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Environment, Sustainability Issues,
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Conversion of municipal solid waste to refuse-derived fuel using biodrying

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Abstract

Indexed keywords

Sustainable Development Goals 2022

SciVal Topics

Metrics

Funding details

Abstract

Municipal Solid Waste (MSW) in Indonesia comes from urban settlements, markets, and industries. MSW decomposes naturally and without being used at all. The purpose of this study to convert MSW to refuse-derived fuel (RDF) using biodrying . The research was conducted on a laboratory scale using

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Preface

After being successfully held in 2019, the 2nd International Conference on Environment, Sustainability Issues and Community Development (INCRID) 2020 was held at a full teleconference in a virtual environment on October 21st, 2020, by "ZOOM". The reason is, active cases of COVID-19 in Indonesia are still increasing, and it is not sure whether October 2020 has returned to normal. Besides, we want this conference to be held regularly. INCRID 2020 is hoped to bring innovative ideas from academics and industrial experts in the field of environment. The conference's primary goal is to promote research and developmental activities in environmental sciences and promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world. The conference was held every year to make it an enabling platform for people to share views and experiences in an environmental context. The conference featured five keynotes (40 minutes each, including Q&A). The plenary session was divided into 2 sessions, which 2 of the 5 speakers gave their talk in the first session and the last 3 in the second session. The speakers shared their slides (through share screen mode) by themselves. However, the committee helped them to share the slides whenever the speakers were getting trouble. Discussion and Q&A in the plenary session were included in the time that was given to them. The moderator gave a sign if the time was over through Zoom's personal chat. Also, we passed 10 minutes for each presentation through the zoom's breakout room. We divided the parallel session into 8 rooms, which can be attended by 10 people (minimum) for each room. Apart from using the zoom platform, We also try to use any other system such as youtube and Instagram for plenary session live streaming and google forms for ensuring the participant attends the conference from beginning to the end. There were around 110 participants, 5 keynotes speakers, 10 moderators (2 in keynote session and 8 in parallel session), 8 co-host, and 48 committees. Participants can share their thoughts remotely (from their home).

We invited some international participants as asked speakers in parallel sessions, including Uganda, Egypt, Japan, Malay, Aussie, and other countries. We were incredibly honored to have invited Dr. Haryono Setiyo Huboyo, S.T., M.T, from Diponegoro University, Indonesia, to serve as our General Conference Chair. The rest of the committee was composed of Indonesia, Italy, Australia, Japan and other countries. In the keynote presentations part, we invited Dr. Swaib Semiyaga from Makerere University (Uganda), Mario Rosario Guarracino, Ph. D from National Research of Council of Italy (Italy), Prof. Dr. Ir. Ambariyanto, M.Sc. from Diponegoro University (Indonesia), Prof. Toru Matsumoto from University of Kitakyushu (Japan), and Dr. Mai Sayed Fouad from Fayoum University (Egypt). The conference provided a forum for discussing environmental topics and, in particular, for promoting the exchange of new ideas and the presentation of the latest developments in this field. This conference also provided an ideal environment for developing new collaborations and meeting experts on the fundamentals, applications, and products of the mentioned fields.

We are glad to share with you that we received lots of submissions from the conference, and we selected a bunch of high-quality papers and compiled them into the proceedings after rigorously reviewed them. These papers feature the following topics: environment, health, and safety, environmental science, technology, and education, green infrastructure, and energy conservation and efficiency. All the papers have been through rigorous review and process to meet the international publication standard's requirements. Lastly, we would like to express our sincere

gratitude to the Chairman, the distinguished keynote speakers, and all the participants. We also want to thank the publisher for publishing the proceedings. May the readers could enjoy the gain some valuable knowledge from the proceedings. We expect more and more experts and scholars from all over the world to join this international event next year. We gave a technical evaluation of the conference to those who needed them. The virtual conference's main problem is signal loss and the presence of technical error by its participant. In this regard, we gave awareness and notice to all of the participants about these problems.

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21st October 2020 | Online (Zoom Cloud Meetings)

The 2nd International Conference on Environment, Sustainability Issues and Community Development

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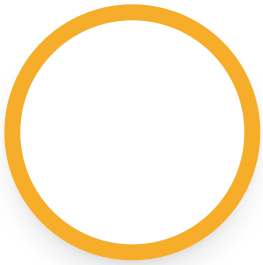

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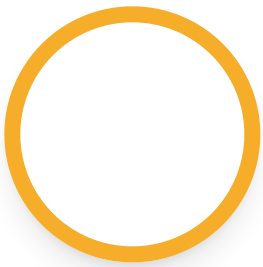

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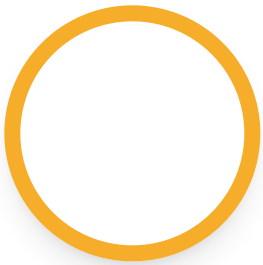

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- Urban development and management
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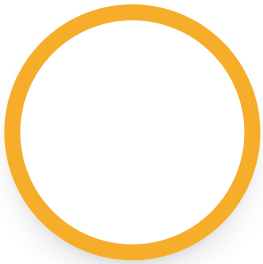

Sustainable Development

- Sustainable economy, policy, and education
- Innovation in sustainable development goals (SDGs)

About 2nd INCRID

The 2nd International Conference on Environment, Sustainability issues, and Community Development (INCRID) is the second held by the Department of Environmental Engineering with the theme "Recent Challenges on Environmental Technology, Science, Education and Innovations". A conference that provides a unique platform for professionals, researchers and academics to share their experiences and explore the sustainable living environment of the future. This conference will be held virtually to cover all development and environmental engineering fields and sciences related to sustainable development. The International Conference on Environment, Sustainability issues, and Community Development (INCRID) was originally part of the annual anniversary event of the Diponegoro University Environmental Engineering Department. Due to the department's assigned status, in 2019, INCRID was independently organized by the Department of Environmental Engineering. INCRID international develops to expand the range of attendees and speakers. The Forum undertakes all factors related to environmental technology, science, education and innovation to achieve the desired sustainable goals with the target audience of postgraduate students, and final year students.

INCRID in work in IOP Publishing, develops, transforms and disseminates science, technology and / or art through research activities, creation of works. The selected articles will be published at the IOP conference proceeding indexed by Scopus and

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Conversion of municipal solid waste to refuse-derived fuel using biodrying

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Abstract. Municipal Solid Waste (MSW) in Indonesia comes from urban settlements, markets, and industries. MSW decomposes naturally and without being used at all. The purpose of this study to convert MSW to refuse-derived fuel (RDF) using biodrying. The research was conducted on a laboratory scale using a biodrying reactor. The biodrying process takes place aerobically with an airflow rate of 6 L/min, the highest temperature reaches 60°C on the third day and the water content on the 21st day is 32.65%. The final RDF calorific value is 6,102.82 cal/g. This calorific value is equivalent to low-energy coal (brown coal). RDF from MSW can be applied to the cement industry that requires heat >6000 cal/g, PLTU requires 5242 cal/g, the metal industry requires 6000 cal/g, and the paper industry requires 5240 cal/g to carry out the production process.

1. Introduction

The primary source of municipal solid waste in Indonesia come from urban settlement, market, office, and industrial area. In 2016 the amount of solid waste that entered the Banyuurip landfill in Magelang City was 71.82 tons/day [1]. MSW was not used at all and decomposed naturally in the Banyuurip landfill. MSW is a proven energy resource because solid waste contains sufficient energy/heat as a substitute for fuel [2]. According to SNI No.13-6011-1999, regarding the classification of coal resources and reserves, the lowest rank, soft and easily crushed type of coal contains high water content (10-70%) can be used as an energy source if it has a calorific value <7,000 cal/g.

The technology used to convert solid waste into energy (waste to energy) has developed. Pre-treatment of solid waste using biodrying technology can produce Refuse Derived Fuel (RDF). This technology is one of the best methods to maximize energy recovered into fuel products [3]–[5]. Municipal solid waste from the Banyuurip landfill has been studied as a mixture of paving block materials - a substitute for fine aggregate. Composition of portland cement (PC): sand (1: 3) + 15% sludge mixture produces a compressive strength of 197.080 kg/cm^2. It meets the quality criteria B (can be used for car parking spaces) [6]. Alam, Oktiawan and Wardhana (2014) planning to use the solid waste of Banyuurip landfill to be processed into organic fertilizer and plastic recycling [7]. Based on the plan, organic fertilizer production is estimated to be 15 tons per day and 150 kg of recycled plastic. However, this has not been realized in the field. Based on the energy aspect, municipal solid waste equal to fossil fuels because it contains oxidizable materials (mainly carbon and hydrogen), which can release energy, which is

Simulation sediment transport in development location of a diesel power plant using Computational Fluid Dynamic (CFD) methods

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Abstract. Research about Sediment Transport is important for the sustainability of coastal buildings. The infrastructure construction of the Halmahera Diesel Power Plant (PLTD) in the coastal area requires water supply as a cooling system. The supply of cooling water can be reduced because of erosion or sedimentation. This study uses CFD modelling of ANSYS FLUENT applications with variations in mass flow rates. The Eulerian-Lagrangian approach is used to predict the rate of erosion and accretion that occur around the place of Halmahera. Methods of Particle Size Distribution (PSD) numerical simulation is uniform. The simulation process results consist of particle mass, erosion, and accretion rate in the seabed. Variations in mass flow rates of 0.05 kg/s, 0.1 kg/s, 0.15 kg/s, 0.2 kg/s, 0.25 kg/s obtained the erosion rate respectively 5.425 x 10^{-7} mm/year, 1.085 x 10^{-6} mm/year, 1.626 x 10^{-6} mm/year, 2.170 x 10^{-6} mm/year, 2.712 x 10^{-6} mm/year. The result of the accretion rate obtained from the variation in mass flow rates is 301.43 mm/year, 602.87 mm/year, 904.30 mm/year, 1205.50 mm/year, 1507.77 mm/year. From this research. The result of simulation to be important to predict the rate of sediment transport for consideration in the development location of construction Halmahera PLTD.

1. Introduction

A natural process that often happens in the coastal area will have resulted in sediment transport. These conditions will result in accretion and erosion. Sedimentation or erosion across the coastline will have impacted the form of coastal buildings (ex: pier, jetty, wave breaker, groin, artificial sea wall, etc.). Halmahera East Ternate island is a specified location for Diesel Power Plant Construction (PLTD). The diesel power plant is usually used for fulfilling the electric in low capacity, new isolated place, village, and industrial needs. The diesel power plant needs a huge water consumption for its cooling system. The lack of water needs for cooling system because of sediment transport, will prevent diesel power plant to work properly [1]. The research uses the data from the temporal change of shoreline that needs expensive cost and longtime research so that simulation needed to be efficient processes [2].

Research about sediment transport conducted by Javaherci and Aliseda (2017) used Discrete Random Walk (DRW) method on simulation to obtain sediment transport rate which marine hydrokinetic turbine

Bibliometric analysis of the study on exposure evaluation to aerosol nano or ultrafine particles in the breathing zone

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Abstract. To map the advancement of exposure evaluation research for particles less than 100 nm in the breathing zone, we developed a bibliometric analysis using VosViewer 1.6.15 by collecting relevant publications from Scopus on August 10th, 2020. Of 769 relevant documents, 90.64 % (n = 697) came from the journal and used English as the language that started to be published in 1985. The results showed that research themes have grown on the three clusters related to inhaled nanoparticles exposure measurement, responses and effects, and their primary existence in consumer products. Moreover, depth analyses by visualizing maps of the top active countries, authors, and top-cited documents on the citation, co-citation, or co-occurrence have revealed several essential pieces of information on this research area. Our findings suggest that the greater depth on appropriate devices for exposure measurements, particularly in nano-sized, which matches with the metrics were needed. Through these efforts, the capabilities of analyses can improve for future inhaled nanoparticles exposure assessments.

1. Introduction

Regarding the development of nanotechnology, nanomaterials' use implies that the risks of particle less than 100 nm had spread to large environments, from workplaces as the production site until consumers in many forms of product. Previously, the sources of the general size-segregated particles from the combustion activities have also played as the contributors to the emission of nano or ultrafine particles, such as forest fires, volcanic eruptions, industrial chimneys, the exhaust of vehicles, and kitchens. Therefore, studies on the health effects of nano-sized particles have been extensively developed in the last two decades with nanotoxicological knowledge's critical role to comprehend the responses and make the adverse impacts identified in a more broad aspect [1-3]. Regarding the health and environmental risks, nanotechnology products, as the new contributors of nano-sized particles with combustion activities previously, need to concern for sustainable principles. While, the particulate matter in their size-segregated forms has been known can increasing respiratory morbidity and mortality [4,5].

Compared to the larger particles, nano-sized particles had more deposition rate to cross the pulmonary epithelium and reach the interstitium, which can be systematically distributed into the bloodstream to increase the possibility of increasing the level of inflammation [6,7]. Therefore, future effects of nano-

Potential and control method of bioaerosol emission at composting process in *TPST* Diponegoro University

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Abstract. Laboratories in university particularly related to biological process have the potential to emit bioaerosol. The composting process in the lab is one of those that produce complex bioaerosol. This study is aimed at analyzing the potential bioaerosol emissions from the composting process at *TPST* and proposing efforts to reduce emissions toward outside the lab room. To calculate the emission potential of bioaerosol, specific emission factors from the literature are used.The room dimensions for composting are 2.46 x 1.38 x 0.7 m, and there are 18 spaces for the composting process. Based on the the measured dust concentration in the composting room were on average above the ambient air quality standard for TSP (230 ug/m^3). Hypotetically, emissions from the composting process at *TPST* reach a highest point of 4x106 CFU/m3, peak at a distance of 7 m from the source of the composting process. However, the health risks associated with bioaerosol emissions are relatively small because the period of exposure to *TPST* operators near the composting area is quite small. Control efforts by installing a windbreak fence can minimize the amount of emissions that leave the composting area by 80%.

1. Introduction

Bioaerosol or air microorganisms found in the environment in space with a large number [1]. Based on several studies conducted in several countries in the world it was reported tahat bioaerosol contribute to 5 – 10% of total suspended particles and about 24% of the total particles in the atmosphere [2]. Although bioaerosol is present in most of habitat, outdoor/ambient air, housing construction, and maintenance of material, the parameters of air exchange ventilation, human occupancy, and operational activities are the main factors affecting bioaerosol in the room level [3]. Specified bacteria and fungi are bred through humans activities, where humans do not appear to be the place to grow these classifications, human activities play an important role, for example in shedding particles from clothes or scattering dust that sticks to the fabric can contain bioaerosol types of fungi [4]. The charcteristic of source, species, relative humidity and aerosolization mechanism will determine the size of particles derived from airborne bacteria and fungi. Around the room,bacteria and fungal particles are in the breathable size range of <5 µm which allows inhalation via the human respiratory tract. Several studies have shown that exposure to aerosol types of bacteria and fungi around rooms is associated with non-communicable diseases, including allergies, respiratory diseases, and immunotoxics [5]. In Indonesia, studies on bioaerosol are mostly carried out by hospitals where there is a lot of potential for microbial scattering in the air in the treatment room, kitchen room, operating room, toilet and laundry room. In public facilities, especially