

Eco-Innovation Report

Summary:

Petronas Chemicals Group Berhad

Report Period:

2019-2024

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1. Executive Summary

PETRONAS CHEMICALS GROUP BERHAD (PCG) has demonstrated a significant upward trajectory in its eco-innovation performance from 2019 to 2024, particularly accelerating in the latter half of the period. While initial years showed minimal eco-innovation activity, the company has since established robust organizational frameworks, diversified into specialty chemicals with strong sustainability credentials, and initiated numerous product and process-level eco-innovations. Key strengths lie in its comprehensive sustainability governance, transparent reporting, and strong stakeholder engagement, though specific quantitative disclosures for product-level eco-metrics and historical CO2 emissions remain areas for improvement.

Overall Assessment: PCG is an Eco-Adopter, actively transitioning towards becoming an Eco-Leader. The company has moved beyond basic compliance to strategically integrate sustainability into its core business model, driven by significant investments in R&D, circular economy initiatives, and a strong commitment to Net Zero Carbon Emissions by 2050.

2. Eco-Innovation Disclosure (%)

The Eco-Innovation Disclosure Index measures the transparency and comprehensiveness of sustainability reporting across all 87 parameters.



Disclosure quality has significantly improved, especially from 2023 onwards, with detailed reporting on organizational and non-financial sustainability initiatives. Gaps remain in providing specific quantitative metrics for product eco-design (e.g., overall recycled content percentage) and comprehensive historical CO₂ emissions data, which limits a full lifecycle assessment.

3. CO₂ Reduction (%)

Carbon dioxide reduction is a critical indicator of climate action effectiveness.

Year	Total Emissions (tCO ₂ e)	Reduction vs Baseline	Intensity Ratio
2019	Not Disclosed	Baseline	Not Disclosed
2020	Not Disclosed	Not Disclosed%	Not Disclosed
2021	Not Disclosed	Not Disclosed%	Not Disclosed
2022	Not Disclosed	Not Disclosed%	Not Disclosed
2023	Not Disclosed	Not Disclosed%	Not Disclosed
2024	Not Disclosed	329,000 tCO ₂ e reduction%	0.71 tCO ₂ e/RM million

PCG reported a significant reduction of 329,000 tCO₂e in 2024 through operational improvements and renewable energy purchases, achieving a GHG emissions intensity of 0.71 tCO₂e/RM million. While the company has a clear Net Zero Carbon Emissions 2050 roadmap and 2030 reduction targets, historical absolute emissions and intensity data for prior years are not explicitly disclosed, making year-over-year percentage reduction analysis challenging.

4. Product Eco-Innovation Analysis (%)

Product eco-innovation encompasses sustainable design, material selection, lifecycle management, and end-of-life considerations across 20 parameters.

Key Product Innovation Metrics (2024)

Parameter	Score	Status
Recycled Material Content	0%	Specific products (Pevalen™ Pro 100, silicone oil) use renewable/recycled content, but no overall percentage disclosed.
Energy Efficiency Rating	0%	Products like Synmerse™ DC are designed for enhanced cooling efficiency, but no overall energy efficiency rating disclosed.
Product Durability Extension	0%	Not Disclosed
Design for Disassembly	0%	Not Disclosed

PCG's product eco-innovation has gained momentum, particularly in 2023-2024, driven by the acquisition of Perstorp and BRB. Initiatives include the development of ISCC PLUS certified products with renewable carbon content (e.g., Pevalen™ Pro 100, Voxtar™), bio-based emollients, and solutions addressing microplastics pollution. The company is also actively eliminating hazardous substances like TMPTA. However, comprehensive quantitative metrics for overall recycled content, energy efficiency ratings across the entire product portfolio, durability,

and design for disassembly are not explicitly disclosed, indicating a focus on specific product lines rather than a holistic portfolio-wide approach.

5. Process Eco-Innovation Analysis (%)

Process innovation focuses on manufacturing efficiency, resource optimization, and clean production technologies across 20 parameters.

Category	2019	2020	2021	2022	2023	2024
Process Innovation Score	0%	0%	10%	10%	20%	55%

Process Highlights

Process eco-innovation has seen substantial growth, especially in 2024. Key achievements include the implementation of closed-loop water systems (Perstorp's wastewater project saving 1.1 billion liters annually), significant energy efficiency projects (heat recovery, heat sleeves), and a transition to renewable energy in production (Perstorp's Waspik site achieving net zero Scope 1 & 2, BRB partnering with Bullfrog Power). Carbon capture utilization (H2RG recovery) and lean manufacturing principles are also being applied. Digitalization efforts like ePTW and CDEx slot booking contribute to efficiency and reduced idling times. While strong, further details on waste-to-energy conversion or specific material reintegration rates are not provided.

6. Organizational Eco-Innovation Analysis (%)

Organizational innovation evaluates governance structures, policies, and cultural commitment to sustainability across 15 parameters.

Category	2019	2020	2021	2022	2023	2024
Organizational Innovation Score	0%	13%	13%	27%	60%	87%

PCG demonstrates strong organizational eco-innovation, with a clear commitment to sustainability embedded at the highest levels. The company publishes standalone Sustainability Reports, has established a Board Sustainability and Risk Committee (BSRC) and a Sustainable Development Steering Committee (SDSC) with dedicated taskforces (NZCE, Reporting & Disclosure, Circularity). Certifications like ISO 14001 (BRB) and EcoVadis ratings (Perstorp Platinum, BRB Silver) underscore its commitment. Green procurement policies, employee eco-training, and a significant R&D budget for eco-innovation (7 labs, new innovation centers) are in place. The adoption of PETRONAS Human Rights Policy and flexible work policies further strengthen its social governance.

7. Marketing Eco-Innovation Analysis (%)

Marketing innovation assesses sustainability communication, eco-labeling, consumer education, and brand positioning.

Category	2019	2020	2021	2022	2023	2024
Marketing Innovation Score	0%	0%	0%	0%	50%	80%

Marketing eco-innovation has become a significant focus, particularly in 2023-2024. PCG leverages eco-labeling certifications (Protect & Sustain, ISCC PLUS, BIS) to communicate product sustainability. The launch of a customer portal provides digital product passports, enhancing transparency on order status and regulatory information. Green marketing claims are supported by robust reporting frameworks (EESG, CSRD readiness). The company actively engages in user education on safe chemical handling and eco-use, and promotes sustainable packaging. While carbon neutral labeling is an internal achievement for one site, its application to products is not broadly stated.

8. Financial Eco-Innovation Analysis (%)

Financial innovation measures economic benefits including cost savings, revenue from green products, and return on environmental investments.

Category	2019	2020	2021	2022	2023	2024
Financial Innovation Score	0%	0%	0%	0%	50%	67%

Financial Benefits Identified

Financial performance related to eco-innovation shows a growing focus on cost savings and value creation. PCG aims for eco-premium pricing power through sustainable products and targets value-accretive decarbonization projects. Explicit energy and water cost savings are noted (e.g., 1.1 billion liters water saved, 7% cost savings across sites). The company is aware of carbon tax avoidance strategies (CBAM, internal carbon pricing) and hedges material cost volatility by exploring renewable/recycled raw materials. While no specific green capital access is detailed, the focus on ESG ratings suggests an intent to attract such investment.

9. Non-Financial Eco-Innovation Analysis (%)

Non-financial performance covers brand value, employee satisfaction, stakeholder relationships, and social license to operate.

Category	2019	2020	2021	2022	2023	2024
Non-Financial Innovation Score	0%	0%	0%	10%	100%	100%

PCG exhibits exceptional non-financial performance in eco-innovation. Its strong sustainability reputation is reflected in improved ESG ratings (Dow Jones, FTSE4Good, EcoVadis Platinum/Silver). High customer loyalty (NPS +65) and strong regulatory relationships are maintained through consistent engagement and compliance. The company demonstrates high innovation capability, evidenced by new product launches, co-created solutions, and a robust R&D network. Employee satisfaction and retention are prioritized through well-being programs, and community license to operate is fostered via social impact initiatives. Supply chain resilience is a key focus, addressing climate-related disruptions.

10. SDG Scoring in Percentage (%)

Alignment with UN Sustainable Development Goals measures global sustainability impact across four key SDGs.



PCG demonstrates strong alignment with SDG 13 (Climate Action) and SDG 7 (Affordable and Clean Energy), driven by extensive carbon reduction initiatives, renewable energy adoption, and energy efficiency projects. Alignment with SDG 12 (Responsible Consumption and Production) is moderate, reflecting efforts in circular economy, sustainable products, and supply chain management, but with room for broader implementation and quantitative disclosure. SDG 9 (Industry, Innovation and Infrastructure) shows foundational efforts in R&D and eco-innovation, indicating potential for further growth.

11. Suggestions and Improvements

Strategic recommendations to enhance eco-innovation performance across all dimensions:

- **Product Innovation:** Develop and disclose portfolio-wide metrics for recycled content, energy efficiency, and durability. Explore modular design and design-for-disassembly principles for new product development to enhance circularity.
- **Process Innovation:** Expand waste-to-energy conversion initiatives and implement comprehensive scrap material reintegration programs. Invest in advanced water management technologies to achieve zero-liquid discharge across more facilities.
- **Organizational Innovation:** Formalize a carbon offsetting program with clear targets and budget allocation. Explore incentives for green commuting to further reduce employee-related emissions.
- **Marketing Innovation:** Develop and promote a broader range of products with verified carbon-neutral labeling. Implement and promote take-back schemes for end-of-life products to close material loops.
- **Financial Innovation:** Quantify and report Return on Eco-Investment (RoEI) for all major sustainability projects. Actively pursue green capital financing options to fund eco-innovation initiatives.
- **Carbon Reduction:** Establish and disclose a clear baseline for CO₂ emissions (Scope 1, 2, and 3) for all years to enable transparent year-over-year reduction tracking. Expand carbon capture and utilization technologies to a wider range of operations.

12. Trend Analysis (6 Years)

The 2019-2024 period reveals a significant acceleration in PCG's eco-innovation journey. From minimal activity in 2019-2021, the company experienced a turning point in 2022 with the acquisition of Perstorp, which brought in advanced sustainability practices. This was followed by a surge in initiatives across all indexes in 2023 and 2024. Organizational and Non-Financial indexes show consistent and rapid improvement, reaching high maturity levels due to strong governance, reporting, and stakeholder engagement. Product, Process, and Marketing eco-innovation, while starting later, are now on a strong upward trend, driven by new product development, process efficiency, and enhanced communication. Financial performance reflects growing cost savings from efficiency and strategic investments. The overall pattern indicates a strategic shift towards embedding sustainability as a core business driver, moving from foundational steps to active implementation and market differentiation.

Key Trend Observations

Upward Trends: Organizational Eco-Innovation, Non-Financial Performance, Marketing Eco-Innovation, Process Eco-Innovation, Product Eco-Innovation, Financial Performance

Stable Areas: N/A

Growth Drivers: Strategic acquisitions (Perstorp), strong sustainability governance, increased R&D investment, focus on circular economy, customer demand for sustainable solutions, digitalization of operations.

13. Predictions for Next Year (2025)

Based on stated goals and current trajectory, PCG is expected to continue its strong eco-innovation growth in 2025. The full commercialization of new plants (melamine, isononanol), operationalization of the Sayakha plant, and establishment of new innovation labs will drive further advancements in product and process eco-innovation. Continued focus on low-carbon solutions, bio-based chemicals, and recycled polymers under the NZCE 2050 roadmap will bolster sustainability performance. Organizational and non-financial aspects are likely to maintain their high performance, with continued emphasis on EESG integration and stakeholder engagement. The company's strategic focus on both organic and inorganic growth in specialty chemicals, coupled with customer-centric innovation, positions it for sustained improvement.

Expected Performance Improvements

Category	2024 Score	2025 Prediction	Expected Change
Product Innovation	45%	50%	+5%
Process Innovation	55%	60%	+5%
Organizational	87%	90%	+3%
Marketing	80%	85%	+5%

14. Comparison with Other Companies in General

Benchmarking positions the company relative to industry peers and sustainability leaders.

Performance Level	Characteristics	Company Status
Eco-Leaders (Top 10%)	Comprehensive sustainability integration, certified products, carbon neutral targets	Aspiring - On track with targeted improvements
Eco-Adopters (40-70%)	Active sustainability programs, systematic reporting, renewable energy adoption	Current Position - Active programs in place
Eco-Laggards (Below 40%)	Limited sustainability initiatives, compliance-driven, minimal disclosure	Not Applicable

PCG's eco-innovation performance positions it as a strong Eco-Adopter, actively closing the gap with industry Eco-Leaders. Its robust governance, comprehensive sustainability reporting, and strategic investments in circular economy and low-carbon solutions place it ahead of many peers in the chemicals sector. The acquisition of Perstorp and BRB has significantly enhanced its specialty chemicals portfolio and brought in advanced sustainability practices. While some industry leaders might have more mature product-level eco-design metrics or longer track records of absolute CO₂ reductions, PCG's rapid progress and clear strategic direction indicate a strong commitment to achieving a leadership position in eco-innovation.

15. Conclusion

PETRONAS CHEMICALS GROUP BERHAD has made remarkable strides in its eco-innovation journey from 2019 to 2024, transforming from a nascent stage to a proactive Eco-Adopter. The company's strategic focus on sustainability, bolstered by significant acquisitions and R&D investments, has yielded strong performance in organizational, financial, and non-financial aspects. Key achievements include establishing a robust sustainability governance framework, launching innovative sustainable products, and implementing energy-efficient processes. To further advance towards Eco-Leader status, PCG should prioritize enhancing quantitative disclosures for product eco-metrics, providing comprehensive historical CO₂ data, and expanding circularity initiatives across its entire value chain. The strategic path forward is well-defined, with a clear commitment to Net Zero Carbon Emissions and continuous innovation.

Final Assessment

Overall Rating: Eco-Adopter

Key Strengths: Strong sustainability governance, Comprehensive EESG reporting, Strategic acquisitions driving eco-innovation, Robust R&D and innovation network, Significant carbon reduction initiatives, High customer loyalty and stakeholder engagement.

Priority Areas: Quantitative product eco-design metrics, Historical CO₂ emissions data disclosure, Broader implementation of circular economy principles, Waste-to-energy conversion, Green capital utilization.

Strategic Outlook: PCG is strategically positioned for continued growth in eco-innovation, leveraging its diversified portfolio and strong commitment to

sustainability to drive long-term value creation and achieve its Net Zero Carbon Emissions 2050 ambition.