

# Water Resource Management in Taiwan Fastener Industry (Part 1)



*In early 2025, Taiwan's Ministry of Economic Affairs (MOEA) stated that "Prime Minister of the Executive Yuan, considering the fact that Taiwan's water prices have not been adjusted for 31 years, and that the current temporal and spatial environments as well as the cost structure of water supply are much different than in the past, instructed the MOEA that it should conduct a timely review of the reasonableness of water prices; however, whether or not the price of water will be adjusted and how to adjust it has not yet been finalized yet." This already indicates that there is going to be an increase in water charges which have not been increased for 31 years.*

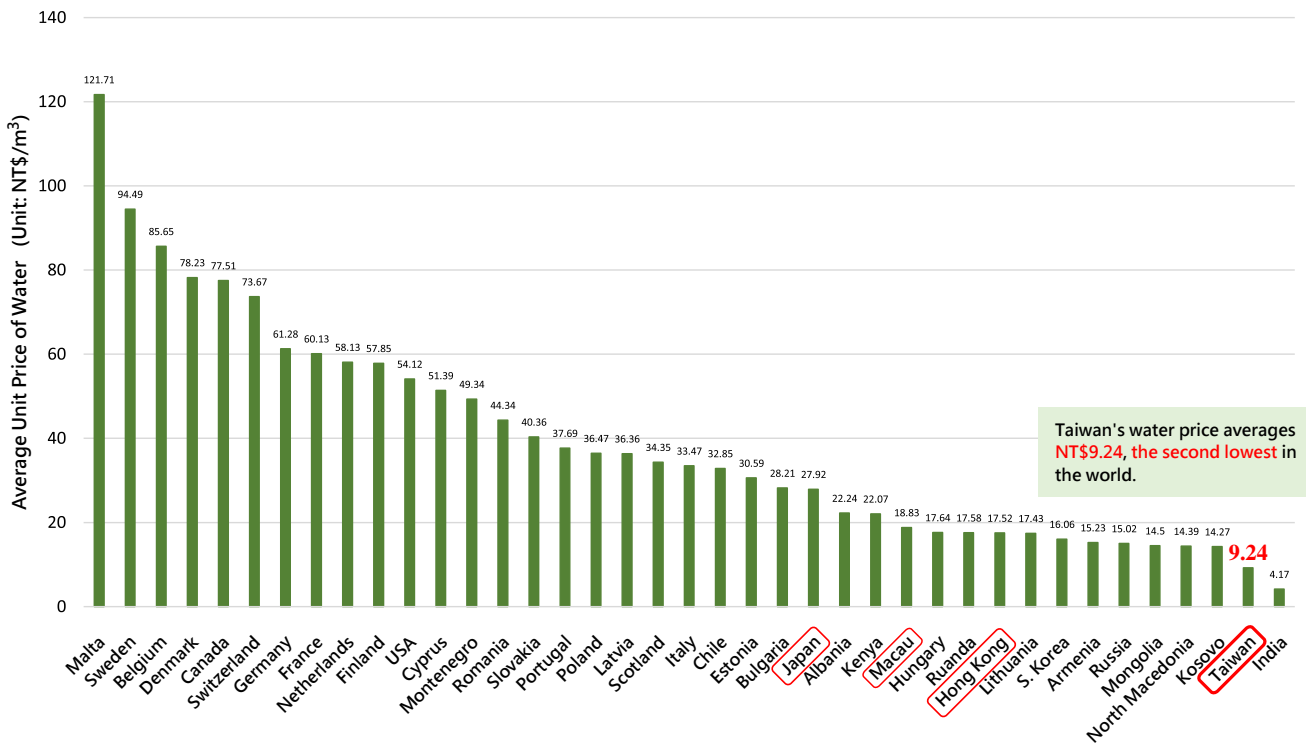
*Since the beginning of 2023, Taiwan's fastener export & production has been on a decline, followed by two electricity price increases in 2024, the concern about possible levy of carbon fee in Taiwan in 2025, coupled with the increase in basic wages, the pressure of various cost increases, as well as factories' spare capacity, most of the fastener industry do not dare to raise the prices of products, but rather to absorb the rising costs. Some manufacturers reflected that they could only expect to break even to maintain the basic needs of factory operations and to wait for the early return of export orders. I have recently heard that water rates may go up. Will it influence Taiwanese fastener suppliers? This article will illustrate the impact of Taiwan's water resources on the fastener industry.*

In the article "Taiwan's Carbon Fee Era - The Future of the Fastener Industry" released in Fastener World Magazine (Issue # 209 and 210), I once mentioned that the beginning and future of Taiwanese fasteners rely on Taiwan CSC. According to the article "Taiwan CSC Increases Percentage of Recycled Water in Use - Realizing Corporate Social Responsibility" on the CSC website, "Taiwan CSC is a steel mill that requires a lot of water for cooling, dust suppression, rust removal, lubrication, water sealing, water quenching, etc., in manufacturing processes, so a shortage of water will not only affect the normal operation of production, but also may seriously damage its equipment." The article also mentions: "In order to stabilize the water supply for production and alleviate the risk of water shortage, Taiwan CSC implements the 4R strategy for water resource management and promotes various water conservation programs, including reducing water consumption in processes, multi-level recycling of water, recycling and purification of wastewater, and replacement of new water with reclaimed water, as well as the promotion of a number of projects to reduce the consumption of raw water."

According to the article "Comparison of Water Prices in Various Countries" published by Taiwan Water Corporation on Nov. 15, 2024, The average price of water in Taiwan is NT\$9.24/m<sup>3</sup>, the second lowest price following India compared to neighboring countries. Please refer to Figure 2 for the average unit price of water for "domestic water consumers" consuming 200 m<sup>3</sup> of potable water per year in each country (or region) according to IWA statistics.



Figure 2. The Average Unit Price of Water for “Domestic Water Consumers”



Source: <https://www.water.gov.tw/ch/ServerFile/Get/07a111bb-ed90-4fe9-9fcc-faf3c3f166de?nodeId=4889>

With reference to the 2023 Taiwan CSC Sustainability Report, the disclosed items pertaining to environmental aspects of Taiwan in 2019-2023 are shown in Table 1. Item 11 (Water Intensity) and item 12 (New Water Intensity) show that Taiwan CSC consumes 5.04 m<sup>3</sup> of water per ton of steel billet and 2.16 m<sup>3</sup> of new water per ton of steel billet. According to Taiwan Water Corporation's Trial Calculation of Water Rates, the water consumption category for Kaohsiung is industrial and commercial, with differences in pipelines. The rate includes NT\$4.1 per m<sup>3</sup> for removal and treatment fees, NT\$10 per m<sup>3</sup> for sewerage fees with an extra 5% business tax, so the total amount payable for each m<sup>3</sup> of water consumption is about NT\$24.507, and the new water consumption per ton of steel billet is 2.16 m<sup>3</sup>, and the water price per ton of raw water consumed (excluding the consumption of recycled water, etc.) is NT\$52.94. Based on the average price of Taiwan CSC wire rod in December 2024, which is NT\$26,550/ton, the cost of water only accounts for 0.2% of the total cost of water, which is a very small proportion for Taiwan CSC. Thus, it can be seen that the impact of water price increase on Taiwan CSC is minimal, and the real threat to Taiwan CSC's water resources is “water scarcity” rather than the increase in water price.

In the fastener manufacturing process, the higher water consumption is in the pickling process for wire drawing, several washing processes for electroplating, and the cleaning process for quenching oil in heat treatment. Based on the production data collected in the past two years by assisting fastener companies in performing organizational carbon inventory (ISO14064-1:2018) and product carbon footprint (ISO14067:2018), I have compiled the following Table 2 for Water Consumption in the Production of Fasteners in Taiwan, covering from Taiwan CSC's wire coil to the finished products of screws and nuts. However, the data in this table may vary greatly depending on the equipment and products of each factory, so the data is for reference only.

In Taiwan, the total water consumption per ton of fasteners (from wire rod production of Taiwan CSC to product packaging and shipment) is about 10.853 m<sup>3</sup>, and if calculated at NT\$24.507 per m<sup>3</sup>, the water price per ton of fasteners is NT\$265.97. Taiwan Customs import/export statistics show that in 2024 the total export weight of Taiwan's steel fasteners is 1,250,320.465 tons, and the total export value is NT\$140,281,305,000, which translates to NT\$112.196,28 per ton, and the average price of steel fasteners exported per ton is NT\$112,000, and the cost of water consumed is NT\$265.97, which accounts for about 0.24% of the total. In this regard, the impact of Taiwan's water rate increase on the overall Taiwan fastener industry is very limited, so the real threat of water resources in Taiwan fastener industry is not water price increase but the “water shortage.”

The temperature of the Earth in 2024 has been 1.5°C higher than that in the Industrial Revolution in 1860, showing that the extreme climate has had an impact on the rainfall of Taiwan. The fastener industry is facing the threat of “water shortage.” Is there any water shortage in Taiwan? Yes, the 2021 drought crisis is a rare and serious incident in Taiwan's history. The massive drought in the western part of the island in early 2021 caused various regions to experience varying degrees of water supply pressure reduction, water restrictions, farming stoppages, and shutdowns, making it the most severe drought in Taiwan since 1947. In order to strengthen the industry's ability to cope with the risk of water resources, Taiwan's Water Resources Agency promoted the “Water Consumption Charge Policy”, which has been formally implemented since Feb. 1, 2023.



**Table 1. The Disclosed Items Pertaining to Environmental Aspects of Taiwan CSC in 2019-2023**

Aspect	Item	2019	2020	2021	2022	2023	Unit	
Environmental Aspect	4. GHG Intensity*	2.269	2.374	2.301	2.326*	2.326	tCO <sub>2</sub> e/tCS	
	5. GHG Emissions - Scope 1	20,351,815	18,318,428	20,939,573	18,248,901	16,809,455	tCO <sub>2</sub> e	
	6. GHG Emissions - Scope 2*	1,181,783	1,243,430	1,357,456	1,373,673*	1,249,102	tCO <sub>2</sub> e	
	7. NOx Emissions	6,464	5,822	6,593	5,603	5,209	Tonnes	
	8. SOx Emissions	6,233	4,943	5,579	4,257	4,163	Tonnes	
	9. VOCs Emissions	518	483	409	356	306	Tonnes	
	10. Particulate Emissions	2,315	2,188	2,164	1,921	1,776	Tonnes	
	11. Water Intensity	4.53	5.06	4.32	4.86	5.04	t/tCS	
	12. New Water Intensity	3.57	3.58	2.65	2.31	2.16	t/tCS	
	Note: The data of new water intensity is collected after reclaimed water introduced in 2018							
	13. Processing Water Recycling Rate	98.4	98.4	98.4	98.5	98.5	%	
	14. Production Process Water Recirculation	2,795,892	2,809,637	2,849,595	2,821,318	2,802,252	Million liters	

Source: 2023 Taiwan CSC Sustainability Report P.6

**Table 2. Water Consumption in the Production of Fasteners in Taiwan**

Unit: m<sup>3</sup>/ton

Process	Taiwan CSC's Wire Rod Production	Pickling for Wire Drawing	Cleaning for Heat Treatment	Washing for Electroplating	Heading, Threading, Forming, Tapping	Total
Avg. Water Consumption	5.04	2.0	0.9	2.563	0.35	10.853

Ps. The water consumption per unit of steel billet of Taiwan CSC is 5.04 m<sup>3</sup>/ton.

In response to these external environmental challenges, the ISO46001:2019 Water Management System becomes a key tool for enterprises to implement water management. This standard provides a systematic framework to help enterprises improve water consumption efficiency, reduce wastage and lower costs by reducing water consumption, replacing water consumption, and reusing water resources in the face of water shortage. Taiwanese fastener industry can use it to establish effective water management strategies to cope with future water risks and get a head start on the global ESG policy wave.

Taiwanese fastener suppliers must recognize that water is not an endless resource, and water shortage in Taiwan is a potential threat that may occur, so how to face and deal with the water resource management will be an important issue that cannot be ignored.

(Editor's note: The second part of this article will delve into the essence of the ISO46001 Water Management System and how existing Taiwanese fastener manufacturers are utilizing effective water conservation strategies to meet the ever-increasing water resource challenges.) ■

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