Potential Impact of COP28 Resolution on Taiwan

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Abstract After two weeks of discussions and consultations at the 28th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28), states parties finally reached a series of important sustainable development resolutions and voluntary initiatives. In this paper, the possible impact of these resolutions on Taiwan was mainly discussed, and the relevant regulations and policies that the Taiwan authorities may enact were analyzed.

Key words COP28 resolution; Potential impact; Renewable energy; Taiwan

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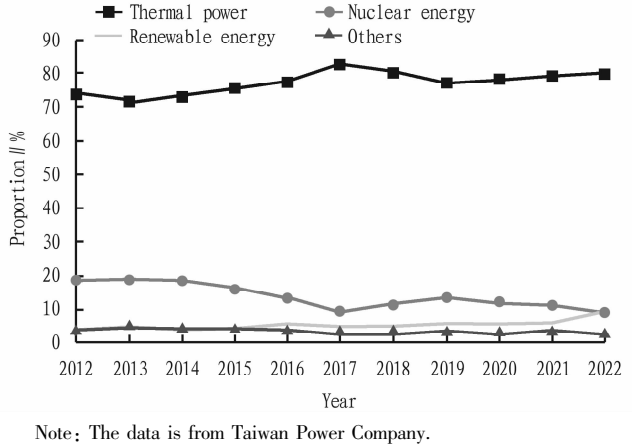
The 28th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) was held in Dubai from November 30 to December 12 in 2023. In addition to the Paris Agreement and the first Global Stocktake (GST), some key topics such as loss and damage fund, fossil fuels, renewable energy, climate and health, food systems, urban engagement, nature and the transition to justice were mainly discussed. During the COP28, a total of 11 declarations and commitments were issued, including the firstly issued declaration on food system transformation and health, a declaration on renewable energy and energy efficiency, and an initiative to decarbonize high-carbon industries. Meanwhile, the commitment of funds for energy, finance, livelihoods, adaptation and assistance to the least developed countries reaches $85 billion during the conference, including $792 million from the loss and damage fund.

1 "Beginning of the end" of the global fossil fuel era and Taiwan's energy situation and challenges

After two weeks of negotiations and consultations, 198 states parties finally reached a historic resolution in Dubai on December 13, namely The UAE Consensus, and getting off fossil fuels was included in the text of the agreement for the first time. Besides, it called for the transition away from fossil fuels to other energy sources in a just, orderly and equitable manner in the energy system and accelerate action over the next decade to achieve net zero emissions in line with science by 2050. Although the use of transition away in this resolution has been questioned by countries and organizations, fossil fuels were included in the resolution with the agreement of nearly 200 countries, which has undoubtedly sent a powerful signal to investors and policymakers, symbolizing the "beginning of the end" of global fossil fuel era.

According to the public data on the official website of Taiwan Power Company (Fig. 1), the energy in Taiwan mainly depended on thermal power generation in the past ten years (2012 - 2022), and on average, about 77% of electricity is generated by fossil fuels, while the rest was made up of nuclear energy, renewable energy and other forms of electricity generation (such as pumping capacity, combined heat and power) every year. The reason for the high proportion of thermal power generation is that it is not affected by climate and other external factors, and can provide electricity stably to meet power demand. Therefore, it is not possible to directly eliminate all thermal power generation in the short term. Therefore, in addition to building a zero-carbon energy system, Taiwan's energy transition policy also aims to improve the resilience of the energy system. Only by overcoming the constraints of climate factors on renewable energy can we complete the energy transition and build a sustainable power structure.



Note: The data is from Taiwan Power Company.

Fig. 1 Proportion of energy for Taiwan's electric power from 2012 to 2022

In order to gradually reduce the dependence on fossil fuels and improve the energy security of Taiwan (its dependence on imported energy is as high as 97%) at present, in the *General De-*

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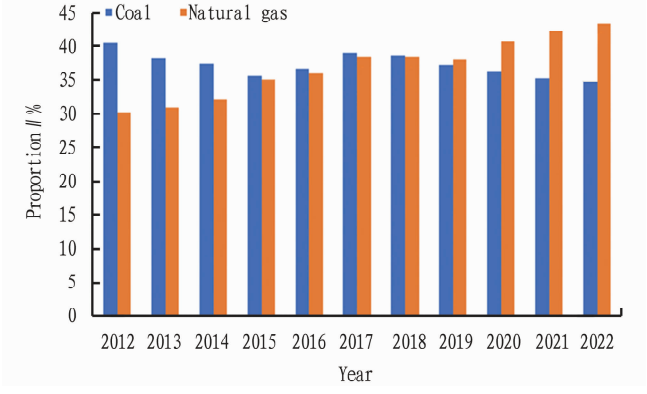
scription of Net Zero Emission Paths and Strategies in Taiwan in 2050 proposed in March 2022, the development direction of clean energy of "reducing coal, increasing natural gas, developing green energy, and non-nuclear" is the planning principle to ensure a stable supply of electricity, and reduce air pollution and greenhouse gas emissions. For the part of increasing natural gas, electricity generation from natural gas in Taiwan will account for 50% before 2025, and any new coal-fired units will be built. Coal-fired units are decommissioned into gas-fired units. Meanwhile, low-carbon thermal power generation (exchanging gas for coal) is conducted, and carbon-free fuel (biomass energy, hydrogen energy) supply system is constructed.

As shown in Fig. 2, Taiwan has gradually reduced coal-fired power generation and increased gas-fired power generation, because the latter produces lower carbon emissions in the process of generating electricity. In 2019, gas-fired power generation exceeded coal-fired power generation for the first time. In addition, in order to enable enterprises to have more positive motives for carbon reduction, at the beginning of 2023, the *Response Law on Climate Change* promoted by Taiwan revised and confirmed the carbon pricing system and relevant regulations, regulated the collection of carbon fees for special purposes, and promoted the reduction credits for trading system, striving to achieve the goal of net-zero emissions by 2050. That is, carbon is "priced", and the cost of carbon emissions is internalized into production behavior and consumption decisions to prompt enterprises to face the urgency of carbon reduction.

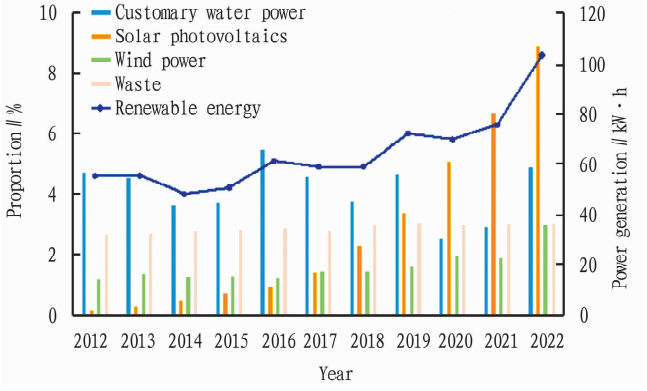


Note: The data is from Taiwan Power Company.

Fig. 2 Proportion of coal-fired and gas-fired power generation in total power generation in Taiwan from 2012 to 2022

2 Development of renewable energy and green electricity in Taiwan

From Fig. 3, it can be seen that the proportion of Taiwan's renewable energy generation in total power generation increased from 4.6% to 8.6% in the past ten years. The annual power generation of solar photovoltaics rose from about 160 million kW · h in 2012 to 10.6 billion kW · h in 2022, with an increase of about 66 times, showing Taiwan's determination to develop renewable energy and accelerate energy transformation. In December after the end of COP 28, the Ministry of Environment also echoed the *Global Renewable Energy and Efficiency Commitment*, and would continue to increase the proportion of low-carbon energy in Taiwan, accelerate the deployment of renewable energy, gradually reduce the use of fossil energy, and promote the key strategic action plans related to energy supply and demand of solar power, hydrogen energy, forward-looking energy, power system and energy storage, energy conservation, carbon capture, utilization and storage.



Note: Data is from energy statistics database.

Fig. 3 Proportion of renewable energy generation in Taiwan from 2012 to 2022

In December after the end of COP28, the Ministry of Environment also echoed the "Global renewable energy and efficiency commitment", saying that it will continue to increase the proportion of low-carbon energy in Taiwan, accelerate the deployment of renewable energy, gradually reduce the use of fossil energy, and promote the key strategic action plans related to energy supply and demand such as solar power, hydrogen energy, forward-looking energy, power system and energy storage, energy conservation, carbon capture and utilization and storage.

In addition to the government's commitment to carbon reduction, The industry is becoming more strict about ESG regulations, and receiving a request from supplier or proactively innovating business opportunities indicate that the demand for green electricity will continue to increase in the future. As of September 2023, a total of 32 Taiwan-based companies have joined the RE100 initiative, pledging to entirely use green electricity production by 2050 to reduce carbon emissions and environmental pollution.

Therefore, at the end of 2023, the Ministry of Economic Affairs released the *Status and Outlook of Green Electricity Trading Market in Taiwan*, in which it is mentioned that the cumulative volume of green electricity transfer transactions since 2020 has reached 3.03 million (one sheet represents 1 000 kW · h), about 3.03 billion kW · h of green electricity, and multiple flexible measures would be studied, so as to let users smoothly enter green electricity market and expand the development of green electricity market.

3 Nuclear power is not the main source of electricity in Taiwan

Another voluntary declaration drew attention during the conference, namely the *Declaration to Triple Nuclear Energy* signed by 22 countries, including the United States, Japan and France. The signatories acknowledge the key role of nuclear energy in meeting the goal of limiting temperature rise to 1.5 ℃, and promise to tripling nuclear capacity by 2050. The declaration brings nuclear energy back into the discussion of COP28, but the word "nuclear energy" was absent from the original GST draft, which was presented on December 8. However, in Article 28 of the mitigation chapter in the final text, "nuclear energy" is also regarded as one of the technologies to accelerate zero and low-carbon emissions in addition to renewable energy and CCUS. Notably, "nuclear energy" is mentioned only in the mitigation section described above, and there is no reference to the goal of tripling nuclear energy by 2050 as advocated in the *Declaration to Triple Nuclear Energy*. According to *The World Nuclear Industry Status Report* 2023, the Green Citizen Action Coalition pointed out that global nuclear power generation has experienced the largest decline in the past 10 years, and the reduction of the proportion was also the lowest in the past 40 years. According to the report, nuclear power generation accounted for only 9.2% of global power generation in 2022, declining by 0.6% compared with the previous year.

According to the results of energy policy poll conducted by the Taiwan Research Institute in 2019, nearly 60% of the people in Taiwan mistakenly believed that the main mode of power generation in Taiwan is nuclear energy. However, according to the proportion of various energy sources of power generation over the years announced by Taiwan Power Company, the proportion of nuclear energy has been below 15% since 2016, and it even only accounted for only 8.24% of the total power generation in 2022.

To sum up, although the *Declaration to Triple Nuclear Energy* has aroused great discussion and attention, the final COP28 text only considers nuclear energy as one of technologies to accelerate zero and low-carbon emissions, and does not specifically include the goal of increasing to tripling, not becoming a "global consensus" of COP28. Although nuclear energy has been recognized as a key player in achieving the goal of controlling temperature rise, the role of nuclear energy in Taiwan's energy transformation remains to be deeply considered in light of the fact that nuclear power generation has declined globally and nuclear energy is not currently a major source of power generation in Taiwan.

Taiwan is facing complex challenges on the issue of nuclear energy, and needs to consider factors such as technical level, social consensus and renewable energy development. According to the report of the Central News Agency, the Ministry of Economy said on January 2, 2024 that the proportion of nuclear power generation in 2030 ranged from 10% to 25%, of which 10% is 34 billion kW · h, about the power generation of five No. 2 nuclear power units; if it is 12%, six No. 2 nuclear power units are needed; nine nuclear power units are needed for 20%. In other words, it is necessary to build new nuclear power plants (No. 5, No. 6 or even more), and communication with the community is needed for the location of these plants.

the referendum result of "restarting the fourth nuclear power plant" in 2021 reflects that Taiwan society has not yet formed a clear consensus on nuclear energy issues, highlighting the differences and opposition of the people on this issue.

4 Conclusions

Taiwan has gained an advantage in renewable energy. Compared with other countries, Taiwan has better conditions for the development of renewable energy, especially in the fields of wind power and optoelectronics. Relevant policies and investments should be further strengthened to promote the larger application of renewable energy, which will not only help achieve energy diversification and reduce dependence on traditional energy sources, but also conform to the trend of global energy transition.

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