CPC Corporation, Taiwan

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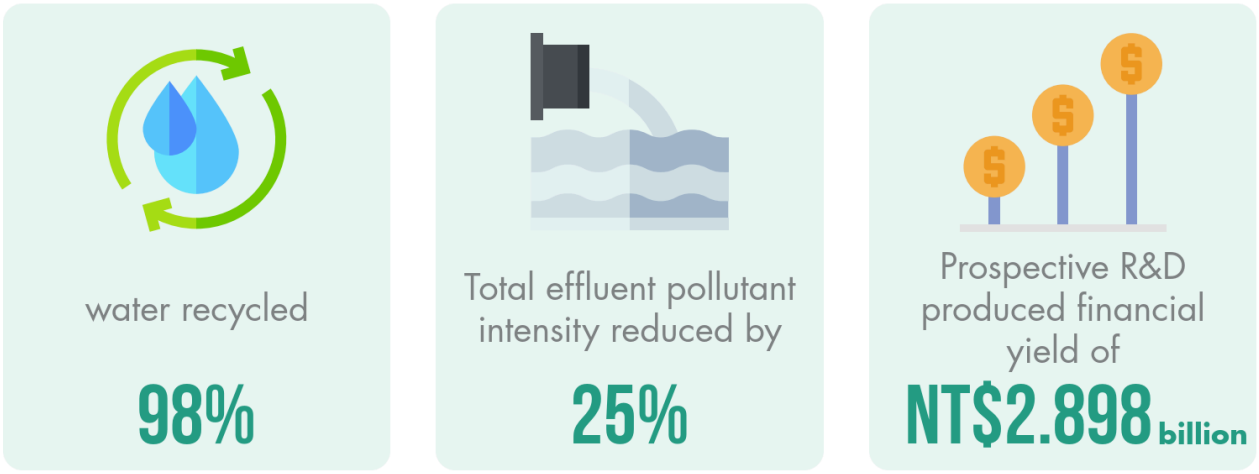
Energy Conservation & Carbon Reduction

CPC's performance highlights



Taking on the important responsibility of decarbonizing the energy industry, CPC is committed to promoting the transition to net-zero emissions with great determination. Recognizing the risks and opportunities presented by climate change, CPC has established a Climate Change Response Team, integrating international management systems and the TCFD climate risk management framework. Guided by the three principles of "High-value Petrochemical, Low-Carbon Emission and Lean-Renewable Energy," CPC is executing a low-carbon and green energy transformation strategy, leading the development of various prospective R&D projects.

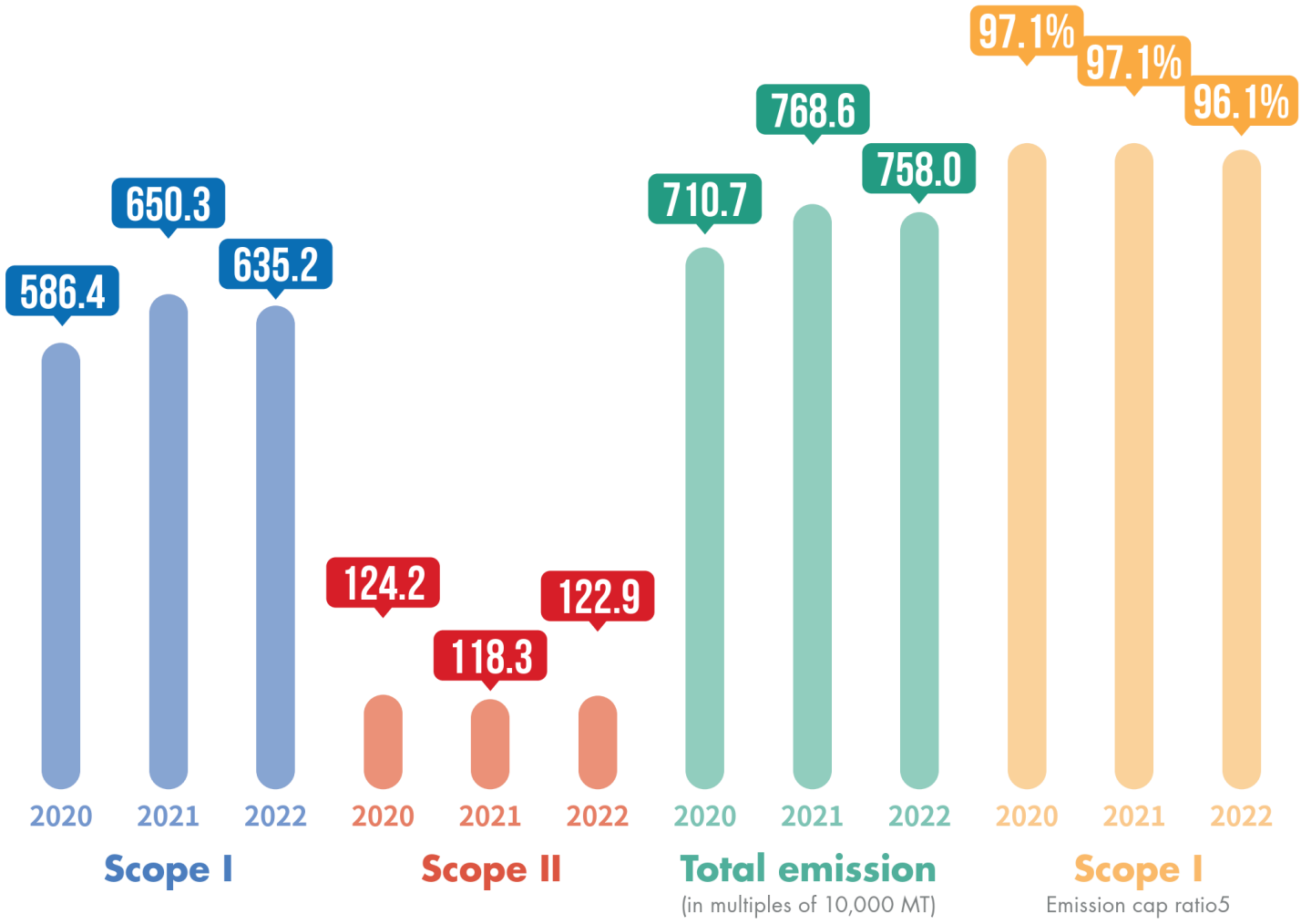
Initiatives include driving the development of LTO energy storage material technology, constructing smart and green refueling stations, and establishing an Advanced Catalyst Center. Additionally, CPC has implemented internal carbon pricing, actively seeking opportunities for carbon reduction and circular economy practices. Furthermore, CPC actively responds to environmental group demands by implementing conservation of the algal reef ecosystem in the third LNG Receiving Terminal. In addition, CPC will establish the first domestic Ecological Conservation Trust Fund to support various conservation actions, aiming to achieve a vision of ecological sustainability and economic progress, creating a win-win situation.

GHG Management

In response to the international trend of the mitigation of climate change, carbon reduction goal and enhance the competitiveness of the green economy, CPC has followed the national policy to set GHG reduction targets and continuously tracked emissions through GHG inventory. In line with the national long-term GHG reduction targets, CPC introduced the ISO 14064-1 GHG inventory system in 2004 to conduct annual GHG emissions inventory, which the refinery emissions are verified by third-party certified by the EPA. Based on which GHG reduction targets, GHG management plans are promoted to reduce GHG emissions.

As a support to the national carbon reduction goals laid up in EPA's Greenhouse Gas Reduction and Management Act (GGRMA), CPC designated 2005 as the baseline year, in which it measured greenhouse gas emission at 11.58 million MT (carbon dioxide equivalent). CPC has since surveyed Scope 1 and Scope 2 greenhouse gas emission on a yearly basis, and made calculations by following EPA's Greenhouse Gas Emission Coefficient Sheet for guideline, or using proprietary coefficients as a priority. GWP values are adopted according to EPA's rules.

CPC greenhouse gas surveys are conducted using the operational control approach, and survey outcomes are presented in carbon dioxide equivalent term. Total greenhouse gas emission in 2022 had reduced by 106,000 MT carbon dioxide equivalent (CO2e) compared to 2021. This reduction was mainly due to the spread of COVID-19 since 2020 that decreased economic activities, for which CPC had adjusted its production strategies to accommodate the market's demand. Greenhouse gas emission intensity had reduced for 3 consecutive years between 2016 and 2019, but the global spread of COVID-19 in 2020 led to the collapse of oil prices, causing full-year revenues to fall by 29% and emission intensity increased as a result. Greenhouse gas emission intensity in 2021 had already fallen by 13.6% compared to the previous year.



» Note 1: CPC does not use biofuel

» Note 2: CPC's greenhouse gas survey covers Scope 1 and Scope 2 and 7 major categories of greenhouse gas, namely: carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), hydrofluorocarbons (HFCs), perflourocarbons (PFCs), sulphur hexafluoride (SF6), and nitrogen trifluoride (NF3).

» Note 3: CPC has designated 2005 as the baseline year for its greenhouse gas reduction targets, and emission volume for the baseline year was measured at 11.58 million MT CO2e. Due to the extensive number of upstream and downstream partners involved, it is somewhat difficult to survey the entire chain. CPC is currently in midst of surveying the supply chain, therefore Scope 3 data and validation are excluded from calculation at the moment.

» Note 4: According to EPA's rules, Global Warming Potential (GWP) is taken from IPCC's 2007 4th evaluation report

» Note 5: Emission cap is defined using the sources of greenhouse gas emission announced by the central authority. CPC was required to survey and disclose emission sources for the four refineries and petrochemical plants back in 2020; Kaohsiung Refinery was later exempted of the obligation to survey and disclose greenhouse gas emission in 2020, which made Taoyuan Refinery Plant, Dalin Refinery, and Linyuan Petrochemical Complex the only three facilities that required survey and disclosure of emission source in 2021 and 2022.

» Note 6: CPC introduced ISO 14064-1 greenhouse gas survey system in 2004 and has since been surveying greenhouse gas emission on a yearly basis using the operational control approach. Total greenhouse gas emission volume for 2022 is pending for 3rd-party validation, which is scheduled to complete in June 2023. GHG emission intensity = GHG emission for the year / revenues for the year (kg/NTD).

CPC has been supporting the government's energy conservation policy and executing greenhouse gas emission controls intended for the nation's energy and manufacturing sectors. Since 2005, CPC has implemented a multitude of production improvements and energy management solutions in an attempt to reduce emission, and in 2022, the organization committed NT$870 million into additional GHG reduction measures including procedure optimization, equipment renewal, and heat recycling/reuse that reduced carbon by 88,000 MT. Between 2005 and 2022, CPC accumulated energy savings totaling 984,000 kL of oil equivalent,

which equates to 2.836 million MT of carbon reduction.Power consumption per unit of production was significantly improved in major production sites.

Major Energy Conservation Measures and Performance 2005-2022

Major Energy Conservation Measures	Reduction (KLOE)	Performance (NT$ ten thousands)	tCO_2e (t)
Process Equipment Renewal	255,881	362,647	784,697
Equipment Repair/Improvement	147,617	217,732	446,737
Waste Heat and Fuel Gas Recovery	268,072	430,597	796,136
Operation Improvement	119,857	286,176	352,179
Other Improvements in Energy Management	192,929	289,393	456,173
Total	984,356	1,586,545	2,835,922

Energy and Resources Management

CPC consumes electricity, natural gas, steam, fuel gas, petroleum gas, and fuel oils. The total 2022 energy consumption was 107 million GJ, with the highest heating value from fuel gas. In addition, the 2021 renewal energy output of our petrol station PV systems totaled 10.849 million kWh, and were sold to TPC. The 2022 output of own production was about 161.57 million kL, with energy intensity at 0.662 GJ/kL, about 7.7% lower than that of 2021 at 0.611 GJ/kL. Being Taiwan's largest oil and gas supplier, CPC supports the global low-carbon movement and takes pro-active steps to reduce carbon in line with the government's net zero goal. Through import of carbon neutral LNG and implementation of related projects and measures, CPC contributes to the sustainability of the environment and continuity of future business activities.

Use of energy source (thermal value) by the three plants in 2020-2022

	Unit: 10 million GJ (GJ=10^9J)	2020	2021	2022
Direct energy consumption	Natural gas	2.13	2.25	2.25
	Fuel gas	5.14	5.23	5.2
	Low BTU fuel gas	0.45	0.54	0.5
	LPG	0.03	0.0026	0.01
	Low sulfur fuel oil 0.5 %	0.55	0.63	0.35
	Carbon residue	1.23	1.48	1.69
	Total heating value	9.54	10.13	10
Indirect energy consumption	Purchased electricity	0.6	0.58	0.59
	Purchased steam	0.11	0.10	0.11
	Total heating value purchased	0.71	0.68	0.7
	Total energy consumption	**10.20**	**10.81**	**10.7**

CPC actively sources suitable land for the construction of solar power system. The Company invested NT$40.11 million into the development of photovoltaic technology in 2022, and by 2022, it had completed 248 photovoltaic (PV) sites with rated capacity of 12.518 MW (excluding 709 KW that were leased out) located throughout Taiwan and offshore areas, including the rooftops of fuel stations, oil supply centers, refineries, petrochemical plants, and rooftops of office buildings. These PV stations generated 13.519 million kWh of renewable energy in and most of which was sold to Taiwan Power Company. As of 2022, CPC had obtained renewable energy site certifications for 19 of its self-use PV sites and accumulated 4,796 renewable energy certificates. In the future, CPC plans to expand renewable energy capacity to 19.56 MW in 2023 (with early bird privilege) and to 25.2 MW in 2024 (estimated based on the progress of existing projects).

Mandatory renewable energy capacity for CPC plant sites

Threshold on contracted power usage	Contracted user	Contracted power usage	Capacity of existing equipment 2022	Required capacity by 2023 (MW) (8% of contracted power usage)
Unit： (MW)				
5,000 kWh (5MW) and above	Refining Business Division — Dalin Refinery	140	0.43	11.2
	Refining Business Division — Taoyuan Refinery Plant	42	1.00	3.36
	Petrochemical Business Division — Linyuan Petrochemical Plant	20	1.67	1.60
	Natural Gas Business Division — Yongan LNG Refinery	20	0.65	1.60
	Natural Gas Business Division — Taichung LNG Refinery	14.50	0.33	1.16
	Refining Business Division — Kaohsiung Refinery	8	0.98	0.64
	Others — CPC is not an intensive electricity user	-	7.45	-
	Total capacity		**12.51**	**19.56**

» Note: CPC is entitled to early bird privilege (20% deduction) for meeting the requirements of "Regulations for the Management of Setting up Renewable Energy Power Generation Equipment of Power Users above a Certain Contract Capacity" by 2023, and the mandatory capacity has been presented to reflect this goal

SDGs

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