



區塊鏈技術應用於稻米生產過程 之溫室氣體排放

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摘要

2022 年聯合國氣候變遷專門委員會 (IPCC) 發布第六次評估報告 (AR6) 指出，目前全球升溫已來到 1.07° C，唯有全球碳排量減半才有機會達到《巴黎協定》中設定之 1.5°C 目標，因此國際間已有逾 130 國響應 2050 年淨零排放 (Net Zero)，並各自承諾減排目標。根據全球食品排放數據庫 (EDGAR-FOOD) 估算 1990 年至 2015 年間的溫室氣體 (CO₂、CH₄、N₂O、氟化氣體) 排放分布，其中糧食系統排放量達到每年 18 億噸二氧化碳當量，佔總溫室氣體排放量的 34%，而貢獻最多為農業活動和土地利用 (71%)。我國之農業淨零策略以減量、增匯、循環及綠趨勢為方向，因此本研究應用區塊鏈具可追蹤 (Traceability)、不可修改 (Unmodifiable)、去中心化 (Decentralization) 等特性，記錄不同農業耕作系統之活動紀錄與相關農業溫室氣體排放、土壤碳匯至農業剩餘資源循環之量測數據，整合建構一具有透明性、完整性、準確性與一致性之綠色知識區塊鏈履歷追蹤系統。

關鍵詞：溫室氣體、淨零碳排、產銷履歷、土壤碳匯、區塊鏈

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Monitoring greenhouse gas emissions in rice production and accreditation with block-chain technology

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Abstract

The Intergovernmental Panel on Climate Change (IPCC) released its Sixth Assessment Report (AR6) in 2022, stating that global warming has reached 1.07 ° C. It emphasized that global carbon emissions need to be halved to have a chance of achieving the 1.5° C target set in the Paris Agreement. As a result, over 130 countries have committed to achieving net-zero emissions by 2050, each setting their own reduction targets.

According to the Emissions Database for Global Atmospheric Research (EDGAR-FOOD), greenhouse gas emissions (GHG, CO₂, CH₄, N₂O, fluorinated gases) from the food system accounted for 1.8 billion tons of CO₂ equivalent annually between 1990 and 2015, constituting 34% of total GHG emissions. The agricultural activities and land use contributed the most to these emissions (71%).

In response, our country has formulated an agricultural net-zero strategy focusing on reduction, enhancement, circularity, and green trends. To address this, the present study utilizes blockchain technology with features such as traceability, immutability, and decentralization. It records activity logs of various agricultural cultivation systems, related agricultural GHG emissions, soil carbon sequestration, and measurements of residual resources in the agricultural cycle. This integration aims to establish a green knowledge blockchain ledger tracking system characterized by transparency, completeness, accuracy, and consistency.

Keyword: Greenhouse gas, Net-zero, Traceability, Soil carbon sequestration, Blockchain

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