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APPLICATION OF PYROLYSIS REACTOR MODEL TECHNOLOGY BIOMASS RAW MATERIALS FOR MAKING CHARCOAL BRIQUETTES HOME INDUSTRY SCALE

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Abstract

The application of carbonization or carbonization model technology to reactor equipment uses a closed method. The purpose of using a closed system is to produce high quality carbon which is shiny black in nature and breaks easily when pressed with the thumb. This technological method is very practical for the community to apply both in the manufacture of reactors and the carbonization process to the manufacture of charcoal briquettes. The reactor can be made from used compressor cylinders or 12 kg gas cylinders. The material is then modified into a reactor device where combustion is carried out in the reactor tube. In the process of carbonizing biomass, neither agricultural nor industrial waste needs to wait until it turns into carbon, in this case black granules. In this training, participants were first provided with theory and explanations about the use of reactor tubes starting from the manufacturing process to carbon production. In making briquettes, several stages are carried out, including drying, waste sorting, carbonization, mixing with adhesive to printing with a briquette size of 3.18 cm and drying using an oven or sun. so that participants can practice at home. This training can provide skills to the participants, as well as open the mindset of how to use the waste around it to be used as a solid alternative fuel. It can also be used as a home industry business so that it can improve the household economy.

Keywords: Briquetting Technology, Coalition Reactor Model, Closed Pyrolysis.

INTRODUCTION

Indonesia has many alternative energy sources, such as gas, coal, water, geothermal and solar power, biomass. Several regions in Indonesia have developed and empowered alternative energy but encountered many obstacles in terms of human resources and financing. Therefore, it is understandable if the development has not met expectations and it seems that it is still running in place.

Investment in the development of alternative energy sources still needs to be developed and studied with academics; the government cannot do it alone. That's why the government encourages the private sector to actively invest in this alternative energy sector. The

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government is also preparing steps to develop biofuel-based alternative energy. This national program has been started since 2005 by developing energy based on palm oil, corn, sugar cane, cassava and industrial waste. This development prioritizes certain areas, especially remote areas that are not yet developed, which will be implemented by the Energy Independent Village program. It is hoped that these villages will be able to meet their energy needs without having to depend on fuel oil

Everything we do in our daily life requires energy. To survive we need energy which is obtained from food. Every vehicle requires energy to move and this energy is obtained from fuel. Animals also need energy to live, just like humans and plants

Carbonization or authoring is the process of turning the original raw material into shiny carbon black through combustion in a confined space with limited air. The co-authoring technique has been known since hundreds of years ago, it's just that the charcoal that is made comes from firewood not from organic waste. In this training, modeling technology that has been applied to participants can be developed.

The explanation above explains that agricultural and industrial waste has not been used as fuel for charcoal or charcoal briquettes, this is due to the lack of knowledge and awareness of the community about reactor equipment for the coagulation or carbonization process of the original waste which is converted into wood charcoal and charcoal briquettes.

IMPLEMENTATION METHOD

The pattern of approach taken was visits and meetings with the head of the Asyaman village, then explained the purpose of this community service activity was to apply reactor technology or carbonization for the manufacture of wood charcoal or charcoal briquettes from agricultural waste. This activity is the Tridarma of Higher Education which must be disseminated, namely the results of the research are then applied in the form of community service.

The method applied in this service is as follows:

Communicative Method

Introduction to Reactor or pyrolysis technology with a simple model. Explains the design of the materials used from the compressor tube scraps obtained from Bestu. Describes a simple pyrolysis (engineering) design that can be done or made in welding workshops, by adding an iron pipe in the middle of the casting tube as the initial combustion chamber as well as a chimney.

a. The raw materials for making charcoal are wood or biomass that has been dried and chopped dry corn cobs
b. The process of carbonization or coagulation of biomass (corn cob, sawn wood) takes 45 minutes while the shell takes ± 1 hour, this depends on the capacity of the charcoal.
c. Prepare and distribute guidelines on how to make reactors and their use as well as how to make solid fuel (charcoal briquettes)
d. The shape of the pyrolysis reactor tool that has been made and tested

Training Methods

This training explains step by step the tools used in the application of carbonization technology for making wood charcoal or charcoal briquettes

1. Introduce biomass from agricultural waste corn cobs, corn leaves and corn stalks as well as sawmill industrial waste linggua and merbau wood shavings
2. The size of the waste, describes the shape of the size of the waste which is cut into two finger knuckles in order to speed up the drying process
3. Sorting, sorting is done on the material so that nothing is mixed or joined with other materials in the form of stone or sand during combustion.

RESULTS AND DISCUSSION

Linkages

This service is related to appropriate technology courses or abbreviated as TTG. In designing tools students are encouraged to create technology for the needs of the village community. One of the waste materials used is compressor tubes which are obtained from bestu at low and affordable prices. The tool that was created is related to the potential of available waste, which has not been utilized optimally and also the rising price of fuel oil which is troubling the village community.

Service Activities

1. Submission of materials

The material presented is in the form of lectures and presentation of the material in the form of short and clear power points. Agricultural waste and household industrial waste are shown or displayed. Most of the agricultural waste produced is burned or left to rot to become organic fertilizer. This happened due to the lack of touch from related agencies, both the village community empowerment service, the social service and the renewable energy service to provide counseling and practice. Explain the function of the reactor and the authoring process, to making charcoal briquettes.

Figure 1. Explanation of the reactor apparatus

2. Discussion and Q&A

After the presentation of the material was completed, it was continued with training on the writing process (workshop), but previously the participants explained the functions of the reactor parts and the materials used with the aim that participants from various professions who participated could easily understand and carry out the . In this training, a question and answer room was opened.

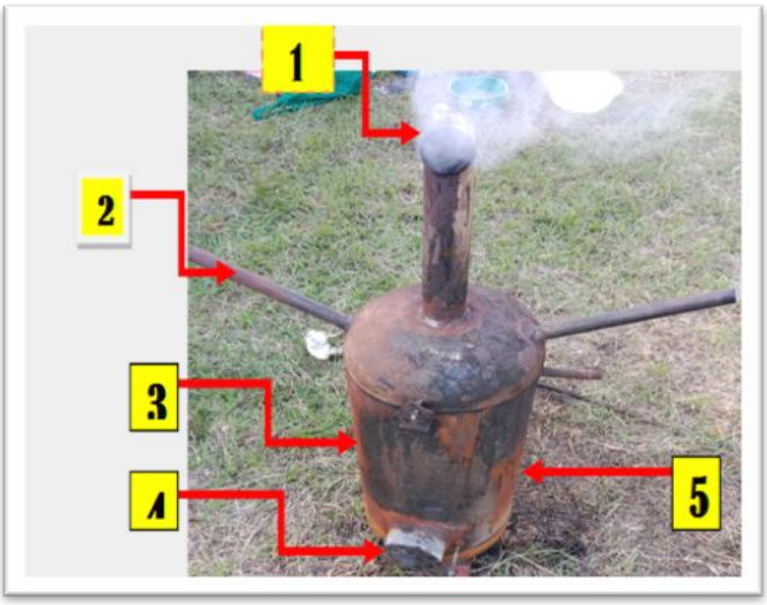

Figure 2. Description of the Components-reactor

With a question submitted by a wood charcoal entrepreneur named **Husain**, namely:

1. Can all types of agricultural waste be carbonized to be used as charcoal briquettes?
2. Is it possible to do open composition using drums?
3. Apart from tapioca adhesive being used as an adhesive, can other adhesives be used such as fox glue
4. How to know that the carbon produced from carbonization is good?

The **second participant**, one of the welding workshops, asked the following questions:

1. Can the smoke be used to smoke fish?
2. How long does the carbonization process take?

Figure 3. Explanation of charcoal briquettes from waste

Answering **Mr. Husain**'s question

1. All types of agricultural waste can be used as fuel for charcoal briquettes by means of a combination of organic materials and hard materials, for example corn stalks with shells, corn cobs with shells so that cooking can take a long time and the heat produced is quite high.
2. All writing can be done either fully open, semi-open or closed. the results obtained from carbonization are certainly different in terms of the quality and quality of the briquettes. The open method has a greater risk of failure because free air directly contacts the raw material, it is also cheap and the fastest, but the other parts become ashes as well. In contrast to the carbon-covered coking that is produced, it is very black, shiny and easily broken.

3. Not all adhesives can be used in the manufacture of charcoal briquettes depending on the use of charcoal, because some adhesives contain chemicals and if tapioca or sago adhesives are at risk they are safe for food.
4. To know if carbon is good, it is easy to break, shiny black

Q&A with participants in the welding workshop, **Mr. T**uriman

1. Coal smoke can be used to smoke fish or as a preservative by modifying it by adding a pipe and then pouring the smoke into the pre-designed oven.
2. The time required for carbonization depends on the material and capacity, the tool designed in this training is for shells with a capacity of 3 kg, the time to produce carbon is ± 1 hour.

CONCLUSION

1. The application of the carbonization technology model or the authoring of wood and biomass waste in the Asyaman village community has had a major impact on the participants and charcoal entrepreneurs. That the authoring model in this training is very practical, all agricultural and industrial waste can be carbonized. In contrast to the traditional system of making charcoal, the raw material is solid wood, which is then planted and stockpiled for a long time, making it ineffective.
2. This service introduces a reactor model for a closed authoring process, using scrap materials from Bestu, which is modified with the aim of producing high-quality carbon so that in the manufacture of briquettes and their use they provide high heat.
3. Agricultural waste should not be burned or piled up into garbage which can damage the environment but instead use it as fuel for charcoal briquettes as a creative economy to increase income.
4. Changing people's habits of using oil by switching to solid fuels or charcoal briquettes as an alternative energy, and reducing household expenses in addition.

Suggestion

1. Through this training, the participants, both from charcoal entrepreneurs and other entrepreneurs as well as representatives from each RT, are expected to be able to make reactor tubes for carbonization of agricultural and industrial waste to be used as solid fuel or charcoal briquettes
2. Utilization of this natural resource as an alternative energy that can reduce dependence on fuel oil, as well as the use of firewood. This waste processing can have an impact on improving the welfare of the community's economy

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