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FACT SHEET

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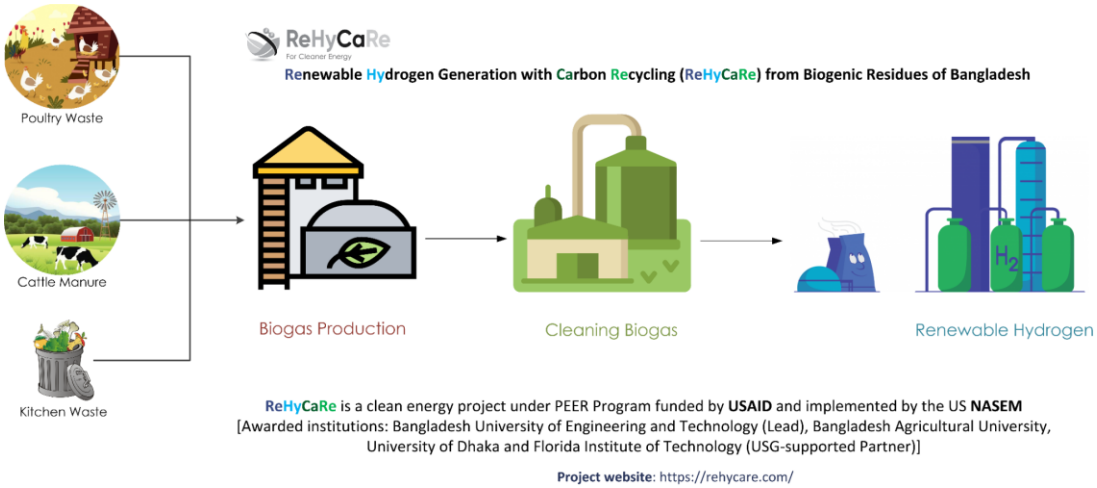
RENEWABLE HYDROGEN GENERATION WITH CARBON RECYCLING (REHYCARE) FROM BIOGENIC RESIDUES OF BANGLADESH.

A PARTNERSHIP FOR ENHANCED ENGAGEMENT IN RESEARCH (PEER) IN ENERGY

ABOUT REHYCARE

Bangladesh, being one of the most rapidly growing developing countries in South Asia, is going to experience a surge in energy demand in the upcoming years. Unfortunately, the country's fossil reserve has already been depleted. Bangladesh, with 180 million people, produces an enormous amount of biogenic residue that could be harnessed for clean energy (e.g., hydrogen (H2)) production. In order to distribute clean energy at a lower cost throughout the country, low-risk ready-to-deploy modular H2 generation systems hold the key to success for Bangladesh. The ReHyCaRe activity is a $174,735 research grant under the Partnerships for Enhanced Engagement in Research (PEER) cycle 9 sub awarded by National Academy of Sciences (NAS) for the period of April 2021 - March 2024. The researchers under this grant will find a novel process that utilizes biogenic residues for renewable H2 generation in modular scale. This transformative concept has been developed by three leading universities of Bangladesh - Bangladesh University of Engineering Technology (BUET), Bangladesh Agriculture University (BAU) and Dhaka University (DU); in collaboration with USG-supported partner, Florida Institute of Technology (FIT). By converting environmental liability (biogenic residues) into clean energy (H2), this activity can aid in attaining energy security for Bangladesh.

The overall goal of this activity is to instigate unique research and development activities targeted for Bangladesh and its H2 generation potential. The concept proposes to utilize the biogenic residues available in Bangladesh by anaerobic digestion (AD) to produce biogas, which will be cleaned and further upgraded to H2 with low-cost catalysts. These activities will be carried out at the three Bangladeshi universities. Meanwhile, the U.S. partner University will share their findings on digestate (from AD) conversion to high value carbon materials from their ongoing projects. In the long run, the technology could be adopted in Bangladesh for improved process performance and environmental benefits. From this study, it will be possible to make policy suggestions to direct the deployment of highly efficient energy systems, laying the foundation for a H2-based clean energy infrastructure.



PROGRAM OBJECTIVES

TECHNICAL OBJECTIVES

- IDENTIFY APPROPRIATE FEEDSTOCKS FROM THE AVAILABLE BIOGENIC RESIDUES FOR OPTIMAL BIOGAS PRODUCTION BY ANAEROBIC CO-DIGESTION
- DEVELOP A PROCESS FOR BIOGAS CLEANING AND CATALYTIC REFORMING TO GENERATE SYNGAS AS FEEDSTOCK FOR RENEWABLE H2 THROUGH CARBON DIOXIDE RECYCLING

POLICY SUPPORTING OBJECTIVES

- ASSESS ECONOMIC FEASIBILITY OF THE PROPOSED CONCEPT THROUGH TECHNO-ECONOMIC ANALYSIS (TEA) AND EVALUATE ENVIRONMENTAL SUSTAINABILITY THROUGH A LIFE CYCLE ASSESSMENT (LCA) FOR MODULAR SCALE H2 PRODUCTION

CAPACITY BUILDING OBJECTIVES

- ESTABLISH STRONG RESEARCH COLLABORATION AND KNOWLEDGE TRANSFER BETWEEN USG- SUPPORTED PARTNER (FIT) AND 3 BANGLADESHI UNIVERSITIES THROUGH RESEARCH EXCHANGE VISITS AND ACCESS TO COMPLEMENTARY LABORATORY FACILITIES, AND
- ENHANCE RESEARCH FACILITIES, TRAIN ENGINEERING STUDENTS TO BECOME SUCCESSFUL PROFESSIONALS, AND ENGAGE PRIVATE SECTOR INDUSTRIES THROUGH STAKEHOLDER WORKSHOPS.

FOR MORE INFORMATION

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ReHyCaRe Project Information: https://sites.nationalacademies.org/PGA/PEER/PEERscience/PGA_364171