

DELIVERABLES REPORT



Multipurpose hemp for industrial bioproducts and biomass

(Ref n. 311849)

D8.2 & D8.3 (Final dissemination and exploitation report)

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1 Introduction

The present document includes the combined Deliverables D8.2 and D8.3, the final dissemination and exploitation reports. It informs about the dissemination and exploitation activities that have been carried out in the course of the MultiHemp project.

The communication and dissemination strategy aimed mainly at the market introduction and commercial upscaling of the products featured in the MultiHemp project and followed the description of work with a clear strategy to define the message, target the audience and stakeholders, select the tools and plan the dissemination programme. The communication and dissemination activities of MultiHemp have been coordinated by partner nova-Institute together with the relevant partners from the consortium. The nova-Institute, leader of WP8, is at the same time acting as the executive office of the European Industrial Hemp Association (EIHA) and as such is very experienced in the dissemination of research results on industrial hemp.

The strategy included internal communication within the MultiHemp project in order to facilitate an effective exchange between project partners as well as external communication to the academic and research communities, industrial networks and the general public. The idea of the dissemination in the MultiHemp project was to develop concise information that can be transferred to all relevant stakeholders in Europe and abroad and thus raise awareness about the project and the products.

2 Dissemination: Objectives and structure

This project employed a broad set of dissemination activities, which mainly included the usual state-of-the-art activities such as a website, online and printed brochures, posters and presentations at events interesting for the MultiHemp products' stakeholders.

The main objectives of the dissemination and especially the exploitation activities are:

- To promote MultiHemp and its results and products as widely and effectively as possible to all relevant stakeholders, the scientific community and the broad public;
- To ensure proper and effective handling of Intellectual Property;
- To prepare documentation of new products and processes for standardization.

The dissemination part is integrated in the MultiHemp framework and linked to all technical processes, building a frame with the coordination (WP9) and the sustainability assessment within the project (WP7):

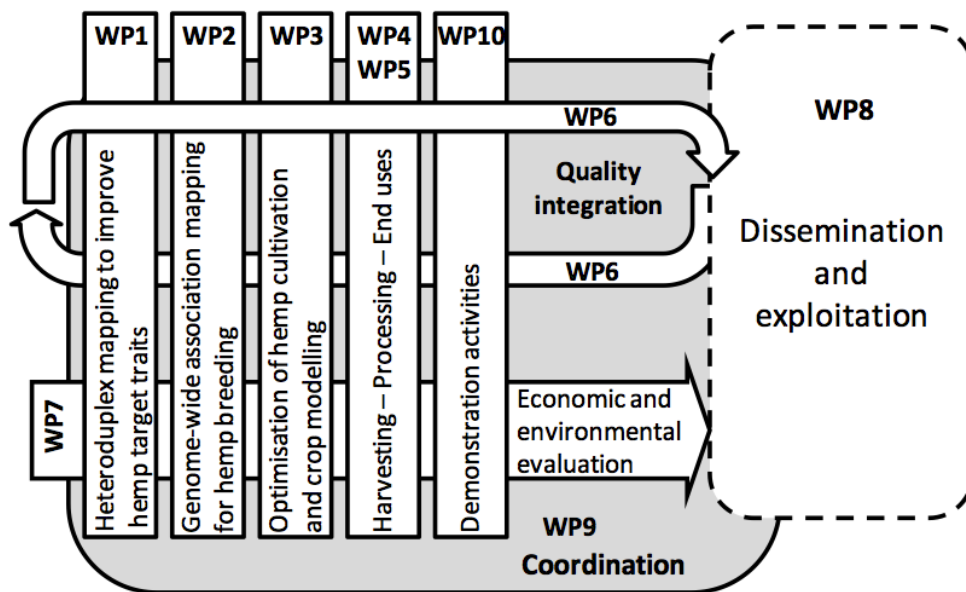


Figure 1 – MULTIHEMP Structure: Work packages and Objectives

3 Dissemination activities in the course of the project

3.1 Summary of activities by the dissemination leader

At the start of the project, the **website** www.multihemp.eu has been set up which served both as an internal and external communication platform. The website has been set up with the well-established WordPress system. This guarantees a long-term availability of up-to-date features that can be accessed without any hurdles. It is user-friendly and receives lots of updates and technical support from a big international community of users and programmers.

Consortium members can log in to the internal area (called Partners' Area) through a user name and password assigned to them.

The internal area featured two subsections:

- Downloads: A list of internal documents such as presentations and meeting minutes as well as the Description of Work (DoW)
- User database: A list of all consortium members with their contact details

The website's public area serves for the dissemination of information about the project to the wider academic and industrial communities and the general public. This website was continually expanded by further information on the project structure and with information on the development of the project over the whole project's running time. At the final meeting in Milan in January 2017, options have been discussed for using the structure of the website also after the end of the project for exchanging upcoming publications. The nova-Institute has developed a special tool for this purpose which could be implemented easily.

The following Figure 1 shows for the last year of the project an overview of the page views and visits of the project website. It shows that the number of visits, i.e. the number of times the website has been visited at least once, has been quite stable in that period at around 3,000 per month. The number of page views, i.e. the number of times different sub-pages of the website have been viewed averaged almost 8,000 per month but with peaks in September and November 2016. Unfortunately, a plausible explanation for these peaks could not be found.

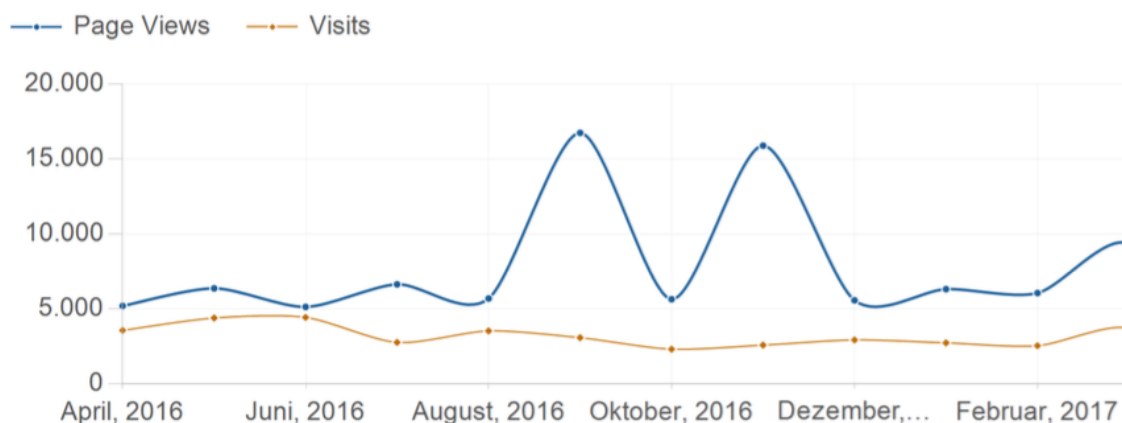


Figure 1: Page views and visits of the MultiHemp website, April 2016 to March 2017

Source: © 2017 SmarterTools Inc.

The external website is currently structured as follows:

- Home
- Project Overview
- Research
- Partners
- Imprint / Contact

The project's research partners disseminated the scientific and technological knowledge developed during the MultiHemp project to the academic community and other stakeholders. Primarily the industrial partners disseminated commercial benefits of the novel technologies to end users and key decision makers. The industrial partners used their existing links to the appropriate industrial, trade and professional organisations and associations.

As described above, the WordPress system is well established and receives a lot of support from a wide community. Therefore, after the end of the project, the website will be able to stay running in order to make the project results accessible for the public in a long-term perspective.

The forum of the annual international conference of the **European Industrial Hemp Association (EIHA)** has been used very actively throughout the duration of the project for an exchange between the project and scientific and industrial community. EIHA consists of regular members from hemp primary processing companies within the EU and of associate members such as associations, national organisations, companies or individuals working in the field of Hemp or other natural fibres. Founded in 2005, EIHA today comprises 9 regular and over 60 associated members from 30 different countries.

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EIHA was formed originally to give members a voice at the European Commission in Brussels. It grew quickly into a respected organisation that is an excellent bank of information and a real support to the fast developing hemp industry. Each annual EIHA conference, which takes place in Wesseling, Germany, allows members and non-members alike to exchange views and important developments with their colleagues.

nova-Institute with its central role in EIHA represents an ideal link to industrial actors, that will become the drivers of the innovation and developments that MultiHemp is foreseen to achieve. The participation of consortium members at EIHA congresses and workshops also represents an ideal situation in which to come into close contact with stakeholders and demonstrate the technical feasibility and effectiveness of the innovations to be developed in MultiHemp.

At the EIHA conference in 2013, a dedicated session on MultiHemp had been organised which included presentations from the coordinator UCSC, nova-Institute, HSB, UoY, ATB and WU. At the 2014 conference, a joint session for the two FP7-projects MultiHemp and FIBRA took place, with presentations from UCSC on the status of the MultiHemp project and by WU on the progresses in hemp breeding. At the 2015 conference, two internal project meetings had been organised, one of the Dissemination Committee at which the strategies for dissemination and exploitation have been discussed and one on the status of data collection. Finally, at the 2016 EIHA conference, nova-Institute presented interim results of the techno-economic and environmental sustainability assessment.

Also at the 2016 EIHA conference, a **stakeholder workshop** had been organised. This workshop has been attended by 10 external stakeholders and 10 representatives from the MultiHemp consortium. As a general conclusion from these discussions, it was stated that part of the problem is that hemp is still new to many industries. Furthermore, industrial users and farmers/processors of hemp often “speak different languages”. Overall, politics and marketing are the drivers for markets for hemp. Especially in these areas, EIHA members should work more together. The stakeholders had been invited from the stakeholder panel consisting of main stakeholders from industry, associations and research that would be affected by our research results and could in turn provide feedback for steering our way forward.

A **brochure** on the topic of "Carbon Footprint and Sustainability of Different Natural Fibres for Biocomposites and Insulation Material" has been developed and printed in April 2015. This brochure was also publicised by a press release introducing the MultiHemp project on 20 April, 2015. The results have also been presented at the Annual Conference of the European Industrial Hemp Association (EIHA) in May 2015. An update of this report, which will include the final results of the MultiHemp sustainability assessment, is still planned to be published in 2017.

Furthermore, a **poster** ("Hemp - a natural biorefinery") has been developed in November 2015 jointly with the FP7-project FIBRA which introduces the hemp plant as a multipurpose crop. This poster has been made publicly available on the MultiHemp website. As a further activity, a general **PowerPoint slide kit** has been prepared for the partners with a general introduction to the project.

Another highlight of activities included the organisation of a **Fibre quality workshop** by the Coordinator at the Université de Lille (FR) on January 18th, 2016. This was as a free of charge 1 day multidisciplinary workshop to PhD students and young researchers interested in the multifaceted world of using natural fibre crops for industrial applications and included several presentations by MultiHemp partners.

3.2 Summary of activities by the consortium

Most partners contributed in various forms to the dissemination of research results. Activities other than scientific publications (i.e. interviews, videos, conferences and workshops) form the largest part of dissemination activities. Figure 2 shows an overview of the main types of dissemination activities over time. It shows that scientific publications, both peer-reviewed papers and scientific conference proceedings have later started to be produced but than continuously increased in volume. Figure 3 shows that apart from peer-reviewed papers and scientific conference proceedings, oral presentations to scientific events form the largest group of activities. Accordingly, the scientific community was also the main target audience to be addressed by the activities (Figure 4). However, many activities also targeted the general public or civil society.

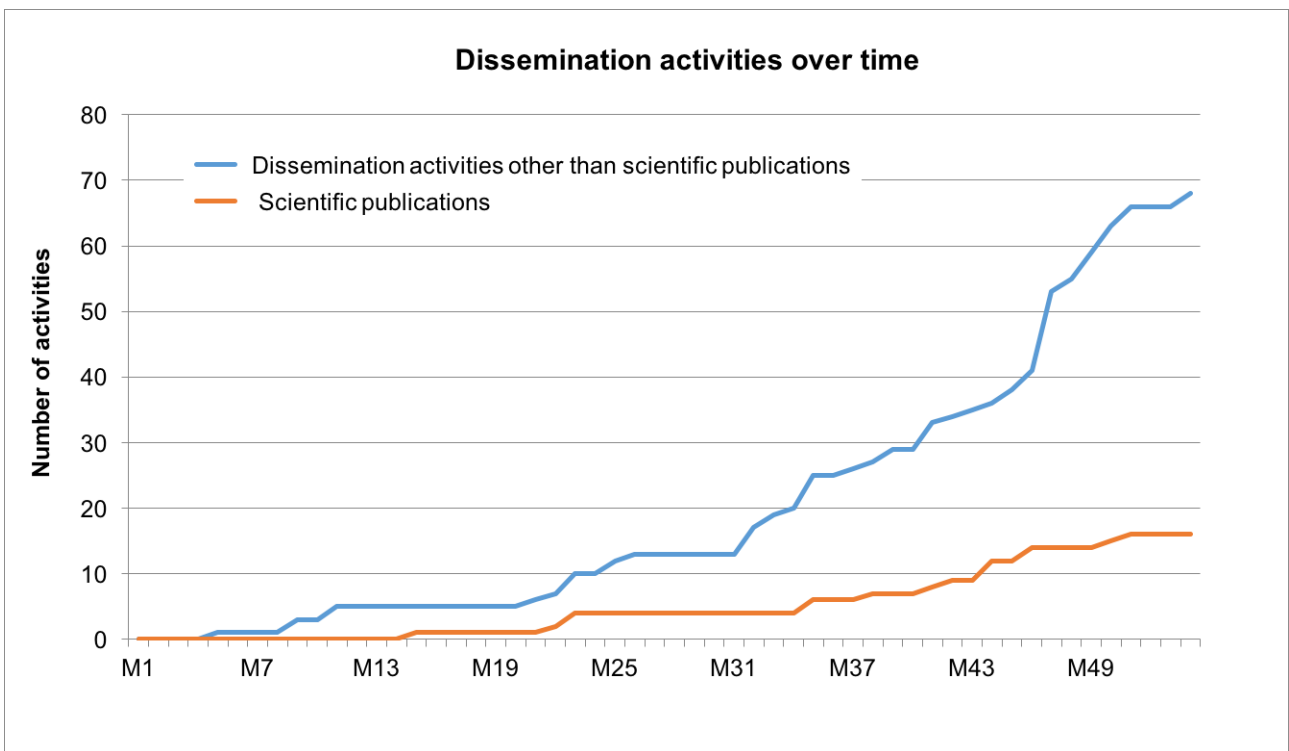


Figure 2: Dissemination by type of activities and over time

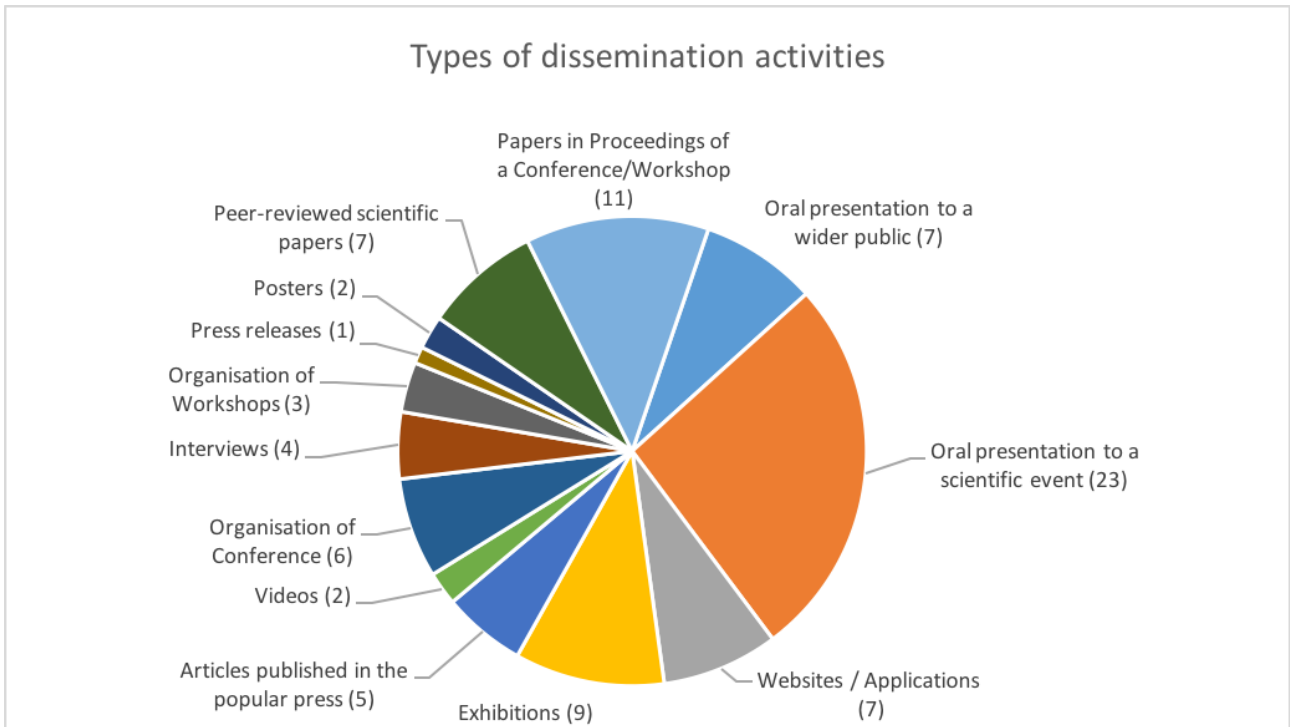


Figure 3: Dissemination by type of activities

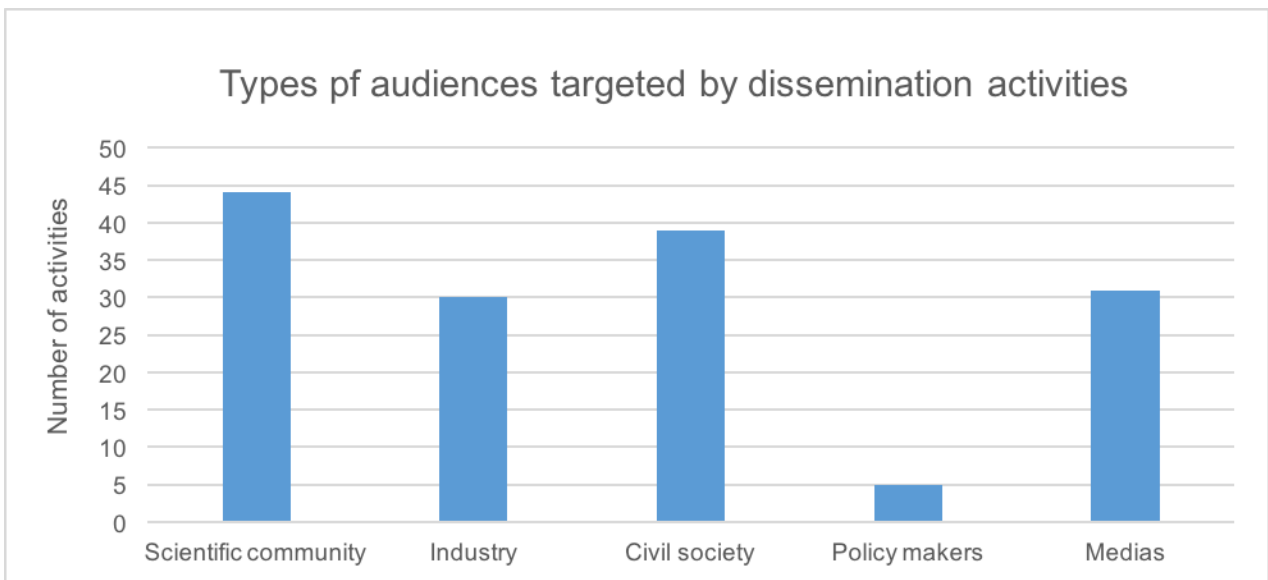


Figure 4: Type of audiences targeted by dissemination activities (other than scientific publications)

4 Exploitation

Regarding the commercial exploitation of project results, several advancements of products developed in the course of the project in terms of their Technology Readiness Levels (TRL) could be reported, although at this stage, no patents or utility models have been filed by any of the partners. It follows a description of those products for which advancements in their commercial exploitation have been reported by the partners.

The **hemp-based blow-in insulation materials** have reached TRL 6 (Prototype systems). According to the project partner Ventimola, there are currently discussions with German cellulose producers who are interested in developing the idea further and actually consider an EU licencing. However, until now, patents or utility models could not yet be filed.

In the framework of WP5 and WP6, Ventimola in cooperation with Zimic, the following raw materials have been used to the production of blow-in insulation materials:

1. Whole hemp plants without seeds, field-retted and baled at the field,
2. Processed, shive-free technical fibres,
3. Short fibres that remain after the technical fibre production with a relatively high share of shives,
4. Pre-dried, milled and silaged hemp plants without field retting.

In principle, the results have shown that from the raw materials 1-3, the production of blow-in insulation material according to European norms is possible. However, for most raw materials, there are side effects that prevent a further consideration for the development of a marketable product.

1. The utilisation of whole plants is at this time very uneconomic, since a large share of the plant mass is not suitable as an insulation material and the by-products that are separated using the current technologies for the production of an insulation material as the main product are not well assorted. Furthermore, these by-products do not yield sufficient market value.
2. While the technical fibres without shives provide a high technical value, they are in the current market situation about six times more expensive than comparable technical raw fibres and therefore their utilization is hardly economic for the manufacture of a blow-in insulation material. Furthermore, the “over-qualified” technical fibre displays considerable problems in the processing and this leads to technical problems and severe potential damages in the construction parts. However, there also still room for further development so that mainly economic reasons speak against the technical fibres.
3. The samples of short fibres displayed by nature the worst mechanical properties, but a multitude of insulation materials could be produced and all normative requirements could be met. Also, the difficulties in the processing as occurred with the technical fibres did not take place with the short fibres. The degree of contaminations or the separation of fine parts and shives could not be sufficiently solved in the project. However, a product that is technically and economically comparable to other blow-in insulation materials could be produced. Remarkable was also the low demand in chemical additives for flame and mould inhibition. Apart from the resulting economic advantage, such a production could achieve higher acceptance and sympathy by customers.

Importantly, such a blow-in insulation material without chemical additives could also be used energetically at the end-of-life.

Hemp-oil based cosmetics developed in WP5 reached TRL5 (Small scale prototype built in a laboratory environment) according the project partner Ctaex. The raw material, seeds from the Finola variety, to work with belonged to the production of one of the MultiHemp partner LARC.

Several trials had been carried out in order to look for the best way to obtain hemp seeds oil:

- Cold mechanical extraction
- CO₂ supercritical fluid extraction

Some cosmetic products from the wide range of them that exist in the market have been developed with hemp seed oil:

- Shower gel
- Shampoo
- Face cream
- Hand cream
- Body milk
- Sunscreen
- After-sun Cream

A suitable supplier and specialist in these ingredients has provided the raw materials used for developing the cosmetics products. The packaging material is also a very important factor for the future market of these products, as well as the quality of ingredients.

The study of the stability of the processed products provided information on the degree of relative stability of a product in the varied conditions to which it can be subject from its manufacture to its expiration. This stability is relative, since it varies with time and in function of factors that accelerate or delay alterations in the parameters of the product.

Conservation tests have been performed on products. For that, samples must be stored under conditions that accelerate plausible changes occurring during the period of validity. In order to establish the conservation test, the European and Spanish regulations have been followed:

REGULATION (EC) No 1223/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL. This Directive was reevaluated in 2013 to enable further harmonization and an EU-wide Cosmetics Products Regulation entered into force in July 2013.

Once the cosmetic products prepared were submitted to Protocol of the Stability Preliminary Studies (Screening Test, Accelerated Stability), all the parameters studied did not show significant changes throughout the storage period, except the rancidity, expressed as peroxide index due to the richness in polyunsaturated fatty acids (PUFA) especially linoleic and gamma-linoleic acids, of hemp seed oil.

The tested cosmetics products do not contain any substance which is forbidden by EC legislation. As far as the use of cosmetic and personal hygiene products is concerned, the preservatives in the formula are in the list of the accepted components approved by the EEC and are used in a concentration provided for by the law.

These products are not irritating if applied to human skin, after overcoming successfully the Patch test, Mean index of irritation analysis and the application of Applying Finn Chambers (application on the healthy skin of 20 volunteers)

According to the project partner CMF, the development of **hemp-shive based panels** has reached TRL 9, i.e. they are ready to be marketed. Regarding the **panels based on hemp bulk fibre**, advancements have been made but difficulties have been encountered so that only TRL 4 has been reached. So far, there are no plans to protect intellectual property rights by patent filing.

As a conclusion, advancements in at least three new end products, blow-in insulation materials, hemp oil based cosmetics and construction panels made from shives or bulk fibre, have been made in the project to a level that make a commercial exploitation in the future likely.

In order to help the industrial partners in the commercialisation of their products, the idea of developing a **sustainability certification** for hemp products has been brought into the project as an additional task in October 2013. Certification is a suitable instrument to prove sustainability. At the same time certification expresses and allocates the added value of sustainability within the market as well as it yields further positive economic effects. However, based on the proposal made for the development of an own sustainability certification scheme, the MultiHemp partners decided together not to further pursue this in the framework of the MultiHemp project. Nevertheless, the European Industrial Hemp Association (EIHA) worked on this idea of having a sustainable certified fibre for the automotive industry.