

โดยเฉลี่ยในอัตรา $3.16 \text{ MJ/kg}_{\text{RDF-5}}$ ซึ่งจะถูกใช้ในกระบวนการอัดแท่งเชื้อเพลิงมากที่สุด เท่ากับ 1.69 MJ/kg คิดเป็น 53.4% ของพลังงานที่ใช้ทั้งหมด รองลงมาคือกระบวนการลดขนาดขยะจำพวกพลาสติก ที่มีปริมาณการใช้เท่ากับ 0.695 MJ/kg คิดเป็น 21.96 % ของพลังงานที่ใช้ทั้งหมด ดังนั้นเมื่อประเมินปริมาณพลังงานความร้อนที่ได้จากเชื้อเพลิงเทียบกับพลังงานที่ต้องใช้ในกระบวนการผลิตพบว่าจะมีสัดส่วนเฉลี่ยอยู่ที่ 1.59

และเมื่อพิจารณาค่าต้นทุนในการผลิตขยะเชื้อเพลิง RDF-5 พบว่ามีต้นทุนมีการผลิตมีค่าเท่ากับ $4.21 \text{ บาท/kg}_{\text{RDF-5}}$ หรือเทียบเท่ากับ 0.143 บาท/MJ



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ABSTRACT

The research aimed to analyze energy consumption and cost of Refuse Derived Fuel (RDF) production from waste in Chiang Mai University. For potential study, the result showed that the waste disposal rate in university was at 4.28 ton per day. The amount of combustible waste including wood waste, plastics, and paper was as high as 2.09 ton per day. They could be used as materials for RDF production. For the RDF production process development, the prototype of the RDF production system are designed and constructed. The system contained four main processes which were (1) separation (2) shredding (3) mixing and (4) extruding. Due to the different properties of wood waste, plastics and papers, they had to be shredded separately. The RDF production capacity of the designed system is at 25 kg/hr. In this research, RDF had been produced with various compositions. Three binders which were lime, molasses and tapioca flour had been used. The obtained products and their properties were compared to find out the most suitable composition. The results showed that the composition of plastics: wood wastes: papers: tapioca flour at 4:3:1:1 was the most suitable. Due to this composition, the density and the heating value density of produced RDF were 1312.88 kg/m^3 and 29.25 MJ/kg , respectively. These values were acceptable according to the fuel quality standard. Besides, in this research, the energy consumption of RDF production was also carried out. The results of energy analysis showed that the overall energy consumption was 3.164 MJ/kg . The extruding process consumed the highest energy of 1.692 MJ/kg . It was accounted for 53.4 % of the overall energy consumption. Following by plastic shredding process, the energy was consumed as much as 0.695 MJ/kg or 21.96 % of the

overall energy consumption. From the energy consumption and the heating value of RDF, the average ratio of energy input and output was 1.5. From the economic analysis, the production cost of RDF was at 4.21 baht/kg or equivalent to 0.143 baht/MJ.



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