GREEN SYNERGIES: SUSTAINABILITY, SECURITY AND TAIWAN-EUROPE COLLABORATION

Joint issue
China Observers in Central and Eastern Europe (CHOICE) and Taiwan Insight

May 2025
China Observers in Central and Eastern Europe (CHOICE)
ASSOCIATION FOR INTERNATIONAL AFFAIRS (AMO)
Žitná 27/608
CZ 110 00 Praha 1 Tel.: +420 224 813 460 info@amo.cz www.amo.cz

Table of Contents

Green Synergies: Sustainability, Security and Taiwan-Europe Collaboration

Welcome to the first joint issue of *CHOICE* and *Taiwan Insight*! As Taiwan and the European Union advance along their respective paths toward green and digital transitions, they are increasingly prioritizing aspects like renewable energy, circular economy, and sustainable development in both their domestic and foreign policies. This makes it an ideal time to delve into these complex issues – and the growing potential for collaboration between the two – in the realm of green energy and green technologies. This issue covers several key functional topics, including critical raw materials, wind, and solar energy. It also explores potential avenues for cooperation not only at the EU level but also trough sub-regional frameworks, examining opportunities for V4-Taiwan and Balkan-Taiwan "green partnerships."

Navigating Geopolitical Turbulence through Taiwan's Energy Transition Policy

Yun-Ling Ko and Chia-Wei Chao

Taiwan's reliance on imported fossil fuels presents a critical vulnerability in the island's energy security, making the transition to renewable energy a major step toward greater national resilience. Developing domestic renewable energy sources and strategically managing supply chain dependencies are crucial for Taiwan to strengthen both its energy and national security in an evolving geopolitical landscape.

In Taiwan, concerns about energy security focus primarily on the country's heavy dependence on thermal power generated from imported fossil fuels – often described as the "Achilles' heel" in its security framework. According to statistics from the Energy Administration, in 2024, 39.3 percent of electricity generation came from coal and 42.4 percent from liquefied natural gas (LNG), all of which is imported. Renewables accounted for only 11.6 percent of the share.

The government targets to have an energy mix of 50 percent natural gas, 30 percent coal, and 20 percent renewables by 2025, making LNG the largest component of Taiwan's energy portfolio. To meet this goal, the government plans to increase LNG reserves from the current 11-day supply to 14 days by 2027. However, Taiwan's heavy reliance on LNG has emerged as a politically contentious issue, particularly amid concerns that such dependence heightens Taiwan's vulnerability to price volatility associated with geopolitical risks – most notably, the potential risk of a maritime blockade by China.

A closer examination of Taiwan's energy security index (Table 1) over the past decade reveals only a slight decrease in its dependence on imported energy – from 97.67 percent to 95.63 percent. This marginal reduction can be attributed primarily to the expansion of renewable energy and the gradual contraction of the petrochemical sector. Nevertheless, the country's overall reliance on imported energy remains remarkably high. On average, imported energy accounts for 14.4 percent of the total national expenditure, with a peak of 18 percent in 2022, when global fuel prices surged due to the outbreak of the war in Ukraine.

Because of Taiwan's high reliance on imported energy and its subsequent vulnerability to market volatility, energy security is a critical concern. Conventional strategies – such as diversifying import sources and relying on nuclear power as the ultimate solution – are insufficient in providing the resilience necessary to withstand rapid and unpredictable geopolitical disruptions. This article argues that renewable energy development offers a vital pathway to greater resilience of Taiwan, aligning with the growing recognition of energy transition as a critical component of national security, beyond its environmental imperative. The article seeks to debunk common misconceptions that hinder Taiwan's energy transition while advocating for forward-looking, strategic planning to navigate geopolitical uncertainty.

Year	Dependence on Imported Energy (%)	Energy Imports / Total Imports (%)
2015	97.67	15.36
2016	97.58	12.73
2017	97.70	14.86
2018	97.51	17.19
2019	97.28	15.12
2020	97.28	10.19
2021	97.19	12.53

2022	96.65	18.12
2023	96.20	15.83
2024	95.63	12.81

Table 1: Taiwan's key energy security indicators, Source: Energy Administration, MOEA

Energy Transition as the New National Security

The concept of "energy transition as national security" has gained prominence due to two key developments: the urgent need to address climate change and extreme weather events, and the escalating concerns about national security. A turning point was Russia's invasion of Ukraine in 2022. The surge in fuel prices accelerated the deployment of renewable energy in Europe. As a result, European countries now see clean energy development as a means to reduce dependence on authoritarian petrostates like Russia. Clean energy thus becomes the key to both current energy and future climate security. Some even argue that security concerns, rather than climate change, will become the primary driver of the energy transition, with sovereign states diversifying their energy mix across multiple sources to insulate themselves from geopolitical, macroeconomic, and financial risks.

Another factor is President Trump's new trade order. With 74 percent of the world's population living in fossil fuel-importing countries – a dependency historically shaped by the US-led geopolitics and oil-dominated markets – Trump has turned fossil fuels into trade bargaining chips to balance the US trade deficit. For example, the East Asian countries, including Japan, Korea, and Taiwan, were pressed to invest in Alaska's LNG project, while the EU was forced to modify its methane leakage standards for LNG imports. As confidence in securing oil and gas erodes, policymakers are increasingly turning to domestic energy sources, namely renewables and electrification. Countries believe that the transition to clean energy could create a world that is less susceptible to energy price shocks and geopolitical trade risks.

The dependence on imported fossil fuels remains a profound concern for national security. A former US Assistant Navy Secretary even claimed that domestic clean energy deployment may be the greatest step to ensuring national security. Similarly, several EU think tanks had urged the European Commission to include green energy in its increased security spending under the EU's next multi-annual financial framework. Taiwan should, therefore, follow and design its energy security strategy based on this new concept of national security.

Taiwan's Energy Security: Debunking Three Persistent Myths

Three myths continue to cloud the debate about Taiwan's energy security. First, Taiwan's heavy reliance on energy imports renders it incapable to withstand a Chinese blockade. Second, dependence on Chinese clean technology undermines Taiwan's energy security. And third, a fundamental trade-off exists between food and energy security, especially in the use of land for renewable energy projects. These myths, however, do not hold up under closer examination.

In the wake of China's latest military drills, during which LNG terminals were explicitly identified as potential targets, Taiwan's LNG reserves have become a political flashpoint. Critics argue that Taiwan's energy transition strategy, which includes a move away from nuclear and toward renewables, weakens energy security. Much attention has been paid to Taiwan's LNG reserves, which are typically sufficient for 11 to 14 days under normal consumption. But this metric is misleading. In a blockade scenario, Taiwan's total energy demand would likely plummet – potentially by 50 percent – as industrial exports halt. Under these conditions, Taiwan's existing coal-fired power plants, combined with a growing renewable energy capacity, could sustain the island's electricity needs for over a year.

Crucially, the success of this transition depends on the rapid deployment of renewable resources. Some have questioned whether this strategy is viable, given China's dominance in the global clean energy supply chains. However, Taiwan retains significant domestic solar panel manufacturing capacity and has banned imports of Chinese-made solar modules since 2022. As for energy storage – a vital component of flexible power grids – Taiwan is on track to produce 13 GWh of batteries annually by 2027, which is enough to support its renewable energy ambitions.

Another common argument from skeptics is that Taiwan's increasing dependence on food imports – currently around 70 percent – poses a new vulnerability, especially if utility-scale solar projects encroach on agricultural land. But this concern is overstated. Taiwan's self-sufficiency rate for rice – its staple crop – remains at impressive 98 percent, even with 6 percent of farmland currently lying fallow. In fact, allocating less than 10 percent of Taiwan's agricultural land to solar projects could allow solar power to cover up to one third of the island's electricity needs. Food security, in other words, is not threatened. Using it as a rhetorical weapon against renewable energy deployment is misleading and disingenuous.

Energy security is a serious issue that deserves a serious conversation. Clinging to outdated myths only serves to undermine thoughtful policymaking. Taiwan's path to a resilient energy future requires realistic assessments, not fear-driven narratives detached from the facts.

A Real Tabletop Exercise on Energy

A tabletop exercise (TTX) tackling Taiwan's national security challenges is held annually by Taiwanese think tanks. These simulation exercises see key stakeholders discussing and analyzing responses to different threat scenarios, including Taiwan Strait crisis or economic disruptions. Besides the threat from China, a TTX specifically focused on energy transition is needed to debunk the aforementioned myths and build robust policy frameworks.

US-based think tank, the Center for Climate and Security, has conducted similar tabletop exercises in Japan and South Korea. These simulations have emphasized the idea that "clean energy is national security" by demonstrating how disruptions from extreme weather events and geopolitical shifts threaten energy security of countries heavily dependent on imported fossil fuels. Scenarios included acute crises – such as halving of fossil fuel imports due to militarization of the Taiwan Strait – as well as chronic or non-acute threats like the compounding effects of climate change on critical infrastructures essential to national defense and public security.

Importantly, these exercises recognized that a clean energy transition is not without its own risks. Participants were made aware of new vulnerabilities emerging from the shift to clean energy, particularly the global reliance on China for critical minerals used in clean technology. While this dependence may be less immediately destabilizing and more easily mitigated than fossil fuel dependence, it presents strategic risks to long-term national security. NATO, the EU, the US, and Japan have all echoed this warning.

The Way Forward

The challenge of supply chain dependency can be addressed through targeted innovation and strategic planning. Technological advances, such as the development of cobalt-free or nickel-free batteries, offer viable alternatives to current supply chain constraints. Furthermore, building democratic and diversified supply chains – anchored in cooperation with like-minded partners – creates a pragmatic

path forward. Sourcing critical materials from a wider range of geopolitical allies can significantly reduce systemic risks.

Conducting a dedicated TTX on energy transition would provide Taiwan with a strategic opportunity to assess both its strengths and vulnerabilities under various clean energy adoption scenarios. Such an exercise would not only help identify critical infrastructure and policy gaps but also support a more integrated approach to enhancing both national and energy security in the context of global decarbonization.

From Extraction to Innovation: The EU and Taiwan in the Critical Minerals Value Chain

Blanca Marabini San Martín

As the European Union's green transition gains momentum, ensuring the safe and sustainable supply of critical raw materials (CRMs) has become a strategic priority. Renewable energy and decarbonization technologies – such as electric vehicles, wind turbines, solar panels, and batteries – depend on critical minerals including lithium, cobalt, nickel, and different rare earth elements (REEs). The EU's agenda, as outlined in the European Green Deal and the accompanying industrial policy, cannot be achieved without robust, dependable, and diversified mineral value chains.

As shown in Figures 1 and 2, China currently controls the global market for critical minerals used in clean energy, both in terms of extraction and processing. This dominance has enabled the scaling of low-carbon technologies worldwide, making them cheaper and faster to develop. However, the concentration of mineral extraction and processing in a single country has generated concerns about supply risks, particularly in the context of increasing geopolitical tensions and export restrictions.

The EU has adopted a "de-risking" approach: rather than severing economic ties, the aim is to reduce vulnerabilities by diversifying supply chains and building strategic partnerships. Although Taiwan is not a producer of raw materials, it emerges as a promising partner due to its relative strengths in high-tech manufacturing, advanced material processing, and regulatory alignment with the EU. This article explores opportunities for EU-Taiwan cooperation on critical minerals and how such cooperation can enhance the resilience and sustainability of both actors' green industrial agendas.

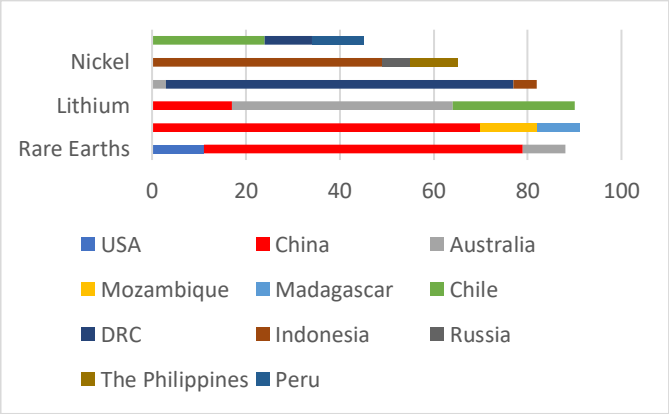

Figure 2: Share (%) of top three countries in the extraction of critical minerals, 2022, Source: IEA

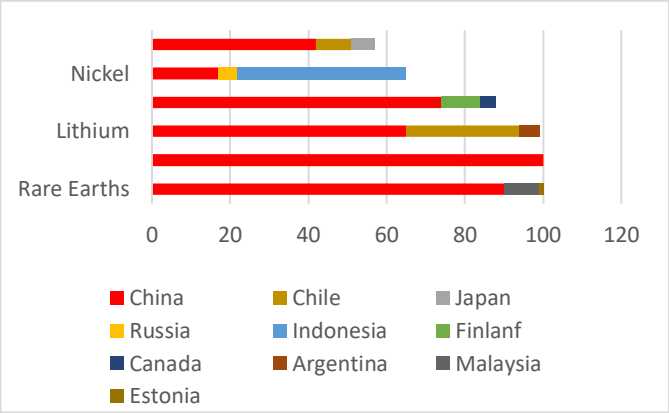

Figure 1: Share (%) of top three countries in critical minerals processing, 2022, Source: IEA

The EU's Critical Minerals Agenda

The EU has taken significant steps to secure access to CRMs. The 2023 Critical Raw Materials Act (CRMA) sets ambitious targets: by 2030, the Union aims to mine 10 percent, process 40 percent, and recycle 15 percent of its annual consumption of critical raw materials domestically. The Act also emphasizes forming strategic partnerships with like-minded countries to secure sustainable imports, with a particular focus on improving traceability, ESG standards, and circular economy practices. In addition to this legislation, the EU has launched initiatives such as the European Raw Materials Alliance and the Global Gateway strategy, which encourage responsible mining, processing, and infrastructure development abroad. The emphasis is not only on accessing raw materials but also on enhancing Europe's capacity in refining, component manufacturing, and recycling – areas where a partnership with Taiwan may be particularly fruitful.

This approach reflects the EU's broader push for strategic autonomy in green industries, which involves reducing dependencies not only in energy and digital infrastructures, but also in the material foundations of clean technologies. As the Union's search for global partners increasingly prioritizes those with shared regulatory frameworks, technological innovation, and high-value supply chain capabilities, Taiwan stands out as a viable partner.

Taiwan's Role in Global Minerals Value Chains

Taiwan lacks significant domestic reserves of critical minerals. Following its 2022 pledge to reach net-zero carbon emissions by 2050, it faces similar challenges as the EU, including surging demand for permanent magnet motors containing rare earths. REEs are particularly crucial for Taiwan, given their vital role in the island's leading manufacturing sectors. They are key components in semiconductor production, which accounts for nearly 40 percent of Taiwan's total exports. Despite this, Taiwan imports around 3,000 tons of rare earths every year, and has limited refining and processing capacities, with only one or two companies active in the upstream segment of Taiwan's rare earths supply chain.

Nevertheless, Taiwan occupies a pivotal position in downstream segments of global mineral supply chains, particularly in high-tech manufacturing. Taiwan boasts an industrial base that includes companies engaged in the production of magnets, semiconductors, battery components, and other technologies that rely on stable and sustainable supply of critical inputs. Taiwan also plays a key role in the global smart machine supply chain, producing components and assembling products that depend on rare earth elements. Other sectors also rely on REEs, including the growing medical technology sector, known for innovative treatments and virus detection tools. Taiwan's high-tech industries are thus dependent on a stable REE supply chain across sectors.

Taiwan is also investing heavily in research and development (R&D) of circular economy for critical materials, including battery recycling and rare earths recovery. Companies such as Aleees (Advanced Lithium Electrochemistry) and E-One Moli (Molicel) are contributing to battery technology innovation. Non-profit and civil society organizations such as the Circular Taiwan Network contribute to developing mineral circularity strategies, while research institutions such as the Institute for National Defense and Security Research explore environmentally friendly extraction and substitution techniques, often through international collaborations. Taiwan has also sought to join global initiatives like the Semiconductor Supply Chain Initiative (SSCI), which, through TSMC's involvement, contributes to securing the island's critical mineral supply chains.

Taiwan's high standards in industrial safety and environmental protection show regulatory convergence with the EU in areas such as sustainability reporting, emissions reduction, and traceability. In the context of critical minerals, the 2023 Climate Change Response Act promotes

renewable energy development and energy security, and the accompanying National Climate Change Action Guidelines stress the need to manage supply chain pressures associated with renewable energy through international cooperation. These efforts align closely with the EU goals, such as those outlined in the updated Battery Regulation, which aims to increase the circularity of components with CRMs and secure supply chains in accordance with the CRMA, all while reducing environmental impacts and increasing self-sufficiency through innovation rather than extraction alone.

Potential Pathways for Collaboration

The complementarity between the EU's strategic objectives and Taiwan's industrial strengths creates a compelling case for deeper cooperation. While the EU has focused on securing diversified and green sources of critical materials, Taiwan excels in transforming these materials into high-value components. This downstream expertise – especially in the fields of electronics, mobility, and energy storage – is essential for achieving the EU's green technology ambitions. Both sides also share an interest in enhancing supply chain transparency and traceability, especially considering the increasing scrutiny from investors, regulators, and civil society.

Several bilateral mechanisms already exist to facilitate collaboration, including annual trade consultations, an industrial policy dialogue, a dialogue on digital economy, and sector-specific working groups. These platforms offer opportunities to explore industrial partnerships or supply chain agreements in key sectors such as battery or electric vehicle manufacturing. The European Chamber of Commerce in Taiwan can help foster these partnerships by creating shared incentives for innovation and resilience. Similarly, as both regions move toward stricter environmental and due diligence standards, coordination on reporting frameworks, third-party certification, and traceability tools could reduce compliance costs and improve market access. The European Business and Regulatory Cooperation Program (EBRC) in Taiwan, created with the purpose of improving regulatory cooperation between the EU and Taiwan, could serve as a foundation for such joint efforts, especially when it comes to setting regulatory standards.

R&D presents another promising area for cooperation. EU and Taiwanese institutions could collaborate on substitution research (e.g., of rare earths alternatives for permanent magnets), low-impact refining technologies, and advanced recycling methods. These projects would not only reduce raw material dependencies but also support broader environmental sustainability goals. The EU's Horizon Europe program and Taiwan's Ministry of Economic Affairs could co-fund research into mineral processing, recycling, and sustainability innovations, involving universities and research centers, which could further broaden their impact.

As the EU accelerates its green transition, securing stable and sustainable access to critical minerals will remain a central challenge. While Taiwan is not a source of raw materials, its capabilities in processing, technology, and supply chain governance make it a partner with great potential. The EU's emphasis on de-risking and diversification aligns well with a pragmatic, innovation-driven, and mutually beneficial approach to cooperation. By focusing on innovation, standards and industrial complementarity, EU-Taiwan collaboration can contribute meaningfully to shared climate and industrial goals, strengthening both actors' positions in the evolving global green economy.

The Power of "Taiwan Can Green":
Energy Transition as a Discursive Response to Cross-Strait Geopolitical Tensions

Anthony Ho-fai Li

The Democratic Progressive Party (DPP) has been committed to its ambitious solar energy target despite growing controversies since 2016. This commitment goes hand in hand with enhancing the DPP's ideational power through the narrative of "Taiwan can green," which helps the party navigate escalating geopolitical tensions across the Taiwan Strait while coping with domestic political challenges at the same time.

Taiwan has almost tripled its proportion of energy generation from renewable sources in the past decade, rising from 4.2 percent in 2015 to 11.9 percent in 2024. The process was, however, anything but free of controversies – ranging from communal conflicts over solar panel installations and national referendum on the role of renewable energy in the phase-out of nuclear energy, to misinformation campaigns targeting renewables. Despite this, the DPP-led central government showed a steadfast commitment to the energy transition, setting an aggressive target of 20 percent energy generation from renewables by 2025.

How does the DPP find it politically beneficial to adhere to its controversial energy policy? While some critics argue that the DPP has been driven by nothing but ideological commitment to eliminate nuclear energy, this article suggests that the party has also pragmatic motivations. In addition to enhancing Taiwan's economic competitiveness and energy security – two oft-cited reasons – there is also the discursive utility of Taiwan's energy transition within the context of cross-Strait tensions.

Escalation of Geopolitical Tensions

Since Tsai Ing-wen assumed the presidency under the DPP in 2016, cross-Strait relations have become increasingly strained. China accused the Tsai administration of not recognizing the "One-China Principle" underlying the "1992 Consensus," which it views as a move toward secession. In response, Beijing stepped up its efforts in luring Taiwan's diplomatic allies into switching recognition, which led to a drastic decrease in countries recognizing Taiwan from 22 in 2016 to just 12 in 2024. Taiwan was also effectively barred from participating in the UN agencies, such as the World Health Organization, after the Tsai Administration refused to be admitted under the name "Chinese Taipei."

Additionally, Beijing took retaliatory measures against countries like Lithuania that had sought to elevate their relations with Taiwan. Between 2022 and 2024, China has also conducted more intensive military drills around Taiwan, signaling its increasing willingness to take over Taiwan by force if necessary. These escalations in the cross-Strait tensions have deepened public anxiety about the repercussions of an increasingly outright confrontation with China.

Taiwan Can Green and Taiwan is Greening

Under such increasing geopolitical pressures, Taiwan has employed non-traditional diplomatic strategies to expand its international support and safeguard its precarious position. As the Deputy Minister of Foreign Affairs Wu Chih-chung recently noted, the Ministry of Foreign Affairs (MOFA) has adopted a "working-official model" (官式運作模式), which fosters pragmatic partnerships in areas such as innovation, trade, technology, and democratic values – even in the absence of formal diplomatic recognition.

This approach was exemplified by the "Taiwan can help (and Taiwan is helping)" campaign during the COVID-19 pandemic, which saw Taiwan delivering medical supplies and other types of support to over

80 countries. The "Taiwan can help" narrative was underscored by three key messages: 1.) Taiwan is valuable to the international community with its advanced public health system; 2.) Taiwan is willing and capable of helping others in need; and 3.) Taiwan welcomes new forms of collaboration with countries it does not have diplomatic relations with.

A preliminary content analysis of the diplomatic activities released by MOFA between 2023 and 2024 shows that Taiwan's narrative of energy transition resembles that of "Taiwan can help" in several ways. First, in official documents such as "Taiwan's Pathway to Net-Zero Emissions in 2050," the central government pledges to be a valuable member of the international community by reducing carbon emissions through sustained renewable energy production. This message is echoed by NGOs representing Taiwan at the side meetings of the United Nations Framework Convention on Climate Change (UNFCCC) as well as MOFA's promotional material such as "Green Action Taiwan!".

In the past, Taiwan was a significant exporter of solar panels, accounting for about 15 percent of the global photovoltaic (PV) production in the early 2010s. With the rise of Chinese PV firms, however, Taiwanese firms were outcompeted due to their higher production costs, especially in the upstream segment of the supply chain where Chinese corporations now control over 90 percent of the global market. The central government's intervention to boost domestic solar installations helped Taiwan's photovoltaic industry to survive, preserving a complete PV supply chain within Taiwan – from upstream to downstream. Moreover, the UNFCCC provides a venue for Taiwan to not only demonstrate its solidarity with other countries in upholding the principle of "common but differentiated responsibility," but to showcase its renewable energy capabilities – even if its overall carbon reduction performance remains modest.

Second, the narrative of energy transition emphasizes Taiwan's willingness to provide technological assistance to countries in need of renewable energy. Since the 2010s, Taiwan's foreign aid strategy has shifted from maintaining diplomatic recognition to supporting the development of like-minded countries. The strong presence of the photovoltaic industry gives Taiwan valuable leverage to provide relevant solar energy technologies to underdeveloped countries like Tuvalu as acts of goodwill.

Third, Taiwan's PV sector facilitates new business partnerships with developed countries in the Asia-Pacific and Europe. As the international order in 2025 turns increasingly protectionist, small states with strategic assets are among the first to become casualties of the Sino-American rivalry – as evident in the sale of Panama ports owned by a Hong Kong-based transnational corporation. While cost remains a major concern for renewable energy firms, they increasingly take into consideration the need to diversify the risks of global supply chain disruptions, especially when it comes to the development of low-carbon energy infrastructure. Because of this, doing business in democratic countries can be a practical way to reduce the risks of policy uncertainty. This bolsters both green investment and business confidence in Taiwan. As such, promoting the idea that "Taiwan can green," alongside the achievements in its domestic energy transition, enhances Taiwan's soft power and international appeal.

Home-Grown Renewable Energy Technologies

Domestically, the "Taiwan can green" narrative is framed in terms of Taiwan's pride in "Made-in-Taiwan" (MIT) renewable energy technologies. This appeals to the increasing proportion of the population identifying as Taiwanese, which is in tandem with their prevailing support for energy transition. The DPP-led government portrays itself as the guardian of such pride by nurturing Taiwan's global economic competitiveness with advanced technologies. This helps it to cope with the mounting public grievances about its perceived incompetency in handling domestic economic issues and alleged

connections between organized crime and the solar energy industry – issued exacerbated by misinformation campaigns from China.

For years, cross-Strait relations have been central to Taiwan's presidential elections, often framed as a trade-off between economic benefits offered by China and political autonomy of Taiwan. A deep ideological divide along the partisan line persists: KMT supporters prefer a closer economic and political relationship with China, while the DPP supporters advocate greater distance. Historically, an important source of support for the DPP's electoral strength stemmed from its ideological conviction in Taiwan's political and economic distinctiveness from China. According to Academia Sinica's China Impact Survey, the majority of respondents between 2019 and 2023 regarded the issue of "national sovereignty" as more important than "economic benefits" when it came to cross-Strait interactions – a sharp contrast to the 2013-2018 period. The DPP's promotion of the "Taiwan can green" narrative – rooted in the national pride in Taiwan's renewable energy strength – reinforces Taiwan's distinctiveness from China and benefits the party electorally.

Concluding Remarks

Recognizing Taiwan's stellar performance in several areas of global affairs, President Lai Ching-te remarked at the Third National Climate Change Committee in January 2025: "In the eyes of the international community, today's Taiwan is not the Taiwan of the past. We must be even more proactive as we work to fulfill our international responsibilities." This shows that the "Taiwan can green" narrative continues to be seen as a useful tool for attracting the attention of the international community – particularly in the absence of support from the US under the Trump administration.

Meanwhile, it is unclear whether the narrative will remain to be as useful for the DPP as it was in the past, especially as it continues to be discursively linked to Taiwan's distinctiveness from China. The China Impact Survey revealed a dramatic shift in public opinion in 2024: about 70 percent of the respondents now consider both "national sovereignty" and "economic benefits" equally important in cross-Strait relations, compared to less than 10 percent over the past decade. This change could indicate rising public anxiety about the practical ramifications of over-emphasizing Taiwan's distinctiveness amid the heightened geopolitical tensions. Given growing doubts about the US commitment to Taiwan under the second Trump administration, such uneasiness will likely continue.

Adding Turbulence to the Turbulent Region: Cooperation Between Western Balkans, China and Taiwan

Stefan Vladisavljev and Damir Dizdarević

The geopolitical and economic landscape of the Western Balkans has long been shaped by great power competition, with new actors emerging in recent years. As external actors seek to exert their influence in this region – traditionally shaped by its proximity to the European Union – both Russia and Turkey have maintained a notable presence. In the past 15 years, China has significantly increased its involvement, creating a context in which potential cooperation with Taiwan remains markedly limited – though not entirely absent. Constrained by the One-China policy and facilitated through unofficial channels, cultural exchanges, and economic interests, Western Balkan countries have yet to fully explore the potential of cooperation with a rising democratic and technological power like Taiwan.

China and the Western Balkans: Strategic Engagement through the BRI

China's engagement with the Western Balkan region intensified following the 2012 launch of the China and Central and Eastern Europe cooperation framework (originally known as the 16+1, then 17+1, and now, following the withdrawal of several EU member states, 14+1). While not EU members, Serbia, Bosnia and Herzegovina, Montenegro, North Macedonia, and Albania have become strategic nodes for China's Belt and Road Initiative (BRI) in Europe. The 14+1 effectively serves as the BRI's extension in Central and Eastern Europe. China's interests in the region are threefold: extending political influence, securing logistical and infrastructural footholds, and fostering trade and investment opportunities. However, cooperation between China and the Western Balkan countries has not been uniform, with significant variation in the depth of these bilateral relationships.

Serbia has emerged as China's flagship partner in the region. Often described as a "steel friendship" by officials in both countries, the relationship is underscored by significant Chinese investments in infrastructure, energy, mining, and heavy industries. Chinese banks – most notably the Export-Import Bank of China – have provided favorable loan arrangements for such projects, frequently tied to Chinese contractors and labor. This partnership continues to evolve, with Serbia having become the first (and so far, only) European country to sign the declaration on the "Community with a Shared Future" during Xi Jinping's visit to Belgrade in May 2024.

Other Western Balkan countries have had either limited or no significant engagement with China. The smallest country in the region, Montenegro, nearly fell into a "debt trap scenario" in 2021, prompting a more cautious approach toward Beijing. Montenegro's experience with China set alarm bells ringing in the EU and the broader international community. Other countries in the region have largely defined their position toward China in line with their (mostly) transatlantic orientation. As both Albania and North Macedonia are NATO members committed to the process of European Integration, Chinese push toward closer relations remains limited. Meanwhile, Kosovo, is not recognized as an independent country by Beijing due to its stance on territorial integrity and close relationship with Belgrade, which actively works on disputing Kosovo's statehood.

Despite the growing presence, Chinese influence in the Western Balkans is not without friction. EU institutions have repeatedly raised concerns over the lack of alignment with European standards, particularly in public procurement and state aid transparency.

Taiwan and the Western Balkans: Diplomatic Constraints, Soft Power, and Emerging Interest

Taiwan's engagement with the Western Balkans is notably constrained by the region's adherence to the One-China policy – a prerequisite for diplomatic relations with Beijing. None of the Western Balkan

countries formally recognize Taiwan or maintain official diplomatic missions in Taipei. Nonetheless, informal exchanges and low-level cooperation do exist, particularly in trade, education, technology, and humanitarian aid.

Taiwan's economic footprint in the region is limited, but not negligible. Taiwanese companies, especially in the IT and manufacturing sectors, have shown intermittent interest in entering the Western Balkan markets, though market size, institutional fragility, and China's overshadowing presence pose challenges. In countries like North Macedonia and Albania, Taiwanese firms have explored opportunities in the electronics, machinery, and textile sectors – though these efforts remain fragmented and lack the strategic depth of China's initiatives.

Soft power and people-to-people diplomacy are at the core of Taiwan's regional engagement. Academic scholarships, cultural exchanges, and technology forums hosted by Taiwanese institutions foster grassroot connections. Taiwanese representatives also tend to reach out to political party members and civil society actors, which is often met by strong reactions from Chinese diplomats, leading to mixed outcomes of such initiatives.

While prospects for formal cooperation remain limited, niches for increased engagement exist – particularly in areas like digital innovation, democratic governance, and sustainability, where Taiwan holds comparative advantages and reputational capital. The key challenge lies in navigating these opportunities without triggering diplomatic fallout from China.

China's Role in Green Technologies

Following its 2021 pledge to halt overseas construction of coal-fired power plants, China has shifted the focus of its foreign investment toward green infrastructure. This transition has had a significant impact on the Western Balkans, where several major coal projects like Tuzla 7 (Bosnia and Herzegovina), Pljevlja (Montenegro), and Kostolac B3 (Serbia), were either halted or restructured. Caught unprepared for this pivot, many regional governments scrambled to devise alternative clean energy strategies.

China's global green energy strategy has spurred a wave of renewable investments across the region. In Montenegro, Chinese firms have participated in solar and wind energy development projects, as well as the pollution-control retrofitting efforts at the Pljevlja thermal power plant. Serbia, China's most significant partner in the region, secured a €2.2 billion investment in 2024 from Shanghai Fengling and Zijin Mining for a 1,500 MW wind farm, a 500 MW solar facility, and a green hydrogen plant – largely aimed at decarbonizing the Zijin copper mine in Bor. In parallel, an energy-focused MoU with Hunan Rich Photovoltaic Science and Technology, signed in 2023, set the stage for further Chinese-backed ventures, including a 1 GW solar panel factory and an adjacent 200 MW solar power plant. These projects align with Serbia's ambition to become a regional solar supplier and hydrogen hub, while also deepening its dependence on Chinese capital and technology.

Dependency and Governance Concerns

Although Chinese investments have enabled the region's green transition, they pose considerable risks. Chief among them is a lack of transparency. For instance, the Kostolac B3 project was awarded without a public tender through a state-to-state agreement, prompting criticism for bypassing standard procurement practices. This form of financing is often termed "corrosive capital," due to its negative impact on governance standards. There are also concerns about regulatory compliance, as several Chinese-led projects have clashed with the EU environmental laws.

Another concern is technological dependency. Chinese green technology projects often come as turnkey packages – including solar panels, wind turbines, and control software – leaving recipient countries reliant on Chinese suppliers for maintenance and upgrades. While these packages are sometimes more financially attractive than Western alternatives, they come with trade-offs such as reducing supplier diversity, limiting local capacity building, and increasing Beijing's political leverage.

Taiwan's Emerging Potential

In contrast to China, Taiwan's engagement with the Western Balkans has been modest in previous years. Although formal diplomatic ties are constrained by the One-China policy, economic cooperation exists in some areas. Taiwanese automotive manufacturer Mei Ta built a large-scale factory in Serbia, showcasing Taiwan's potential as a high-tech investor in the region – though it must be noted that this investment, similarly to those from Hong Kong and Macao, is listed as "Chinese investment" by the National Bank of Serbia.

Taiwan is one of the global leaders in solar photovoltaics and smart grid technologies. Institutions like Academia Sinica continue to develop advanced solar cells, having achieved solar cell efficiency exceeding 30 percent, while national investments in offshore wind and grid modernization efforts have positioned Taiwan as a knowledge hub for energy transition. Taiwan has also been expanding its own renewable capacity. As of late 2023, it had 12 GW of installed solar capacity, with a target of 20 GW in the near future.

Taiwan's semiconductor industry – accounting for 15 percent of its GDP – is critical for enabling energy efficiency across smart grids, electric vehicles, and battery management systems. Collaborating with Taiwan could thus help the Western Balkans access cutting-edge clean technologies while helping to diversify the region's technological dependencies away from China.

Strategic Diversification through Balanced Partnerships

As the Western Balkans strive to modernize their energy systems and align with EU climate goals, they face a dual challenge: leveraging Chinese investment without becoming overly dependent, and diversifying partnerships to enhance strategic resilience. China will likely remain a dominant economic actor in the region, but its green investments bring governance risks, debt concerns, and technological lock-in.

Taiwan, while operating on a smaller scale, offers a promising alternative. Through cooperation in solar energy, semiconductors, smart infrastructure, and battery technology, Taiwan can support the region's green transition while reinforcing democratic values and supply chain security, especially as it is already well integrated with Western partners. Quiet but deliberate expansion of such cooperation could help the Western Balkans navigate an increasingly complex geopolitical landscape.

De-Risking the Next-Generation Solar Supply Chain: Potential for the EU-Taiwan Collaboration

Yu-Ping Yang

Facing China's dominance in the solar panel market, the EU is exploring perovskite solar cells (PSCs) as a strategically important alternative to diversify its supply chain and reduce reliance on China-controlled materials and manufacturing. Amid growing geopolitical tensions and urgent climate goals, PSCs stand at the crossroads of energy and strategy, where Taiwan brings deep expertise, while the EU brings strong policy momentum.

With the growing global demand for solar energy, China has steadily expanded its market share as the dominant player in the international market. According to the research on global solar photovoltaic (PV) supply chains conducted by the International Energy Agency (IEA), China has invested over $50 billion in new PV manufacturing capacity since 2011 – an amount ten times greater than that of Europe – and it now controls more than 80 percent of the global market share across all manufacturing stages of solar panels.

In response to China's monopoly in the solar panel market, the European Union has launched investigations into Chinese solar panel manufacturers suspected of receiving market-distorting subsidies, aiming to ensure fair competition. Concerns about China's dominance in the solar panel market were further legitimized by past events, such as CEFC China Energy's investment in the Czech Republic, which triggered widespread alarms over financial opacity and political influence. To address these concerns, the EU has taken concrete steps to revitalize its critical industries. For instance, Belgian chemicals group Solvay launched an initiative to restart rare earth metal production, aimed at strengthening regional supply chains. At the same time, the EU is actively exploring technological alternatives.

In short, the EU's growing concerns over its dependence on conventional solar panels highlight the importance of diversifying the clean energy supply chain, with perovskite solar cells (PSC) offering a compelling alternative due to their reduced reliance on China-dominated critical minerals, flexibility of customizable applications in buildings and agriculture, and the potential for manufacturers not based in China. Based on a prior report drafted by the Research Institute for Democracy, Society and Emerging Technology (DSET), this article explores the strategic advantages of PSCs and Taiwan's potential role in building a resilient PSC supply chain for Europe.

Why PSC Matters: Lessons from the Solar Panel Dependence on China

While China's dominance in today's silicon-based solar panel market appears firmly entrenched, next-generation solar technologies offer Europe an opportunity to reshape its strategic position and enhance supply chain resilience. PSCs are made from non-silicon materials, allowing the EU to reduce its reliance on silicon-based supply chains and technological inputs from China. Their unique structure thus not only allows countries to mitigate their reliance on China-controlled silicon processing but also to avoid vulnerabilities linked to the increasing cost and scarcity of critical materials such as silver.

Taiwan Perovskite Science and Technology (TPSC), in collaboration with the Industrial Technology Research Institute's (ITRI) Measurement Center, achieved a photovoltaic conversion efficiency of 33.5 percent by incorporating perovskite materials into tandem cells. This achievement represents a significant milestone in the advancement and validation of third-generation solar panel technologies.

The ability of PSCs to flexibly adjust their conversion rates – combined with their thin and bendable structure – makes them highly suitable for a wide range of innovative applications. The lightweight

characteristics of PSCs make them particularly suited for applications such as building-integrated photovoltaics (BIPV) and portable solar devices. Moreover, the wide range of possible applications suggests that the next-generation solar market may shift away from mass production toward more specialized, local solutions. For example, PSCs could be tailored to combine with insulated glass windows for smart buildings or modular photovoltaic systems for greenhouse agriculture. This diversification reduces reliance on China's large-scale supply chains and opens opportunities for decentralized manufacturing.

Clearly, PSCs not only represent a significant technological breakthrough but offer flexible application potential that can address diverse energy needs. Compared to traditional silicon-based cells, PSCs hold the promise of reducing reliance on China-centric supply chains. For the EU, which is seeking to accelerate the energy transition and enhance supply chain resilience, PSC technology represents a strategically significant and promising alternative.

How Taiwan Can Help: Building a Resilient Solar Module Supply Chain

Taiwan's PSC development builds on its existing panel industry infrastructure, where many production processes can be directly applied to perovskite cells. Techniques such as wet coating, layer assembly, and module integration are already in place. While some large-scale production still depends on facilities in China, Taiwan maintains strong capabilities in regulation, flexible manufacturing, and research. By focusing on quality and practical applications, Taiwanese firms are finding ways to reduce reliance on China and strengthen their roles in the future solar technology market.

In 2024, the EU officially passed the Net-Zero Industry Act (NZIA), a landmark regulation aimed at boosting domestic clean technology production. This Act designates solar photovoltaic technology as one of the strategic net-zero technologies and sets an ambitious target of meeting at least 40 percent of the EU's annual solar deployment needs with domestically manufactured products by 2030. It streamlines permitting procedures, introduces sustainability and resilience criteria into procurement processes, and provides a regulatory framework to boost investments in the clean energy industry. In line with this goal, European countries have launched a variety of PSC-focused research and development (R&D) projects to accelerate next-generation solar innovation. One example is the PEARL project, funded by Horizon Europe, which aims to develop flexible PSCs incorporating carbon electrodes to lower material costs and achieve conversion efficiencies exceeding 25 percent. Meanwhile, the PEPPERONI project is working to scale tandem perovskite-silicon modules for industrial production.

Against this backdrop, experienced partners like Taiwan could serve as key contributors in bridging the gap between the EU's solar innovation and its manufacturing objectives. With a vertically integrated supply chain, advanced R&D in PSCs, and decades of collaboration with European firms, Taiwanese manufacturers are well-positioned to support local production and create jobs in Europe. According to interviewees cited in the DSET report, proposed strategies include exporting entire manufacturing facilities to Central and Eastern Europe and adopting patent licensing models to enable joint production without the need to establish local factories.

TPSC Chairman Chen Lai-Chu, who previously worked at AUO Corporation, highlighted the turnkey project in the Czech Republic as a promising opportunity for Taiwan-EU cooperation in developing PSC panels. In addition to facilitating joint production, this project also contributes to carbon reduction goals, aligns with the EU's Carbon Border Adjustment Mechanism (CBAM), and helps cultivate a skilled labor force within the region. This cooperation thus represents a mutually beneficial pathway toward sustainable energy development and industrial revitalization.

In terms of R&D advancement, the research team at Academia Sinica has recently developed a next-generation solar cell with power conversion efficiency surpassing 31 percent, which represents performance improvement of over 30 percent compared to the most advanced commercial technologies. This achievement demonstrates Taiwan's strength in scientific innovation and advanced materials research, reinforcing its role in strengthening the resilience and diversity of the global solar photovoltaic supply chain.

PSC Advancement as Geopolitical Necessity

Both Taiwan and the EU have demonstrated strong ambitions in advancing the development and deployment of PSCs. Amid growing concerns in European countries over their excessive reliance on China for critical materials and clean technologies, the need for diversified and resilient partnerships is more urgent than ever. Establishing cooperation with trusted and credible partners is crucial, as developing PSC technology not only reduces European countries' dependence on China but enables to achieve their clean technology goals.

There is no doubt that the role of geopolitical strategy in shaping clean energy partnerships has become increasingly pronounced. As the DSET report highlights, building resilient supply chains for emerging technologies like PSCs is not merely a climate imperative, but also a geopolitical necessity. Under this context, deepening cooperation between the EU and Taiwan offers a pragmatic solution. Taiwan's strengths in PSC innovation and flexible manufacturing aligns well with the EU's policy objectives. By aligning green technology development with geopolitical risk mitigation, EU-Taiwan collaboration can help secure strategic autonomy, diversify clean tech partnerships, and lay the groundwork for a sustainable energy future.

V4-Taiwan Industrial Cooperation as a Strategic Response to a Shifting Global Order

Filip Křenek

The European Union finds itself caught between new dependencies – on US LNG and Chinese clean tech. The Visegrád Four (V4) countries stand out as both highly exposed to these pressures and well-positioned to seize the opportunities from the ongoing green transition. Taiwan is navigating its own energy transformation while striving to maintain a technological edge amid growing geopolitical tensions and shifting supply chains, opening doors for potential V4-Taiwan collaboration.

Europe's Energy and Industrial Shock

The Covid-19 pandemic, Russian war against Ukraine, and the subsequent energy crisis in Europe have profoundly reshaped global industrial strategies, accelerating the shift toward green industrial policies. These interconnected crises exposed critical supply chain vulnerabilities – particularly the EU's reliance on fossil fuel imports – and forced policymakers to prioritize energy security, supply chain resilience, and strategic autonomy.

In response to Russia's aggression, the EU moved swiftly to reduce its dependence on Russian oil and gas, adding 71 billion cubic meters of LNG capacity, concentrated mainly in Germany, the Netherlands, Italy, France, and Finland. The United States became the EU's primary LNG supplier, accounting for 45 percent of its imports. Trump's return, however, has turned US gas into a political tool, raising concerns that energy access could be leveraged in broader trade disputes.

Meanwhile, Europe's decarbonization ambitions have created a strategic dependency on China. Today, China produces 80 percent of solar panels, 62 percent of wind turbines, 75 percent of batteries and 70 percent of electric vehicles. It is the world's leading processor of critical raw materials, such as lithium, cobalt, nickel, and graphite. As a result, Europe's energy transition hinges on two (unpredictable) external partners: the US and China.

These risks are further compounded by Europe's energy price disadvantage, which undermines its competitiveness. In 2023, electricity prices in the EU were 158 percent higher and gas prices 345 percent higher than in the US. Under Europe's energy pricing model, gas was the price-setter 63 percent of the time despite accounting for only 20 percent of the energy mix, driving up electricity costs. One-third of the EU's LNG contracts are also based on spot prices, which adds to the existing volatility. Fragmentation across EU energy markets also means that prices can vary threefold between individual member states.

EU Policy Response: Strategic Autonomy

To counter Chinese clean tech overcapacity, the EU has ramped up protective trade measures, alongside subsidies to stimulate domestic industry. New initiatives aim to boost resilience, reduce dependencies on critical materials, goods, and technologies, and diversify trade relations – including with partners in the Indo-Pacific region. With the global market for clean technologies set to rise from $700 billion in 2023 to $2 trillion in 2035, this is increasingly viewed not only as a climate or energy policy but also as a major economic opportunity.

The Net-Zero Industry Act aims for 40 percent of the EU's clean tech demand to be met domestically by 2030. Similarly, the Critical Raw Materials Act mandates that at least 10 percent of the EU's consumption is met by domestic extraction, 40 percent by processing, and 25 percent by recycling, while limiting dependence on any single supplier of critical materials at 65 percent. The Battery Regulation introduces recycling targets, such as recovering 80 percent of lithium from waste batteries

by 2031, reducing the need for imported raw materials. These efforts will also soon be complemented by the first Clean Trade and Investment Partnerships and the Circular Economy Act, which is expected in 2026.

V4's Dual Challenge of Decarbonization and Energy Security

Against this backdrop, the V4 – Czechia, Hungary, Poland, and Slovakia – face significant challenges. With manufacturing accounting for around 20 percent of GDP, they are among the EU's most industrialized and energy-intensive economies. For instance, in Czechia and Slovakia, employment in energy-intensive sectors is more than double the EU average. Moreover, their energy systems remain highly dependent on fossil fuels, which puts them in a difficult position as they try to balance the pursuit of energy self-sufficiency with the need to decarbonize. Even though the whole region was hit hard by the energy crisis in 2022-2023, some countries were able to cope better than others. Czechia and Poland continue to have some of the highest electricity prices in the EU, while Slovakia and Hungary benefit from prices that are 2-3 times cheaper.

V4 countries also lag behind in renewable energy deployment, with Czechia generating 16 percent from renewables, Slovakia 23 percent and Hungary and Poland 31 percent, compared to the EU average of 47 percent in 2024. Instead, most V4 countries rely on nuclear-generated electricity, with a 62 percent share in Slovakia, 39 percent in Hungary, and 34 percent in Czechia. Poland is the only V4 country without a nuclear power plant, though it plans to join the group in the coming years. While still heavily reliant on coal, its share in the Polish energy generation mix has dropped from 70 percent in 2023 to 54 percent in 2024.

Despite these challenges, the V4's strong industrial base and skilled workforce position it well to benefit from the green transition. Poland and Hungary have become major players in battery production, with significant investments from LG Energy Solution, SK Innovation, CATL, Samsung and others. Poland, Czechia, and Slovakia are emerging as hubs for wind energy components and heat pumps. Some investments, however, provide a cautionary tale. The Hungarian government has actively courted Chinese investment, creating jobs with limited added value in the long run and raising concerns about the country's overexposure to Chinese technology.

Taiwan's Clean Energy Transition and Strategic Positioning

While the V4 is navigating its own energy and industrial recalibration, Taiwan faces a parallel set of pressures – albeit shaped by different geopolitical dynamics. Despite its 20 percent renewable target for 2025, Taiwan's energy sector remains dependent on coal (42 percent) and natural gas (40 percent). By 2030, the government plans a 50-30-20 energy mix of gas, renewables, and coal. Taiwan's national power utility company, Taipower, is also preparing to upgrade the electricity grid to meet growing energy demand, aiming for 60-70 percent renewables by 2050.

As in the case of the V4, Taiwan's reliance on imported fossil fuels makes energy diversification both an economic and security imperative. One of Taiwan's flagship initiatives is the Taiwan Innovative Green Economy Roadmap (TIGER), developed in collaboration with the MIT Energy Initiative. Through TIGER, Taiwan's leading companies are developing strategies for sustainable energy security, exploring advanced technologies, assessing economic impacts of decarbonization, and identifying effective policy tools to support the transition.

Taiwan's economic security concerns, however, extend beyond energy. The island has long been a flashpoint in the US-China rivalry. China pursues a strategic campaign to undermine Taiwan's leadership in the global semiconductor industry while investing in its domestic chip production. At the

same time, Beijing has increased its diplomatic and military pressure on Taiwan, seeking to isolate the island on the international stage. Taiwan's 'Silicon Shield' could also be eroded by US policies aimed at on-shoring semiconductor production, which led to TSMC's decision to expand its US investment to an unprecedented level of $100 billion.

Consequently, Taiwan must cultivate strategic partnerships, maintain key technological research within its territory, and prevent technology leakage to its rivals. In this context, Taiwan increasingly recognizes the importance of building alliances with other democratic and industrial partners, such as Japan, South Korea, and Singapore. Taipei also sees growing potential to forge strategic partnerships in Europe that could help safeguard its economic and technological leadership.

Can Taiwan and the V4 Turn Potential into Partnership?

Among Taiwan's emerging European partners, the V4 stand out for their industrial capacity, skilled workforce, and growing role within the EU value chains. Taiwan has recently supported the creation of a semiconductor research center in Brno, which is the third such center in the Czech Republic, strengthening academic research and creating new opportunities for industry-led innovation and technology transfer. This, however, falls short of the original ambition – a TSMC semiconductor factory, which ultimately went to Dresden, Germany – just 50 kilometers from the Czech border.

Slovakia is also deepening its own cooperation with Taiwan on semiconductors. Taiwan's investment fund, Taiwania Capital, has invested in Slovak company Sensoneo, which specializes in smart solutions for waste management and circular economy. In 2023, Taiwan also began consultations with Slovakia on joint electromobility strategies and launched a dialogue on hydrogen production, storage, and distribution in Poland. Meanwhile, Hungary presents a paradox. Despite its close political alignment with China, it remains a major destination for Taiwanese firms in electronics, automotive, and smart manufacturing. Taiwanese companies continue to expand their presence in Hungary, attracted by its industrial capacity and access to the EU market, even as official diplomatic relations remain minimal.

For Taiwan, deepening cooperation with the V4 could help reduce its dependence on China and integrate itself into a more diversified, resilient supply chain system with Europe and other allies increasingly promoting a 'China-free' model in strategic sectors like semiconductors, batteries, AI, and clean technologies. For their part, the V4 countries could gain valuable access to Taiwan's technological expertise, capital, and international market networks.

Yet shifting priorities have cast doubt on Taiwan's long-term commitment to the region. Past investment plans have underdelivered, and with growing focus on the United States, questions remain about whether enough financial and political capital will be available to deepen ties with Europe and the V4. As resources concentrate in larger economies, there is a real risk that smaller but strategically important partners like the V4 will be sidelined.

Winds of Change: How Offshore Wind Boosts Taiwan-EU Collaboration and Shapes Taiwan's Climate Identity

Elizabeth Frost

Offshore wind energy plays a central role in Taiwan's energy transition ambitions. However, the technology is more than just a source of renewable energy to power Taiwan's households and semiconductor fabs. Offshore wind has strengthened Taiwan-Europe collaboration, with Taiwan drawing extensively on European expertise to establish itself as a regional leader in this field.

Beyond such material collaborations, offshore wind plays a significant role in the discursive realm, shaping Taiwan's global image and identity as a responsible actor in addressing climate change. A review of Taiwan's official climate diplomacy narratives reveals that images of offshore wind are often used as a visual shorthand to demonstrate Taiwan's green credentials. Offshore wind is also frequently featured in international media coverage of Taiwan, with an analysis of news stories between 2015 and 2024 revealing how this coverage has evolved from presenting Taiwan as an ambitious climate leader to depicting it as falling behind due to policy missteps.

Taiwan-EU Offshore Wind Collaboration

Wind power is one of Taiwan's key strategies for achieving net zero by 2050, with installed capacity of offshore wind power expected to reach 13.1 GW by 2030 and 40-55 GW by 2050. While current capacity is still behind the government's goal of 5.7 GW by 2025, Taiwan is now the seventh-largest producer of offshore wind energy globally. In January 2025, almost 46 percent of Taiwan's renewable energy generation came from offshore wind.

The sector has also become a focal point for collaboration with European companies. In 2023, the EU retained its position as Taiwan's largest foreign investor, with €2.9 billion in investments –primarily concentrated in the offshore wind sector – driving rapid industry development in Taiwan. For example, Danish multinationals Ørsted and Vestas have respectively developed Taiwan's largest wind farm and partnered with local manufacturers to produce wind turbine blades in Taichung.

However, the Taiwan-EU relationship has not all been smooth sailing. In 2021, Taiwan's Ministry of Economic Affairs (MOEA) introduced a localization policy for its Round 3 offshore wind tenders, mandating that at least 60 percent of offshore wind farm components be sourced locally – except when the domestic supply chain could not meet project needs. Many international developers argued this requirement would dramatically increase construction costs, undermining project profitability. This, combined with other factors, such as expanded renewable energy construction in Europe spurred by the Russian war on Ukraine, led to some European developers – including Germany's EnBW and RWE – scaling back their operations in Taiwan in 2023.

In July 2024, the EU filed a WTO dispute against Taiwan, claiming that its local content requirement and award criteria for offshore wind projects violated WTO rules by discriminating against imported goods and services. In November, the two parties resolved the dispute, with Taiwan committing to greater flexibility for implementing offshore wind projects and pledging not to include localization requirements as eligibility conditions or award criteria.

While this resolution was welcomed, other regulatory uncertainties continue to concern international investors. Taiwan's transition from some of the world's most generous feed-in tariffs (FITs) – a subsidy that incentivizes renewable energy investment by guaranteeing producers a fixed energy price – to a market-driven model requiring developers to secure financing through corporate power purchase agreements (CPPAs) is another challenge facing developers. Partnerships with local stakeholders offer

EU developers one means of navigating Taiwan's complex regulatory and policy environment. Danish investment firm Copenhagen Infrastructure Partners (CIP) is a case in point, having worked with Taiwan's China Steel to develop the Zhong Neng wind farm, which began operations in 2024. In March 2025, CIP secured a power purchase agreement for Google's first offshore wind power purchase deal in the Asia-Pacific.

Looking ahead, Taiwan-EU offshore wind collaboration may encounter both opportunities and risks. The US pivot away from offshore wind – exemplified by the Trump administration's surprise decision to halt construction of Equinor's New York wind farm – will have significant consequences for European companies. Greater investment in Taiwan, which can also serve as a gateway to other Asian markets, may help weather the storm. Future collaboration could emerge in cutting-edge technologies such as floating offshore wind, with European countries, including France, already leading the way. Floating wind will likely be key for Taiwan's future offshore development, as sites suitable for fixed-bottom turbines are running out. However, progress has been delayed due to policy bottlenecks.

Taiwan's Climate Identity: From Offshore Wind Pioneer to a Policy Crisis

Thanks in large part to the involvement of European partners, Taiwan has emerged as a regional leader in offshore wind energy, attracting considerable media coverage. The media's evolving portrayal of Taiwan's offshore wind development – from ambitious to struggling – reveals how policy decisions have shaped Taiwan's global identity. Given the importance of public opinion to Taiwan's sovereignty and its long-held desire for inclusion in the UNFCCC, its international climate reputation is a matter of significant concern.

My analysis of 138 climate-related articles published between 2015 and 2024 in English-language media from the US, the UK, the EU, Japan, and Australia revealed that offshore wind was the most frequently discussed form of energy, even surpassing the contentious topic of nuclear energy. This prominence reflects both Taiwan's pioneering commitment to offshore wind development, and the active participation of international companies. Most articles portrayed Taiwan as a contributor to global climate action, with its ambitious wind development goals positioning it as a regional leader. Taiwan's experience in offshore wind is often cited as an example that other countries, such as Australia, can learn from. Taiwan's offshore wind sector is also described as a "stepping stone into the Asia-Pacific," where foreign firms can gain experience before expanding into other markets.

Taiwanese companies have been portrayed as trailblazers in offshore wind development. For example, TSMC made headlines in 2020 for signing the world's largest corporate renewable power purchase agreement with Ørsted. Similarly, Swancor's development of a cutting-edge material that enables wind turbine blades to be recycled was hailed as contributing to solving one of the industry's biggest problems.

However, 2021 marked a shift in the discourse, with media coverage becoming more critical as Taiwan's progress fell short of expectations. Some reports described the sector as being in "a downward spiral" or facing a "crisis," often citing the experiences of international developers like CIP. While the COVID-19 pandemic and the Russian invasion of Ukraine were mentioned as contributing to delays, the greatest attribution was assigned to "policy missteps," particularly Taiwan's "byzantine and inflexible" local content requirements. It remains to be seen whether Taiwan's decision to eliminate these requirements will help restore the earlier media optimism surrounding its offshore wind sector. Such negative coverage risks undermining Taiwan's international climate credibility, painstakingly developed through climate diplomacy narratives.

Offshore Wind in Climate Diplomacy

Taiwan's official climate diplomacy narratives have attempted to leverage offshore wind to present Taiwan as a contributor to global climate action. Excluded from the UNFCCC, climate change has formed a key part of Taiwan's public diplomacy efforts to gain increased international recognition as a responsible stakeholder and constructive partner.

Videos published on the 潮台灣 Trending Taiwan YouTube channel, managed by the Ministry of Foreign Affairs (MOFA), frequently feature offshore wind turbines as symbols of the country's green energy transition. A video titled 'Riding the Wind' (2019) presents Taiwan as an active participant in global climate action through the development of its first offshore wind farm. The video conveys that various elements of Taiwanese society are all committed to a green transition – as seen through a fisherman expressing his hope for more coastal wind farms. This portrayal is somewhat ironic, as ongoing conflicts with local fishermen are one of the key challenges facing offshore wind development in Taiwan.

In another video titled 'A Green Promised Land' (2022), an Indigenous grandmother telling her granddaughter a legend of the great flood serves as an allegory for modern-day climate change. In this narrative, renewable energy, including wind energy, is portrayed as a gift from Mother Earth, offering humanity the means to sustain itself. This reflects how Indigenous Peoples act as non-state diplomatic actors in Taiwan's public diplomacy efforts. The videos thus portray Taiwan's approach to public climate diplomacy, with the evocative image of white turbines along the Formosan coastlines used as a visual representation of Taiwan's commitment and contribution to the global decarbonization effort.

Looking Ahead

Offshore wind energy is more than just a cornerstone of Taiwan's green transition; it has also strengthened ties with Europe – a key climate leader – despite policy hurdles along the way. Beyond direct collaboration, offshore wind showcases how cleantech is shaping Taiwan's international climate identity by driving media attention and bolstering Taiwan's climate diplomacy narratives. Taiwan's climate identity – whether it is seen as a climate leader or laggard – will increasingly influence its soft power and relationships, not only with the EU but also with other key partners, including Southeast Asia, where climate change has recently ranked as the top public concern. If Taiwan can regain momentum in offshore wind energy development through sustained collaboration with the EU, its international reputation will benefit – and so will the planet.

About Authors

Yun-Ling Ko is a researcher at Taiwan Climate Action Network (TCAN) with seven years of experience working in the renewable energy industry. She holds an MA and BA from National Taiwan University.

Chia-Wei Chao is the Research Director at Taiwan Climate Action Network (TCAN) and an Adjunct Assistant Professor at National Taiwan University's Program on Climate Change and Sustainable Development.

Blanca Marabini San Martín is a PhD student at the Centre for East Asian Studies of the Madrid Autonomous University (CEAO – UAM), in Spain, as well as part of the China Horizons Research Consortium. She has collaborated with the International Institute for Asian Studies (IIAS, Leiden), the Spanish Institute for Strategic Studies (Ministry of Defense of Spain), and the Spanish Chinese Policy Observatory. Her research interests center around the climate, environmental, and green tech dimensions of China's foreign policy, particularly within the framework of EU-China relations.

Anthony Ho-fai Li finished his PhD in environmental governance at the University of Hong Kong. He specializes in institutional analysis, collaborative governance, and Taiwan's energy transitions. He is also an Adam Smith Fellow (2022-23) and a Research Fellow of Earth System Governance.

Stefan Vladisavljev is a CHOICE Fellow and Program Director of the Belgrade based non-governmental organization Foundation BFPE for a Responsible Society.

Damir Dizdarević is a Program Coordinator of the Belgrade based non-governmental organization Foundation BFPE for a Responsible Society.

Yu-Ping (Yolanda) Yang is a master's student in International Relations at the Department of Political Science, National Taiwan University. She is also a research assistant with the Climate Resilience and Sustainability Research Program at the Research Institute for Democracy, Society and Emerging Technology (DSET), a Taiwan-based think tank. Her research focuses on international disputes and geopolitical analysis, with particular interests in energy security and environmental policy.

Filip Křenek is an analyst at EUROPEUM Institute for European Policy, focusing on the European economy, economic security, competitiveness, and climate. From 2018 to 2023, he worked at the European Commission in the Directorates General for Competition, International Trade, and Regional Development. He is also a James S. Denton Fellowship alumnus at the Centre for European Policy Analysis (CEPA) in Washington D.C.

Elizabeth Frost is a British Master's candidate in Climate Change and Sustainable Development at National Taiwan University, where her thesis explores constructions of Taiwan's climate identity. Her research interests include climate diplomacy and the geopolitics of the energy transition.