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ISLAMABAD: The National Energy Efficiency and Conservation Authority (NEECA) has released a pre-feasibility study on green hydrogen energy, aiming to unlock the vast potential of the clean fuel and pave the way for a more sustainable energy future.

The study, conducted in collaboration with international experts, analyzed 13 value chain cases for hydrogen production, storage, and utilization, and identified the three most promising ones for further exploration.

Currently, Pakistan relies heavily on thermal sources for its power generation, with a staggering 64 percent of its energy being sourced from imported fossil fuels such as RLNG, Coal, and RFO. The escalating global energy prices and the nation"s dependence on imported fuel have presented formidable challenges, affecting both the reliability and cost-effectiveness of Pakistan"s energy supply. Additionally, this reliance on fossil fuels has contributed to higher greenhouse gas emissions, exacerbating environmental concerns.

Hydrogen, with its high energy content, environmental compatibility, storage capabilities, and ability to address intermittency issues in RE sources, emerges as a crucial energy vector for ensuring a reliable and cost-effective harnessing of Pakistan"s RE resources.

Dr. Sardar Mohazzam, Managing Director of NEECA, provided insight into the motivation behind conducting this groundbreaking study, which aims to explore the potential of green hydrogen energy in Pakistan. The event featured key presentations from Stephen B. Harrison, an International Expert on Green Hydrogen, and Dr. Nadeem Javed, the ex-chief economist, who outlined crucial aspects of the pre-feasibility study.

In the study, 13 value chain cases for financial modeling have been meticulously analyzed to gauge their economic viability across current and potential future scenarios. The study focused on advancing sustainable energy solutions and identified and highlighted the three most promising value chains.

Hydrogen Electrolysis from Ghazi-Barotha Dam: Researchers propose harnessing hydrogen through electrolysis from hydroelectricity at the existing Ghazi-Barotha dam. The innovative approach involves admixing the produced hydrogen at a low concentration into the local natural gas grid.

Solar-Powered Hydrogen Production at Quaid e Azam Solar Park: Utilizing solar power generated from the Quaid e Azam solar park, scientists envision producing hydrogen on an electrolyzer. The resulting hydrogen, generated through sustainable solar energy, would be admixed at a low concentration into the local natural gas grid. This application aims to decarbonize the gas pipeline network and enhance sustainability in heating, cooking, and CNG applications.

Run-of-the-River Hydropower Micro-Grid: A One MW Run-of-the-river hydropower remote micro-grid is

proposed, allocating a portion of the generated power for hydrogen production during the 10 months of hydropower generation. The hydrogen would be stored and released to a fuel cell for two winter months when the hydro plant undergoes winterization, mitigating the risk of ice damage.

The findings of this study represent a significant leap forward in the pursuit of sustainable energy solutions, offering a potential roadmap for the future. As the global community continues to prioritize environmentally friendly alternatives, these identified value chains hold promise for a cleaner, more sustainable energy landscape. The research is set to spark discussions and further exploration into practical applications and implementations.

High capital expenditure and elevated electricity costs currently impede the financial feasibility of the identified value chain projects for hydrogen generation.

The study recommends policy interventions, such as reviewing power pricing tariffs, providing low-cost power for hydrogen generation from curtailed hydropower, and implementing a CO_2 emissions cost.

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