

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/
Researchgate	Przemyslaw Bukowski
Personal website / Working group website	none
Participation in projects in last 5 years (chronological; with distinction into PI (kierownik) and RF (wykonawca))	RF: 2019 BeeCoop (Horizaon 2020) RF: 2017 Biostrateg ECO-Dryer RF: 2017 Rubizmo (Horizon 2020)
Do you plan to engage support of second supervisor or auxiliary supervisor?	NO
PhD topic	Influence of pressure on the physical and chemical parameters of the chosen biomass torrefaction
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)	<p>The aim of the doctorate is to determine the influence of pressure on the physical and chemical parameters of the torrefaction and its combustion parameters. The obtained torrefaction will be the subject of further research, both for fertilizing properties and suitability as a fuel. The doctoral thesis will be devoted to two areas: research on the process of torrefaction itself and the properties of the obtained torreficates.</p> <p>1) The research of the process will include the analyses of:</p> <p>a) physical parameters (pressure, temperature, humidity),</p> <p>b) chemical parameters (low and high calorific value, elemental composition, volatile matter content)</p> <p>b) analysis of the energy consumption of the torrefaction process (at different pressures)</p> <p>c) the kinetics of the reaction.</p> <p>The research materials will be of plant origin. Tests of tomato haulm, grape production waste and wood analysis are planned. The research stand is located in laboratory of Institute of Agricultural Engineering and includes:</p> <p>a) high pressure torrefaction reactor</p> <p>b) calorimeter with Peltier cooler</p> <p>c) 2 low-power boilers (up to 20 kW) equipped with fuel dosing systems, measuring nozzles, flue gas chemical analyser.</p> <p>c) high-temperature furnaces.</p> <p>The main research thesis is the expectation that increasing the torrefaction pressure will allow to obtain torrefaction with satisfactory properties but with the use of lower temperature and lower energy consumption (higher energy efficiency).</p>
Professional skills for PhD candidate (e.g. master program, specializations, softwares, language, analytical techniques, minimum 500 characters)	<p>1) Knowledge of pyrolysis and torrefaction processes.</p> <p>2) Knowledge of the chemistry of combustion and gasification.</p> <p>3) Technical education with particular emphasis on energetics.</p> <p>4) Knowledge of the English language at the B2 level.</p> <p>5) Experience in laboratory work.</p> <p>6) Knowledge in the field of cultivation and agriculture (knowledge of concepts such as hydrophobicity, pot experiment, etc.).</p> <p>7) Category B driving license.</p> <p>8) Good knowledge of MS Office programs, especially MS Excel.</p> <p>The candidate will be involved in obtaining biomass samples, their preparation, testing in a reactor, combustion in a boiler and simple agronomic experiments.</p>
Details of the project to support PhD research	
a) Project title	none
b) Agreement number	none
c) Number of months in the project to support PhD (in months; starting from 1st of October 2022)	0
d) Project website	