CLIMATE CHALLENGES

CLIMATE COLLECTIVE

Climate Challenges Case Study Series

ON-SITE GREEN HYDROGEN USING WASTE CARBON

WITH OSSUS BIORENEWABLES AND A LARGE STEEL MANUFACTURER

ABOUT THE STARTUP

Ossus Biorenewables is a green hydrogen company, that supplies process industries with on-site, on-demand green hydrogen at USD 0.5-1.2 per kilogram using the waste carbon in effluents available on-site.

SERVICES

- **On-Site On-demand Green Hydrogen:** Producing affordable green hydrogen (at USD 0.5–1.2/kg) directly at industrial sites using waste carbon from effluents.
- **OB HydraCel Bioreactors:** Deploying retrofittable, autonomous bioreactors that minimize power consumption, downtime, and carbon footprint while converting waste into hydrogen.

VALUE PROPOSITION

- **On-Site Green Hydrogen Production:** Eliminates the need for storage, compression, and transportation by producing green hydrogen directly at industrial sites using waste carbon in effluents on-site.
- **Cost-Competitive:** Delivers green hydrogen at price points comparable to or below traditional Steam Methane Reformation, enabling cost-effective decarbonization for industries.
- **Effluent Recycling:** Provides an added environmental benefit by making recycled industrial effluents available for reuse after green hydrogen extraction, promoting circular economy practices.

Founded in 2017

Domain: Carbon Capture Utilization and Storage

Headquarters in Mumbai, Maharashtra

Website: Ossus Biorenewables

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THE PILOT

ESTIMATED IMPACT

Deployment:
Bioreactor producing 1 Ton Green H2 / Day Recycling 400 KL Effluent

4000 TPA
Reduction In Net Co2 Emissions

USD 1.4 / kg
Cost of Green Hydrogen Production

INR 43 Lakhs
Annual Savings In Water Treatment Charges

GREATER IMPACT

5040 TPA
Minimum Production Of Green H2, If OB Hydracel Reactors Scaled To Full Capacity

19800 TPA
Coke Replaced In Blast Furnace

59400 TPA
Reduction In Net Co2 Footprint

ABOUT THE CORPORATE

Location: India

Industry: Steel Manufacturing

CHALLENGES

- **High Carbon Emissions in Steel Production:** The steel sector in India relies heavily on coal-based coke, contributing significantly to CO_2 emissions, which need urgent reduction to meet climate goals.
- **Resource Limitations for Hydrogen Production:** Conventional methods, such as electrolyzers, require large amounts of ultrapure water and energy, which are unsustainable given India's limited water and energy resources.
- **Scaling Hydrogen Production:** Meeting India's ambitious green hydrogen targets (7.5 MMTPA by 2030) requires innovative solutions to overcome the inefficiency of existing technologies like water splitting.

SOLUTIONS

- **On-Site Green Hydrogen:** Ossus's OB HydraCel bioreactors convert industrial effluents available on-site into hydrogen and combines microbial electron generation and electrochemical hydrogen production for fueling blast furnaces.
- **Effluent Recycling and Reuse**: Recycling industrial effluents by consuming their organic and inorganic content during hydrogen production, enabling water reuse on-site.
- **Low Energy and Carbon Footprint**: The OB HydraCel bioreactors use minimal energy (0.76 kWh/kg of hydrogen) and produce just 1 gram of CO_2 per gram of hydrogen.

OUTCOMES

- **On-Site, On-Demand Green Hydrogen Supply**: The project scaled from lab to field deployment, producing 30 kilograms of hydrogen daily from 6,000 liters of industrial effluent, demonstrating efficient on-site production, eliminating logistical challenges like transport and storage.
- **Reduction in Coke Dependency**: Replaced a portion of coke with green hydrogen, reducing reliance on conventional carbon-intensive inputs.
- **Lower CO_2 Emissions**: ~ 30 - 50% reductions in carbon dioxide emissions aligned with industrial decarbonization goals.
- **Effluent Recycling:** Effluent generated on-site at the steel manufacturer's plant was used to produce green hydrogen for fueling blast furnaces.
- **Cost-Effective Hydrogen:** Provided green hydrogen at a competitive price as opposed to traditional methods, proving its financial feasibility.

Onsite, On-Demand Green Hydrogen

Cost Competitive

Circular Economy