



2023 electricity emissions factor published by the Taiwan Power Company

Electricity emissions factor for 2023:

= 0.494 CO₂ e/kwh

Description:

1. The above calculation is made according to the “Standard Operating Procedures for Calculation of Electricity Emissions Factor, Version 1.4”, and is for reference only.
2. Adjustments made this year:
 - (1) New heat-electricity allocation method for cogeneration: according to the statistic recommendation from the International Energy Agency (IEA) and in view of the aim of using process waste heat for cogeneration, the Ecabert method is now used to allocate the input of energy sources between heat and electricity for cogeneration.
 - (2) Changes in activity data: the data regarding more energy sources have been added, such as waste fuel gas, and updates have been made with corrections provided by the vendors (e.g., fuel use, power generation, or effective heat outputs).
3. According to the foregoing adjustments, the electricity emissions factors for the past years have been retrospectively corrected as follows:

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CO ₂ e / kWh	0.518	0.525	0.530	0.554	0.533	0.509	0.502	0.509	0.495	0.494

4. The parameters for the calculation of emissions caused by different types of power plants were determined as outlined below:
 - (1) The heating values of energy sources were determined according to the “Heat Content of Energy Products” published by the Bureau of Energy, Ministry of Economic Affairs.
 - (2) The emission factors and the global warming potentials for different energy sources were determined according to the Guidelines for National Greenhouse Gas Inventories 2016 issued by the UN Intergovernmental Panel on Climate Change (IPCC) and the fourth evaluation report. The emission factors for the original units of different energy sources are shown in the table below.
 - (3) For the above calculation, the emission factor for power generation using renewable sources such as water power generation, solar power generation, wind power generation, and geothermal power generation



was set as zero according to the fifth evaluation report of the IPCC. Since power was generated without using the foregoing fuel, no greenhouse gas emission was caused.

5. As provided in Article 28-1 of the Electricity Act, “when an Electricity Retailing Utility Enterprise sells electric power to its users, the sold electric power shall have an electricity carbon emission factor that meets the electricity carbon emission factor criteria and be reported to the electricity industry regulatory authority.” The publication of the electricity carbon emission factor will be ceased in the next year (2019) and “the electricity emissions factor applicable to electricity retailing utility enterprises” is to be approved and applied instead.

Source:

https://www.moeaea.gov.tw/ecw/populace/content/ContentDesc.aspx?menu_id=26391

Campus Carbon Footprints

1. Carbon emissions from electricity in 2023:
=(power consumption in 2023 (KwH)/1000) × 0.494 (the factor provided by Bureau of Energy, Ministry of Economic Affairs, <https://www.moeaboe.gov.tw>)
=(11,425,764/1000) × 0.494
=5644.32 tons
2. Carbon emissions from transportation in 2023 (buses)
=(no. of shuttle buses entering the campus in 2023 × no. of laps per day × travel range on campus per shuttle bus × working days /100) × 0.01(provided by UI)
=(6 × 82 × 5 × 249/100) × 0.01
=61.254 tons
3. Carbon emissions from transportation in 2023 (cars)
=(no. of cars entering the campus in 2023 × 2 × approx. travel range on campus per car × working days /100) × 0.02(provided by UI)
=(789 × 2 × 6 × 249/100) × 0.02
=471.5 tons
4. Carbon emissions from transportation in 2023 (motorcycles)
=(no. of motorcycles entering the campus in 2023 × 2 × approx. travel range on campus per motorcycle × working days/100) × 0.01(provided by UI)
=(918 × 2 × 4.8 × 249/100) × 0.01
=219.43 tons
5. Total annual carbon emissions in 2023
=Total power consumption + transpiration (buses, cars, and motorcycles)
=5644.32+ (61.254+471.5+219.43)
=6396.37 tons
6. School population in 2023
= Students + faculty
=8621 persons
7. Ratio of total carbon footprint to campus population in 2023
=6396.37 tons/ 8621 persons
=**0.74** ton/person
(NCNU’s annual Ratio of total carbon footprint to campus population was 0.96 ton/person for 2018)

