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INTERNATIONAL SCIENTIFIC CONFERENCE

**GREEN ECONOMY IN THE FUNCTION
OF SOLVING GLOBAL ENVIRONMENTAL
PROBLEMS**

BOOK OF ABSTRACTS

MEĐUNARODNA NAUČNA KONFERENCIJA

**ZELENA EKONOMIJA U FUNKCIJI
REŠAVANJA GLOBALNIH EKOLOŠKIH
PROBLEMA**

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FOREWORD

This year, as in the previous 30, we are celebrating Earth Day as part of an international scientific meeting dedicated to the current topic of the day: Green economy in the function of solving global environmental problems. The conference is planned in a hybrid (off-line and on-line) mode using the Google meet platform.

In 2023, the International Scientific Conference will be held in cooperation with the Scientific and Professional Society "ECOLOGICA" with ALFA BK University, the Union of Engineers and Technicians under the auspices of the Ministry of Science, Technological Development and Innovation of the Republic of Serbia. This year's scientific conference Green Economy as a function of solving global environmental problems is focused on many topics related to the role of the Green Economy in environmental protection, which are distributed in the announcements of the Plenary Section and 4 other scientific sections:

- Green and circular economy as the basis of sustainable development,
- Renewable energy,
- Technogenesis and problems of environmental protection,
- The role of institutions in financing environmental protection.

The green economy includes many sectors of the economy, transport, primary production and application of renewable energy sources, organic agriculture, ecotourism, recycling of municipal waste, permanent disposal of toxic hazardous waste, purification of industrial and municipal water. For the development of the Green Economy, innovative multidisciplinary technologies, resource-saving technologies and the support of financial institutions are necessary in order to solve the problem of environmental protection.

The diversity and of environmental problems associated with numerous crises in the world require a multidisciplinary approach. Research into man-made changes in the environment is necessary, as well as monitoring and assessment of the impact of man-made pollutants on ecosystem health and human health.

About 90 scientific announcements by participants from the country and abroad from various scientific fields were prepared for presentation at the Conference: environmental monitoring and protection, economics, ecology, chemistry, biogeochemistry, physical chemistry, biotechnology, agronomy, environmental management, application of information technologies, financial management, sociology, law and political science.

Scientific announcements were prepared by teachers and doctoral students of ALFA BK University, as well as the Institute of Economic Sciences, the Belgrade Banking Academy, the Institute of Economics, the Academy of Economics in Novi Sad and other educational and research institutions, the Institute for Multidisciplinary Research, the Institute of Criminological and Sociological Research, the Vinča Institute, Mining Institute, NIVS, INEP, IHTM, Faculties of Geography, Forestry, Agriculture, Traffic and Economics from Belgrade, Kragujevac and Priština, as well as the Faculty of Occupational Safety of the University of Niš and many other faculties from state and private universities (Singidunum, Union, Megatrend, Union - Nikola Tesla, University of Defense).

The best works of our and foreign scientists will be included in the International thematic monograph Green economy and environmental sustainability.

Quality analyzes of the impact of the Green Economy on the state of the environment and on the sustainability of various spheres of industry, transport, ecotourism, which are based on valid data and information, as well as the application of systemic thinking and the formation of strategic decisions, are of great importance to decision makers in the field of environmental protection. Special attention should be paid to the planning of future international scientific research and the exchange of information from the field of environmental protection in order to develop scientific research work.

About 40 foreign scientists from 10 countries sent scientific papers. The participation of foreign scientists in the International Scientific Conference serves the exchange of information and the development of important directions in the field of environmental protection, and in this way can promote the improvement of successful cooperation between Russian, Belarusian, Moldovan, Chinese, Australian, Macedonian, Slovak, Slovenian, Turkish, Armenian, and Serbian scientists in new international projects.

Emeritus prof. dr Larisa Jovanović

PREDGOVOR

Ove godine, kao i prethodnih 30, slavimo Svetski Dan Planete Zemlje u okviru međunarodnog naučnog skupa posvećenog aktuelnoj temi sadašnice: *Zelena ekonomija u funkciji rešavanja globalnih ekoloških problema*. Konferencija je planirana u hibridnom (of-line i on-line) režimu uz korišćenje platforme Google meet.

Godine 2023 Međunarodna naučna Konferencija održava se u saradnji Naučno-stručnog društva „ECOLOGICA“ sa ALFA BK Univerzitetom, Savezom inženjera i tehničara pod pokroviteljstvom Ministarstva nauke, tehnološkog razvoja i inovacija Republike Srbije. Ovogodišnja naučna konferencija *Zelena ekonomija u funkciji rešavanja globalnih ekoloških problema* usredsređena je na mnoge teme povezane sa ulogom Zelene ekonomije u zaštiti životne sredine, koje su raspoređene u saopštenjima Plenarne sekcije i još 4 naučne sekcije:

- Zelena i cirkularna ekonomija kao osnove održivog razvoja,
- Obnovljivi izvori energije,
- Tehnogenezna i problemi zaštite životne sredine,
- Uloga institucija u finansiranju zaštite životne sredine.

Zelena ekonomija obuhvata mnoge sektore privrede, transporta, primarnu proizvodnju i primenu obnovljivih izvora energije, organsku poljoprivredu, ekoturizam, recikliranje komunalnog otpada, trajno zbrinjavanje toksičnog opasnog otpada, prečišćavanje industrijskih i komunalnih voda. Za razvoj Zelene ekonomije neophodne su inovativne multidisciplinarnе tehnologije, resursoštedljive tehnologije i podrška finansijskih institucija u cilju rešavanja problema zaštite životne sredine.

Raznovrsnost i mnogostranost ekoloških problema povezanih sa mnogobrojnim krizama u svetu zahtevaju multidisciplinarni prilaz. Neophodna su istraživanja tehnogenih promena u životnoj sredini, a takođe monitoring i procena uticaja tehnogenih polutanata na zdravlje ekosistema i ljudsko zdravlje.

Za izlaganje na Konferenciji bilo je pripremljeno oko 90 naučnih saopštenja učesnika iz zemlje i inostranstva iz različitih naučnih oblasti: monitoringa i zaštite životne sredine, ekonomije, ekologije, hemije, biogeochemije, fizičke hemije, biotehnologije, agronomije, ekološkog menadžmenta, primene informacionih tehnologija, finansijskog menadžmenta, sociologije, prava i političkih nauka.

Naučna saopštenja pripremili su nastavnici i doktorandi ALFA BK Univerziteta, a takođe Instituta ekonomskih nauka, Beogradske bankarske akademije, Ekonomskog Instituta, Privredne Akademije u Novom Sadu i drugih obrazovnih i istraživačkih institucija, Instituta za multidisciplinarna istraživanja, Instituta kriminoloških i socioloških istraživanja, Instituta Vinča, Rudarskog instituta, NIVS, INEP, IHTM, Geografskog, Šumarskog, Poljoprivrednog, Saobraćajnog i Ekonomskog fakulteta iz Beograda, Kragujevca i Prištine, a takođe Fakulteta zaštite na radu Univerziteta u Nišu i mnogih drugih fakulteta sa državnih i privatnih Univerziteta (Singidunum, Union, Megatrend, Union – Nikola Tesla, Univerzitet odbrane).

Najbolji radovi naših i stranih naučnika biće uključeni u Međunarodnu tematsku monografiju *Green economy and environment sustainability*.

Donosiocima odluka u oblasti zaštite životne sredine od velikog značaja su kvalitetne analize uticaja Zelene ekonomije na stanje životne sredine i na održivost razliĉnih sfera industrije, transporta, ekoturizma koje se zasnivaju na validnim podacima i informacijama, a takođe primeni sistemskog mišljenja i formiranja strategijskih odluka. Posebnu pažnju treba posvetiti planiranju budućih međunarodnih nauĉnih istraŹivanja i razmeni informacija iz oblasti zaštite životne sredine u cilju razvoja nauĉno-istraŹivaĉkog rada.

Okolo 40 stranih nauĉnika iz 10 zemalja, poslali su nauĉne radove. Uĉešće inostranih nauĉnika u Međunarodnoj nauĉnoj Konferenciji sluŹi razmeni informacija i razvoju bitnih pravaca u oblasti zaštite životne sredine, i na taj naĉin moŹe pospešiti unapređenje uspešne saradnje ruskih, beloruskih, moldavskih, kineskih, australijskih, makedonskih, slovaĉkih, slovenaĉkih, turskih, jermenskih, i srpskih nauĉnika u novim međunarodnim projektima.

Emeritus prof. dr Larisa Jovanović

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DEVELOPMENT OF A NEW TECHNOLOGY FOR OBTAINING FERRIC-PHOSPHATE FOR APPLICATION IN THE PRODUCTION OF LITHIUM BATTERIES

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A lithium-iron-phosphate battery, LiFePO_4 battery or LFP battery, is a type of lithium-ion battery in which lithium-iron-phosphate is the cathode material. LiFePO_4 has many advantages over other Li-ion battery designs and older lead-acid, LA batteries. These batteries are lighter in weight, safer to use, have better charge and discharge characteristics, and have a much longer lifespan. The paper presents the results of the hydrometallurgical process of obtaining ferric phosphate from the Jarosite waste sediment, previously leached with water. The solid residue was then treated with HCl under defined conditions in order to convert Fe into a soluble form. After precipitation of $\text{Fe}(\text{OH})_3$ and separation of the solid from the liquid phase, $\text{Fe}(\text{OH})_3$ was dissolved with H_2SO_4 to obtain a ferric sulfate solution. By reacting a ferric sulfate solution with phosphoric acid, and after pH correction with NH_4OH , a ferric phosphate product was obtained whose quality meets the requirements of the standard for obtaining lithium batteries in relation to the content of Fe, P, Mg, Na, K, Cu, Mn, Co and Cr.

Keywords: hydrometallurgy, ferric phosphate, lithium batteries, jarosite



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