Applicability of Waste Wood for a Renewable Energy Source in Daejon, Korea

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ABSTRACT

Global increase in energy consumption would eventually lead to the depletion of fossil fuels, and results in the increase of coal and oil price. Korea imports approximately 97% of its total energy consumed, and there is an immediate need for an alternative source of energy.

Domestic policy aims at zero waste community, which can be explained as the concept of 4R(3R+Recovery) on top of existing 3R(Reduce, Reuse, Recycle) policy. As such, securing of alternative energy sources, in other words, recovering energy sources can be achieved.

So, waste to energy policy has received much attention recently. Also conversion of waste to energy, a form of renewable energy, has been, and is, an effective alternative for the increasing energy crisis.

In Daejon, Korea, 40 tons/day of waste wood, being 95% of the total waste wood generated daily, was incinerated for the production of heat energy. However, simple treatment of incineration makes energy efficiency of resource decrease and accelerates incinerator deterioration due to its high caloric value. In order to overcome these problems, alternative treatment should be investigated.

This study focuses on the conversion of waste wood to energy source. As an initial step to check the applicability of waste wood as an alternative energy source, analysis was carried out on characteristics, elemental composition and heavy metal contents of waste wood.

The characteristics of waste wood (13.2% of moisture, 81% of combustibles, 5.8% of Ash and caloric value of 4,000kcal/kg on average) were revealed. Energy efficiency of waste wood is expected to be higher than other wastes. In addition, elemental composition of waste wood sample contains 49.3% carbon, 6.0% hydrogen, 37.1% oxygen, 2.2% nitrogen, 0.3% sulfur, 0.2% chlorine and 5.1% ash.

According to the analysis, heavy metals such as Cr, As, Cd, Pb, Cu, Ni, Hg, contained in waste wood, were less than 0.1mg/kg, Zn, F and Cr^6+ were 0.16mg/kg, 0.66mg/kg and 1.19mg/kg, respectively. This analysis depicted that recycling and resource recovery of waste wood can reduce secondary pollution, and be an alternative energy source, as well.
Waste wood treatment for the conversion into energy source does not cause secondary pollution and is highly expected to reduce the primary energy consumption. Eventually, this study diagnoses techniques that can reduce fossil fuel and mitigate carbon dioxide emission.

**Keywords:** Waste Wood, Energy Recovery, Renewable Energy, Waste to Energy