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Preamble

Global warming caused by the emission of greenhouse gases has brought significant risks to the growth of the global economy in recent years and will affect a greater number of businesses in the future. However, it may be difficult for investors to learn which companies are susceptible to risks of climate change, which companies are adequately prepared, and which ones are taking response actions. According, it is the reason why the Financial Stability Board (FSB) has assembled a special task force called the Task Force on Climate-Related Financial Disclosures (TCFD), which has published its "TCFD Recommendations Report" in June 2017 after spending 18 months gathering opinions from business and financial leaders. The Recommendations Report provides businesses and investors with a complete and well-defined assessment framework for disclosing risks and opportunities associated with climate change and for reflecting risks in financial reports.

In response to global trends, Nan Ya Plastics Corporation (NPC) has disclosed risks and opportunities associated with climate change in accordance with the TCFD Recommendations Report and made a more reasonable and efficient allocation of capital in line with NPC's responsibilities and strategies to realize our vision toward low-carbon transition.

NPC's Climate Change Management Focus

- The Chairman acts as the convener of "ESG Promotion Organization" and the President acts as the vice convener, in charge of the approval of ESG strategies and targets for climate change and risk management. The promotion team implements specific actions and reports to the Board of Directors annually
- The "Sustainable Development Committee" will be set up in 2022, to enhance the Board of Directors' management toward ESG
- Formulate climate related performance indicators and quantitative targets, and periodically track the level of achievement and publicly disclose the result
- To achieve carbon neutrality in 2050, we set up an internal management goal of "based on 2020, reduce carbon by 12.5% in 2025, reduce carbon by 25% in 2030"



- Low carbon energy transition
- Energy saving, carbon reduction and circular economy
- Increase renewable energy consumption
- Carbon capture technology utilization
- Identify and assess climate change related risks and opportunities according to ISO 14001 risk identification procedure
- Cross-department collaboration to execute risk and opportunity identification operation, assess financial impact and establish countermeasures

NPC's Energy Saving and Carbon Reduction Promotion Schedule



• Applied to join "Science Based Targets Initiative"

Governance

1.1 Company Profile

NPC, established 1958, was specialized in the production of secondary processing plastic products of PVC pipes, PVC film and PVC leather at the early stage of the company, and then gradually entered the fields of chemical products, polyesters fibers, electronic materials, and electrical and mechanical engineering fields from the original plastic processing field. In addition, since 1979, NPC has started its overseas businesses in the U.S. and China. Presently, NPC has become an international and diverse business entity (please refer to NPC's company website "About Us" for details of the company development history)



"About Us" on NPC website

	Name of Company	Nan Ya Plastics Corporation
	Company Establishment Date	August 22, 1958
_	Main Business Items	Electronic materials, chemical products, polyester fibers, plastic processing, electrical and mechanical engineering
	2021 Global Number of Employees	32,812 people
	2021 Consolidated Revenue	NT\$ 411,670,391 thousand

1.2 Organization and Responsibilities

The operation of the Board of Directors of NPC complies with relevant laws and the resolutions of the shareholders' meeting to exercise the authorities and adheres to the principle of sustainable operation, improvement of corporate ESG information transparency, and maintaining proper communication with stakeholders with best effort. The primary responsibilities of the Board of Directors are to ensure the corporate legal compliance, transparent information to the external, and to supervise major operation strategies of company. In addition, the ESG promotion status is discussed at least once annually, and such discussion also includes the climate related issues.

For NPC's "ESG Promotion Organization", the Chairman acts as the convener, and the President acts as the vice convener, in charge of establishing strategic direction for the climate change management. The President's Office and its subordinate departments, including "ESG Promotion Team" is responsible for executing promotion and implementation of relevant duties, and ESG promotion execution status is reported quarterly.

To cope with the global sustainability trend of carbon reduction, in 2021, NPC has established the "Risk Management Promotion Team" and the TCFD Task Force has been further established to handle the identification of risks and opportunities associated with climate change, following which the "ESG Promotion Team" and "Energy Saving and Carbon Reduction Promotion Team" discuss and establish the management actions of climate change risk adjustment and enhancement of risk resilience, and periodically tracks the energy saving and carbon reduction promotion of each business department and relevant unit, as well as submit reports to the "ESG Promotion Organization" timely.

Furthermore, to enhance the Board of Director's supervision and management on ESG matters of the company with respect to climate change, NPC is expected to establish the "Sustainable Development Committee" under the Board of Directors in 2022 to be responsible for the review of sustainable development policies, strategies and management directives, and the supervision of the company in the promotion of sustainable development related matters and execution plans.

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Board of Directors

Supervise the climate change management measure of NPC

ESG Promotion Organization

- Set up ESG strategy goal of NPC and supervise the implement status.
- The Chairman acts as the convener, and the President acts as the vice convener leading the management team to suprvise the implement of ESG
- Report ESG implementation to the Board of Directors at least once a year
- The ESG implementation of 2020 (includes risk management) has been reported to the Boards of Directors in July, 2021

ESG Promotion Team

- Composed of President's Office and its subordinate departments and was divided into three promotion teams namely "Envrionment Proection(E)", "Social Responsibility(S)" amd "Corporate Governmance(G)" by function. Plan and promote various tasks of ESG in referenc to the result of risk identification
- From the 4th quarter of 2021, report the ESG implement status quarterly

Energy Saving and Carbon Promotion Team

- The President acts as convener, discusses and sets up renewable energy facilities, circular econmy and energy saving and carbon redution tasks planning with President's Office, Engineering and Construction Division and each business division. In addition, set up and promote coping measures in response to the risk identified reusults related to climate.
- 16 energy saving and carbon reduction meetings were held in 2021.

Risk Management Promotion Team

- Composed of President's Office and its subordinate departments and was divided to "Envrionment Proection(E)", "Social (S)" amd "Corporate Governmance(G)" by function, in charge of indentifying various risks
- TCFD Task Force Team was set up under the Environment (E) Risk Management Team
- NPC will publish 2021 TCFD Report in July, 2022

Supervision Mechanism of Board of Directors

NPC believes that through implementation of ethical management and construction of sound and effective Board of Directors serve as the foundation for the sustainable development of the company. To cope with the global sustainability trend and to focus on the climate change issue, the Board of Directors takes the role of the supervisor and director for the sustainable management strategies. In addition, "Audit Committee" and "Remuneration Committee" are further established under the Board of Director to assist the Board of Directors to exercise its authorities and to fulfill responsibilities. To further strengthen the supervision on the sustainability duties, the "Sustainable Development Committee" is expected to be additionally established in June 2022, to assist the Board of Directors to supervise NPC in its implementation and promotion of climate change related sustainable duties.

Board of Directors' Climate Change Supervision Focus



Management Responsibility

"ESG Promotion Organization" is the highest supervisory and governing unit of NPC among the management for promoting ESG, and the Chairman of the Board acts as the convener, and the President acts as the vice convener, for leading the management team to supervise the promotion of ESG affairs of climate change, to establish NPC's carbon reduction targets and sustainable development strategies, and to report to the Board of Directors annually.

With regard to NPC's sustainable management structure, under the supervision of the ESG Promotion Organization, the "Risk Management Promotion Team" identifies the climate related risks and opportunities, followed by submitting to the "ESG Promotion Team" and the "Energy Saving and Carbon Reduction Promotion Team" to establish and implement action plans for climate related issues.

ESG Promotion Organization				
Convener Chairman				
Member	 President acts as the vice convener According to the three main aspects of "Environmental Protection (E)", "Social Welfare (S)" and "Corporate Governance (G)", a supervisor from the President's Office and having the job rank above management head is assigned to act as the responsible person for each main aspect respectively; in addition, according the functional attribute of each issue, relevant supervisors of the President's Office, direct department or business department shall act as the members "ESG Promotion Organization" is responsible for the establishment of the ESG strategic targets and the supervision of execution of ESG affairs. Its responsibilities also include the establishment of NPC's risk management strategic targets, and supervision of the risk management operation status (task-based team formation) 			
Review Frequency	Quarterly			
Responsibility	The Chairman leads the management team to establish company's risk management of ESG vision and strategic directives, and supervises the ESG affairs promotion status of each unit, to strengthen the sustainability culture and to create transformation opportunities			

Appendix

ESG Promotion Team

"ESG Promotion Team" is an ESG internal communication platform of NPC. In addition to passing on and implementing the sustainability policies and directives of the Board of Directors and the highest management, it also acts as the lateral communication channel among departments. The responsible persons of the three main aspects of the "ESG Promotion Organization" supervise the execution of affairs and duties, and lead each task force to establish response strategies and management directives according to the major sustainability issues identified, thereby coordinating resource allocation, and tracking the project execution outcome, to ensure the proper implementation of ESG strategies.

Organization Structure				
Supervising Head Responsible persons for three main aspects of "ESG Promotion Organization"				
MembersThe President's Office and direct departments assign management representatives to the the role of members according to relevant functional attributes of "Environmental Protect" (E)", "Social Welfare (S)" and "Corporate Governance (G)".				
Review Frequency	Quarterly			
Work Items	 Identify major sustainability issues annually, and establish response action plan Promote ESG affairs cross-department communication, and integrate resources Track the execution performance for each aspect of sustainability issue, and establish continuous improvement plan Report execution outcome and work plan to the Chairman quarterly 			

2021 Climate Change Issue Promotion Outcome

Promoted eight main carbon reduction projects according to the corporate policy

- Climate-related financial disclosure: Enrolled in the support of TCFD advocacy
- Renewable energy and green energy review and promotion: Increased the renewable energy consumption ratio
- Circular economy Increased energy (resource) efficiency, and achieved internal carbon emission reduction improvement
- Circular economy Develop recycled renewable products
- Safe and green purchase (including transportation packaging)
- Green product research and development, and green industry promotion
- Developed biodegradable products
- Link to international carbon reduction advocacy: Applied for enrollment in the "Science Based Targets Initiative" (SBTi)





Energy Saving and Carbon Reduction Promotion Team

The President acts as the chairperson of NPC's organization of climate change risk and opportunity actions management and execution, and relevant management strategies are established, and execution status and future plan are reviewed quarterly.

Organization Structure				
Chairperson President				
Members	 Supervising head: "Environmental Protection (E)" responsible person (Senior Vice President of the President's Office), and promotion officer (Assistant Vice President of the President's Office) 			
	 President's Office, Engineering and Construction Department and supervising head of each business department, energy saving and carbon reduction officer 			
Review Frequency	Quarterly			
	 Discuss relevant strategies for physical risks, transformation risks and opportunities in response to climate change 			
Work Items	 Establish management plan, inspect execution status and discuss future plan 			
	 Report execution outcome and work plan to the Chairman irregularly 			
2021 Climate Change Issue Promotion Outcome				

Established the 2050 "Carbon Neutrality Long-Term Target", and established the four main carbon reduction strategies:

- Low carbon energy transition
- Energy saving, carbon reduction and circular economy
- Increase renewable energy consumption
- Carbon capture technology utilization

Risk Management Promotion Team

"Risk Management Promotion Team" is formed by representatives assigned by each organization, and it is responsible for conducting risk matrix assessment based on the risk event occurrence frequency and operation impact level, and is also responsible for executing risk control project, reviewing project outcome, and performing continuous improvement. In addition, TCFD Task Force Team is established under the "Environment (E) Risk Management Team", to execute the climate change risk and opportunity identification, followed by submitting the identification result to "ESG Promotion Team" and the "Energy Saving and Carbon Reduction Promotion Team" for the establishment and promotion of relevant risk mitigation strategies.

Organization Structure			
Supervising Head Vice President of President's Office			
Members Formed by representatives assigned by each organization			
Review frequency	Annually		
	 Understand international ESG risk trend, and collect relevant information 		
Work Itoms	 Identify ESG risk items; in addition, TCFD Task Force Team is responsible for the identification of climate change risks and opportunities 		
WORK HEITIS	 Submit the risk items identified to the "ESG Promotion Team" and "Energy Saving and Carbon Reduction Promotion Team" to continuously promote risk mitigation measures and to strengthen the risk resilience of NPC 		
	2021 Climate Change Issue Promotion Outcome		
	Identified ESG risk items, and climate change risks and opportunities		

1.3 Organization Boundary

This report is established with NPC as the disclosure entity and describes carbon reduction targets, strategies established in response to climate change as well as the content of risks and opportunities identified according to the TCFD framework.





2.1 Strategy of Carbon Reduction

Since the establishment, NPC has upheld the philosophy of equal importance for both industrial development and environmental protection. NPC focuses on industrial safety, environmental protection and climate change trends, seeks reduction of energy and resource investment, utilizes most optimal control technologies and implements waste reduction at the source and during the production process with best effort. According to the principle of circular economy, NPC reviews and recycles the use of various resources. Through operation control and periodic monitoring, various air pollutant emissions are superior to the national standards. In addition, optimized process management and green product development are integrated into the company business management, to contribute efforts to the economic development and social prosperity in Taiwan jointly.

NPC focuses on the 'climate change issues" and actively faces the opportunities and challenges associated with the climate change to the company's business operation. To cope with the global carbon reduction trend and in response to the UN's Sustainable Development Goals (SDGs) 13 climate actions, NPC has set the long-term carbon reduction goal of carbon neutrality by 2050, and actively promotes the four main carbon reduction strategies. The strategy promotion focuses and carbon reduction benefits expected to be achieved by 2030 are summarized in the following:

- 1. Low carbon energy transition: Stop the running of coal-fired boilers at the utility plant, and install gas-fired steam boiler equipment. In addition, all production plants also change to use low carbon energy (such as natural gas) to replace high carbon energy sources (such as coal, heavy oil). It is expected to reduce 1.29 million tons of carbon annually.
- 2. Energy saving, carbon reduction and circular economy: Continue to promote process improvement, circular economy, Al and digital transformation, increase energy use efficiency and reduce waste generation. It is expected to reduce 970 thousand tons of carbon annually.
- 3. Increase renewable energy consumption: Install solar power generation facilities at the plant roof of each plant site. By 2030, the installation total capability will reach approximately 51,625kW and is expected to account for approximately 29.4% of the Taiwan Power Company (TPC) contract capacity, which is higher than the 10% requirement for large electricity consumption users specified by the government.
- 4. Utilization of carbon capture technology: Expand the construction of electronic and industrial liquid CO₂ factory to recover all CO₂ generated during the manufacturing process to achieve resourcezation. It is expected to reduce 240 thousand tons of carbon annually.



NPC's Short/Medium/Long-Term Strategy of Carbon Reduction

Management of Climate Change Risks and Opportunities

Indicators and Targets

Appendix

NPC has completed 405 energy saving improvement projects in 2021, and the investment amount was NT\$742,018 thousand. The amount of carbon reduction achieved is estimated to be approximately 740,475 tons/year. In addition, the main promotion projects with respect to NPC four main carbon reduction strategies in 2021 are summarized in the following:

• Replaced the coal-fired boilers at the Linkou utility factory with gas-burning boilers. The annual carbon reduction is estimated to be approximately 148,248 tons/year.	
Low Carbon Energy Transition	
 For EG-4 carbon dioxide emission and waste heat, implemented the Organic Rankine Cycle system power generation improvement project. The annual carbon reduction is estimated the approximately 13,471 tons/year. Through AI technology, the process condition can be optimized in order to reduce the raw material and energy consumption: For example, Petrochemical Division II BPA Plant :reduce phenol consumption of 1,650 tons/year, acetone of 660 tons/year; Petrochemical Division II EG Plant: reduced vinyl consumption of 3,867 tons/year. 	e ro ed I
Energy Saving and Carbon Reduction and Circular Economy	
 1,500 kW solar power generation equipment construction investment project of Hsinkang Switchboard Plant: Project outsourcing has been completed, it is now entering the construction stage. Promoted Hsinkang Site (Glass Fabrics Cloth Plant I~IV), Chiayi Site solar power generation equipment construction investment project: Expected installation capacity:24,763 kW. 	
Increase Renewable Energy Consumption	
 Reuse: Continue to promote electronic and industrial liquid CO₂ factory expansion and construction project; and I910 waste gas incinerator carbon dioxide recycling Reduction: Continue to review, and promote the additional installation projects of CO₂ absorption towers, and to increase the catalyst selection rate; and use the catalyst of the highest performance, to reduce side reaction. 	
Carbon Capture Technology Utilization	

2.3 Water Reservation and Water Resource Efficiency Improvement Outcome

The number of water reservation improvement projects completed by NPC in 2021 was 43 cases. The investment amount is estimated to be NT\$150 million, and it is expected to save 2,504tons/day of water.

2021 Water Reservation Improvement Project Description

Project	Description	Water Saving Improvement Performance
Project 1	EG-4 steam condensed water delivery to anhydride (MA) plant to improve waste heat recycling	148 tons/day
Project 2	BG2 2E340 cooling water flow rate adjustment to improve water saving	96 tons/day
Project 3	BPA Plant absorption type of freezer with increased performance to improve water saving	28 tons/day



2.4 Low Carbon Product Promotion Method and Outcome - Plastic Recycled Product

1. PET bottle recycling:

- PET bottles are recycled for polyester resins to replace the virgin polyester resins, and the carbon emission can be reduced by 72%.
- In 2021, a total of 8.7 billion PET bottles were recycled, and the carbon emission of 188 thousand tons/year was reduced.



- After recycling, 90% is used for the manufacturing of long filaments of relatively higher technical difficulty and high added value. (most of general business operators manufacture short filaments and sheets, and only 7.7% uses long filaments.)
- Continue to expand production line, and the target for the Taiwan region is the recycled resin production capacity reaching more than 75% of the virgin bottle resins.



PET Bottle, storage box, dinner set

2. MLCC (Multi-layer Ceramic Capacitor) release film recycling:

After the used by customer, the release films were originally disposed as waste. Now, after the recycling and treatment by NPC, they can provide for the manufacturing of the products of UP resin and polyester staple fibers. The recycling capacity is 600 tons/month, and the release films used by domestic MLCC and optical customers can be recycled.

Back End

Applicatio



Recycle

In the past, 3C electronic consumer products mostly use non-PET materials, and after the scrap of such materials, they are not facilitated for recycling. After the modification of the polyester resins industrially recycled, they can also be applied to 3C consumer electronic products, such as: notebook computer chassis, television stands, connectors and cooling fans, etc., thereby increasing the value of the product recycling and reuse.

Modifie

3. Fiber recycling:

For Production

After used

In 2020, there were approximately 34 million tons of waste clothes being disposed via the landfill or incineration method worldwide. Accordingly, NPC has actively cooperated with leading brand manufacturers to develop fiber recycling, to recycle waste greige (dyed) fabrics, fabric scraps and old clothing from consumers and to transform them into recycled resins, to form the textile regeneration cycle chain.

NPC has developed its own recycling technology for pure PET greige fabrics, finished fabrics and fabric scraps, and has also established the pre-treatment and polyester resin manufacturing production line with a monthly production capacity of 1,000 tons. Presently, NPC is currently self-developing the high-end depolymerization and recycling technology, and will construct a leading factory to serve as the basis for mass production in the future.



4. Replace virgin material with recycled material:

By replacing the virgin materials with recycled materials, the carbon emission generated from the raw material end can be reduced. Presently, the products under development include: PP recycled materials for production of plastic pallets, 65% of recycled and retreated naked coppers used for producing copper foil, and the products of UP resin, rigid fabric, A-PET tape and PP tape with the addition of different proportion of recycled materials respectively.

Governance



UP resin and

5. Material with homogeneous design:

To further expand the recycling scope and to achieve greater convenience, design and development of material homogeneous products is the trend for the future. Accordingly, NPC now implements the following development projects:

Development of modified polyester rein

Garment and accessory material homogeneity: Presently, most of the traditional garments and accessories (such as zippers and buttons, etc.) use non-PET materials. After recycling, it is necessary to perform manual removal and selection. By developing modified polyester resins to replace the original garment and accessory materials, it is able to achieve textile material homogeneity, thereby facilitating the subsequent recycling and reuse.



+ Curtain material homogeneity: Presently, venetian blinds and roman blinds are formed by using components and fabric of different materials, such that they are not facilitated for subsequent recycling and reuse.

Parts	Venetian Blind	Beam and Frame of Venetian Blind and Roman Blind	Transparent UV Resistant Exterior Parts	Blade Steering Mechanism and Rope Control Mechanism
Raw Material	Aluminum Sheet and PVC	ABS, PVC	UV Resistant PC	POM

NPC cooperated with domestic leading curtain manufacturers to manufacture 100% polyester material curtains, to facilitate the subsequent recycling and reuse.



+ Develop packaging film of material homogeneity:

Based on the consideration of quality and preservation, functional packaging films are required to have the characteristics of high-water resistance and air resistance, and different material plastic films are used for attachment. Consequently, the recycling of such films is difficult. Accordingly, NPC develops the packaging material of material homogeneity (high resistance BOPP, BOPE film) to facilitate future recycling and reuse.



Indicators and Targets

Appendi

2.5 Joint Promotion of Energy Saving and Carbon **Reduction Projects**

To cooperate with the energy saving and carbon reduction projects coordinated and planned by the company, NPC will implement projects comprehensively from management aspect to new investment opportunities in 2022, to enhance the company's energy saving and carbon reduction actions. The summary of each project is described in the following:



3 Management of Climate Change Risks and Opportunities

3.1 Risk and Opportunity Management Process

NPC has established comprehensive risk management culture to implement risk management. In addition, on December 16, 2020, the Board of Directors has approved the "Risk Management Regulations", and climate change is explicitly specified as one of the risk items of the Company. Furthermore, in conjunction with currently implemented ISO 14001 environmental management system, risk management procedures such as "identification, analysis and evaluation, control and handling, supervision and review, information communication and report" are incorporated into the climate risk management and integrated into the Company's overall risk management mechanism.

NPC's TCFD Task Force is formed by the President's Office, direct departments and business divisions. With reference to the transition risks, physical risks, transition opportunities and other items that should be considered in the Recommendations of the Task Force on Climate-related Financial Disclosures (June 2017), the work is performed and allocated according to the job function.

Each year, the TCFD Task Force collects, analyzes and summaries information on climate change and energyrelated risks and opportunities. The climate change-related risks and opportunities are identified and assessed according to ISO 14001 risk identification procedure, following which the "ESG Promotion Team" and the "Energy Saving and Carbon Reduction Promotion Team" establish targets and response strategies according to the identification result. The promotion outcome is also inspected periodically and reported to the "ESG Promotion Organization", in order to facilitate the management to monitor and track the implementation effect of the projects.



NPC's TCFD Risk and Opportunity Identification Process

NPC's TCFD Risk and Opportunity Identification Work Allocation

Risk Identification Work Allocation



Opportunity Identification Work Allocation



Management of Climate Change Risks and Opportunities

1

Governance

2 Strategy



3.2 Risk and Opportunity Identification

For the climate change risk identification method, NPC follows the Recommendations of the Task Force on Climate-related Financial Disclosures (June 2017) and takes transition risks (policy and legal/market/ technology/reputation), and physical risks (chronic and acute) into consideration when establishing risk scenario. And risks are described and explained for possible events.

We consider the likelihood of each risk and opportunity, the level of financial impact, in order to divide the severity of financial impact of NPC caused by risks and opportunities and the probability of occurrence into five levels with scoring as per the impact and the probability of occurrence; the financial impact and the probability of occurrence are then weighted. The risk matrix is as follows:



According to the results of the above risk and opportunity matrix, the risks and opportunities are classified as follows:

Score of 1–4 is defined as low risk: Level of risk is considered as acceptable risk.

Score of 5–14 is defined as moderate risk: No action is required at this time, and changes are continuously monitored.

Score of 15–25 is defined as material risk: Planning of the corresponding management strategy is prioritized and the performance outcome is tracked periodically.

After the climate change risks and opportunities are assessed by each unit, the risks and opportunities are compiled into a risk-opportunity matrix correspondingly. The risk-opportunity matrix is as shown in the figure below:



Note: For relevant content and response strategy, please refer to "3.3 Summary Table of Impact of Risks and Opportunities on the Company" for details

Management of Climate Change Risks and Opportunities

✓ Indicators and Targets

Appendix

3.3 Summary Table of Impact of Risks and **Opportunities on the Company**

No.	Analysis of Current Risk or Opportunity (Possible impact on the Company)	lssue Category	Risk/ Opportunity Level	Response Strategy
1	[Policy/legal - Risk of collection of carbon tax] The "National Climate Change Action Guideline" and the "Greenhouse Gas Reduction Management Act" specify Taiwan's long-term greenhouse gas emission control and allocation method for manufacturing departments. In the future, the government will impose control over the total amount, determine the emission intensity for each industry, and establish a carbon trading system. In response to the regulatory requirements, it is necessary for us to reduce the greenhouse gas emissions from the processes. After the control is imposed, we may have to purchase emission amounts, and energy bills will rise, causing our production costs to increase. In addition, the "Greenhouse Gas Reduction and Management Act" of 2020 will be amended to "Climate Change Response Act", and NPC is expected to pay the required carbon tax starting in 2024, and the amendment of the law is expected to list manufacturers of large volume of carbon emission in the manufacturing industry with greenhouse gas emissions reaching 25 thousand tons of carbon dioxide equivalent CO ₂ e and above as the subjects for carbon tax collection, such that the cost and expenditure is increased. NPC's annual greenhouse gas emission in the last three years exceeded 5.9 million tons, such that the Company is defined as the large carbon emission company and is listed as the first group of organizations under control. It is expected to pay the carbon tax in 2023 at the earliest time. In addition, according to the calculation based on the carbon emission of 2021, the operating cost is expected to increase by 0.29%~0.87%.	Transition risk/Policy and law	Material risk	 1.Continue to promote the four main carbon reduction strategies of "Low carbon energy transition". 2.Promote low carbon manufacturing technologies: Continue to adopt optimal and feasible control technologies and process optimization, in order to reduce greenhouse gas emission of products, and to promote the research and development of eco-friendly products. 3.Increase energy-saving improvement benefits: Continue to promote various water saving and energy saving improvement projects. Through the assistance of Al technology, find reduction solution, improve raw material conversion rate and reduce unit consumption. 4.Achievement case sharing: Encourage the participation in internal and external evaluation and demonstration tour, learn from outstanding case examples, and provide incentive timely, and increase employees' carbon reduction awareness and knowledge.

No	Analysis of Current Risk or Opportunity (Possible impact on the Company)	lssue Category	Risk/ Opportunity Level	Response Strategy
2	[Policy/legal - Risk of installation of renewable energies] The amendment to the "Renewable Energy Development Act" in Taiwan was officially passed in April 2019. Since the contracted capacity of 175,810 kW of electricity consumed by NPC is larger than the 5,000 kW required by law, it is necessary to install 10% of the contracted capacity (or 8% within three years) of renewable energy power generation facilities, storage facilities, or purchase renewable energy certificates within five years; otherwise, monetary substitution must be paid. In addition, according to the calculation based on the electricity consumption contract capacity of NPC, the monetary substitution accounts for approximately 0.08% of the operating revenue.	Transition risk/Policy and law	Material risk	NPC has set the target of construction of 8% of renewable energy equipment within three years, and the Company plans to complete the phase 1 construction planning of solar power generation facility before 2023. For Hsinkang Plant and Chiayi Plant, the building roofs of the plants are installed with the solar power generation system of 26,263 kW which comply with the regulatory requirements.
3	[Product/market - Change of customer behavior] To satisfy the demands of international brand customers, recycled raw materials are used to replace the virgin resins manufactured from petrochemical raw materials, or eco-friendly low carbon raw materials are used. Consequently, the demand of the existing products decreases, and the risk of decrease of revenue may occur in the future. Presently, some of the products of the polyester fiber division and electronic materials division of NPC have faced the challenge that customers request for use of eco-friendly products, such that the product portfolio change occurs. Take the fiber product as an example, customers such as Adidas and NIKE request for the use of recycled PET resins to replace the virgin resins, leading to the decreases of production volume of the virgin resins. According to the statistics, the potential risk of decrease in revenue due to "change of customer behavior" is approximately 0.76%.	Transition risk/Market	Material risk	NPC accelerates the research and development of new applications of products, new materials, and products that satisfying the eco-friendly trend or with special specifications. NPC also actively seeks the production and sale collaboration and strategic alliance with international giant companies along with the e-commerce and online marketing to expand high- end markets of the U.S. and Japan as well as emerging markets with potential. By developing toward the manufacturing service industry to provide services satisfied by customers. Furthermore, to seize the low carbon business opportunities, in addition to the existing green products (products awarded Type I and Type II green mark), NPC has promoted green solutions and developed eco-friendly products from eight aspects, including energy efficiency, emission reduction, waste reduction, water saving, non-toxic, healthy, recycled products and safety to enhance techniques and relevant applications since 2018.

10.	Analysis of Current Risk or Opportunity (Possible impact on the Company)	lssue Category	Risk/ Opportunity Level	Response Strategy
4	[Company reputation - Causing negative feedback] In recent years, due to the increasing trend of ESG, investment institutions tend to evaluate clients' ESG performance during the evaluation of investment and loan extension. If a business fails to meet the ESG sustainability requirements, its reputation can be negatively affected, and financial institutions may increase the interest rates on loans or may even refuse to provide loans to industries of high carbon emissions. According to the assessment of NPC, if the sustainability linked loan signed with the financial institutions fails to reach the target, the loss of interest benefit is expected to account for approximately 0.01%-0.03% of the operating revenue.	Transition risk/ Reputation	Moderate Risk	 NPC actively participates energy saving and carbon reduction advocacies in home and abroad. To demonstrate the execution outcome and effort, the promotion case examples are summarized in the following: 1. Participate in the international "Carbon Disclosure Project (CDP)" evaluation, "TCFD Advocacy", "Science Based Target initiative (SBTi)". 2. Actively head toward the low carbon energy transition, and consecutively replace the oil-fired boilers at Shulin site, Linkou site and Kung San site with gasfired boilers. 3. Participate in the sustainability linked loan project of Mizuho Bank and MUFG Bank.
5	[Acute - Extreme climate (heavy rainfall/flooding)] With the base period of 1986~2005, the climate condition at the plant site in recent period (2016~2035) is predicted. Under the scenarios of RCP4.5 and RCP8.5, the maximum consecutive days of precipitation are 7.5~7.7 days with a total precipitation of 1078mm~1085mm, and the total precipitation is increased by 15% from the average. For the RCP8.5 scenario, it is predicted that the number of typhoons in Taiwan will decrease by 15%; the rate of strong typhoons will increase by 100%, and the typhoon precipitation will increase by 20%. Based on the assumption of the impact of strong wind and super typhoon, the plant site needs to safely shut down to prevent the occurrence of industrial safety hazards and process hazard; or the impact of heavy rainfall/flood, causing serious flood at the plant site, and it is necessary to reduce production or shut down the operations, NPC estimates that the potential impact on the revenue is approximately 1%.	Physical risk/ Acute	Moderate Risk	 NPC periodically monitors and manages the energy consumption and water consumption of each plant site at a monthly basis, and has established strategies for mitigating the climate change risk. The key examples are described in the following: 1.Renwu Plant is installed with the flood control pumps. Inspection, repair and maintenance are performed periodically, in order to reduce the occurrence of flooding in the plant site due to heavy rainfall. 2.For Mailiao Site, major desilting and dredging operation is performed annually, in order to reduce the probability of flooding in the plant site due to heavy rainfall.

2 Strategy

No.	Analysis of Current Risk or Opportunity (Possible impact on the Company)	lssue Category	Risk/ Opportunity Level	Response Strategy
6	[Acute - Extreme climate (water shortage/drought)] The period of 1986~2005 is used as the base period to predict the climate condition of the plant site in recent period (2016~2035). It is predicted that there will be two months of water shortage or drought every year. Based on the assumption of water shortage or drought that may cause the worst scenario of production reduction or shut down of operation, NPC estimates that the potential impact on the revenue is approximately 1.6%.	Physical risk/ Acute	Moderate Risk	 NPC periodically monitors and manages the energy consumption and water consumption of each plant site at a monthly basis, and has established strategies for mitigating the climate change risk. The key examples are described in the following: 1. Mailiao Industrial Complex seawater desalting plant project (constructed by FPCC). 2. Jinxing Site uses effluent water of Taoyuan Norther District Water Resource Recycle Center as the process cooling water. 3. Implement circular economy, actively promote various water saving improvement projects. 4. To cope with potential risk of production suspension due to water shortage or drought at the plant site, Renwu Site has excavated 2 wells, to fight drought and an amount of 2,300M³/day water supply can be increased. 5. Cooperate with government departments to develop the subsurface water of Donggang River and Gaoping River, in order to stabilize the water source supply. In addition, the assessment and development of high ammonia nitrogen wastewater treatment for Huliao River was carried out in order to acquire water rights via the reclaimed water exchange method.
7	[1. Product/market - New market development; 2. Energy/ technology-Carbon capture, storage and utilization] Presently, consumers and governments of various countries continue to increase their demands for low carbon products and product safety. For example, EU Committee will propose legislation on sustainable product policy, in order to ensure that products entering the EU market have longer useful lifetime, facilitate for repetitive use, repair and cycle use, and recyclable materials are used to replace the main raw materials as much as possible. For instance, disposable plastic products will be restricted, and destruction of unsold durable products will be prohibited. In addition to the recycle and reuse of waste gas and waste generated from the manufacturing process, NPC also considers the product value chain and life cycle, and implements improvement based on the three aspects of "Reduction of raw material use", "Process improvement", and "Supply chain transportation reduction" to reduce product cost and achieve resource sustainable use at the same time. It is expected to reduce the carbon tax or to increase the revenue, and the potential impact is approximately 2%.	Opportunity/ products and services; market; energy and technology	Moderate opportunity	 NPC values customers' health and safety, and continues to improve operation process (such as reduction of hazardous recipe, promotion of energy-saving process and development of recycled product, etc.). To meet the market trend and downstream customer demands, NPC is heading toward the development trend of non-toxic production, eco-friendly production, process improvement and green production process products. The key examples are described in the following: 1. Strengthen the recycling of PET and recycled eco-friendly film products to reduce the carbon emission of value chain. 2. The CO₂ generated during the process are converted into liquid CO₂ via carbon capture technology for further sale to the downstream customers. 3. Through change of process operation criteria, and use of Al and Big Data, to achieve process energy saving and carbon reduction and reduce the carbon footprint. 4. Develop modified polyester resins, and packaging films with single material.

No.	Analysis of Current Risk or Opportunity (Possible impact on the Company)	lssue Category	Risk/ Opportunity Level	Response Strategy
8	[Product/market - Development of low-carbon product through R&D] In recent years, due to the global impact of extreme climate, temperature continues to rise, and consumers' demand for carbon reduction of manufacturers also increases. Accordingly, there are potential business opportunities for low carbon energy saving and heat insulation products. NPC continues to develop and expand green and eco-friendly products such as heat insulation paint and airtight windows, etc. Accordingly, the revenue is expected to increase, and the potential impact is approximately 4%.	Opportunity/ products and services	Material opportunity	 NPC has developed numerous green products. In addition to continuous investment in research and development, NPC will follow the consumer behavior trend to expand the green business opportunities. The key examples are summarized in the following: 1. Cooler Paint (heat insulation paint): The product which is verified by National Taiwan University of Science and Technology, is able to save 31.8% energy consumption of air conditioning in summer. 2. Energy saving airtight window: Low thermal conductivity, heat insulation being 1/1250 of aluminum material, and capable of saving energy consumption by more than 20%. 3. ICE COOL (heat insulation paper): Use non-toxic material, and equipped with the characteristics of anti-explosion, high light transmittance and high IR, UV isolation, capable of reducing energy consumption.
9	[Resilience - Diverse business operation] For the 26th UN Climate Change Conference (COP26), countries focus on the realization of zero emission by 2050, and aim to reduce at least 50% of carbon emission by 2030, in order to suppress the global average temperature rise from exceeding 1.5 degree Celsius by the end of the century. Many countries around the world have formulated the timetable for the ban on fuel sale from 2020~2040. In the next 20 years, consumers in these countries will have no choice but to buy electric vehicles or hydrogen fuel cell vehicles, which will drive the rapid development in the EV market. The U.S. has also set the target of electric vehicles accounting for 50% of new car sales in 2030. In recent years, the U.S. government has also approved the US\$1 trillion fundamental construction act for investment in the new construction of highway charging station, hydrogen fuel fundamental facilities, old and obsolete grid improvement. etc. Accordingly, the future EV market is expected to develop rapidly. NYPC expects that the copper foil consumption for lithium battery production will be benefited from the rapid increase of market demand. In addition to that, its sales volume is expected to grow, NPC will seize the business opportunity of development transition to increase the revenue ratio. Furthermore, NPC will research and develop the use of biomass materials to replace the products of petrochemical raw materials. It is expected to increase the potential operating revenue by approximately 0.5%.	Opportunity/ products and services; market	Material opportunity	Considering the external business environmental change due to climate change, NPC actively seeks and develops biomass materials, or other potential transition opportunities to enhance the risk resilience. The main examples are summarized in the following: 1. Actively engage in the research and development of electric vehicle industry related products. For instance, NPC's copper foils are initially used in electrical and electronic industries. With the continuous development of copper foils with high heat resistance and high strength, some of the copper foils can be further used as the electrodes of the lithium batteries of electric vehicles in recent years. Accordingly, the copper foil production line is expanded. 2.Replacing petrochemical raw materials with PLA (polylactic acid, corn, sugar cane or their residues) to produce packaging films.



3.4 Climate Risk Scenario Analysis

According to the TCFD's recommendations, NPC adopts The Worst-case Scenario for the transition and the physical risks and includes the analysis results in the strategic resilience assessment.

Regarding the transition risk, NPC refers to the IEA WEO 450 Scenario (2016) and the Nationally Determined Contribution (NDC) target set by each manufacturing site. In Taiwan's Intended Nationally Determined Contribution (INDC) report, the greenhouse gas emissions are set to be reduced by 50% by 2030 based on the Business as Usual (BAU) scenario. Under such scenario, the power generation structure in 2025 will be 20% for renewable energy, 30% for coals, and 50% for gases. After the above scenarios are implemented, the impact on NPC is analyzed in terms of market, technology, reputation, finance, and operations in the future.

As for the physical risk, we refer to the data from Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP) and National Science and Technology Center for Disaster Reduction to estimate temperature rise and precipitation conditions of 2020~2040, with respect to the scenarios of RCP2.6, RCP4.5 and RCP8.5.

Transition risk	 IEA WE Intenc Contri 	EO 450 Scenario Jed Nationally Dete bution (INDC)	ermined	2030 greenhouse (based on the busir BAU) with reduction	gas emission is est ness as usual (Busir of 50%	imated ness as Usual,
Physical risk	TCCIP \ Brief(RC	limate 、Central、 :P2.6、RCP4.5、R(Carbon CP8.5)	Predicted condition below-tidal-line are temperature rise, a variability, maximur precipitation and to	ns includes 2020-2 a, area below the verage drought le n number of cons ptal precipitation	040 sea level rise, 2050 flood line, ngth, rainfall secutive days of
Plant S	ite	New Taipei Site	Taoyuan Site	Yunlin Site	Chiayi Site	Kaohsiung Site

Scenario Analysis	The extreme climate risk assessment is mainly conducted using RCP 8.5 scenarios, with some of the RCP 2.6 and RCP 4.5 scenarios				
Sea level rise (RCP 8.5)	No impact	No impact	Impacted	No impact	No impact
Below-tidal-line area (risk of flooding) (RCP 8.5)	No impact	No impact	Partially impacted	No impact	No impact
Area below the 2050 flood line (RCP 8.5)	No impact	No impact	Impacted	No impact	No impact
Temperature rise (RCP 8.5)	1.58	1.63	2.59	2.57	2.54
Average drought length (RCP2.6)	2 months	2 months	2 months	2 months	2 months
Rainfall variability (RCP 8.5)	5%-10%	5%-10%	10%-15%	5%-10%	10%-15%
Maximum number of consecutive days of precipitation (RCP 4.5-8.5)	11.6 days -11.8 days	9.5 days -9.7 days	5.9 days -12.2 days	5.9 days -12.2 days	12.3 days -12.4 days
Total precipitation (RCP 4.5-8.5)	2,291mm- 2,306mm	1,807mm	1,017mm- 1,041mm	1,661mm- 1,720mm	1,755mm- 1,817mm

Sea Level Rise



Below-Tidal-Line Area



Area Below the 2050 Flood Line



























4.1 Carbon Reduction Absolute Targets and Emission Indicators

In order to ensure the accuracy of the greenhouse gas emission inventory values, the annual inventories of greenhouse gas emission of NPC are verified by SGS Taiwan and British Standards Institution (BSI). Relevant data is disclosed in this report, and the inventory result is also disclosed in the "Environmental Protection" related chapters of the Sustainability Report to be used for the communication with stakeholders and internal performance review. The carbon reduction targets set by NPC are as follows:

- External commitment on carbon reduction targets: With the base year of 2007 (6.95 million tons of CO_2e), reduction of 20% in 2025 (5.56 million tons of CO_2e), reduction of 35% in 2030 (4.52 million tons of CO_2e), and achieving carbon neutrality in 2050.
- Internal enhanced management targets: With the base year of 2020 (5.92 million tons of CO₂e), reduction of 12.5% in 2025 (5.18 million tons of CO₂e), and reduction of 25% in 2030 (4.44 million tons of CO₂e).



NPC's Carbon Reduction Roadmap- Internal enhanced management targets

Regarding NPC's 2021 greenhouse gas emission, since the Taiwan Power Company Electricity's power plant coefficient has not yet been published before the release of the TCFD report in June 2022, the external verification operation cannot be completed. Accordingly, the internal inspection value is disclosed first. In addition, due to the excellent business operation of NPC in 2021, the overall revenue and production volume increased significantly, such that the greenhouse gas emission in 2021 increased by 6% from 2020. However, if the greenhouse gas emission intensity (greenhouse gas emission/NPC's parent company only revenue) is used for comparison, the emission in 2021 is reduced by 30% from 2020.



Trend chart of NPC's GHG-related data

2016

2017

3,000,000



2018

2019

2020

2021(Unverified)

Note 1: Scope 1 refers to the direct emission of greenhouse gas.

Note 2: Scope 2 refers to the indirect emission of greenhouse gas.

Note 3: The data used for 2015-2020 is verified by SGS and BSI. For 2021, the emission data is still under verification; therefore, the internal audit data (computer database) is used.

Note 4: The GWP in the IPCC's Fourth Assessment Report (2007) is used to calculate the emission according to the EPA's regulations after 2016.

In addition, in response to the Paris Climate Agreement, NPC has officially applied to enroll in the "Science Based Target initiative (SBTi)" at the beginning of 2022. With the base year of 2021, NPC has set the target of carbon reduction of 12.5% for 2026. In addition to continuing to promote the four main carbon reduction strategies and various carbon reduction projects, NPC will further implement the carbon reduction culture such energy conservation, carbon reduction and circular economy in each plant site, so as to strengthen the capabilities and resilience in the climate change with best effort.

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4.2 Scope 3 Emission Indicators

NPC conducts an annual inventory on the relevance and emission data of Scope 3, and such data is verified by a third-party authentication unit. The 2020 emission indicator information is summarized in the following:

Scope 3 Emission Source	Relevance	Emission (tons CO_2e)	Calculation Scope
Products and services purchased	Relevant and counted	10,924,951.514	80% of raw material purchase amount
Capital goods	Relevant and counted	134,409.393	Land, house and building, machine and equipment, transportation equipment, electrical (electronic) and computer equipment, boilers, public equipment, general office equipment and miscellaneous equipment are included in the calculation.
Fuel and energy-related activities (not included in Scope 1 or 2)	Relevant and counted	914,045.502	Include all fuel and energy activities, such as coal, pyrolysis low sulfur fuel oil, and natural gas
Upstream transportation and distribution	Relevant and counted	43,774.200	80% of raw material purchase amount
Business waste disposal	Relevant and counted	4,289.115	100% of the emissions generated by dealing with the business wastes
Business travel	Relevant and counted	172.632	Emissions from air travel
Employee commuting	Relevant and counted	219.735	Emissions from the transportation of employees between their homes and worksites
Upstream asset leasing	Irrelevant		Relevance of upstream asset leasing business is relatively lower
Downstream transportation and distribution	Relevant and counted	519,481.525	All products (80%) are transported and sold to the doors of key customers
Processing of sold products	Relevant and counted	12,767,765.143	The calculated processing methods refer to distillation and purification, polymerization; copper foil and glass filament processing, PCB processing, esterification products. For the rest of products, numerous processes are performed, such that presently, they cannot be analyzed
Use of sold products	Irrelevant		Most of NPC's products are plastic products, and no greenhouse gas emission is generated from the use of the sold products
Ultimate disposition of the products sold	Relevant and counted	52.544	Calculate the carbon emissions from the ultimate disposal of cartons and plastic packaging materials used in sold products
Downstream asset leasing	Irrelevant		Relevance of downstream asset leasing business is relatively lower
Franchising	Irrelevant		No franchising right
Investment	Irrelevant		The relevance for investment in business capable of generating additional areenhouse as emission is relatively low

4 Indicators and Targe

Appendi

4.3 Other indicators and Project Targets

In addition to the statistical analysis of the greenhouse gas emission, NPC also disclose the energy saving execution status of steam, electricity and fuel related to the greenhouse gas emission. Please refer to NPC's 2021 Sustainability Report "3.2.2 Management of Climate Change Risks and Opportunities" for details. In addition, the other energy saving and carbon reduction targets of NPC are as follows:

- Construction of renewable energy facility: To comply with the government's "large electricity consumption users clause", NPC plans to install solar power generation facilities at the building roof of each plant site in two phases. By 2030, the installation total capacity is expected to reach approximately 51,625 kW and is expected to account for approximately 29.4% of the Taiwan Power Company (TPC) contract capacity, which is higher than the 10% requirement for large electricity consumption users specified by the government.
 - Installation plant site: Hsingkang Site (Switchgear Plant, Glass Fiber Cloth Plant I~IV); Chiayi Site
 - Estimated installation capacity of 26,263 kW



Change of coal-fired to gas-fired in utility plant: To achieve the target of carbon neutrality, NPC plans to promote the change of coal-fired to gas-fired for each utility plant. The transformation for Linkou utility plant has been completed in 2021, and it is expected to reduce 148 thousand tons of CO₂e. For the rest of the utility plants, relevant operations are expected to be completed before 2030. The predefined transformation schedule for the utility plants is as follows:



In addition, NPC will continue to monitor the domestic and foreign renewable energy market development trend and the new energy transition strategy, and timely implement zero-carbon applications to achieve the long-term target of carbon neutrality.

Recycled product target: To actively implement energy saving and carbon reduction to the products, NPC continues to research and develop green products with single material according to market characteristics of each product, and timely expand the sales proportion of recycled products. The targets are as follows:

Year		Actual ratio in 2021	Target ratio in 2025
Recycle Category	Product Name	Actual ratio in 2021Target ratio in 2025Sales proportion of recycled products (Target sales volume of recycled products / Target sales volume of recyclable products)65.3%100%34.0%100%45%100%	
Post-consumer recycled	PET	65.3%	100%
(PCR)	Polyester film	34.0%	100%
Post-industrial recycled (PIR)	PET	45%	100%

Appendix

TCFD Disclosure Comparison Table

Aspect	Recommendations of TCFD	Correspond Chapter	Page
	Describe the Board of Directors' oversight of climate-related risks and opportunities.	1.2 Organization and Responsibilities	P.4
Governance	Describe management's role in assessing and managing climate-related risks and opportunities	1.2 Organization and Responsibilities	P.6
	Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	3.2 Risk and Opportunity Identification	P.18
Strategy	Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	Chapter II Strategy 3.3 Summary Table of Impact of Risks and Opportunities on the Company	P.10-15 P.19-23
	Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	3.4 Climate Risk Scenario Analysis	P.24-25
	Describe the organization's processes for identifying and assessing climate-related risks.	3.1 Risk and Opportunity Management Process	P.16-17
Risk Management	Describe the organization's processes for managing climate-related risks.	3.1 Risk and Opportunity Management Process	P.16-17
	nagement Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	3.1 Risk and Opportunity Management Process	P.16
	Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	4.1 Carbon Reduction Absolute Targets and Emission Indicators	P.26
Indicators and Targets	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	4.1 Carbon Reduction Absolute Targets and Emission Indicators4.2 Scope 3 Emission Indicators	P.26-28
	Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	4.3 Other Indicators and Project Targets	P.29



Nan Ya Plastics Corporation

President's Office 3F,201, Tung Hwa North Road, Taipei 105, Taiwan Tel : 886-2-27122211 Fax : 886-2-27178533 Email : NPC_ESG@npc.com.tw