Summary for Public Release
Dairy Methane Utilization for Clean Hydrogen Production
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The **California Dairy Research Foundation (CDRF)**, in collaboration with sub recipients **Sandia National Laboratories**, **California Bioenergy LLC**, **West Coast Advisors**, will lead an innovative project aimed at exploring the feasibility of utilizing dairy methane, captured through anaerobic digesters, to produce clean hydrogen (H_2). The primary objective of this project is to assess the environmental and economic feasibility of converting methane from dairy manure into hydrogen, a renewable energy source with zero emissions, particularly suited for the transportation sector. The project will also evaluate the scalability of this process and its potential to reduce greenhouse gas emissions, enhance energy sustainability, and contribute to the U.S. Department of Energy's (DOE) long-term clean energy goals.

This project proposes exploring the ability to leverage existing dairy methane capture infrastructure in California to produce clean H_2, an energy carrier with zero emissions upon use. Traditionally, methane captured from dairy farms has been converted into renewable natural gas (RNG). However, this project takes a novel approach by examining how that methane can be transformed into H_2. The study will assess various H_2 production pathways, including steam methane reforming (SMR) and electrolysis. It will also explore the use of on-site renewable energy systems like fuel cells and linear generators to power the H_2 production process.

In collaboration with **West Coast Advisors**, who are providing strategic guidance and regulatory expertise, and **California Bioenergy LLC**, a leader in dairy methane capture systems, CDRF will utilize advanced modeling and life-cycle assessment (LCA) tools developed by **Sandia National Laboratories**. These tools will help evaluate the project's potential to reduce greenhouse gas emissions, improve cost-effectiveness, and assess the broader applicability of H_2 production from dairy methane.

The project will use advanced process simulations and financial metrics, such as cash flows and Net Present Value (NPV), to determine the economic feasibility of scaling hydrogen production across California's dairy industry.

If successful, this project could revolutionize the use of dairy methane, transforming it from an environmental liability into a renewable energy asset. It holds the potential to significantly reduce methane emissions from dairy operations, promote environmental justice by mitigating pollution in underserved rural communities, many of which bear the brunt of industrial pollution, and contribute to California's clean energy goals.

The results will provide a scalable model for other livestock-intensive regions across the U.S. to replicate, aligning with DOE's strategic objectives to foster clean energy technologies, reduce greenhouse gas emissions, and support a transition to a sustainable energy economy.