

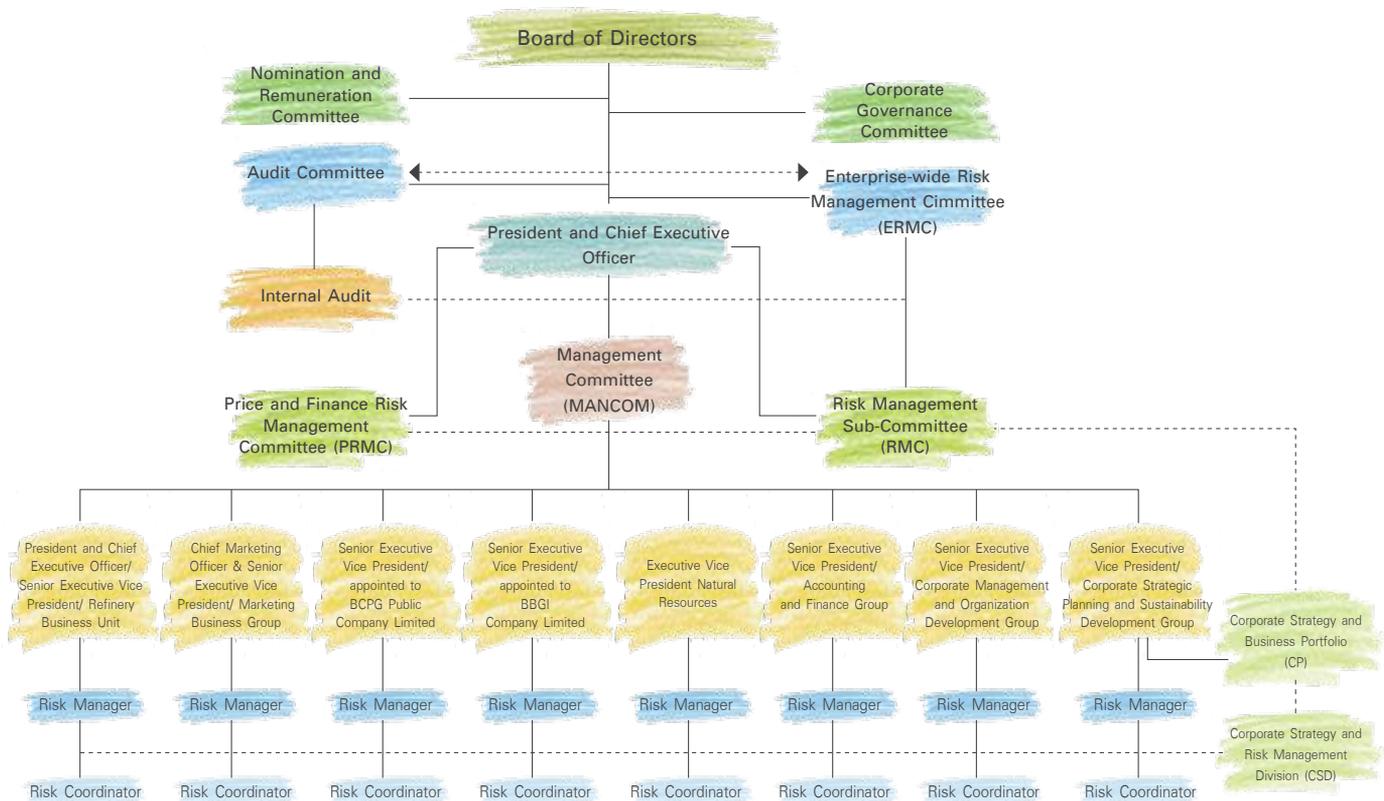
Corporate Risk Management

Due to the dynamic changes in business environment, corporate risk management is an important process to systematically plan for and mitigate risks. Bangchak has adopted an enterprise-wide COSO ERM and ISO 31000 as tools for its risk management system and applied them to all levels from business groups to divisions, sections, and all investment projects (Disclosure 102-11). Corporate risk management process has been standardized and deployed to all subsidiaries where risk management structure has been implemented to ensure full coverage of all business operations and successful achievement of short and long term targets in line with sustainable development strategy.

Corporate Risk Management Structures

Everyone at Bangchak is responsible of risk management. The Enterprise-wide Risk Management Committee (ERMC) has been established by the Board of Director to oversee corporate risk management. The Risk Management Sub-Committee (RMC), which makes up by top management from various businesses and divisions, has the responsibility to monitor and improve risk management efforts. The Price and Finance Risk Management Committee (PRMC) is responsible for managing risk related to price and currency fluctuations.

In addition, every business, division, and function has two representatives, Risk Manager and Risk Coordinator, who are responsible for coordinating risk management efforts with strategy function and corporate risk management function as well as increase awareness of risk management amongst employees to ensure that risk management plan is executed properly.



Remark

Risk Manager - Vice presidents or appointed persons

Risk Coordinator - assigned by Senior Executive Vice Presidents / Executive Vice Presidents

Reporting

———— Functional

- - - - Risk Communication

Promoting Risk Culture Enterprise-wide Risk Management Policy states that:

“The Company encourages and drives risk management to be a part of our corporate culture and be valued by all employees” In addition to assessing short and long term business risk as well as systematize corporate risk management process, risk management is one of the performance indicators for Bangchak’s management at every level. This ensures that every employee has a part in managing corporate risks to achieve company’s targets. To further promote risk culture, Bangchak has organized forums to exchange knowledge relating to changes in business environment as well as provide analysis on threats and opportunities to the business to relevant management and employees. The knowledge dissemination events are conducted to ensure that every employee has the same understanding and standards (based on Bangchak’s Risk Management Handbook) when it comes to corporate risk management.

Risk Management Performance

Risk management at Bangchak covers strategic risks, operational risks, financial risks, and reputational risks that may arise from health and safety, environmental, social and community, and regulatory performance. In 2017, Banchak assessed internal and external factors that could impact business. These include oil price and exchange rate volatility, industry competitiveness, state of the economy, innovation and technological change (e.g. energy storage and electric vehicle), and government policies. We also take into account megatrends identified in the World Economic Forum’s “The Global Risks Report 2017” and stakeholders inputs when conducting risk assessment to identify impacts and opportunities to the business.

We have divided risk management framework into 3 areas: **1) Corporate Risk Management 2) New Business Investment Risk Management 3) Business Continuity Management (BCM)** in order to effectively assess and manage impacts according to the nature of risks.



1. Corporate Risk Management

Risk assessment takes into consideration internal and external factors as well as future trends that may impact corporate target in both short term and long term.

Economic Risks (Disclosure 102-29)

Risks	Mitigation Measures
<p>1) Oil and raw material price volatility</p> <p>Impact : Revenue stream fluctuation in petroleum and other businesses</p> 	<p>Short-term and long-term mitigation measures includes:</p> <ul style="list-style-type: none"> • Closely monitoring oil price and develop new tools and measures to manage the spread between crude and refined products. The Price Risk Management Committee (PRMC) is responsible for selecting measures to mitigate price risks. • Secure raw materials for biofuel production from reliable sources at a price that ensure profitability for Bangchak. Develop high value products to increase revenue. • Increase investment in new businesses, specifically green power generation both in Thailand and overseas through subsidiary, Bangchak Green Power • Establish a new subsidiary, BBGI, that focuses on biofuel production to increase competitiveness and diversify risk of raw materials price fluctuation from tapioca, molasses, and crude palm oil prices. Currently BBGI has production capacity of over 1,710,000 liters/day (ethanol capacity of 900,000 liters/day and biodiesel capacity of 810,000 liters/day).
<p>2) Supply chain and raw material management</p> <p>Impact : Business disruption/ production costs</p> 	<ul style="list-style-type: none"> • Securing crude offtake agreements in a more long-term format from both domestic and overseas sources to consistently stabilize the level of crude supply. • Procuring crude oil quality more suitable to existing technologies to maximize yield and value to the company. • Categorizing suppliers with a focus on high-value raw materials and feedstock, goods, and services properly processed with appropriate sets of risk assessment, i.e. economic, environmental and social, to ensure business continuity.
<p>3) Technological Change and Energy Innovations</p> <p>Impact : Decrease in revenue growth from petroleum businesses</p> 	<ul style="list-style-type: none"> • Increase investment in lithium mining through 16.1% share purchase of Lithium Americas Corp. to support the growing trend in battery usage • Setup Bangchak Initiative and Innovation Center (BiIC) and collaborating with industry network to create Green Ecosystem that supports green innovation leading to business breakthrough and resource efficiency

Social Risks (Disclosure 102-29)

Risks	Mitigation Measures
<p>4) Operations could create impacts on communities and the public</p> <p>Impact : Public and community confidence in Bangchak's operations</p> 	<ul style="list-style-type: none"> • Adding Safety Integrity Level (SIL), Reliability-Centered Maintenance (RCM), and Risk-Based Inspection (RBI) to the risk management system to expand risk assessment coverage all equipment and work processes and design the maintenance program in advance with high accuracy, leading to reduction of accidents. • Complying the Occupational Health and Safety Management System with TIS/OHSAS 18001 standard, identifying work hazard (HAZOP: Hazard and Operability Studies) and implementing the Process Safety Management System (PSM). • Installing online air emission monitoring stations at Sai Jai Thai Foundation (under the royal patronage) on Sanpawuth Road, and the entry gate No. 2 of Bangchak Refinery. The installation of these two new monitoring stations increased the coverage of air emission control and bolstered the confidence level among the surrounding communities and the public. There are now six online air emission monitoring stations. • Installing an enclosed ground flare to reduce emission impact on surrounding communities. The project is set for completion in 2019. • Promoting activities with surrounding communities for more knowledge and better understanding, as well as awareness of safety. People from schools, temples, and nearby condominiums attended these activities and participated in evacuation and firefighting drills. Installing fire alarm and communication systems to better communicate with the communities and having community representatives participate in and observe emergency drills.

Environmental Risks (Disclosure 102-29)

Risks	Mitigation Measures
<p>5) Climate Change</p> <p>Impact : Climate change impacts disrupting business operations</p> 	<p>Bangchak has implemented short-term and long-term measures to mitigate impacts from climate change that could disrupt business operations. In addition, Bangchak is actively reducing our GHG emissions.</p> <ul style="list-style-type: none"> • Monitoring potential risks that may arise from climate change (e.g. floods) and put in place plans (based on impact level) to ensure business continuity • Replacing fuel oil power plant with 12 MW Cogeneration Power Plant in 2017 resulting in increase in energy efficiency and decrease in GHG emission from the refinery • Promoting environmental stewardship culture in the company through energy and environmental conservation. Bangchak refinery has received Level 5 Award (Green Network) from the Department of Industrial Works. The new Head Office building has also been LEED Platinum certified. • Developing green energy business by expanding renewable energy power generation through BCPG and biofuel production through BBGI. • Collaborate in research and development effort for “Environmental technology Development for Sustainable Refinery” to reduce GHG emission which includes Carbon Footprint assessment and ISO 14067 Standard.

Environmental Risks (Disclosure 102-29)

Risks	Measures
<p>6) Water Supply Shortage</p> <p>Impact : Insufficient water for production processes</p> 	<ul style="list-style-type: none"> • Formulation of a Refinery Water Management Taskforce to explore optimal water management measures to stabilize the entire production processes, minimize water consumption, reuse, and recycle with reverse osmosis technology. This year Bangchak successfully reduced the volume of discharged effluent and consumption by 3.42% of the total water consumption (compared with 2015 baseline). • Developing a water footprint to enhance water management through the product life-cycles. • Promote water efficiency in subsidiaries’s operations beginning with water reuse and constructing new water reservoirs to increase water reserve
<p>7) Ecosystem Collapse</p> <p>Impact : oil spill from marine transportation could cause severe impacts to the ecosystem</p> 	<ul style="list-style-type: none"> • Deploying oil spill prevention measures by redefining the standards for crude and refined product vessels with double hulls. • Providing capability measures associated with emergency equipment and oil spill equipment to cope with oil spills and fires of vessels and floating storage unit) • Constantly developing and enhancing safety technologies for equipment, system, and instruments at ports under the standards defined by Oil Company International Marine Forum (OCIMF) such as the upgrade of the firefighting system and redesigning the wharf to become a Quick Release Hook, and installation of additional closed-circuit television (CCTV) system at the jetties.

2. New Business Investment Risk Management

In addition to consideration of strategic alignment and returns on investment of new businesses, project risk management is crucial to business success. A systematic project review must be conducted to identify:

- 1) Development Phase Risk
- 2) Construction Phase Risk
- 3) Operational Phase Risk (including financial, tax regulations in various countries, business risks, and reputational risks)
- 4) Natural Disaster Risk in order to ensure that new investment will achieve business targets and objectives without negative impacts to the environment, society, and local communities. Each new business investment risk management plan must be approved by the Enterprise-wide Risk Management Committee prior to Board’s approval.

3. Business Continuity Management (BCM)

Bangchak continues to be ISO 22301: 2012-certified for its BCM standard, for its Head Office, refinery, and Bangchak Oil Distribution Center, Central Region Business Office, and Bang Pa-in Oil Distribution Center, the same certification for five consecutive years for an international standard and efficiency on crisis management and an emergency response system. This recognition bolsters confidence among stakeholders in Bangchak's ability to properly respond to any potential emergencies and deliver products to customer without disruption.

In 2017, we updated our BCM plan to include our new Head Office and expand coverage to our subsidiaries. In addition, we conducted an emergency drill with Bongkot Ship of Bongkot Marine Service company to simulate an oil spill incident from a Floating Storage Unit. The drill scope covers communications among subsidiaries. Findings from the drill are used to improve emergency response process and allocate additional resources for all subsidiaries to ensure that business can continue to operate during emergencies.

