We leverage deep technical expertise, decades of process knowledge and a culture of innovation to continuously enhance our product portfolio and performance. Our ability to convert insights into scalable solutions, combined with digital transformation, strengthens our competitive positioning and supports value creation across every business segment.

Focus areas

- Capacity enhancement
- Productivity and efficiency
- Product quality and safety
- Sustainable manufacturing
- Ensuring raw material security

2025 highlights

12
New products

656 Mn
Investment in R&D

Stakeholders impacted

- Customers
- Government and regulators
- Employees
- Vendors and suppliers

Material topics associated

- Climate and energy
- Circularity and innovation

Intellectual capital

Product and process innovation

In 2025, we strengthened our product portfolio through targeted product and process innovation that enhances material performance, reduces environmental impact and supports the evolving needs of energy-storage and mobility markets. Additionally, we advanced a multi-year collaboration focused on developing alternative anode materials and expanded our pilot-scale capabilities to accelerate validation of new energy-storage materials. Our R&D centres across North America and Europe work closely with commercial and engineering teams to refine raw-material platforms, scale low-carbon formulations, and drive new product development in the energy-storage segment.

Science-led developments

- Industrialisation of NOVARES® MP50 and LM liquid resin product lines to support advanced coatings and adhesive applications
- Development of new styrene-rich C9 NOVARES® SN and NOVARES® ST resins for tyres and adhesives
- Advanced process innovations, including direct polymerisation at lower temperatures, to achieve lighter-colour resins with enhanced thermal stability

Innovation in raw materials

Over the years, we have gradually scaled the deployment of alternative raw materials across our operations. What began as a focused R&D initiative over a decade ago has now evolved into one of the core pillars of our product innovation strategy.

Carbon

- Testing biogenic raw materials and recycling streams as alternatives to coal tar in carbon distillation
- Development of specialty products that deliver both environmental and technical advantages
- Development of biocarbon materials (biochar) blended with petroleum coke and agglomeration technology for densification
- Scaling up biochar integration in calcined products up to 50% blend) for non-anode applications

Advanced Materials

- Larger share of bio-based raw materials used in NOVARES® resins
- Strong customer traction for the NOVARES®-eco product line
- Engineered products (PETRORES® and LIONCOAT®) utilising alternative materials and improved process control for lithium-ion battery applications
- Replacement of C9 monomers declining in availability by styrene that in the future could be used from sustainable sources when available

We are participating in the European Union Horizon project “Sustainable routes for synthetic graphite production for high-performance lithium-ion battery anodes” (SOURCE), working alongside a consortium of 12 partners to develop more sustainable pathways for synthetic graphite used in battery anode applications.

New product launches

NOVARES® SN 100 and 120

Applications

Adhesives

NOVARES® ST 90 and 100

Applications

Tackifiers in rubber/tyre

NOVARES® ST 100 and 120

Applications

Binding materials in the coatings

NOVARES® LM liquid resin product family, modifiers

Applications

Coatings

Process-driven performance

Optimising material blends

The use of anhydrous carbon pellets (ACP) strengthens the structure of green petroleum coke before calcination, improving blend flexibility, enhancing CPC quality and enabling better cost efficiency during processing.

Continuous refinement

Ongoing modifications and upgrades ensure NOVARES® products meet evolving customer requirements and industry specifications.

Future priorities

- Scale alternative raw material platforms across the Carbon and Advanced Materials segments
- Expand specialty materials for the aluminium and electric arc furnace (EAF) steel sectors
- Maintain a strong R&D pipeline that addresses customer-specific needs and emerging regulatory requirements

Proprietary technologies

Our technology platforms, developed over decades of carbon science, technology innovation, and process engineering, enable us to deliver consistent performance, respond to evolving industry requirements and contribute meaningfully to emerging sectors, such as energy storage and advanced mobility.

Our anchors

- Protected know-how in distillation and calcination
- In-house development of advanced refining technologies
- Proprietary binder systems
- Platform formulations for engineered carbon materials
- Proprietary processes enabling energy savings and emissions reduction
- Specialist electrochemical testing capabilities

IP protection

Our innovations are safeguarded through multiple patent filings covering new resin formulations, carbon products and process methods, and eco-friendly application technologies.

LIONCOAT®

LIONCOAT® is our proprietary carbon precursor product line used as a carbon source in the manufacture of battery anode material where it is used in the agglomeration and coating of graphite particles with carbon. The resulting carbon structure improves particle stability and electrical conductivity and elevates electrochemical performance of graphite and silicon/carbon battery anode materials being increasingly critical for advanced lithium-ion battery systems.

Technology spotlight

- High purity
- High softening point and carbon yield
- Validated through rigorous testing at the Hamilton Technology Innovation Centre
- Strengthens performance of high-value anode materials

Why it matters

LIONCOAT® serves as a strategic differentiator for RAIN in the rapidly expanding BAM space, offering customers superior material performance that is difficult to replicate.

PETRORES®

PETRORES® represents our established platform of engineered carbon materials used across multiple high-performance sectors like refractories and battery materials. Its formulations, developed through closely protected process pathways, deliver structural consistency and material stability essential for today's advanced industrial applications.

Technology spotlight

- Proprietary formulation science with tight process controls
- Strong compatibility with evolving battery chemistries
- High structural purity and thermal stability
- Built on decades of process intelligence and testing data

Why it matters

PETRORES® provides us with a stable, high-performance platform that supports our sustained participation in the engineered materials.

Alternate binder technologies and substitution strategies

We have made early and significant investments in developing alternative binder technologies and approaches for raw material substitution. These innovations allow our customers to produce high-performance electrodes consistently, even as traditional raw materials become scarce or as the steel industry transitions from blast furnace to electric arc furnace (EAF) processes.

Technology spotlight

- Ability to produce high-performance electrodes without relying solely on traditional coal tar pitch
- Proprietary binder formulations ensure strength and performance despite changes in raw material supply
- Built on decades of distillation and carbon-science expertise, these approaches allow us to adapt to shifts in global raw-material availability

Why it matters

These unique capabilities position RAIN as a vital, long-term partner for graphite electrode producers who require a stable and secure supply of essential carbon materials, insulating them from volatile global raw material changes.

Validation infrastructure that reinforces proprietary leadership

Our proprietary solutions are strengthened by a specialised validation ecosystem, most notably the Technology Innovation Centre for energy storage materials Hamilton, Canada, which focuses on PETRORES® and LIONCOAT® carbon precursors. This centre drives electrochemical performance testing and serves as a hub for R&D and process development, including enhancements in purification processes for carbon precursors to improve battery safety. It enables systematic evaluation of next-generation materials and ensures that proprietary technologies like LIONCOAT® and PETRORES® undergo rigorous testing before commercial deployment. The combination of testing capability, proprietary formulations and in-house process knowledge creates a technological moat that is difficult to replicate.

How we Innovate

Digitalisation is transforming how we design, test and scale our solutions. By digitising research workflows, enhancing process visibility and strengthening global knowledge connectivity, RAIN is modernising the way it develops, validates and scales next-generation materials.

Digital-first R&D facility

Our new Technology Innovation Centre and demonstration plant in Hamilton, Canada, is accelerating work on next-generation energy storage materials. It is enabling the rapid evaluation of alternative solid raw materials for future battery anode material, thereby paving the way for our entry into emerging markets, such as battery-anode materials (BAM) and energy storage materials (ESM).

Facility feature	Application
Advanced electrochemical testing systems	Precision testing of material performance in energy storage applications
Pilot-scale process and material evaluation equipment	Simulating real-world production to assess material behaviour
Digital dashboard and knowledge management	Monitoring performance outcomes and degradation profiles
Rapid prototyping capabilities	Fast development and testing of new material compositions and designs

Process digitalisation

- Upgraded TrendMiner production data-mining software to improve usability
- Enhanced integration with the iHistorian database for better data accessibility
- Enabled real-time tracking of key production metrics, including:
  - Finished product yields
  - Carbon dioxide emissions
  - Flow rates
- Launched an artificial intelligence (AI) pilot programme at one of our US Carbon plants
- Using AI to refine performance parameters and optimise operational efficiency

Advanced monitoring system

Lake Charles, US

At the Lake Charles Carbon segment plant, the adoption of an online continuous monitoring system has replaced manual quarterly inspections of turbine generator units. This upgrade now enables 24/7 remote monitoring, improving reliability and reducing the need for on-site intervention.

Gramercy & Norco, US

At our Gramercy and Norco Carbon segment plants, cloud-based monitoring technology has replaced bi-monthly physical inspections. This shift to fully digital tracking enhances maintenance efficiency and provides real-time visibility into equipment performance.

Knowledge management and industry expertise

Besides our R&D facilities and technology platforms, decades of institutional knowledge, technical expertise and industry experience back our intellectual strength. This foundation guides our strategic decisions, drives material innovation and helps us support customers in fast-changing markets.

Commitment to expertise

We build expertise across our Carbon and Advanced Materials segments through focused training programmes and comprehensive knowledge-sharing initiatives. This expertise is then utilised for diverse purposes:

Focus area	Outcome
Operational excellence	Applying longstanding industry experience to optimise operations, leading to greater efficiency and reliability
Customer solutions	Utilising in-depth industry know-how to deliver innovative, customer-oriented solutions that address specific client needs

Industry expertise as the foundation of leadership

Built on our deep industry expertise, we continue to contribute to the advancement of the carbon and advanced materials industries by sharing insights and participating in industry publications and knowledge platforms. Our ability to anticipate and interpret industry shifts enables us to align our innovation agenda with future requirements.

What we saw early

Structural shift	Our response
Battery Anode Materials reshaping demand for GPC and needle coke	A sharpened focus on alternative feedstock and anode-material innovation
The global shift from blast-furnace to EAF steelmaking is reducing coal tar supply	Development of proprietary carbon binder and impregnation technologies independent of coal tar pitch

How expertise adds value to customers

We work closely with customers in the aluminium, steel, battery materials and specialty chemicals sectors. This collaboration helps us refine raw material choices, tailor products to specific needs, and validate performance through real-world customer applications.

Application engineering and customer collaboration

Tailoring material formulations to meet specific end-use performance requirements and providing technical material solutions to solve problems of our customers.

Material qualification and commercial adoption

Integration of alternatives into product lines such as NOVARES®-eco, engineered products, and emerging pathways being evaluated for future Battery Anode Materials. Guiding customers through testing and validation cycles for new or modified products.

Sustainability alignment

Helping customers transition to greener raw material pathways while ensuring consistent product performance.