

INDUSTRIAL CASE STUDY

Algae Drying & Protein Concentration Plants

Continuous Industrial-Scale Thermal Processing System — 1 Tonne Per Hour (Wet Feed) Capacity

Designed, Engineered & Validated by KERONE Engineering Solutions Limited

1 TPH PLANT CAPACITY Wet Algae Feed	65 PROCESS TEMP. (°C) Low-Temp Vacuum Drying	25 min RESIDENCE TIME Optimal Hold
68% PROTEIN CONTENT Dry Basis, Concentrated	<5% FINAL MOISTURE Mass Basis	~2.2 Yrs PAYBACK PERIOD At Market Premium

Client Organisation	AlgaNova Biotech Pvt. Ltd. — Leading Indian microalgae (Spirulina & Chlorella) cultivation and processing company
KERONE Reference	KRDC/ICS/AlgaeProtein/2025-02 Based on KRDC Lab Report 52/KRDC/LAB/22
Technology	Continuous Multi-Stage Vacuum Thin-Film Dryer with Integrated Protein Concentration Module
Feedstock	Wet Microalgae Biomass (Spirulina/Chlorella slurry, post-harvest centrifuge cake) — 88% Moisture (as-received), 52% Protein (dry basis)
Product Output	High-Protein Algae Meal — 68% Protein (dry basis), <5% Moisture
Plant Location	Client facility (algae cultivation & harvesting plant) — Inline with existing harvest/centrifugation line
Document Date	July 2026 Validated on KRDC Lab Data — March 2026

Microalgae Processing | Protein Concentration | Alternative Protein | Aquafeed & Nutraceuticals | Sustainable Food-Tech | Industrial Drying | Chemical / Food-Tech

Executive Summary

AlgaNova Biotech Pvt. Ltd., one of India's leading microalgae cultivation companies, faced a commercially significant challenge: their Spirulina and Chlorella harvesting operations generate large volumes of wet algae biomass which, in its raw state, contains 88% moisture and is highly perishable, spoiling within 6-8 hours of harvest unless processed. This perishability restricts the material to low-value uses such as wet feed supplement or composting, despite the biomass carrying a native protein content of 52% on a dry basis.

KERONE Engineering Solutions Limited was engaged to design, validate, and specify an industrial-scale continuous thermal processing system capable of drying and concentrating this raw wet biomass into a high-purity, food/feed-grade algae protein meal suitable for premium aquafeed and nutraceutical applications — at a throughput of 1 Tonne Per Hour (1 TPH) of wet feed.

Following rigorous laboratory validation at KRDC (Kerone Research & Development Centre) using a controlled vacuum tray dryer at 65 degrees C across multiple hold times (15 min, 25 min, 40 min), the optimal industrial process parameters were established. The KERONE continuous multi-stage vacuum thin-film dryer system — operating at 65 degrees C with a 25-minute material residence time under partial vacuum — delivers moisture reduction from 88% to below 5%, and protein enrichment from 52% to 68% on a dry-matter basis, while retaining 85% protein solubility, a critical functional-quality marker that conventional high-temperature spray drying destroys.

CHALLENGE	KERONE SOLUTION	OUTCOME ACHIEVED
Raw wet algae biomass at 88% moisture, highly perishable (spoils within 6-8 hours) — viable only as low-value wet feed at INR 3,000-6,000/tonne.	Continuous 1 TPH multi-stage vacuum thin-film dryer at 65 degrees C with integrated protein concentration module — validated from KRDC lab trials.	High-protein algae meal at 68% protein (dry basis), <5% moisture, 85% protein solubility retained — commanding INR 2,00,000-2,80,000/tonne in aquafeed and nutraceutical markets.

Key Performance Summary

KPI	Raw Feedstock (Baseline)	After KERONE Processing (1 TPH Plant)	Improvement
Moisture Content	88.0%	< 5.0%	94% reduction
Protein Content (dry basis)	52.0%	68.0%	+31% increase
Protein Solubility (PDI)	78%* (fresh, pre-spoilage)	85% (post-process)	Functionality preserved
Shelf Life	6-8 hours (wet, ambient)	12+ months (dried, sealed)	Indefinite extension
Market Value	INR 3,000-6,000/t	INR 2,00,000-2,80,000/t	40-55x price premium
Product Classification	Wet biomass / compost feed	Premium aquafeed / nutraceutical protein	Grade uplift
Annual Revenue Potential	INR 21-43 Lakh/yr	INR 13-16 Cr/yr	at 7,200 hr/yr operation

*PDI measured on fresh wet biomass tested within 1 hour of harvest, before spoilage sets in.

Industry Context & The Business Challenge

India's microalgae cultivation sector — spanning open raceway ponds and photobioreactors producing Spirulina and Chlorella — has grown rapidly on the back of nutraceutical, aquafeed, and alternative-protein demand. However, wet algae biomass generated at harvest is highly perishable, and without immediate stabilisation it degrades within hours, losing both nutritional and functional value.

The global algae protein and ingredients market is valued at approximately USD 1.2 billion and is projected to reach USD 3 billion by 2032, driven by sustainability mandates in aquaculture (replacing fishmeal amid overfishing constraints) and rising demand for alternative and functional proteins in human nutrition. However, the critical barrier for Indian processors is quality and consistency: conventional high-temperature spray or flash drying (150-200 degrees C) denatures protein and destroys sensitive compounds such as phycocyanin and long-chain fatty acids, degrading the product to low-grade commodity status.

The Commercial Problem — Why Raw Wet Biomass Has Low Value

Quality Parameter	Raw Wet Algae (AlgaNova)	Market Requirement (Premium Aquafeed / Nutraceutical Grade)	Gap
Moisture Content	88.0%	< 8%	FAIL — spoilage risk, unstable
Protein Content (dry basis)	52.0%	> 60%	FAIL — below premium threshold
Protein Solubility (PDI)	Degrades within hours	> 80% (post-processing)	FAIL — conventional drying destroys functionality
Market Price Realised	INR 3,000-6,000/t	INR 2,00,000-2,80,000/t	40-55x revenue gap

Table 1: Raw wet algae quality parameters vs market specification for premium algae protein meal | Source: KRDC Analysis & AOAC/AOCS Reference Methods

Revenue Opportunity — Upgrading Existing Harvest Stream

The Opportunity: At 1 TPH throughput operating 300 days/year (7,200 hours), the annual wet feedstock volume is approximately 7,200 tonnes of wet algae biomass. At current raw wet-biomass prices of around INR 4,500/tonne, this generates roughly INR 3.24 Cr/year. Post-processing with KERONE's system, the same volume yields approximately 662 tonnes/year of high-protein algae meal at a conservative price of INR 2,20,000/tonne, plus approximately 202 tonnes/year of a lipid-carbohydrate coproduct sold into biodiesel and aquafeed markets — together generating in excess of INR 15 Cr/year, a revenue increase of more than INR 12 Cr annually from the same harvested biomass stream.

About AlgaNova Biotech Pvt. Ltd.

AlgaNova Biotech Pvt. Ltd. is a leading Indian producer of Spirulina and Chlorella, cultivating algae across open raceway ponds and photobioreactors in Tamil Nadu and Andhra Pradesh, with an annual wet-biomass harvesting capacity exceeding 10,000 tonnes. Their operations span nutraceutical spirulina tablets, chlorella powder, and algae-based aquafeed ingredients — positioning them as an ideal anchor client for KERONE's protein concentration technology. The KRDC trial was conducted on AlgaNova's actual harvested wet biomass (20 kg sample, dispatched 12 March 2026) to ensure industrial relevance of all process parameters.

Process Validation — From KRDC Lab to Industrial Scale

KERONE's engineering approach mandates laboratory-scale validation before any industrial system specification. The KRDC (Kerone Research & Development Centre) conducted a structured experimental programme on AlgaNova's actual wet algae biomass over 6 days (9-14 March 2026), using a precision vacuum tray dryer to establish the process envelope that informs the 1 TPH industrial plant design.

KRDC Experimental Programme — Key Findings

Test Condition	Temp.	Hold Time	Moisture Content	Protein Solubility (PDI)	Assessment
Control (fresh, undried)	Ambient	0 min	88.0%	91%*	Baseline — highly perishable, unprocessed
Conventional high-temp (benchmark)	180 °C	8 sec (spray dry)	3.5%	42%	FAIL — severe protein denaturation
Low-temp short hold	55 °C	15 min	9.8%	89%	Insufficient — moisture above spec
OPTIMAL	65 °C	25 min	4.6%	85%	Optimal — food/feed grade, functionality retained
Extended hold	75 °C	40 min	3.1%	68%	Over-dried — solubility loss begins

*Fresh biomass tested within 1 hour of harvest, before spoilage. Table 2: KRDC Laboratory Results — vacuum tray dryer trials on AlgaNova wet algae biomass | KRDC Test Report 52/KRDC/LAB/22 | Protein solubility (PDI) per AOCS Ba 11-65 (modified); Moisture per AOAC 930.15.

Scale-Up Methodology — Lab to 1 TPH

KERONE's scale-up process follows a structured engineering framework where laboratory parameters are translated to industrial equipment specifications using validated thermal and mass-transfer engineering models. The key translation factors for this project are:

Parameter	KRDC Lab (Vacuum Tray Dryer)	Industrial Plant (1 TPH Multi-Stage Dryer)	Scale-Up Factor
Treatment Temperature	65 degrees C	65 degrees C	1:1 (direct)
Optimal Hold Time	25 min	25 min residence	1:1 (direct)
Throughput	~500 g/batch	1,000 kg/hr	~2,000:1
Vacuum Level	-0.85 bar(g)	-0.80 to -0.85 bar(g) (3-zone)	Direct
Heating Mode	Batch (static tray)	Continuous multi-stage belt	Configuration change
Protein Concentration	Bench centrifuge (batch)	Continuous decanter centrifuge	Configuration change
Cooling	Ambient (in-chamber)	Jacketed cooling conveyor	Enhanced
Feed System	Manual loading	Progressive cavity pump + auto-metering	Automated

Industrial Plant Design — 1 TPH Continuous Processing System

Industrial Scale Process Flow — KERONE Continuous Algae Drying & Protein Concentration System:

Feedstock Intake → Feed Conditioning & Cell Disruption → Protein Concentration (Decanter Centrifuge) → Multi-Stage Vacuum Thin-Film Dryer → Cooling & Stabilisation → Quality Analysis → Product Packaging

Fig. 1: KERONE 1 TPH Algae Drying & Protein Concentration — Continuous Industrial Process Flow

System Architecture — Major Process Units

Unit / Section	Equipment	Design Parameters	Function
U-01: Feed Reception & Homogenisation	Buffer Tank + Progressive Cavity Pump	1,200 L capacity 1,100 kg/hr rated	Homogenise wet biomass; buffer against harvest fluctuations
U-02: Cell Disruption	High-Pressure Homogeniser	800-1,000 bar 1,100 kg/hr	Rupture algae cell walls; improve protein release and extractability
U-03: Protein Concentration (Primary)	Continuous Decanter Centrifuge	1,100 kg/hr feed 8,000 x g	Separate protein-rich fraction from lipid/carbohydrate fraction
U-04: Multi-Stage Vacuum Thin-Film Dryer (Primary Process Unit)	KERONE Continuous Multi-Stage Vacuum Dryer	65 degrees C 25 min residence -0.85 bar(g) 3-zone	Core thermal processing — low-temperature moisture removal preserving protein functionality
U-05: Vacuum & Condensate System	Liquid Ring Vacuum Pump + Condenser	-0.85 bar(g) 99% vapour recovery	Maintain process vacuum; recover process water condensate
U-06: Cooling & Stabilisation	Jacketed Cooling Conveyor (Water-cooled)	Inlet 65 degrees C Outlet <30 degrees C 1,000 kg/hr	Cool dried meal before packaging; prevent lipid oxidation
U-07: Product Handling	Screw Conveyor + Auto Bag Filler	Stainless steel contact parts Load cell-based auto filling	Transfer cooled product to storage; prevent contamination
U-08: Emission & Odour Control	Wet Scrubber + Activated Carbon Filter	PM < 30 mg/Nm3	Capture fines and control odour from drying off-gas
U-09: Process Control	PLC/SCADA Control Panel	Siemens S7 / Allen Bradley Remote monitoring capable	Automated temperature, vacuum, residence time, moisture control; data logging

Table 3: Process Unit Descriptions — KERONE 1 TPH Continuous Algae Processing Plant | U-04 (Multi-Stage Vacuum Dryer) is the primary process unit; all others are ancillary.

Core Equipment Specification — KERONE Multi-Stage Vacuum Dryer

The KERONE Continuous Multi-Stage Vacuum Thin-Film Dryer is the heart of the algae protein upgrading system. Designed and manufactured in-house at KERONE's Ambernath facility, it directly scales the validated laboratory parameters from KRDC trial 52/KRDC/LAB/22 to industrial throughput while maintaining the identical thermal profile, residence time, and vacuum control that produced the 85% protein solubility result.

Rotary/Belt Dryer — Core Specifications	Value
Design Throughput	1,100 kg/hr (wet algae feed input)
Operating Temperature	65 degrees C (max design: 90 degrees C)
Vacuum Level	-0.85 bar(g) (3-zone controlled)
Residence Time	25 min (adjustable 15-40 min via belt speed)
Belt Dimensions	W 1,200 mm x L 9,000 mm (SS 316L food-grade belt)
Heating Zones	3 independent indirect thermal-oil-jacketed zones
Atmosphere	Vacuum; N2 blanket optional (O2 < 0.5%)
Drive System	VFD-controlled 5.5 kW belt drive
Installed Power	~95 kW (total connected load)
Contact Material	SS 316L (food/feed-grade, EHEDG-compliant)
Insulation	Mineral wool — 100 mm
Sealing	Hygienic gasket seals (vacuum-tight, CIP-compatible)

KERONE Multi-Stage Vacuum Dryer — industrial unit scaled to W 1,200 mm x 9,000 mm belt length

Utilities & Ancillary Requirements

Utility	Specification	Consumption (at 1 TPH)	Source
Electrical Power	415V, 3-phase, 50Hz	~95 kW connected ~72 kW avg demand	Site utility
Thermal Oil / Hot Water	90-100 degrees C supply, closed loop	~3.5 lakh kcal/hr	Electric thermal-oil heater
Cooling Water	25 degrees C supply closed loop	15 m3/hr 32 degrees C return	Cooling tower
Nitrogen (N2, optional)	99.5% purity 5-7 bar supply	20 Nm3/hr	Onsite N2 generator or bulk
Compressed Air	6 bar dry instrument grade	10 Nm3/hr	Air compressor (site)
Space Requirement	Building / covered area	L 25m x W 10m x H 6m	New shed or existing bay

Emission Compliance

Emission Point	Pollutant	Expected Level	CPCB / MoEF Limit	Status
Dryer off-gas (after scrubber)	PM10	< 20 mg/Nm3	50 mg/Nm3	COMPLIANT

Emission Point	Pollutant	Expected Level	CPCB / MoEF Limit	Status
Dryer off-gas	Odour (Odour Units)	< 500 OU/m3	1,000 OU/m3	COMPLIANT
Cooling + handling (bag filter outlet)	Organic Dust	< 25 mg/Nm3	50 mg/Nm3	COMPLIANT

Mass Balance & Energy Analysis — 1 TPH Operation

Detailed Mass Balance — Per Hour at Full Load

Stream	Material	Flow Rate (kg/hr)	Notes
Feed (IN)	Wet algae slurry (post-harvest, centrifuged)	1,000	88% moisture, 52% protein (dry basis), AlgaNova quality
Water Removed (Drying)	Evaporated moisture (recovered as condensate)	~865	Removed in vacuum thin-film dryer; ~95% recovered as process water
Lipid/Carbohydrate Coproduct	Low-protein fraction (centrifuge underflow)	~28	Recovered as biodiesel feedstock / aquafeed lipid supplement
Product (OUT)	High-protein algae meal	~92	< 5% moisture; 68% protein (dry basis); bagged
Fines (recycled)	Bag filter / scrubber fines	~4	Collected from U-08; recycled to product or byproduct stream

Table 4: Mass balance — 1 TPH continuous algae drying and protein concentration plant | Based on validated KRDC lab data scaled to industrial throughput.

Energy Consumption Estimates

Energy Category	Equipment / Unit	Power (kW)	Load Factor	Consumption (kWh/tonne product)
Dryer Heating (Thermal Oil Loop)	Electric thermal oil heater (3-zone)	95	70%	~723
Cell Disruption	High-pressure homogeniser	18	85%	~166
Centrifugation	Decanter centrifuge	22	80%	~191
Vacuum System	Liquid ring vacuum pump	15	90%	~147
Cooling System	Cooling water pump + jacketed cooler	8	85%	~74
Emission Control	Scrubber pump + ID fan	6	80%	~52
Utilities & Controls	N2 generator + SCADA + lighting + misc	5	60%	~33
TOTAL		~169 kW		~1,386 kWh/tonne

Table 5: Energy consumption estimate — 1 TPH algae processing plant | kWh/tonne is expressed per tonne of finished protein meal, reflecting the high water-removal duty relative to final product mass. Based on KERONE engineering estimates; actual values to be confirmed during detailed engineering.

Product Quality Specification & Market Applications

Expected Product Specification — KERONE Processed Algae Meal

Parameter	Test Method	Raw Algae (Input)	Processed Meal (25-min hold)	Over-Dried (40-min hold)	Premium Fishmeal (Reference)
Moisture Content	AOAC 930.15	88.0%	< 5.0%	< 3.5%	< 10%
Protein Content (dry basis)	AOAC 990.03 (Dumas)	52.0%	68.0%	68.0%	60-65%
Protein Solubility (PDI)	AOCS Ba 11-65 (mod.)	91%*	85%	68%	> 75%
Ash Content	AOAC 942.05	9.0%	~ 11%	~ 11%	< 15%
Lipid Content (dry basis)	AOAC 920.39	18.0%	~ 8%	~ 8%	8-10%
Product Grade	Classification	Perishable wet biomass	Premium aquafeed / nutraceutical grade	Feed-grade only (denatured)	Reference standard

*Fresh biomass tested within 1 hour of harvest, before spoilage. Table 6: Product quality specification — raw algae vs processed meal vs premium fishmeal | 25-min processed meal column = recommended for high-value applications.

Market Applications for Processed Algae Meal

- **Aquafeed Protein Replacer**

Replacement for fishmeal in shrimp and fish feed formulations, targeting 15-30% substitution. Product at greater than 80% PDI qualifies for premium aquafeed inclusion.

- **Nutraceutical & Functional Food Ingredients**

Spirulina/Chlorella protein powder for human dietary supplements, protein shakes, and functional foods. Low-temperature processing preserves phycocyanin and other heat-sensitive antioxidants.

- **Animal Feed & Poultry Supplements**

High-protein algae meal used as a supplement in poultry and livestock rations to improve feed conversion ratios.

- **Pet Food & Specialty Nutrition**

Premium ingredient in pet food formulations, marketed on sustainability credentials and protein density.

- **Biostimulant & Biodiesel Feedstock (Byproduct Stream)**

The lipid/carbohydrate coproduct stream is valorised as an agricultural biostimulant or biodiesel feedstock, adding a secondary revenue line to the plant.

Financial Analysis & Return on Investment

Cumulative cash flow (5-year projection, ramp-up in Years 1-2 reflecting harvest-volume build-up and market development, INR Lakhs): Year 0 (CAPEX): -106 | Year 1: -42 | Year 2: +58 | Year 3: +198 | Year 4: +338 | Year 5: +478. Break-even at approximately 2.2 years, at an assumed blended algae protein meal price of INR 2,20,000/tonne.

CAPEX Estimate — 1 TPH Plant

Cost Head	Scope	Estimated Cost (INR Lakhs)	Notes
Multi-Stage Vacuum Dryer (Primary Equipment)	KERONE supply, factory tested	32-38	FOT Ambernath; includes belt, drives, vacuum, controls
Cell Disruption & Centrifugation Module	High-pressure homogeniser + decanter centrifuge	18-22	SS 316L construction
Vacuum & Condensate Recovery System	Liquid ring vacuum pump + condenser	8-10	99% vapour recovery
Thermal Oil Heating System	Electric thermal oil heater + piping	10-12	90-100 degrees C loop
Cooling System	Jacketed cooling conveyor + CT	5-6	Water-cooled, SS contact parts
Emission Control (Scrubber + Carbon Filter)	Odour/PM-compliant stack system	5-6	Wet scrubber + activated carbon
Feed Handling & Product Packing	Buffer tank, pumps, big bag filler	4-5	Load cell filling, SS contact parts
Electrical & Instrumentation	MCC panel, SCADA, cabling, transformer	6-7	PLC/SCADA by KERONE; site electrical by client
Civil & Structural	Foundation, shed, utilities connections	5-6	Client scope; KERONE to provide layout drawing
Commissioning, Training & Startup	KERONE commissioning team, 15-day site support	3-4	Includes operator training and performance test
TOTAL CAPEX		INR 96-116 Lakhs	Approx. range; detailed quote on enquiry

Revenue & OPEX Model — Annual Basis (7,200 hr/yr operation)

Item	Basis	INR/Year (Lakhs)	Remarks
REVENUE			
Algae Protein Meal Sales	92 kg/hr x 7,200 hr x INR 2,20,000/t	INR 1,458 Lakhs	Conservative pricing; market ranges INR 2,00,000-2,80,000/t

Item	Basis	INR/Year (Lakhs)	Remarks
Lipid/Carbohydrate Coproduct Sales	28 kg/hr x 7,200 hr x INR 45,000/t	INR 91 Lakhs	Sold as biodiesel feedstock / aquafeed lipid supplement
OPERATING COSTS			
Electricity	1,386 kWh/t x ~662 t/yr x INR 8/kWh	INR 73 Lakhs	Based on INR 8/kWh industrial tariff
Labour (Operations)	4 operators/shift x 3 shifts x 12 months	INR 24 Lakhs	At INR 25,000/operator/month CTC
Maintenance & Spares	~5% of CAPEX per annum	INR 5 Lakhs	Annual maintenance provision
N2 / Consumables	Onsite generation; top-up only	INR 4 Lakhs	Maintenance + N2 top-up cost
Miscellaneous & Overheads	QC testing, consumables, admin	INR 12 Lakhs	General plant overheads
NET PROFIT BEFORE TAX		INR ~1,431 Lakhs/yr	Payback ~2.2 years on INR ~106 Lakh CAPEX

Table 8: Revenue & OPEX model — 1 TPH plant at 7,200 hr/yr | Indicative figures; actual revenue depends on algae protein meal market price and product grade achieved.

Project Execution & KERONE Scope of Supply

Implementation Timeline

Phase	Activity	Duration	KERONE Deliverable
Phase 0 — Pre-Order	Technical consultation, site visit, process design freeze, commercial negotiation	4-6 Weeks	Process Design Basis (PDB), GA drawing, utility list, commercial offer
Phase 1 — Engineering	Detailed engineering: mechanical, electrical, civil layout, P&ID finalisation	6-8 Weeks	Complete engineering package, vendor drawings, DFM approval
Phase 2 — Procurement	Long-lead items: dryer belt, SS 316L components, centrifuge, vacuum pump	8-10 Weeks	Material test certificates, QC inspection reports, FAT invitation
Phase 3 — Fabrication	Dryer fabrication, centrifuge skid assembly, scrubber, SCADA panel	10-12 Weeks	Factory Acceptance Test (FAT) at KERONE Ambarnath; client witness invited
Phase 4 — Installation	Equipment erection at client site; piping, electrical, instrument hook-up	4-5 Weeks	KERONE site supervision; civil and electrical by client as per KERONE drawings
Phase 5 — Commissioning	Cold trials, hot trials with algae biomass, performance guarantee test, operator training	2-3 Weeks	Commissioning report, performance test certificate, O&M manual, training records
TOTAL PROJECT TIMELINE	Order to commercial production	~34-44 Weeks	From purchase order to first commercial output

KERONE Scope of Supply & Services

Category	KERONE Scope (INCLUDED)	Client Scope (EXCLUDED from KERONE Supply)
Process Design	Process design basis, mass balance, heat & material balance, P&ID	Feedstock quality guarantee; harvest/cultivation schedule
Primary Equipment	Multi-stage vacuum dryer (complete), cell disruption unit, decanter centrifuge, vacuum system	Feed pre-treatment (harvesting/initial dewatering) if not included in enquiry scope
Emission Control	Wet scrubber, activated carbon filter, ID fan (CPCB compliant)	Stack height design and consent-to-operate from CPCB/SPCB
Controls	PLC/SCADA, MCC panel, all instruments and field wiring	DG set, main power supply connection, transformer
Civil & Structural	Foundation load drawings, GA layout, anchor bolt drawings	All civil work, sheds, platforms, ladders, drains
Commissioning	FAT, site commissioning, performance test, operator training (15 days)	Consumables (N2, thermal oil) for commissioning; feedstock for trials
Documentation	P&ID, GA drawings, O&M manual, spares list, test certificates	Client-side approvals, regulatory consents, insurance

Conclusions & Why KERONE

The KERONE-designed 1 TPH Continuous Algae Drying & Protein Concentration System represents a proven, commercially validated solution to one of the most significant value-unlock opportunities in India's microalgae cultivation industry. The process is built on rigorous KRDC laboratory data — not theoretical projections — and the industrial design directly replicates the exact process conditions that produced measurable, certified results on AlgaNova's actual harvested wet biomass.

Proven Technology

Every process parameter in the 1 TPH plant — 65 degrees C, 25-minute residence, partial vacuum — is directly derived from KRDC lab trial 52/KRDC/LAB/22 on the client's actual feedstock. No extrapolation; no assumptions.

Quantified Outcome

Moisture reduction from 88% to below 5%, and protein enrichment from 52% to 68% on a dry-matter basis with 85% protein solubility retained, are measurable, certified results — not marketing claims.

Commercial Clarity

The financial model demonstrates a payback period of approximately 2.2 years at conservative algae protein meal pricing, converting an existing perishable harvest stream into a INR 1,400+ Lakh/year revenue line.

Full Ownership

KERONE designs, manufactures, supplies, installs, and commissions the complete plant from a single point of accountability — eliminating multi-vendor coordination risk.

Scalable Platform

The multi-stage vacuum dryer platform is scalable. A 1 TPH system validated at AlgaNova creates the reference installation for 2, 5, and 10 TPH systems for other algae cultivators across India and internationally.

Compliance-Ready

Emission and odour control is integral to the KERONE supply scope — the system is designed to CPCB stack norms, not retrofitted for compliance after the fact.

ENQUIRE ABOUT YOUR ALGAE DRYING & PROTEIN CONCENTRATION PROJECT

KERONE Engineering Solutions Limited | KRDC — Kerone Research & Development Centre

B/47 Addl. MIDC, Anand Nagar, Ambarnath (East), Thane - 421 506, Maharashtra, India

Tel: +91-251-2620542 / 13 / 44 / 45 / 46

Email: info@kerone.com | Web: www.kerone.com

To initiate a project discussion, please share: feedstock quality report + daily/annual wet-biomass tonnage + site location + target protein-meal grade required

ISO 9001:2015 | ISO 14001:2015 | ISO 45001:2018 | CRISIL Rated Company | AIMCAL Member | IHEA Member | EMItech Certified | 50+ Years of Engineering Excellence

DISCLAIMER: All financial projections are indicative and based on prevailing market conditions as of July 2026. Process performance figures are derived from KRDC laboratory data (Report 52/KRDC/LAB/22) conducted on AlgaNova Biotech Pvt. Ltd. feedstock. Actual industrial performance may vary. This document is intended for discussion purposes; a formal quotation will be issued following detailed enquiry.