



# LINOKAS – Combined use of linseed and fibre straw

## Client II – International partnerships for sustainable innovations

Both the building materials industry and the automotive industry are experiencing an increase in demand for environmentally friendly, natural raw materials. Linseed straw is a by-product of the linseed farming industry in Kazakhstan, which can be further processed into a raw fibre material for industrial use. Up to now, however, this raw material has remained largely unexploited economically. The German-Kazakh project “LINOKAS” therefore works to develop a cost-reduced and thus economically viable treatment process for linseed straw and to test the various processing stages on-site in Kazakhstan.

### From problem substance to raw material

In recent years, Kazakhstan has grown to become one of the world’s most important producers and exporters of linseed. The continental climate is very well suited to linseed production. At the same time, the integration of the additional linseed crop allows more flexibility in crop rotations, which were previously dominated by spring wheat. However, the fibrous stalk material of the linseed (straw) is difficult to decompose and causes major problems for farmers when sowing the following crop after the winter. Current practice is to burn large areas of linseed straw in the fields in an uncontrolled manner.



Linseed straw burning in the fields.

Within the framework of “LINOKAS”, German and Kazakh partners from agriculture, industry and research work together over three years to develop specially adapted processes to turn the currently “problematic” agricultural product linseed straw into a raw fibre material that can be used for industrial purposes, for example for manufacturing construction products. In cooperation with partners in Kazakhstan, a crop farming method is to be developed for the combined use of linseed, for the production of both high-quality seeds and raw fibre materials. This work is supported by German project partners specializing in the adaptation of harvesting and straw recovery

technology. Taking these findings into account, the German side will develop a technology for processing linseed straw, which is adapted to regional conditions. The aim is to create the conditions in the target region for producing and marketing a transportable raw fibre material for export or further processing into an innovative insulation material, thus creating added value in the agriculture industry.

### Using resources sustainably

Variety and crop farming trials by the Kazakh partners allow for the targeted selection of linseed varieties and the corresponding adaptation of the entire farming process to meet the requirements of the combined use of both seeds and straw. These experiments will be repeated in the second and third year of the project in order to account for seasonal influences. In addition to native varieties, European linseed varieties will also be tested. The harvested straw will undergo storage trials before being processed using specific laboratory methods. Tests will also be done to assess the quality of the fibres produced. At the same time, comparative technical trials will be carried out with harvest biomasses from crop production. This will produce fundamental insights into the development, design, and manufacture of components that are essential for establishing the planned processing plant in Kazakhstan. Finally, easy-to-process blow-in insulation made of linseed fibres is to be developed, and options and technical concepts for its corresponding application are to be tested.

The project has a high degree of practical relevance since the fibre plants do not need to be specially cultivated, competing for surface space with food or fodder crops, as the raw material is already available as fibre straw from linseed production. The solution to a previously well-known environmental problem can even lead to additional revenue for linseed farmers following successful fibre extraction and processing to create intermediate and end products.

### Implementation prospects

The selection of linseed varieties based on their suitability for both seed and straw harvest will result in an appropriate combined use crop farming system that can be integrated into existing crop rotation systems in Kazakhstan. The fibrous raw material will be put into quality-oriented interim storage before being processed on-site using a new decortication technique to produce an intermediate product that is ready for transportation or further processing. This will create additional employment and income opportunities in direct connection with agricultural production in Kazakhstan. In addition to the direct partnerships in the research project, multiplication effects are also expected in other regions, with a corresponding increase in export opportunities for the German engineering partners.



Roof insulation with bast fibres.

There is a growing interest among the German building materials sector and the automotive industry for natural, environmentally friendly raw materials and natural fibres. Flax, hemp, and imported fibres are already being used, for instance, in the production of automotive interior trims. The flax that is already in use is currently obtained from the genetically similar flax fibres; however, this material is subject to the price influences of the textile industry due to its popularity in linen production. "LINOKAS" therefore considers substitution or supplementation with linseed fibres in current production to be a realistic possibility.

#### Funding initiative

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#### Project title

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#### Duration

01.11.2017–30.06.2021

#### Funding code

033R192A-F

#### Funding volume

699,284 Euro

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bmbf-client.de

#### Published by

Bundesministerium für Bildung und Forschung/  
Federal Ministry of Education and Research (BMBF) Division  
Resources, Circular Economy; Geosciences  
53170 Bonn, Germany

#### July 2019

#### Editing and layout

Project Management Jülich (PtJ), Forschungszentrum Jülich GmbH; adelphi research gGmbH

#### Photo credits

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