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Europe-China: A New Joint Venture Strategy for Cleantech

POLICY PAPER - DECEMBER 2025

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Foreword

At a time when the energy transition has become an instrument of global geoeconomic competition, Europe faces a strategic paradox: demand for cleantech has never been higher, yet its ability to control the associated value chains has never been more fragile. In solar, batteries, wind, and electrolyzers, Europe's dependence on China is truly structural: Beijing not only dominates global supply chains, it is now directly establishing industrial capacity across the world with the same asymmetry that characterizes its trade strategy.

While the United States embraces an unapologetically aggressive industrial reconstruction agenda, Europe continues to approach market access and industrial partnerships through frameworks designed for a world where competition was neither so coordinated nor so concentrated. In an environment marked by massive subsidies, chronic overcapacity, and systemic distortions, insisting that "the market should decide" is increasingly equivalent to allowing others to decide for us.

Industrial strength and independence cannot simply be proclaimed—they must be deliberately built. This paper argues that Europe does in fact have powerful levers at its disposal, if it chooses to activate them swiftly and coherently. Requiring EU-majority joint ventures in critical sectors; structuring their governance; aligning public funding, competition rules, public procurement, and investment screening; strengthening local content requirements in strategic projects: these proposals are neither protectionism nor isolationism, but economic realism in the face of the shifting rules of international trade.

In continuity with our work on economic security and industrial decarbonization, this study defends a simple idea: there is no inevitability in allowing the technologies of the transition—the technologies that will define industrial power in the decades ahead—to be designed, built, and governed elsewhere. We have become what China once was in our eyes: a land of economic conquest. It is time to aim for what China has become today: a power capable of shaping economic outcomes. Industry is the instrument. Clarity of purpose is the prerequisite.

Marie-Pierre de Bailliencourt,
Institut Montaigne's Managing Director

Executive summary

In order to secure its clean energy future, Europe is pursuing a new industrial strategy aimed at balancing openness to Chinese investment with safeguarding European technological sovereignty. Faced with China's dominance in batteries, solar photovoltaic (PV), electric vehicles, and other cleantech, EU policymakers are exploring tools to ensure that foreign investments benefit Europe's economy, technology, and security.

A key measure under discussion is conditioning foreign investment in strategic sectors on **joint ventures (JVs) with EU-majority ownership**, local management, technology sharing, and supply-chain localization. This approach echoes a recommendation from Institut Montaigne that *access to the European market in China-dominated sectors should be made contingent on 50 percent local content requirements and European-majority-owned JVs to localize value chains*.[1] This would mark a significant shift from Europe's historically open investment regime.

The rationale behind this recommendation is threefold:

1. **Industrial sovereignty**—Europe risks being reduced to an "assembly-only" role while China dominates upstream production, particularly in solar wafers, lithium-ion batteries, and rare earth processing.

2. **Competitiveness**—Chinese cleantech benefits from state support and lower production costs, making EU-produced technologies more expensive (20–50 percent higher for solar PV, 30–40 percent for wind turbines, ~40 percent for batteries). JVs could allow Europe to capture know-how and reduce cost gaps over time.

[1] *Joseph Dellatte, Cleantech: Reducing Europe's Strategic Dependence on China, Institut Montaigne, July 2025, https://institutmontaigne.org/en/publications/cleantech-reducing-europes-strategic-dependence-china.*

3. **Data and security**—China's regulatory environment raises the risk of sensitive data exposure if critical infrastructure is reliant on Chinese technology.

The EU needs to **complement the Net-Zero Industry Act (NZIA) and Critical Raw Materials Act (CRMA)**, which set local production targets and limit overreliance on single foreign sources, with **a JV strategy that should be at the heart of Clean Industrial Deal implementation**.

CHINA'S JV STRATEGY AND ITS IMPACT ON CLEANTECH

China has historically used joint ventures (JVs) as a tool of industrial policy. Since the era of Deng Xiaoping's Reform and Opening-Up, foreign investors have only been allowed market access via JVs with Chinese partners, typically capped at 50 percent foreign ownership and often paired with state-owned enterprises. This strategy ensured technology transfer, skills development, and domestic capacity building, turning foreign firms into "schools" for Chinese innovation. Over time, as domestic capabilities matured, China lifted JV restrictions in sectors such as the automotive industry, highlighting the strategic, temporary nature of the JV requirement.

In practice, most high-tech Sino-European JVs in China exhibit a pronounced asymmetry: European companies hold minority stakes in about **80 percent of cases**, state influence is present in roughly a quarter, and technology transfer is often an explicit objective. This asymmetric openness ensures that foreign firms provide technology and know-how, while Chinese partners localize production and build domestic capacity.

This has tangible consequences for Europe. While European firms face restrictions when entering China, Chinese firms such as CATL and BYD

are establishing factories in Europe—sometimes wholly owned—while retaining control over critical technology and operations. In batteries, solar PV, and wind, Europe risks becoming dependent on Chinese technology and supply chains. Without strategic conditions, European investment can unintentionally support China's industrial objectives, providing jobs locally but leaving decision-making, intellectual property (IP), and key manufacturing abroad.

Europe faces a strategic choice: continue doing business as usual, accepting Chinese trade conditions and Chinese investment with minimal conditions, or adopt a strategic approach that mirrors China's playbook—requiring **EU-majority ownership, local content, and governance safeguards in critical cleantech sectors**. This approach underpins the emerging EU strategy to correct structural imbalances, secure supply chains, and strengthen technological sovereignty.

EXISTING SINO-EU CLEANTECH JOINT VENTURES

Sino-European JVs in cleantech on European soil are growing but remain ***ad hoc*** **and heavily skewed toward Chinese control**. Across batteries, solar PV, wind (magnets), hydrogen electrolyzers, and electric vehicles, most partnerships feature **Chinese-majority ownership, technology dominance, or assembly-only operations**, with few safeguards to benefit Europe.

Out of roughly forty Sino-EU cleantech JVs in Europe, **only seven have EU-majority ownership**, about twenty-five are Chinese-majority-owned, and most others are 50/50 or unclear. The lack of JV requirements has meant that Europe is subsidizing assembly capacity without securing **technology transfer, R&D influence, or localized supply chains**, thus risking being consigned to an "assembly hub" role while China captures most of the value.

Structure of Sino-European Joint Ventures on European soil

Type of Joint Venture	Number of Cases
EU-majority	7
Chinese-majority	Around 25
50%-50%	3
Predicted to be 50%-50%	4

THE LEGAL GAP IN EUROPE'S FRAMEWORK

The EU currently **lacks a clear legal mechanism** to require majority European ownership in JVs with Chinese investors. The existing frameworks—**Foreign Direct Investment (FDI) screening, merger control, subsidy rules, and public procurement**—are primarily reactive and designed for national security, competition, or anti-subsidy purposes, not proactive industrial policy.

- **FDI screening** covers acquisitions and some greenfield investments but cannot mandate JVs; it mainly addresses security risks and is applied on a case-by-case basis.
- The **Foreign Subsidies Regulation (FSR)** can scrutinize large, subsidized JVs, but the thresholds are high, and it focuses on subsidy mitigation, not ownership or technology control.
- The **EU Merger Regulation** reviews full-function JVs for competition concerns, not strategic control or supply-chain dependencies.
- **Public procurement** allows some leverage through local content clauses (e.g., NZIA's >50 percent dependency triggers), but cannot

explicitly require EU-majority JVs without risking internal market or World Trade Organization (WTO) violations.

- **EU internal market freedoms and WTO** rules limit outright nationality-based restrictions; exceptions exist for national security or proportional industrial policy measures, but they must be justified, targeted, and proportionate. WTO compliance is especially challenging under GATT, TRIMs, and SCM rules; GATT Article XX (environment/health) or XXI (security) could offer limited justification.

Without an EU-wide harmonized approach, individual Member States could undermine stricter policies, creating a **"Trojan horse" risk** whereby non-EU investors could exploit the most permissive jurisdictions. **A coordinated EU-level framework** is thus essential to enforce any JV strategy, ensure industrial autonomy, and prevent unilateral loopholes.

To address the current legal gap, the EU could establish a dedicated mechanism—through the **Industrial Accelerator Act (IAA)**, updated **FDI screening**, and **public procurement rules**—to require or incentivize EU-majority ownership in JVs with non-EU investors in selected critical cleantech sectors or sub-sectors. The rule would apply to significant projects in areas such as batteries, solar, wind, electrolyzers, and critical materials processing, ensuring proportionality by targeting large-scale investments rather than every small start-up. "EU-controlled" would be defined based on ultimate ownership and influence, closing potential circumvention via EU subsidiaries.

Approval for such investments would be conditional on forming a joint venture with EU-majority ownership. Beyond equity, governance structures would ensure that strategic decisions remain under European control, with veto rights on sensitive matters and European-led oversight committees monitoring key operations. Critical functions such as R&D, manufacturing, and management would be localized in Europe, ensuring operational sovereignty and accountability under EU law.

The IAA framework would integrate with existing industrial policies, notably the Net-Zero Industry Act (NZIA) and Critical Raw Materials Act (CRMA), aligning the JV requirement with domestic production targets and supply-chain resilience goals. The **FDI screening authorities would enforce compliance, supported by procurement rules that favor projects meeting these conditions**. As mentioned above, uniform application across Member States is essential to prevent loopholes and avoid a "Trojan horse" scenario in which a permissive state undermines EU-wide strategic control.

In practice, this system allows Chinese and other non-EU investors to participate in EU cleantech markets—but only on terms that secure EU-majority ownership, governance control, and localization of key functions—ensuring that Europe captures technological, industrial, and strategic value while reducing dependency risks.

SECTOR-SPECIFIC STRATEGY (2026–2035)

A one-size-fits-all approach may not suit every clean technology sector, given the differences in market maturity, Europe's standing, and Chinese involvement. Therefore, the joint venture and localization strategy should be tailored sector by sector, with phased milestones from 2026 to 2035.

Each sector plan fits into a broader timeline of 2026–2035, in which the early years set up frameworks and modest requirements, and the later years escalate toward strategic autonomy goals. By 2035, if all goes well, Europe will have achieved the following:

- A **solar manufacturing revival** in partnership with (but not controlled by) Chinese tech—meeting at least 10 percent of its own module needs and otherwise diversified.
- A **battery industry** that is largely localized with significant European control and no longer massively dependent on Chinese imports, covering EV demand with domestic or friend-shored supply by the EV transition's completion.
- A **wind supply chain** fortified by domestic magnet production and allied sources, ensuring that wind expansion is not hostage to Chinese rare earth policies.
- A **hydrogen electrolyzer sector** thriving on European innovation, with foreign contributions but under frameworks that keep the core tech (membranes, catalysts, etc.) anchored in Europe.
- **Heat pump and other cleantech** sectors with any foreign participation happening through cooperative structures rather than through wipe-out competition.

Given the observed patterns, asymmetries, and sector-specific challenges, a coordinated set of EU- and Member State-level measures is essential to secure Europe's cleantech sovereignty.

Recommendations

Implementing a joint venture strategy for critical cleantech in Europe will require concerted action at multiple governance levels—the EU institutions, member state governments, and industry stakeholders. This part of the paper concentrates on comprehensive recommendations, structured by **EU-level initiatives**, **Member State actions**, overarching **industrial strategy measures**, and a proposed **roadmap for 2026–2035**. These recommendations aim to operationalize the analysis above, ensuring that the policy is effective, balanced, and adaptable over time.

EU-LEVEL RECOMMENDATIONS

Recommendation 1

Enact the Industrial Accelerator Act with JV provisions.

The EU should adopt the IAA by 2026, explicitly requiring EU-majority ownership in JVs for strategic sectors such as batteries, solar PV, wind components, and electrolyzers above defined size thresholds. The act should justify this on public interest grounds—supply security, climate goals, and reciprocity—and should include legal safeguards under Article 45 TFEU and WTO exceptions. It must integrate with the revised FDI Screening Regulation, making authorization contingent on compliance and effectively embedding the JV requirement into the EU single market framework for future industries.

Recommendation 2

Issue guidance on JV governance standards.

DG GROW should publish guidance for "Strategic Joint Ventures," detailing best practices such as European veto rights, local management, EU-based Head Quarters (HQ), qualified majority votes for strategic decisions, and local content requirements. This would help companies structure JVs to satisfy regulators and ensure consistency across deals. Compliance with this guidance could be tied to positive incentives such as faster regulatory clearance, even if non-binding.

Recommendation 3

Align funding and incentives with the JV strategy.

The EU should direct financial support toward European-led cleantech JVs. Programs like the European Sovereignty Fund, Horizon Europe, Innovation Fund, and Important Projects of Common European Interest (IPCEI) should condition participation or funding on EU-majority ownership or substantial EU IP control. State aid rules should allow higher support for EU-majority-owned JVs, encouraging foreign investors to partner with European firms to access subsidies.

Recommendation 4

Trade policy and WTO stance.

The EU should prepare to defend the JV measures under WTO exceptions and link them to climate and security objectives. It should negotiate with allies (India, Japan, South Korea, US) to frame the rules as shared resilience against non-market economies, potentially allowing mutual exemptions or JV waivers for trusted partners. EU notifications to the WTO should be transparent about this approach. Simultaneously, the Foreign Subsidies Regulation should be enforced to scrutinize fully foreign-backed investments, making non-JV acquisitions less attractive and encouraging the JV route.

Recommendation 5

Monitor and adjust mechanisms ("adaptive governance").

The Commission should implement a monitoring framework to track policy impacts on investments, costs, and cleantech deployment. Annual or biannual Strategic Cleantech Investment Reviews should be conducted to evaluate JV formation, capacity built, and EU vs. foreign market share. Cost trends (e.g., €/W for solar, €/kWh for batteries) should be tracked and measures adjusted if local content rules slow deployment or raise costs. Industry and stakeholder input should be included via a dedicated forum to ensure that policies remain proportionate, effective, and legally justified.

Recommendation 6

Strengthen protective clauses in public procurement and EU projects.

Before the strategy is fully in place, the Commission should encourage Member States to use existing flexibilities. NZIA procurement clauses (e.g., >50 percent single-country supply triggers) should be implemented across relevant tenders and guidance should be issued to the contracting authorities. The International Procurement Instrument should be applied where needed to address nonreciprocal market access. For EU-funded projects, grant recipients should be required to prioritize EU-produced equipment whenever legally permissible.

Recommendation 7

Enhance cooperation with like-minded partners.

Industrial partnerships outside the EU should be developed to complement the JV strategy. Implement a "Made in Europe +" approach, allowing trusted countries (Canada, India, Japan, South Korea, the US) to count components toward EU local content quotas or gain preferential treatment, thus diversifying supply chains and mitigating cost impacts. CRMA partnerships should be used to secure critical raw materials from reliable sources, and MoUs should be signed to earmark supplies for EU use. Joint R&D initiatives with these partners should be launched, ensuring that EU entities share IP ownership and benefit equally, thus maintaining collaboration while protecting EU interests.

MEMBER STATE-LEVEL RECOMMENDATIONS

Recommendation 1

Implement and enforce ex ante screening diligently.

Member States must fully apply updated FDI rules to JV and greenfield investments, even before EU-wide mandates. Chinese or other non-EU investors proposing new plants should be treated as if they were making acquisitions. Projects aligned with the EU JV strategy (with a strong EU partner and safeguards in place) should get faster approval, while stand-alone foreign ventures may be delayed or rejected. The authorities should share information across states to prevent "forum shopping."

Recommendation 2

Use golden shares and national controls where needed.

For strategically sensitive JVs, governments can take golden shares or observer roles to secure EU control, veto critical moves, and monitor compliance (e.g., tech offshoring or workforce commitments). Exit clauses should trigger rescreening if the EU partner plans to sell, ensuring long-term control.

Recommendation 3

Align state aid and subsidies with EU objectives.

Subsidies, grants, and tax incentives should condition on local R&D, supplier development, and clawbacks if production moves abroad or foreign partners gain majority ownership. National funding programs should prioritize European-led projects and those with high EU value add, explicitly scoring European ownership and content.

Recommendation 4

National investment in JV projects.

Member States can take direct stakes or enable local consortia to secure EU-majority ownership in JVs using public funds or state-backed investment vehicles. Where private EU partners are too small, public equity (via state or EIB) can bridge the gap, as seen in Northvolt or European chip fabs. Governments can also facilitate European consortia of companies to collectively hold majority stakes, coordinating them around strategic objectives.

Recommendation 5

Avoid internal undercutting—the solidarity principle.

Member States must not undercut each other by offering foreign investors full ownership or relaxed JV conditions. A political commitment or informal pact can reinforce adherence. Harmonized regulation plus political discipline should prevent "Trojan horse" scenarios that would undermine the EU strategy.

Recommendation 6

Enhance national champions and SMEs.

Support EU firms in participating effectively in JVs through financing, guarantees, and skills development. Invest in workforce training to staff JVs with EU personnel, reducing reliance on foreign imports. Encourage clustering and integration with local research and supply chains, ensuring that technology remains rooted in the EU. National procurement can strategically favor local JV products to reinforce market demand.

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Introduction

Europe has started to embark on a new direction in industrial policy aimed at securing its clean energy future. Faced with an influx into Europe of Chinese batteries, solar panels, electric vehicles, and other cleantech technologies, EU leaders are searching for both the right tools to ensure the fair development of European technologies and strategies to attract Chinese investments to benefit Europe's economy and security.

In March 2025, under the impetus of Executive Vice-President Teresa Ribera, the European Commission indicated that it was considering imposing unprecedented requirements on foreign investors: In strategic sectors such as electric vehicles (EVs), inbound investments could be made conditional on forming joint ventures (JVs) with European partners, installing EU nationals in senior management, sharing technology, and committing to local supply chains.[2]

This would mark a sea change in Europe's traditionally open investment regime. It echoes a recommendation from Institut Montaigne that access to Europe's market in China-dominated sectors should be made contingent on creating 50 percent local content and EU-majority JVs to localize value chains.[3] The overarching goal is to leverage the EU's vast market to induce local production and safeguard strategic autonomy in the clean economy.

[2] *European Commission, "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Industrial Action Plan for the European Automotive Sector" (Brussels, March 5, 2025), https://transport.ec.europa.eu/document/download/89b3143e-09b6-4ae6-a826-932b90ed0816_en.*

[3] *Joseph Dellatte, Cleantech: Reducing Europe's Strategic Dependence on China, Institut Montaigne, July 2025, https://institutmontaigne.org/en/publications/cleantech-reducing-europes-strategic-dependence-china.*

STRATEGIC RATIONALE

The push for EU-majority ownership in Sino-European JVs reflects multiple converging concerns. The first is **industrial sovereignty:** After years of offshoring, Europe needs to rebuild its manufacturing capacity in critical clean technologies—that is, in batteries, solar photovoltaics (PV), and wind components. Key energy transition sectors are dominated by Asian—especially Chinese—suppliers,[4] leaving Europe vulnerable to supply disruptions and geopolitical pressure. As of the mid-2020s, China produces about 80–95 percent of the world's solar wafers and cells and over 70 percent of lithium-ion batteries; it also controls 90 percent of global rare earth processing.[5] Unless policies are introduced to ensure that more of the value chain is anchored in Europe, European industries risk becoming mere assemblers of imported components—the **"assembly-only" trap**.[6] This is already evident in projects such as Chinese-owned solar and battery plants in Europe, which operate module assembly lines but rely on core components, intellectual property, and strategic materials produced in China.

Second, there is a **competitive imbalance**. Chinese cleantech companies benefit from massive state subsidies, economies of scale, and a state-led industrial system, putting them at the center of the value chain and enabling them to undercut European producers. For example, it is estimated that European-made solar modules cost 20–50 percent more to manufacture than those produced in China, which translates into electricity costs that are approximately 15 percent higher for projects using EU panels. Chinese wind turbines are 30–40 percent cheaper than Western models, and Chinese battery cells are about 40 percent cheaper than EU-made cells. How to strike the right balance between promoting an

[4] *Joseph Dellatte, Cleantech: Reducing Europe's Strategic Dependence on China.*
[5] *Jila Zadeh, "China–EU Trade Talks: Market Access and EV Disputes Intensify," Discovery Alert, June 4, 2025, https://discoveryalert.com.au/china-eu-trade-key-issues-2025.*
[6] *Transport Environment (T&E), "Assembly Plant or Battery Powerhouse? Analysis of Foreign Battery Investments in EU," 2025, https://www.transportenvironment.org/articles/no-tech-transfer-requirements-in-chinese-european-battery-partnerships-despite-eu-subsidies-study.*

indigenous, sovereign European cleantech sector and keeping the cost of the energy transition under control has become an urgent question.

Third, rebuilding the European cleantech industry involves issues of **data sovereignty** and security. Under China's regulatory framework (e.g., the National Intelligence Law[7]), companies are required to store certain categories of sensitive data domestically and submit them for state security reviews. For critical European infrastructure projects, this could mean that strategic information (e.g., geolocation, energy output, operational data, and maintenance logs) is hosted in or routed through China, potentially exposing the EU to espionage or detailed mapping of its key energy assets.

Technology	Cost Premium with LCR (EU vs. China)	Sources
Solar PV	EU-made modules ~20–50% higher manufacturing cost than China. ~15% higher LCOE when using EU modules (≈€0.61/W vs €0.50/W).	IEA 2024;[8] Fraunhofer 2025;[9] Nature Energy 2020.[10]
Wind Turbines	Chinese turbines ~30–40% cheaper than Western (EU) models (this infers that EU manufacturing costs should be ~50–70% higher when taking into consideration the benefit of China's full industrial policy support). Therefore, this means that LCOE impact should be ~20–30% higher CAPEX for onshore wind with EU-only supply.	Rystad 2025;[11] EUISS 2024.[12]

[7] *National Intelligence Law of the People's Republic of China, adopted June 27, 2017, effective June 28, 2017 (amended April 27, 2018), https://cs.brown.edu/courses/csci1800/sources/2017_PRC_NationalIntelligenceLaw.pdf.*

[8] *Pablo Sánchez Molina, "PV Panel, Battery Production Up to 45% More Expensive in EU Than in China, IEA Finds," PV Magazine International, October 31, 2024, https://www.pv-magazine.com/2024/10/31/producing-pv-panels-batteries-costs-up-to-45-more-in-eu-than-in-china-iea-finds/.*

[9] *SolarPower Europe, "New Study Reveals Path to Reshore Solar Manufacturing in Europe," press release, September 23, 2025, https://www.solarpowereurope.org/press-releases/new-study-reveals-path-to-reshore-solar-manufacturing-in-europe.*

[10] *Benjamin Probst, Valeria Anatolitis, Alexandros Kontoleon, and Luis Díaz Anadón, "The Short-Term Costs of Local Content Requirements in the Indian Solar Auctions," Nature Energy 5, no. 11 (November 2020): 842–850, https://doi.org/10.1038/s41560-020-0677-7.*

[11] *Andrea Scassola, "Chinese OEMs in the European Wind Market: Cost Advantage Meets Credibility Gaps," Rystad Energy, April 22, 2025, https://www.rystadenergy.com/insights/chinese-oems-in-the-european-wind-market-cost-advantage-meets-credibility-gaps.*

[12] *Lukas Trakimavičius, "Going green without China? The EU's clean tech tightrope", European Union Institute for Security Studies, May 8, 2024, https://www.iss.europa.eu/publications/briefs/going-green-without-china.*

Technology	Cost Premium with LCR (EU vs. China)	Sources
Battery Packs	China ~40% lower cell/pack costs (EU cost ~67% higher per kWh). EV or storage project costs ~20–30% higher with EU-only batteries.	EUISS 2024;[13] IEA 2025.[14]
Electrolyzers	Chinese alkaline electrolyzer units up to 50–75% cheaper base cost. After transport, gap ~0–20% (Chinese $1,500/kW vs EU $2,000/kW installed). Potential for >50% cost reduction if Chinese tech used at scale.	IEA 2025;[15] Hydrogen Industry reports.[16]
Heat Pumps	40–60% cheaper to produce in China (EU production cost 1.7–2.5× China's). EU-made heat pumps could cost ~20–30% more at retail.	IEA 2024.[17]
Carbon Capture	70–90% cheaper reported CCS costs in China vs EU. (EU ~$300/ton, China $30–40/ton CO_2; EU CAPEX ~3–10 × higher).	WoodMac 2025 via EI.[18]

Table: Estimated cost increase due to local content requirements for major Net-Zero Industrial Act technologies. A range is given where data vary; figures compare European domestic production costs to Chinese benchmark costs. LCOE = levelized cost of energy. CAPEX = capital cost.

[13] *Trakimavičius, "Going Green Without China?"*
[14] *International Energy Agency (IEA), "The Battery Industry Has Entered a New Phase—Analysis," IEA Commentary, March 5, 2025, https://www.iea.org/commentaries/the-battery-industry-has-entered-a-new-phase.*
[15] *Emma Laity, "No Clear Cost Advantage to Installing Chinese Electrolyzers Abroad, Says IEA," H2 View, September 12, 2025, https://www.h2-view.com/story/no-clear-cost-advantage-to-installing-chinese-electrolysers-abroad-says-iea/2132052.article/.*
[16] *"China's Electrolysers Redefining Hydrogen Production," Fuelcellsworks, December 20, 2024, https://fuelcellsworks.com/2024/12/20/news/in-case-you-missed-it-the-competitive-edge-of-china-s-electrolysers.*
[17] *Raquel Martinez-Gordon, Carlo Delmastro, and Jing Dou, "Is a Turnaround in Sight for Heat Pump Markets?—Analysis," IEA Commentary, February 7, 2025, https://www.iea.org/commentaries/is-a-turnaround-in-sight-for-heat-pump-markets.*
[18] *"China's Low-Cost Carbon Capture Puts Pressure on Europe's Struggling Power Sector," Energy Institute, October 2025, https://knowledge.energyinst.org/new-energy-world/article?id=139906.*

These cost gaps reflect China's scale and industrial policy and have become a cause for concern in Europe regarding long-term dependency. EU policymakers increasingly view JVs as a way to **capture some of China's cost advantages and know-how for Europe**, rather than simply surrendering the market. **A JV with EU-majority ownership could require the transfer of production techniques and training of local workers, helping to close the cost and technology gap over time**.

Finally, there are questions of **reciprocity and fairness**. European companies entering China have long faced JV mandates and ownership caps.[19] Even after China's entry into the World Trade Organization (WTO), foreign firms in China were still under restrictions in dozens of sectors and were often forced to take on a Chinese partner. As of 2025, only **20 percent** of EU firms report having full market access in China, whereas **83 percent** of Chinese companies enjoy essentially open access in Europe.[20] Strategic political considerations tend to determine how the Chinese authorities decide who can own 100 percent of their facility.

The gap is striking: For instance, BMW had to produce its electric and combustion models in China through the 50:50 JV BMW Brilliance Automotive (BMW + Brilliance), in line with the foreign ownership cap for the automotive sector. Although BMW's shareholding rose to 75 percent in 2022 following regulatory changes, the earlier 50:50 structure is still a relevant illustration of previous ownership constraints in China.[21] Similarly, Siemens AG only entered the Chinese wind market through two JVs with Shanghai Electric Group rather than as a wholly owned subsidiary. In both JVs, Shanghai Electric had a 51 percent stake.[22]

[19] *François Godement, "Can Europe Do a 'Reverse Deng' With China?" Institut Montaigne, 2025, https://www.institutmontaigne.org/en/expressions/can-europe-do-reverse-deng-china.*
[20] *Zadeh, "China–EU Trade Talks: Market Access and EV Disputes Intensify."*
[21] *Victoria Waldersee, "BMW Pays 4.2 Bln to Take Control of Chinese JV," Reuters, February 11, 2022, https://www.reuters.com/business/autos-transportation/bmw-receives-license-take-75-stake-china-joint-venture-bmw-brilliance-automotive-2022-02-11/.*
[22] *Jason Fellman and Stefan Bakewell, "Shanghai Electric, Siemens Invest 226 Million in Wind Power," Bloomberg, December 9, 2011, https://www.bloomberg.com/news/articles/2011-12-08/shanghai-electric-siemens-invest-226-million-in-wind-ventures.*

Meanwhile, **CATL**—China's battery champion—received full authorization to build a wholly owned gigafactory in Hungary. These asymmetries are giving rise to growing calls in Brussels to make Chinese investments conditional on joint-ownership frameworks that ensure European control, value capture, and industrial benefits. Europe cannot remain "naively open" while China plays by different rules.

EUROPE'S CHOICES

Therefore, Europe needs a JV strategy aligned with Europe's **new regulatory framework for cleantech**. In 2023, the EU adopted the Net-Zero Industry Act (NZIA) and the Critical Raw Materials Act (CRMA) to bolster domestic production.

- The NZIA sets a target for 40 percent of key net-zero technologies to be made in Europe by 2030, and it even empowers the authorities to require that no more than 50 percent of a strategic project's inputs come from any single foreign source.[23]
- The CRMA similarly aims to ensure that dependence on any one country for critical raw materials does not exceed 65 percent.[24]

Meanwhile, drawing from the 2025 Clean Industrial Deal, an Industrial Accelerator Act (IAA) is in preparation to drive demand for "Made-in-the-EU" green products.[25] A JV requirement can be seen as another tool in this policy toolkit—it forces foreign investors to localize production

[23] *European Commission, "Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on Establishing a Framework of Measures for Strengthening Europe's Net-Zero Technology Manufacturing Ecosystem," Official Journal of the European Union, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202401735.*

[24] *European Commission, "Regulation (EU) 2024/1252 of the European Parliament and of the Council of*

[11] *April 2024 Establishing a Framework for Ensuring a Secure and Sustainable Supply of Critical Raw Materials," Official Journal of the European Union, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202401252.*

[25] *European Commission, "Clean Industrial Deal," https://commission.europa.eu/topics/competitiveness/clean-industrial-deal_en.*

and decision-making in line with Europe's industrial base objectives. In this respect, Europe's approach may start to resemble aspects of the US and Chinese models—performing a "Reverse Deng"[26] by using the carrot of its market and the stick of regulation to extract local value from foreign investment.

Against this backdrop, this paper examines how the EU could **enforce EU-majority ownership in JVs with Chinese partners in critical cleantech sectors**, and whether such a strategy is legal, practical, and effective.

- Section I reviews China's own JV strategy—rooted in Deng Xiaoping's legacy—and examines how it has advanced Chinese interests.
- Section II maps existing Sino-EU JVs in batteries, solar, wind, hydrogen, and electric mobility, highlighting ownership structures and risks.
- Section III analyses gaps in EU law (FDI screening, subsidy rules, competition law, etc.) that currently make it difficult to require JV structures, as well as WTO considerations.
- Section IV proposes a mechanism—likely via the upcoming IAA, the Public Procurement Regulation Revision, and the FDI regulation revision—to enforce EU-majority ownership and governance control, detailing how to structure such JVs (asymmetric governance, localizing key functions, etc.) in harmony with the NZIA and other initiatives.
- Section V outlines tailored strategies for each sector from 2026 to 2035, including phased local content requirements and partnership approaches.
- Section VI provides policy recommendations at the EU and Member State levels—a roadmap for 2026–2035 to operationalize this JV strategy while bolstering Europe's industrial competitiveness.

[26] *François Godement, "Can Europe Do a 'Reverse Deng' With China?"*

1 China's JV Strategy and Its Impact on Cleantech

The concept of leveraging JVs as a tool of statecraft has deep roots in China's Reform and Opening-Up era. When Deng Xiaoping opened China's economy in the late 1970s, he welcomed Western capital and technology on the condition that they came in via JVs with Chinese entities.[27] This "opening-up" strategy was a shrewd bargain: Foreign multinationals gained access to China's vast market, but in exchange, China secured technology transfer and the development of local capabilities.[28]

Throughout the 1980s and 1990s, China's JV rules typically capped foreign equity at 50 percent and required foreign firms to partner with a Chinese firm—often a state-owned enterprise—in strategic sectors such as automobiles, aviation, or telecommunications. There were some noticeable exceptions to this JV strategy (for example, Allianz and BNP Paribas were allowed to fully own their Chinese subsidiaries), but this approach reflected the broader logic of China's reform era: Foreign capital was welcome, but only if it clearly served domestic industrial upgrading.

Although Deng Xiaoping's famous metaphor "It doesn't matter whether a cat is black or white, as long as it catches mice" (不管黑猫白猫, 能捉到老鼠就是好猫) dates from the early 1960s in the aftermath of the Great Leap Forward, its pragmatism became the ideological backbone of China's industrial strategy. **JVs became the practical "cats" that would catch the "mice" of foreign technology, managerial know-how, and market access**.

[27] *François Godement, "Can Europe Do a 'Reverse Deng' With China?"*
[28] *Raphaël Korteweg and Frans-Paul van der Putten, "Sino-European Joint Ventures and the Risk of Technology Transfers," Clingendael Institute Brief, August 29, 2022, https://www.clingendael.org/publication/sino-european-joint-ventures-and-risk-technology-transfers.*

This approach paid off spectacularly in certain industries. In automotive manufacturing, for example, global carmakers (Volkswagen, General Motors, Toyota, etc.) have been obliged to form 50:50 JVs with Chinese automakers for decades. These JVs trained generations of Chinese engineers and gradually fostered domestic competitors. By the 2020s, Chinese automotive companies had absorbed enough knowledge to design their own competitive EVs and developed their own strategic innovation vision—and Beijing finally lifted the formal JV requirement in the automotive sector, deeming it no longer necessary.

The delayed easing of rules after domestic industry had caught up underscored the strategic intent behind Deng's JV doctrine: JVs were a means to an end, not a permanent openness.[29] China essentially used JVs as "schools" for indigenous innovation, a path some Chinese scholars have dubbed "[trading the Chinese] market for technology." Foreign partners gained market access, and Chinese partners learned the business and eventually became equals or leaders.

1.1. QUANTITATIVE PATTERNS: 80/25/25 ASYMMETRY

Research shows how asymmetrical Sino-European JVs in China tend to be. In a sample of high-tech JVs spanning sectors aligned with China's Made in China 2025 priorities, the European company held a minority stake in 80 percent of cases. In a quarter of JVs, the Chinese state—through state-owned enterprises or state investment funds)—had a significant presence, ensuring alignment with national industrial policy. Moreover, in roughly 25 percent of cases, technology transfer was likely a key part of the JV's activities.[30]

[29] *National Development and Reform Commission,* 关于*2021*年国民经济和社会发展计划执行情况与*2022* 年国民经济和社会发展计划草案的报告 *[Report on the Implementation of the 2021 Plan for National Economic and Social Development and on the 2022 Draft Plan for National Economic and Social Development] (Government of the People's Republic of China, March 2022), https://www.gov.cn/zhengce/2022-11/28/content_5713317.htm.*

[30] *Korteweg and van der Putten, "Sino-European Joint Ventures and the Risk of Technology Transfers."*

In other words, many JVs are explicit or implicit vehicles for one-way knowledge flow from Europe to China. This reflects a structural imbalance: European firms often seek capital or market access and thus accept a minority role, whereas Chinese partners (backed by state directives) seek to absorb foreign technology and eventually localize production. Not all JVs are problematic: many are commercially successful and involve genuine cooperation, but the pattern of Chinese-majority ownership and strategic intent is clear.

Beijing has multiple objectives in encouraging JVs. **Technological upgrading** lies at the core: JVs have been an effective shortcut for Chinese firms to acquire advanced manufacturing processes, R&D capabilities, and intellectual property that would otherwise have taken years to develop. For instance, through automotive JVs, Chinese engineers gained tacit knowledge in engine design and quality control; through solar energy JVs, Chinese companies accessed Western photovoltaic cell technologies in the 2000s. **Capacity-building** is another goal: JVs require foreign partners to set up production in China, thereby developing local supply chains, worker skills, and infrastructure. Over time, this builds domestic capacity that can stand on its own. **Gaining market access and boosting exports** also play a role: By partnering with European companies, Chinese firms can integrate themselves into global supply networks, sometimes piggybacking on the foreign partner's distribution channels to sell products abroad under the JV brand or a new Chinese brand.

Crucially, China's approach to JVs is embedded in a broader strategy of **asymmetric openness**. China tightly controls access to its own market—maintaining barriers or informal hurdles in many sectors—while its firms expand aggressively outward into more open economies like the EU. This asymmetry has only grown more stark. As already noted, European businesses face licensing hurdles and JV mandates in a range of Chinese industries (energy equipment, transport, finance, etc.), whereas Chinese companies encounter few ownership restrictions when investing in Europe.

The results are evident in investment flows: Chinese battery champion **CATL**, for instance, has been allowed to wholly own its large new factories in Germany and Hungary, with European authorities celebrating the jobs created—and in the recently announced JV with Stellantis in Spain, CATL is seeking approval to bring around 2,000 Chinese engineers and technicians to work on the new plant (though it should be noted that negotiations with the Spanish authorities are still ongoing).[31] This reflects China's growing desire to ensure that foreign investment supports domestic industrial capacity, workforce development, and local value creation.

1.2. CHINA'S STRATEGIC LEVERAGE AND EUROPE'S VULNERABILITIES

The Chinese JV strategy exploits a fundamental vulnerability: **Europe's hunger for investment and short-term benefits can undermine its long-term strategic position**. Chinese companies often present themselves as attractive partners—cash rich, willing to build factories in struggling regions, and able to execute quickly. In pursuit of economic growth, European politicians may offer subsidies or fast-track approvals for such joint projects.

However, without protective conditions, these JVs can become Trojan horses—the assembly happens on European soil, but the critical technology, equipment, and decision-making remain under Chinese control and are made in China. Additionally, EU–China battery partnerships in Europe (like Volkswagen's venture with Gotion High-Tech in Germany and Stellantis' JV with CATL in Spain) entail **no meaningful requirements for technology transfer or long-term skill development** for Europe.[32]

[31] *Adrian Cang and Arijit Rathi, "CATL Still Wants Spain to Allow 2,000 Chinese Workers For Battery Plant," Bloomberg, November 14, 2025, https://www.bloomberg.com/news/articles/2025-11-14/catl-still-wants-spain-to-allow-2-000-chinese-workers-for-battery-plant.*

[32] *Assembly Plant or Battery Powerhouse? Analysis of Foreign Battery Investments in EU, Transport Environment (T&E), 2025, https://www.transportenvironment.org/uploads/files/Assembly-plant-or-battery-powerhouse_2025-02-18-092506_lxdk.pdf.*

In the Volkswagen–Gotion case, Volkswagen invested €1.1 billion for just a 26 percent stake in the Chinese battery firm, gaining access to lithium iron phosphate (LFP) battery supply but with little say in operations.[33] The CATL–Stellantis JV in Spain, supported by nearly €300 million in Spanish subsidies,[34] similarly lacked provisions to ensure any proprietary battery know-how would be shared or developed in Europe, everything being based on a contract-based agreement. These examples underscore how, in the absence of a strategic framework, Europe can end up hosting Chinese-invested plants that meet its immediate needs (e.g., battery supply) but do nothing to advance Europe's autonomous capabilities.

1.3. EUROPE'S VULNERABILITY TO THIS STRATEGY

Solar photovoltaic manufacturing is a prime example: Although Europe pioneered solar technology, Chinese firms now control the lion's share of production. EU solar manufacturing capacity is only a few GW,[35] versus China's hundreds of GW. European developers source over 80 percent of modules from China or Chinese-owned suppliers. Chinese companies have achieved such scale that European firms struggle to compete on cost, leading to a near-complete offshoring of this supply chain.[36] If Europe invites Chinese solar investment without conditions, it risks cementing this dependence and being reduced to assembly plant manufacturing with little value added or knowledge shared.

[33] *"Press Release: No Tech Transfer Requirements in Chinese-European Battery Partnerships Despite EU Subsidies—Study," Transport Environment (T&E), November 18, 2025, https://www.transportenvironment.org/articles/no-tech-transfer-requirements-in-chinese-european-battery-partnerships-despite-eu-subsidies-study.*

[34] *Mariano Granda, "Stellantis Recibe los 300 Millones que Quería para Su Megaproyecto de Baterías y Coches Eléctricos en España," Cinco Días, October 8, 2024, https://cincodias.elpais.com/companias/2024-10-08/stellantis-recibe-los-300-millones-que-queria-para-su-megaproyecto-de-baterias-y-coches-electricos-en-espana.html.*

[35] *Maya Chadly et al., "State of Global Solar Energy Market Overview, China's Role, Challenges, and Opportunities," Sustainable Horizons 11 (2024): 100108, https://doi.org/10.1016/j.horiz.2024.100108.*

[36] *Joseph Dellatte, Cleantech: Reducing Europe's Strategic Dependence on China.*

Battery cell production is another example: Chinese firms (CATL, BYD, CALB, etc.) are expanding in Europe to supply carmakers, often with their own technology and equipment. Without JV requirements, Europe could end up with numerous "100 percent Chinese" gigafactories on its soil—creating jobs, yes, but leaving key decisions, critical components manufacturing, and intellectual property abroad.

Wind energy presents a slightly different issue: Europe's turbine makers, such as Vestas and Siemens Gamesa, are world-class, but they depend on rare earth magnets and other inputs that are mostly made in China. Chinese wind Original Equipment Manufacturers (OEMs) are now internationally competitive. Thus far, Europe has kept Chinese turbines largely out of its market on quality and brand grounds, but the cost pressure is mounting. Chinese firms could begin to partner with European wind developers or component suppliers as a backdoor entry, again raising concerns over technology transfer (e.g., sharing offshore turbine designs) and supply security (e.g., magnets and electronics).

China's playbook has been consistent: **Use JVs to gain what China needs (technology, skills, market foothold) while ensuring that Chinese entities retain control**. This approach has been highly successful in fostering China's industrial rise. For Europe, however, this has often meant subtle erosion of its technological edge. European companies entered JVs with Chinese firms eagerly in earlier decades, only to find new Chinese competitors emerging a few years later armed with knowledge from the partnership.

The EU now faces a choice: continuing with business-as-usual—that is, welcoming Chinese cleantech goods and investments with few strings attached—or taking a page from China's book by imposing local content requirements (LCRs) and requiring JVs on Europe's terms for critical sectors. The vision of the emerging EU strategy is the latter. It aims to flip the script: if Chinese firms want to access the lucrative EU market in sectors deemed critical, they should be prepared to **partner up under**

conditions that favor the EU's strategic interests. This would represent a defensive modernization of Europe's open investment model aimed at correcting the imbalance described above.

2 Mapping of Existing Sino-EU Cleantech Joint Ventures

JVs between European and Chinese companies in cleantech sectors are already proliferating, albeit in an ad hoc fashion. This section surveys key sectors**—batteries, solar PVs, wind (magnets), hydrogen electrolyzers, and EVs—**to identify major Sino-EU joint undertakings or investments and assess their structure (who owns what) and the associated risks. The mapping reveals a common theme: **Most of these partnerships currently feature Chinese-majority ownership—or, at a minimum, Chinese technology dominance—or simply final assembly manufacturing in Europe, and few have safeguards to ensure long-term benefits for Europe**.

Batteries (LFP & Beyond)	
Chinese actors	CATL, BYD, Envision AESC, CALB, Gotion, SVOLT.
Types of investments	• Targeted JVs (Stellantis–CATL in Spain, Volkswagen–Gotion in Germany); • 100% Chinese-owned factories (Erfurt/ Hungary); • Comparable Korean cases (LG Poland).
Examples of JVs	• Stellantis–CATL: €4.1bn, CATL tech dominant, limited tech transfer; • Volkswagen–Gotion: Volkswagen holds 26% but has limited operational control.
Wholly Chinese-owned factories	• CATL Erfurt; • CATL Debrecen, Hungary (100 GWh+, ~$7.5bn, €800–900m in subsidies).
Structural dependency	90% of EV batteries produced in Europe come from Asian firms; 40% of announced gigafactories are Chinese or Korean.
Risks	Strategic decisions made in China; no technology transfer; Europe often reduced to assembly; weak control over R&D.

Solar Photovoltaics	
Current dependency	≈90% of solar panels installed in Europe come from China; EU industry has nearly disappeared.
Chinese presence in Europe	Mass exports; a few Chinese-owned factories (e.g., JinkoSolar Portugal and Greece).
Forms of cooperation	Chinese equipment and licenses; emerging EU–China PV ecosystems.
Example of JV	Tayan Energy: Shanghai Electric + Eland Private Equity in Spain (2 GW project pipeline).
Key issue	JVs are rare: Chinese firms do not need them to access the market.
Strategic risks	• Import of turnkey Chinese factories → deeper dependency; • Data leakage (example: inverters).
Policy window (NZIA)	50% single-country cap in public procurement → incentivizes EU manufacturing and JVs.

Wind Turbines & Rare-Earth Magnets	
European actors	Vestas, Siemens Gamesa, Ørsted.
Chinese dependency	China produces over 90% of global NdFeB magnets (which are critical for turbines).
Chinese presence in Europe	• Mingyang (Germany); • COSCO–Jan De Nul in Belgium (installation JV); • CGN in UK offshore projects.
Absence of turbine JVs	Direct competition; dependency mainly in materials.
Risks	Supply-chain vulnerability; cheaper Chinese turbines; Trojan horse acquisitions.
Opportunities	JV opportunities in magnets with Japan/Korea; NZIA supports EU magnet relocalization to localize software, data, and power electronics.

Hydrogen Electrolyzers	
Market situation	• Leadership still open; • Europe strong in PEM/membranes; • China strong in low-cost alkaline production.
Costs	• Chinese alkaline: $200–400/kW; • Western PEM: >$1,000/kW.
EU regulation	Hydrogen Bank: Max 25% Chinese electrolyzer capacity in funded projects.
JV opportunities	Possible combination: EU technology + Chinese manufacturing scale.
Risks	Loss of EU advantage in critical components; influx of low-cost Chinese equipment.
Opportunities	Localizing membranes, catalysts, bipolar plates in the EU.

Electric Vehicles & the EV Supply Chain	
Chinese actors	BYD, NIO, Xpeng, SAIC/MG, Geely.
EU presence	• ≈25% of EU EV sales in 2024; • EU anti-subsidy investigation; BYD scouting EU sites.
Existing JVs	• NIO–Shell in the Netherlands and the UK (charging); • Polestar (hybrid China–EU structure via Geely).
Value chain presence	China dominates mining, lithium refining, batteries, motors and software.
Risks	• Data control; • Trojan horse acquisitions; • Dumping.
Opportunities	Require EU-majority JVs for any Chinese EV plant; localize software, data and power electronics.

A clear pattern emerges across most cleantech sectors: Chinese firms are increasingly embedded into Europe's cleantech landscape but almost always on terms that favor China's manufacturing apparatus rather than that of Europe. Sino-European JVs exist in only a limited number of cases—**about 40 in total**—and even these rarely feature

EU-majority ownership or meaningful technology transfer. In most cases, Europe has welcomed large-scale Chinese investments—often supported by substantial public subsidies—without leveraging these deals to secure co-ownership, co-control, or the localization of critical functions. In 2024 alone, Chinese green manufacturing projects in Europe amounted to over €13.8 billion ($15 billion).[37] In addition to the Spanish CATL–Stellantis JV case, Member States have offered great incentives: Hungary has provided more than €800 million to CATL and made additional grants to BYD and EVE Energy;[38] Slovakia has allocated €267 million to Volvo (Swedish, but 80 percent owned by Geely);[39] Italy has prepared a €6 billion support package relevant to Dongfeng,[40] and Spain has extended major incentives, including €3.7 billion for Chery and €300 million for Envision.[41]

[37] *"China's Green Leap Outward: The Rapid Scale-Up of Overseas Chinese Clean-Tech Manufacturing Investments," Net Zero Industrial Policy Lab, 2025, https://static1.squarespace.com/static/64ca7e081e376c26a5319f0b/t/68c09417468c2975452a39d1/1757451287251/PB+-11+China+Low+Carbon+FDI-vf.pdf.*

[38] *Nicholas Thorpe, "Hungary Opens Up to Chinese Tech Despite Protests," BBC News, April 26, 2024, https://www.bbc.com/news/world-europe-68848770; The Budapest Times, "China's BYD to Build HUF 10 Billion Battery Assembly Plant Near Budapest," June 28, 2023, https://www.budapesttimes.hu/corporate/chinas-byd-to-build-huf-10-billion-battery-assembly-plant-near-budapest/; Callum Randall, "Eve Energy to Build Battery Factory in Hungary," Electrive.com, May 10, 2023, https://www.electrive.com/2023/05/10/eve-energy-to-build-battery-factory-in-hungary/.*

[39] *Reuters, "Slovakia Wins EU Nod for €289 Million Aid to Volvo's EV Plant," April 8, 2024, https://www.reuters.com/business/autos-transportation/slovakia-wins-eu-nod-289-mln-aid-volvos-ev-plant-2024-04-08/.*

[40] *Giorgia Piovaccari, "European Nations Compete for Chinese EV Factories, Jobs Even as EU Weighs Tariffs," swissinfo.ch, June 10, 2024, https://www.swissinfo.ch/eng/european-nations-compete-for-chinese-ev-factories2C-jobs-even-as-eu-weighs-tariffs/80231508.*

[41] *Piovaccari, "European Nations Compete for Chinese EV Factories, Jobs."*

Structure of Sino-European Joint Ventures on European soil

Type of Joint Venture	Number of Cases
EU-majority	7
Chinese-majority	Around 25
50%-50%	3
Predicted to be 50%-50%	4

In sectors in which China has already achieved overwhelming dominance, such as batteries and solar PV, the absence of JV requirements has meant that, while Europe subsidizes assembly capacity, it gains little influence over technology choices, R&D, or local supply-chain development. The dynamics typically mirror one-sided partnerships: Chinese firms bring technology and equipment parts, European partners contribute land and labor, and strategic decision-making remains anchored in China. Europe risks consolidating its role as an "assembly hub," providing industrial land and labor while foreign actors capture most of the value.

In wind energy, Europe remains strong at the system level but is critically dependent on China for rare earth permanent magnets. These dependencies function almost as involuntary partnerships—even a fully European turbine contains a core component produced in China. As Chinese turbine OEMs become increasingly competitive, the lack of conditionality in their access to Europe poses a risk of future entry on terms unfavorable to European manufacturers.

Hydrogen electrolyzers present a different dynamic. Leadership is still contested, and Europe retains strong positions in key components such as membranes and catalysts. This window offers the EU a chance to set rules early, ensuring that any Chinese participation in Europe's

hydrogen industry occurs through EU-majority JVs that anchor sensitive technologies on EU soil.

The core finding is consistent across sectors: Europe currently lacks a coherent framework to ensure that Sino-European cooperation strengthens rather than undermines Europe's industrial base. Where JVs exist, they tend to be structured around Chinese control. Where they do not exist, China has no incentive to create them. As a result, Europe rarely secures technology transfers, governance rights, or strategic influence.

This mapping underscores the central policy gap: Without a structured JV strategy—particularly one requiring EU-majority ownership and localization of critical functions—the EU will continue to absorb Chinese capital and technology without building a resilient, strategically autonomous cleantech industry.

3 The Legal Gap in Europe's Framework

Despite the strategic logic of requiring EU-majority JVs, the EU's current legal and regulatory framework does not provide a clear mechanism for imposing such ownership conditions on foreign investments. Europe's investment screening and competition rules were crafted in an era of promoting open markets and addressing narrow concerns (such as national security or antitrust), not industrial strategy or reciprocity.

As a result, **JVs can often slip through regulatory cracks**. In this section, we examine the limitations of existing tools—from foreign investment screening to subsidy control, merger regulation, public procurement, and single-market freedoms—and identify the legal obstacles to enforcing a JV requirement today. We also consider the international trade law constraints, including WTO rules, that any such policy must navigate.

3.1. FOREIGN DIRECT INVESTMENT (FDI) SCREENING—LIMITED SCOPE AND NO JV MANDATE

The EU's FDI Screening Regulation (Regulation (EU) 2019/452) and the patchwork of national screening regimes are primary tools for vetting foreign investments on security or public order grounds. However, they do not explicitly address the formation of JVs—especially greenfield JVs.

In fact, **most FDI regimes have historically focused on acquisitions of existing companies (i.e., takeovers)**. In many countries, establishing a new JV entity from scratch did not typically trigger screening, as no existing European company was being acquired. An OECD report

in 2022 flagged that, due to varying national rules, greenfield JVs frequently escaped FDI review in several Member States.[42]

There are signs that this gap is closing. Pushed by growing security awareness, the EU has moved to tighten screening. In January 2024, the European Commission proposed a major revision of the FDI Screening Regulation to **make screening mandatory in all Member States and explicitly cover greenfield investments in critical sectors**. This draft (now advancing through the legislative process) would oblige every Member State to have a screening mechanism and set a minimum scope of sectors that must be screened—including key technologies and infrastructure—regardless of whether the investment is an acquisition or a new JV.[43] Notably, the proposal clarifies that even indirect investments (e.g., via EU subsidiaries of a foreign parent) and new establishments fall under "FDI" for screening purposes. The European Parliament's amendments go further, suggesting that certain greenfield projects *must* undergo mandatory filing and clearance if in designated sensitive fields.

If adopted, these changes would mean that **any Sino-European JV in a critical cleantech sector would be highly likely to undergo scrutiny by the authorities**. For example, a new Chinese–European JV to build a battery factory or a wind turbine plant would face a mandatory economic security review. While this does not itself impose a JV requirement, it gives governments a chance to examine—and potentially set conditions on—the structure of the JV. In practice, to secure approval under screening, the JV might need to demonstrate "effective European control" or mitigation of security risks (this topic is discussed in more

[42] *OECD, "Framework for Screening Foreign Direct Investment into the EU: Assessing Effectiveness and Efficiency," 2022), https://www.oecd.org/content/dam/oecd/en/publications/reports/2022/01/framework-for-screening-foreign-direct-investment-into-the-eu_d966075e/f75ec890-en.pdf.*

[43] *Thomas Jenkins et al., "EU European Parliament Adopts Proposal to Harmonise and Expand ForeignInvestment Screening Processes Across All EU Member States," Foreign Investment and National Security Blog, June 23, 2025, https://foreigninvestment.bakermckenzie.com/2025/06/23/eu-european-parliament-adopts-proposal-to-harmonise-and-expand-foreign-investment-screening-processes-across-all-eu-member-states.*

detail below). Indeed, even under current rules, an FDI screening review can result in the authorities imposing conditions such as limitations on foreign voting rights, requirements to keep certain operations or R&D in-country, and even mandating a partnership with a local entity. However, these are usually case-by-case remedies, not general rules.

Crucially, **FDI screening is reactive and case specific**, not a broad policy that mandates JVs ex ante. It can block a dangerous deal or attach strings, but it **cannot generally require that "Chinese investor X may only invest if it takes a minority position to a European lead"**—as that kind of rule would go beyond traditional security screening into the realm of industrial policy.

As of now, no Member State law or EU regulation says: "a foreign investor must team up with a local partner that holds the majority stake." At most, France or Germany might informally encourage such setups to alleviate concerns but do not mandate it by law. The French screening procedure, for instance, assesses whether a deal affects national interests and can veto or approve with conditions, but it is largely reactive and does not proactively shape deals to ensure majority local ownership. This reactive approach can mitigate immediate security risks but does not provide an anticipatory framework to systematically favor European control.[44]

The bottom line on FDI screening is that it is a necessary tool to catch problematic foreign investments, and one that is evolving to cover more scenarios (such as JVs). However, it **stops short of being a policy lever for imposing JV structures when deemed strategic**. Screening looks at foreign investments one by one through a security lens, not an

[44] *French Government, Contrôle des Investissements Étrangers en France—Rapport Annuel 2024 [Control of Foreign Investments in France—Annual Report 2024], Ministère des Finances, July 30, 2025, https://presse.economie.gouv.fr/controle-des-investissements-etrangers-en-france-rapport-annuel-2024; Direction générale du Trésor, "Foreign Direct Investment Screening in France: FAQ Abridged" (January 2025), https://www.tresor.economie.gouv.fr/Institutionnel/Niveau2/Pages/f149e66d-6df2-4726-a594-3d95409d7a46/files/4a4c79dc-22a0-4db4-b6d4-559368852675.*

economic security lens. Even in the security context, if a foreign investor passes the test (no clear security threat), the authorities currently have no basis to insist on a JV form as a condition—unless perhaps they justify it as a mitigation measure (but that would be unprecedented and likely challenged).

The new proposal will enhance coordination and could indirectly push more JV-ish outcomes (since, to pass scrutiny, foreign investors might volunteer to partner with an EU firm or accept certain governance terms). Still, a dedicated legal vehicle or clause would be needed to straightforwardly require EU-majority ownership for certain categories of investments as a rule.

3.2. FOREIGN SUBSIDIES REGULATION (FSR) —A NARROW NET THAT MISSES MANY JVS

The EU's Foreign Subsidies Regulation (Regulation (EU) 2022/2560), in force since mid-2023, addresses another angle: It **empowers the European Commission to scrutinize mergers, acquisitions, and public contract bids by companies that have benefited from non-EU subsidies in order to prevent distortions in the internal market**. At first glance, one might ask: How is this related to JVs? The answer: The FSR can cover JVs but only large ones, and it is aimed at subsidy issues, not ownership per se.

Under the FSR, if companies are engaging in a "concentration" (merger or JV formation) and have received foreign financial contributions above certain thresholds, they must notify the Commission. For a JV, the trigger thresholds are quite high: The JV must be established in the EU and have at least **€500 million in EU turnover** (in the prior year), and the parties combined must have received at least **€50 million** in non-EU subsidies in the past three years. A brand-new JV will rarely have €500 million turnover unless it is a carve-out of an existing business.

This means that most greenfield JVs will initially fall below the notification thresholds. Even if the parent companies are huge and subsidized, if the JV itself is new or small, it may escape the FSR's mandatory review.[45] For example, if a Chinese state-backed company forms a JV with a European firm to build a €200 million battery plant (turnover zero at creation), no FSR notification is required—even though that JV could later become quite significant. This effect is even more pronounced for start-ups and venture-capital-backed projects, which often begin with minimal turnover but may receive substantial foreign funding.

Moreover, the FSR focuses on distortive subsidies—it can require remedies such as repayment of subsidies, divestment, or in public procurement, even exclusion of a subsidized bidder.[46] It is not directly concerned with JV ownership unless the ownership is a channel for subsidies. A JV can be investigated if, for example, it is effectively propped up by foreign subsidies that give it an unfair advantage. But the FSR does **not give the Commission authority to demand a change in ownership structure purely to address concerns regarding strategic autonomy**. It might block a JV if the foreign subsidy effect is too distortive and no remedies can cure it, but that is about subsidy fairness, not ensuring EU control.

One aspect that should be noted here is that the FSR does consider full-function JVs (those operating as independent businesses) within its scope, but it "leaves out non-full-function JVs"—that is, more cooperative arrangements or small JVs might not count. Therefore, a significant proportion of partnership vehicles might not trigger the FSR. In addition, when assessing a JV under the FSR, the Commission looks at the JV's own turnover, not that of the parent companies, as noted above.[47]

[45] *Based on interviews.*
[46] *Transport Environment (T&E), "Press Release: No Tech Transfer Requirements in Chinese-European Battery Partnerships Despite EU Subsidies—Study," November 18, 2025, https://www.transportenvironment.org/articles/no-tech-transfer-requirements-in-chinese-european-battery-partnerships-despite-eu-subsidies-study.*
[47] *"QA: Foreign Subsidies Regulation," Houthoff, 2023, https://www.houthoff.com/content/uploads/2025/11/FSR-Brochure.pdf.*

This creates a gap in which significant parent-level influence via smaller or nascent JVs may escape early scrutiny.[48] In plainer terms, a Chinese company could establish a modest-sized JV in Europe and heavily subsidize it via cheap loans or input supplies from China ("upstream subsidies"), and the FSR might not catch it because the JV itself is not big enough yet. This has been highlighted as an imperfection: The FSR does not perfectly address cases of foreign subsidies that benefit a JV indirectly—for instance, by subsidizing the JV's suppliers or the foreign parent.

By way of illustration, consider a Chinese battery firm that gets cheap state-financed raw materials, which it then uses in a European JV factory—the advantage is real, but the JV might not count that as a direct subsidy to it. The FSR might miss or be unable to fully remedy such a scenario. It is a reminder that tools like the FSR are at best partial levers; they may disqualify a JV from a public tender if it is proven to be subsidized, but they **cannot mandate the JV's structure, nor can they require that it be a JV with an EU partner in the first place**.

In summary, the FSR is an innovative instrument for keeping competition fair vis-à-vis subsidized foreign firms, but it was not designed to enforce local majority ownership or strategic control. It is reactive and threshold bound. Many Sino-EU JVs will be below its radar initially, and even when in scope, the outcomes are about subsidy mitigation (like forcing capacity reduction or prohibiting certain market behaviors). The FSR could indirectly encourage JVs, though—if a Chinese firm knows going solo and being subsidized in the EU could cause trouble, it might prefer to partner with a European entity and avoid blatant subsidies. But that is speculative and would play out on a case-by-case basis.

[48] *Based on interviews.*

3.3. EU MERGER CONTROL (EUMR)—NO HANDLE ON GREENFIELD JVS FOR INDUSTRIAL POLICY

The EU Merger Regulation (EUMR) (Reg. 139/2004) governs competition (antitrust) review of concentrations. It does cover **JVs** but only those that are "full-function" (i.e., perform all functions of an autonomous economic entity) and meet certain size thresholds. If, for instance, a European conglomerate and a Chinese company create a JV, and each parent is large enough that their turnovers push the JV over the notification thresholds, the Commission would review the JV for its competitive impact. However, **merger control is concerned solely with market competition, not ownership nationality or supply-chain security**. The Commission might approve a JV if it does not significantly reduce competition in the EU, regardless of the foreign ownership issue.

Most JVs in emerging cleantech fields would not yet pose a classic competition problem—markets such as batteries or hydrogen are not highly concentrated in Europe, and a new JV often adds a competitor. Therefore, the EUMR is unlikely to block a JV or require structural changes unless, say, it is part of a market-sharing scheme or combines big existing competitors. Moreover, **many greenfield JVs with Chinese partners might not even trigger EU merger review because the parents' turnovers in the EU or worldwide might not meet the high thresholds** (roughly €5 billion combined worldwide turnover, with at least two parties over €250 million EU turnover each, etc.). In a situation where the Chinese company had huge domestic revenue but had not yet started to generate significant revenue within the EU and their European partner was a mid-size firm, the JV might fall outside EU jurisdiction (although possibly falling under some national merger regimes).

Even when merger control does apply, the EUMR has no mandate to consider factors like "EU industrial leadership" or "dependency on foreign technology"—these are outside its remit. It cannot say, "We approve this JV only if the European side holds majority or equal equity,"

as that is irrelevant to competition law. At most, the Commission might impose remedies if the JV raises anticompetitive concerns (e.g., if two parent companies improperly commit not to compete outside the JV, the Commission could demand that be fixed).

3.4. PUBLIC PROCUREMENT RULES—CAN THEY IMPOSE LOCAL CONTENT OR OWNERSHIP?

Public procurement is one area in which the EU does have some leverage to favor domestic industry, but it is constrained by principles of non-disctimination and value for money. Under EU directives, **contracting authorities must award contracts based on *objective criteria*** (usually the "most economically advantageous tender" or MEAT), and they generally **cannot outright exclude foreign companies or require domestic ownership**.[49] The procurement rules stress transparency, equal treatment, and allowing competition to get the best quality and price.

That said, there are subtleties. The concept of MEAT **allows for including qualitative criteria beyond just price, which could encompass things like supply-chain resilience, environmental impact, or social considerations**. Indeed, the directives explicitly allow Member States to avoid using the lowest price only and to include environmental or social value considerations.[50] Recently, the NZIA introduced an obligation in certain renewable energy tender contexts: If the EU supply share of a technology exceeds a threshold from one country, the contracting authorities must include clauses limiting single-country content to 50 percent. **This effectively imposes a local (or at least diversified) content requirement on those tenders**.

[49] *European Commission, "Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on Public Procurement and Repealing Directive 2004/18/EC," Official Journal of the European Union, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0024.*
[50] *European Commission, "The Public Procurement Directives," Public Buyers Community, February 26, 2004, https://public-buyers-community.ec.europa.eu/resources/public-procurement-directives.*

In addition, the **International Procurement Instrument (IPI)**, which came into force in 2022, **enables the EU to penalize bidders from countries that close their own procurement markets**. Under an IPI measure, an EU authority can require, for instance, that no more than 50 percent of the value of a public contract be sourced from the targeted country. This is a retaliatory tool aimed at opening markets—for example, if China blocks EU firms in its public projects, the EU can hit back in EU tenders. It is essentially leveraging procurement access for reciprocity.

Despite these developments, **current procurement rules cannot impose "local ownership" conditions—only local content in some cases**.[51] A contracting authority cannot say "the bidder must be a company with EU-majority ownership"—that would violate WTO Government Procurement Agreement (GPA) commitments and EU internal market rules, as it discriminates based on ownership. **However, they can require some local production or partnership as part of contract performance in certain justified cases** (e.g., complex defense procurement often demands local industrial participation).

Thus, **procurement can support a JV strategy indirectly—for example, if governments specify that for large renewable projects or publicly funded EV bus fleets, a certain percentage of components must be EU-made, foreign suppliers might be compelled to partner with locals to meet that requirement**. However, general JV enforcement via procurement is not currently allowed. To enable that, either EU procurement law would need amendment, or new regulations must carve out exceptions (as the NZIA did for specific cases).

[51] *Based on interviews.*

It is worth noting that procurement is one area where WTO rules have an explicit exception: **Government procurement is largely excluded from WTO non-discrimination (according to WTO's writing) rules except where covered by the GPA**. The EU and China have no mutual GPA commitments (China is not yet a GPA member, although its accession is in process[52]). Therefore, the EU could, if it chose, favor domestic or EU firms in procurement more aggressively for non-GPA-covered sectors. However, the EU's own directives currently enforce broad non-discrimination with regard to all bidders from WTO countries. Changing this could be controversial and complex.

In sum, procurement offers leverage and precedents (like the NZIA's content requirement for tenders when facing > 50 percent foreign dependency). **This demonstrates that the EU can link market access to local value added when allocating its own funds**. However, it does not currently allow saying "only JVs with EU control can bid." Therefore, a creative approach is needed: an authority could give an evaluation advantage to bids that have European partnerships or that involve tech transfer agreements. That might pass muster if framed under MEAT as contributing to supply-chain resilience (one could argue that a bid that builds local skills has long-term value). There's a gray area here that could be explored in policy (maybe in the IAA context or through a review of the Public Procurement directive). But as it stands, procurement is one of the tools for enforcing JV structure across the economy for critical cleantech.

[52] *Ou Shi, "The Art of the Deal Does Not Align with China–EU Ties," China Daily, June 23, 2025, https://www.chinadaily.com.cn/a/202506/23/WS68591795a310a04af22c7edd.html.*

3.5. EU INTERNAL MARKET FREEDOMS —ESTABLISHMENT AND CAPITAL MOVEMENT

Any requirement that Chinese investors enter a JV with EU-majority ownership touches on fundamental EU principles: the freedom of establishment and the free movement of capital. Normally, these freedoms prevent restrictions on who can invest in or set up companies in the EU. While the free movement of capital also applies to third-country investors—though it allows for much broader exceptions, including on security or public-policy grounds—the freedom of establishment applies only to EU nationals and companies.[53] The EU can discriminate in market access between EU and non-EU entities in ways it could never do among EU Member State entities.

For example, if a law states that "a non-EU company cannot invest or operate in X sector except as a minority JV partner", it is indeed a restriction on establishment and capital movement. But since it targets non-EU companies, it does not violate the non-discrimination rule among EU members, which cannot be held against companies that are not established in the European Union (ECJ, 7 April 2011, Francesco Guarnieri & Cie, case C-291/09). Nor can a restriction on freedom of establishment be invoked by a foreign company, since, pursuant to Article 49 TFEU, it only applies between companies established in the EU. On the other hand, a foreign company may claim the application of the free movement of capital, based on Article 63 TFEU. **The key is that such a restriction must be justified by an overriding reason in the public interest and must be proportionate**.[54]

Possible justifications include **security of supply, public security**, or **industrial strategy objectives**, such as preventing dependence on a single third country for critical technologies. The EU treaties allow

[53] *European Union, "Consolidated Version of the Treaty on the Functioning of the European Union," https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012E.*
[54] *European Union, "Consolidated Version of the Treaty on the Functioning of the European Union."*

exceptions for public policy or security (with narrow interpretation), and the Court of Justice has recognized that "essential security interests" can justify investment restrictions (mirroring, to some extent, GATT Article XXI logic on security). The Commission would need to clearly articulate the aim—for example, ensuring industrial and technological security in critical cleantech, which is essential for both economic resilience and the EU's climate goals. This could tie into Article 52 of the Treaty (for establishment) or the general exceptions. Additionally, one could invoke the fact that **China itself imposes equivalent restrictions**—and thus, under the principle of reciprocity or even the EU's autonomy, it may respond in kind. **While reciprocity is not a standard legal justification in EU law, national security and public order are**.

To be proportionate, this JV strategy might need to be targeted—perhaps only at sectors with clear strategic importance and where Europe faces a defined dependency risk. The measure should be the least restrictive way to achieve the aim. **If Europe can convincingly show that letting certain investments go uncontrolled would jeopardize its energy security or leave it vulnerable to supply cut-offs (which implicates public security and even health/safety in the context of the climate transition), that strengthens the case**.

One interesting nuance is regarding **circumvention through EU-incorporated entities**. If the rule only said, "Chinese companies must enter into a JV," what if a Chinese firm sets up a shell company in, for example, Luxembourg and invests via that EU entity? On paper, it is an EU company. Free movement of capital and freedom of establishment within the EU would then protect that shell. Thus, any regulation must define the target in terms of **ultimate control**—similar to FDI screening definitions. Indeed, the FDI Regulation defines foreign investors by looking at the person(s) who ultimately control a firm or exercise a dominant influence. **A JV requirement law would have to say something like, "Any investment in sector X by an entity ultimately controlled by a non-EU person must be done via a JV with an EU-controlled partner**

holding the majority stake." That would close the loophole of simply reflagging a Chinese company in Europe.

To summarize regarding internal market law: The EU likely has the legal ability to impose a JV requirement on non-EU investors, but **it must frame it under permissible exceptions**. It would need to assert an **overriding reason in the public interest**—e.g., safeguarding critical industrial capacities and supply security in the net-zero transition—and ensure that the measure is **necessary and proportionate**. For proportionality, it might include that only investments above certain thresholds (so as not to hit the funding of every small start-up) or only in specific high-risk segments are covered rather than a blanket rule on all sectors. The legislation should be carefully justified with evidence (e.g., Chinese market barriers, prior tech transfers harming EU interests, etc.).

One strong argument Europe can wield is **reciprocity and "level playing field"**: since European companies are effectively barred from controlling stakes in similar sectors in China (40 sectors with JV requirements in China[55]), **the EU measure is a response to a distorted global environment**. Additionally, the fact that China's own public procurement is closed to foreign firms and that it has strategies to dominate critical supply chains could be cited as justification that Europe's essential security interests are at stake.

The EU could even craft the rule as a country-specific measure, applying it explicitly to investments from countries that impose restrictive practices on EU companies (which would basically mean China, possibly Russia, etc.). This approach would align it somewhat with the International Procurement Instrument logic or even Article XXI GATT (security exception) if challenged at the WTO.

[55] *Zadeh, "China–EU Trade Talks: Market Access and EV Disputes Intensify."*

3.6. WTO LAW—TRADE AND INVESTMENT RULES VS. INDUSTRIAL POLICIES

Mandating local JVs and LCRs raises flags under WTO rules, which generally prohibit discrimination against foreign goods and investors. Key relevant WTO agreements include:

- **General Agreement on Tariffs and Trade (GATT) 1994:**[56] If a JV requirement or LCR affects trade in goods, GATT's core principles apply. Article III:4 (National Treatment) forbids treating imported products worse than domestic like products. A rule that "50 percent of components must be EU-made" means, in effect, you are limiting use of imported inputs—a straightforward violation of national treatment. Article I (Most Favored Nation [MFN]) requires not discriminating between WTO members. If the EU singled out Chinese investors for special conditions (JV or else), that might be seen as an MFN violation—treating Chinese goods/investors differently from, say, Korean ones. **However, if the rule is framed broadly for all non-EU (or all above certain dependency thresholds), it might avoid explicit MFN discrimination (though in effect it targets, at the moment, mostly China)**.

- **Agreement on Trade-Related Investment Measures (TRIMs):**[57] This specifically prohibits certain investment measures that are trade-distortive—notably those requiring investors to buy local products or imposing quotas on imports as a condition of investment. A classic TRIMs violation is a "domestic content requirement for manufacturing." The EU experienced this issue in the past, challenging countries like Canada and India for solar local content rules. Any obligatory local content percentage (e.g., "X percent of value must be EU origin") is almost certainly inconsistent with TRIMs

[56] *World Trade Organization, "WTO Analytical Index—Guide to WTO Law and Practice," updated electronic version, https://www.wto.org/english/res_e/publications_e/ai17_e/gatt1994_e.htm.*
[57] *World Trade Organization, "Agreement on Trade-Related Investment Measures (TRIMs)," https://www.wto.org/english/tratop_e/invest_e/invest_info_e.htm.*

paragraph 1(a), which forbids requiring the purchase or use of local products. Past WTO cases like *India—Solar Cells*[58] confirmed that such renewable energy local content rules violate TRIMs and GATT III. Thus, the envisaged 50 percent EU content quota would indeed conflict with WTO law.

- **Agreement on Subsidies and Countervailing Measures (SCM):** If the EU ties any subsidies or advantages to these requirements (for example, offering grants only to JVs or only to firms using EU inputs), that could be seen as a prohibited subsidy if contingent on using domestic over imported goods. SCM theoretically prohibits subsidies contingent on local content as well as those contingent on export. The EU must be wary that any state aid schemes (like under the IAA) that favor local content might be challengeable as prohibited subsidies—although enforcement at WTO is slow and partial (France's "made-in-the-EU" requirement for EV leasing has not yet been challenged), and **the EU could potentially justify some clean subsidies under a climate rationale if framed carefully** (still, SCM has no climate exception except if one goes to Article XX GATT via some route).

[58] *World Trade Organization, "WTO Dispute Settlement—The Disputes – DS456: India—Certain Measures Relating to Solar Cells and Solar Modules," https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm.*

Possible WTO Justifications

The EU could attempt to justify these measures under **GATT Article XX** (General Exceptions) or **Article XXI** (Security Exceptions).

Relevant clauses under Article XX might include the following:

- *(b) necessary to protect human, animal, or plant life or health—which could be interpreted to justify climate-related measures*; or
- *(g) relating to the conservation of exhaustible natural resources—arguably applicable if framed as ensuring domestic capacity for clean energy* (less clear).

However, those are stretch arguments for local content rules; usually, they are hard to justify as "necessary" for such goals, and they **risk being seen as disguised protectionism** (the Article XX chapeau test).

The more compelling route is **Article XXI (Security Exceptions)**. This allows a country to take "any action which it considers necessary for the protection of its essential security interests … relating to the traffic in arms, ammunition, and implements of war and such traffic in other goods and materials as is carried on directly or indirectly for the purpose of supplying a military establishment," or in time of war or other emergency in international relations.

One could argue that batteries, critical minerals, etc., have national security relevance, especially given their importance for defense (e.g., rare earth magnets in fighter jet engines, batteries for military vehicles). Also, **energy security can be viewed as part of essential security interests, particularly in the wake of geopolitical tensions**.

The interpretation of XXI has been contentious (recent WTO panels have taken a narrow view in some US–China cases, although the Russia–Ukraine war context provided a new angle). The EU could state that ensuring a secure and diversified supply of cleantech is an essential security interest, not merely an economic one. The presence of an "emergency in international relations" could be invoked given the heightened geopolitical rivalry in technology (some might cite US–China tensions or even the climate emergency plus global power shifts as justification).

Furthermore, the EU can leverage the fact that ***public procurement is largely exempt from WTO disciplines except under GPA commitments***. The EU has GPA commitments but can carefully carve out certain new programs (like if something under the IAA is structured as public procurement or government support, maybe it can exclude GPA coverage for strategic sectors).

The EU could also hope to negotiate bilateral solutions instead of litigation—for example, by coming to an understanding with allies such as the US or Japan that they will not challenge each other's local content measures aimed at China, and China right now might not want to escalate either (though it would be likely to object strongly, at least politically).

In any event, from a strictly legal perspective, an outright LCR or JV requirement that discriminates by origin would violate WTO rules, ***absent a justification*. This does not mean that such a requirement would be impossible to justify**, but it is a risk. The EU could design the measure in a somewhat origin-neutral way—for example, **if more than 50 percent of EU supply of a technology comes from a single third country, then JV requirements kick in for new investments in that sector**.

This bases the JV requirement on a factual threshold rather than naming China explicitly, though de facto, it targets China for most relevant sectors. This is similar to what NZIA did with its >50 percent dependency trigger. That might help argue it is a legitimate public interest measure to prevent single-supplier risk, not arbitrary discrimination.

The EU has also argued in other contexts that climate change measures could fall under Article XX(b) or (g) (for health or conservation)—for example, defending local content by saying it is needed to scale up cleantech for environmental objectives. It would be a novel argument to use the environment to justify industrial policy, but not inconceivable, given the existential nature of decarbonization (ensuring the supply of cleantech might be painted as necessary for protecting life/health from climate change, thus meeting Article XX(b)).

In summary, the legal gap analysis shows that **no existing EU instrument is explicitly designed to mandate EU-majority JVs**. FDI and FSR regimes catch some problematic cases but do not proactively impose a JV structure; merger rules and procurement have only tangential effects. Meanwhile, any new measure must be carefully squared with EU Treaty freedoms and WTO obligations.

Additionally, the "Trojan horse" risk is evident—if one Member State does not cooperate (for example, by offering an open door for Chinese investment with no strings attached to attract jobs), this would undermine the stricter stance taken by others. **That is why an EU-level solution is needed: Otherwise, the weakest link (perhaps a smaller country desperate for investment) could become the entry point for unfettered Chinese control—effectively a Trojan horse inside the single market. A harmonized EU approach** is essential to avoid such internal loopholes.

4 How the EU Can Impose EU-Majority Ownership in Joint Ventures

To bridge the policy gap identified above, the EU needs a dedicated mechanism to require or induce EU-majority ownership and control in JVs with foreign (particularly Chinese) investors in critical cleantech sectors. This section proposes a strategy to do so, centered on EU legal instruments—probably involving the upcoming **Industrial Accelerator Act (IAA), the revision of the FDI screening directive, and the revision of the Public Procurement regulation**—that would set out the JV requirement and its conditions. We then detail the key elements that must accompany such a measure: **asymmetric governance structures to ensure European control, localization of critical functions, Europeanization of management**, integration with existing acts like NZIA/CRMA, use of FDI screening as enforcement, and **harmonization across Member States** to avoid internal loopholes.

4.1. THE MAIN LEGAL VEHICLE: THE INDUSTRIAL ACCELERATOR ACT (IAA)

The IAA, as announced in the Commission's 2025 work program, is a prime candidate for launching this strategy. Its broad aim is to **boost demand for EU-made low-carbon products and support the decarbonization of industry**. This gives it a natural scope to introduce conditions on foreign investments that align with decarbonization and supply-chain resilience.

In fact, the Commission's thinking is already along these lines: The automotive cleantech action plan explicitly mentions developing "conditions for inbound foreign investments"—such as JV requirements and tech licensing—to increase their added value for the EU. Folding a JV

requirement into the IAA would allow it to **apply directly across all Member States** (as a Regulation) and tie into related measures (such as funding programs or procurement criteria for decarbonization projects).

a. Proposed Scope of Application

A JV policy should specify that in certain **"critical net-zero technology sectors,"** any non-EU-controlled investor establishing new significant operations must do so via a JV with an EU-controlled partner holding at least 51 percent of equity (with corresponding voting rights). **The sectors would be likely to mirror those in the NZIA annex** (e.g., batteries, solar PV, wind, heat pumps, electrolyzers, storage, grid tech) and **possibly critical materials processing** (where there is an overlap with the CRMA).

The rule might kick in only for projects above a threshold—for instance, investments above €100 million or production facilities above a certain capacity. This would ensure that it targets major, potentially strategic investments (such as gigafactories, large solar fabs, etc.), not every small start-up investment, thus supporting proportionality.

The regulation would define **"EU-controlled"** using criteria akin to FDI rules—meaning ultimately owned by EU or EEA nationals or entities, with no foreign entity holding dominant influence. Conversely, "non-EU investor" would capture any entity ultimately controlled outside the EU. If a Chinese company tried to route via an EU subsidiary, it would still count as foreign by this definition—closing the circumvention loophole.

This JV requirement can be couched as an *authorization requirement:* that is, any covered investment must receive approval (possibly from the Member State's FDI authority or from the Commission under

the IAA), and **such approval would be conditional on the JV structure**. In effect, it would be a quasi-screening mechanism but with an ***ex ante* structural requirement built in**. Member States would then refuse authorization to, say, a wholly owned Chinese factory in a sensitive sector unless it restructured as a JV with a qualifying European partner.

Importantly, the measure should clearly state the **public interest objectives** to justify overriding internal market freedoms: **"To ensure the security and resilience of EU supply chains in critical net-zero technologies, to safeguard the Union's industrial base and technological leadership, and to prevent undue dependence on third countries in sectors vital to the clean transition."** By enshrining these objectives, the regulation would provide a legal basis that could be weighed against fundamental freedoms, demonstrating necessity and proportionality. It would note that these goals align with EU climate policy (Paris Agreement, European Green Deal) and security (as energy and economic security now blend).

To reinforce proportionality and WTO compatibility, the IAA could include a **reciprocity or country-specific trigger**. One innovative approach that should be mentioned here is to implement the JV mechanism **"in a manner similar to the IMPI Regulation—as countermeasures targeting countries that impose restrictive market access practices on EU companies."**

In practice, the law might say: If a third country mandates JVs or blocks foreign majority ownership in sectors X, Y, and Z, the EU will impose a reciprocal JV requirement on investors from that country in analogous sectors. This would very clearly target China (with its JV rules and unequal openness) and provide a justification rooted in fairness and leveling the field.

Additionally, the IAA JV rule could have review clauses—for example, it could be time-limited or subject to periodic review (perhaps scheduled to sunset in 2035, unless renewed) to show that it is not a permanent protectionist measure but one tied to achieving certain capacity goals. This dynamic aspect would align with the idea that once Europe's industries are strong enough, such heavy-handed measures may no longer be needed (or can be relaxed).

b. Integration with Enforcement Mechanisms

Because the IAA would be an EU regulation, enforcement could partly lie with the European Commission (for instance, it could require notification of covered investments to the Commission). However, primary enforcement would likely rely on **Member State FDI authorities**, since they would be the ones who would actually allow or block an investment.

The IAA could mandate Member States to refuse authorization to a foreign investment in a listed sector unless the JV condition had been fulfilled. This would tie into the revised FDI Screening Regulation, which will make screenings mandatory—one could envision a coordinated process whereby FDI screening checks whether the structure meets the IAA criteria. If not, either it is not approved or the investor is invited to remedy by bringing in a European partner or altering ownership shares.

Alternatively (or additionally), the IAA might empower the Commission to directly review and prohibit an investment that does not meet the JV requirement. However, this might duplicate FDI screening. A more feasible approach would be to **incorporate this into the FDI process—essentially broadening the "security and public order" concept to include the industrial security criterion.**

We should also consider **penalties for noncompliance:** If a foreign investor were to try to circumvent the rule (e.g., by nominally partnering with a shell EU company that is actually foreign-influenced), the regulation should allow for post-investment investigation and unwinding similar to FDI breaches. Companies could be fined or operations suspended if they breach conditions (similar to the FSR's powers to impose fines for non-notification).

Finally, the IAA should link to other tools. For example, **access to EU funding (such as Important Projects of Common European Interest [IPCEIs], or Horizon Europe funds) should be conditioned on respecting the JV rule**. In addition, any JV that is formed in compliance could be given fast-track access to permits or support, whereas a wholly foreign-owned project might face more scrutiny or delay.

4.2. GOVERNANCE ASYMMETRY: ENSURING EFFECTIVE EUROPEAN CONTROL

Requiring an EU-majority stake (51 percent+) is the first step, but by itself it does not guarantee control over strategic decisions or technology—savvy partners can draft shareholder agreements that give disproportionate influence to a minority (through veto rights, etc.), or the EU-majority might be a financial investor without technical involvement. Therefore, **an asymmetrical governance structure favoring the European side must be hardwired into JV arrangements**. This concept of *"gouvernance asymétrique justifiée"*[59] has been proposed as a means to reflect the greater exposure of Europe to strategic risks. In practice, this means that the JV's bylaws and shareholder agreements **should include provisions that secure European decision-making power beyond what the equity split alone would confer**.

[59] *Based on interviews.*

Key mechanisms include the following:

- Qualified Majority for Strategic Decisions: The JV should require that certain fundamental decisions can only be made with a qualified majority that *must include the affirmative vote of the European partner(s)*. Examples of such decisions would include any sale or transfer of key assets, changes to the JV's business scope, offshoring of any production or R&D activity, admission of new investors, or merger/restructuring of the JV. By stipulating that, for example, 75 percent shareholder approval is needed and the European side holds 51 percent, this would effectively give the European partner a blocking right on these strategic matters. This would prevent a scenario in which the foreign 49 percent partner plus perhaps some small ally could gang up to force through something contrary to EU interests. It would also *prevent indirect takeover:* The Chinese side cannot, for instance, push the JV to sell off a critical division to them or another Chinese entity without the European side's consent.

- **Golden Share / Veto Rights on Sensitive Issues:** Building on the above, explicit veto rights should be granted to the European side (or even to a government representative, if inserted) on specific sensitive issues. These matters would include any decision to **relocate or establish any critical operation outside the EU** and any changes to security protocols or access involving sensitive data. Another would be **procurement of certain equipment**—for instance, if the JV wanted to buy critical manufacturing equipment from the Chinese parent, perhaps the European side must consent to ensure that this does not represent a backdoor dependency. By embedding these vetoes, the JV's day-to-day operations can be flexible, but the "crown jewels" cannot be touched unilaterally by the foreign partner. This would be in alignment with the requirements often set by FDI screening authorities—they want assurance that sensitive technology stays under EU control.

- **European-led Committees and Oversight:** The JV's governance can include the creation of a **Strategic Committee composed solely of European representatives**. This committee would have oversight over certain operations and could have the right to review and temporarily suspend decisions for further scrutiny. It could also serve as a liaison with EU authorities—if something were to raise concerns, this European-only body could alert regulators or commission an internal review. This committee should work as an internal guarantor of EU interests, ensuring that technology and skills transfers actually happen and that EU stakeholders have real insight. Such a committee would fulfill this by monitoring training programs, R&D progress, etc., and making sure that commitments are met.

Combining these mechanisms should result in a **preventive governance architecture**. This would mean that the JV is structurally aligned with regulatory expectations (FDI, FSR) from the start, reducing the need for ad hoc fixes later. If done right, this would **avoid irreversible decisions that could undermine European interests** (such as losing IP or moving factories) and create a documented decision trail to show regulators that the JV is behaving responsibly. In essence, the JV would become a sandbox in which any sensitive move can be caught and evaluated before it becomes a problem, increasing the venture's "compliance IQ."

This addresses the FDI screening requirements directly: It should be recalled that any Chinese involvement triggers a review where the Commission and Member States are supposed to ask: *Who really controls the decisions, and where are the critical functions performed?*[60] By designing the JV from inception to have European control and local functions, the partners can more easily obtain clearance and access to

[60] *European Union, "Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 Establishing a Framework for the Screening of Foreign Direct Investments into the Union," Official Journal of the European Union, https://eur-lex.europa.eu/eli/reg/2019/452/oj/eng.*

public support (including subsidies). **In fact, one can imagine making it a selling point—a Chinese firm might be told: If you accept these governance terms, your JV will get faster approval and support, whereas if you insist on controlling everything, you may be blocked or face delays.** This would create an incentive for foreign partners to go along with an asymmetric governance model.

4.3. LOCALIZATION OF CRITICAL FUNCTIONS AND "MANAGEMENT EUROPEANIZATION"

Beyond legal control, the JV strategy must ensure that the **substantive operations and know-how reside in Europe**. This means that key functions such as R&D, engineering design, manufacturing of core components, and operational management should be located and anchored in the EU. If a JV is majority EU-owned, but all the design work is still done in Shanghai, Europe does not gain much. Thus, conditions regarding localization are essential.

Under the NZIA, projects must demonstrate contributions to the EU's industrial base—similarly, a JV should make a commitment that certain **critical functions will be performed within the EU**, for example:

- *Any R&D related to the JV's product must have its primary center in Europe*, perhaps with a certain percentage of R&D staff being based in the EU.

- *Manufacturing of the strategic components* (such as battery cells, not just pack assembly; or the actual solar cells, not just module assembly) should be done in the EU plant. If some parts must be imported, **the JV should have a plan to localize more of them over time** (e.g., by starting out assembling with imported cells but planning to set up cell production locally within three years).

Management Europeanization refers to ensuring the leadership and day-to-day decision-makers of the JV are predominantly European (or at least EU-resident persons accountable under EU law). **This includes setting up the JV's headquarters and executive committee in an EU country**. Also, the majority of the management board or committee should be EU citizens or residents. This is not xenophobia but is a matter of legal and practical accountability: If the top executives live and work in Europe, they are subject to European jurisdiction, they internalize EU regulatory culture, and they are less likely to simply follow foreign parent orders that conflict with EU interests.

This management localization serves multiple objectives:

- **Regulatory compliance and oversight:** The authorities can engage directly with the local management, and these executives can attest that strategic decisions are being made on EU soil in line with EU laws. For FDI and FSR review, being able to show that "the effective decision-making center is in the EU" is crucial. This demonstrates that the JV is not just a nominal shell, while the real decisions are made abroad. The French FDI code, for instance, looks at whether a deal preserves the decision center in France—having European management helps satisfy this requirement.[61]

- **Operational sovereignty:** European-based management can act quickly to implement any emergency measures if needed (for example, if geopolitical events disrupt Chinese supply, an EU-led team will be more inclined and empowered to switch to alternate sources or ramp up EU supply, as opposed to a Beijing-led team that might have conflicting loyalties). Having European-based management would also mean that data and sensitive info about the JV's operations would stay within EU oversight (European managers can

[61] *French Republic, Code Monétaire et Financier, Article R. 151-8 [Monetary and Financial Code Article R. 151-8], Légifrance, April 1, 2020, https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000041461647?utm.*

be held liable if they illegally transfer data abroad, etc., adding a deterrent).

Practically, to enforce this, one could include in the JV the following conditions

- The company's registered and head office must be in an EU Member State;
- The CEO and at least (for example) 60 percent of the executive leadership positions must be held by EU nationals or long-term residents;
- The technical headquarters (like the chief technology officer's team) must be located in the EU;
- And key technical data (blueprints, source code, etc.) must be stored on EU-based servers or facilities.

Some of these might be softer commitments rather than strict legal requirements, but they can be encouraged via FDI approval conditions or state aid conditions, for instance.

4.4. AN INTEGRATED STRATEGY

The JV strategy should not exist in isolation; it should dovetail with the EU's broader industrial policies for cleantech, notably the **Net-Zero Industry Act (NZIA)** and the **Critical Raw Materials Act (CRMA)**, as well as funding initiatives. This integration would serve two purposes: policy coherence (so that JV requirements complement other targets and do not conflict with them) and legal justification (embedding JV rules within the framework of achieving NZIA/CRMA goals strengthens their necessity and proportionality).

Under the NZIA, the EU has a target of 40 percent domestic production for key net-zero technologies by 2030 and measures to curb excessive dependence. **The JV requirement can be seen as a *means to reach that 40 percent target***. By forcing foreign entrants to produce locally with EU partners, every Chinese investment actually contributes to the EU's domestic production statistics (as the JV's output is "made in the EU"). This is a way of harnessing foreign resources to meet NZIA goals. Moreover, NZIA's dependency threshold mechanism (if >65 percent from one country, impose conditions) could be directly linked: **The JV rule might only be activated for countries/technologies where that dependency threshold is exceeded**. Right now, that is basically China in most clean technologies. But if, in the future, for example, one technology is diversified, the rule could be relaxed there—adding nuance.

Another critical integration point concerns state aid rules: The EU has relaxed state aid constraints for cleantech (the Temporary Crisis and Transition Framework, etc.), allowing Member States to subsidize factories in these sectors. **If governments are giving money to a battery plant or solar fab, they can and should condition it on JV structure and governance. The EU could provide guidance that, for instance, any state aid to a project involving a foreign investor *must include conditions ensuring EU-majority ownership and technology-sharing***. In this way, national funds will not inadvertently strengthen a foreign firm's foothold without local benefits.

Using funding carrots, the EU can also strike *industrial partnerships with trusted countries* as a parallel pillar to the JV strategy. For example, **forging alliances** with, for example, India for solar manufacturing or Canada for battery materials—**whereby production in those partner countries might be partly counted as "EU" content ("Made in Europe+")**.

This concept of "EU+" content could be integrated: A JV with a Chinese firm might still need to ensure majority of EU content but

could also incorporate allied-country content. It has been suggested that partial credit be given for non-EU but non-China inputs in certain requirements. That could be operationalized in the NZIA and in JV deals (e.g., a JV could source components from, for example, Japan or the US and count them as equivalent to EU content for meeting local content rules). Legally, that might raise MFN issues—but perhaps it could be done informally or via agreements.

4.5. USE OF FDI SCREENING REMEDIES AND COORDINATION

Even with a new regulation, Member State FDI screening regimes remain a frontline defense and enforcement tool. They will be the ones examining JV proposals and can extract specific **remedies or commitments** to bolster the general rules. For instance, a Member State reviewing a Chinese JV in batteries might approve it **on the condition that the JV devotes a certain minimum budget to R&D in the host country or that it supplies a portion of its output to EU customers first** (this latter could ensure EU market priority).

FDI authorities can also act if an investor tries to skirt the JV rule—for example, if a Chinese firm attempts to claim that a European partner is the majority owner, but in reality, that partner is just a proxy or plans to sell out later. Screening could attach a condition that ***the European partner must retain at least X percent ownership for Y years or that any change in ownership requires new approval*. Essentially, it is possible to use screening to lock in the JV structure.**

Moreover, if a JV does not comply upfront, screening provides a *case-by-case negotiation forum*. It could even become standard that if a non-EU investor proposes a wholly foreign-owned project in a sensitive area, the authorities respond, "We will only clear this if you bring in an EU co-investor with majority ownership and implement governance ABC."

This is currently beyond the text of many FDI laws, but regulators have *de facto* leverage to suggest remedies. Some foreign investors might accept partnering with a European company or fund to smooth the approval process.

However, relying solely on case-by-case remedies is less predictable. This is why it helps to have a clear rule in the IAA. But screening is where enforcement happens deal by deal, so synergy is needed: **the IAA could mandate that screening decisions incorporate its requirements, and vice versa, Member States should refer to the IAA as part of their assessment criteria** ("affecting security or public order" could explicitly include situations in which the foreign investor refuses to partner up or might relocate tech abroad).

Public procurement and FDI screening should work together too: For example, if a Chinese company bypasses JV rules and sets up a factory, it might find itself excluded from public contracts or subsidies (for example, if it does not meet NZIA content rules, it cannot sell into certain subsidized projects). Conversely, if such a company were to comply and enter into a JV, it might be preferred in government contracts (there could be some language to that effect in policy documents, if not in law). FDI screening could coordinate with procurement by notifying the authorities of which companies have compliant structures in place and which do not.

4.6. HARMONIZATION ACROSS MEMBER STATES —AVOIDING THE TROJAN HORSE

As mentioned above, an EU regulation is key to avoiding a scenario whereby one Member State undermines the rest by becoming a soft entry point for foreign control. The Trojan horse scenario is real: **If even one country offers a loophole (like not screening or not applying JV conditions), a Chinese firm can set up there and then operate across**

the single market, nullifying others' stricter stance. For example, if Portugal (hypothetically) did not enforce the JV rule and let a wholly Chinese-owned battery assembly plant flourish, those batteries would freely circulate into the EU market and be recognized as "made in the EU," making it harder to incentivize the JV strategy elsewhere.

Therefore, uniform application via an EU act is needed. Member States must resist the temptation to undercut each other for short-term investment gains. The IAA should have direct effect, ensuring no country can opt out. But beyond the law, political coordination is needed: a common understanding that European industrial strategy is a shared goal.

The regulation could include a clause that **Member States shall not impose lower requirements or conflicting conditions** on covered investments. They can have more restrictive measures if truly justified (some might want 100 percent EU or state involvement in certain strategic projects, which the EU would not forbid domestically as long as it does not violate EU law), but they should not be looser.

It could also establish a **coordination group** (similar to the FDI Screening Coordination Group) to monitor the implementation of the JV rule. National authorities could share information on how they are enforcing it, and the Commission could publish guidance such as examples of acceptable JV agreements and governance (a sort of best practices manual for deals).

Third-country reactions, particularly from allies, should also be considered. What if a US or Japanese investor falls under this rule inadvertently? Ideally, the rule would have a waiver for countries with robust mutual access. Or, in practical terms, one might find that US companies voluntarily partner anyway (or maybe the Commission quietly does not enforce the regulation as stringently for allied investors). **To preserve unity, the EU might clarify that it is open to discussing aligning such measures with G7+ partners so they do not cause friction there**

(although Japan, for example, might welcome the magnet JV approach, as Japanese companies could partner with European ones).

In conclusion, through an EU-level regulation complemented by coordinated national enforcement, Europe can implement a workable system to **impose EU-majority ownership and control in JVs in critical cleantech**. The system would leverage Europe's market (no JV, no easy access, especially to public funding and demand-side measures), align with parallel policies (NZIA and CRMA targets), and embed legal safeguards (justifications and proportionality). It would ensure that Chinese firms can still participate—Europe is not closing the door—but on terms that mitigate risks and create value for Europe (as opposed to the status quo of asymmetry).

5 Sector-Specific Strategy (2026–2035)

A one-size-fits-all approach may not suit every clean technology sector, given the differences in market maturity, Europe's standing, and Chinese involvement. Therefore, the JV and localization strategy should be tailored sector by sector, with phased milestones from 2026 to 2035. Below, we outline strategies for **solar photovoltaics, batteries, wind (and magnets), electrolyzers, heat pumps**, and briefly **carbon capture** as an optional sector. Each sub-section identifies the sector's context (Europe's position vs. China's) and then proposes specific thresholds, JV requirements, local content rules, and timelines for ramping up. The general philosophy is to **start with modest requirements (2026–2027) that signal the new direction and then progressively ratchet up by 2030 and 2035** in line with EU goals (the NZIA 2030 targets and probably enhanced 2040 climate targets). This gradualism would give industry time to adjust and scale up while maintaining pressure on foreign firms to localize.

5.1. SOLAR PHOTOVOLTAICS (PV)

Context: Europe's solar deployment is booming, but manufacturing of solar panels in Europe is minimal, with China currently supplying the vast majority (in 2024, around 95 percent of EU solar panel imports came from China). Europe's dependence when it comes to solar is near total in several segments: wafers, cells, and module assembly. However, Europe has some strengths in inverter electronics and certain new technologies (such as next-gen perovskite cells in the lab stage). The EU's goal under the NZIA is to reach ~30 GW of solar manufacturing by 2030 (40 percent of expected demand)—up from just a few GW today.[62]

[62] *There is a target for "at least 30 GW of operational solar PV manufacturing capacity by 2030 across the full PV value chain" from the European Parliament. See: European Parliament, "Report on the Proposal for a Regulation of the European Parliament and of the Council on Establishing a Framework of Measures for Strengthening Europe's Net-Zero Technology Products Manufacturing Ecosystem (Net Zero Industry Act)" (A-9-2023-0343), November 6, 2023, https://www.europarl.europa.eu/doceo/document/A-9-2023-0343_EN.html.*

Strategy: The EU should pursue a dual track: (1) **Diversification of import sources ("de-risking")** by encouraging allies such as India and Vietnam to supply more and reduce China's share; and (2) Local manufacturing revival via JVs with top-tier Chinese firms and scaling-up of European firms. **A LCR will underpin** this, coupled with JV requirements to capture Chinese investment.

- **JVs with Chinese PV Manufacturers:** Encourage leading Chinese solar companies (e.g., Jinko, Trina and LONGi) to establish cell/module factories in Europe as JVs with European partners (which could be utilities, equipment suppliers, or government-backed entities). These JVs should be EU-majority-owned and commit to localizing at least one critical component of the value chain (for instance, **inverters or mounting systems entirely made in the EU**, or cell assembly in EU using imported wafers initially). Inverters are mentioned because Europe has capabilities there—requiring EU-made inverters in Chinese panel systems is a quick win to add EU content. A JV might, for example, produce modules in Europe with Chinese cells but integrate EU-made inverters and framing, which would already boost the made-in-the-EU content.

- **Targets and Thresholds:** Set a modest starting target—by **2026, at least 1 percent of solar PV components installed in the EU (by value) should be made in the EU**. This essentially signals a beginning—requiring perhaps that utility-scale projects include a token EU-made portion. Then ramp it up—by **2030, aim for 10 percent of the value of PV systems installed in the EU to be EU-made**. This 10 percent could include modules, inverters, etc. This is an achievable yet meaningful step from close to 0 percent today. Also, **a cap should be implemented whereby no more than 60 percent of any major PV system component should come from any single foreign country (in particular, China)**. In practice, since China now supplies ~80–90 percent of components in PV systems manufactured in Europe, this cap would force diversification

or local production. It is similar to the NZIA's procurement clause (50 percent maximum) but could perhaps start at 60 percent for market-wide rules to be slightly softer initially.

- **Public Procurement and Subsidy Conditions:** Leverage public tenders for solar (e.g., large solar farm auctions, capacity tenders under renewable energy support schemes) by reserving them for bids that meet "EU or EU+ content" criteria. For instance, **any project receiving public subsidies or benefiting from feed-in tariffs must use at least, for example, 10 percent EU-made equipment by 2028**. In addition, Europe's upcoming Solar Photovoltaic Industry Alliance[63] and funding through the Innovation Fund can prioritize consortia that include JVs. Essentially, **government support should be tied to local manufacturing** so that Chinese companies have an incentive to enter into JVs if they want to benefit from these sources of funding.

- **Timeline: Starting in 2026**, introduce a minimal local content rule (1 percent) to get the principle established. That could even mean something like a requirement for all projects to include at least one EU-manufactured component (like some panels from EU factories, even if just a small share). This would be symbolic, but it would set compliance mechanisms in motion. Increase that to **5 percent by 2028** and **10 percent by 2030**, contingent on Europe's ramp-up. Post-2030, assess industry progress: If Europe's manufacturing has scaled up significantly (e.g., approaching the 30–40 GW capacity mark), one could envisage upping the requirement to **20 percent by 2035**. However, if domestic capacity remains limited, the EU might rely more on the "EU+" approach—counting imports from India, the US, etc., partially. The idea is not autarky but resilience, so having no single country with over 50 percent share by 2030 is

[63] *European Commission, "European Solar Photovoltaic Industry Alliance," in Internal Market, Industry, Entrepreneurship and SMEs, https://single-market-economy.ec.europa.eu/industry/industrial-alliances/european-solar-photovoltaic-industry-alliance_en.*

a key milestone. By 2035, China's share should be below 50 percent of the EU's PV supply, replaced by a mix of EU production (maybe 15–20 percent) and diverse imports (Southeast Asia, etc.).

During this ramping-up period, JVs could serve as vehicles to meet these targets. For example, by 2028, a Sino-European JV could be producing 5 GW of modules in Europe, which might cover ~10 percent of the EU's needed annual installations if it wants to stay on track for the 2030 target[64]—hitting the target and providing competition to Chinese imports. The JV requirement ensures those factories involve European stakeholders and tech.

Expected Outcomes: By 2030, Europe will regain at least a foothold in solar manufacturing, with a few large JV-driven factories making cells and modules within the EU. Chinese partners contribute efficiency and scale, but Europe holds majority ownership, keeping technical knowledge and decision-making power in-house. The cost gap for EU-made panels, which today is ~20–35 percent higher, should diminish as scale and automation improve. Reports indicate that at the gigawatt scale with advanced technologies, EU utility-scale solar installations cost around €0.608/W, compared to €0.50/W for an equivalent Chinese system, translating into a levelized cost of electricity (LCOE) that is 14.5 percent higher for European-made modules.[65] Some cost

[64] *The Solar Energy Strategy is part of the EU's RepowerEU plan to phase out Russian fossil fuels and accelerate the green transition in response to Russia's invasion of Ukraine. According to the European Commission, solar energy has the potential to become part of the mainstream energy system by providing power and heat to households and industry. The strategy puts forward a target of over 320 GW of newly installed solar photovoltaic capacity by 2025 and almost 600 GW by 2030. Considering that the EU needs to install 50–60 GW per year to stay on track for the 2030 target, 5 GW, equivalent to 10 percent of the EU's annual installation volume, is the target level to be achieved. See: European Commission, "Questions and Answers on Emergency Measures to Accelerate the Deployment of Renewable Energy," Press Corner, https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_6658; European Parliament, EU Solar Energy Strategy in "A European Green Deal," 2025; European Parliament, "EU Solar Energy Strategy," Legislative Train Schedule, https://www.europarl.europa.eu/legislative-train/package-repowereu-plan/file-eu-solar-strategy.*

[65] *Peter Jowett, "EU Policies Could Cut Cost Gap Between European and Chinese Solar Modules," PV Magazine International, September 25, 2025, https://www.pv-magazine.com/2025/09/25/policy-changes-can-reduce-cost-gap-between-european-chinese-solar-modules/.*

increases in projects (a few percent on LCOE) will occur but should be considered manageable for the sake of supply security. Meanwhile, Europe reduces the risk of total import disruption and fosters innovation (for example, tandem or perovskite cells potentially developed in EU labs and scaled via these JVs). Public acceptance might also grow seeing jobs and factories return, justifying the policy costs.

5.2. BATTERIES

Context: Batteries are the linchpin of electric mobility and energy storage. Europe's demand for lithium-ion batteries is skyrocketing with EV adoption. The EU has many announced battery plants (some domestic, many foreign-led) but remains behind Asia. China dominates production of LFP batteries, a cost-effective chemistry popular for standard-range EVs and storage, controlling virtually all LFP cathode material supply. European industry has focused more on NMC (nickel-rich) chemistries with higher energy density, but Chinese firms are encroaching there, too. Chinese companies such as CATL, BYD, and CALB are actively building or planning factories in the EU, as noted. **The EU's target under NZIA is to be capable of *manufacturing 550 GWh of batteries by 2030 (40 percent of what is needed)*, which actually seems low, given that industry plans already exceed that—meaning it is likely that this target will be surpassed or raised**.[66]

However, the quality of that "EU manufacturing" matters—if it is mostly Chinese-owned, the strategic risk persists (as Section III shows, 90 percent of current EU battery output is Asian-made[67]). So the aim is not just gigawatt-hours but European *control and content*.

[66] *European Union, "Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on Establishing a Framework of Measures for Strengthening Europe's Net-Zero Technology Manufacturing Ecosystem and Amending Regulation (EU) 2018/1724," Official Journal of the European Union, https://eur-lex.europa.eu/eli/reg/2024/1735/oj/eng.*

[67] *Joseph Dellatte, Cleantech: Reducing Europe's Strategic Dependence on China.*

Strategy: For batteries, especially LFP where China leads, the EU should **favor maximum European content at each step of the value chain**. The policy will push Chinese battery makers to partner with European firms (automakers, chemical companies, etc.), ensuring technology transfer and localizing not just assembly but also materials production over time. A phased LCR will apply to EV batteries, and JV mandates will enforce EU-majority ownership in new battery plants.

- **JVs in Cell Production:** Chinese cell manufacturers entering Europe (e.g., CATL's new plants, BYD rumored plant) must do so via JVs with European stakeholders—which could be automakers (like Stellantis in the CATL case) or consortia of companies and public actors. **These JVs should start by immediately localizing the later-stage manufacturing (cell assembly) and gradually move upstream to materials (cathode, anode)**. For example, in 2026–27, a JV might import cathode and anode materials but do cell assembly and pack assembly in Europe; by 2030, it begins producing some cathode material in Europe too.

- **Local Content Phases:**
  - **By 2026**, require that at least **20 percent of the battery value in any new EV sold in Europe be made in the EU**. This could be met by having either the cells or the pack integration and some components produced in the EU. Initially, the assembly of battery packs or modules in Europe (even if cells are imported) might be counted. Many European-made EVs could already meet ~20 percent if they assemble packs locally.
  - **By 2030**, raise this to **50 percent EU content in batteries**. This means at least half of the value (cells, key materials) must come from EU or "EU+" sources. Achieving 50 percent will probably require local cell production and partial material production (such as CAM—cathode active material).
  - **By 2035**, aim for **near 100 percent (hypothetically, 85–100 percent) EU+ content** in batteries for EU-made vehicles.

By then, Europe should ideally have complete supply chains for its EV sector (this aligns with climate goals of fully decarbonizing vehicle production by 2035, which would ring hollow if Europe is still completely reliant on Chinese imports).

These targets apply to the EV supply chain and possibly stationary storage that receives public support.

Value Chain Localization Sequence:

- Start with **pack assembly and cell assembly** (easiest to localize, more labor, less IP intensive).
- Then, **CAM (cathode active material) and precursors (pre-CAM) should be required** to be localized gradually. For instance, by **2026, JV plants must at least do cell assembly and CAM mixing in Europe**.
- **By 2027–28, require that they produce or source a portion of electrolyte, anode, cathode from EU/ally sources** (maybe 10–20 percent local at the start).
- **By 2030, at least 50 percent of electrolyte, cathode, anode, and separator by weight should be EU-made**. This pushes JVs to either establish those material facilities or partner with European materials firms (e.g., BASF has a cathode JV, Umicore, building cathode plants—these should be integrated into supply chains).

The timeline given in the policy drafts suggests these targets: **2026–2030: assembly + CAM/pre-CAM made in EU required; 2027–2030: reach 50 percent of electrolyte, cathode, anode, separator made in EU+**.

- **Procurement and Market Access Levers:** The EU and national governments should **reserve public procurement and subsidy programs for batteries/EVs to those meeting EU content rules**. For example, if a government is subsidizing an electric bus fleet or

doing a social leasing program for EVs (which France and potentially the EU level consider), it should mandate that only vehicles with EU-made batteries qualify. The "social leasing" idea in Europe to provide affordable EVs could stipulate a percentage of battery content that must be from EU sources to support local industry. Similarly, any EU funding for battery manufacturing (e.g., through IPCEI or Recovery funds) should require the output to be primarily for the EU market and to contain local content.

Expected Outcomes: By enforcing JV majority ownership and these content rules, Europe's battery sector is likely to consist of a mix of European-led consortia (Verkor, ACC) covering a chunk of production; Sino-European JVs (CATL–Stellantis, Volkswagen–Gotion, probably BYD with perhaps a European OEM, etc.) covering another chunk; and Korean or other foreign plants, which by then might also localize due to similar pressures. Crucially, thanks to the JV strategy, European companies and workers will be deeply involved in each of those ventures. Skills and IP that come from Chinese technology (such as LFP chemistry manufacturing know-how) will partially reside in Europe through the JV. Over time, this can enable Europe to develop its own next-gen battery tech (solid state, etc.) without starting from zero.

There will be initial cost impacts: today, China's manufacturing cost for battery packs is 40 percent cheaper than the EU's,[68] though large-scale plants and lower energy prices in the EU can narrow that. Even so, requiring, for example, 50 percent EU content by value in 2030 might increase EV battery cost by roughly 10–20 percent. This could translate to a few percentage points on an EV's price or a slight reduction in driving range if some cheaper components are swapped for local ones. However, these costs are expected to fall as learning and scale kick in (the "learning curve" argument—short-term cost for long-term competitiveness). Also, friend-shoring can mitigate the premium; for

[68] *Trakimavičius, "Going green without China?"*

example, if not all content is from the EU, some can come from Japan or Korea at moderate cost to avoid depending solely on high-cost local supply. Ultimately, by 2035, European battery JVs might be cost-competitive on a global scale, meaning the protective requirements could be eased without risking collapse because by then Europe would have an entrenched industry.

5.3. WIND TURBINES AND PERMANENT MAGNETS

Context: Europe's wind industry is relatively strong with domestic OEMs, but it **faces intense pressure on costs and a dependency on permanent magnets from China for certain turbine types** (especially offshore turbines with direct-drive generators). China also has its own large wind OEMs that can compete abroad. The Critical Raw Materials Act highlights neodymium (for magnets) as a key vulnerability.[69] Currently, Chinese companies have not captured the European wind turbine market, but their components (magnets) are deeply embedded in it. European turbine makers have struggled financially due to price competition (not directly from China yet but low auction prices and some Chinese bids in global markets).

Strategy: Focus on the critical weak link**—NdFeB magnets—**ensuring that Europe develops non-Chinese sources. **This means either attracting Japanese or Western magnet producers to Europe or forcing Chinese magnet suppliers to produce in Europe via JVs** (although it might be preferable to diversify away from Chinese sources entirely for magnets). The JV strategy here is less about turbine assembly (which is already done by EU firms) and more about the **supply chain: magnets and other rare earth components**. Also, continue to keep Chinese turbine OEMs out for the most part unless they partner meaningfully with EU firms.

[69] *European Commission, "Regulation (EU) 2024/1252."*

- **Permanent Magnet Production:** Aim to apply NZIA's dependency thresholds specifically to magnets: If >50 percent of the EU's turbine magnets come from China (currently >90 percent), then by regulation, *magnets used in EU wind turbines must gradually incorporate a European-made share*. For example, **by 2026, at least 10 percent of the magnet content (by weight) in any new wind turbine installed in Europe should be sourced from EU or non-Chinese producers**. Increase to **25 percent by 2030** and **40 percent by 2035**. Achieving this would require establishing magnet factories in Europe (perhaps via JVs with Japanese firms such as Hitachi, or with Australian companies using rare earths from allied countries).

- **JVs for Magnets:** Encourage or require JVs between European material companies and foreign—ideally non-Chinese but also including Chinese—magnet experts to set up production in Europe. If Chinese magnet makers (such as JL MAG or others) want to supply the EU, insist that they do so via a JV with EU metallurgy firms or government involvement, and that the JV has EU-majority ownership. However, given security concerns, the preference might be to team up with Japanese or Korean firms—**the strategy is explicitly to favor non-Chinese JVs and investment in permanent magnet production (especially Japanese and Korean companies)**. Therefore, for Chinese magnet companies, there may be even stricter oversight or exclusion in favor of allied companies.

- **Procurement Conditions:** Public tenders for offshore wind (which are huge and often government-run) can stipulate magnet sourcing criteria. For instance, an auction for an offshore wind farm might require that by the time of commissioning (say 2030), a certain percentage of the turbine magnet mass is non-Chinese. This pressures developers and OEMs to invest in alternative supplies. **Some OEMs** are already exploring *magnet recycling in Europe*, which could count toward EU content.

- **Timeline:**
  - **2026–2027:** Start implementing the **magnet content rule at 10 percent**. Possibly initial demonstration: An offshore project might voluntarily incorporate European magnet prototypes to meet it.
  - **2028–2030:** Magnet factories begin production in Europe (some EU projects underway, e.g., *Less Common Metals* expansion in the UK[70]). The requirement **increases to 25 percent by 2030**.
  - **2030–2035:** If Chinese companies have not come into magnets via JVs, by 2035 Europe is likely to have partnerships with Japan/Australia for supply, making achieving 40 percent by 2035 feasible. Ideally, by 2035, a significant portion of magnet needs will be met by EU or allied producers, with the remainder perhaps still imported from China, but at least those Chinese magnets could be assembled into rotor components in the EU if JV deals force it.

- **Wind Turbine Assembly JVs:** The EU may not need Chinese JVs for turbine assembly, since European companies are the leaders in this area. In fact, keeping Chinese OEMs at bay might be the strategy unless they propose building factories in Europe. If a Chinese OEM such as Mingyang wants to set up in the EU, insist on a JV with a European firm (maybe a JV with a local developer or supplier) and limit them to ensure they do knowledge-sharing (for example, on blade manufacturing). However, the biggest benefit from China in the wind sector might be its cost-effective manufacturing of less critical parts—which could be imported anyway. Therefore, the focus should remain on magnets.

Expected Outcomes: By 2030, Europe should have reduced the share of Chinese magnets in its new turbines, perhaps with one or two magnet

[70] *Less Common Metals, "UK RE Magnet Base," Project Profile, https://lesscommonmetals.com/projects/uk-re-magnet-base/.*

production facilities on EU soil (with supply of rare earth feedstock from, for example, Australia, or local recycling). This will significantly improve resilience, because a vulnerability was that China could choke magnet supply (similar to how it restricted gallium/germanium in 2023, or twelve rare earth metals in 2025[71]). Economically, using non-Chinese magnets might raise turbine costs slightly (Chinese magnets are currently the cheapest). Studies suggest that Chinese turbines are overall 30–40 percent cheaper, partly due to magnet cost advantages.[72] If magnets cost more, it may add a few percent to turbine cost, eventually trickling to LCOE, which could be a couple of percent higher. However, given that wind is already one of the cheapest sources, a 2–3 percent LCOE increase is not catastrophic if it ensures supply security. Over time, a domestic magnet industry can innovate (e.g., develop magnets needing less rare dysprosium, etc.), which could bring global benefits.

5.4. HYDROGEN ELECTROLYZERS

Context: As discussed above, Europe is in a decent position in electrolyzer technology, but there is a looming threat from low-cost Chinese producers. The goal is to scale up EU electrolyzer production for domestic hydrogen needs. If Chinese suppliers were to flood the market with cheap alkaline electrolyzers, EU firms would suffer (as the solar industry did earlier). However, heavy-handed LCRs might raise the cost of green hydrogen at a moment when it needs to become competitive. **Therefore, a nuanced approach is needed—likely *not a strict threshold approach initially* but targeted requirements on the most crucial component (membranes) and proactive industry support to ensure EU production**.

[71] *Shamim Sharmin, "China Tightens Export Controls on Rare-Earth Metals: Why This Matters," Al Jazeera, October 10, 2025, https://www.aljazeera.com/news/2025/10/10/china-tightens-export-controls-on-rare-earth-metals-why-this-matters.*

[72] *Andrea Scassola, "Chinese OEMs in the European Wind Market: Cost Advantage Meets Credibility Gaps," Rystad Energy, April 22, 2025, https://www.rystadenergy.com/insights/chinese-oems-in-the-european-wind-market-cost-advantage-meets-credibility-gaps.*

Strategy: Instead of an immediate large local content percentage on entire electrolyzers, impose a requirement focusing on the **electrolytic membrane and perhaps catalysts** for subsidized projects. Ensure that as the hydrogen market grows, Europe retains leadership in membrane and stack know-how.

- **Membrane Localization Clause:** For any hydrogen project that receives public support (which most will via Hydrogen Bank auctions, IPCEI, etc.), require that the **membranes used in the electrolyzers be made in Europe or by trusted partners** from a certain date. For example, starting **in 2026, at least some percentage (e.g., 20 percent) of membranes in a subsidized project must be sourced from an EU producer**—given that Solvay and a few others already exist, this will direct demand to them. Then gradually raise that requirement—maybe to **50 percent by 2030** and **100 percent by 2035**—for supported projects. This will push Chinese electrolyzer OEMs to either source EU membranes (if they want to bid into EU projects) or partner to produce membranes locally.

- **JVs if needed:** If Chinese electrolyzer manufacturers—for example, a major alkaline player—want to open assembly operations in the EU, that should be allowed via a JV with EU-majority—but at present, Europe's own companies can cover demand, so it may not be desirable to actively encourage Chinese JVs unless they bring something novel. **More relevant might be JVs for localization of machinery**, for example, if the best coating machines for membranes are Japanese.

- **Long Timeline:** Recognizing hydrogen rollout is slower, allowing a longer timeline up to ~2040 to guarantee a diversified value chain. This implies being gentle early to avoid stifling the nascent market:
  - **2026–2030:** A moderate requirement (10-20 percent) like "if Chinese stacks are used, the project must have some EU content or require a license from an EU partner."
  - **2030–2035:** Ramp up local manufacturing as EU players scale up.

- **By 2035 or 2040:** An expectation that the majority of electrolyzer value (especially core stack components) will be "EU+ -made."

- **No Blanket LCR Yet:** Avoid a broad LCR on all electrolyzer purchases in the late 2020s, which could impede cheap, clean hydrogen. Instead, combine the membrane rule with robust **industrial policy support** for EU manufacturers (subsidies, guaranteed offtake via Hydrogen Bank that favors EU products to an extent). In parallel, use trade instruments if needed—for example, if evidence arises of Chinese dumping or huge subsidies, the EU can launch anti-subsidy cases or apply the Foreign Subsidies Regulation to Chinese bids on EU hydrogen projects (ensuring they are not distortive).

Expected Outcomes: Europe stays competitive in electrolyzers, with companies such as ITM, Nel, and Sunfire scaling up. If Chinese players try to enter, they are likely to do so by partnering or establishing local assembly to meet the specific requirements (for example, to meet the membrane rule, they might buy membranes from Solvay, which indirectly benefits EU industry). By 2030, Europe's electrolyzer deployment should not be overly reliant on China; EU firms are expected to supply a large share, while the remainder is diversified (some from China, some from Japan, etc.). Chinese low-cost units may complement but not dominate, and the EU's rule would ensure that even when using Chinese units, critical parts such as membranes and catalysts would still involve EU production, preserving technical know-how.

5.5 HEAT PUMPS

Context: Heat pumps are crucial for decarbonizing heating. Europe has a robust heat pump industry (with major players such as Bosch, Vaillant, and NIBE), partly because of Korean and Japanese investors (such as Daikin, LG Electronics, Mitsubishi, Panasonic), and also because it imports some (including cheaper models from China). China's home

market for heat pumps is nascent and growing fast, but Chinese manufacturers (such as Midea and Haier) often produce units at lower cost and aim to export more to Europe. There is concern that if Europe massively scales heat pump demand after ETS2, Chinese suppliers might try to capture the low end of the market with cheaper offerings. According to the data, EU production costs are significantly higher—possibly up to 1.7–2.5 times Chinese costs.[73] So Chinese heat pumps could undercut EU ones by maybe 40–60 percent at the factory gate. That is an enormous difference that could tempt consumers. The EU wants to ramp up heat pump installs (60 million additional heat pumps between 2023 and 2030 under REPowerEU[74]), so ensuring a strong EU manufacturing base is also a priority task.

Strategy: While heat pumps were not explicitly addressed in the earlier outline compared to others, they are within NZIA's net-zero tech list. The strategy here might be to use a lighter-touch JV requirement (if Chinese firms invest) and to leverage standards and quality to favor EU production (the EU could set efficiency or refrigerant rules, which EU firms excel at meeting).

- If a big Chinese HVAC company wanted to set up a heat pump factory in Europe (there are no major cases yet, although Midea has done JVs in Italy's AC sector in the past[75]), require a JV with an EU partner or an acquisition of an existing EU manufacturer with government oversight. In essence, do not allow a pure greenfield fully Chinese plant to capture the market.

[73] *International Energy Agency (IEA), "Is a Turnaround in Sight for Heat Pump Markets?—Analysis," IEA Commentary, February 7, 2025, https://www.iea.org/commentaries/is-a-turnaround-in-sight-for-heat-pump-markets.*

[74] *European Heat Pump Association, "Europe Can Meet REPowerEU Heat Pump Target If Barriers Are Tackled," press release, June 19, 2023, https://ehpa.org/news-and-resources/press-releases/europe-to-add-over-43-million-heat-pumps-by-2030-providing-heat-to-half-its-buildings.*

[75] *Qiu Quanlin, "Midea to Acquire 80% Stake in Italy's Clivet," China Daily, June 24, 2016, https://www.chinadaily.com.cn/business/2016-06/24/content_25844593.htm; Midea, "Groundbreaking! Midea's New European Base in Italy," Midea.com, 2022, https://mbt.midea.com/global/news/groundbreaking--midea-s-new-european-base-in-italy; Cool & Comfort, "Midea Finalise l'Acquisition d'Arbonia Climate," Cool and Comfort, 2025, https://www.coolandcomfort.be/fr/actualites/item/1545/midea-finalis e-lracquisition-drarbonia-climate.*

- **Possibly include heat pumps in procurement rules:** For example, any publicly funded building renovation using heat pumps must use EU+ LCR or at least non-subsidized equipment. However, since private homeowners are buyers, a direct content rule is tricky (there's no single procurement to attach it to). Instead, incentives (subsidies) for heat pump installation should be higher for EU-made units or conditional on some local content.

5.6. CARBON CAPTURE UTILIZATION AND STORAGE (CCUS)—OPTIONAL

Context: CCUS is less of a "manufactured cleantech" and more of an industrial service (building CO_2 capture units, pipelines, etc.). However, certain types of equipment such as CO_2 compressors or membranes are increasingly becoming an industry. China has some cheaper reported CCS installations, although the numbers vary substantially (some sources claim that China's CCS cost is an order of magnitude lower, but that might be due to different accounting or project types[76]). It is a nascent field, and global collaboration might be valuable. Europe might not want to enforce JVs in this area yet, as it is more important to just get CCS working where needed.

Possible Strategy: If a Chinese state-owned company wanted to build a CCS facility in the EU, treat it like others—with screening and perhaps a preference for local contractors. Possibly include CCUS equipment in the IAA's scope to future-proof (so that, if it becomes a commodity tech, foreign investments in it would also be subject to JV rule). But for now, this sector is unlikely a priority for JV enforcement.

[76] *"China's Low-Cost Carbon Capture Puts Pressure on Europe's Struggling Power Sector," Energy Institute, October 15, 2025, https://knowledge.energyinst.org/new-energy-world/article?id=139906.*

Wrap-up of Sector Strategies

Each sector plan fits into the broader timeline of 2026–2035, where the early years set up frameworks and modest requirements, and the later years escalate toward strategic autonomy goals. By 2035, if all goes well, Europe will have the following:

- A **solar manufacturing revival** in partnership with (but not controlled by) Chinese tech—meeting at least 10 percent of its own module needs and otherwise diversified.
- A **battery industry** that is largely localized with significant European control, no longer massively dependent on Chinese imports, covering EV demand with domestic or friendly supply by the EV transition's completion.
- A **wind supply chain** fortified by domestic magnet production and allied sources, ensuring that wind expansion is not hostage to Chinese rare earth policies.
- A **hydrogen electrolyzer sector** thriving on European innovation, with foreign contributions but under frameworks that keep the core tech (membranes, catalysts, etc.) anchored in Europe.
- **Heat pump and other cleantech** sectors dominated by European firms, with any foreign participation happening through cooperative structures rather than wipe-out-type competition.

Implementing a JV strategy for critical cleantech in Europe will require concerted action at multiple governance levels—the EU institutions, Member State governments, and industry stakeholders. This section concentrates on comprehensive recommendations, structured by **EU-level initiatives, Member State actions**, overarching **industrial strategy measures**, and a proposed **roadmap for 2026-2035**. These recommendations aim to operationalize the analysis above, ensuring that the policy is effective, balanced, and adaptable over time.

EU-LEVEL RECOMMENDATIONS

Recommendation 1

Enact the Industry Accelerator Act with JV Provisions.

The European Commission and Council should prioritize the adoption of the **IAA regulation** by 2026, explicitly incorporating the JV requirement for foreign investments in the defined strategic sectors. The Act should define the sectors (batteries, solar PV, wind components, electrolyzers, etc.), threshold sizes, and the requirement for EU-majority control for new ventures. It should articulate the public interest rationale (supply security, climate objectives, reciprocity) and include language to fend off legal challenges, invoking Article 45 TFEU exceptions and WTO security/environment exceptions as needed. The regulation must also **coordinate with the revised FDI Screening Regulation**—by making use of an FDI authorization contingent on meeting IAA's JV criteria. Essentially, **the JV rule should be made an integral part of the EU's single-market rulebook for industries of the future**.

Recommendation 2

Issue Guidance on Governance Standards for JVs.

The Commission, via DG GROW, should publish detailed guidance or a code of practice for **"Strategic JVs."** This would elaborate on governance best practices—for example, the need for European veto rights, local management, and local content clauses in JV contracts. It could draw on what is outlined in this paper: requiring qualified majority votes for strategic decisions, European-only committees, location of HQs in the EU, etc. This guidance will help companies structuring JVs to know what will satisfy regulators. It also ensures consistency—that is, all JVs should be held to similar standards. The guidance can be non-binding but linked to positive incentives (for example, you get easier regulatory clearance if you follow it).

Recommendation 3

Align Funding and Incentives with the JV Strategy.

The EU should use its financial tools to reinforce the desired outcomes:

- Under the **European Sovereignty Fund** or other proposed funding vehicles, allocate support to projects that involve European-led JVs in cleantech.
- In programs such as Horizon Europe or the Innovation Fund, attach conditions that any pilot/demo projects involving foreign firms have a plan for EU-majority ownership in the commercialization phase or at least significant EU IP ownership.
- Use the **Important Projects of Common European Interest (IPCEI)** mechanism (such as the battery IPCEI) to foster consortia

that include European firms absorbing foreign tech. For example, a second IPCEI on solar manufacturing could explicitly invite Chinese partner involvement *only if* structured as JVs with EU firms and under EU control.

- Enhance **state aid guidelines** to allow Member States to preferentially support JV projects that meet European ownership criteria. For example, approving higher aid intensities for a battery factory that is an EU-majority JV, as opposed to a foreign-owned one—this would nudge companies to choose a JV route to benefit from subsidies.

Recommendation 4

Trade Policy and WTO Stance.

The EU should prepare the ground internationally for these measures. This means being ready to defend them in the WTO if challenged by framing them under exceptions. It **should also proactively negotiate with its allies in the following ways:**

- **Seek an understanding with India, Japan, South Korea and the US**, etc., via the Trade and Technology Councils or G7 that these measures are about ***common resilience against non-market economies*** so they will not dispute them. Possibly even carve out mutual exemptions (e.g., treat each other's content partly as domestic or allow a JV requirement waiver for trusted partner investors).
- **Update the EU's notification to the WTO of industrial policies** to be transparent on this approach, **linking it to climate and security rationale**. If diplomatic, the EU might avoid formal disputes—especially as the global mood has shifted toward tolerating more industrial policy for cleantech.

- Keep the **Foreign Subsidies Regulation** enforcement pressure—ensure that any Chinese firm benefiting from big state support (including energy cost subsidies) is scrutinized if it attempts acquisitions or bids. This complements the JV rule by making non-JV (fully foreign) acquisitions less attractive due to FSR delays/risks, indirectly pushing them to opt for a JV structure, which might alleviate some FSR issues (since JVs have their own EU revenue, etc.).

Recommendation 5

Monitor and Adjust Mechanisms ("Adaptive Governance").

The Commission should set up a monitoring framework to track the impact of these policies on investments, cost of cleantech, and deployment:

- Establish annual or biannual **Strategic Cleantech Investment Reviews**, similar to the FDI annual report, evaluating how many JVs have been formed, how much capacity is built, and what share of market is EU vs. foreign.[77]
- Track cost trends: **If local content policies are causing undue cost spikes or deployment lags, be ready to fine-tune**. For instance, if by 2028 solar deployment slowed because of supply bottlenecks, maybe temporarily allow more imports while capacity catches up, or vice versa—if costs are manageable, maybe accelerate the content increase. As previously noted, ***"monitor and adjust"* is key:** It is important to watch metrics such as €/W for solar, €/kWh for battery in EU vs. China and adapt policy if needed.

[77] *Zadeh, "China–EU Trade Talks: Market Access and EV Disputes Intensify."*

- Include industry and stakeholder input in this monitoring (a forum or observatory with companies, trade unions, and consumer reps) to gauge effects. This will ensure the policy remains **proportionate and justified**, which is important both legally and economically.

Recommendation 6

Strengthen Protective Clauses in Public Procurement and EU Projects.

As immediate measures, even before the IAA fully kicks in, the Commission can encourage Member States to use the following existing flexibilities:

- The NZIA clauses on procurement (for >50 percent from one country triggers) should be swiftly implemented in all relevant tenders.
- The Commission can issue guidance to contracting authorities on how to include those in calls.
- **Apply the *International Procurement Instrument* if needed:** For example, consider using IPI measures if China does not reciprocate market access. This could allow the EU to effectively penalize Chinese suppliers in large public projects (such as public rail or grid projects) until they partner with locals or localize production.
- EU-funded projects (such as Connecting Europe Facility, or structural funds for energy, etc.) **require grant recipients to give preference to EU-produced equipment when available** (within what's legally allowed).

Recommendation 7
Enhance Cooperation with Like-Minded Partners.

Develop industrial partnerships outside the EU to complement the JV strategy:

- Implement the concept of **"Made in Europe +"**—negotiate agreements with countries such as **Australia, Canada, India, Japan, South Korea, and the US** that, if they supply components to the EU meeting certain standards, those will count toward EU local content quotas or be exempted from certain restrictions. This would foster a diversified supply-chain network. For example, if Indian solar panels are only 10 percent more expensive than Chinese ones, create a framework whereby EU importers can count Indian panels as partially local (maybe not fully local, but giving them a leg up via tariff preferences or in procurement scoring). This will diversify sources and reduce cost impact, as recommended (friend-shoring to obtain middle-ground cost security).
- On raw materials, use the CRMA's partnerships to ensure that any non-EU critical raw input we rely on comes from trusted sources (e.g., lithium from Australia rather than China). Sign raw material partnership MoUs with specific output earmarks for EU use.
- Launch joint R&D initiatives (such as EU–Japan on magnets and EU–US on next-gen batteries) that, by design, share benefits among participants. If IP arises, ensure that EU entities co-own it. That mitigates a scenario in which we exclude all foreign collaboration—we still collaborate, but with clear rules that the EU gets equal benefits.

MEMBER STATE–LEVEL RECOMMENDATIONS

Recommendation 1

Implement and Enforce Ex Ante Screening Diligently.

Member State governments must rigorously apply the updated FDI screening rules to **all relevant JV and greenfield investments**. Even before EU law mandates it, national authorities (especially those with established screening mechanisms like France, Germany, and Italy) should *voluntarily cover greenfield* JVs in their reviews. In practice, when a Chinese investor proposes a new plant, they should treat it as though it were an acquisition. Authorities should make clear to investors that proposals aligning with the EU JV strategy (that is, including a strong EU partner and safeguards) will get smoother approval. Conversely, a plan to go solo may be flagged and delayed or even rejected if it touches sensitive technologies. Essentially, **screening should be used as leverage to negotiate JVs or conditions**. Member States should also coordinate with each other, sharing information if an investor rejected in one country tries another (to prevent the "forum-shopping" Trojan horse scenario).

Recommendation 2

Use Golden Shares and National Controls where needed.

Member States can complement EU measures by employing their national tools. For extremely sensitive JVs (perhaps in defense-related high-tech or critical infrastructure), governments can take **golden shares or**

observer roles. Some countries (France and Italy) already use special shares or board observers in strategic companies to veto undesirable moves. This can be extended to strategic JVs—for example, if a JV is building a big battery plant that is considered critical, the government might negotiate an observer seat to ensure compliance with commitments (such as technology not being offshored, or most skilled employees being sent from abroad). National authorities can also ensure that **exit clauses** are in place: If the European partner in a JV wants to sell out, that sale would trigger a new screening approval, preventing the Chinese side from quietly gaining the majority later. Using such measures ensures continuity of control.

Recommendation 3

Align State Aid and Subsidies with EU Objectives.

When Member States give incentives (tax breaks, grants, infrastructure support) for cleantech investments, they should attach the following strings reflecting this strategy:

- Require **local R&D or supplier development** as part of the deal. If a Chinese JV comes, make them commit to spending a certain percent of revenue on R&D in-country and sourcing from local SMEs when possible. This builds a domestic ecosystem.
- If allowing a foreign JV, include **clawback clauses:** If the JV later shifts production abroad or if the foreign partner tries to take over the majority, **subsidies must be repaid**. This would deter any bait-and-switch behaviors.
- **Prioritize domestic consortia and those with high EU value added in national funding competitions** (such as Germany's support for cell factories, France's calls for PV manufacturing, etc.). They **should explicitly score projects on European ownership**

and content. Many do already implicitly, but making it a criterion ensures an even playing field with EU rules.

Recommendation 4

National Investment in JV Projects.

Member States can consider **taking direct stakes** or facilitating local investor consortia to join JVs. For example, if a Chinese company is building a plant, the state (or a state-owned bank or sovereign fund) **could co-invest to secure the majority stake for the EU side**. Commissioner Ribera (as competition commissioner) hinted that governments could take equity instead of just subsidizing. This approach (similar to France and Germany taking stakes in chip fabs or Northvolt) could ensure EU-majority ownership *literally by public ownership bridging the gap if private EU partners are too small*. This is essentially putting money where policy is.

Though not all states can afford it, pooling through the European Investment Bank or other means is possible. Additionally, **European consortia of companies should be encouraged to jointly take equity in JVs**—for example, if a Chinese battery maker comes, a group of European automakers could collectively hold 60 percent. Member States can facilitate these partnerships among domestic firms (which sometimes are rivals) by highlighting the strategic need.

Recommendation 5

Avoid Internal Undercutting—The Solidarity Principle.

Governments should refrain from trying to attract foreign investors by offering to waive or go around EU conditions. For example, a smaller country should not promise a Chinese firm, "Come here and you can own 100 percent, and we will not enforce the JVs strategy like big countries do." To bolster this, **an informal solidarity pact could be agreed upon within the EU:**

- All Member States commit to uphold common standards and not engage in a race to the bottom for cleantech FDI.
- If one country is found to be doing so, others via the Commission should call it out.
- Harmonized regulation will help, but political commitment also matters. Member States should see strategic autonomy as a shared goal, not something to be bargained away for short-term jobs. A "Trojan horse" in one state endangers *the entire strategy*.

Recommendation 6
Enhance National Champions and SMEs.

Member States also have a role in making their domestic firms capable partners. Many EU companies might shy away from JVs because of capital or technology gaps. Therefore, support is needed from Member States to do the following:

- Provide **financing support to domestic firms** (loans and guarantees) so that they can afford stakes in JVs. For example, help a mid-size European component maker invest in a JV with a Chinese OEM.
- Invest in **skills and training**—ensure the local workforce can staff the new JVs in technical roles. (Chinese might otherwise import engineers, but if the EU can provide skilled personnel, that reinforces EU control culturally and operationally).

- Promote **clustering:** Have national innovation clusters where JVs integrate with local academia and suppliers, anchoring them. For example, a battery JV in France hooking into the French Battery Institute research, etc., so that even if ownership changes, the cluster effect keeps technology in the region.
- Use **procurement at the national level tactically:** For example, a government EV fleet purchase could specify that the battery must be from a local JV plant to boost its order book, etc.

Conclusion

Europe stands at a crossroads in its clean energy transition. Will it merely swap reliance on imported fossil fuels for reliance on imported cleantech, or will it secure its future by cultivating domestic strength in the industries that matter? This paper has argued that a bold strategy of **enforcing EU-majority ownership in JVs with Chinese (and other foreign) actors in critical cleantech sectors is a central pillar in achieving the latter**. By leveraging the EU's vast single market as bargaining power, Europe can gain not only factories on its soil but also control over technology, supply chains, and decision-making—the ingredients of true industrial sovereignty.

This paper began by examining China's own playbook. For decades, China used JV requirements to acquire foreign know-how and build competitive industries. That strategy has paid off handsomely for Beijing; now, Europe must adapt a version of it to its circumstances—not to close itself off but to engage with Chinese investors on terms that bolster European resilience. The data show the stakes: In our cleantech sectors, China currently holds 60 to 90 percent market shares in key segments, and European firms often find themselves junior partners or tech providers in one-sided arrangements. Without intervention, Europe risks becoming a mere **"assembly workshop"** or sales market for technologies made elsewhere.

The strategy outlined in this paper is multifaceted. It tightens investment rules (through the IAA and a revamped FDI screening framework), embeds asymmetric governance and local content obligations in JV structures, and coordinates this with broader industrial initiatives such as the NZIA and CRMA. Crucially, it remains *targeted and proportionate*. It does not ban Chinese investment—it channels it. It does not indiscriminately force JVs in every sector—it focuses on those vital for decarbonization and where dependency is most acute. It provides a path to compliance that Chinese private partners can accept: By partnering

and sharing, they still gain access to Europe's lucrative market, whereas refusing to cooperate might limit their opportunities.

There will undoubtedly be challenges and costs. European production is initially more expensive in many cases; requiring local content and JV structures may raise short-term prices for solar panels, batteries, or other equipment. We must be candid about these costs. However, as the analysis shows, these premiums can be viewed as *investments*—investments in learning curves and scale that will drive costs down over time and investments in jobs and industrial capabilities that strengthen the economy. Moreover, the cost of **inaction** could be higher. If Europe's clean energy deployment were to become hostage to the growing geopolitical tensions, the transition and economy would suffer immensely. **The security cushion provided by local capacity and diversified supply is like an insurance policy**—one whose value is hard to dispute after recent experiences with gas supplies and semiconductor shortages.

Legally and politically, the EU will have to navigate uncharted waters. It will have to justify its measures under EU law and possibly at the WTO. However, the world has changed since the 1990s consensus on unfettered globalization. Major trading partners have recognized the need for defensive tools in strategic sectors—the United States invoking security to onshore tech, Japan and South Korea nurturing their industries, and of course China's long-standing practices. The EU's actions, if carefully crafted to pursue legitimate public interests (climate goals, security of supply) and applied in a nonarbitrary way, have a strong case for validity. The EU should not hesitate to use exceptions in trade law that exist precisely to safeguard essential interests.

In conclusion, Europe's cleantech JV strategy is not about disengaging from China or the world; it is about rebalancing a relationship and correcting a course that left Europe overly exposed. It is a strategy of **engaged empowerment**—engaging with global partners, including

China, but on terms that empower Europe's economy and protect its values and security. As Deng Xiaoping put it, *it doesn't matter if the cat is black or white, as long as it catches mice*—Europe's adaptation of that wisdom is that it doesn't matter if investment is foreign or domestic, as long as it builds European capacity and does not compromise our autonomy.

In an era of great power competition and rapid technological change, this strategy offers a path for the European Union to remain true to its open market principles while not being naive about geoeconomic realities. It threads the needle between protectionism and passivity. If executed with care and conviction, Europe's JV strategy can become a cornerstone of a resilient, sovereign European Cleantech Age—one in which Europe is not a bystander but a leader.

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All responsibility for the analyses and recommendations made in this document remains with the author.

EUROPE

- Agora Industrie
- Airliquide
- Alinnea
- Battery Association for Supply Chain
- Batteries European Partnership Association (BEPA)
- Breakthrough Energy
- Cleantech for Europe
- Clifford Chance France
- Delegation of the European Union to China
- Demeter Investment Managers
- DG CLIMA, European Commission
- DG ENER, European Commission
- DG GROW, European Commission
- DG TRADE, European Commission
- Direction Générale des Entreprises, France
- Engie
- European Climate Foundation
- Eurelectric
- European Battery Association
- Federal Ministry for Economic Affairs and Energy (BMWE), Germany
- Font Corporation
- French Office in Taipei
- French Representation to the European Union
- Future Cleantech Architects
- Gide Loyrette Nouel
- Hy24
- Hydrogen Europe
- InnoEnergy
- Institut Mobilités en Transition
- IReform

- Jacques Delors Institute
- Joint Research Centre, European Commission
- Minister of Industry, France
- Ministry of Climate and Environment, Republic of Poland
- Ministry of Finance, Germany
- Ministry of Foreign Affairs, Republic of Poland
- NEDO
- Northvolt
- Ondra
- Orano Batteries
- Polish Economic Institute
- Polskie Stowarzyszenie Nowej Mobilności
- Presidencia del Gobierno de España
- Renault
- Research Institute for Sustainability
- Siemens Energy
- SWP
- T&E
- Umicore
- Valeo
- White & Case
- Wuppertal Institute
- ZSW (Center for Solar Energy and Hydrogen Research)

JAPAN

- Asahi Kasei
- CRIEPI, Japan
- Embassy of Japan in France
- Emulsion Flow Technologies
- GS Yuasa International
- IGES, Japan
- Global Strategic Studies Institute

- JOGMEC
- Kanadevia Corporation
- Marunouchi Innovation Partners
- Ministry of Economy, Trade, and Industry (METI), Government of Japan
- Mitsubishi
- Mitsui & Co. Global Strategic Studies Institute
- NEDO Europe
- NEDO Critical Raw Materials
- Panasonic
- RITE, Japan
- Shimadzu
- Special Advisor to METI
- The Institute of Energy Economics, Japan
- Toyota Motor Corporation

TAIWAN

- Center for Asia-Pacific Resilience and Innovation
- Institute of International Relations, Taiwan
- Ministry of Environment, Taiwan
- National Chengchi University
- ProLogium Technology
- Taiwan Climate Action Network
- Taiwan Institute of Economic Research

SOUTH KOREA

- Climate Change Center
- Doosan Enerbility
- EcoPro BM
- Embassy of the Republic of Korea in France

- KEY
- Kim & Chang
- KOMIR
- Kongju National University
- Korean Institute for International Economic Policy
- LG Energy Solution
- Ministry of Climate, Energy and Environment of Korea
- Ministry of Trade, Industry, and Economy (MOTIE), Government of the Republic of Korea
- Presidential Committee for Net Zero and Green Growth of the Republic of Korea
- Veolia Korea

CHINA

- BYD
- Chambre du Commerce Chinoise en Europe
- CATL
- China Council for Promotion of International Trade
- Chinese Academy of Sciences
- Chinese Academy of Social Sciences
- EDF, China
- GEELY
- MEE, Government of the People Republic of China
- MIIT, Government of the People Republic of China
- Shanghai Institute of International Studies
- OTHER
- Amazon
- International Energy Agency
- OECD

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Microsoft France
Mistertemp'
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Moody's France
Morgan Stanley
Natural Grass
Naval Group
Nestlé
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o9 Solutions
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Pelham Media
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Publicis
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Ricol Lasteyrie
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Roche Diagnostics
Rokos Capital Management
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RTE
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Willis Towers Watson France
Zurich

Europe stands at a decisive crossroads in its clean energy transition. **The critical technologies it needs**—batteries, solar panels, wind turbines, and other key components—**are today largely sourced from China or deeply embedded in Chinese-controlled value chains**. While Chinese firms export massively from their domestic base, they are also rapidly expanding overseas, including into Europe, with few remaining restrictions. By contrast, **European companies have long faced strict joint-venture requirement**s and persistent market-access barriers in China—conditions that have significantly shaped China's technological catch-up.

The central question is now whether Europe will continue down a path of structural dependence, becoming primarily a buyer—or at best an assembler—of clean technologies designed, financed, and controlled in China. Such a trajectory would weaken Europe's industrial sovereignty, undermine its long-term competitiveness, and erode control over strategic data and infrastructures.

Building on Institut Montaigne's previous work on reducing Europe's critical dependencies in clean technologies, this paper confronts the joint-venture question head-on. It argues that, in strategically critical sectors, **access to the European market should be conditional on the establishment of robust local value chains, through European-majority joint ventures** and carefully designed local content requirements with Chinese partners.

Drawing on this foundation, the paper assesses the legal gaps in the European Union's current framework and puts forward a comprehensive set of recommendations. **It details EU-level initiatives, Member State actions**, strategic industrial instruments, and **a concrete 2026–2035 roadmap** to secure Europe's industrial base, strengthen its technological autonomy, and anchor its cleantech future on resilient, competitive foundations.

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