PRODUCTION OF CHARCOAL BRIQUETTE FROM WOOD ASH WASTE AS A RENEWABLE ENERGY SOURCE IN PADUKUHAN KAJEN

Triani Afifatul Bariroh [1] , Afina Sajidah [2] , Alya Nur'aini Ma'rifah [3] Najma Aqila [4] Muhammad Reza [5] Ahmada Fathan Mubarok [6] Irham Yoga Saputra [7] Annabel Ardiningrum Supriyanto [8] Luthfianna Putri Revitanady [9] Faza Isnan Nasrulah [10] Raihan Natasya [11] Madan Kuroisi [12] Chandra Kartika Dewi [13]

Universitas Sunan Kalijaga, Yogyakarta
kkn14.kajen@gmail.com

Abstract - *Most of the residents of Kajen hamlet work as pottery craftsmen. In this case, making pottery produces quite a lot of ash waste. This waste should be used to provide added value for the villagers. The purpose of this study is to provide training and assistance to the Kajen hamlet community to process agricultural waste into useful products in the form of charcoal biobriquettes. The methods used in this service are socialization and training. The results of this service are that socialization and training have been carried out related to the utilization of rice waste into useful products that have a selling value, namely biobriquettes. Then, residents were also given a biobriquette making instruction card as a guide for the Kajen hamlet residents.*

Keywords: *Biobriquettes, Ash Waste, Socialization, Training*

1. INTRODUCTION

The increasing population growth causes the demand for energy to increase as well. The energy sector plays an important role in supporting the continuity of the national development process (Lubis and Sugiyono, 1996). Energy is mostly used in the household, industrial and transportation sectors, while fossil fuel reserves such as oil, natural gas and coal which have been the main sources of energy are decreasing (Indarti, 2001). This has caused concerns about fuel shortages in the future. Thus, it is necessary to seek other alternative energy sources that come from raw materials that are continuous and renewable such as biomass energy.

Kajen hamlet is one of the hamlets located in Bangunjiwo, Kasihan, Bantul, Yogyakarta. Based on the statement of the head of Kajen hamlet, the population in Kajen is 1,628 people and 90% work as pottery makers. In making pottery, one of the processes is pottery burning. This process produces wood ash waste. The wood ash waste produced varies between 3.5-10 kg of waste/day (Dan et al., 2023).

Figure 1. Pottery firing process

One of the efforts in providing alternative energy as well as being an alternative to handling waste from burning pottery (wood ash) is to utilize the waste as a raw material for making charcoal briquettes. This paper presents the results of research on the use of pottery burning waste as a raw material for making charcoal briquettes, which is expected to help improve city cleanliness and open up new jobs for the community.

Briquettes are a potential and reliable material for households. Briquettes are able to supply energy in the long term. Briquettes are defined as solid fuels derived from organic waste that has undergone a compression process with a certain pressure. The use of briquettes as an alternative energy is the right step. Briquettes can replace the use of firewood which is starting to increase in consumption and has the potential to damage forest ecology. In addition, the price of briquettes is relatively cheap and affordable for the community, especially those domiciled in remote areas and briquette entrepreneurs can absorb labor, both in their briquette factories, distributors, furnace industries, and briquette machines(Zarkati Kurdiawan & Ir Sri Rachmania Juliastuti, 1959).

Briquettes are an alternative material that can replace fuel, especially for rural communities as fuel for domestic and household scale industries. The energy

potential of Indonesian rice husks reaches 27 x 109 J/year, with a calorific value of around 4,000 – 5,000 cal/g. Another source states that the calorific value of rice husk briquettes without carbonation is 3,922 cal/g, while briquettes with carbonation are 5,190 cal/g. This calorific value is slightly below the calorific value of coal, namely 6,058 cal/g, and higher than biobriquettes from cocoa shells and palm fruit shells, namely 4,000 cal/g and 2,753.71 cal/g respectively [6]. The results of Patabang's research showed that the calorific value of rice husk charcoal briquettes was 2789 cal/g [7]. Based on experimental data from literature studies, it is necessary to make efforts to empower the community to obtain other benefits from rice husk ash waste. The solution that will be offered in this community service activity is the use of rice husk ash to be processed into briquettes (Sari et al., 2024).

2. METHOD

Method, Time and Place of Devotion

UIN KKN activities in Padukuhan Kajen are carried out using the Socialization and Training method. The outreach is aimed at providing an understanding of the dangers of ash waste to human health and an understanding of the use of ash waste to make briquettes. Meanwhile, the training is aimed at providing technical knowledge regarding the process of biobriquette processing of wood ash waste. The socialization and training will be carried out on July 25 2024. The place of service is located in Padukuhan Kajen, Bangunjiwo village, Kasihan sub-district, Bantul district, D.I Yogyakarta province. Location of socialization and training at Al-Hidayah Padukuhan Kajen Mosque(Bhakti et al., 2019).

Implementation Stage

The implementation of socialization and training is carried out based on structured stages in accordance with planned activities. These stages are described as follows:(Sudirman et al., 2022). These stages are described as follows:

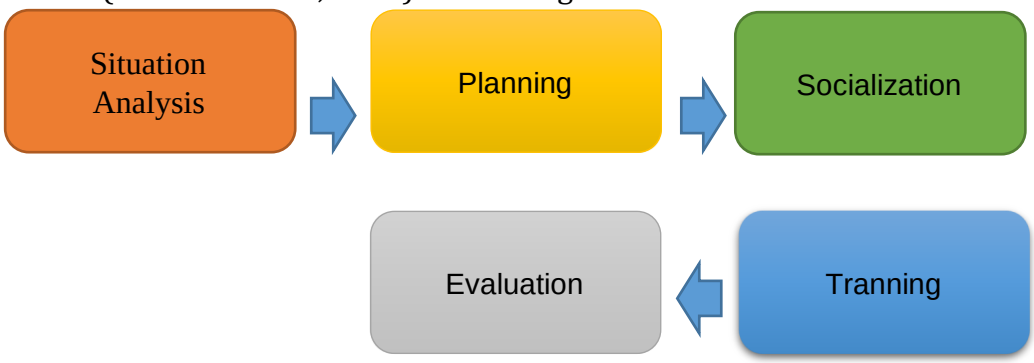

Figure 2. Stages of Implementing PKM Activities

The initial stage is the situational analysis stage. At this stage, an initial analysis is carried out to find out several problems that exist in the Kajen hamlet. From these problems, further analysis is carried out. The results of the analysis are then used

as a basis for determining which problems are possible to be solved in this PKM activity. In this case, the problem that is possible to be solved in this PKM activity is to utilize the waste ash from burning pottery to make charcoal biobriquettes. Referring to the existing problems, a plan is then made regarding how to make charcoal biobriquettes. In addition, planning is also carried out to market the charcoal biobriquettes that have been made.

The planning has been completed, then the next step is to provide socialization and training. Socialization and training are carried out in a series of activities attended by the youth of the Kajen hamlet youth organization. Socialization is carried out with the aim of providing knowledge of the dangers of ash waste and the benefits of ash waste as an alternative energy tool. Furthermore, after conducting socialization, training is continued on processing ash waste into biobriquettes as an alternative energy. Knowledge related to making charcoal biobriquettes is expected to be practiced and disseminated to the general public, especially residents of the Kajen hamlet.

3. RESULTS AND DISCUSSION

Socialization and presentation of materials

Figure 3. Socialization of wood ash waste processing

The socialization activity began with the provision of material through a powerpoint presentation. The material presented included the potential of ash waste from pottery burning and how to process pottery burning waste. In this implementation, wood charcoal biobriquette products were offered as a solution for processing pottery burning ash waste in the Kajen hamlet. The delivery of material related to the processing of pottery burning ash waste into wood charcoal biobriquettes was given in detail such as (1) advantages and disadvantages; (2) materials needed; (3) manufacturing process; (4) printing process; to (5) images of biobriquette products that had been made previously (Figure 3). In this case, seeing the presentation of the material presented, residents were quite enthusiastic about the products offered. In this case, we also made a biobriquette making instruction card containing the steps, equipment and materials that need to be prepared in making biobriquettes.

Biobriquette making training

After the socialization and presentation are complete, the next step is to carry out training on making biobriquettes. This training is led directly by one of our members and attended by all participants in this training activity.

Figure 4. Instruction card for making biobriquettes

Before the training, each participant gets a card containing the steps, equipment and materials needed in making charcoal biobriquettes. The image above is a card that we made to help participants and as a guide if at some point participants want to continue making biobriquettes in the future. Here are the details of the steps and materials needed in making biobriquettes:

1. Ingredients:
   - Firewood waste (Ash)
   - Tapioca flour
   - Water
2. Equipment needed:
   - Stove and gas
   - Pan
   - Molding tool
   - Sieve dll
3. Steps for making:
   - Prepare the materials and equipment needed
   - Crushing and filtering
     This crushing is done so that the collected wood ash becomes smooth and after that the filtering process is carried out with the aim that the ash we get is not mixed with dirt.
   - Boiling tapioca flour
     Tapioca flour is boiled using hot water until the flour and water are mixed until it becomes thick.
   - Mixing flour and ash
     The fine ash and thick tapioca flour are mixed and stirred until the flour and ash are evenly mixed until they can clump. The mixing process must be carried out evenly, because it is related to the density

level between the adhesive and the rice husk charcoal. The higher the density value, the better the quality of a briquette, which means that the rice husk charcoal grains are united with the adhesive.

Figure 5. Process of mixing flour and ash

- Printing

  After the adhesive mixture with rice husk charcoal is evenly mixed, it is continued with the printing process. Qistina et al. in their scientific article explained that the ideal printing process uses a special machine, where the required compressive strength is in the range of 50 kg/cm2. In this case, the response of the residents of Kajen hamlet tends to be positive. This can be seen from the enthusiasm of the residents when accompanied by KKN students to try the biobriquette printing process (Figure 6). The printing of rice husk charcoal biobriquettes is carried out using a PVC pipe with a diameter of 25 mm.

Figure 6. Biobriquette making process

- Drying process

  After going through the printing process, the printed briquettes are removed from the printing machine and dried for 3 days until the water content disappears. Drying can also be done by burning using an oven for one day. The printed biobriquettes are then dried in the sun. The goal is to remove the water content in the biobriquettes so that the rice husk charcoal dries perfectly.

4. CONCLUSION

The majority of Kajen hamlet are pottery craftsmen. Where the pottery making process undergoes a burning process that produces ash waste. The socialization and training carried out by KKN UIN Sunan Kalijaga in Kajen hamlet aims to provide education on the dangers of ash waste and the benefits of ash waste that can be utilized by processing it into biobriquettes as an alternative energy.

Socialization and training were carried out together with the Kajen hamlet youth organization by providing procedures for making biobriquettes and providing instruction cards as a guide in making biobriquettes. The changes experienced by the Kajen hamlet residents, especially the youth organization, are that after this training, residents can learn about the dangers of ash and residents can utilize previously useless ash waste into biobriquette products that have a selling value.

DAFTAR PUSTAKA

Bhakti, C. P., Ghafur, A. L., Setiawan, R. A., & Widodo, A. (2019). Pelatihan Dan Pemanfaatan Sekam Padi Menjadi Bahan Bakar (Briket) Di Desa Kemranggon, Kecamatan Susukan Kabupaten Banjarnegara. *Jurnal Pemberdayaan: Publikasi Hasil Pengabdian Kepada Masyarakat*, *3*(1), 117–122. https://doi.org/10.12928/jp.v3i1.637

Dan, H., Anggota, J., Gelar, M., & Ekonomi, S. (2023). *STRATEGI PENGRAJIN GERABAH DALAM MENCAPAI KESEJAHTERAAN KELUARGA DIMASA PANDEMI COVID-19 Di Desa Wisata Kasongan, Padukuhan Kajen, Kalurahan Bangunjiwo, Kapanewon Kasihan, Kabupaten Bantul, Yogyakarta*. *1*, 42–58.

Sari, R. J., Mansyur, S., Nugroho, A. P., & Sukandaru, F. B. (2024). Pemanfaatan Limbah Abu Sekam Padi Dalam Peningkatan Ekonomi Masyarakat Desa Kemudo Kecamatan Prambanan. *BERNAS: Jurnal Pengabdian Kepada Masyarakat*, *5*(1), 857–865. https://doi.org/10.31949/jb.v5i1.7183

Sudirman Rizki Ariyanto1*, Yelma Dianastiti1, Wahyu Robby Cahyadi1, Ata Syifa' Nugraha2, M. Y. P. (2022). Pelatihan Pembuatan Biobriket Arang Sekam Padi untuk Meningkatkan Ekonomi Masyarakat Desa Doroampel Kabupaten Tulungagung. *Journal of Economic Perspectives*, *2*(1), 1–4. http://www.ifpri.org/themes/gssp/gssp.htm%0Ahttp://files/171/Cardon - 2008 - Coaching d'équipe.pdf%0Ahttp://journal.um-surabaya.ac.id/index.php/JKM/article/view/2203%0Ahttp://mpoc.org.my/malaysia n-palm-oil-industry/%0Ahttps://doi.org/10.1080/23322039.2017

Zarkati Kurdiawan, Y., & Ir Sri Rachmania Juliastuti, A. (1959). *Thesis-Tk 091383 Utilization of Rice Husk Waste Into Briquettes As an Alternative Energy Source With Carbonization and Non Carbonization Process*.