



Thaioil *Thaioil*
Transitional Risk Scenario

As of 26 December 2023



Methodology

Transition Risk Assessment

1



Policy & Legal



Reputation



Market



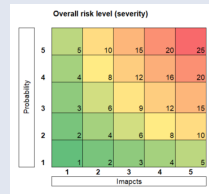
Technology

Identify Impact Drivers

Determine the factors putting pressure on companies into a low-carbon economy transition

2

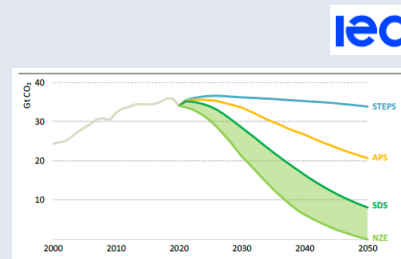
Probability (likelihood)	Meaning	Score
Very low	Prob. <10%. Its application/policies is likely not occur	1
Unlikely	Prob. 10 - 30%. Its application/policies is unlikely to occur	2
Medium	Prob. 30-70%. Its application/policies chance is normal, there is 50% chance to not occur, and 50% chance to occur	3
High	Prob. 70 - 90%. Its application/policies is likely to occur	4
Very high	Prob. >90%. Its application/policies is likely to occur	5



Prioritisation of risks and opportunities

Analysis of risks & opportunities to business based on each driver

3



Scenario Analysis

Qualitative assessment of identified impacts under two transition scenarios by 2030 and 2050

4

Risks	Impact of climate change on agricultural and livestock products is assumed in both 4-degree and 2-degree scenarios	4-degree scenario	2-degree scenario
		Yield decrease in raw materials, such as fresh milk, dairy ingredients, and cocoa beans, due to changes in air temperature, precipitation, etc., implementation of summer heat countermeasures, etc. might affect sourcing cost	Alcane introduction of carbon pricing for raw materials
Responses	Product related response	<ul style="list-style-type: none"> Provide added value enhancement to improve the competitive edge in the market Optimize product portfolio 	
	Response to maintain stable sourcing	<ul style="list-style-type: none"> Strengthen our relationship with farmers for stable sourcing of raw materials through Meiji Group's unique initiatives (Meiji Cocoa Support and Meiji Dairy Advisory) 	
	Response to reduce CO ₂ emission volume	<ul style="list-style-type: none"> Study of low carbon dairy farming Cooperation with dairy farmers for realizing low carbon dairy farming 	

Strategic Response

Identify potential response measures to risks and opportunities

Scenario Analysis

Quantitative assessment of identified risks under two transition scenarios by 2030 and 2050



Identify impact drivers

Scenario Analysis

Thaioil's Transition Drivers

RISK / OPPORTUNITY CATEGORY	Topic	Timeframe	TRANSITION RISKS / OPPORTUNITIES	Impact to
Policy and Legal	Carbon pricing and tax	Short- to long-term	Carbon-pricing policies may be applied in Thailand and regional in the future, which will affect TOP's operational cost.	Upstream and own operation
	CBAM	Short- to long-term	Carbon Border Adjustment Mechanism may be applied which TOP's exported products make 20% of the total portfolio of 2021 (*will be considered when TOP have exported products to CBAM area)	Upstream and own operation (only when Thaioil has expanded exporting product to CBAM adjustment area)
Technology Advances	Demand for lower carbon products	Medium- to long-term	High demand for biofuels, biojet and others clean fuels lead to invest more in the technology.	Upstream, own operation and downstream
	Maturity of CCUS and DAC technologies	Medium- to long-term	CCUS and DAC technologies are needed for Net Zero goal, needs of the technology and applying for TOP's facilities would affect to a number of cost.	Own operation
	Improvement of EV technology and cost effective, and customer shift to EV, then decrease in oil demand	Medium- to long-term	Changing demand of oil product prices will make significantly effects to Thaioil revenues. While demand for alternative low-carbon fuel & EV might be increased in low-carbon transition scenario e.g., SDS and Net Zero Scenario	Own operation and downstream

Thaioil's Transition Drivers

RISK / OPPORTUNITY CATEGORY	Topic	Timeframe	TRANSITION RISKS / OPPORTUNITIES	Impact to
Market Changes	Crude oil prices	Short- to long-term	Changing crude oil prices will make significantly affect to oil and gas value chains both in term of increasing and decreasing	Upstream and own operation
	Oil products prices: displacement of demand for fossil fuel and demand for alternative fuel	Short- to long-term	Changing demand of oil product prices will make significantly effects to Thaioil revenues. While demand for alternative low-carbon fuel & EV might be increased in low-carbon transition scenario e.g., SDS and Net Zero Scenario	Own operation and downstream
Reputation	Increasing pressure from investors on Net Zero targets	Medium- to long-term	Increased stakeholder & investor concern about low-carbon economy transition and requirement of climate target ambitions	Upstream and own operation
	Change of consumer preferences	Medium- to long-term	Changing consumer preferences towards products seen as better for the environment verified or lower carbon emissions	Upstream, own operation and downstream



Prioritisation of Risks

Scenario Analysis

Prioritisation of risk and financial impact

Risk parameters & risk matrix for qualitative assessment

Probability (Likelihood)

Probability	Meaning	Score
Very low	Probability <20%	1
Unlikely	Probability 20 - 40%	2
Medium	Probability 40 - 60%	3
High	Probability 60 - 80%	4
Very high	Probability > 80%	5



Magnitude of impact (CDP & TOP risk management)

Impact (CDP)	Meaning (TOP)	Score
Low	<1% of Profit	1
Medium-low	1-2.5% of Profit	2
Medium	2.5-5.0% of Profit	3
Medium-high	5.0-10% of Profit	4
High	>10% of Profit	5



Magnitude of impact (CDP & TOP risk management)

Impact (CDP)	Meaning (TOP)	Score
Low	<1% of impact on target	1
Medium-low	1-5% impact on target	2
Medium	5-15% impact on target	3
Medium-high	15-25% impact on target	4
High	>25% impact on target	5

*Severity of impacts on a specific target

Overall risk level (severity)

Probability	1	2	3	4	5
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
	Impacts				

Thaioil's Transition Risk Matrix

Direct operation: Transitional risk assessment in 2030 & 2050

2030

2050

Very High High Medium Low Very low



Direct operation – Risks Assessment

P1 Carbon Price (local) on Scope 1 & 2 emissions

T1 Demand for lower carbon products (Biofuel, ethanol, SAF), lead to high investment

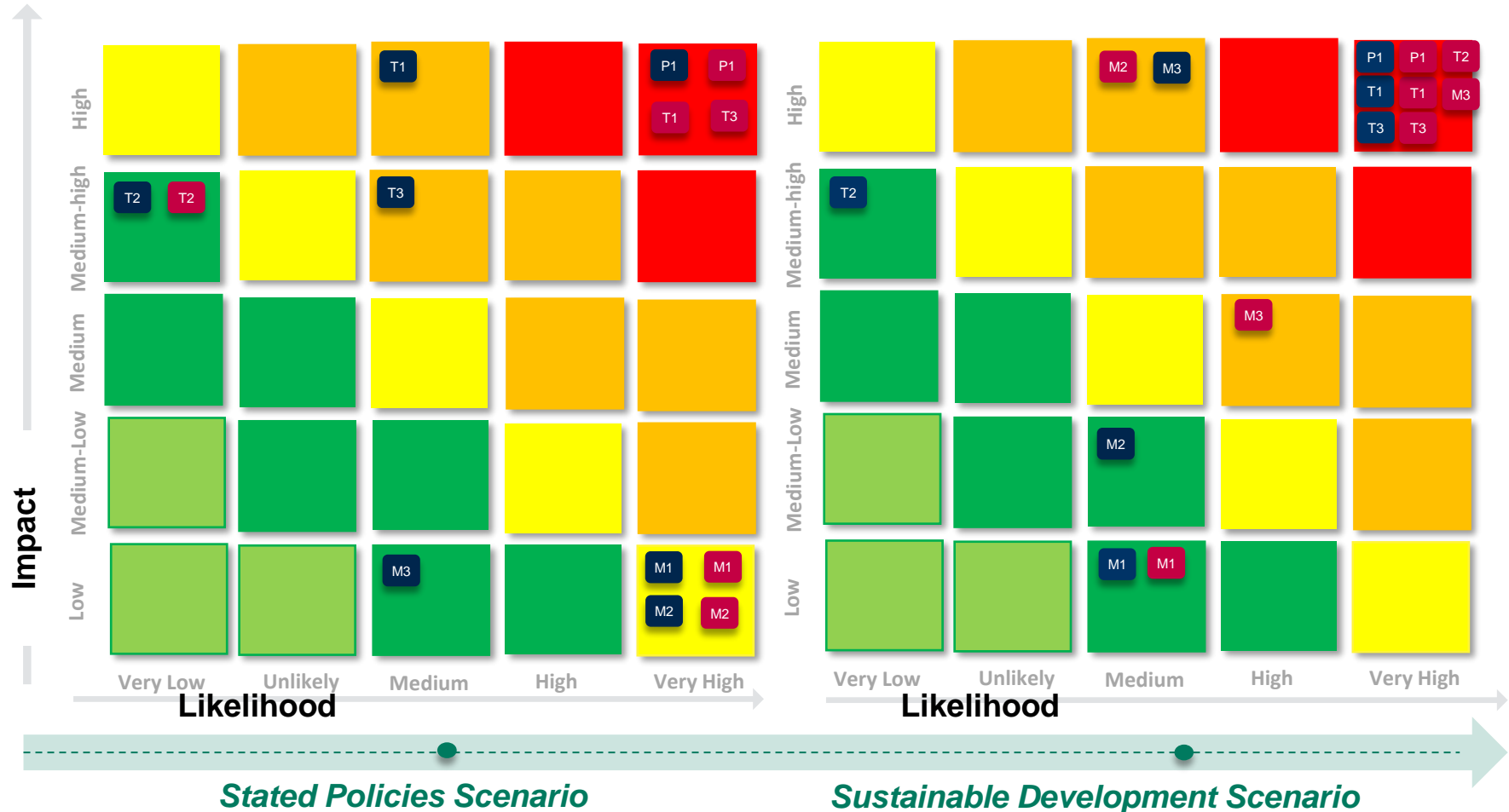
T2 Maturity of CCUS and DAC

T3 Improvement of EV technology and cost effective (EV market share)

M1 Change of crude oil price

M2 Demand on Oil products

M3 CAPEX costs to reduce GHG reduction plan and mitigation requirement (Increasing pressure on Net Zero)



Thaioil's Transition Risk Matrix

Upstream: Transitional risk assessment in 2030 & 2050

2030

2050

Very High High Medium Low Very low



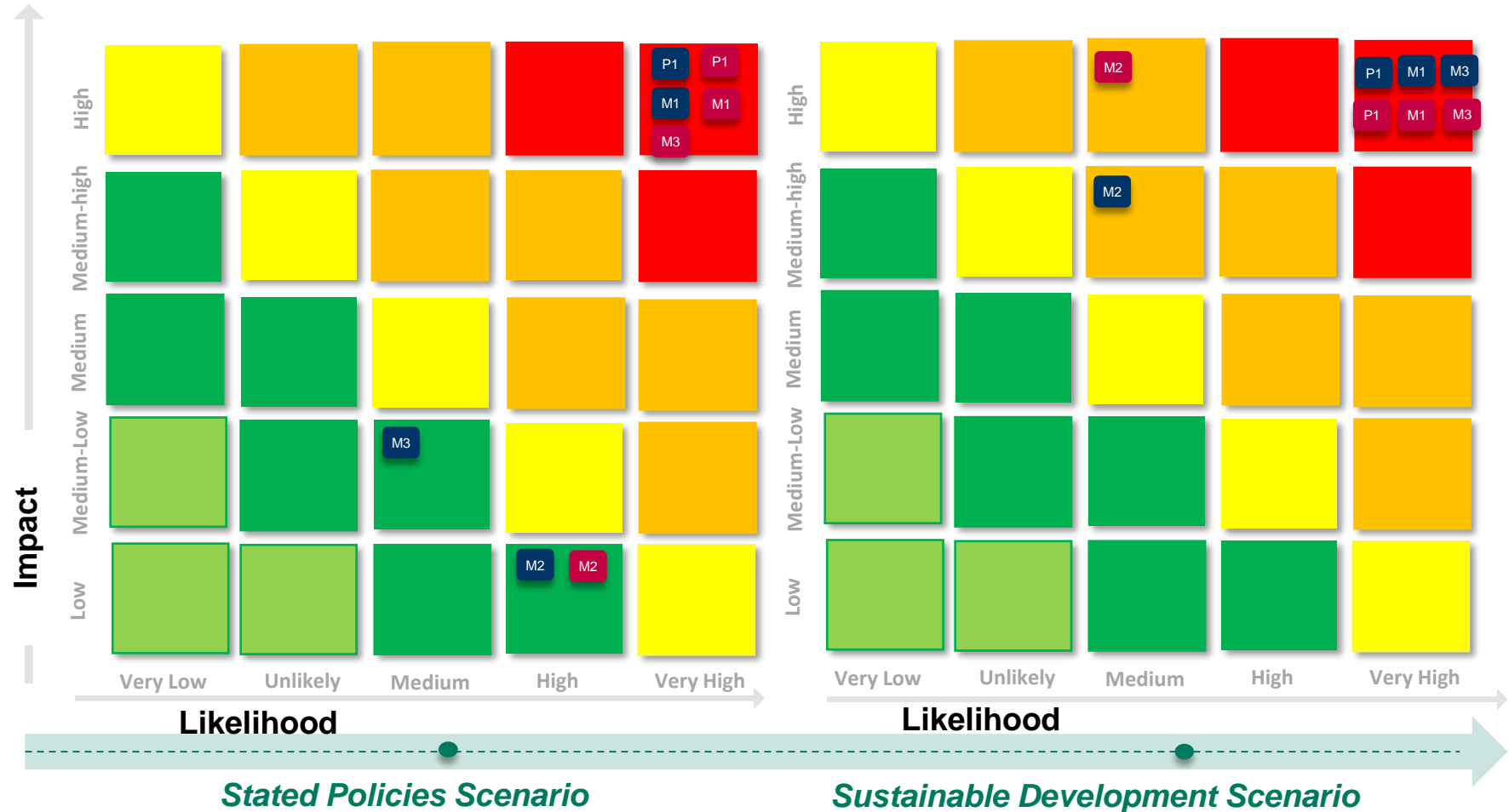
Upstream – Risks Assessment

P1 Carbon Pricing on Scope 1 & 2

M1 Demand for lower carbon products

M2 Change in Crude oil price

M3 CAPEX costs to reduce GHG reduction plan and mitigation requirement Increasing pressure on Net Zero)



Thaioil's Transition Risk Matrix

Downstream: Transitional risk assessment in 2030 & 2050

2030

2050

Very High High Medium Low Very low

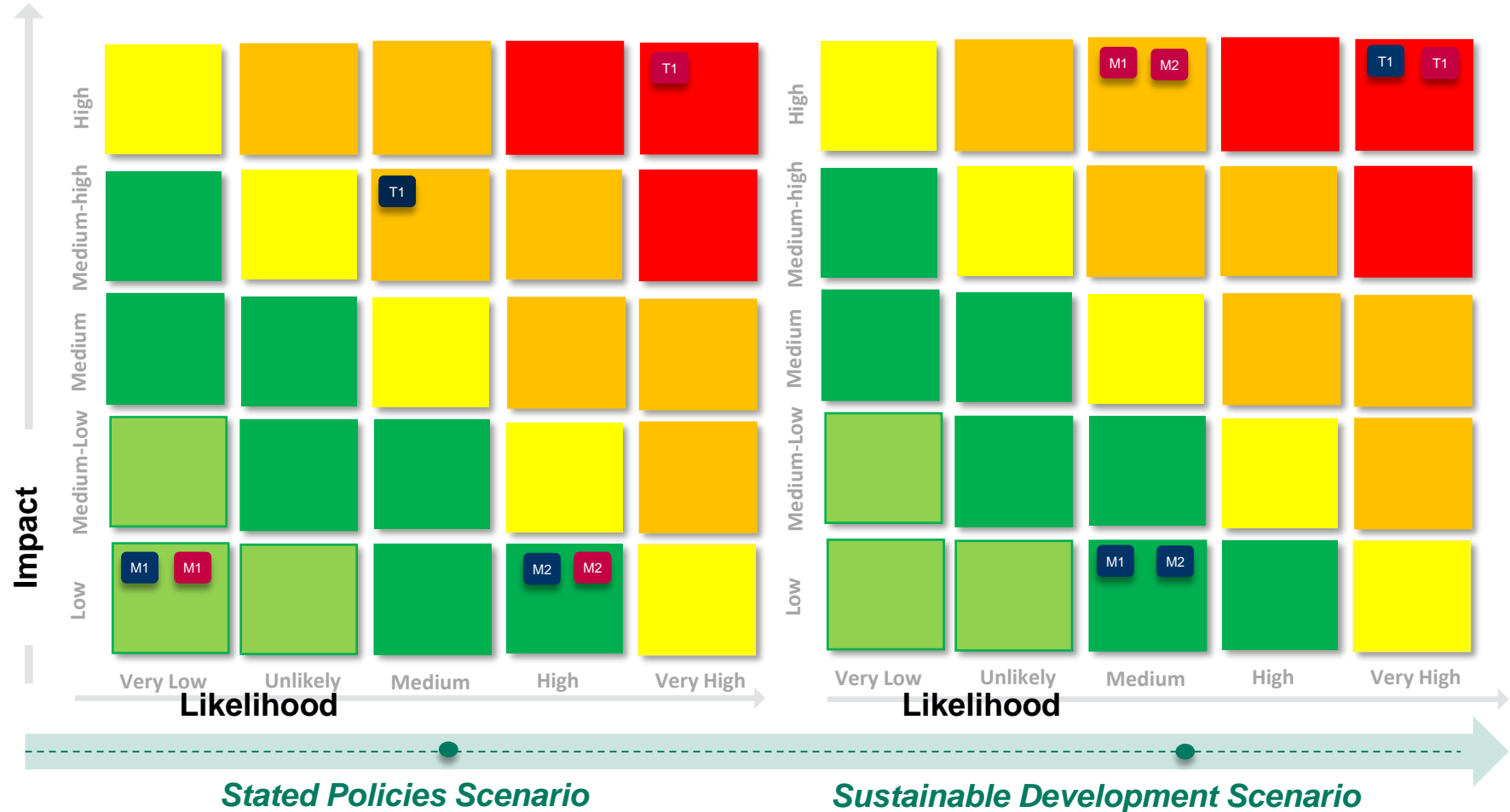


Downstream – Risks Assessment

T1 Improvement of EV technology and cost effective (EV market share)

M1 Re-pricing of assets (fossil fuel reserves)

M2 Demand of oil products (Global)



Summary of selected top 2 risks



Upstream – Risks Assessment

P1 Carbon Pricing on Scope 1 & 2

M1 Demand for lower carbon products

M2 Change in Crude oil price

M3 CAPEX costs to reduce GHG reduction plan and mitigation requirement Increasing pressure on Net Zero)



Direct operation – Risks Assessment

P1 Carbon Price (local) on Scope 1 & 2 emissions

T1 Demand for lower carbon products (Biofuel, ethanol, SAF), lead to high investment

T2 Maturity of CCUS and DAC

T3 Improvement of EV technology and cost effective (EV market share)

M1 Change of crude oil price

M2 Demand on Oil products (Diesel)

M3 CAPEX costs to reduce GHG reduction plan and mitigation requirement (Increasing pressure on Net Zero)



Downstream – Risks Assessment

T1 Improvement of EV technology and cost effective (EV market share)

M1 Re-pricing of assets (fossil fuel reserves)

M2 Demand of oil products (Global)

Financial impact calculation

- Three selected risks included carbon pricing on scope 1&2 of suppliers and carbon pricing and demand for lower carbon of TOP's direct operation have been translated into financial impacts for TOP's operation.
- Other impacts of selected risks were included in the calculation.
 - Demand for lower carbon products of upstream was included in direct operation
 - Improvement of EV technology cause lower demand of oil products which is reflected in the calculation.
 - Re-pricing of assets of customers will not affect to TOP's cost & revenue

Financial impact assumption

Business	Transitional Risks	Impact to TOP	Calculation	Justification
Operation	Carbon Pricing on Scope 1 & 2	Increase operating cost	TOP's CO ₂ e x differences in CO ₂ e price	-
	Demand for lower carbon products	Decrease revenue in oil related products	Differences in oil product demands x product prices	-
Upstream (Supplier)	Carbon Pricing on Scope 1 & 2	Increase cost feedstock by adding cost on top of crude oil prices	Calculated TOP's category 1 emission x differences in CO ₂ e price	-
	Demand for lower carbon products	Reduce capacity of supplier, crude cost may be either increased or decreased	-	Included in operation as demand for lower carbon products
Downstream (Customer)	Improvement of EV technology and cost effective (EV market share)	Resulting in lower demand of oil products	-	Included in demand for lower carbon products
	Re-pricing of assets (fossil fuel reserves)	No impact to TOP	-	No directly impact to TOP

Transition Risk Implications (Own Operation 1/2)



Identified Risk	Possible Risk Implication	Financial Impacts										
<p>Mandatory Carbon Pricing</p>	<ul style="list-style-type: none"> Potentially increased operating costs due to policy changes such as carbon tax or emission trading scheme, estimated time frame for financial implications of this risk will occur in next 7 years (in 2030) Potentially increased capital investment in upgrading facilities or transition 	<p>Thaioil Group have quantified the potential financial implications (before taking actions) which may affect us from carbon cost in emission trading scheme as follows:</p> <div data-bbox="988 432 2300 1003" style="text-align: center;"> <p>Financial Impacts from Carbon Pricing</p> <table border="1"> <caption>Financial Impacts from Carbon Pricing Data</caption> <thead> <tr> <th>Scenario</th> <th>% impact on EBITDA</th> </tr> </thead> <tbody> <tr> <td>STEPS 2030</td> <td>-5%</td> </tr> <tr> <td>SDS 2030</td> <td>-15%</td> </tr> <tr> <td>STEPS 2050</td> <td>-23%</td> </tr> <tr> <td>SDS 2050</td> <td>-71%</td> </tr> </tbody> </table> </div> <p>As currently no carbon pricing regulations in place in Thailand, there are no immediate impacts. Thaioil expects the implementation of an emission trading scheme mechanism starting in 2030, we assume to pay a carbon price based on the annual volume of our GHG emissions; assuming it would be capped at our 2023 emission level. Carbon pricing levels were assumed based on IEA World Energy Outlook 2021, resulting in negative impact on EBITDA at 5% in STEPS and 15% in SDS scenario.</p>	Scenario	% impact on EBITDA	STEPS 2030	-5%	SDS 2030	-15%	STEPS 2050	-23%	SDS 2050	-71%
Scenario	% impact on EBITDA											
STEPS 2030	-5%											
SDS 2030	-15%											
STEPS 2050	-23%											
SDS 2050	-71%											

Transition Risk Implications (Own Operation 2/2)



Identified Risk	Management Measures/Adaptation Plan
Mandatory Carbon Pricing	<p>Thaioil Group has committed to reduce 15% of GHG scope 1 and 2 from based year 2026 by 2035 and to achieve Net Zero GHG Emissions target by 2060. We have been conducting Decarbonization Pathway by focusing on managing resources to achieve efficiency, perusing study on decarbonization technology in our operations e.g., carbon capture and storage and the feasibility of renewable and alternative fuel consumption in the process.</p> <p>Moreover, Thaioil Group has been monitoring the progress of the government's Climate Act. and participating in public association to support sustainable development of the country.</p> <p>By 2030</p> <ul style="list-style-type: none">- Continuing conducting energy efficiency improvement projects to reduce GHG emission scope 1 and 2 in the operational processes. Normally we conduct 10-20 energy reduction projects per year, which can reduce approximately 399,480 tons of CO₂ equivalents from 2012-2022. In 2023, we conduct 23 projects which can reduce 28,003 tons of CO₂ equivalents. <p>After 2030:</p> <ul style="list-style-type: none">- Plan to install decarbonization technology e.g., carbon capture- Plan to collaborate with PTT Group for carbon transportation and storage hub.- Plan to study the feasibility of cleaner fuel consumption in the operation units e.g., biofuel, renewable fuel, green hydrogen.

Transition Risk Implications (Downstream 1/2)



Identified Risk	Possible Risk Implication	Financial Impacts										
<p>Market Demand for Oil Product</p>	<ul style="list-style-type: none"> Decreased revenue due to lower demand on hydrocarbon product and consumer's behavior change 	<p>Thaioil Group have quantified the potential financial implications (before taking actions) which may affect us from consumers' behavior change and market shift to lower carbon product, as follows:</p> <p style="text-align: center;">Financial Impacts from Product Demand Change</p> <table border="1"> <caption>Financial Impacts from Product Demand Change</caption> <thead> <tr> <th>Scenario</th> <th>% impact on revenues</th> </tr> </thead> <tbody> <tr> <td>STEPS 2030</td> <td>30%</td> </tr> <tr> <td>SDS 2030</td> <td>6%</td> </tr> <tr> <td>STEPS 2050</td> <td>1%</td> </tr> <tr> <td>SDS 2050</td> <td>-18%</td> </tr> </tbody> </table> <p>As IEA estimated oil peak in Asian is still growing in 2030 so the result shows positive impact at 30% in STEPS and 6% in SDS; however, the demand will be significantly lower in 2050.</p>	Scenario	% impact on revenues	STEPS 2030	30%	SDS 2030	6%	STEPS 2050	1%	SDS 2050	-18%
Scenario	% impact on revenues											
STEPS 2030	30%											
SDS 2030	6%											
STEPS 2050	1%											
SDS 2050	-18%											

Transition Risk Implications (Downstream 2/2)



Identified Risk	Management Measures/Adaptation Plan
Market Demand for Oil Product	<p>As the demand on our oil products will be lower significantly in the future as opposed to the higher demand on environmentally friendly products, Thaioil Group's transformation strategy is to re-segment the product portfolio as we decided to expand our refinery in 'The Clean Fuel Project (CFP)' to minimize production of gasoline which will be mainly affected by the electric vehicle growth, and to increase diesel and jet oil which will be in higher demand.</p> <p>The CFP will improve the production process and resource efficiency, thus raising its marketing competitiveness and better respond to the increasing demand of both domestic and ASEAN countries with the upward trend of fuel imports and energy transition. It will upgrade the refining unit with higher yields for converting fuel into premium and cleaner products and allow the transformation opportunity to petrochemical business. This will increase the capacity from 275,000 to 400,000 barrels per day, and the energy efficiency will uplift to be top quartile performance with no fuel oil consumption and use of cleaner fuel firing.</p> <p>This demand change is being both risk and opportunity for Thaioil Group to transform our product portfolio and value chain. Therefore, we plan to increase investments in the development of green products e.g., biofuels, sustainable aviation fuel and to expand market such as specialty product.</p>