

## CONVERSION OF LOCAL WET ORGANIC WASTE TO A COAL SUBSTITUTE VIA HYDROTHERMAL CARBONIZATION

Wadasinghe L.G.O.S.<sup>1</sup>, Perera I.Y.C.<sup>1</sup>, Perera I.N.<sup>1</sup>, De Silva K.B.N.S.<sup>3</sup>, Weerasekera T.S.<sup>1</sup>, Yatawara C.<sup>1</sup>, Kodikara M.<sup>1</sup>, Berge N.D.<sup>2</sup>, Senarath-Yapa M.D.<sup>1\*</sup> and Gunatilake S.K.<sup>3</sup>

<sup>1</sup>John Keells Research, John Keells Holdings PLC, Sri Lanka

<sup>2</sup>Department of Civil and Environmental Engineering, University of South Carolina, USA

<sup>3</sup>Department of Natural Resources, Faculty of Applied Sciences, University of Sabaragamuwa, Sri Lanka

\*muditha.jkh@keells.com

According to The Central Environmental Authority of Sri Lanka, about 55% of Sri Lankan municipal solid waste (MSW) is comprised of organic waste. To manage the said fraction, biological processes such as composting, anaerobic digestion as well as physical processes such as incineration, pyrolysis are utilized. Nevertheless, biological processes are time-consuming while physical processes are energy-intensive due to the inherently high moisture content in organic waste. Therefore, most of it ends up in landfills without any utilization and causes many environmental problems such as the release of leachate, odour, greenhouse gases, etc. Hydrothermal Carbonization (HTC) is a thermal conversion technique that converts organic waste to a valuable, energy-rich resource identified as hydrochar. It occurs in the aqueous phase under elevated temperature (180 – 250°C) at autogenous pressure for few hours (2–12 hr). The resulting hydrochar has the potential to be used as a carbon neutral substitute for coal. At present, many European countries such as Germany, Finland, and UK are successfully operating commercial scale HTC plants. This study was conducted to investigate the potential of using the HTC process to convert Sri Lankan organic waste to hydrochar. Organic waste collected from households, hotels & resorts, and food processing industry were carbonized at selected temperatures and residence times under autogenous pressure. Results indicate that hydrochar can be produced within 2 to 4 hours, with an average yield of 50% on a dry basis. The produced matter has a higher calorific value (>25MJ/kg), lower ash content (<5% w/w) and lower moisture content (<5% w/w) compared to the mined coal. Moreover, it is a stable product which can be stored without any odour. As a by-product, process water is generated and the viability of using it to make fertilizer has been demonstrated. Therefore, HTC can be a solution to effectively manage local organic waste. The recent results of conversion of local organic waste to hydrochar and process water will be presented.

**Keywords:** *Hydrothermal Carbonization, Organic waste, Hydro char, Process water*