

Name and surname:	Przemysław Bukowski
Academic Degree:	dr hab. inż. (DSc.)
Institute/Department:	Institute of Agricultural Engineering
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ORCID:	https://orcid.org/0000-0001-6613-5619
UPWr Base of Knowledge - link:	https://bazawiedzy.upwr.edu.pl/info/seam?id=UPWr1b2200e0d0444674816a228a56061840&affil=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Przemyslaw-Bukowski-3
Personal website / Working group website:	
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1. Development of an innovative method of air purification in grain and seed dryers, along with reducing pollutant emissions. NCBIR. BIOSTRATEG III. 2018-2021. RF 2. RUBISMO. Business models for modern rural economies. H2020. 2018-2021 . RF 3. BECoop. Unleashing the community's energy potential to support the commercialization of bioenergy heating technologies. H2020. 2020-2023. RF
Do you plan to engage support of second supervisor or auxiliary supervisor?	YES
	Auxiliary supervisor
Name and surname:	Błażej Gaze
Academic Degree:	dr inż. (Dr. Eng.)
Faculty, Institute/Department:	Institute of Agricultural Engineering
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UPWr Base of Knowledge - link or most important publications from last 3 year (JCR) / patents from last 3 years (maximum 5):	https://bazawiedzy.upwr.edu.pl/info/author/UPWrrebeb7db672a347caa55fbc464d24cf5f/B%25C5%2582a%25C5%25Bcej%2BGaze?r=phd&tab=phd&sort=&lang=pl
Researchgate:	https://www.researchgate.net/profile/Blazej-Gaze
Personal website / Working group website:	
Projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca)):	1. Development of an innovative method of air purification in grain and seed dryers, along with reducing pollutant emissions. NCBIR. BIOSTRATEG III. 2018-2021. RF 2. Development of technology for rational management of shavings from leather processing. European regional development fund. 2021-2023. RF 3. An innovative way of using waste from tomato production for energy purposes. MEiN. 2021-2023. PI 4. Optimization of the composting process of dairy sewage sludge in hyperbaric conditions. MEiN. 2022-2024. PI
PhD topic:	High-Pressure Torrefaction of selected biomass fuels.
Research discipline in Doctoral School:	Environmental Engineering, Mining and Energy
Short description of the research problem to be solved in the PhD (minimum 1000 characters):	The main problem is a comprehensive description of the new approach to biomass torrefaction under high-pressure conditions. A new type of laboratory-scale high-pressure reactor has been prepared . The aim of the research is to compare the high-pressure torrefaction with conventional near atmospheric pressure torrefaction. The torrefaction process (also known as biomass 'roasting') is a type of thermochemical treatment of the organic matter, consisting of a slow heating rate <50 °C per minute to a temperature above 200 °C, usually 280–320 °C, at a pressure close to atmospheric and in the absence of oxygen. The residence time varies from several minutes up to several hours. The torrefaction is assumed to be suitable for processing material with moisture content under 15%. Torrefaction research will be performed at five steps. At first, the treated material is (I) preheated, followed by (II) pre-drying, where some of the water is evaporated. The next stages are (III) drying and (IV) post-drying and intermediate heating where remaining water is removed. When water is removed, the proper (V) torrefaction process takes place. Two products are formed. Solid fraction (torrefied material) and a gas fraction (torrgas), wherein the liquid fraction may be separated from the torrgas, dividing it between the condensable fraction (water, oils, tars, and other compounds) and the non-condensable fraction (CO, CO2, CH4, and other gases). The solid fraction can be used as fuel or as an additive to industry. Torrgas can be used for further processing or for supplying the heat for the torrefaction process.
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters):	The candidate should be a graduate of renewable energy sources or related fields, fluent in Office 365 programs, statistical data analysis programs, as well as data visualization programs. The candidate should be able to process and interpret data obtained from experimental studies and their statistical processing. The candidate should have basic knowledge of optimization tools. Documented scientific achievements will be highly valued, e.g., publications in periodicals from the JCR list. The candidate should be creative and able to work in a research team. The future doctoral student should also have basic knowledge of the operation and construction of popular fuel cells.
a) Project title:	
b) Agreement number:	
c) Number of months in the project to support PhD (in months; starting from 1st of October 2022):	
Project website:	