



Climate Strategy

PETRONAS Chemicals Group Berhad (PCG)

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July 2022

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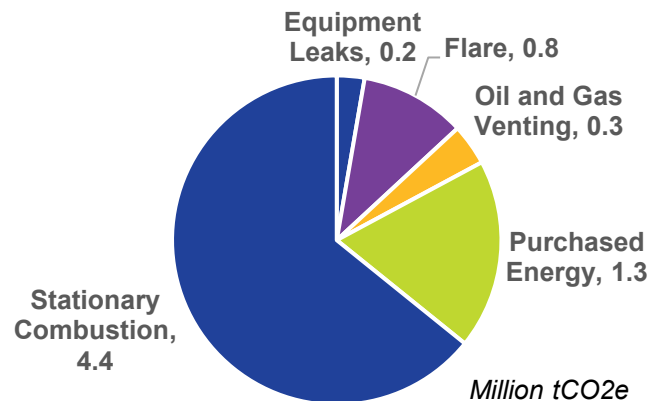
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PCG GHG Inventory

GHG emissions for existing facilities (2018-2021) Scope 1 and Scope 2 emissions combined

Year	GHG Emissions (million tonne CO ₂ equivalent)
2018	7.08
2019	7.02
2020	7.10
2021	7.00

Breakdown of GHG Emissions by Source (2021) Scope 1 and Scope 2



Source: PCG GHG Inventory

Scope 3 GHG Emissions

Our material Scope 3 GHG emission categories are identified in consistency with GHG Protocol – Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

Key categories for Scope 3 GHG emissions informed by hotspot analysis comprise:

- Category 1: Purchased Goods and Services;
- Category 3: Fuels and Energy Related Activities (excl. Scope 1 or 2);
- Category 11: Use of Sold Products; and
- Category 12: End of Life Treatment of Sold Products.

Top 2 Most Relevant Sources of Scope 3 Emissions

Source	Relevance	Metric tons CO ₂ e	Emissions calculation methodology
Category 1	Emissions from purchased goods and services are more material for companies with downstream operations in the oil and gas value chain, such as petrochemical companies that do not produce their own oil and gas products.	1,571,278	Estimation of Category 1 Scope 3 emissions has applied simplified IPCC Tier 1 method using default emission factors. Tonne CO ₂ -equivalent = GHG activity data (unit) x Default Emission Factor (tCO ₂ e/ unit)
Category 11	Emissions from use of sold products is material to the majority of oil and gas companies, including petrochemical companies that produces products such as fertilisers that produce GHG emissions when they are used by customers.	1,702,103	Estimation of Category 11 Scope 3 emissions has applied simplified IPCC Tier 1 method using default emission factors. Tonne CO ₂ -equivalent = GHG activity data (unit) x Default Emission Factor (tCO ₂ e/ unit)

Climate Risk Management Framework

Governance

Climate risks management incentives and KPIs linked to GHG emission reductions have been introduced for CEO, Executives and Line Managers of PCG.

Climate Risks and Climate Strategy Working Team has been established at PCG corporate level, including representatives from Sustainability, Operations, Risk & Finance and Business Strategy teams to drive climate risks assessment and their integration into business process. Working Team reports monthly to PCG Management Committee.

PCG has established a dedicated Board Sustainability and Risk Committee to improve oversight on sustainability material matters including climate change. Details of the Terms of Reference (TOR) of the committee can be accessed in [PCG website](#).

Strategy

Climate scenario analysis is performed to quantify the possible future financial impacts to revenues and costs from different climate change scenarios.

IEA World Energy Outlook 2020 Scenarios are adopted to understand potential business impact from transition risks, including STEPS (Stated Policies Scenario), SDS (Sustainable Development Scenario) and NZE (Net Zero Emissions by 2050 Scenario). For physical climate risks, two Representative Concentration Pathway (RCP) scenarios, RCP 8.5 and RCP 4.5 have been used to assess potential business implications.

The climate-related scenario analysis results inform a longer-term strategic decision making to improve the resilience of the business, and capitalise on opportunities from climate change and circular economy.

Risk Management

PCG proactively identifies, analyses and manage risks that materially impact our value creation abilities, including sustainability related risks and opportunities. We proactively manage our risks to ensure they remain within defined risk appetite and tolerance limits, covering risk-focused areas namely; operational, financial, sustainability, reputation and compliance for effective monitoring and reporting.

Our Corporate Risk Profile (CRP) 2021 includes climate-related risks, namely Sustainability Risk (climate change and circular economy), and Strategic Investment Risk (low carbon investment projects).

In 2021, PCG conducted an assessment of material physical and transition climate risks for our company using a combination of qualitative and quantitative climate-related scenario analysis and following Task Force on Climate-Related Financial Disclosures (TCFD) recommendations.

Metrics and Target

Our absolute GHG emissions reduction target covers Scope 1 and Scope 2 combined and aims at 2% GHG emission reduction by 2024 compared with 2017 baseline levels (7,090,000 metric tCO₂e).

We recorded an energy intensity of 15.76GJ/tonne in 2021, hence sustaining our target reduction of 10% from 2014 baseline.

In addition, PETRONAS Group has set Net Zero target for Scope 1 and Scope 2 emissions towards 2050 covering PCG. In 2021, PCG has developed its own Net Zero Roadmap by 2050. Our next milestone is to reduce 20% of our emissions by 2030.



PCG Corporate Risk Profile 2021

KEY RISKS



Among PCG Key Risks identified in 2021, two – ‘Strategic Investment Risk’ and ‘Sustainability’ – focus on climate change related business implications.



Legends: Critical Non-Critical

Source: PCG Integrated Report 2021

Climate-related Scenario Analysis

PCG conducted an assessment of material climate risks for our operations using qualitative and quantitative climate-related scenario analysis. The scope of our assessment includes:

- Climate transition risks and physical risks
- potential scenarios for legislation, technological development and market conditions
- our own operations, upstream and downstream activities and clients
- assessment is consistent with the expected lifetime of the assets/activities

Assessment Approach



Assessment Scope



Primary Climate Scenarios

Transition Risk Scenarios:

- IEA Stated Policies Scenario (STEPS)
- IEA Sustainable Development Scenario (SDS)
- IEA Net Zero Emissions by 2050 Scenario (NZE)

Physical Risk Scenarios:

- IPCC RCP 8.5
- IPCC RCP 4.5

Climate-related Transition Risks and Opportunities



Policy and legal

Transition Risk

Chemicals Business Implications

- | | |
|---|--|
| Carbon pricing and reporting obligations | <ul style="list-style-type: none"> • Restrictive cap and trade policy • Carbon taxes |
| Carbon border adjustment mechanism (CBAM) and climate-related trade barriers | <ul style="list-style-type: none"> • CBAM to be implemented in the EU • Other countries with net zero ambitions and carbon taxes may follow suit |



Market

Transition Risk

Chemicals business implications

- | | |
|---|---|
| Increase in demand for recycled products | <ul style="list-style-type: none"> • Recycled plastics |
| Increase in demand for EVs | <ul style="list-style-type: none"> • Plastics use intensity will change • Could impact Methanol demand in the long term |
| Improved application efficiency in the agriculture sector, and reduced wastage | <ul style="list-style-type: none"> • Reduction in demand for ammonia and urea over the long term |



Reputation

Transition Risk

Chemicals business implications

- | | |
|--|---|
| Increased stakeholder concern/negative feedback | <ul style="list-style-type: none"> • Increase in cost of capital, both debt and equity |
| Shift in consumer preferences/ Stigmatization of sector | <ul style="list-style-type: none"> • Reputational risks can degrade the intangible value of the company and goodwill |



Technology

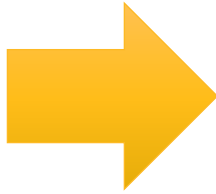
Transition Risk

Chemicals business implications

- | | |
|--|--|
| Substitution of existing products and services with lower emissions options | <ul style="list-style-type: none"> • Products from less carbon intensive sources will be preferred • Biofuels and bio-feedstock • Methanol derived products as blend |
| Development and maturity of new technologies | <ul style="list-style-type: none"> • Synthetic fuels, carbon capture, utilisation and storage (CCUS), hydrogen • Bio feedstock, electrification • Patented technology that is not readily available |

Sustainability initiatives informed by low carbon economy

- Competing **technologies**
- Evolving **policy** environments
- **Market** and finance imperatives



PCG Bio Agenda

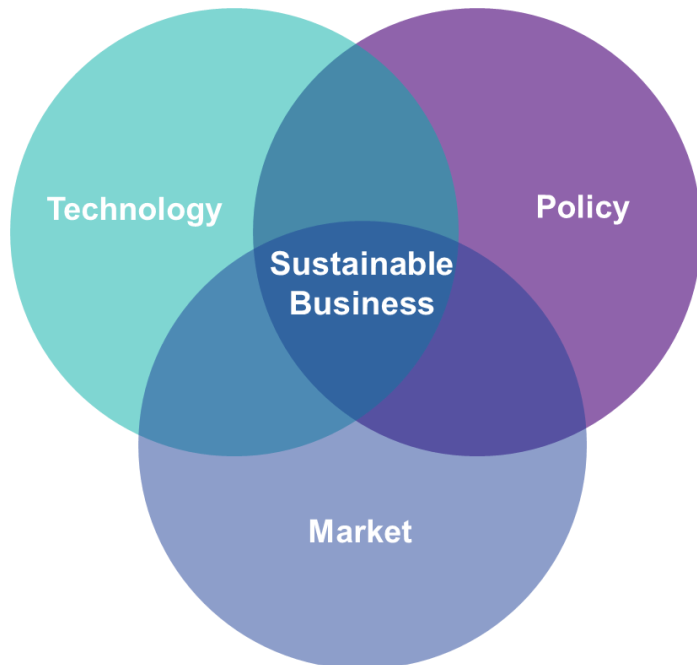
- ▶ Several projects have been developed under PCG Bio-Agenda

New Plastics Economy (NPE)

- ▶ Focus will be given to certain bio applications and circularity

Carbon Utilisation

- ▶ Several initiatives to pursue carbon utilisation (CU) projects & technology



Strategic Actions 2022-2023

- Deeper quantitative analysis of climate risks and asset-level financial implications
- Further integrate climate risks, strategy, metrics with performance evaluation and incentives into existing business processes and governance system
- Complete Scope 3 emissions baselining

Physical Climate Risks

Key physical climate risks identified by country of PCG operations and countries ranking by level of risk

China indicates comparatively higher risk due to drought as compared to other countries of interest

Thailand indicates the highest risk due to sea level rise among the countries of interest

Risk Rank	Hazard Scenario	Drought				Cyclone				Extreme Heat				Extreme Cold				Flooding				Sea Level Rise			
		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5	
		2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050
1	Thailand	1	1	1	1	2	2	2	3	2	2	2	2	-1	-2	-2	-2	3	3	3	3	3	3	3	3
2	China	2	2	2	3	2	2	2	3	2	3	2	3	-2	-3	-2	-3	2	3	2	3	1	2	2	2
3	Indonesia	2	1	1	1	2	2	2	3	1	2	1	2	-1	-2	-1	-2	3	3	3	3	1	2	1	2
4	Malaysia	1	1	1	1	2	2	2	3	1	2	1	2	-1	-2	-1	-2	3	3	2	3	1	2	1	2
5	India	1	1	1	1	1	2	2	2	2	2	2	3	-2	-2	-2	-3	3	3	3	3	1	2	1	2
6	Netherland	1	1	1	1	NA	NA	NA	NA	2	3	2	3	-2	-2	-2	-2	2	2	2	2	1	1	1	2

Cyclones indicate intensification under RCP 8.5 scenario by 2050. Particularly, east and southeast Asia indicate higher risk due to cyclone

Flood could be a major concern throughout the Asia. Particularly Thailand, Indonesia, and India indicate comparatively higher risk in the region

Risk of sea level rise increases towards mid -century under both the RCPs

Criteria for Climate Risk (Qualitative) Classification

Category		Drought (Change in likelihood of extreme drought)	Cyclone (Change in maximum sustained wind speed)	Extreme Heat (Change in monthly maximum temperature)	Extreme Cold (Change in monthly minimum temperature)	Flooding (Change in rainfall of very wet day)	Sea Level Rise
3	Significant Increase	> +0.2	>5%	>2°C	<-2°C	>10%	>50 cm
2	Moderate Increase	> +0.1	>2.5%	>1°C	<-1°C	>5%	>25 cm
1	Increase	> 0	>0%	>0°C	<0°C	>0	>0
0	No Change	0	0%	0°C	0°C	0	0
-1	Decrease	< 0	<0%	<0°C	>0°C	<0	<0
-2	Moderate Decrease	< -0.1	<-2.5%	<-1°C	>1°C	<-5%	<25 cm
-3	Significant Decrease	< -0.2	<-5%	<-2°C	>2°C	<-10%	< 50 cm

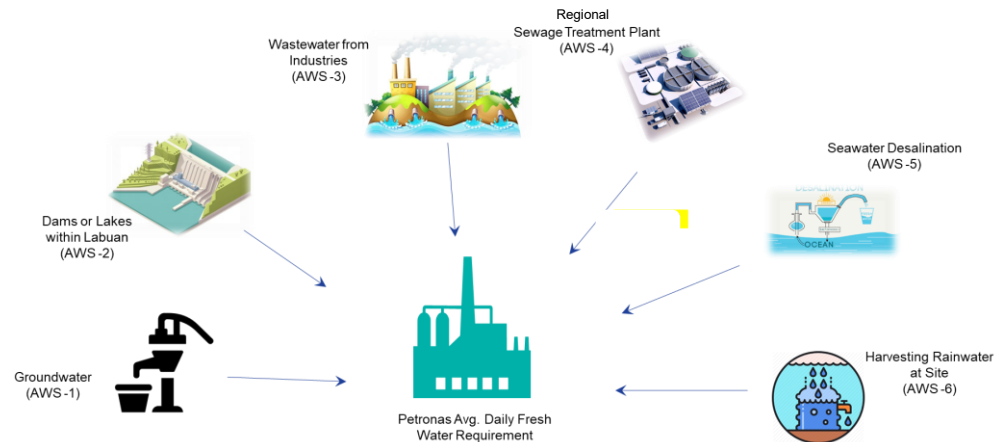
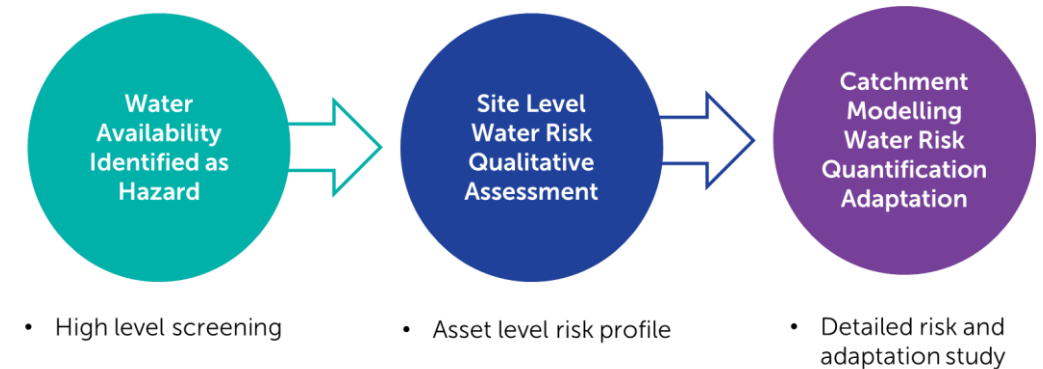
Reference: IPCC, 2014: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*

Note: Country ranks are based on the cumulative hazard score across all climate change scenarios

Strategic Response: Freshwater availability study for Labuan Plant

- PCG conducted water risk screening exercise by using World Resources Institute's Aqueduct Water Stress Atlas to assess future freshwater availability against projected demands from year 2021 – 2050, and to identify current and future risks associated with freshwater availability and develop appropriate mitigation actions.
- Quantify water availability using regional catchment modelling for baseline and future climate change and socioeconomic development in the region (2050).
- Develop site level water management plans to mitigate future water availability risks for business resilience.

Screening using WRI Aqueduct Water Stress Atlas



Alternative freshwater sources

From the physical risk assessment, PCG has prepared an adaptation plan (e.g., Freshwater Availability Study) to address the adverse effects of climate change and taking appropriate actions to prevent or minimise the damage they can cause or taking advantage of opportunities that may arise.