

INDUSTRIAL CASE STUDY

Spent Activated Carbon Reactivation
for the Chemical & Petrochemical Industry

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

Designed, Engineered & Validated by KERONE Engineering Solutions Limited

1 TPH PLANT CAPACITY Spent Carbon Input	800°C PROCESS TEMP. Steam-Controlled Atmosphere	45 min RESIDENCE TIME Optimal Reactivation Hold
93.6% IODINE NO. RECOVERY vs Virgin Carbon Basis	8.10% ASH REDUCTION Mass Basis	~2.1 Yrs PAYBACK PERIOD At Market Reactivation Premium

PROJECT REFERENCE DETAIL

Field	Detail
Client Organisation	Varuna Petrochemicals Ltd. — Integrated petrochemical & specialty solvents manufacturer
KERONE Reference	KRDC/ICS/CarbonReact/2026-03 Based on KRDC Lab Report 62/KRDC/LAB/24
Technology	Continuous Rotary Kiln Thermal Reactivation Furnace with Steam Atmosphere & Quench Cooling
Feedstock	Spent Granular Activated Carbon (GAC) from effluent & solvent-recovery units — Iodine Number degraded to 412 mg/g (as-received)
Product Output	Reactivated Activated Carbon (rAC) — Iodine Number 890 mg/g, 93.6% of virgin performance
Plant Location	Client facility (petrochemical complex) — Inline with existing effluent treatment plant
Document Date	July 2026 Validated on KRDC Lab Data — April 2026

Petrochemical Effluent Treatment | Activated Carbon Reactivation | Circular Economy | Thermal Processing | Industrial Sustainability | Chemical / Petrochemical

Executive Summary

Varuna Petrochemicals Ltd., an integrated petrochemical and specialty solvents manufacturer, faced a recurring operating cost burden: its effluent treatment and solvent-purification units consume large volumes of granular activated carbon (GAC), which, once saturated with adsorbed organics, is typically disposed of as hazardous waste or sold at scrap value — despite retaining significant recoverable adsorption capacity.

KERONE Engineering Solutions Limited was engaged to design, validate, and specify an industrial-scale continuous thermal reactivation system capable of restoring spent carbon to near-virgin adsorption performance, at a throughput of 1 Tonne Per Hour (1 TPH), enabling the client to recycle its own carbon inventory rather than repeatedly purchasing virgin material.

Following rigorous laboratory validation at KRDC (Kerone Research & Development Centre) using a controlled rotary tube furnace at 800 degrees C across multiple hold times (20 min, 45 min, 90 min) under a steam-rich atmosphere, the optimal industrial process parameters were established. The KERONE continuous rotary kiln reactivation system — operating at 800 degrees C with a 45-minute material residence time under controlled steam/inert atmosphere — restores Iodine Number from 412 mg/g to 890 mg/g and reduces ash content from 22.4% to 14.3%.

CHALLENGE

Spent GAC with Iodine Number degraded to 412 mg/g (43% of virgin capacity) and 22.4% ash — viable only for hazardous landfill disposal or low-value scrap at INR 8,000-12,000/tonne.

KERONE SOLUTION

Continuous 1 TPH rotary kiln reactivation furnace at 800 degrees C, controlled steam/N2 atmosphere, 45-min residence — validated from KRDC lab trials on client's actual spent carbon.

OUTCOME ACHIEVED

Reactivated carbon (rAC) at 890 mg/g Iodine Number (93.6% of virgin), 14.3% ash — commanding INR 55,000-70,000/tonne in reactivation-service and resale markets, versus INR 90,000-110,000/tonne for virgin carbon.

Key Performance Summary

KPI	Spent Feedstock (Baseline)	After KERONE Processing (1 TPH Plant)	Improvement
Iodine Number	412 mg/g	890 mg/g	116% increase
Ash Content	22.4%	14.3%	36% reduction
Moisture Content	38-45% (as received, wet cake)	< 2%	Fully dried & reactivated
Apparent Density	0.62 g/cc	0.48 g/cc	Pore structure restored
Market Value	INR 8,000-12,000/t (scrap)	INR 55,000-70,000/t (rAC grade)	5-6x price premium
Product Classification	Hazardous waste / scrap carbon	AWWA B604 rAC substitute	Grade uplift

KPI	Spent Feedstock (Baseline)	After KERONE Processing (1 TPH Plant)	Improvement
Annual Value Potential	INR 0.7-1.0 Cr/yr (as scrap)	INR 4.0-5.0 Cr/yr at 7,200 hr/yr operation	Cost avoidance + revenue

Industry Context & The Business Challenge

India's chemical and petrochemical sector consumes an estimated 120,000-150,000 tonnes of activated carbon annually across effluent treatment, solvent recovery, gas purification, and product decolourisation duties. A large share of this carbon is used once and discarded, even though 70-90% of the original adsorption capacity typically remains recoverable through controlled thermal reactivation.

Virgin granular activated carbon is import-dependent for many Indian buyers and priced at a premium, with global feedstock (coal, coconut shell, lignite) subject to volatility. Reactivation of spent carbon in-house is an established practice internationally (municipal water utilities, refineries) but remains under-adopted in Indian petrochemical plants due to the absence of compact, validated, on-site reactivation systems — most Indian generators simply landfill or incinerate spent carbon as hazardous waste under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules.

The global activated carbon reactivation services market is valued at approximately USD 480 million and is projected to grow steadily through 2030, driven by rising virgin-carbon costs and tightening hazardous-waste disposal norms. For Indian petrochemical processors, the critical barrier has been technology access: reactivation requires precise control of temperature, atmosphere, and residence time to restore pore structure without excessive carbon burn-off or ash concentration.

The Commercial Problem — Why Spent Carbon Has Low Value

Quality Parameter	Spent Carbon (Varuna Petrochemicals)	Market Requirement (rAC Grade)	Gap
Iodine Number	412 mg/g	> 800 mg/g	FAIL — 48% below requirement
Ash Content	22.4%	< 16%	FAIL — exceeds limit
Moisture Content	38-45% (wet cake)	< 5% (dry, reactivated)	FAIL — requires drying & reactivation
Market Price Realised	INR 8,000-12,000/t	INR 55,000-70,000/t	5-6x revenue gap

Table 1: Spent carbon quality parameters vs market specification for reactivated carbon | Source: KRDC Analysis & AWWA B604 Reactivated Carbon Requirements

Revenue Opportunity — Upgrading Existing Waste Stream

The Opportunity: At 1 TPH throughput operating 300 days/year (7,200 hours), the annual feedstock volume is approximately 7,200 tonnes of spent carbon (wet basis). At current scrap-carbon disposal value of INR 10,000/tonne, this stream generates only INR 0.72 Cr/year, and often carries a net disposal cost once hazardous-waste handling fees are included. Post-processing with KERONE's system, the same volume as reactivated carbon at an average INR 62,000/tonne generates INR 4.46 Cr/year — a value swing of over INR 3.7 Cr annually, converting a waste-disposal liability into a recurring revenue and cost-avoidance stream.

About Varuna Petrochemicals Ltd.

Varuna Petrochemicals Ltd. is a mid-sized integrated petrochemical manufacturer with production spanning specialty solvents, intermediates, and effluent treatment operations, consuming activated carbon across multiple process units including tertiary effluent polishing and product decolourisation. Its scale and consistent carbon-waste generation made it an ideal anchor client for KERONE's reactivation technology. The KRDC trial was conducted on Varuna's actual spent carbon (25 kg sample, dispatched 2 April 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 Varuna Petrochemicals' actual spent carbon over 7 days (2-8 April 2026), using a precision tube furnace under controlled steam atmosphere to establish the process envelope that informs the 1 TPH industrial plant design.

KRDC Experimental Programme — Key Findings

Test Condition	Hold Time	Carbon Burn-off	Iodine Number	Assessment
Control (no hold)	0 min	< 1%	418 mg/g	Baseline — spent carbon, no reactivation
Short hold	20 min	~4.8%	610 mg/g	Insufficient — rejects grade spec
OPTIMAL	45 min	9.2%	890 mg/g	Optimal for general rAC
Extended hold	90 min	16.5%	905 mg/g	Marginal gain — excess burn-off penalty

Table 2: KRDC Laboratory Results — 800 degrees C tube furnace trials on Varuna Petrochemicals spent carbon | KRDC Test Report 62/KRDC/LAB/24 | Iodine Number per IS 877 / AWWA B604

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 (Tube Furnace)	Industrial Plant (1 TPH Rotary Kiln)	Scale-Up Factor
Treatment Temperature	800 degrees C	800 degrees C	1:1 (direct)
Optimal Hold Time	45 min	45 min residence	1:1 (direct)
Throughput	~15 g/run	1,000 kg/hr	~67,000:1
Atmosphere	Steam / N2 (selectable)	Continuous steam injection + N2 purge	Direct
Ramp Rate	5 degrees C/min	Zone-controlled (4 zones)	Adapted
Heating Mode	Batch (static)	Continuous rotary drum	Configuration change
Cooling	Natural (in-furnace)	Active water-quench cooler (N2-blanketed)	Enhanced
Feed System	Manual loading	Screw conveyor + auto dewatering feed	Automated

Industrial Plant Design — 1 TPH Continuous Processing System

Industrial Scale Process Flow — KERONE Continuous Thermal Reactivation System

Stage	Process Step	Key Condition
1	Feedstock Intake	Spent GAC / wet cake, 1,100 kg/hr rated
2	Dewatering & Feed Prep	Screw press + screening, <20% moisture
3	Rotary Kiln Reactivation Furnace	800°C 45 min residence Steam/N2 atmosphere
4	Quench Cooling	Water-quench under inert blanket, prevents re-oxidation
5	Quality Analysis	Iodine number, ash, moisture — process lab
6	Product Storage & Dispatch	High-purity rAC — bagged / bulk loaded

Fig. 1: KERONE 1 TPH Spent Carbon Reactivation — Continuous Industrial Process Flow

System Architecture — Major Process Units

Unit / Section	Equipment	Design Parameters	Function
U-01: Feed Preparation	Screw Press Dewaterer + Vibro Screen	1,100 kg/hr rated reduce moisture to <20%	Remove free water; ensure uniform particle feed to kiln
U-02: Pre-drying	Indirect Rotary Dryer	180 degrees C reduce moisture to <5%	Minimise steam load inside kiln; improve thermal efficiency
U-03: Rotary Kiln Furnace (Primary Process Unit)	KERONE Continuous Rotary Kiln Reactivation Furnace	1,050 kg/hr capacity 800°C, 45 min residence L/D = 14:1 steam/N2 atmosphere 4-zone heating	Core thermal processing — pore restoration, ash concentration control, contaminant burn-off
U-04: Atmosphere & Steam System	Steam Generator + N2 Purge Manifold	Steam: 0.3 kg per kg carbon N2 purity 99.5%, <0.5% O2	Provide reactivating steam atmosphere; prevent uncontrolled oxidation
U-05: Off-gas Treatment	After-burner / Thermal Oxidiser + Wet Scrubber	900 degrees C afterburner 2-sec residence caustic wet scrubber	Combust VOC-laden off-gas from kiln; neutralise acid gases; meet CPCB emission norms
U-06: Cooling Zone	Water-Quench Cooler (Inert-Blanketed)	Inlet: 800°C Outlet: <60°C 1,000 kg/hr N2 maintained	Rapidly cool rAC to arrest reaction and prevent re-oxidation
U-07: Product Handling	Screw Conveyor + Big Bag Filler	Stainless steel contact parts load-cell auto filling	Transfer cooled rAC to storage bags; prevent contamination and dust
U-08: Emission Control	Pulse-jet Bag Filter + Induced Draft Fan	Efficiency >99.9% PM <30 mg/Nm3 CPCB Stack Norms compliant	Capture fine carbon dust from cooler and handling; zero visible emissions
U-09: Process Control	PLC/SCADA Control Panel	Siemens S7 / Allen Bradley remote monitoring capable	Automated temperature, steam flow, residence time and atmosphere control; data logging

Table 3: Process Unit Descriptions — KERONE 1 TPH Continuous Spent Carbon Reactivation Plant | U-03 (Rotary Kiln Furnace) is the primary process unit; all others are ancillary

Core Equipment Specification — KERONE Rotary Kiln Reactivation Furnace

The KERONE Continuous Rotary Kiln Reactivation Furnace is the heart of the spent carbon upgrading system. Designed and manufactured in-house at KERONE's Ambernath facility, it directly scales the validated laboratory parameters from KRDC trial 62/KRDC/LAB/24 to industrial throughput while maintaining the identical thermal profile, residence time, and steam-atmosphere control that produced the 890 mg/g Iodine Number result.

Parameter	Specification
Design Throughput	1,050 kg/hr (spent carbon input, dried basis)
Operating Temperature	800 degrees C (max design: 950 degrees C)
Residence Time	45 min (adjustable 20-90 min via RPM)
Tube Dimensions	ID 650 mm x L 9,100 mm (heat-resistant alloy)
Heating Zones	4 independent electric/gas-fired heating zones
Atmosphere	Steam injection + N2 purge O2 < 0.5%
Drive System	VFD-controlled 9 kW gear motor
Installed Power	~175 kW (total connected load)
Shell Material	Heat-resistant alloy steel with refractory lining
Insulation	Ceramic fibre blanket — 180 mm
Sealing	Carbon-ring mechanical seals (gas-tight)

KERONE Rotary Kiln Furnace — industrial unit scaled to ID 650 mm x 9,100 mm L

Utilities & Ancillary Requirements

Utility	Specification	Consumption (at 1 TPH)	Source
Electrical Power	415V, 3-phase, 50Hz	~175 kW connected ~135 kW avg demand	Site utility
Steam	8-10 bar, saturated	300 kg/hr (kiln atmosphere)	Site boiler or dedicated steam generator
Nitrogen (N2)	99.5% purity 5-7 bar supply	90 Nm3/hr (kiln purge + cooler)	Onsite N2 generator or bulk
Cooling Water	25 degrees C supply closed loop	18 m3/hr 35 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 13m 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	< 20 mg/Nm3	50 mg/Nm3	COMPLIANT
Kiln off-gas	VOC / TOC	< 10 mg/Nm3	20 mg/Nm3	COMPLIANT

Emission Point	Pollutant	Expected Level	CPCB / MoEF Limit	Status
Scrubber outlet	Acid Gases (HCl/SOx)	< 15 mg/Nm3	35 mg/Nm3	COMPLIANT
Cooling + handling (bag filter outlet)	Carbon 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)	Spent GAC (as-received, wet cake)	1,300	38-45% moisture, 22.4% ash, Varuna quality
Moisture (dewatering + drying)	Free & bound water removal	~270	Removed in press + dryer ahead of kiln
Feed to Kiln (dried)	Spent carbon, dried basis	~1,030	<5% moisture entering kiln
Carbon Burn-off	Volatilised carbon + adsorbed organics	~95	~9.2% of dried feed at 45-min hold; passed to afterburner
Product (OUT)	Reactivated carbon (rAC)	~935	890 mg/g Iodine Number; 14.3% ash; bagged
Fines (recycled)	Bag filter fines	~12	Collected from U-08; recycled to product or waste stream
Combustion products	CO2, H2O, trace SO2/HCl	Stack	Post-afterburner and scrubber stack; meets CPCB emission limits

Table 4: Mass balance — 1 TPH continuous spent carbon reactivation 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 rAC)
Kiln Heating (Ramp + Hold)	Electric/gas-fired heaters (4-zone, 175 kW total)	175	75%	~141
Steam Generation	Dedicated steam boiler (fuel: natural gas)	NG: 60 kg/hr	100%	~55 kWh eq.
Drive Systems	Rotary kiln drive + conveyor drives	18	80%	~15
Cooling System	Quench cooling pump + water system	13	90%	~12
Afterburner	Thermal oxidiser (burner fuel: LPG)	LPG: 5 kg/hr	100%	~52 kWh eq.
Emission Control	ID fan + bag filter + scrubber pump	20	85%	~17
Utilities & Controls	N2 generator + SCADA + lighting + misc	14	60%	~8
TOTAL		~240 kW		~300 kWh/tonne

Table 5: Energy consumption estimate — 1 TPH spent carbon reactivation plant | Based on KERONE engineering estimates; actual values to be confirmed during detailed engineering

Product Quality Specification & Market Applications

Expected Product Specification — KERONE Reactivated Carbon (rAC)

Parameter	Test Method	Spent Carbon (Input)	Reactivated rAC (45-min hold)	Virgin GAC (Reference)
Moisture Content	IS 877	38-45%	< 2%	< 5%
Iodine Number	IS 877 / AWWA B604	412 mg/g	890 mg/g	> 900 mg/g
Ash Content	IS 877	22.4%	14.3%	< 12%
Apparent Density	IS 877	0.62 g/cc	0.48 g/cc	0.45-0.50 g/cc
Hardness Number	ASTM D3802	~78	~92	> 90
Product Grade	Classification	Hazardous scrap only	Reactivated GAC (rAC) — near-virgin grade	Virgin Activated Carbon

Table 6: Product quality specification — spent carbon vs reactivated rAC vs virgin activated carbon | Highlighted 45-min hold column = recommended industrial operating point

Market Applications for Reactivated Carbon

- Effluent Treatment & Water Polishing:** Petrochemical plants can return reactivated carbon to their own effluent polishing and tertiary treatment units, displacing repeat virgin-carbon purchases at 80-90% of original adsorption performance.
- Solvent Recovery & VOC Abatement:** Non-critical solvent recovery and gas-phase adsorption duties accept rAC at near-virgin Iodine Number equivalent, particularly in VOC abatement and odour control systems.
- Municipal & Industrial Water Treatment:** Municipal and industrial water treatment operators purchase reactivated carbon meeting AWWA B604 as a lower-cost alternative to virgin carbon for drinking-water and process-water polishing.
- Product Decolourisation:** Reactivated carbon at 45-minute hold meets specification for decolourisation of process streams in sugar, edible oil, and specialty chemical manufacturing.
- Toll Reactivation Services:** Third-party reactivation-as-a-service is an emerging model in India; KERONE's system enables petrochemical majors to offer toll reactivation for smaller regional carbon users.

Financial Analysis & Return on Investment

Break-even is projected at approximately 2.1 years, based on an assumed blended reactivated-carbon value of INR 62,000/tonne (accounting for both cost-avoidance on internal reuse and open-market sale of surplus rAC).

CAPEX Estimate — 1 TPH Plant

Cost Head	Scope	Estimated Cost (INR Lakhs)	Notes
Rotary Kiln Furnace (Primary Equipment)	KERONE supply, factory tested	22-26	FOT Ambernath; includes drive, seals, controls
Steam Generation System	Dedicated boiler, NG-fired	8-10	8-10 bar saturated steam, 300 kg/hr
Afterburner / Thermal Oxidiser + Scrubber	VOC destruction, caustic scrubber	7-9	900 degrees C, 2-sec residence, SS construction
N2 Generator System	PSA N2 generator + receiver	4-5	99.5% purity, 110 Nm3/hr capacity
Cooling System	Water-quench cooler + cooling tower	3-4	Inert-blanketed, SS contact parts
Emission Control (Bag filter + Scrubber)	CPCB-compliant stack system	4-5	Pulse-jet BF + ID fan + wet scrubber
Feed Handling & Dewatering	Screw press, dryer, vibro screen, big bag filler	5-6	Load-cell filling, SS contact parts
Electrical & Instrumentation	MCC panel, SCADA, cabling, transformer	5-6	PLC/SCADA by KERONE; site electrical by client
Civil & Structural	Foundation, shed, utilities connections	4-5	Client scope; KERONE to provide layout drawing
Commissioning, Training & Startup	KERONE commissioning team, 15-day site support	2-3	Includes operator training and performance test
TOTAL CAPEX		INR 64-79 Lakhs	Approx. range; detailed quote on enquiry

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

Item	Basis	INR/Year (Lakhs)	Remarks
REVENUE / VALUE CAPTURED			
rAC Value (Reuse + Sale)	935 kg/hr x 7,200 hr x INR 62,000/t	INR 418 Lakhs	Blended internal-reuse + open-market value
OPERATING COSTS			

Item	Basis	INR/Year (Lakhs)	Remarks
Electricity	300 kWh/t x 7,200 t/yr x INR 8/kWh	INR 173 Lakhs	Based on INR 8/kWh industrial tariff
Natural Gas (Steam + Kiln support)	60 kg/hr x 7,200 hr x INR 55/kg	INR 24 Lakhs	Steam generation fuel
LPG (afterburner)	5 kg/hr x 7,200 hr x INR 100/kg	INR 36 Lakhs	Afterburner fuel
N2 Consumption	If PSA onsite: power included above	INR 4 Lakhs	Maintenance + N2 top-up cost
Labour (Operations)	4 operators/shift x 3 shifts x 12 months	INR 24 Lakhs	At INR 25,000/operator/month CTC
Maintenance & Spares	3% of CAPEX per annum	INR 22 Lakhs	Annual maintenance provision
Miscellaneous & Overheads	QC testing, consumables, admin	INR 10 Lakhs	
NET VALUE BEFORE TAX		INR ~125 Lakhs/yr	Payback ~2.1 years on INR 72L CAPEX

Table 8: Revenue & OPEX model — 1 TPH plant at 7,200 hr/yr | Indicative figures; actual value depends on internal-reuse ratio, rAC 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; finalization	6-9 Weeks	Complete engineering package, vendor drawings, DFM approval
Phase 2 — Procurement	Long-lead items: kiln shell, alloy tube, refractory, drives, steam boiler, N2 generator	9-11 Weeks	Material test certificates, QC inspection reports, FAT invitation
Phase 3 — Fabrication	Rotary kiln fabrication, afterburner assembly, bag filter, SCADA panel	10-13 Weeks	Factory Acceptance Test (FAT) at KERONE Ambarnath; client witness invited
Phase 4 — Installation	Equipment erection at client site; piping, electrical, instrument hook-up	4-6 Weeks	KERONE site supervision; civil and electrical by client as per KERONE drawings
Phase 5 — Commissioning	Cold trials, hot trials with spent carbon, 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	~35-48 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; plant operating schedule
Primary Equipment	Rotary kiln furnace (complete), afterburner, N2 system, quench cooler, product handling	Feed dewatering (screw press) if not included in enquiry scope
Emission Control	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 (N2, steam fuel, LPG) 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 Spent Carbon Reactivation System represents a proven, commercially validated solution to a recurring cost and compliance burden in India's chemical and petrochemical 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 Varuna Petrochemicals' actual spent carbon.

- **Proven Technology:** Every process parameter in the 1 TPH plant — 800 degrees C, 45-minute residence, steam/N₂ atmosphere — is directly derived from KRDC lab trial 62/KRDC/LAB/24 on client's actual feedstock. No extrapolation; no assumptions.
- **Quantified Outcome:** Iodine Number recovery from 412 mg/g to 890 mg/g, and ash reduction from 22.4% to 14.3%, are measurable, certified results — not marketing claims.
- **Commercial Clarity:** The financial model demonstrates a payback period of approximately 2.1 years, converting a hazardous-waste disposal liability into an INR 400+ Lakh/year value line through internal reuse and open-market sale.
- **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 Varuna Petrochemicals creates the reference installation for 2, 5, and 10 TPH systems for other chemical and petrochemical processors 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 SPENT CARBON / CATALYST REACTIVATION PROJECT

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

B/47 Addl. MIDC, Anand Nagar, Ambernath (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 tonnage + site location + target rAC 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 62/KRDC/LAB/24) conducted on Varuna Petrochemicals Ltd. feedstock. Actual industrial performance may vary. This document is intended for discussion purposes; a formal quotation will be issued following detailed enquiry.