

Materiality External Impact Valuation

Global Green Chemical Public Company Limited



Materiality Assessment Approach

GGC has conducted the materiality assessment in order to review the business activities and analyze the external impacts towards other stakeholders as well as the internal impact towards the company and business activities by utilizing the double materiality assessment as a methodology. This would allow GGC to prioritize the most significant materiality and create action plans to bring about positive impacts to all stakeholders.



1. Understand the organization's context

- 1.1 Review all business activities, relationships, sustainability context, and stakeholders in a value chain.
- 1.2 Conduct global trend and peer reviews across the industry to predetermine material topics.
- 1.3 Engage with stakeholders to help identify impacts.



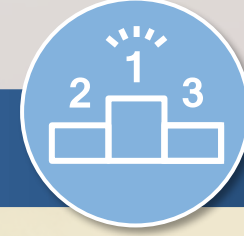
2. Identify actual and potential impacts

- 2.1 Identify impacts (actual, potential, positive, and negative), by referring to Double Materiality Approach
- 2.2 Seek to understand the concerns of stakeholders by consulting with them directly or with experts.
- 2.3 Assess how the organization can shape business activities to deliver positive impacts and address negative impacts.
- 2.4 Revisit the online survey questionnaires and conduct online surveys to gather stakeholder opinions.
- 2.5 Develop an interview guide and conduct stakeholder interviews.



3. Assess the significance of the impacts

- 3.1 Assess the significance of identified impacts to prioritize them by conducting quantitative and qualitative analysis.



4. Prioritize the most significant impacts for reporting

- 4.1 Set a threshold to determine which topics are material.
- 4.2 Group impacts into topics.
- 4.3 Test material topics with global trends, experts, or peers.
- 4.4 Propose selected material topics to the highest governance body for approval.
- 4.5 Determine what to report for each material topic.

Result of Materiality Assessment

In 2022, there are two most important materiality topics that are selected in order to conduct the impact valuation. The 2 materiality topics include “Climate & Environment” and “Supply Chain Management”.



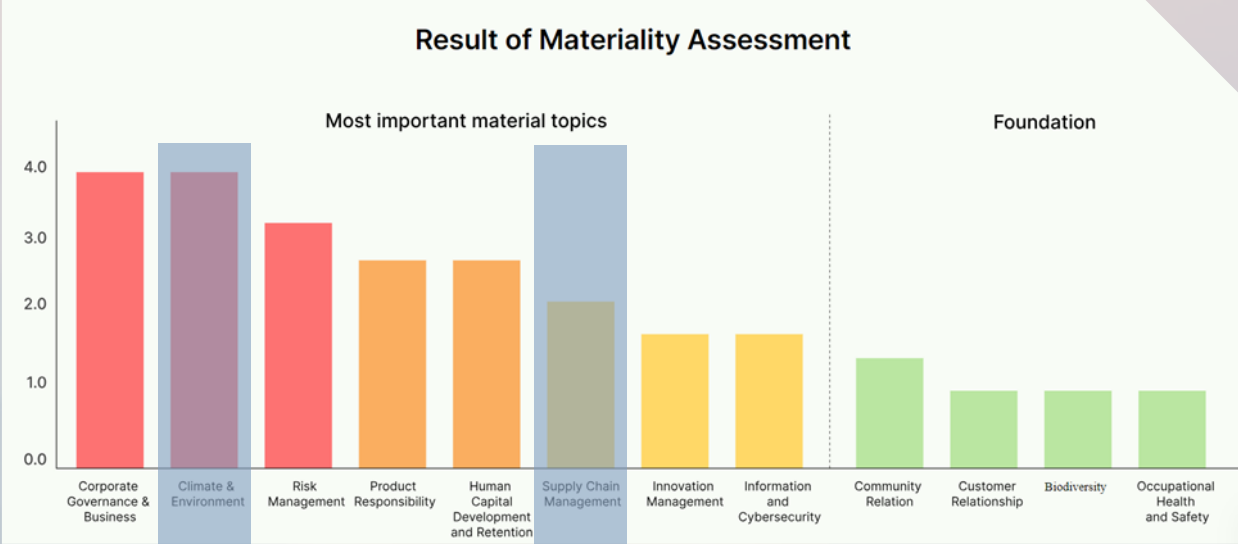
Climate Strategy

The climate strategy is an essential topic for all businesses, as companies have to create a transition plan to reduce our GHG emissions to achieve the target of limiting the temperature increase to 1.5 Celsius above pre-industrial levels according to the Paris Agreement. Therefore, companies are responsible to create a transition plan and put in place a Climate Strategy that would reduce the environmental lost as well as reduce the social cost of carbon that will help avoid the aggravation of people’s quality of life due to the direct and indirect impacts from GHG emissions. Accordingly, GGC has established a climate strategy with 3 pillars includes efficiency driven, portfolio driven and compensation driven to create positive impacts to the society and environment. One of which includes, the development of low-carbon products considered as a new substitute products, such as, Methyl Ester or Biodiesel that help reduce the GHG emissions and become a new substitute for a fuel source.



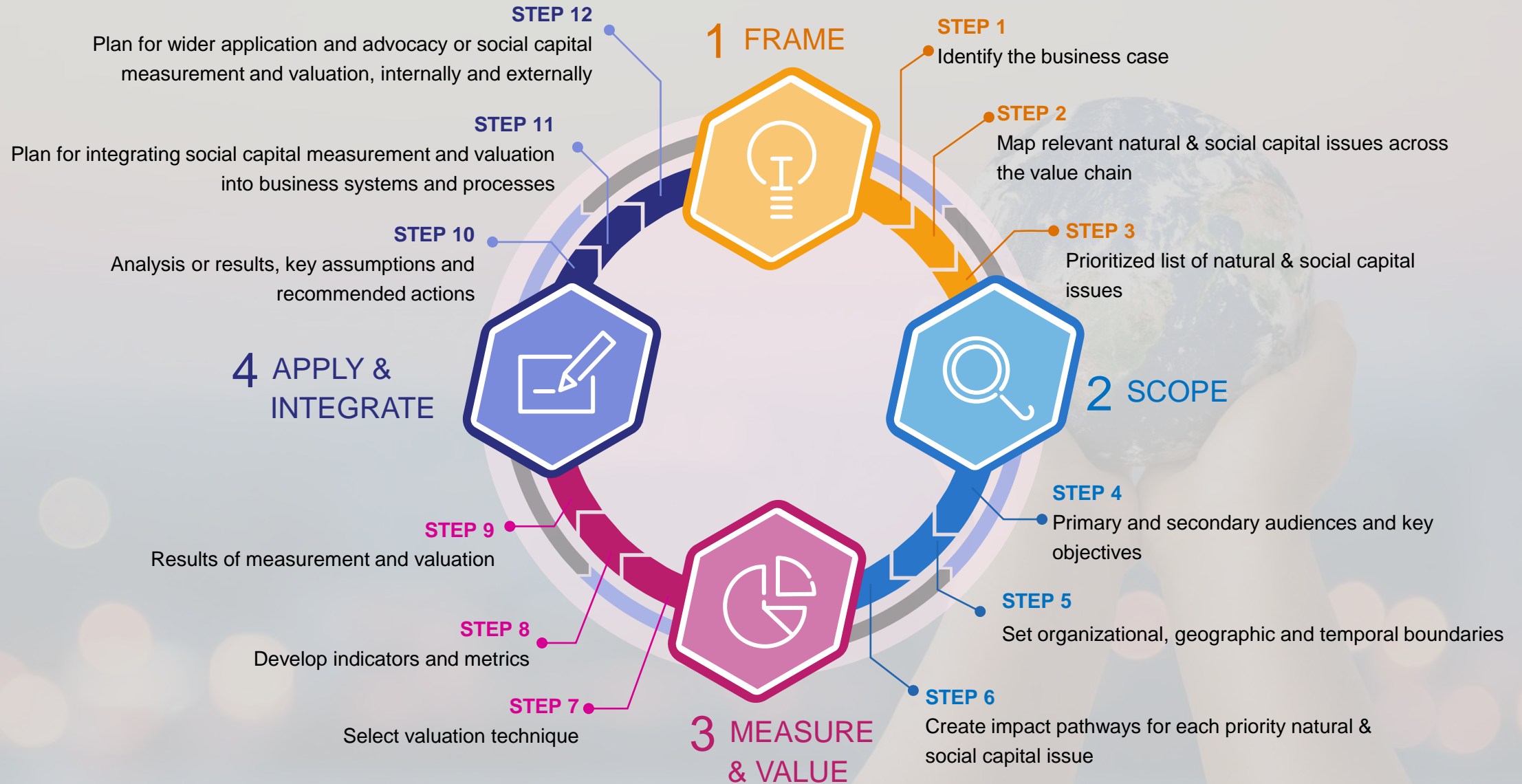
Supply Chain Management - RSPO

Supply Chain Management is one of GGC’s most vital material issues especially the raw material sourcing, involving agricultural commodities, such as Palm Oil. The agricultural products often suffer from fluctuating yields and prices, which would hurt the overall production costs and prices, affecting farmer’s household income and quality of life. Therefore, GGC would like to encourage sustainable agricultural through the Roundtable on Sustainable Palm Oil (RSPO) certificate, which help secure the quality and offer higher secured price to the farmer and reduce the external impacts for farmers in Thailand as well as maintain the quality of the raw material for GGC. This will not only make sustainable palm oil the norm, but also generate social impacts to farmers who are our significant stakeholders and improve local community well-being by increasing their household-level income from selling RSPO certified Fresh Palm Fruit Bunches (FFB) at higher prices to palm oil manufacturers.



Adapted Four Stages of Natural & Social Capital Protocol

In order to calculate the external impact valuation of the 2 selected topics, GGC adapted the Four Stages of Natural & Social Capital Protocol as a calculation methodology, referencing below steps





Impact 1 – Climate and Environment

Cause of the impact: Operations, Products/Services, and Supply chain with >50% of business activity

External stakeholder(s)/ Impact area(s) evaluated: Environment and Society

Topic relevance on external stakeholders: Greenhouse gas (GHG) emissions cause global warming leading to various negative impacts such as drought and flooding and pose a potential threat to human health such as respiratory and cardiovascular diseases resulting in the rising of healthcare costs and lower quality of life.

Climate and Environment is one of the most vital material issues of GGC. Therefore, as a part of Portfolio-Driven, GGC has been striving to drive sustainable business growth by increasing low-carbon investments and developing environmentally friendly products, especially biofuels such as methyl ester which use raw materials from domestic agricultural products. In this case, biofuels are the important solution to prevent GHG emissions by the replacement of fossil fuels leading to the **decreasing of Global Warming Potential (GWP)** and **decreasing of the social cost of carbon** that can reduce detrimental effects and enhance people's quality of life.

External Impacts:

Output Metric	Output Valuation	External stakeholder(s)/ impact area(s) evaluated	Type of Impact	Impact Valuation	Impact Valuation Result in 2022	Impact Metric	Reference
GHG Emission Avoided	GHG emissions are avoided by using methyl ester* or B100 722,140 tCO ₂ e	Environment	Positive	Environmental value lost/ gained	Decreased Global Warming Potential (GWP) by GHG emissions avoided of 722,140 tCO₂e	Global Warming Potential (GWP)	<ul style="list-style-type: none"> IRIS, 2021. Greenhouse Gas Emissions Avoided or Reduced (PI2764). v5.2. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials
		Society	Positive	Social cost caused/ avoided	Decreased social cost of carbon by GHG emissions avoided , so people's health impact will be lessened by 1,330,841,193 THB**	Social cost of carbon	<ul style="list-style-type: none"> IRIS, 2021. Social Impact Objectives (OD6247). v5.2. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990

Note: * Methyl Ester, which is commonly known as pure biodiesel fuel or "B100", is a clean burning renewable fuel made from natural plant oil such as palm oil, rapeseed oil, soybean oil, etc.

**The social cost of carbon (SCC) is an estimate of the economic damages that would result from emitting one additional ton of carbon dioxide into the atmosphere, and the value is calculated by using the SCC which is \$53 per metric ton of carbon dioxide in 2020 dollars with 3% discount rate (https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf) and the average exchange Rates in 2023 which is 34.7719 THB per USD (Exchange Rates UK, <https://www.exchangerates.org.uk/USD-THB-spot-exchange-rates-history-2023.html>).



Impact 2 – Supply Chain Management - RSPO

Cause of the impact: Operations, Products/Services, and Supply chain with >50% of business activity

External stakeholder(s)/ Impact area(s) evaluated: Society

Topic relevance on external stakeholders: **Supply Chain Management** is one of GGC's most vital material issues. The agricultural products often suffer from fluctuating yields and prices, which would hurt the overall production costs and prices, affecting farmer's household income and quality of life. Thus, GGC has not only develop the raw material selection process to improve decision making, but also implement programs with external stakeholders such as farmers to promote sustainable agricultural practices.

GGC together with partners such as Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and palm oil manufacturers developed the Thailand Oil Palm Smallholder Academy (TOPSA) to provide training programs to encourage smallholder farmers to obtain the Roundtable on Sustainable Palm Oil (RSPO) certification. This will not only help make sustainable palm oil the norm, but also generate social impacts to farmers who are our significant stakeholders and improve local community well-being by increasing their household-level income from selling RSPO certified Fresh Palm Fruit Bunches (FFB) at higher prices to palm oil manufacturers.

External Impacts:

Output Metric	Output Valuation	External stakeholder(s) / impact area(s) evaluated	Type of Impact	Impact Valuation	Impact Valuation Result in 2022	Impact Metric	Reference
Number of raw materials made of Fresh Palm Fruit Bunches (FFB) used in productions of Glycerin, Methyl Ester and Fatty Alcohol	Number of raw materials from Fresh Palm Fruit Bunches (FFB) i.e. <ul style="list-style-type: none"> Crude Palm Oil (CPO) 131,407 tons Crude Palm Kernel Oil (CPKO) 131,032 Refined Palm Oil (RPO) 90,460 tons Palm Fatty Acid Distillate (PFAD) 13,311 tons Palm Stearin (PS) 44,859 tons 	Society	Positive	Increase/decrease in household-level income	Improved local community well-being by increasing household-level income from selling Roundtable on Sustainable Palm Oil (RSPO) certified Fresh Palm Fruit Bunches (FFB) at higher prices by 10,765,702,020.64 THB/year*	Quality of life improvement: Amount of increased household-level income	<ul style="list-style-type: none"> IRIS, 2021. Target Stakeholder Socioeconomics (PD2541). v5.2. IRIS, 2021. Supplier Individuals: Low Income (PI8819). v5.2. IRIS, 2021. Payments to Supplier Individuals: Low Income (PI8999). v5.2.

Note: * The value is under the assumption of all related palm oil raw materials in GGC's production are all derived from RSPO certified FFB. The value is calculated by using related factors including CPO rate from FFB which is 202 kg/t FFB, CPKO rate from FFB which is 23 kg/t FFB, RPO rate from CPO which is 955 kg/t CPO, PFAD rate from CPO which is 45 kg/t CPO (Table 3, <https://www.osti.gov/servlets/purl/1812185>), PS rate from RPO which is 27.60% (Figure 1, <https://core.ac.uk/download/pdf/290123484.pdf>), average price of FFB which is 5.90 THB/kg (<https://palm.dit.go.th/Price.aspx>), and increase of price from RSPO certified plantation which is 20% (https://wwfint.awsassets.panda.org/downloads/executive_summary.pdf)