



TECHNO-COMMERCIAL PROPOSAL

Algae-Based Carbon Capture & Biomass Production System

Proposal Reference	KB/OFF/ALGAE/26-27/001
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Submitted By	Medigreen Energy Pvt. Ltd
Submitted To	
CO ₂ Capture Capacity	1 Tonne Per Day (TPD)

1. Executive Summary

Growing awareness of climate change and the increasing importance of carbon management have created significant opportunities in the carbon capture and biomass utilization sector. Medigreen Energy Pvt. Ltd proposes an Algae-Based Carbon Capture & Biomass Production System that captures CO₂ from biogas upgrading or industrial flue gas streams and converts it into high-value algae biomass, establishing a sustainable circular economy. The system sequesters

1 tonne of CO₂ per day while generating commercially viable bio-products.

The Algae-Based Carbon Capture technology integrates advanced CO₂ absorption with photobioreactor-based algae cultivation, converting captured carbon into biomass for use in biofuels, animal feed, and bio-based industrial products. This approach delivers measurable environmental impact alongside a commercially attractive revenue model.

Key Project Highlights

Parameter	Value
CO ₂ Capture Capacity	1 TPD (300 TPA)
Algae Biomass Yield	500 kg / Day (150 MT / Year)
Capital Investment	Rs. 4 Crores
Annual Operational Cost	Rs. 45 Lakhs
Annual Revenue from Biomass Sales	Rs. 140 Lakhs
Revenue from Carbon Credits	Rs. 5 Lakhs
Annual Profit	Rs. 95 Lakhs
Project Payback Period	Approx. 4 Years
Land Requirement	10,000 Sq. Ft.
Power Requirement	20 kW/hr
Water Requirement	0.6 MLD (+ 5 KLD for losses)

2. Utility Requirements

The following utilities are required to be arranged at the plant boundary for the successful commissioning and operation of the Algae-Based Carbon Capture & Biomass Production System:

<i>Utility</i>	<i>Requirement</i>
Electrical Power Supply	20 kW/hr (Connected Load)
Water Supply	0.6 MLD (Total) + 5 KLD/Day for evaporation losses & captive consumption
Plant Area (Civil)	10,000 Sq. Ft. (Minimum – Covered + Open)
CO ₂ Feed Connection	Pipeline / dedicated feed line from biogas upgrading unit or flue gas source
Foundation & Civil Works	As per Medigreen layout and engineering drawings
Nutrient Supply	Nutrient concentrates for algae growth medium (arranged by client)

3. Plant Deliverables / Scope of Supply

Medigreen Energy Pvt. Ltd shall be responsible for the complete design, engineering, fabrication, supply, installation, and commissioning support of the following systems and equipment:

<i>S. No.</i>	<i>Description</i>	<i>Remarks</i>
1	CO ₂ Capture & Absorption System	Advanced absorption units for biogas scrubbing / flue gas CO ₂ capture
2	CO ₂ Conditioning & Distribution	Flow control, conditioning, and delivery to photobioreactors
3	Photobioreactor (PBR) System	High-efficiency PBRs optimised for CO ₂ absorption and algae cultivation
4	Algae Cultivation Support Systems	Nutrient dosing, pH control, lighting, and temperature management
5	Biomass Harvesting & Dewatering Unit	Centrifuge / filtration systems for biomass separation
6	Growth Medium Recycling System	Filtration and recirculation for water conservation
7	Biomass Post-Processing Equipment	Drying and processing equipment for feed and biofuel conversion
8	Electrical Control Panel & Automation	Complete monitoring, control, and interlocking system
9	Plant Instrumentation	Flow, pressure, temperature, pH, and dissolved O ₂ / CO ₂ sensors
10	Engineering & Documentation	P&ID, GA drawings, O&M manual, and test certificates
11	Erection Supervision & Commissioning	Medigreen engineers on-site for installation supervision and system startup

4. Project Implementation Timeline

The project is structured across three distinct phases designed to ensure systematic deployment, optimization, and stable operation of the Algae-Based Carbon Capture & Biomass Production System:

<i>Phase</i>	<i>Description</i>	<i>Duration</i>
Phase 1	Installation & Commissioning – Equipment installation, civil works, system integration, and initial commissioning trials	Months 1 – 4
Phase 2	Culture Development & System Optimization – Algae strain inoculation, culture scale-up, photobioreactor calibration, and process parameter optimisation	Months 5 – 6
Phase 3	Stable Operation & Biomass Recovery – Full-scale CO ₂ capture at 1 TPD, consistent biomass production at 500 kg/day, and commencement of commercial biomass sales	Months 7 – 8

5. Revenue Model

The project generates revenue from two complementary streams — biomass sales and carbon credit monetisation — providing stable and predictable cash flows throughout the project lifecycle.

Revenue Stream 1 – Biomass Sales

<i>Parameter</i>	<i>Value</i>
Biomass Production per Day	500 kg / Day (0.5 MT)
Annual Biomass Production	150 MT / Year
Cost of Production per kg	Rs. 25/ kg
Selling Price per kg	Rs. 80 / kg
Annual Revenue from Biomass Sales	Rs. 140 Lakhs

Revenue Stream 2 – Carbon Credits

<i>Parameter</i>	<i>Value</i>
Annual CO ₂ Sequestered	300 Tonnes per Annum
Carbon Credits Generated	300 Credits (Approx.)
Estimated Revenue from Carbon Credits	Rs. 5 Lakhs per Annum

6. Total Annual Revenue

<i>Revenue Source</i>	<i>Annual Revenue (INR)</i>
Biomass Sales Revenue	Rs. 140 Lakhs
Carbon Credit Revenue	Rs. 5 Lakhs
Total Revenue	Rs. 145 Lakhs

7. Capital Investment

The total estimated capital investment required for the Algae-Based Carbon Capture & Biomass Production System, including all plant equipment, civil infrastructure, and engineering, is summarised below:

<i>Component</i>	<i>Cost (INR)</i>
CO ₂ Capture & Conditioning System	Included in Total
Photobioreactor (PBR) System	Included in Total
Biomass Harvesting & Processing Equipment	Included in Total
Electrical, Controls & Instrumentation	Included in Total
Civil & Infrastructure Works	Included in Total
Engineering, Commissioning & Contingency	Included in Total
Total Capital Investment	Rs. 5 Crores

8. Operational Expenses (Estimated)

The estimated annual operational expenditure (OPEX) for the Algae-Based Carbon Capture & Biomass Production System, covering all operational costs including manpower, utilities, and consumables, is as follows:

<i>Expense Item</i>	<i>Annual Cost (INR)</i>
Operational Costs (Total)	Rs. 45 Lakhs
(Includes: manpower, nutrients, power, water, maintenance, and consumables)	
Total Annual OPEX	Rs. 45 Lakhs

9. Environmental & Economic Benefits

Environmental Impact

- Mitigates 300 tonnes of CO₂ annually through biological carbon sequestration.
- Eliminates atmospheric CO₂ release by converting captured carbon into stable biomass products.
- Supports the transition to green energy through biofuel production.
- Promotes sustainable animal husbandry through eco-friendly, bio-based feed supplements.
- Conserves water through a closed-loop growth medium recycling system.

Economic Impact

- Provides a commercially viable, revenue-generating solution to carbon management.
- Reduces dependency on fossil fuels through the production of sustainable bioenergy.
- Generates carbon credits that add an additional monetisable asset for project stakeholders.
- Creates a replicable business model applicable to Bio-CNG plants, industrial clusters, and standalone facilities.

Social Impact

- Creates green employment opportunities in algae farming, biomass processing, and bio-product development.
- Strengthens rural economies through the development of bio-product supply chains.
- Supports national and international carbon neutrality commitments and ESG objectives.

10. Roles & Responsibilities

The successful execution of this project requires clear allocation of responsibilities across three key stakeholder categories:

<i>Stakeholder</i>	<i>Responsibilities</i>
Client / Host Facility	CO ₂ source connection (biogas / flue gas), land provision, utility supply (power & water), statutory clearances, and commercial offtake of biomass products
Medigreen Energy Pvt. Ltd	Technology provision, complete turnkey EPC execution, system commissioning, operation & maintenance support, and performance deliverable assurance
Investor / Financial Sponsor	Project capital investment, working capital support, financial closure, and strategic governance participation

11. Conclusion

The Algae-Based Carbon Capture & Biomass Production System proposed by Medigreen Energy Pvt. Ltd represents a financially sound, technologically proven, and environmentally responsible approach to carbon management. By capturing CO₂ from biogas upgrading or industrial flue gas streams and converting it into high-value algae biomass through advanced photobioreactor technology, this project delivers measurable value across environmental, economic, and social dimensions.

Bio-CNG plants and industrial CO₂ emitters gain a scientifically robust and regulatory-compliant carbon management pathway. Industry partners gain access to sustainable bio-based products that reduce dependence on conventional fossil-fuel-derived inputs. Investors benefit from a capital-efficient project with strong annual profitability, carbon credit income, and an accelerating market tailwind driven by global decarbonisation mandates.

Kankyo Bert Pvt Ltd invites interested parties to engage further in detailed discussions and site-specific technical assessments to advance this project towards implementation.