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Effect of using CO2 Sequestration on SMR Hydrogen Production from Waste with a Life Cycle Assessment to Environmental Impact in South Korea

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This research provides a numerical analysis of the impact of using CO2 sequestration on SMR hydrogen production from renewable gas. With the rapid advancement of hydrogen production technology, environmental considerations, particularly emissions, have become extremely important due to the pollution produced during the process. This study specifically focuses on the environmental impact of hydrogen production during Steam Methane Reforming process with and without CO2 sequestration. Renewable raw materials such as landfill gas (LFG), animal waste (AW), food waste (FW), and wastewater sludge (WSW) are evaluated. Wastewater sludge with CO2 sequestration shows the highest GHGs credit of -199,576 gCO2e/mmBTu, however if without CO2 sequestration the credit decreases to -130,559 gCO2e/mmBTu. Meanwhile, the use of LFG raw materials produces the highest GHGs, the value is 33,498 gCO2e/mmBTu. However, if adding CO2 sequestration to production, it will produce a credit of -45,576 gCO2e/mmBTu. Apart from GHGs, other emissions such as carbon monoxide (CO) and nitrous oxide (NOx) are also analyzed to provide information in selecting optimal renewable raw materials for hydrogen production.

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