely the base of Fraunhofer's main business model and serves as the foundation for groundbreaking pre-competitive research that will become important for industry and society in the years ahead. What truly sets Fraunhofer apart is its high share of industrial revenue, which ensures close collaboration with the private sector while keeping Fraunhofer's research focused on the market. Fraunhofer raises at least two-thirds of its contract research budget competitively from private-sector contracts and public project funding. In 2025, industrial revenue alone accounted for 966 million euros.

Mehr als 30 000 Mitarbeitende an 74 Instituten und selbstständigen Forschungseinrichtungen in Deutschland erarbeiten das jährliche Finanzvolumen von 3,6 Mrd. €. Davon entfallen 3,2 Mrd. € auf das zentrale Geschäftsmodell von Fraunhofer, die Vertragsforschung. Im Vergleich zu anderen öffentlichen Forschungseinrichtungen bildet die institutionelle Förderung durch Bund und Länder mit maximal einem Drittel lediglich das Fundament des Kernbereichs Vertragsforschung. Sie ist die Basis für wegweisende Vorlaufforschung, die in den kommenden Jahren für Wirtschaft und Gesellschaft von Bedeutung sein wird. Das entscheidende Alleinstellungsmerkmal ist der hohe Anteil an Wirtschaftserträgen. Er garantiert die enge Zusammenarbeit mit Wirtschaft und Industrie sowie die stetige Marktorientierung der Fraunhofer-Forschung. Bei der Vertragsforschung wirbt Fraunhofer mindestens zwei Drittel im Wettbewerb ein, aus Aufträgen der freien Wirtschaft sowie durch öffentliche Projektfinanzierung. Im Jahr 2025 beliefen sich allein die Wirtschaftserträge auf 966 Mio. €.

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Neue Wege müssen gesucht werden, um reduzierte Bestände an Starkholz durch die Nutzbarmachung minderwertigen Holzes zu ergänzen.«

W. Klauditz, 1946

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