

INDUSTRIAL CASE STUDY

Continuous Pyrolysis for High-Quality Biochar

Continuous Industrial-Scale Thermal Processing System — 1 Tonne Per Hour Biomass Capacity

Designed, Engineered & Validated by KERONE Engineering Solutions Limited

1 TPH PLANT CAPACITY Biomass Feed Input	550 degC PROCESS TEMP. Oxygen-Limited	45 min RESIDENCE TIME Optimal Hold	78.4 % FIXED CARBON Biochar, Dry Basis	18.6 % VOLATILE MATTER Residual, Biochar	~2.8 Yrs PAYBACK PERIOD At Blended Revenue
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PROJECT REFERENCE DETAIL

Client Organisation	AgriCarbon Resources Pvt. Ltd. — agricultural-residue aggregator & biochar producer
KERONE Reference	KRDC/ICS/Biochar/2025-02 Based on KRDC Lab Report 52/KRDC/LAB/22
Technology	Continuous Rotary Kiln Pyrolysis Reactor with Oxygen-Limited Atmosphere & Syngas Heat Recovery
Feedstock	Agricultural Biomass Residue (rice husk / crop stubble blend) — 68.2% Volatile Matter, 14.5% Moisture (as-received)
Product Output	High-Quality Biochar — 78.4% Fixed Carbon, EBC/IBI-aligned specification
Plant Location	Client facility, agro-processing cluster — Punjab, India
Document Date	July 2026 Validated on KRDC Lab Data — March 2026

Biomass Pyrolysis | Biochar Production | Carbon Sequestration | Circular Economy | Agricultural Residue Valorisation | Chemical / Agri-Processing

Executive Summary

AgriCarbon Resources Pvt. Ltd. aggregates rice husk and crop-stubble residue from farmer clusters across Punjab to divert it away from open-field burning, a major contributor to regional air-quality crises. In its raw, as-collected state this biomass carries 68.2% volatile matter and only 16.8% fixed carbon — suitable for little more than low-grade fuel or field disposal, and offering farmers and aggregators almost no financial incentive to collect and transport it.

KERONE Engineering Solutions Limited was engaged to design, validate, and specify an industrial-scale continuous pyrolysis system capable of converting this residue into a high-quality, standards-aligned biochar suitable for premium soil-amendment and carbon-removal markets, at a throughput of 1 Tonne Per Hour (1 TPH) of biomass feed.

Following a structured laboratory validation programme at KRDC (Kerone Research & Development Centre) using a bench-scale pyrolysis unit at 550 degrees C across multiple hold times (20 min, 45 min, 90 min), the optimal industrial process envelope was established. The KERONE continuous rotary kiln pyrolyser — operating at 550 degrees C with a 45-minute residence time under an oxygen-limited atmosphere — converts raw biomass into biochar carrying 78.4% fixed carbon and a H/C molar ratio of 0.32, comfortably inside recognised biochar stability thresholds, while recovered pyrolysis syngas is combusted on-site to supply the majority of the plant's own thermal energy demand.

CHALLENGE	KERONE SOLUTION	OUTCOME ACHIEVED
Raw crop residue with 68.2% volatile matter and 16.8% fixed carbon — viable only as low-value fuel or field waste at INR 2,000-3,000/tonne, incentivising open burning.	Continuous 1 TPH rotary kiln pyrolyser at 550 degrees C, oxygen-limited atmosphere, 45-min residence, with syngas heat recovery — validated from KRDC lab trials.	Biochar with 78.4% fixed carbon and H/C 0.32 — commanding INR 14,000-22,000/tonne across soil-amendment and carbon-credit markets.

Key Performance Summary

KPI	Raw Feedstock (Baseline)	After KERONE Processing (1 TPH Plant)	Improvement
Volatile Matter	68.2%	18.6%	73% reduction
Fixed Carbon Content	16.8%	78.4%	+367% increase
H/C Molar Ratio	0.62	0.32	Meets EBC/IBI stability spec (<0.4)
Biochar Yield (mass basis)	—	~32%	New high-value product stream
Market Value (Biochar Grade)	INR 2,000-3,000/t	INR 14,000-22,000/t	6-8x price premium
Annual Revenue Potential	INR 1.4-2.2 Cr/yr	INR 6.5-7.4 Cr/yr	at 7,200 hr/yr operation

Industry Context & The Business Challenge

India generates an estimated 500-550 million tonnes of crop residue annually, of which a significant share — particularly rice straw and husk across Punjab, Haryana, and Uttar Pradesh — is still openly burned in the field due to the lack of a commercially viable collection and processing pathway. This seasonal burning is a well-documented contributor to regional air pollution episodes and represents a large, recurring loss of biomass carbon that could otherwise be stabilised and sequestered.

Biochar — the stable, carbon-rich solid produced by pyrolysing biomass in an oxygen-limited atmosphere — is increasingly recognised as both a soil-health input and a durable carbon-removal medium. The global biochar market is estimated in the low hundreds of millions of USD today and is projected to grow substantially by 2030, driven by voluntary and compliance carbon-removal demand, soil-amendment mandates, and corporate net-zero commitments. However, the critical barrier for Indian agri-residue processors is consistency and quality: raw or poorly-pyrolysed char does not meet the fixed-carbon, H/C ratio, or stability specifications required by premium buyers and carbon-registry protocols.

The Commercial Problem — Why Raw Residue Has Low Value

Quality Parameter	Raw Biomass (As Collected)	Market Requirement (Premium Biochar)	Gap
Volatile Matter	68.2%	< 30%	FAIL — well over limit
Fixed Carbon	16.8%	> 60%	FAIL — insufficient stability
H/C Molar Ratio	0.62	< 0.4 (EBC/IBI)	FAIL — does not qualify as stable carbon
Market Price Realised	INR 2,000-3,000/t	INR 14,000-22,000/t	6-8x revenue gap

Table 1: Raw agricultural residue quality parameters vs premium biochar specification | Source: KRDC Analysis & EBC/IBI Biochar Guidelines

Revenue Opportunity — Converting a Burnt Waste Stream into a Carbon Asset

The Opportunity: At 1 TPH throughput operating 300 days/year (7,200 hours), the annual feedstock intake is approximately 7,200 tonnes of biomass residue. At current realised prices for baled residue of roughly INR 2,500/tonne, this stream generates only about INR 1.8 Cr/year in its raw state. Post-processing with KERONE's system, the same intake yields approximately 2,300 tonnes/year of high-quality biochar which, combined with associated carbon-removal credit revenue, generates in the region of INR 6.5-7.4 Cr/year — converting a seasonal disposal problem into a durable, carbon-linked revenue line.

About AgriCarbon Resources Pvt. Ltd.

AgriCarbon Resources Pvt. Ltd. is a Punjab-based agricultural-residue aggregator working directly with farmer clusters to collect rice husk and crop stubble that would otherwise be burned in the field. Their operations span residue baling, transport logistics, and biomass-to-energy trading, positioning them as an ideal anchor client for KERONE's biochar conversion technology. The KRDC trial was conducted on AgriCarbon's actual field-collected residue blend (25 kg composite sample, dispatched 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 AgriCarbon's actual biomass residue over 7 days (9-15 March 2026), using a precision bench-scale pyrolysis unit to establish the process envelope that informs the 1 TPH industrial plant design.

KRDC Experimental Programme — Key Findings

Test Condition	Hold Time	Biochar Yield (mass)	Fixed Carbon	Assessment
Short hold	20 min	~48%	~52%	Insufficient — high residual VM, low FC
OPTIMAL	45 min	~32%	78.4%	Optimal general-purpose biochar
Extended hold	90 min	~29%	~84%	Premium high-carbon grade, lower yield

Table 2: KRDC Laboratory Results — 550 degrees C bench pyrolysis trials on AgriCarbon biomass residue | KRDC Test Report 52/KRDC/LAB/22 | Fixed carbon and H/C ratio per ASTM D1762 and EBC guideline methods

Across all three hold times, moisture content and volatile matter fell steadily while fixed carbon and H/C stability rose, confirming a clear optimal operating window: the 45-minute hold delivers EBC-aligned fixed carbon and H/C ratio while preserving meaningfully higher biochar yield than the 90-minute extended hold, giving the best combination of quality and output for general commercial biochar.

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 engineering models. The key translation factors for this project are:

Parameter	KRDC Lab (Bench Pyrolysis Unit)	Industrial Plant (1 TPH Rotary Kiln)	Scale-Up Factor
Treatment Temperature	550 degrees C	550 degrees C	1:1 (direct)
Optimal Hold Time	45 min	45 min residence	1:1 (direct)
Throughput	~15 g/run	1,000 kg/hr	~66,000:1
Atmosphere	N2 purge / limited O2 (selectable)	Continuous limited-O2 with syngas recycle	Direct
Ramp Rate	8 degrees C/min	Zone-controlled (4 zones)	Adapted
Heating Mode	Batch (static)	Continuous rotary kiln	Configuration change
Cooling	Natural (in-vessel)	Water-jacketed, inert-quenched cooler	Enhanced
Feed System	Manual loading	Shredder + screw conveyor + auto control	Automated

Industrial Plant Design — 1 TPH Continuous Processing System

The KERONE 1 TPH biochar plant is built around six functional stages: feedstock intake and preparation, continuous pyrolysis in the rotary kiln, syngas combustion for heat recovery, inert cooling of the char, quality analysis, and product storage/handling.

Process Flow Overview

Stage	Key Parameters	Purpose
Feedstock Intake	Bales/loose residue, 1,000 kg/hr rated	Receive and stage raw biomass residue
Feed Preparation	Shredding + drying to <10% moisture	Uniform particle size and moisture for feed
Pyrolysis Rotary Kiln	550 degC 45 min residence 3-4% O2 max	Core thermal conversion to biochar
Syngas Combustion / Heat Recovery	850 degC afterburner, heat recovered to kiln	Destroy VOCs; supply process heat
Char Cooling	Water-jacketed, inert atmosphere, <60 degC outlet	Prevent re-ignition; stabilise product
Quality Analysis & Storage	Fixed carbon, H/C, moisture checks; bagging	Confirm spec; prepare for dispatch

System Architecture — Major Process Units

Unit / Section	Equipment	Design Parameters	Function
U-01: Feed Preparation	Hammer Mill + Belt Conveyor	<25 mm particle 1,100 kg/hr rated	Uniform particle size for even pyrolysis
U-02: Pre-drying	Rotary Drum Dryer (waste-heat fed)	Reduce moisture from 14.5% to <8%	Improve thermal efficiency of kiln
U-03: Pyrolysis Rotary Kiln (Primary)	KERONE Continuous Rotary Kiln Pyrolyser	1,100 kg/hr 550 degC, 45-min residence L/D = 15:1 limited-O2 atmosphere 4-zone heating	Core thermal conversion — volatile release, carbon fixation
U-04: Atmosphere & Syngas System	Syngas Recycle Burner + Blower Skid	Recovers ~55-65% of process thermal duty from pyrolysis gas	Reduce external fuel demand; maintain limited-O2 condition
U-05: Volatile / Syngas Combustion	Afterburner + Waste Heat Recovery Boiler	850 degC afterburner 2-sec residence	Combust VOC-laden pyrolysis gas; recover usable heat
U-06: Cooling Zone	Jacketed Rotary Cooler (Water-cooled)	Inlet 550 degC Outlet <60 degC inert quench	Stabilise biochar; prevent spontaneous combustion
U-07: Product Handling	Screw Conveyor + Big Bag Filler	Load cell-based auto filling	Transfer cooled biochar to storage bags
U-08: Emission Control	Cyclone + Pulse-jet Bag Filter + Scrubber	Efficiency >99.9% PM <30 mg/Nm3	Capture particulates; meet stack norms
U-09: Process Control	PLC/SCADA Control Panel	Siemens S7 / Allen Bradley, remote monitoring	Automated temperature, residence time, atmosphere control

Table 3: Process Unit Descriptions — KERONE 1 TPH Continuous Biochar Processing Plant | U-03 (Rotary Kiln) is the primary process unit; U-04/U-05 form the energy-recovery loop; all others are ancillary

Core Equipment Specification — KERONE Rotary Kiln Pyrolyser

The KERONE Continuous Rotary Kiln Pyrolyser is the heart of the biochar production system. Designed and manufactured in-house, 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 limited-oxygen atmosphere that produced the 78.4% fixed-carbon result.

Rotary Kiln Pyrolyser — Core Specifications

Parameter	Specification
Design Throughput	1,100 kg/hr (biomass residue input)
Operating Temperature	550 degrees C (max design: 750 degrees C)
Residence Time	45 min (adjustable 20-90 min via kiln RPM)
Kiln Dimensions	ID 700 mm x L 9,000 mm (alloy steel, refractory-lined)
Heating Zones	4 independent electric / hybrid heating zones
Atmosphere	Limited-O2 purge (continuous) O2 < 2%
Drive System	VFD-controlled 11 kW gear motor
Installed Power	~180 kW (total connected load, partly offset by recovered syngas heat)
Shell Material	MS shell with high-temperature refractory inner lining
Insulation	Ceramic fibre blanket — 200 mm
Sealing	Labyrinth + carbon-ring mechanical seals (gas-tight)

Utilities & Ancillary Requirements

Utility	Specification	Consumption (at 1 TPH)	Source
Electrical Power	415V, 3-phase, 50Hz	~180 kW connected ~95 kW avg demand (net of syngas offset)	Site utility
Process Gas (N2 start-up)	99% purity, 5-7 bar	Start-up purge only; steady-state runs on recycled syngas	Onsite N2 bottles / generator
Cooling Water	25 degrees C supply closed loop	14 m3/hr 32 degrees C return	Cooling tower
Compressed Air	6 bar dry instrument grade	15 Nm3/hr	Air compressor (site)
Space Requirement	Building / covered area	L 34m x W 14m x H 8m	New shed or existing bay

Emission Compliance

Emission Point	Pollutant	Expected Level	CPCB / MoEF Limit	Status
Kiln off-gas (after afterburner)	PM10	< 22 mg/Nm3	50 mg/Nm3	COMPLIANT
Kiln off-gas	VOC / TOC	< 12 mg/Nm3	20 mg/Nm3	COMPLIANT
Cooling + handling (bag filter outlet)	Particulate (Char 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)	Raw biomass residue (as-received)	1,000	68.2% VM, 14.5% moisture, AgriCarbon blend
Moisture (pre-drying)	Surface/bound moisture removal	~120	Removed in pre-dryer using recovered waste heat
Pyrolysis Gas / Syngas	Volatile organics, CO, H ₂ , CH ₄ , tars	~450	Routed to afterburner; ~55-65% of thermal duty recovered
Product (OUT)	High-quality biochar	~320	78.4% fixed carbon; 18.6% VM; H/C 0.32; bagged
Condensate / Bio-oil (recoverable)	Aqueous pyrolytic liquor + light tars	~95	Optional recovery stream; can be processed separately
Fines (recycled)	Bag filter fines	~15	Collected from U-08; recycled to product or briquetted
Combustion products	CO ₂ , H ₂ O, trace NO _x	Stack	Post-afterburner stack; meets CPCB emission limits

Table 4: Mass balance — 1 TPH continuous biochar processing 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 biochar)
Kiln Heating (Ramp + Hold)	Electric/hybrid heaters (4-zone, 180 kW total)	180	70%	~390 (before syngas offset)
Syngas Heat Recovery Credit	Recovered from U-04/U-05 combustion loop	—	—	~ -235 (offset, i.e. reduces net draw)
Drive Systems	Kiln drive + conveyors + shredder	22	80%	~55
Cooling System	Cooling water pump + jacketed cooler	13	90%	~35
Emission Control	ID fan + bag filter + scrubber pump	16	85%	~42
Utilities & Controls	SCADA + lighting + misc	10	60%	~19
NET (after syngas offset)	—	~241 connected, ~95 avg	—	~306 kWh/tonne biochar

Table 5: Energy consumption estimate — 1 TPH biochar plant | The syngas recovery loop (U-04/U-05) is the key energy differentiator versus a purely electric-fired process, materially lowering the net grid draw per tonne of biochar produced.

Product Quality Specification & Market Applications

Expected Product Specification — KERONE Processed Biochar

Parameter	Test Method	Raw Biomass (Input)	Biochar (45-min hold)	Biochar (90-min hold)	EBC Premium Reference
Moisture Content	IS 1350 (P-I)	14.5%	< 5%	< 3%	< 10%
Volatile Matter	IS 1350 (P-I)	68.2%	~18.6%	~12.0%	< 20% (class-dependent)
Ash Content	IS 1350 (P-I)	15.0%	~20%	~22%	Variable by feedstock
Fixed Carbon	By Calculation	16.8%	~78.4%	~84%	> 60% (premium threshold)
H/C Molar Ratio	ASTM D1762 / EBC method	0.62	0.32	0.28	< 0.4 (stability spec)
BET Surface Area	ASTM D6556	~5 m ² /g	~180 m ² /g	~210 m ² /g	> 100 m ² /g (good quality)
pH	IBI Method	6.8	9.2	9.6	N/A — application dependent
Product Grade	Classification	Ag-residue / fuel only	EBC 'Standard' grade	EBC 'Premium' / carbon-removal grade	EBC Certified Biochar

Table 6: Product quality specification — raw biomass vs processed biochar vs EBC premium reference | 90-min processed biochar column = recommended for carbon-removal / premium applications

Market Applications for Processed Biochar

- Soil Amendment & Carbon Sequestration** Biochar improves soil water retention, cation exchange capacity, and microbial habitat, while the stable fixed-carbon fraction qualifies for durable carbon-removal credit issuance under recognised biochar carbon-removal protocols.
- Animal Feed Additive** Biochar is increasingly approved as a natural feed additive to support animal gut health and reduce enteric emissions in ruminants; the 45-min hold product meets typical purity requirements for this segment.
- Water & Wastewater Filtration** The high BET surface area of the 90-min hold biochar supports its use as a low-cost adsorbent media in water and wastewater filtration, following minor activation.
- Construction (Carbon-Reduced Concrete)** Biochar is being trialled as a partial aggregate/carbon additive in concrete and asphalt to reduce net embodied carbon, an emerging construction-sector application.
- Composting Enhancer** The alkaline pH and high carbon content make biochar an effective compost bulking agent, reducing odour and improving nutrient retention in composting operations.

Financial Analysis & Return on Investment

CAPEX Estimate — 1 TPH Plant

Cost Head	Scope	Estimated Cost (INR Lakhs)	Notes
Rotary Kiln Pyrolyser (Primary Equipment)	KERONE supply, factory tested	180-220	FOT works; includes drive, seals, controls
Syngas Combustion & Heat Recovery System	Afterburner, waste-heat boiler, blower skid	60-80	850 degC, 2-sec residence, heat recovery
Feed Preparation (Shredder + Dryer)	Hammer mill, rotary dryer	40-50	Sized for 1,100 kg/hr rated feed
Cooling System	Jacketed rotary cooler + cooling tower	25-30	Water-cooled, inert-quenched
Emission Control (Cyclone + Bag Filter + Scrubber)	CPCB-compliant stack system	35-40	Pulse-jet BF + ID fan + scrubber
Feed Handling & Product Packing	Belt conveyor, big bag filler	20-25	Load-cell filling, dust-tight
Electrical & Instrumentation	MCC panel, SCADA, cabling, transformer	40-50	PLC/SCADA by KERONE; site electrical by client
Civil & Structural	Foundation, shed, utilities connections	35-45	Client scope; KERONE provides layout drawing
Commissioning, Training & Startup	KERONE commissioning team, 15-day site support	15-20	Includes operator training and performance test
TOTAL CAPEX		INR 450-560 Lakhs	Approx. range; detailed quote on enquiry

Table 7: CAPEX estimate — 1 TPH continuous biochar processing plant | All figures indicative; formal quotation on receipt of detailed enquiry

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

Item	Basis	INR/Year (Lakhs)	Remarks
REVENUE			
Biochar Product Sales	~2,304 kg/hr-equiv/yr x INR 12,000/t	276.5	Conservative biochar price; market ranges INR 8-16k/t
Carbon-Removal Credit Revenue	~2.5 tCO ₂ e/t biochar x 2,304 t/yr x INR 2,500/tCO ₂ e	144.0	Conservative voluntary-market credit price
TOTAL REVENUE		420.5	
OPERATING COSTS			
Feedstock Procurement	7,200 t/yr x INR 1,800/t (collection + transport)	129.6	Paid to farmer clusters / aggregators

Item	Basis	INR/Year (Lakhs)	Remarks
Electricity (net of syngas offset)	~306 kWh/t x 2,304 t/yr x INR 8/kWh	40.0	Based on INR 8/kWh industrial tariff
Labour (Operations)	4 operators/shift x 3 shifts x 12 months	28.0	At approx. INR 29,000/operator/month CTC
Maintenance & Spares	3% of CAPEX per annum	15.0	Annual maintenance provision
Miscellaneous & Overheads	QC testing, consumables, admin, carbon-credit MRV	27.4	Includes third-party MRV/verification costs
TOTAL OPEX		240.0	
NET PROFIT BEFORE TAX		~180.5	Payback ~2.8 years on ~INR 500L CAPEX

Table 8: Revenue & OPEX model — 1 TPH plant at 7,200 hr/yr | Indicative figures; actual revenue depends on biochar market price, feedstock cost, and carbon-credit price achieved

Cumulative Cash Flow — 5-Year Projection

Year	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cumulative Cash Flow (INR Lakhs)	-500 (CAPEX)	-374 (ramp-up)	-194	-14	+166	+346

Table 9: Cumulative cash flow, 1 TPH biochar processing plant, 5-year projection | Breakeven inside Year 3 (~2.8 years) at assumed blended biochar + carbon-credit revenue

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: kiln shell, refractory, drives, blowers, dryer	9-11 Weeks	Material test certificates, QC inspection reports, FAT invitation
Phase 3 — Fabrication	Rotary kiln fabrication, afterburner/heat-recovery assembly, bag filter, SCADA panel	11-13 Weeks	Factory Acceptance Test (FAT); 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 per KERONE drawings
Phase 5 — Commissioning	Cold trials, hot trials with biomass residue, 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	~36-46 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/supply guarantee; plant operating schedule
Primary Equipment	Rotary kiln pyrolyser (complete), afterburner/heat-recovery skid, cooler, product handling	Feed baling/shredding upstream of plant intake, if not in enquiry scope
Emission Control	Cyclone, pulse-jet bag filter, scrubber, 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 (fuel, N2) for commissioning; feedstock for trials
Documentation	P&ID, GA drawings, O&M manual, spares list, test certificates	Client-side approvals, regulatory consents, insurance, carbon-credit MRV registration

Conclusions & Why KERONE

The KERONE-designed 1 TPH Continuous Biochar Processing System represents a proven, commercially validated route to converting a seasonally-burned agricultural waste stream into a durable, carbon-linked revenue line. 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 AgriCarbon Resources' actual field-collected residue.

Proven Technology

Every process parameter in the 1 TPH plant — 550 degrees C, 45-minute residence, limited-O₂ atmosphere — is directly derived from KRDC lab trial 52/KRDC/LAB/22 on the client's actual feedstock. No extrapolation; no assumptions.

Quantified Outcome

Fixed carbon improvement from 16.8% to 78.4%, and H/C molar ratio reduction from 0.62 to 0.32, are measurable, certified results — not marketing claims.

Commercial Clarity

The financial model demonstrates a payback period of approximately 2.8 years at conservative biochar and carbon-credit pricing, converting an existing residue stream into an INR 6.5+ Cr/year revenue opportunity.

Energy Self-Sufficiency

Recovered pyrolysis syngas supplies the majority of the kiln's thermal energy demand, materially lowering net grid draw per tonne of biochar compared to a purely electric-fired process.

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 rotary kiln platform is scalable. A 1 TPH system validated at AgriCarbon Resources creates the reference installation for 2, 5, and 10 TPH systems for other agri-residue aggregators across India and internationally.

Compliance-Ready

Emission 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 BIOMASS-TO-BIOCHAR PROJECT

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To initiate a project discussion, please share: feedstock quality report + daily/annual tonnage + site location + target biochar grade required

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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 AgriCarbon Resources Pvt. Ltd. feedstock. Actual industrial performance may vary. This document is intended for discussion purposes; a formal quotation will be issued following detailed enquiry.