LATVIJAS VALSTS KOKSNES ĶĪMIJAS INSTITŪTS

LSIWC - sustainable non-food bioeconomy research center

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Mission

Development of knowledge-based, environmentally friendly low-waste technologies for obtaining competitive materials and products from wood and other plant biomass for sustainable utilisation of natural resources for economic, social and ecological benefits.

Vision

Modern research centre of wood and other biomass with broad research infrastructure potentialities, and tradition-based creative and dynamic researchers' staff, open to new ideas and science challenges.

koksnes ķīmijas institūts • institute of wood chemistry •

the logo is being changed

LATVIAN STATE INSTITUTE OF WOOD CHEMISTRY

- **Founded in 1946**
- **139 employees;**
- **41 Dr.**
- **turnover 2020 – 5,5 mill. EUR**

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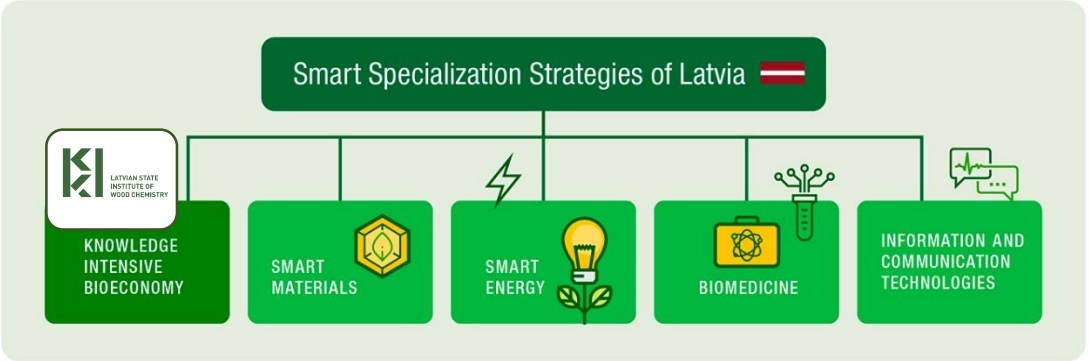
STRATEGY



Industrial, research, innovation and bioeconomy policies, R&D requirements from forest, agricultural and wood processing industries, which allows identifying three excellences

Wood Materials

Wider use of wood and wood-based materials in building and construction:
improving the durability properties and providing a predictable service life. In the studies, ecological and economical products and technologies are sought for improvement of biodurability and ageing resistance.

Biorefinery

The valorization of European and local plant biomass:
mainly wood and its by-products, considering biorefinery and wasteless conceptions, is the vital conditions for the development of bioeconomy. The advanced analytical tools for chemical analysis of natural products and processes of their obtaining are directed to complete sustainable use of raw materials, through designing of a multi product or feedstock portfolio.

Green Chemistry

Renewable feedstock as raw materials for synthesis and production of chemicals and polymers:
which substitute petrochemical origin materials. Ecologically and economically viable polymers synthesis method, up-scaling of polymer production. Life cycle analysis (LCA) of developed processes.

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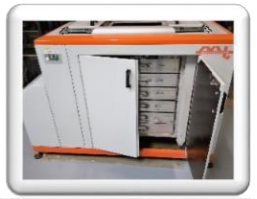
PILOT-SCALE HANGAR AND EQUIPMENT

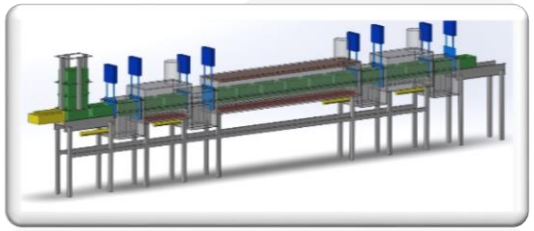
Material preparation workshop (18×8):

- Coarse mill;
- Vibrating mill;
- High-capacity coarse sieve;
- High-grade fine sieve;
- Dryer;
- Spray dryer;
- Vacuum evaporator;
- Filter press;
- Climatic chamber.



Pilot scale equipments (18×18):

- Wood impregnation equipment;
- Non-destructive testing machine;
- Microscope with digital camera;
- Mini reactor for synthesis in liquid medium with mechanical mixing;
- Polyurethane production and test equipment;
- Impact-tolerance measuring equipment with accessories;
- Extraction plant (with 10 L extraction cells);
- Homogenizer for micro- / nano- cellulose;
- Electrospinning equipment;
- Steam explosion equipment;
- Hydraulic press;
- Extraction Plant 100L;
- Continuous operation tunnel oven;
- Fermentation plant.



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OTHER ORIGINAL CONSTRUCTION EQUIPMENT

Several unique devices have been developed and constructed at the institute for biomass processing into various products, such as pulp, biomass pellets, impregnated wood, char, bio-oil, anhydrosugars, furfural, betulin, polyols, plant extracts, etc

- **Pulping reactor** (2 L) for cellulose fiber production;
- **Steam explosion reactor** (0.5 L) for biomass disintegration;
- **Microwave torrefaction reactor** for modification and upgrading fuel pellets;
- **Wood impregnation autoclave** for optimisation of initial processes and materials;
- **External heating rotating retort** for thermal processing of biomass with operating temperature 100-900°C;
- **Screw thermoreactor** (0.5 kg/h) for catalytic production of levoglucosenone;
- **Continuous flow thermoreactor** (1 kg/h) produces an anhydrosugar rich bio-oil from biomass in a superheated steam system;
- **Bench scale reactor system** (13.7 L) modulates the industrial furfural obtaining process, and is additionally used for catalytic and non-catalytic pre-treatment of several biomasses;
- Automated **batch reactor (30 L) for extraction** to obtain betulin and perform chemical synthesis in laboratory pilot tests;
- Automated stainless steel **chemical reactor** (50 L) for polyol and other chemical synthesis;
- **Microwave extraction reactor** (1.5 L) for pre-treatment of plant biomass for lignocellulosic cell wall degradation;
- Low temperature pulse **microwave reactor** (1.2 L) with a focus on effective water extraction of the main constituents and secondary metabolites from plant biomass.

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COOPERATION

You are welcome !

Conference

Industry

- Pulp and paper
- Pyrolysis of biomass
- Charcoal production
- Polyurethane as thermal insulation
- Biologically active products for pharmacy and cosmetics
- Bioreactors cinstruction and software
- Tests of long term storage stability and biodegradability
- Tests of wood protective materials
- Testing of wood chips, pellets, charcoal and activated carbon
- Tests of formaldehyde content in wood materials

International projects

- Cryogenic insulation
- Complex biomass refinery
- Sustainable binder for plywood
- European Research Infrastructure for Circular Forest Bioeconomy
- Bio-based polyurethane composites
- Sugar based biotechnology
- Bioactive agents for food
- Wood based carbon catalysts

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WE OFFER

- **Research in the field of non-food bioeconomy**, wood science, biorefinery, cellulose and lignin chemistry, biotechnology, thermolysis, polymer chemistry and technology;
- **Analysis and tests** of forest and nature origin materials, polymers, foams;
- **Workplaces** where students, including foreign students, develop their research work;
- **Up-scaling of processes** developed in laboratories. Increasing TRL up to 4-6;
- **Organization of conferences and summer schools.**

WE ARE LOOKING FOR

- **Enhancement of the scientific and innovation capacity**, through the knowledge transfer and exchange of the best practice with the internationally leading research institutions, establishing of a partnership cluster;
- **Increasing the opportunity for** international and intersectorial **cooperation**;
- **Common research and joint projects** in the field of non-food bioeconomy,wood science, biorefinery, cellulose and lignin chemistry, biotechnology, thermolysis, polymer chemistry and technology;
- **Cooperation i**n Horizon-Europe projects. M-ERA-Net projects, COST actions, etc;
- **Industrial partners** as customers interested in our expertize;
- **Researchers and students** ready to work in our team.

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MINISTRY OF FINANCE REPUBLIC OF LATVIA | NATIONAL DEVELOPMENT PLAN 2020 | EUROPEAN UNION European Regional Development Fund

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