



# **ESIA for Petrochemical Complex, PT Lotte Chemical Indonesia**

*Climate Change Management Framework*



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## Acronyms and Abbreviation

Name	Description
CCU	Carbon Capture and Utilization
ERP	Emergency Response Plan
ESIA	Environmental and Social Impact Assessment
GHG	Greenhouse Gas
HEC	Hyundai Engineering Company
IEA	International Energy Agency
LCI	PT Lotte Chemical Indonesia
LEC	Lotte Engineering & Construction
SDS	Sustainable Development Goals
SMR	Steam Methane Reformer
STEPS	Stated Policies Scenario



# 1. CLIMATE CHANGE MANAGEMENT FRAMEWORK

## 1.1 Introduction

The Climate Change Management Framework seeks to provide guidelines on preparedness and management of extreme weather events and physical climate risk, climate change transition risk, and greenhouse gas emissions.

## 2.1 Objectives

The overall objectives of this framework are the following:

- Implement adequate procedures to manage extreme weather, physical climate risk, climate change transition risk, and greenhouse gas emissions; and
- Ensure adequate training and socialization of this Plan for all employees as relevant.



## 2. PHYSICAL CLIMATE RISK

The Climate Change Risk Assessment (Annex G) of the Environmental and Social Impact Assessment (ESIA) Report has discussed physical climate risks in detail. Table 2.1 summarises the mitigation measures for various physical climate risks, including: extreme temperatures, storms, wildfires, and landslides.

**Table 2.1 Overview of Mitigation Measures for Physical Climate Risk**

Impact Type	Impact / Risk	Mitigation Measures
Storms	Extreme Temperatures	<ul style="list-style-type: none"><li>• Establish policies or procedures articulating the preventive measures regarding heat hazard during construction phase;</li><li>• Consider extreme heat hazard in emergency response plan (ERP). The ERP should include clarification of temperature threshold to indicate possible necessity of implementing stop work measures, work breaks, etc.;</li><li>• Train workers to identify the symptoms of heat stress and first aid. Take necessary measures to counter heat stress impacts to personnel; and</li><li>• Ensure the facilities, equipment and machinery are kept sufficiently cool during Project operations and replace any faulty / damaged equipment when required.</li></ul>
	Storms	<ul style="list-style-type: none"><li>• Further plans and monitoring related to work arrangements, with identification of site location and equipment where work at height would be present; and</li><li>• Applicable measures to protect workers during high winds, in particular in the presence of tropical cyclones.</li></ul>
	Wildfires	<ul style="list-style-type: none"><li>• Conduct regular technical check-ups, fuel management.</li></ul>
	Landslides	<ul style="list-style-type: none"><li>• Conduct landslide hazard zonation mapping, landslide monitoring and forecast, and strengthening of slopes.</li></ul>



### 3. CLIMATE CHANGE TRANSITION RISK AND GREENHOUSE GAS EMISSIONS

The Climate Change Risk Assessment (Annex G) of the ESIA Report has discussed climate change transition risk and greenhouse gas emissions in detail.

Table 3.1 summarises the mitigation measures for climate change transition risk and greenhouse gas emissions. Refer to the ESIA for full details on impact assessment.

**Table 3.1 Mitigation Measures for Climate Change Transition Risk and Greenhouse Gas Emissions**

Impact Type	Impact/Risk	Mitigation Measures
Transition Risk	Change in Petrochemical and Plastic Demand	<ul style="list-style-type: none"> <li>• Consider how the Projects products may benefit the energy transition through its end use; and</li> <li>• Monitor global market demand for petrochemical feedstocks.</li> </ul>
	Change in Demand for Lower Emission / Bio-based Products	<ul style="list-style-type: none"> <li>• Consider running scenarios, which assume that the customer exercises a downward trend in quantity of product in line with change petrochemical demand between and the International Energy Agency's (IEA) Stated Policies Scenario (STEPS) and Sustainable Development Scenario (SDS); and</li> <li>• Consider feasibility for producing bio-based feedstocks as plastic building blocks in the future</li> </ul>
	Non-regulatory Driven Energy Efficiency Gains	<ul style="list-style-type: none"> <li>• Consider benchmarking of processes to measure energy efficiency across the market and promote the installation of energy efficient equipment, optimisation of production processes through better controls and maintenance and retrofitting with more energy-efficient and less carbon intensive technologies;</li> <li>• Audit the energy use and resource efficiency of your operations to identify cost-effective high-impact reductions; and</li> <li>• Consider ways in which digitalisation can create opportunities to capture energy efficiency gains.</li> </ul>
	Drivers to reduce air pollutants	<ul style="list-style-type: none"> <li>• Engage with regulators to reduce uncertainty over emerging regulations; and</li> <li>• Pursue stringent air quality standards</li> </ul>
	Carbon Pricing mechanisms	<ul style="list-style-type: none"> <li>• Consider incorporating the IEA SDS carbon price for developing economies into the Project Financial Model to assess the exposure to higher carbon prices;</li> <li>• Regularly monitor updates from the Indonesia on its policy on carbon tax and emission trading schemes;</li> <li>• Integrate cost of carbon into business decisions (e.g., introduce shadow price on carbon); and</li> </ul>



Impact Type		Impact/Risk	Mitigation Measures
			<ul style="list-style-type: none"> <li>• Continue to look at options to abate carbon emissions.</li> </ul>
		Regulatory-driven energy/material efficiency gains and reductions in greenhouse gas (GHG) emissions.	<ul style="list-style-type: none"> <li>• Engage with regulators to reduce uncertainty over emerging regulations;</li> <li>• Continuously review emerging regulations and update Project Risk Register based on potential regulatory risks to the Project;</li> <li>• Assess opportunities to integrate carbon capture and utilization (CCU) technology into the steam Methane reformer (SMR) process to reduce the carbon intensity;</li> <li>• Review options to replace current fossil-fuel energy sources with renewable energy for example green hydrogen; and</li> <li>• Make provisions to assess the Scope 3 emissions associated the Project.</li> </ul>
Greenhouse Emissions	Gas	Global warming and climate change	<p>The following measures may be carried out during the construction phase to reduce GHG emissions:</p> <ul style="list-style-type: none"> <li>• Develop and implement preventive maintenance plan for machines, and engines for greater combustion efficiency;</li> <li>• Develop vehicle maintenance plan and transport planning for construction to avoid unnecessary trips; and</li> <li>• Undertake construction work within designated construction areas and avoid trees removal outside of construction area.</li> </ul> <p>The following measures may be carried out during the operation phase to reduce GHG emissions:</p> <ul style="list-style-type: none"> <li>• Undertake an annual GHG inventory to monitor the annual GHG emissions and impose appropriate mitigation measures once the major sources of emissions are identified;</li> <li>• Replant trees in area where clearance and levelling work were undertaken during construction;</li> <li>• Consider possibilities of replacing fossil fuel (natural gas) with biomass as well as other captive sources for power supply such as solar and wind, among others;</li> <li>• Consider sourcing from biomass feedstock;</li> <li>• Integrate carbon capture and storage technology into the process; and</li> <li>• Set progressive GHG emissions reduction and performance improvement targets.</li> </ul>



## 4. TRAINING

Employees and subcontractors will receive training in extreme weather management on their arrival on site through an environmental on-boarding training session and prior to the start of work as part of the site orientation. The purpose of this training is to provide all site personnel with a basic level of environmental awareness and an understanding of their obligations regarding compliance with regulatory requirements, commitments, and best practices.