

## **Life cycle assessment of biochar application in Vietnam using two pyrolysis technologies**

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This study presents a comparative analysis of the environmental impacts of biochar systems in Vietnam using household scale and district scale pyrolysis technologies. At the household scale, pyrolytic cook-stoves were assumed to be used by households to produce biochar. The pyrolytic cook-stoves burn pyrolysis gases and use the heat for cooking. At the district scale, the BIGchar 2200 unit, a continuous operation system, is utilised to convert rice husk to biochar. This unit allows for easy capture of produced gases, which can be used to generate energy products, adding value to biochar production and decreasing environmental costs through the displacement of fossil fuels. The biochar produced from each system was assumed to be applied to paddy rice fields. Results from Life Cycle Assessment showed that biochar production at the both scales for application to the soil significantly improved environmental performance of 1 Mg of rice husk relative to the reference scenario (open burning of husk) across a range of impacts including climate change (CC), particulate matter and non-renewable energy (NRE) use. Net carbon abatement of biochar systems ranged from 355 to 427 kg CO<sub>2</sub>-eq Mg<sup>-1</sup> of spring rice husk at the household scale and district scale, respectively. The district scale offered greater carbon abatement primarily due to the higher rate of LPG displaced by this unit.