


Status of GHG Emissions

Facing the severe challenge of climate change, TSRC continues to review and examine the balance between industry and the environment, and dedicates our efforts to energy conservation and carbon reduction with the vision of achieving carbon neutrality. With 2021 as the base year, TSRC aims to reduce Scope 1 + 2 GHG emissions by 10% by 2025 and by 22.5% by 2030, and to achieve a renewable energy ratio of 10% by 2025 and 30% by 2030. TSRC's GHG emissions (on a regional basis) were reduced by 8.3% in 2023, exceeding the original target of a 5% reduction in 2023. Renewable energy accounted for 5% of the total, also meeting the 2023 target in the ESG strategy blueprint.

|  Goals and Achievement | 2023 Achievement | 2023 Goals | 2025 Goals | 2030 Goals |
|--|--|--|---|---|
| | Total carbon emissions reduced by 8.3% (regional basis) from 2021 baseline | Reduce total carbon emissions by 5% from 2021 baseline | Reduce total carbon emissions by 10% from 2021 baseline | Reduce total carbon emissions by 22.5% from 2021 baseline |

1. Strategy of GHG Emissions Reduction

In response to global climate action, TSRC has set a vision to achieve carbon neutrality. TSRC will continue to invest in green manufacturing processes and increase the use of renewable energy while actively implementing energy conservation and carbon reduction measures. As a manufacturer of specialty chemicals, TSRC prioritizes the reduction of Scope 1 and Scope 2 GHG emissions. TSRC optimizes its processes and utility systems and expanding its green process innovations. In response to the Scope 1 reduction strategy, TSRC has stopped using coal-fired boilers since 2020 to reduce emissions from coal use, while adjusting the fuel used in boilers at all plants to replace fuel oil with natural gas. No fuel oil was used in the entire TSRC Group. From 2022, TSRC has reduced the use of boiler fuel through steam reduction measures. In the future, TSRC will continue to reduce Scope 1 emissions by regulating steam consumption. Regarding Scope 3 emissions and product use, TSRC encourages suppliers to reduce their carbon footprint and continues to develop sustainable and environmentally friendly products. TSRC is continuously developing carbon offset programs as part of its long-term goal to achieve carbon neutrality.

2. Direction of GHG Emissions Reduction

Low-Carbon Processes

TSRC is committed to promoting energy conservation and carbon reduction. All plants optimize their process operations and utility systems and invest in high-efficiency equipment as the main direction of carbon reduction. TSRC reduces electricity and steam consumption by replacing energy-consuming equipment, installing energy-saving devices, and installing steam extraction and heat recovery technologies.

- 1. Optimizing Process Operations: TSRC promotes the optimization of process operation to achieve energy saving and carbon reduction targets by adjusting parameters and operating methods.**

Adjusted the operation of the raw material storage cooling system, recycled process hot water and optimized the manufacturing process to reduce unnecessary energy consumption and improve energy efficiency, total electricity savings of 243,000 kWh (875 GJ), steam savings of 5,738 metric tons (17,020 GJ), and annual emissions reduction of 1,987 metric tons of CO₂ equivalent.

- 2. Optimizing Utility Systems: For lighting systems, air conditioning systems, and other utilities, TSRC uses a combination of equipment replacement and optimized operating conditions to save electricity.**

For old equipment and lighting systems, TSRC replaced old equipment with new energy-saving equipment. Total electricity savings of 361,936 kWh (1,303 GJ) and annual emissions reduction of 350 metric tons of CO₂ equivalent.

- 3. Investing in High-Efficiency Equipment: TSRC actively invests in highly energy efficient process equipment to reduce energy consumption and carbon emissions per unit product.**

TSRC bought the new thermal oxidizer (TO) with heat recovery and replaced dry-bed coolers. Total electricity savings of 36,406 kWh (131 GJ), total natural gas savings of 176,737 M³, steam consumption reduced by 6 metric tons (18 GJ), and annual emission reduction of 308 metric tons of CO₂ equivalent.

Renewable Energy

TSRC plans to build its own solar power, purchase green power contracts, renewable energy certificates or other means to gradually increase the proportion of renewable energy in its production sites in Taiwan and China, and achieved the target of 6.1% of total electricity consumption in 2023, exceeding the original target of 5% in 2023. In the future, the share of renewable energy is expected to reach 10% by 2025 and 30% by 2030 to achieve carbon reduction. In 2023, our subsidiary Nantong Industries signed a contract with power suppliers to purchase green power and green power certificates, and started using 10 million kWh of renewable energy and purchasing 6 million kWh of green power certificates in 2023. In response to Taiwan's "Renewable Energy Development Act" and "Regulations for the Management of Setting up Renewable Energy Power Generation Equipment of Power Users above a Certain Contract Capacity," TSRC completed the installation of solar power generation facilities at its Kaohsiung Dashe Factory site at the end of 2023 and began to generate electricity. Beginning in 2024, TSRC's subsidiaries in China will increase the proportion of renewable energy use to achieve the annual renewable energy use targets.

3. GHG Emissions

2020-2023 GHG Emissions and Emission Intensity (by Subsidiaries)

| (Unit: metric tons of CO ₂ e) | | TSRC Corporation | Shen Hua Chemical | Nantong Industries | TSRC-UBE | Shanghai Industries | TSRC (Vietnam) Company Limited | TSRC Specialty Materials LLC | Polybus | TSRC (Lux.) | TSRC Group in total |
|--|---|------------------|-------------------|--------------------|-----------|---------------------|--------------------------------|------------------------------|---------|-------------|---------------------|
| 2020 | Scope 1 | 89,910 | 4,785 | 52,000 | 68,874 | 27 | 0 | 16,935 | n/a | n/a | 232,531 |
| | Scope 2 | 63,548 | 106,322 | 91,224 | 22,354 | 2,329 | 0 | 40,988 | n/a | n/a | 326,765 |
| | Scope 1+2 | 153,458 | 111,107 | 143,224 | 91,228 | 2,356 | 0 | 57,923 | n/a | n/a | 559,296 |
| | Production volume | 173,773 | 170,426 | 55,560 | 63,036 | 12,214 | 0 | 46,521 | n/a | n/a | 521,529 |
| | GHG emissions Intensity (metric tons of CO ₂ e per unit product) | 0.88 | 0.65 | 2.58 | 1.45 | 0.19 | 0 | 1.25 | n/a | n/a | 1.07 |
| 2021 | Scope 1 | 90,211.10 | 5,069.98 | 9,074.54 | 3,213.34 | 30.84 | 7.32 | 21,968.98 | 0.00 | 0.00 | 129,576.10 |
| | Scope 2 | 70,806.11 | 101,334.73 | 153,827.13 | 80,507.77 | 1,751.53 | 1,820.73 | 21,038.58 | 1.57 | 20.82 | 431,108.98 |
| | Scope 1+2 | 161,017.21 | 106,404.71 | 162,901.67 | 83,721.11 | 1,782.37 | 1,828.05 | 43,007.56 | 1.57 | 20.82 | 560,685.08 |
| | Production volume | 194,194 | 170,988 | 73,815 | 65,285 | 9,934 | 0 | 47,921 | 0 | 0 | 562,138 |
| | GHG emissions Intensity (metric tons of CO ₂ e per unit product) | 0.83 | 0.62 | 2.21 | 1.28 | 0.18 | 0.00 | 0.90 | 0.00 | 0.00 | 1.00 |
| 2022 | Scope 1 | 96,900.17 | 6,380.22 | 7,485.08 | 3,192.44 | 25.81 | 5.58 | 24,274.45 | 0.00 | 0.00 | 138,263.75 |
| | Scope 2 | 53,670.89 | 96,102.37 | 149,597.03 | 84,735.95 | 1,135.13 | 840.36 | 21,150.90 | 1.54 | 0.11 | 407,234.28 |
| | Scope 1+2 | 150,571.06 | 102,482.59 | 157,082.11 | 87,928.39 | 1,160.94 | 845.94 | 45,425.35 | 1.54 | 0.11 | 545,498.03 |
| | Production volume | 178,484 | 170,522 | 72,822 | 67,217 | 5,494 | 577 | 44,910 | 0 | 0 | 540,026 |
| | GHG emissions Intensity (metric tons of CO ₂ e per unit product) | 0.84 | 0.60 | 2.16 | 1.31 | 0.21 | 1.47 | 1.01 | 0.00 | 0.00 | 1.01 |

(Continued)

| (Unit: metric tons of CO ₂ e) | | TSRC Corporation | Shen Hua Chemical | Nantong Industries | TSRC-UBE | Shanghai Industries | TSRC (Vietnam) Company Limited | TSRC Specialty Materials LLC | Polybus | TSRC (Lux.) | TSRC Group in total |
|--|---|------------------|-------------------|--------------------|-----------|---------------------|--------------------------------|------------------------------|---------|-------------|---------------------|
| 2023 | Scope 1 | 101,462.37 | 6,474.18 | 8,658.28 | 3,237.44 | 32.63 | 5.74 | 19,379.14 | 0.00 | 0.00 | 139,249.78 |
| | Scope 2 | 44,228.41 | 93,787.78 | 130,157.52 | 85,609.78 | 1,024.61 | 995.63 | 19,113.65 | 1.15 | 0.17 | 374,918.70 |
| | Scope 1+2 | 145,690.78 | 100,261.96 | 138,815.80 | 88,847.22 | 1,057.24 | 1,001.37 | 38,492.79 | 1.15 | 0.17 | 514,168.48 |
| | Production volume | 178,370 | 171,221 | 66,747 | 67,622 | 6,094 | 1,101 | 39,846 | 0 | 0 | 531,001 |
| | GHG emissions Intensity (metric tons of CO ₂ e per unit product) | 0.82 | 0.59 | 2.08 | 1.31 | 0.17 | 0.91 | 0.97 | 0.00 | 0.00 | 0.97 |

Note:

- This table covers seven greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. The GWP value for 2020-2021 is from the IPCC AR5, and the GWP value for 2022-2023 is from the IPCC AR6.
- The greenhouse gas emissions data for 2020 covers TSRC's Global Business Headquarter, Kaohsiung Factory, Gangshan Factory, Shen Hua Chemical, Nantong Industries, TSRC-UBE, Shanghai Industries, TSRC (Vietnam) Co., Ltd., and TSRC Specialty Materials LLC. It does not include two holding subsidiaries, Polybus and TSRC (Lux.), which are mainly engaged in trading business and were newly included in the scope of reporting in 2022. The operational control approach is adopted. Only the data of Kaohsiung Factory and Gangshan Factory were verified by a third party.
- The reporting boundary of 2021-2023 covers all factories and subsidiaries identical to the reporting scope of this report. The operational control approach is adopted in accordance with ISO14064:2018. Verification conducted by DNV GL Business Assurance Co., Ltd. (DNV) in 2023. The data is rounded to the second decimal place. Verification Statement please refer to [TSRC website](#).
- The emission factors are from:
 - [Taiwan] the global business headquarter, Kaohsiung Factory and Gangshan Factory: Use emission factors published by Taiwan Environmental Protection Agency (version 6.0.4).
 - [China] Shen Hua Chemical, Nantong Industries, TSRC-UBE, and Shanghai Industries: Use China's provincial electricity emission factors, the United Nations Intergovernmental Panel on Climate Change (IPCC) assessment reports, and the Shanghai Bureau of Ecology and Environment [2022] No. 34 The notice of Shanghai Ecological Environment Bureau on the adjustment of emission factor values related to the city's greenhouse gas emission accounting guidelines.
 - [Vietnam] TSRC (Vietnam) Co., Ltd.: Use the electricity emission factors published by Vietnam Ministry of Industry and Trade and Vietnam Ministry of Natural Resources and Environment and the IPCC assessment reports.
 - [USA] TSRC Specialty Materials LLC: Use US Environmental Protection Agency database and the IPCC assessment reports.
- Restatements of information: Greenhouse Gas Emissions in 2022 were restated due to verification of data, Scope 1 emissions of 138,447 metric tons of CO₂e were changed to 138,263.75 metric tons of CO₂e, the degree of change accounts for 1.32 x 10⁻³ of the original Scope 1 emissions. Scope 2 emissions of 408,181 metric tons of CO₂e changed to 407,234.28 metric tons of CO₂e, the degree of change accounts for 2.32 x 10⁻³ of the original Scope 2 emissions. Scope 1+2 emissions of 546,628 metric tons of CO₂e changed to 545,498.03 metric tons of CO₂e, the degree of change accounts for 2.07 x 10⁻³ of the original Scope 1+2 emissions.