



Taiwan Country Report

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Taiwan, R.O.C

15 Nov. 2022

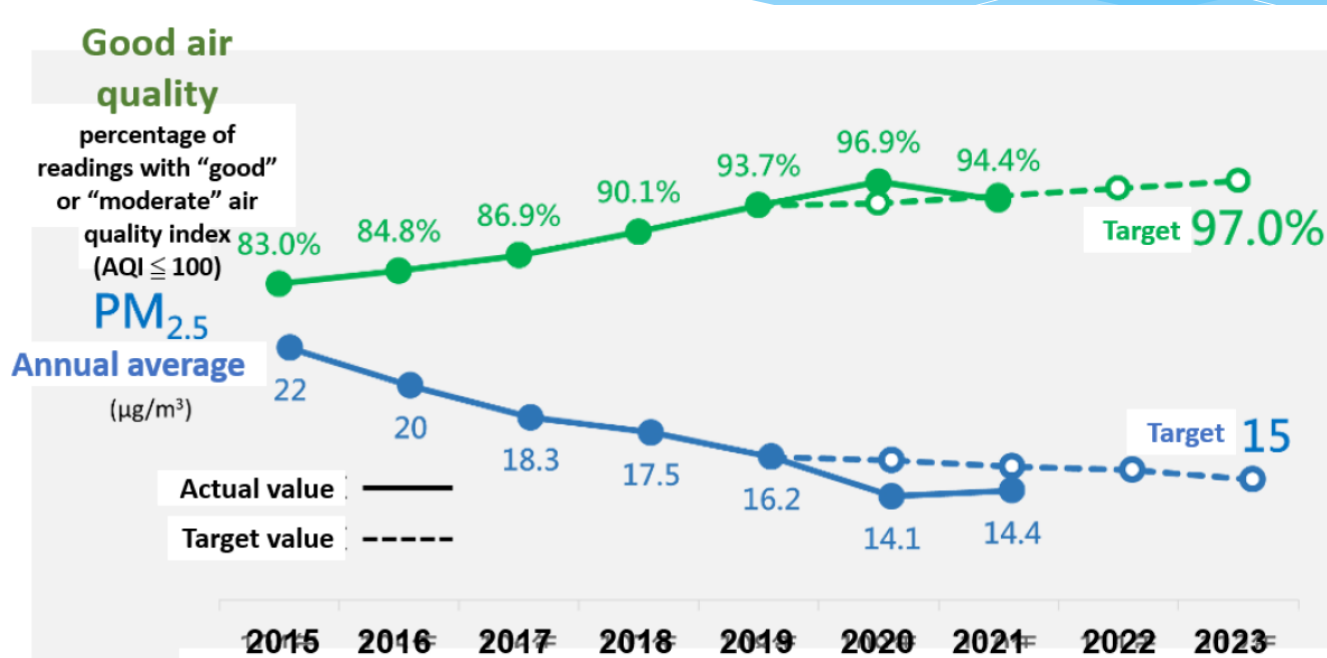
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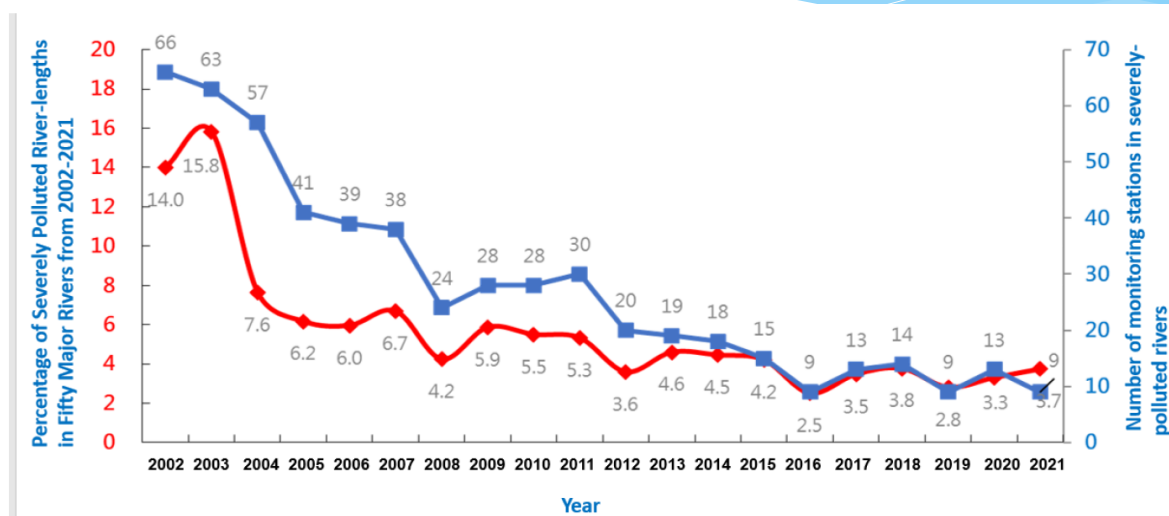
1. Overview of Environment and Safety

Air Quality Improvement in Taiwan



- * Since 2018, in the three years of the **implementation of the *Air Pollution Control Act***, 103 regulations have been amended and 27 measures have been carried out.
- * Under the combined efforts of central and regional authorities, the percentage of readings with “good” or “moderate” air quality index (AQI ≤ 100) during a single year exceeded 90% since 2018.
- * Observations of air quality during 2021 showed that PM_{2.5} in Taiwan dropped from 20 µg/m³ in 2016 to 14.4µg/m³ in 2021, **clear evidence of improved air quality**.

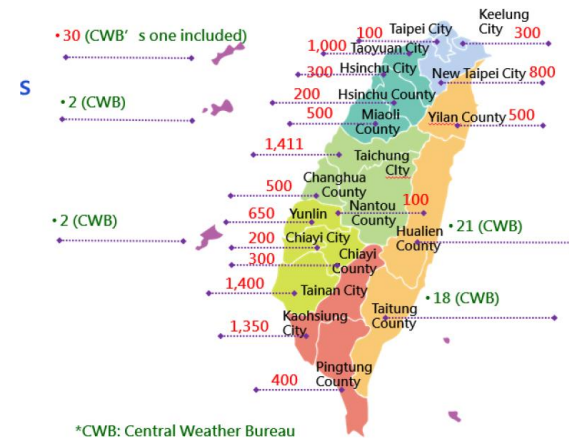
Promotion of Sustainable Water Quality



- * To keep enhancing water quality, Taiwan' EPA launched the four-year *Ammonia Nitrogen Reduction Demonstration Plan* (2020-2023) so that river water quality can improve and meet the desired standards.
- * Taiwan EPA carry out river pollution remediation, the establishment of water purification and other treatment facilities, pollution reduction at the source and other water quality improvement projects. As a result, a reduction of 6,273.71 kg/day of biochemical oxygen demand (BOD), had been established.
- * The percentage of river sections with severe pollution in Taiwan has dropped from 14.0% in 2002 to 3.7% in 2021.

Smart Internet of Things in Environmental Monitoring

- * The program “Smart Internet of Things” (IoT) - Intergenerational Environmental Management”, aimed at providing precise, high-quality environmental monitoring data as well as convenient, stable, and secure digital environmental services. **Taiwan EPA continue to optimize the IoT system for environmental monitoring.**
- * Taiwan EPA applies the IoT for air pollution sensing, and has deployed approximately 10,000 sensors. Located in 111 major industrial and scientific parks across Taiwan, **these sensors are able to detect the air pollution status of over 80,000 factories.**
- * From 2017 to March 2022, environmental law enforcement efforts led to 850 violations, the issuance of 178 million TWD in fines.



Inspect High-Risk Steelmakers

- * 5 major occupation accidents were reported in 2021, and the reason was **violations of safety standard** of a crane or derrick crane, vehicle mechanical management, and machinery, equipment and tool regulations.
- * In 2021, Taiwan's Occupational Safety and Health Administration, Ministry of Labor carried out **a joint inspection of 6 high-risk steelmakers**, whose penalties included 3 suspensions of work, and 19 fines amounting to 1.05 million TWD.



2. Updating on Legislations and Policies

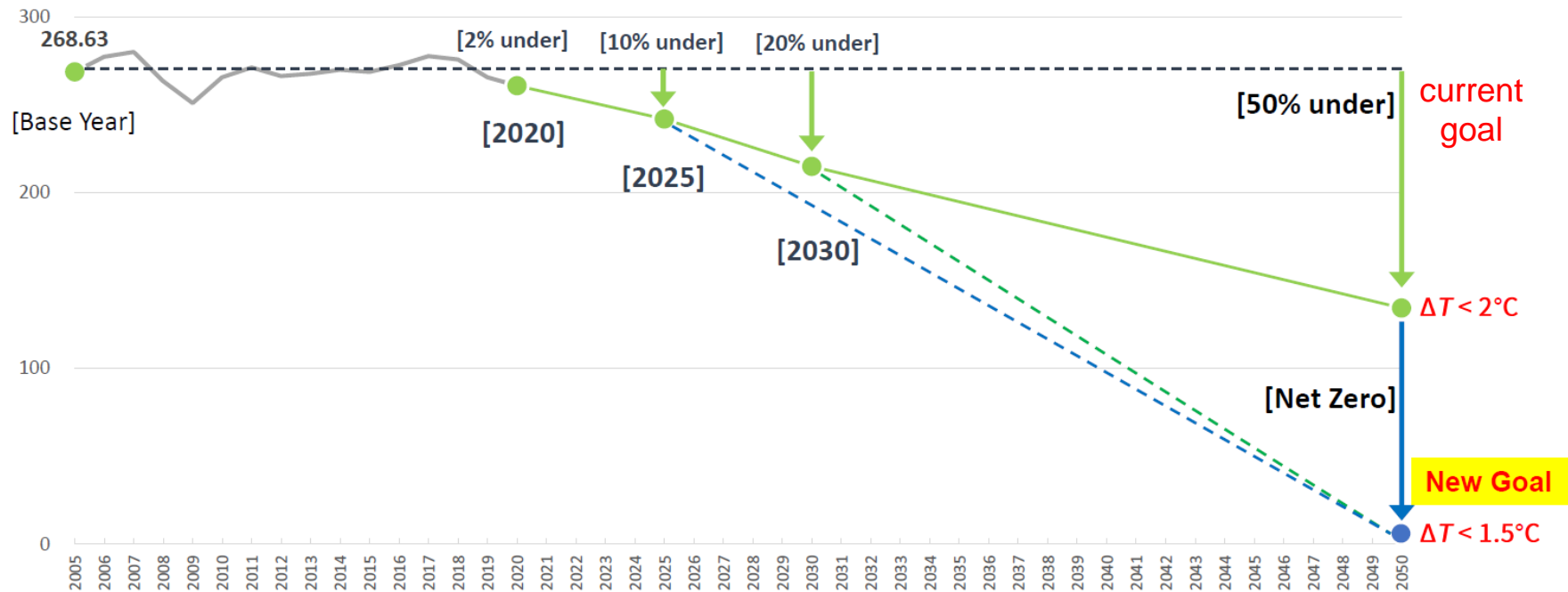
2050 Net Zero Transition

- The climate urgent global challenge, net zero carbon emissions is an international trend, so Taiwan Cooperating with the world and striving for a net zero future together.



Long Term Path for National GHG Emissions Reduction

- * Amendments to the GHG Act: setting target for net zero emissions by 2050.



Taiwan's 2050 Net Zero Transition

* 12 Key Strategies



Key technology to cut GHG emission

Strict Effluent Standards

Taiwan's *Effluent Standards* have been tightened since 1 January 2021:

- * Control standards on ammonium nitrogen were added for metal finishing and electroplating industries. The ammonium nitrogen concentration must be less than 150 mg/L.
- * **Standards on nine heavy metals**(including cadmium, lead, total chromium, copper, zinc, nickel and arsenic) **have also been tightened as the below table.**

	Cd	Pb	Cr	Cu	Zn	Ni	As
Before 2021	0.03	1.0	2.0	3.0	5.0	1.0	0.5
After 2021	0.02	0.5	1.5	1.5	3.5	0.7	0.35

Unit: mg/L

Emergency Controls and Operations for Air Quality Deterioration

- * On 3 March 2022 the revised *Regulations Governing Emergency Measures to Prevent Deteriorating Air Quality* were announced. The regulation tightens the requirements for emission reduction and increase the number of targets subject to compulsory emission reduction.
- * *The Regulations mainly mandate administrative offices and private and public to take short-term response measures to reduce the frequency of short-term air quality deterioration.*
- * Several large pollution sources (like the steel smelting industry) have become new targets required to lower their emissions. It is clearly stated that local governments can draw up response measures for factories to share responsibilities for lessening pollution.

Preventing Storage Tanks from Polluting Groundwater Facilities and the Installation of Monitoring Equipment

- * Since 2021, the *Regulations* was taken effect to strengthen the prevention and management of soil and groundwater pollution from surface tanks.
- * Provisions were added for pollution-preventing facility installation and regular monitoring.
- * Enterprises should conduct the monitoring themselves and reporting the responses to protect soil and groundwater resources.





3. Mitigation & Co-operation in Environmental and Safety Activities

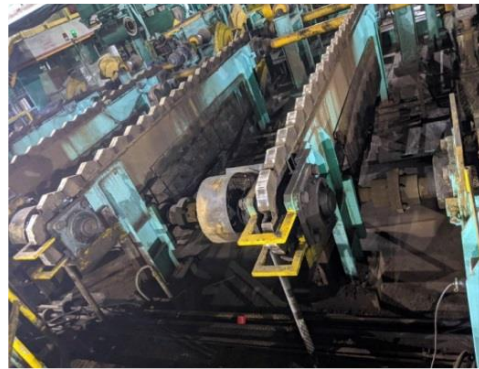
Occupational Health and Safety Management

Performance Evaluation

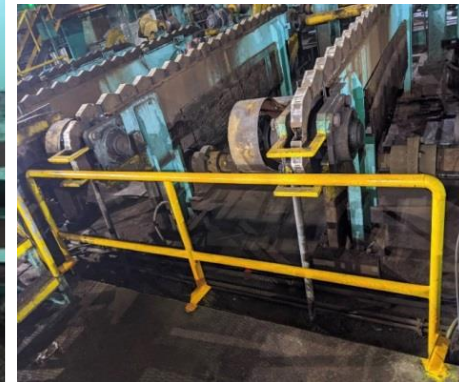
- * TSIIA (Taiwan Steel & Iron Industries Association) would hold the annual activity to **raise the safety consciousness for steelmakers.**
- * The evaluated unit would be reviewed some occupational safety-related deficiencies and provided the positive suggestion for improvement.



Before Improvement



After Improvement: With railing



Annual Goal for OHS

- * Many Steelmakers would set up the annual Goal for OHS (occupation health safety). **The OHS performances would be disclose at the shareholder annual report for public review.** For example, the OHS goal for China Steel Corporation (CSC) is listed below:

Year	2019		2020		2021		2022
Type	Control limits	Performance	Control limits	Performance	Control limits	Performance	Control limits
Employee Disabling Frequency Rate (FR)	≦ 0.2	0.18	≦ 0.2	0.14	≦ 0.18	0.14	≦ 0.18
Number of Employee Disabling by Traffic Accidents in Commute	≦ 9	16	≦ 9	21	≦ 9	21	≦ 9
Contractor Disabling Frequency Rate (FR)	≦ 0.3	0.83	≦ 0.3	0.31	≦ 0.3	0.40	≦ 0.3
Zero major occupation accident	Zero Fatality	Achieved	Zero Fatality	Achieved	Zero Fatality	Not Achieved ¹	Zero Fatality

Sustainability Goal for Environment

- * To fulfill the commitment to sustainable development, CSC has formulated its environmental goals like the table below

Environment				
Issue	GHG Management	Air Pollution	Water Resource	Circular Economy and Co- production between Steel and Petrochemical Plants
Short-term (2022)	<ol style="list-style-type: none"> 1. Reduce carbon emissions by 4% or 884,000 tonnes. <p>Note: Based year 2018.</p>	<ol style="list-style-type: none"> 1. Reduce 120.2 tonnes of Particulates. 2. Reduce 803.6 tonnes of SOx. 3. Reduce 11.5 tonnes of NOx. <p>Note: Accumulated pollutants reduction per year (since 2020).</p>	<ol style="list-style-type: none"> 1. Reduce new water consumption by 46.9% in conjunction with the introduction of reclaimed water from Linhai Reclaimed Water Plant. <p>Note: Based on a water consumption of 130,000 cubic meters per day in 2017 when reclaimed water was yet to be introduced.</p>	<ol style="list-style-type: none"> 1. Establish a pilot production line involving co-production between steel and petrochemical plants that captures 4,800 kg of carbon monoxide per year.
Mid-term (2025)	<ol style="list-style-type: none"> 1. Reduce carbon emissions by 7% or 1.547 million tonnes. <p>Note: Based year 2018.</p>	<ol style="list-style-type: none"> 1. Reduce 177.9 tonnes of Particulates. 2. Reduce 803.6 tonnes of SOx. 3. Reduce 11.5 tonnes of NOx. <p>Note: Accumulated pollutants reduction per year (since 2020).</p>	<ol style="list-style-type: none"> 1. Develop and plan the introduction of (alternative sources of) reclaimed water for industrial parks, and reduce new water consumption by 54.4%. <p>Note: Based on a water consumption of 130,000 cubic meters per day in 2017 when reclaimed water was yet to be introduced.</p>	<ol style="list-style-type: none"> 1. Establish a demonstration production line involving co-production between steel and petrochemical plants that reduces carbon emissions by 240,000 tonnes per year.



4. Best Practice for Improvement & Development Projects

Development of the Energy Saving Technology for Cooling Tower

- * In the past, because of the lack of powerful method to improve the facility performance our **cooling tower consume lot of extra energy**. In our research, we utilized the CFD method to simulate the heat removing phenomena of cooling tower. The analysis guided us to find the well solution to improve the heat removal. **We applied our developed technology to improve the performance of 12 pieces of cooling tower.**
- * Furthermore, we applied the VVVF equipment and our method to control the fan of cooling tower. Finally, we succeed to **solve the resonance problem of the fan in the condition of full loading and to drop 1 degree of water temperature**. The benefit of temperature drop of cooling water for compressor is 1.3% electricity power consumption decrease.
- * Over all of our research and implement, we decreased the electricity power consumption of 2.56 Million kWh and saved 6.4 million TWD in 2018.



Diversified Sources of Water - Reclaimed Water Derived from Urban Sewage

- * To mitigate the risk of water cuts or water rationing, reclaimed water derived from **urban sewage has been selected as the second source of water for the steelmakers.**
- * Since August 2018, CSC has began receiving the reclaimed water from municipal Reclaimed Water Plant, substantially lowering the risk of disruptions to its water supply. For the entire year of 2021, CSC has imported 16,205 million liters of reclaimed water.
- * The main source of reclaimed water is collected from municipal sewage, which is deaminated with nitrogen, and treated with UF and RO. **In 2021, the new water consumption per unit of steel billets is 2.65 tonnes/tCS, which is dramatically lower than the last year value of 3.58 tonnes/tCS.**





5. Researches

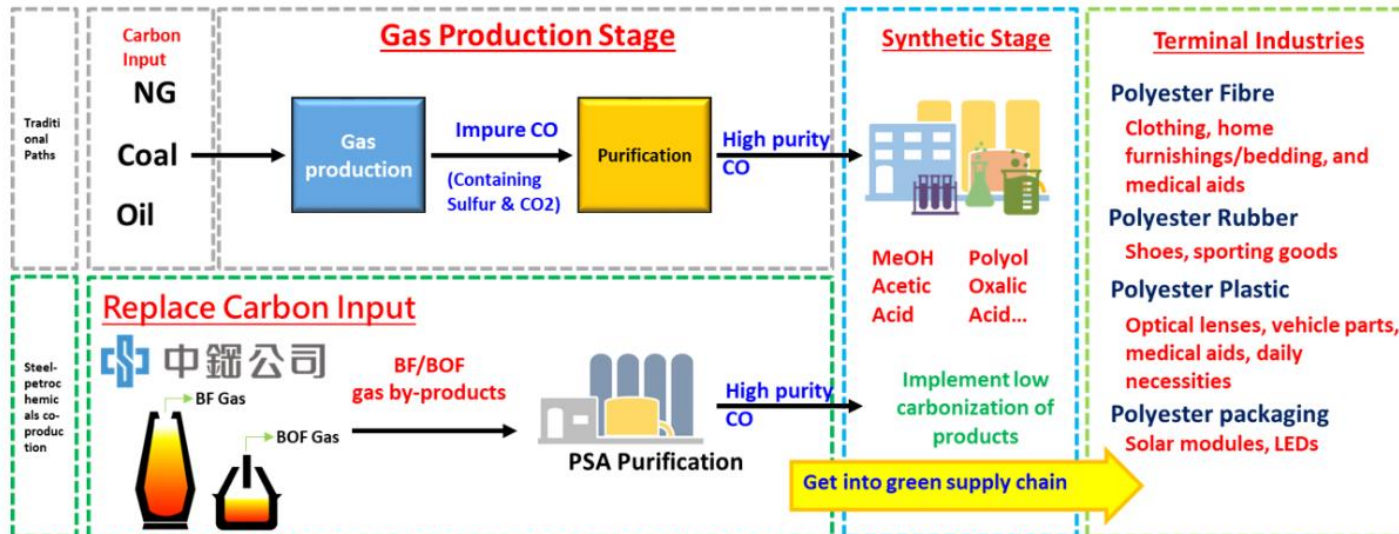
Coproduction between Steel and Petrochemical Plants to Intensify Carbon Reduction Efforts

- With the sustainable development efforts and realizing environmental management and clean production, CSC has set up the “Task Force on **Energy Saving & Carbon Reduction and Carbon Neutrality**” in February 2021 to formulate and promote carbon reduction initiatives in various areas, like energy efficiency enhancement and coproduction between steel and petrochemical plants.
- Coproduction between steel and petrochemical plants is an effective carbon reduction strategy that involves integrating resources from both the steel and petrochemical industries.



High-value Recycling of Carbon Resources

- * Steelmaker and petrochemical industry players, both parties can expand the supply of carbon resources such as CO and CO₂, which are raw materials used for synthesizing chemicals in the petrochemical industry.
- * In the future, **CO and CO₂ extracted from the steelmakers can replace raw materials for petrochemicals** that have to be imported by the petrochemical industry from abroad, and can be used to synthesize general-purpose chemicals through various processes in the petrochemical industry, thereby realizing the benefits of carbon fixation.



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Thank you for your attention

