

## Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*)

1. Članica UL (*UL member*):

Univerza v Ljubljani, Biotehniška fakulteta

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Miha Humar, [miha.humar@bf.uni-lj.si](mailto:miha.humar@bf.uni-lj.si)

3. Raziskovalno področje (*Research field*):

4.01 Gozdarstvo, lesarstvo in papirništvo

4. Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

*slo:*

Po vsem svetu smo vse bolj izpostavljeni onesnaževanju, zato postaja trajnostni razvoj vse pomembnejši. Onesnaževanje postaja resen problem tudi v številnih evropskih mestih, saj ogroža zdravje in vpliva na kakovost življenja. Po podatkih Evropske agencije za okolje je onesnaženost zraka vzrok za veliko število prezgodnjih smrti in bolezni v Evropi. Zato Evropska unija že vrsto let izvaja raziskovalne programe, da bi povečala učinkovitost gospodarskega in družbenega razvoja ter hkrati zmanjšala negativne vplive razvoja na okolje. Večina raziskav se osredotoča na stranske učinke tehnologij, proizvodnje in uporabe surovin, manj pa na vpliv na okolje v celotnem življenjskem ciklu izdelka. Za odpravo obstoječih groženj so pri prenovi industrije potrebne nove prakse in trajnostna miselnost. To zahteva prepoznavanje vplivov različnih faz življenjskega cikla izdelka, ki imajo neposredne in posredne vplive na okolje, od pridobivanja surovin do proizvodnje, distribucije, uporabe in konca življenjske dobe.

Lesni izdelki so v osnovi okolju prijazni, vendar so tehnološki postopki, pomožni in dodatni materiali, uporaba izdelka in ravnanje z njim po koncu njihove življenjske dobe okoljsko problematični. Zato je treba pri presoji vplivov na okolje opredeliti vse vplive, kar je lahko težavno in dolgotrajno, zlasti pri lesnih izdelkih, ki so precej heterogeni, vsebujejo različne materiale in so izdelani z različnimi proizvodnimi postopki. Presoja vplivov na okolje je zapleten večkriterijski problem, pri katerem je odločilnega pomena optimalna izbira vhodnih in izhodnih podatkov, ki zahteva sistematično rešitev s ciljno usmerjenimi, postopnimi in vztrajnimi ukrepi.

Mladi raziskovalec bo delal na prednostnih temah raziskovalnega programa P4-0015 "Les in lignocelulozni kompoziti" s poudarkom na raziskovalnih dejavnostih delovne skupine DS5 "Razvoj, validacija in ekonomika". Cilj usposabljanja bo razviti integriran matematični model za ocenjevanje in podporo pri ocenjevanju okoljske učinkovitosti lesnih izdelkov (Life Cycle Assessment - LCA). Model za optimalno določanje vhodnih in izhodnih podatkov se bo

oblikoval med usposabljanjem. Model bo mogoče prilagoditi vrsti lesnega izdelka ter poenostaviti zamuden in dolgotrajen postopek. Potreben bo temeljit pregled zakonodaje in smernic EU za varstvo okolja, na podlagi znanih izhodišč pa bo treba razviti metodologijo za učinkovitejši popis parametrov lesnih izdelkov, ki vplivajo na okolje ali so z njim povezani. V tej fazi bodo pojasnjeni potrebni podatki, njihova razpoložljivost, kakovost in omejitve. Zbiranju podatkov o količini vhodov in izhodov, ki se pojavljajo v celotnem življenjskem ciklu izdelka, sledi presoja ali vrednotenje vplivov na okolje. Določitev ustreznih parametrov za določen lesni izdelek bo temeljila na predhodno razvitem modelu, ki bo omogočil prilagoditev in dopolnitev obstoječega inventarja življenjskega cikla (LCI). Z razpoložljivimi podatki bo mogoče za izbrani primer izvesti celovit LCA.

### **Izobrazba in izkušnje**

Izobrazba biotehniške, naravoslovne ali tehniške smeri.

Od kandidata pričakujemo aktivno znanje angleškega jezika, smisel za delo v skupini ter veselje in predanost do znanstvenega dela. Prednost bodo imeli kandidati s predhodnimi izkušnjami v raziskovalnem okolju.

*eng:*

All over the world we are increasingly exposed to pollution, so sustainable development is becoming more and more important. Pollution is also becoming a serious problem in many European cities, threatening health and affecting the quality of life. According to the European Environment Agency, air pollution is responsible for a high number of premature deaths and diseases in Europe. For this reason, the European Union has been conducting research programmes for many years to increase the efficiency of economic and social development while reducing the negative impact of development on the environment. Most research focuses on the side effects of technologies, production and use of raw materials, but less on the environmental impact throughout the life cycle of a product. To address existing threats, new practises and a sustainable mindset are needed in industry renewal. This requires recognising the impacts of the different stages of the product life cycle, which have both direct and indirect environmental impacts, from raw material extraction to production, distribution, use, and end-of-life.

Wood products are fundamentally environmentally friendly, but technological processes, auxiliary materials and additives, the use of the product, and the handling of the product at the end of its life cycle are environmentally problematic. Therefore, an environmental impact assessment must identify all impacts, which can be difficult and time-consuming, especially for wood products that are quite heterogeneous, contain different materials, and are manufactured using different production processes. Environmental impact assessment is a complex multi-criteria problem where the optimal selection of inputs and outputs is critical and requires a systematic solution through targeted, incremental, and persistent actions.

The young researcher will work on the priority topics of the research programme P4-0015 "Wood and lignocellulose composites", focusing on the research activities of the working group WG5 "Development, Validation and Economics". The objective of the training is to develop an integrated mathematical model to evaluate and support the assessment of the environmental performance of wood products (Life Cycle Assessment - LCA). The model for optimal determination of inputs and outputs will be developed during the training by selecting key parameters. It will be adaptable to the type of wood product and simplify a tedious and time-consuming process. A thorough review of EU legislation and guidelines for environmental protection will be necessary, and based on the known starting points, a methodology for a more

efficient inventory of wood product parameters that impact or are related to the environment will need to be developed. This phase will clarify the data needed, their availability, quality and limitations. The collection of data on the quantity of inputs and outputs that occur throughout the life cycle of the product is followed by an assessment or evaluation of the environmental impacts. Determination of relevant parameters for a given wood product will be based on the previously developed model, which will allow for the adaptation and completion of the existing Life Cycle Inventory (LCI). With the available data, it will be possible to conduct a comprehensive LCA for the selected case.

**Education and experiences:**

Material science, Wood Science and Technology, Natural sciences, Technical sciences.  
We expect that the candidate has good English communication skills, team-work spirit and dedication to scientific work. Candidates with previous experiences in research are appreciated.