

Expanding Green Energy

Transforming Coalbed Methane Wells into Bio-Hydrogen Factories

Imagine converting coalbeds that produce conventional natural gas into coalbeds that produce hydrogen, the clean fuel of the future. That's what Emerald Operating Co. is doing. It combines biotechnology with infrastructure already in place to create subsurface farms for producing hydrogen.

Underground, living on coalbed surfaces and cleats, are tiny microorganisms, known as archaea, that are natural hydrogen producers. Environmentally, coalbeds are a perfect home for these organisms because the coal is an aquifer and absorbs carbon dioxide (CO₂), a by-product of bio-hydrogen generation, like a sponge, locking it away permanently. This process prevents greenhouse gases from reaching the atmosphere—making coalbed methane (CBM) wells champions of carbon capture for hydrogen production.

These microscopic organisms need the right kind of food to start generating hydrogen. They reproduce and start producing hydrogen gas when fed simple, benign, low-cost nutrients found in organic, food-grade compounds. Here are some other factors making this process a game-changer:

1. **Zero Construction Hassle:** Hydrogen is produced in existing, vast, nature-made networks of coalbeds and CBM wells, which eliminates the cost and environmental footprint of building new facilities.
2. **Carbon Negative:** Instead of adding to the world's carbon crisis, CO₂ is removed before entering the atmosphere. The coal acts like a carbon vault, sequestering the CO₂ deep underground.
3. **Endless Energy:** As long as these tiny microbial powerhouses are fed, the microbial population doubles every 20 minutes and produces hydrogen continuously. No currently available renewable energy is continuous- not solar, wind, or hydro.

Emerald designed a simple trial run on hydrogen over four months. In 12 days, hydrogen levels increased from zero to 45% of analyzed gas volume after feeding and in the 6 days of the second trial, the hydrogen levels increased from zero to 63%. This is major discovery providing a unique opportunity.

Emerald seeks a partner to fund additional field trials to improve efficiency and cost-effectiveness and to ramp-up for commercialization. It brings to the table:

1. A portfolio of 71 CBM wells to produce renewable bio-hydrogen & renewable natural gas (RNG).
2. Patented energy-saving technology that separates gas and water underground in the well, resulting in no carbon footprint from the hydrogen and natural gas produced.
3. Access to the Powder River Basin's idle and producing wells, pipelines, and other infrastructure, a launchpad for commercialization.

Emerald is not just dreaming of a greener future; its building it, one revitalized well at a time.

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