



## INCLUDING PALUDICULTURE PRODUCTS IN THE ADVANCED MATERIALS ACT

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## Introduction

The EU has a set of main goals addressing climate change challenges:

- **EU Climate Law<sup>1</sup>**: Reduction of net greenhouse gas (GHG) emissions by at least 55% by 2030 and 90% by 2040, compared to 1990's levels.
- **Land Use and Land-Use Change Forestry Regulation (LULUCF)<sup>2</sup>**: Net carbon removals of 310 million tonnes of CO<sub>2</sub> equivalent as a sum of the GHG net emission reductions and removals by Member States by 2030.

As a pathway to move in this direction, the EU Bioeconomy Strategy<sup>3</sup> aims to contribute to climate change adaptation and mitigation by creating and expanding markets for innovative bio-based products improving circular economies. In this way, the bioeconomy maximises co-benefits in achieving the targets of EU Climate Law and LULUCF.

Rewetting of drained peatlands has been recognized as a key GHG mitigation measure<sup>4</sup>, with an estimated potential of GHG emissions reduction in the EU amounting to around 20 tonnes of CO<sub>2</sub> equivalent per hectare annually<sup>5</sup>. Since the majority of drained European peatlands are under agricultural use<sup>6</sup>, a shift away from drainage-based agriculture is necessary to reach this potential. Paludiculture – a productive land use of rewetted peatlands<sup>7</sup> – can provide resilient and profitable business models for farmers and landowners, be a source of biomass for advanced materials, and significantly contribute to a sustainable circular economy<sup>8</sup>, while preserving peat soils, minimising GHG emissions and bringing benefits for biodiversity. Paludiculture has been already

<sup>1</sup> Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law').

<sup>2</sup> Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (Text with EEA relevance).

<sup>3</sup> European Commission, 2018. A sustainable bioeconomy for Europe: Strengthening the connection between economy, society, and the environment.

<sup>4</sup> UNEP, 2022, Global Peatlands Assessment – The State of the World's Peatlands: Evidence for action toward the conservation, restoration, and sustainable management of peatlands. Main Report. p17. Global Peatlands Initiative. United Nations Environment Programme, Nairobi.

<sup>5</sup> Tanneberger, F., Appulo, L., Ewert, S., Lakner, S., Ó Brolcháin, N., Peters, J., Wichtmann, W., 2021. [The power of nature-based solutions: How peatlands can help us to achieve key EU sustainability objectives](#). Advanced Sustainable Systems 5, 2000146.

<sup>6</sup> European Commission, 2020. [Peatlands for LIFE](#).

<sup>7</sup> Wichtmann, W., Schröder, C. & Joosten, H., 2016. Paludiculture - Productive Use of Wet Peatlands. Climate Protection - Biodiversity - Regional Economic Benefits. Schweizerbart Science Publishers, Stuttgart.

<sup>8</sup> Schäfer, A. & Wichtmann, W., 2022. Strategy and economic assessment of paludiculture for nutrient retention and other ecosystem services in the Neman River basin. Greifswald University and Michael Succow foundation, partners in the Greifswald Mire Centre, Greifswald, Germany.

included in EU policy areas such as the Nature Restoration Regulation (NRR) and the Carbon Removal and Carbon Farming (CRCF) regulation.

The Advanced Materials Act, based on the Communication on Advanced Materials for Industrial Leadership<sup>9</sup>, will offer solutions for successful implementation of the European Green Deal, improving the environmental performance of products and processes, and facilitating circularity. In this context, the EU's aim for a transition to a sustainable and competitive economy requires the exploration of bio-based markets. The large-scale implementation of paludiculture could offer a valuable contribution to the development of these markets and a sustainable circular economy<sup>8</sup>. In light of this, paludiculture biomass applications should be considered in the Advanced Materials Act for ensuring cohesion with other climate objectives and to facilitate a large-scale market development. This joint policy brief summarises the evidence found in paludiculture biomass applications to contribute to the Advanced Materials Act from the EU projects PaluWise, Palus Demos, Paludi4All, FIBSUN and PaludiAllianz.

## Paludiculture products as advanced materials

Bio-based materials from paludiculture offer an alternative to conventional materials including plastics. Since bio-based markets are expected to increase<sup>10</sup>, paludiculture could contribute to achieving the objectives of the EU Bioeconomy Strategy in providing bio-based materials. Paludiculture crops, such as cattail (*Typha spp.*), reeds (*Phragmites australis*), peat mosses (*Sphagnum spp.*), sedges (*Carex spp.*), alder (*Alnus glutinosa*), and reed canary grass (*Phalaris arundinacea*), are used for building and insulation materials, paper and packaging, substrate and soil improvement products, energy, livestock bedding, fodder, medicine, food, and textiles<sup>11</sup>. For example, a German company is developing bio-based packaging products coming from paludiculture that could substitute plastic packaging products in a more sustainable way<sup>12</sup>. Similarly, a German company produces paludiculture cardboards using fibres from rewetted peatlands<sup>13</sup> and another German company produces cartons containing 10% paludiculture biomass, aiming to increase the paludiculture biomass content in their products<sup>14</sup>. In the UK,

<sup>9</sup> Communication (COM/2024/98 final) from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Advanced Materials for Industrial Leadership.

<sup>10</sup> Asada, R., Krisztin, T., Di Fulvio, F., Kraxner, F., Stern, T., 2020. [Bioeconomic transition?: Projecting consumption-based biomass and fossil material flows to 2050](#). Journal of Industrial Ecology 24, 1059-1073.

<sup>11</sup> Greifswald Mire Centre, 2025. Paludiprodukte – Inspired by peatlands, designed for the future.

<sup>12</sup> See: <https://www.ivv.fraunhofer.de/en/packaging/sustainable-packaging/paludi.html>

<sup>13</sup> See: <https://www.leipa.com/en/news/detail/schrobenhausen-cardboard-made-from-paludicultures>

<sup>14</sup> See: <https://www.ottogroup.com/en/stories/story/peatlands-must-be-wet-ground-breaking-ceremony-in-german-region-uckermark-sets-a-sign-for-climate-protection.php>

seedheads of cattail are being used for textiles<sup>15</sup>. To phase out peat use, a Finnish company produces peat-free growing media and compost bedding applications from lake reed and cultivated reed grass<sup>16</sup>.

The potential is especially large in the building materials sector which faces challenges to reduce energy consumption during all life phases and to reduce the use of resources coming from fossil raw materials<sup>17</sup>. The use of paludiculture biomass for the construction and insulation materials production not only saves energy, but also significantly reduces the carbon footprint<sup>18</sup> and presents lower thermal conductivity and a good hygrothermal performance in the case of cattail<sup>19</sup>. Some paludiculture crops such as reed grasses have been already used as a construction material for millennia, particularly for thatched roofing<sup>20</sup>. Payments for carbon storage in buildings, included in the CRCF, will further advance paludiculture material use. Companies are urgently looking for sustainable options, thus fast upscaling of paludiculture e.g. by large-scale pilots, is required. An example of an innovation for circularity in the building sector is a no-waste solution from a company that harvests reeds and other fibre sources for using them together with paper recycling waste as the basis of a construction board<sup>21</sup>.

Alternative sources for fibres are thus in the right direction. Perennial paludiculture gives a good opportunity for sustainable biomass. There is a need for high quality fibres or particles for many applications. In the future, many different options for different crops will be needed, thus having as many companies as possible to use the materials might be appropriate.

## Challenges for paludiculture

The high cost of paludiculture and the need for homogeneous biomass lead to expensive products from paludiculture compared to others. Therefore, it is hard to compete with plastic products in the current situation, since the cost of plastic has been decreasing.

<sup>15</sup> See: <https://www.ponda.bio>

<sup>16</sup> See: <https://www.matojamulta.com/>

<sup>17</sup> Lahtinen, L., Mattila, T., Myllyviita, T., Seppälä, J., Vasander, H., 2022. [Effects of paludiculture products on reducing greenhouse gas emissions from agricultural peatlands](#). Ecological Engineering 105, 106502.

<sup>18</sup> Staniaszek D., 2015. Renovation in practice – Best practice examples of voluntary and mandatory initiatives across Europe. Buildings Performance Institute Europe (BPIE).

<sup>19</sup> De Jong, M., Van Hal, O., Pijlman, J., Van Eekeren, N., Junginger, M., 2021. [Paludiculture as paludifuture on Dutch peatlands: an environmental and economic analysis of Typha cultivation and insulation production](#). Science of the Total Environment 792, 148161.

<sup>20</sup> Lowland Peat, 2021. An assessment of the potential for paludiculture in England and Wales.

<sup>21</sup> See: <https://www.zelfo-technology.com/applications-source-materials>

In the building sector, it is often not permitted to have products in the market without the CE certification, which requires tests for heat conductivity, water and fire resistance. Both material production and certification are expensive. The EU will increasingly require life cycle assessments (LCA) and other proof of sustainability for products that are seen as fundamental for good business models. Making LCA calculations uniform and including land use changes in the estimates would better address the specific needs of paludiculture products.

Paludiculture should be market-driven in order to make the production attractive. However, it seems that problems related to rules and regulations are persistent. Policies should be designed to steer the markets to be more favourable for paludiculture. For instance, in countries such as the Netherlands, cattail cultivation could provide synergies with the Dutch goal of a climate neutral agriculture and land use by 2050<sup>22</sup>. Cattail cultivation in the Netherlands also contributes to the Dutch circular building economy<sup>19</sup>.

## Recommendations for paludiculture as part of the Advanced Materials Act

In the context of the call for evidence for the Advanced Materials Act, this joint communication presents the potential of paludiculture applications to transform industries and improve circularity while contributing to climate objectives for a net-zero carbon Europe.

**Innovative paludiculture products contribute to a transition to a circular and low-carbon economy minimising negative environmental impacts**, which further supports a sustainable and competitive industry. These are mainly used in markets such as building and insulation sector, where greener and more sustainable materials are needed. Paludiculture is also a solution for **phasing out peat use in growing media** and bedding production. Producing growing media in paludiculture can lead to less hectares in peat production, which reduces negative environmental impacts.

Policies should be designed to **more strongly support paludiculture production**, including direct agricultural subsidies and complementary political measures to reduce the high prices of paludiculture products. The Common Agricultural Policy (CAP), the EU's largest financial

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<sup>22</sup> Rijksoverheid Nederland, 2019. Klimaatakkoord. <https://www.klimaatakkoord.nl/klimaatakkoord>

instrument for agriculture, will need **to support paludiculture** well enough<sup>23</sup> as well as halt drainage-based agriculture.

Incentives to develop more sustainable products with better performance could increase the **industrial uptake of advanced paludiculture biomass materials**. To trigger the scale up of paludiculture, **connecting research and industry** as well as experimental paludiculture fields should be increasingly established with a clear prospects for the future in mind.

The inclusion of paludiculture in the Advanced Materials Act could contribute to a faster economic growth in markets such as building and insulation sector with more sustainable materials while contributing to EU climate goals. With this, industrial ecosystems could accelerate the development and testing of new advanced materials such as paludiculture products, which has already gained attention from the European Commission in several granted EU projects. This can potentially boost the upscale of paludiculture while significantly improving sustainability in different critical sectors.

Information contained in this document is based on discussions from the joint FIBSUN and PaluWise workshop during the Renewable Resources from Wet and Rewetted Peatlands Conference in Greifswald (Germany) in September 2025.

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<sup>23</sup> Nordbeck, R., Hogl, K., Schaller, L., 2025. [The integration of peatlands into the EU Common Agricultural Policy: Recent progress and remaining challenges](#). Environmental Science and Policy 169, 104077.

## Project's Information



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