Powering Ho Chi Minh City's future with net zero industrial precincts

POLICY BRIEF

OCTOBER 2025

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge and pay respect to the Traditional Custodians and Elders – past and present – of the lands and waters of the people of the Kulin nation on which the Climateworks Centre office is located, and all of the Elders of lands across which Climateworks operates nationally. We acknowledge that sovereignty was never ceded and that this was and always will be Aboriginal land. More information.

ACKNOWLEDGEMENTS

Climateworks Centre gratefully acknowledges the valuable contributions made by the following individuals during the interview and peer review processes, as well as the anonymous members whose insightful feedback helped improve the quality of the policy brief. This brief was developed with invaluable support from the Centre for Consultation, Information, Economic Management and Business (CIT) under the Ho Chi Minh City Institute for Development Studies. The contribution of local consultants, led by Thien Khanh Vo, was instrumental in shaping the content through their local knowledge and analysis. We also gratefully acknowledge the insights provided by the Ho Chi Minh City Export Processing Zone Authority (HEPZA), as well as by representatives from relevant line departments, industrial zone developers/management unit (Hiep Phuoc Industrial Park JSC), and companies (FPT, Saigon Garment, TEKBOX, Xingfa Aluminum, Bestmix, Duy Tan Plastics and others) who participated in the data collection process.

ABOUT US

Climateworks Centre bridges the gap between research and climate action, operating as an independent not-for-profit within Monash University. Climateworks develops specialist knowledge to accelerate emissions reduction, in line with the global 1.5°C temperature goal, across Australia, Southeast Asia and the Pacific.

Climateworks Centre, 2025, *Powering Ho Chi Minh City's future with net zero industrial precincts.*

ISBN: 978-1-7637231-6-0

Contents

Executive summary

Seizing Ho Chi Minh City's low-carbon economic opportunities with a net zero industrial precinct approach is both an economic imperative and a climate opportunity. Vietnam's industrial zones are central to its economic success, but they also account for a significant share of national emissions. In line with its net zero by 2050 commitment and evolving international trade requirements, Vietnam – and particularly Ho Chi Minh City (HCMC) – is taking steps to align its industrial growth with decarbonisation pathways.

Net zero industrial precincts (NZIPs) offer a coordinated, place-based decarbonisation approach. They can help unlock shared infrastructure for clean energy, reduce the cost and risk of new technologies, and position HCMC as a globally competitive, net zero-aligned manufacturing hub. By decarbonising its industrial zones through an NZIP framework, the city can future-proof its industries against trade regulations while attracting low-carbon investment and maintaining market access.

HCMC has over 17 industrial zones, each varying in size, types of industries, and energy and emissions profiles. These differences mean each zone has differing decarbonisation opportunities – highlighting the benefits of taking a place-based approach. In industries such as electronics and machinery, priorities include electrification, energy efficiency upgrades, fuel switching and rooftop solar deployment. In contrast, heavy industries, such as steel and chemicals, require more complex interventions, including the use of hydrogen, ammonia, sustainable biomass and potentially carbon capture, utilisation and storage (CCUS). Each zone's energy and emissions profile informs tailored interventions that reflect both the technological requirements and market pressures of its key sectors such as electronics, steel, plastics, cement and textiles.

In this report, Climateworks analyses five representative industrial zones that cover over 70 per cent of HCMC's industrial energy use and a wide range of sectors. These include Saigon Hi-Tech Park, Tan Thuan Export Processing Zone, and Tan Tao, Hiep Phuoc and Dong Nam Industrial Zones. Through this analysis, we identify common decarbonisation levers that can be applied across HCMC, including renewable energy, electrification of heating and improving energy efficiency.

Financing HCMC's industrial transition requires targeted use of blended capital, de-risking mechanisms and the alignment of Vietnam's nascent carbon market, green bond frameworks and sustainability-linked loans. As HCMC is set to become an international financial hub, the city is well placed to mobilise capital for industrial transition.

We recommend a phased implementation strategy beginning with pilot projects in high-readiness zones, supported by key performance indicators, emissions baselines and public–private investment coordination. The success of these pilots will not only help reduce local emissions but also provide a national model for industrial transition that can inform future scaling across Vietnam's industrial ecosystem.

Realising this vision requires action across four foundational pillars and one cross-cutting enabler. Firstly, it means developing coordination and skills to embed cross-sectoral governance mechanisms and building institutional capacity. Secondly, it is building the necessary enabling infrastructure, including renewable electricity, green hydrogen supply, low-carbon transport and industrial-scale heat recovery networks. Thirdly, it means decarbonising existing industries through process upgrades, electrification, energy efficiency and low-carbon procurement standards. Lastly, it is attracting new industries through targeted investment, incentives and policy certainty. There are also cross-cutting enablers that are critical to unlock the required capital and deliver long-term social and economic resilience, such as sustainable finance mechanisms (e.g. green bonds, sustainability-linked loans and concessional climate finance) and workforce reskilling.

By combining our analysis of HCMC's industrial zones with international case studies of industrial transition, this report presents a roadmap for implementing NZIPs in HCMC.

HCMC stands at a strategic crossroads. By implementing net zero industrial precincts, the city can demonstrate climate leadership, secure long-term industrial competitiveness and catalyse Vietnam's broader transition to a resilient, low-carbon economy.

Recommended actions for implementing NZIPs in HCMC

Multi-stakeholder coordination	Building enabling infrastructure	Decarbonising existing industries	Attracting new clean industries
Implementing cross-sectoral governance mechanisms and increasing institutional capacity.	**Deploying the energy, transport and digital infrastructure necessary to decarbonise operations across industrial zones, including renewable electricity, hydrogen and heat recovery networks.**	**Transforming currently high-emitting sectors by supporting process upgrades, electrification, efficiency improvements and low-carbon procurement mechanisms.**	**Investing in innovative, zero-emissions industries to establish HCMC as a regional manufacturing leader, leveraging fiscal incentives and enabling policies.**

Cross-cutting enablers

+ Upskilling the workforce and unlocking capital through sustainable finance mechanisms, including green bonds, sustainability-linked loans (SLLs), Public–Private Partnerships (PPPs) and Just Energy Transition Partnership (JETP) grants and concessional loans.

SHORT-TERM ACTIONS (2025–2030)

Multi-stakeholder coordination	Building enabling infrastructure	Decarbonising existing industries	Attracting new clean industries
+ Establish a cross-sectoral NZIP taskforce involving key government, developer and tenant stakeholders. + Co-design NZIP transition plans, incorporating Measurement, Reporting and Verification (MRV) baselines, risk-mapping and financial requirements. + Develop sectoral reskilling and upskilling roadmaps.	+ Scale rooftop solar in industrial zones. + Launch circular economy pilots on industrial symbiosis. + Develop standardised greenhouse gas (GHG) reporting guidelines.	+ Promote energy efficiency and electrification of heating. + Conduct technical assessments for electrified boilers, biomass and solar thermal applications. + Develop clean heat roadmap and pilot applications. + Integrate GHG reporting and introduce mandates for GHG inventories and audits linked to licensing and procurement.	+ Anchor hydrogen and clean technology pilot projects. + Design fiscal incentives for investors. + Introduce greenfield investments in green materials. + Introduce fiscal support mechanisms and Public–Private Partnership (PPP) models.

Cross-cutting enablers

+ Map capital requirements across industrial zones (IZs)
+ Develop NZIP blended finance strategy and framework
+ Leverage Just Energy Transition Partnership (JETP), PPPs, green bonds and SLLs

MEDIUM-TERM ACTIONS (2030–2035)

Multi-stakeholder coordination	Building enabling infrastructure	Decarbonising existing industries	Attracting new clean industries
+ Implement sectoral reskilling and upskilling roadmaps at precinct scale. + Implement co-developed NZIP transition plans.	+ Expand clean energy infrastructure. + Expand substations and grid inter-connection capacity. + Develop green hydrogen infrastructure. + Embed renewable energy assessments into industrial zone approvals. + Coordinate renewable energy procurement for multiple tenants, supporting aggregation and reducing transaction costs.	+ Roll out decarbonisation pathways for steel and cement. + Integrate CCUS technologies.	+ Foster industrial symbiosis ecosystems.

Cross-cutting enablers

+ Formalise green industrial certification linked to green bonds
+ Strengthen carbon market mechanisms
+ Establish digital platforms to coordinate renewable electricity procurement
+ Apply renewable energy tracking and certification mechanisms aligned with sustainability requirements

1. A novel approach to place-based industrial transition: net zero industrial precincts

1.1 Net zero industrial precincts

The global imperative to limit global warming to 1.5 degrees Celsius above pre-industrial levels, as enshrined in the Paris Agreement, necessitates a profound transformation across all economic sectors. The industrial sector contributes over a third of global greenhouse gas (GHG) emissions and is a critical frontier in this transition. The United Nations Industrial Development Organisation (UNIDO) estimates that industrial emissions must fall by 90 per cent by 2050 to reach the global net zero goal (UNIDO 2024). Within this context, net zero industrial precincts (NZIPs) have emerged as a strategic approach to accelerate industrial transition.

NZIPs are defined as coordinated, place-based strategies that cluster investment in renewable energy and low-carbon technologies within geographically defined industrial areas. Complementary to Vietnam's traditional eco-industrial parks, an NZIP aims to achieve net zero GHG emissions by systematically deploying a portfolio of solutions. These solutions include maximising energy efficiency, deploying renewable energy technologies (both onsite and grid-supplied), electrifying heating processes where feasible, using low-carbon fuels and feedstocks such as biomass or green hydrogen, implementing carbon capture, utilisation and storage (CCUS) for residual process emissions and employing high-quality carbon offsets for any remaining emissions that cannot be captured by other means.

This coordinated approach offers significant advantages over project-by-project decarbonisation efforts. By clustering activities, NZIPs allow tenants and stakeholders to share the costs, risks and benefits of developing new infrastructure (e.g. renewable power generation, hydrogen pipelines, carbon dioxide [CO_2] transport). This collaborative model can attract new industries focused on low-carbon production, stimulate demand for green products, facilitate infrastructure development, drive skills development for the future workforce and accelerate the decarbonisation of existing emissions-intensive industries

1.2 Ho Chi Minh City's industrial transition

Vietnam's rapid economic ascent, achieving middle-income status through remarkable gross domestic product (GDP) growth and poverty reduction over the past two decades, has been significantly fuelled by industrial development. The growth of industrial zones has markedly contributed to Vietnam's GDP, but has also resulted in a rapid emissions surge, up 140 per cent over the last decade (Climate Analytics 2021). Vietnam's industrial sector consumes 54 per cent of national energy, with coal and oil dominating the energy mix (WWF 2023).

Ho Chi Minh City (HCMC)[1] stands at the centre of this growth, serving as the nation's primary economic, financial and industrial hub. The city's dynamism is reflected in its extensive network of industrial and export processing zones – 17 zones are currently operational, with plans for further expansion (Government of Vietnam 2024). Industry is therefore a dominant emissions source in HCMC, accounting for 30 per cent of the city's annual emissions. As a major industrial centre, HCMC contributes significantly to Vietnam's emissions – approximately one-fifth of the country's total GHG emissions in 2022 (Ho et al. 2022).

Addressing industrial emissions is important for the long-term economic viability and competitiveness of both HCMC and Vietnam. The global shift towards decarbonisation means that international markets and investors increasingly demand sustainable products and supply chains (Climateworks Centre 2024b). Failure to decarbonise could mean losing market access due to emerging trade regulations and falling behind competitors who embrace green production (Nguyen and Apanada 2024). A place-based industrial transition approach through NZIPs offers HCMC the opportunity to attract significant green investment, enhance its position in global value chains and align with Vietnam's national commitment to achieve net zero emissions by 2050.

1 This report's research findings and recommendations were developed prior to the administrative merger of Ho Chi Minh City with Binh Duong and Ba Ria Vung Tau. Consequently, the scope of analysis is confined exclusively to the former boundaries of Ho Chi Minh City.

1.3 Scope of the roadmap

This report provides a detailed and evidence-based roadmap for transitioning HCMC's key industrial zones, including Tan Thuan Export Processing Zone (EPZ), Tan Tao Industrial Zone (IZ), Hiep Phuoc IZ, Dong Nam IZ and Saigon Hi-Tech Park into NZIPs by 2050. The report draws on the work of Climateworks Centre's Net Zero Industrial Precincts program, building on the insights and lessons learned from the program's work in Australia and Indonesia. This report has been prepared under a Memorandum of Understanding between the Ho Chi Minh City Institute for Development Studies (HiDS) and Climateworks (Climateworks Centre 2024).

The structure of the report is as follows. Section 2 examines the regulatory and compliance framework in Vietnam. Sections 3 and 4 introduce selected industrial zones' profiles, including their sectoral composition and current energy use and emissions. Section 5 presents key industrial transition levers for the main industries in HCMC's industrial zones. Section 6 lays out relevant international models and practices and finally, Section 7 provides a phased implementation plan with short-term and medium-term actions, key performance indicators and policy recommendations for local-level and national-level implementation.

2. Vietnam's industrial transition regulations and initiatives

Vietnam has developed a comprehensive legal and policy framework to support its net zero emissions by 2050 commitment. Power sector reforms, the national carbon market roadmap and mandatory GHG emissions reporting provide clear signals to industrial emitters.

HCMC is demonstrating how these national frameworks can be implemented locally through public–private collaboration and international partnerships.

This section reviews the key national policies and sectoral regulations driving industrial transition, including climate targets, energy planning and compliance obligations. It also explores how Vietnam and HCMC are implementing these frameworks locally and responding to emerging international trade pressures, particularly through the European Union (EU) Carbon Border Adjustment Mechanism (CBAM).

2.1 National policy and regulatory landscape

National Power Development Plan VIII

Vietnam's National Power Development Plan VIII (PDP8) was approved by the Prime Minister in May 2023 and revised in April 2025 (PDP8-R) to accelerate renewable energy deployment and strengthen power system resilience (Government of Vietnam 2023, 2025). It aligns with Vietnam's net zero target and addresses energy security and industrial competitiveness.

PDP8-R significantly increases renewable energy targets for 2030. Rooftop solar capacity is projected to reach up to 34.1 gigawatts (GW), including 6.6 GW concentrated in Vietnam's southern areas, such as HCMC, Binh Duong and Dong Nai. Wind power targets range from 26.1 GW to 38.1 GW, and battery energy storage system capacity targets are between 10 and 16.7 GW, more than 50 times the original plan. PDP8-R also reintroduced nuclear energy with a plan to deploy Ninh Thuan 1 and 2 nuclear plants by 2035. PDP8-R prioritises flexible technologies like pumped hydropower and dispatchable renewable energy systems. This presents opportunities to deploy flexible renewable energy for industrial zones, which is important in regions facing grid congestion where electricity generation exceeds grid transmission capacity.

National net zero strategy and greenhouse gas regulations

Vietnam's net zero by 2050 target was formally endorsed through the National Strategy for Climate Change (Decision No. 896/QĐ-TTg), and the Scheme Setting Out Tasks and Solutions for Implementation of Outcomes of the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (Decision No. 888/QĐ-TTg), which together outline a national implementation plan and sector-specific emissions trajectories. By 2030, Vietnam aims to reduce national emissions by 43.5 per cent compared to business-as-usual emissions, conditional on international support. Industrial process emissions are targeted to fall 38.3 per cent by 2030, capped at 86 million tonnes of carbon dioxide equivalent ($MtCO_2e$), with a target to achieve an 84.8 per cent reduction by 2050 (Government of Vietnam 2022).

To achieve this, the government mandates that all facilities emitting more than 2,000 tonnes of carbon dioxide equivalent (tCO_2e) per year prepare GHG emissions mitigation plans by 2025; this threshold drops to 200 tonnes by 2030. These requirements now apply across major emitting industries, including cement, steel, chemicals, fertilisers, ceramics and glass manufacturing.

The regulatory architecture is detailed in Decree 06/2022/NĐ-CP (recently amended and supplemented by Decree 119/2025/NĐ-CP), which sets binding obligations for GHG inventories and reduction plans. It also lays the foundation for a domestic carbon market, which is set to be established under Decision No. 232/QĐ-TTg, with preparations and piloting in 2025 and a fully operational carbon market in 2029 (Government of Vietnam 2022, 2025).

Supporting this, Circular 38/2023/TT-BCT outlines national emissions measurement, reporting and verification (MRV) protocols, and Decision No. 13/2024/QĐ-TTg lists the 2,166 high-emitting facilities required to report their emissions, with over 80 per cent of these facilities in the industrial sector (Government of Vietnam 2023, 2024).

Industrial energy use and efficiency

Vietnam's energy efficiency framework is governed by the Law on Economical and Efficient Use of Energy (2010), supported by Decree 21/2011/NĐ-CP. Under these frameworks, enterprises designated as key energy users – those consuming more than defined annual energy thresholds – must report energy use and submit energy efficiency plans (Government of Vietnam 2010, 2011).

In 2024, Decision No. 1011/QĐ-TTg identified 3,500 key energy users across sectors, most concentrated in Vietnam's southern industrial zones (Government of Vietnam 2024). The Ministry of Industry and Trade Decision 2600/QĐ-BCT reinforces this system by linking energy management to mitigating greenhouse gases, digitalising emissions tracking and supporting access to climate finance.

These efficiency frameworks create an enabling environment for the industrial sectors to electrify processes, improve efficiency and transition to low-carbon fuels.

2.2 Industrial transition initiatives in Ho Chi Minh City

Ho Chi Minh City has positioned itself as a leading subnational actor in Vietnam's energy transition. The city is aligning its strategies with national climate objectives and advancing the energy transition. To do this, HCMC is leveraging key national frameworks, including Resolution 31-NQ/TW of the Politburo on HCMC Development, Resolution 98/2023/QH15 on Special Mechanisms and Policies for HCMC Development and the Prime Minister's Decision 1711/QD-Ttg on the master plan for HCMC for 2021–2030, with a vision to 2050. These policies provide a critical foundation for the city to integrate national net zero principles into its economic planning and development pathways.

Under a supportive regulatory environment, the city is forming international partnerships to conduct pilot projects to decarbonise its key industries. For example, the UNIDO Eco-Industrial Park project at Hiep Phuoc involves 30 businesses implementing clean technologies, including biomass boilers and rooftop solar (NetZeroVN 2024). The project has resulted in over 6,800 megawatt hours (MWh) in annual energy savings – roughly the annual electricity use of 5000 households in Vietnam – and emissions reductions exceeding 5,800 tCO_2e (VietnamNews 2024).

Multinational corporate actors operating in HCMC's industrial zones increasingly encourage Vietnamese suppliers to improve their emissions disclosure and to adopt low-carbon technologies. For example, Samsung Electronics initiated a 28 megawatt (MW) rooftop solar project at its facility in Saigon Hi-Tech Park in 2025, aiming to supply 26 per cent of its electricity needs (Samsung Electronics 2025). Similarly, Apple has engaged over 320 suppliers globally, including many in Vietnam, to shift to 100 per cent renewable electricity. Intel has cut scope 2 emissions (those produced from generating or purchasing electricity) by over 92 per cent since 2019 and aims for its direct scope 1 and scope 2 emissions to reach net zero by 2040. Foxconn, Nike and Heineken also announced decarbonisation plans aligned with the goals set by the Science Based Targets Initiative and RE100. This global corporate momentum reinforces low-carbon norms and accelerates decarbonisation technology uptake in HCMC's industries by creating a competitive imperative for local suppliers to align with global sustainability standards.

2.3 International trade and compliance drivers

Carbon Border Adjustment Mechanism

The EU's CBAM represents a significant shift in international trade and climate policy. As part of the EU's Fit for 55 package, CBAM places additional costs on carbon-intensive imports. This is to stop carbon leakage, where companies shift their emissions-intensive production processes from jurisdictions with strict emissions regulations – such as the EU – to countries with less strict regulations. It ensures imported goods face the same carbon costs as those produced within the EU, levelling the playing field and effectively linking trade with climate ambition, creating new compliance obligations for exporters to the EU.

CBAM is being implemented in two phases. In the first transitional phase (2023–2025), companies must report the embedded GHG emissions (scope 1 and scope 2) associated with their imports into the EU. This phase does not require financial obligations but focuses on establishing reliable emissions databases and consistent emissions reporting methodologies. In the second definitive phase (from 2026 onward), importers will be required to purchase CBAM certificates corresponding to the carbon content of their products. The certificate price will be tied to the average weekly price in the EU's Emissions Trading System (ETS) (Trading Economics 2025).

Currently, CBAM applies to six sectors: cement, steel and iron, aluminium, fertilisers, electricity and hydrogen. By 2030, it is expected to expand to additional sectors such as glass, ceramics, paper, chemicals, plastics and potentially textiles and electronics. Many of these sectors are major export industries for HCMC and Vietnam more broadly.

The cost implications for Vietnamese industry are substantial. For example, the EU is the major market for Vietnamese steel, accounting for 27 per cent of total steel exports (around 2.6 million tonnes) in 2023 (Vietnamplus 2024). Starting in 2026, steel companies exporting products to the EU will be required to purchase CBAM certificates based on their product's embedded emissions.

As steel production is carbon-intensive due to a reliance on coal, export costs will increase, affecting the cost competitiveness of Vietnamese steel in the EU market. Given that producing one tonne of steel releases around 0.6–2 tonnes of carbon dioxide (tCO_2) depending on the production method, CBAM cost could be around €70–200 per tonne of steel at the current ETS price (SteelWatch 2025). Without action to transition to low-emissions steel production, CBAM could reduce Vietnam's steel export value to the EU by 4 per cent and cut production volumes by 0.8 per cent (VCCI 2023).

Cement companies will face similar cost challenges, despite their relatively low export volumes – approximately 1–2 per cent of total export turnover (Vietnam Investment Review 2025). One tonne of cement has embedded emissions of around 0.7 tCO_2, potentially triggering additional costs of €50–70 per tonne under CBAM (European Commission 2019).

Broader environmental, social and governance regulations

In parallel with CBAM, Vietnamese exporters face other sustainability requirements, such as the Corporate Sustainability Reporting Directive (CSRD), Ecodesign for Sustainable Products Regulation (ESPR) and European Deforestation Regulation (EUDR). The CSRD expands the scope and depth of non-financial reporting obligations for companies operating in or exporting to the EU. It requires large companies to disclose detailed information on environmental, social and governance (ESG) performance. This includes climate-related risks, direct and indirect GHG emissions, supply chain due diligence and sustainability strategies. For Vietnamese firms, particularly those integrated into global supply chains, this means that their environmental and social performance must be transparently tracked and reported to meet buyers' compliance needs.

The ESPR introduces mandatory sustainability requirements across a product's life cycle – from material sourcing and energy consumption to recyclability and reparability. It targets HCMC's core sectors like textiles, electronics, furniture and steel-based products. ESPR will require Vietnamese manufacturers to redesign products with resource efficiency in mind and maintain product passports with verified data on carbon footprint and material content.

The EUDR prohibits the sale of products linked to deforestation or forest degradation in the EU market. It applies to commodities like rubber, wood, soy, coffee and cocoa, and to products derived from them – such as furniture, leather and packaging materials. Exporters must provide geolocation data and deforestation-free declarations for all products. For Vietnam, a major exporter of furniture and wood-based goods, this raises the bar for traceability and forest governance in supply chains.

Compliance with these frameworks is increasingly critical for market access, supply chain continuity and investor confidence as these EU regulations are setting a new global benchmark for compliance with net zero targets. For Vietnamese exporters, meeting these standards is not just about securing EU market access – it is essential for maintaining competitive advantage, securing long-term supplier contracts and attracting climate finance. These requirements also underscore the urgency of investing in traceability systems, emissions tracking and sustainability certification to remain viable in a rapidly decarbonising global economy.

TABLE 1: **Overview of Vietnam's industrial transition regulatory landscape**

POLICY AREA	KEY INSTRUMENTS	CORE REQUIREMENTS / TARGETS	IMPLICATIONS FOR INDUSTRY
National net zero strategy (domestic)	Decision 888/QĐ-TTg, Decision 896/QĐ-TTg	Net zero by 2050; 38.3 per cent emissions reduction targets for 2030	High-emitting facilities must prepare GHG mitigation plans by 2030
GHG reporting and carbon markets (domestic)	Decree 06/2022/NĐ-CP, Circular 38/2023/TT-BCT, Decision 13/2024/QĐ-TTg, Decision 232/QĐ-TTg Decree 119/2025/NĐ-CP	MRV systems mandatory; carbon market launch by 2029	Structured emissions reporting required, potential carbon cost exposure
Energy efficiency (domestic)	Energy Efficiency Law (2010), Decree 21/2011/NĐ-CP, Decision 1011/QĐ-TTg	Mandatory reporting of energy use and efficiency plans for key energy users	Supports eligibility for green finance instruments, such as green bonds, SSLs
Power sector transition (domestic)	PDP8 & PDP8-R	73.4 GW solar, 38.1 GW wind, 16.7 GW battery storage by 2030	Enables clean electricity access for industry, supports electrification efforts
HCMC 2030 planning (domestic)	Decision 1711/QĐ-TTg	Planning for renewable energy deployment for the industrial sector	Addition of renewable energy projects to PDP8-R in coordination with Ministry of Industry and Trade (MOIT)
Carbon border adjustment (international)	EU CBAM	Reporting phase 2023–2025; compliance and certificate payments from 2026 onwards	Increased costs for carbon-intensive exports, specifically for the steel and cement sectors
Trade regulations (international)	CSRD, ESPR, EUDR	Mandatory ESG disclosures; circular product design standards, deforestation standards	Traceability, design and emissions compliance are required for continued market access

The supply chains are tightening climate-related requirements, and multinational corporations now expect measurable progress on emissions reductions, renewable energy adoption and transparency from all partners – including those operating in Vietnam's industrial zones. To remain competitive, and for HCMC's industrial companies to retain their place in global value chains, proactive alignment with international frameworks is essential. This means adopting robust climate action plans and demonstrating credible pathways to net zero. The transition is no longer optional; it is a prerequisite for market access and long-term resilience in a decarbonising world.

The next section (Section 3) introduces selected industrial zones in HCMC and their sectoral composition to assess their readiness for transitioning to NZIPs.

3. Ho Chi Minh City's industrial zones and sector profiles

3.1 Overview of industrial zones' economic significance

HCMC is Vietnam's leading industrial centre, hosting 17 industrial and export processing zones that function as critical nodes in both domestic value chains and international supply networks. These zones, along with more than 400 industrial or manufacturing zones across the country, play a pivotal role in driving the country's industrial output, attracting foreign direct investment (FDI) and generating employment. These zones also represent a substantial share of the city's energy use and carbon emissions (VietData Research 2024).

Industrial zones have underpinned Vietnam's rapid industrialisation for the last few decades. Collectively, those governed by the HCMC Export Processing and Industrial Zones Authority (HEPZA) contribute approximately 15 per cent of the city's export value (equivalent to US$7 billion annually) and account for 58 per cent of total industrial FDI. With a combined registered capital of US$24.5 billion, these zones host over 1,760 projects and employ more than 281,000 workers – about 6 per cent of HCMC's workforce and 18 per cent of labour in the industrial sector (HEPZA 2025).

These industrial zones now face new imperatives: to remain competitive under emerging net zero-aligned trade regulations, to attract climate-aligned finance and to support Vietnam's national decarbonisation goals. This chapter presents an assessment of HCMC's industrial base, examining the breadth of all 17 zones and the depth of five representative zones – selected based on their economic scale, emissions intensity and decarbonisation potential.

3.2 Profile of HCMC's industrial zones

Industrial zones in HCMC vary significantly in scale, investment and energy intensity (Table 2). Most of HCMC's industrial zones were established between the early 1990s and early 2000s, reflecting over two decades of development. Their sectoral mix and energy use varies widely, with key energy users in Saigon Hi-Tech Park and Tan Thuan EPZ. Tan Thuan EPZ employs the largest workforce (approximately 60,000). Most zones report high occupancy rates – many at or near 100 per cent – underscoring strong industrial land use. The largest zones by area include Hiep Phuoc IZ and Saigon Hi-Tech Park, indicating their strategic importance for future expansion and investment.

Table 2 provides a comparative overview of HCMC's industrial zones, based on the following metrics: export value, energy use by key energy users, employment, year of establishment, total area, number of projects and occupancy rates.

TABLE 2: Overview of HCMC's industrial zones

Industrial zone	Energy use of key energy users (tonne of oil equivalent)	Employment	Year established	Total area (hectares)	Total projects	Occupancy rate (%)
Tan Thuan EPZ	46,759	60,000	1991	300	255	86
Tan Tao IZ	42,295	23,000	1997	380.15	277	85
Hiep Phuoc IZ	45,497	12,000	1998 (Phase 1) – 2008 (Phase 2)	908	201	70
Saigon Hi-Tech Park	102,705	47,000	2002	913	162	85
Dong Nam IZ	63,246	20,000	2008	342.53	39	75
Linh Trung EPZ	33,106	50,000	1992	62	32	84
Linh Trung II EPZ	13,423	30,000	1997	61.75	33	99
Le Minh Xuan	3,370	7,897	1997	100	166	100
Le Minh Xuan 3	N/A	1,633	2014	311.24	35	100
Tan Binh	7,690	25,000	1997	128.69	193	100
Vinh Loc	24,918	18,000	1997	207	147	94
Tan Thoi Hiep	2,056	6,311	1997	28.41	28	100
Tay Bac Cu Chi	19,512	15,173	1997	208	48	100
Binh Chieu	N/A	1,576	1998	27.34	15	100
Cat Lai	3,687	8,454	2003	136.95	70	100
Tan Phu Trung	11,730	12,559	2004	542.64	119	94
An Ha	2,165	2,337	2011	123.5	42	67
Hoa Phu	N/A	1,109	2014	99.34	19	45

Source: Retrieved from Ho Chi Minh City Export Processing and Industrial Zones Authority Decision 1011/QĐ-TTg (2024) and news outlets.

3.3 Methodology for selecting industrial zone case studies

To inform a practical and impactful roadmap for industrial transition in HCMC, this report presents a detailed analysis of five representative industrial zones. These selected zones reflect the broader characteristics of HCMC's industrial landscape and serve as key reference points to develop scalable and targeted decarbonisation strategies across the city's wider network of industrial parks.

The selection process combined quantitative indicators with qualitative assessments to identify industrial zones that collectively represent the city's energy and emissions profile, sectoral diversity and economic significance. The methodology was guided by five interrelated criteria: energy intensity, emissions reduction potential, economic contribution, sectoral diversity and alignment with government policy priorities.

The first consideration is energy consumption and emissions profile. The five selected zones – Saigon Hi-Tech Park, Dong Nam IZ, Hiep Phuoc IZ, Tan Tao IZ and Tan Thuan EPZ – account for more than 70 per cent of total energy used by key energy users in HCMC. The energy intensity of the key energy users in these zones is, on average, 1.7 times higher than the citywide average. This concentration of energy use suggests significant emissions reduction potential and highlights the value of prioritising interventions in these zones.

Secondly, we assessed the economic scale and strategic value of these zones. Together, the five selected zones cover approximately 2,900 hectares (ha) – equivalent to more than half of HCMC's total industrial land – and employ around 160,000 workers, or 50 per cent of the city's industrial workforce. They have also attracted over US$17.3 billion in registered capital. Their scale and productivity make them central to the city's industrial output and vital to Vietnam's integration in global value chains.

Sectoral composition and industrial diversity are also key criteria. The selected zones host a wide spectrum of sectors – ranging from electronics, automotive and semiconductors to steel, cement, footwear, food processing and chemicals. This diversity reflects the broader composition of Vietnam's industrial economy, ensuring that lessons learned from decarbonisation efforts in these zones are transferable across different industries throughout Vietnam.

Policy alignment and institutional readiness further guided the selection. Two of the selected zones – Tan Thuan EPZ and Hiep Phuoc IZ – have been designated by city management as pilot sites for industrial restructuring and sustainable redevelopment under Decision No. 1354/QĐ-UBND. This designation signals political will and regulatory support for industrial transition initiatives, increasing the feasibility of pilot programs and large-scale investment mobilisation (Ho Chi Minh City People's Committee 2023).

Finally, we considered the operational maturity and remaining lifespan of the zones. All five zones are well established (each operational before 2010), with long-term lease structures extending beyond 2040. These timelines align with Vietnam's national net zero target of 2050 and offer sufficient planning horizons for phasing in new energy infrastructure, clean technology investments and workforce transition programs.

The selection of Saigon Hi-Tech Park, Dong Nam IZ, Hiep Phuoc IZ, Tan Tao IZ and Tan Thuan EPZ as case studies reflects a deliberate balancing of ambition and practicality. These zones represent the industrial areas in HCMC with the most to gain from – and contribute to – a coordinated NZIP approach.

3.4

Sector profiles of the case study industrial zones

This section compares the case studies of industrial zones' sectors, energy use and opportunities for emissions reductions. Understanding the sectoral profiles of each precinct enables targeted, scalable solutions to be identified, and this understanding underpins our proposed roadmap for implementing NZIPs (Section 7).

Saigon Hi-Tech Park

Saigon Hi-Tech Park, launched in 2002 and covering over 900 ha, is Vietnam's premier destination for high-technology investment. It hosts 162 projects and employs over 47,000 people. With an annual export turnover exceeding US$20 billion, Saigon Hi-Tech Park alone accounts for nearly 40 per cent of HCMC's total export value (Voice of Vietnam 2024). It is home to flagship electronics and semiconductor facilities for Intel (USA), Samsung (Korea), TTI (Germany), NTT, Nidec and Jabil (Japan), making it an innovation hub.

Establishing Saigon Hi-Tech Park as a replicable net zero innovation zone could position Vietnam as a strategic node in clean electronics supply chains and support the city's aspiration to become a leader in sustainable industrial innovation.

Tan Thuan Export Processing Zone

Established in 1991 as Vietnam's first export processing zone, Tan Thuan EPZ is emblematic of the country's industrial reform era. Spanning 300 ha with an 86 per cent occupancy rate, it has evolved into a hub of diversified manufacturing. The zone is home to 255 enterprises employing over 60,000 workers, contributing more than US$1 billion in export turnover annually. Tan Thuan EPZ is strategically situated in District 7, close to key logistics corridors including Cat Lai and Tan Son Nhat International Airport, making it well positioned for trade-oriented manufacturing.

The zone's industrial base features a well-established mix of sectors, including electronics, automotive components, telecommunications and electrical equipment. Key firms such as Nidec Drive Systems, Furukawa Automotive Parts and FPT Telecommunications anchor the zone's energy use and export profile. These businesses support both global supply chains and domestic assembly markets, producing intermediate goods for vehicles, electronic products and automation systems.

Tan Tao Industrial Zone

Tan Tao IZ, operational since 1997, is one of the largest and most mature industrial zones in HCMC, spanning 380 ha and hosting 277 enterprises. It employs approximately 23,000 workers and reflects the city's early emphasis on labour-intensive manufacturing. The zone's industrial profile remains anchored in sectors such as footwear, plastics, food processing and metal products. Yet it is also at a strategic inflection point, as city-level planning shifts toward value-added, resource-efficient and technology-driven manufacturing.

The zone's energy consumption profile is heavily skewed toward a single large emitter. Pouyuen Vietnam – one of the world's largest footwear manufacturers – accounts for nearly 59 per cent of the zone's total energy use. This concentrated energy use presents an opportunity: targeted interventions at one firm could yield significant zone-wide emissions reductions.

Hiep Phuoc Industrial Zone

Spanning over 900 ha and located adjacent to HCMC's southern port corridor, Hiep Phuoc IZ represents one of Vietnam's largest industrial areas. Its development across two phases (1998 and 2008) has been geared toward hosting heavy industries with strong maritime logistics needs. The zone currently hosts 201 enterprises and employs around 12,000 workers. Despite its relatively lower employment density, Hiep Phuoc plays an outsized role in emissions and resource intensity due to its sectoral composition.

The zone has a mixed industrial base and is home to cement, steel, paper and vegetable oil manufacturing – some of which have high thermal energy demands and significant process emissions. Companies such as Xuan Mai Paper, A Chau Steel and FICO Tay Ninh Cement anchor the zone's industrial operations. These firms operate large-scale thermal systems for their processes, such as billet rolling and industrial paper drying, which rely heavily on coal, natural gas and oil.

Dong Nam Industrial Zone

Dong Nam IZ, located in Cu Chi District and operational since 2008, spans 342 ha with a relatively low tenant density: only 39 enterprises, but each of significant scale. It provides employment to approximately 20,000 workers, with a sectoral focus on advanced manufacturing and export-oriented production.

Despite its lower project count, Dong Nam ranks second in energy use across HCMC's industrial zones, due primarily to its role as a solar panel production hub.The presence of electronics and solar panel manufacturing creates a unique profile: one driven by low-carbon product potential but also characterised by the need for a large, consistent electricity supply.

Table 3 below summarises the sectoral profiles of the five case study industrial zones. Together, these zones represent most of the city's industrial energy use and GHG emissions, and their contrasting sectoral mixes highlight the need for differentiated, place-based interventions. Each zone is defined by its industrial specialisation and the presence of one or more energy-intensive anchor enterprises, or key energy users. These are vital actors due to their scale of energy consumption and influence over supply chains. The next section presents a more granular analysis of the zones' energy consumption patterns and emissions profiles – insights that are critical for identifying targeted, high-impact decarbonisation interventions.

TABLE 3: Summary of case study industrial zones' sectoral profiles

INDUSTRIAL ZONE	CORE SECTORS	KEY ENERGY USERS
Tan Thuan EPZ	Automotive electronics, telecommunication, electrical equipment	Nidec, Furukawa, FPT
Tan Tao IZ	Footwear, plastics, metals	Pouyuen, RKW
Hiep Phuoc IZ	Cement, steel, paper, edible oils	Xuan Mai, A Chau Steel, Ha Long Cement
Dong Nam IZ	Solar panels, garments, packaging	First Solar, Worldon
Saigon Hi-Tech Park	Semiconductors, EMS, chemicals	Intel, Samsung, Air Liquide

4. Energy consumption and emissions profile of Ho Chi Minh City's industrial zones

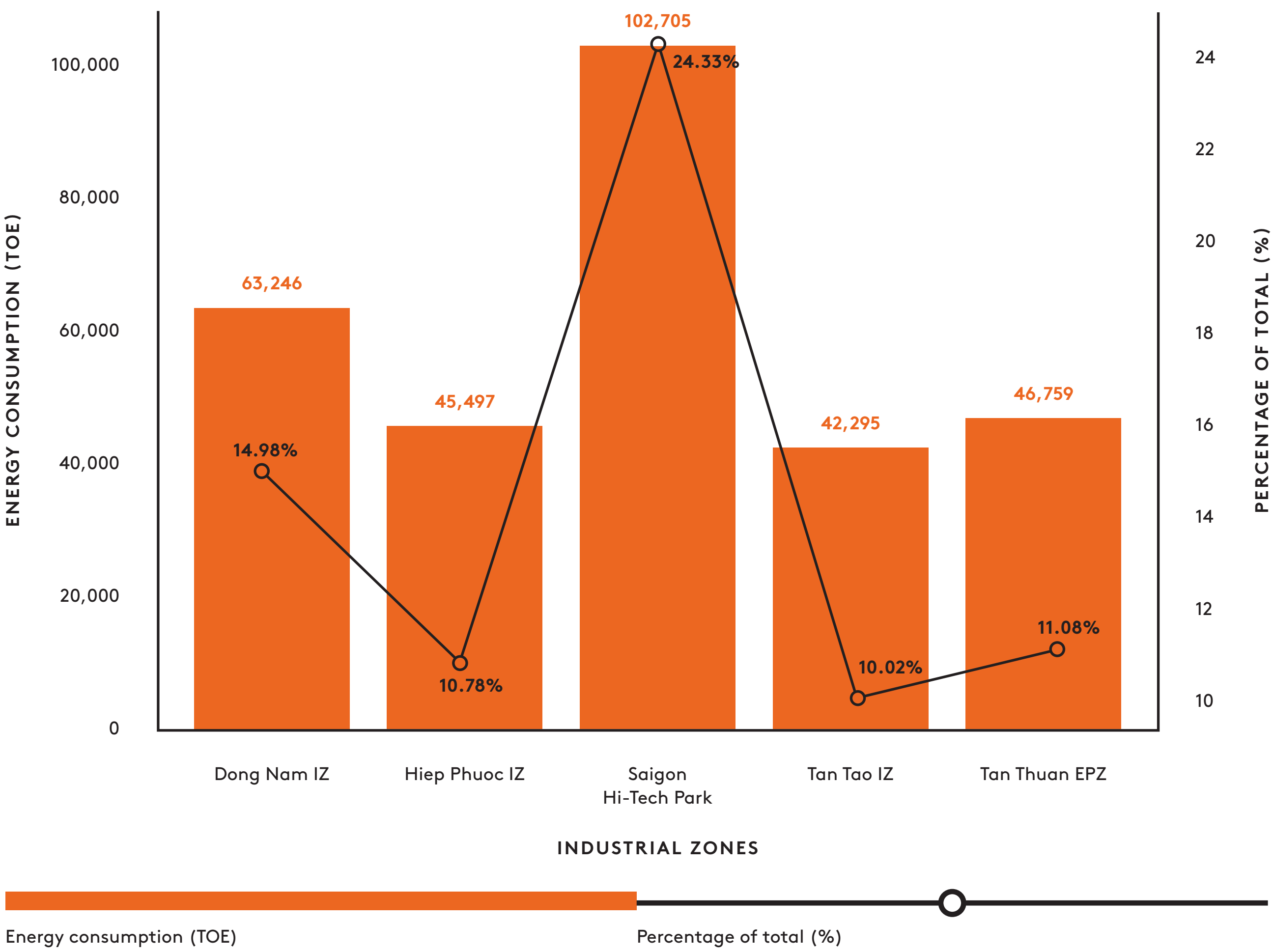
Understanding how energy is used, how it varies across sectors and zones, and where emissions are concentrated provides a foundation for effective transition planning for NZIPs.

This section presents an overview of energy use and emissions within the five selected industrial zones in HCMC, providing the analytical base for the industrial transition strategies discussed in Section 7.

4.1 Overview of industrial energy consumption

As mentioned previously, HCMC's five selected industrial zones – Saigon Hi-Tech Park, Dong Nam IZ, Hiep Phuoc IZ, Tan Thuan EPZ and Tan Tao IZ – account for approximately 70 per cent of total industrial energy consumption by key energy users. Saigon Hi-Tech Park leads with more than 100,000 tonnes of oil equivalent (TOE), representing over 24 per cent of the citywide total. Dong Nam IZ follows with more than 60,000 TOE, while the remaining three zones each consume between 40,000 and 45,000 TOE (Figure 1).

FIGURE 1: Case study industrial zones' energy consumption



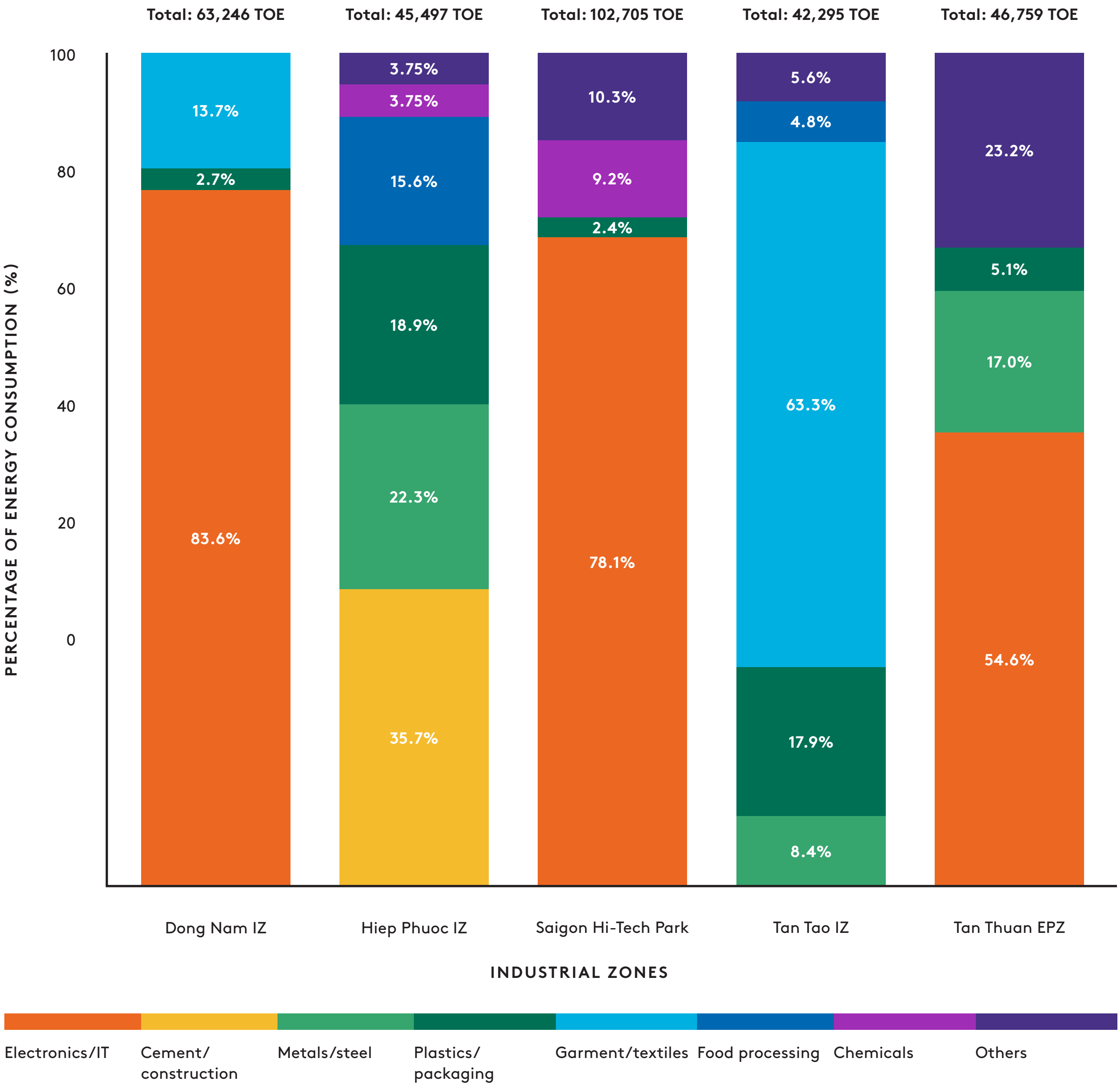
Source: Retrieved from Decision 1011/QĐ-TTg (Government of Vietnam 2024)

4.2

Sectoral energy use and key energy users

Industrial zones in HCMC exhibit clear patterns of sectoral specialisation, with each zone reflecting distinct energy intensities and decarbonisation opportunities. Figure 2 shows the energy consumption of sectors in the case study industrial zones – highlighting this sectoral specialisation.

FIGURE 2: Sectoral breakdown of energy consumption in the case study industrial zones



As seen in Figure 2, Saigon Hi-Tech Park and Dong Nam IZ are driven by the electronics and IT sectors, which account for 78.1 per cent and 83.6 per cent of their total energy use respectively. These zones – home to major energy users such as Intel, Samsung and First Solar – are highly energy-intensive and well suited for renewable energy procurement, energy efficiency upgrades and participation in low-carbon global value chains.

Hiep Phuoc IZ has a more diversified and fossil fuel-reliant energy profile, with cement, steel and food processing making up the bulk of consumption. Cement production alone accounts for approximately 35.7 per cent of energy use in the zone. Sectors that depend on fossil fuels may present high process and thermal energy demands, requiring complex decarbonisation interventions such as fuel switching, carbon capture and waste heat recovery. Sectoral decarbonisation levers will be discussed more in Section 5.

Tan Tao IZ is largely dominated by footwear manufacturing, with Pouyuen Vietnam accounting for 59 per cent of total energy use. Heat-intensive processes such as moulding and drying drive its energy demand, highlighting the potential for rooftop solar, process efficiency and low-emissions thermal systems. In contrast, Tan Thuan EPZ features a more balanced mix – electronics (54.6 per cent), metals (17 per cent) and various light industries – making it a good candidate for shared infrastructure, energy efficiency programs and aggregated renewable electricity procurement.

While in zones like Dong Nam IZ, energy is concentrated in a few high-load enterprises, Tan Tao IZ, Hiep Phuoc IZ and Tan Thuan EPZ display a more distributed consumption pattern, requiring broader tenant engagement. Together, these differentiated sectoral profiles highlight the importance of place-based and sector-specific decarbonisation strategies – aligned with each zone's technological base, production processes and export orientation.

4.3 Energy profiles of case study industrial zones

This section presents a detailed analysis of the energy composition and emissions across the five selected industrial zones. Table 4 shows that key energy users predominantly use grid-supplied electricity in all five industrial zones, with electricity accounting for 89 per cent to 99 per cent of their total energy use. Notably, Tan Tao and Dong Nam industrial zones use the highest electricity shares at 99 per cent and 98 per cent respectively. Even in zones with larger industrial footprints, such as Saigon Hi-Tech Park and Hiep Phuoc IZ, electricity still represents over 90 per cent of total energy consumption.

The analysis presented in Table 4 uses key energy user data derived from Decision 1011/QĐ-TTg and electricity consumption data from Vietnam Electricity (EVN). Grid emissions were calculated using published energy consumption figures and emissions factors from 1726/BĐKH-PTCBT (Government of Vietnam 2024). Electricity consumption was calculated using conversion factors from multiple sources, including Official Letter 3505/BCT-KHCN and interviews with experts from Electric Power University. This was then used to calculate other fuel consumption and the share of electricity used.

TABLE 4: Case study industrial zones' energy use and grid emissions in 2023

Industrial zone	Sectors	Electricity consumption (kWh)	Grid emissions (tCO_2)	Electricity consumption (TOE)	Total energy consumption (TOE)	Other fuels (TOE)	Electricity share (%)
Saigon Hi-Tech Park	Electronics, IT, semi-conductors	614,595	405,141	94,832	102,705	7,873	92
Dong Nam IZ	Solar panels, garments, packaging	400,233	263,833	61,756	63,246	1,490	98
Tan Tao IZ	Footwear, plastics, textiles, food	272,442 *	179,594	42,038	42,295	257	99
Tan Thuan EPZ	Electronics, automotive, telecom	270,202 *	178,117	41,692	46,759	5,067	89
Hiep Phuoc IZ	Cement, steel, chemicals, food	285,213	188,012	44,008	45,497	1,489	97

*Note: Electricity consumption data based on consultation with EVN and Electric Power University.

The key energy users' high electricity consumption across all selected industrial zones reflects a clear dependence on grid-supplied power. This suggests:

+ a manufacturing focus on downstream processes such as finishing and assembly, with limited primary production activities
+ minimal use of high-temperature, fossil fuel-based industrial processes traditionally associated with heavy industries.

Residual energy demand (1 to 11 per cent) likely includes diesel for backup generation, liquefied petroleum gas (LPG) for heating and natural gas for select thermal processes. Detailed site-level surveys are required to confirm and quantify these non-electricity fuel uses.

Electricity use in heavy industry sectors

While most cement and steel production uses fossil fuels to generate heat, enterprises in Hiep Phuoc IZ exhibit unusually high electricity-to-total-energy ratios.

Hiep Phuoc's steel industry configuration

Steel is primarily manufactured through two main processes. The BF-BOF route (Blast Furnace-Basic Oxygen Furnace) uses iron ore and coal to produce pig iron, then refines it into steel – this method is highly carbon-intensive. In contrast, the EAF (Electric Arc Furnace) route melts recycled scrap steel using electricity, offering a significantly lower-emission pathway, especially when powered by renewable energy. A Chau Steel (Thep A Chau) in Hiep Phuoc IZ uses EAF methods to produce steel, eliminating the need for coal and instead resulting in high-grid electricity consumption.

Hiep Phuoc's cement industry configuration

Cement is manufactured through a high-temperature process involving two main stages. First, limestone and clay are heated in a kiln to around 1,450°C to produce clinker, releasing significant carbon dioxide (CO_2) from both fuel combustion and the calcination of limestone. The clinker is then cooled, mixed with gypsum, and ground into powdered cement – a process that accounts for over 90 per cent of the industry's emissions. Most of the thermal energy used by the cement industry is in producing clinker, however, the clinker for cement facilities in Hiep Phuoc is produced offsite in Northern Vietnam. Hiep Phuoc's cement facilities instead function solely as grinding stations, with electricity powering the grinding of clinker into cement via ball mills and separators.

4.4 Emissions profiles of case study industrial zones

The five industrial zones collectively account for an estimated 769,285 tCO_2e per year. Saigon Hi-Tech Park is the largest emitter, contributing 24.3 per cent of HCMC's industrial emissions, followed by Dong Nam IZ (15 per cent), Tan Thuan EPZ (11.1 per cent), Hiep Phuoc IZ (10.8 per cent) and Tan Tao IZ (10 per cent). Together, these zones represent over 71 per cent of HCMC's total industrial emissions.

TABLE 5: Estimated annual emissions of key energy users (KEUs) in industrial zones in 2023

INDUSTRIAL ZONE	ENERGY (TOE)	EMISSIONS (TCO_2E)	SHARE OF HCMC'S INDUSTRIAL EMISSIONS (%)
Saigon Hi-Tech Park	102,705	262,925	24.3
Dong Nam IZ	63,246	161,910	15.0
Tan Thuan EPZ	46,759	119,703	11.1
Hiep Phuoc IZ	45,497	116,472	10.8
Tan Tao IZ	42,295	108,275	10.0
TOTAL	**300,502**	**769,285**	**71.2**

*The emissions factor of 2.56 tCO_2 per TOE is retrieved from the MOIT Grid Emissions database.

4.5 Considerations and insights for key industrial transition levers

Given that electricity accounts for 89 to 99 per cent of total energy use across key energy users in industrial zones, prioritising electricity-focused decarbonisation strategies can achieve significant emissions reductions. These include onsite rooftop solar deployment, direct procurement of renewable electricity through Power Purchase Agreements (PPAs) and investment in energy efficiency through equipment upgrades and smart energy management systems. The zones' high reliance on grid electricity also means they will benefit significantly from national grid decarbonisation – evidenced by the grid emissions factor improving from 0.6766 to 0.6592 tCO_2/MWh between 2019 and 2023. To inform precise decarbonisation roadmaps, enterprise-level energy audits are essential to map non-electricity fuel use, efficiency gaps and onsite renewable energy potential.

A common thread across all zones is the importance of both zone-level and firm-level energy interventions. The insights gained from evaluating the industrial zones' profiles and commonalities is built on in Section 5, which looks at industrial transition interventions across the sectors found in the case study zones.

5. Key industrial transition levers for net zero industrial precincts

This chapter builds on the sectoral composition and energy profile of HCMC's industrial zones to explore the predominant industrial transition levers and associated technologies.

We assessed the transition readiness and decarbonisation potential at a sectoral level, informed by the international best practices for industrial transition included in Section 6 and the Appendix.

The decarbonisation levers introduced in this section are informed by the following frameworks, standards and roadmaps:

+ The Eco-Industrial Park Initiative for sustainable industrial zones in Vietnam (UNIDO 2019)
+ The ResponsibleSteel International Production Standard (ResponsibleSteel 2022)
+ The United States' *Industrial decarbonization roadmap* (DOE 2022)
+ The United Kingdom's *Industrial decarbonisation and energy efficiency roadmaps to 2050* (UK Department of Energy & Climate Change and Department for Business, Innovation & Skills 2015)
+ The *Industry decarbonization roadmaps for Indonesia* (Lu et al. 2024)
+ The *Global Efficiency Intelligence Industrial supply chains decarbonization in Southeast Asia* report (Hasanbeigi & Springer 2023)
+ World Economic Forum Industrial Clusters Program (WEF 2025a).

5.1 Sector-specific industrial transition levers

We focus on six sectors that dominate industrial energy use and GHG emissions: iron and steel, cement, vehicles and machinery, plastics, textiles, garments and footwear, and electronics. Each sector varies in terms of emissions profile, energy intensity, technology maturity, market exposure, and transition potential. Therefore, they provide a representative landscape of HCMC's industrial transition challenges and opportunities.

Iron and steel

Sector overview

Steel accounts for an estimated 7 per cent of global GHG emissions (IEA 2020). According to the International Energy Agency, the sector's emissions need to fall by 90 per cent by 2050 to align with a global net zero pathway (IEA 2021).

Vietnam's steel sector is a core contributor to export revenue and industrial emissions. In 2024, Vietnam produced over 21.98 million tonnes of crude steel, an increase of 14 per cent compared to 2023, while domestic use and external sales reached 21.41 million tonnes, also up 14 per cent year on year. Total finished steel production stood at 29.44 million tonnes (a 6.1 per cent increase), with steel exports reaching approximately 12.62 million tonnes (up 13.47 per cent), generating export revenues of US$9.08 billion (up 8.78 per cent) (Vietnam Steel Association 2024).

In Vietnam, steel demand remains high, driven by rapid urbanisation and infrastructure development. The construction sector alone accounts for nearly 89 per cent of domestic steel consumption. While domestic production capacity continues to expand, the sector also faces growing pressure from import competition and global trade barriers.

Crude steel is primarily produced in northern and central Vietnam. In contrast, steel production in HCMC is mostly recycled steel; the city is also one of the key hubs for downstream crude steel processing. This includes the transformation of crude steel into semi-finished products such as billets, blooms and slabs, followed by further processing into structural steel, pipes, moulds and finished goods.[2] These finished products are either exported or used domestically in the manufacture of machinery, consumer goods and construction materials.

Downstream steel activities in HCMC are concentrated in key industrial zones such as Hiep Phuoc IZ and Tan Thuan EPZ, and they serve both domestic demand – especially from the construction sector – and export markets. While the city does not produce crude steel, the steel products manufactured in its industrial zones are essential for value-added supply chains and infrastructure projects in Vietnam. These downstream processing facilities can also help shape demand for low-carbon crude steel through procurement agreements, positioning HCMC as a strategic driver of low-carbon product demand in the sector.

Barriers to low-emissions steel and steel products in Vietnam

Steel sector decarbonisation in Vietnam faces a set of structural and market constraints that limit near-term progress. The limited availability of low-carbon fuels, high capital investment requirements, limited availability of green crude steel in the global market, and insufficient transparency around emissions data and performance benchmarks remain key barriers. At the same time, market signals are fragmented – while exporters are increasingly exposed to emerging regulations such as the EU's CBAM, domestic buyers have limited capacity or willingness to absorb the potential price premiums associated with verified green steel.

2 Typically, the steel value chain begins with the production of crude steel using either iron ore (via blast furnace) or recycled steel scrap (via electric arc furnace), often supplemented by imports. Crude steel production – primarily located in Central Vietnam and dominated by domestic firms – is energy- and emissions-intensive. The crude steel is then processed into finished steel products, largely in Southern Vietnam, where firms with foreign direct investment play a significant role.

Critical enabling infrastructure, including competitively priced renewable energy, carbon capture and utilisation technologies, and green hydrogen, remains at early stages of development, constraining the feasibility of deep emissions reductions in primary steelmaking. Unlocking progress will require coordinated investment in supply chain visibility, international standards alignment and demand-side incentives that support a viable green steel market both domestically and in key export sectors.

BOX 1

What is low-emissions steel?

Despite increasing appetite for low-carbon steel manufacturing, the frequently used term 'green steel' is poorly defined. Commonly, it is used to describe steel produced with lower GHG emissions than conventional steel, but the precise emissions intensity is not necessarily specified. As it stands, steel may be labelled 'green' when only a small amount of the process is less carbon-intensive (SSAB 2025). Other ESG considerations may also be considered.

Other terms such as 'low-emissions' or 'lower-emissions' steel may also be used. SteelZero, which is a global corporate initiative with many corporate members, defines lower-emissions steel as steel produced by a steelmaking site where the steelmaker has a science-based emissions target. 'Lower-emissions steel' (ResponsibleSteel Decarbonisation Progress Level 2 threshold) is an intermediate step in responsible steel, requiring steel companies to have high visibility of their supply chain links, sourcing a large proportion of their input materials from suppliers with minimum ESG performance (Climate Group 2024). The crude steel emissions intensity for Progress Level 2 is 2.00 tCO_2e per tonne of crude steel (assuming no scrap is used as input). The global average 2023 emissions intensity for blast furnace-based production of steel was 2.32 tCO_2e per tonne of crude steel (World Steel Association 2024).

There are several potential pathways to decarbonise steel. HYBRIT technology, which uses renewable energy and hydrogen, has near-zero emissions (HYBRIT Development AB 2025). However, other pathways, such as natural gas-based direct reduction of iron, see only a partial reduction of emissions intensity. The steelmaking sector has been slow to reduce its emissions for many reasons, including the fact that steel plants are highly capital-intensive, near-zero emissions energy demand is considerable and there are limited examples of commercial-scale deployment to date. For this reason, emissions standards and benchmarks for crude steel are often relatively high, with the expectation that standards will become tighter over time. Despite these barriers, companies in Vietnam and elsewhere in the world are rising to the challenge.

Pioneer low-emissions steel companies in Vietnam

+ VAS Group: one of only two steel plants in Vietnam that has an Environmental Product Declaration certification for producing steel with an emissions intensity below 0.75 tCO_2 per tonne of steel (SteelRadar 2024).
+ Hoa Phat Group: the largest steel producer in Southeast Asia targeting 'green steel' with an investment roadmap to reduce GHG

emissions and aiming to reach carbon neutrality. Early this year, Hoa Phat's GHG inventory was certified according to the International Organisation for Standardisation (ISO) 14064-1:2018 and ISO 1067:2018. It is also taking action to reduce emissions, including using excess heat for electricity generation, optimising production processes and exploring cooperation with international partners to research and implement carbon-neutral technologies (Hoa Phat Group 2023).

+ Xuan Thien Group: its Xuan Thien Nam Dinh steel plant project plans to use low-carbon steel technologies, including Direct Reduced Iron (DRI) and EAF technology powered by wind energy (Global Energy Monitor n.d.).

Global low-emissions steel manufacturing

+ A green steel project has been announced in Thailand by Meranti, which will use green hydrogen and a renewable energy-powered EAF (Meranti Green Steel n.d.).
+ In January 2024, Malaysia-based Esteel Enterprise Sabah Sdn Bhd launched a RM20 billion (AU$7.2 billion) green steel project at the Sipitang Oil and Gas Industrial Park. Local news outlets reported that the three-phase project at the Sipitang Oil and Gas Industrial Park will use natural gas in the production process instead of coal, which will lower carbon emissions by 70 per cent (SEAISI 2024).
+ SSAB's HYBRIT steel-making technology uses low-carbon hydrogen[3] to reduce iron ore, resulting in near-zero emissions steel. A pilot plant in Sweden was completed in 2020, demonstrating safety, functionality and performance of the technology (SSAB).

Opportunities for low-carbon steel manufacturing in HCMC

Decarbonising the steel manufacturing sector depends on a mix of efficiency improvements, electrification, renewable energy and procurement strategies aligned with emerging green market standards.

Near-term opportunities include improving energy efficiency through regenerative or recuperative burners, optimised furnace scheduling and real-time automation. Integrating smart load controls can also enable demand response (DR) capability, enhance flexibility and support integration with intermittent renewable energy. Where technically and commercially viable, electrifying processes such as rolling and finishing offers a clear emissions reduction pathway – particularly when paired with renewable electricity sourced through rooftop solar or Vietnam's Direct Power Purchase Agreement (DPPA) mechanism.

Beyond operational improvements, steel processors in HCMC can influence upstream decarbonisation by procuring low-emissions steel produced via EAFs or hydrogen-based DRI. By applying digital Measurement, Reporting, and Verification (MRV) tools, local manufacturers can accelerate the development of a verified green steel market and send critical demand signals to domestic suppliers. Establishing emissions performance thresholds and participating in sector-wide certification schemes will be key to shifting national production standards and positioning Vietnamese steel competitively in low-carbon export markets.

3 Low-carbon hydrogen refers to hydrogen produced using processes that result in significantly lower GHG emissions compared to conventional methods, including green hydrogen (produced via electrolysis using renewable electricity) and blue hydrogen (produced from fossil fuels with carbon capture, utilisation and/or storage).

Cement

Sector overview

The cement sector is one of the most emissions-intensive industries globally and in Vietnam – accounting for roughly 8 per cent of global CO_2 emissions. Most of these emissions stem from producing clinker through high-temperature processes as well as the calcination of limestone, which emits process emissions.

Vietnam is among the world's top producers of cement, with production rising from 56 million tonnes (2010) to 118 million tonnes (2022). Clinker – the primary source of emissions – is not produced in HCMC. Instead, the city primarily hosts cement grinding and blending, where electricity is used to grind clinker and mix additives like gypsum or fly ash. While substantial energy is used in downstream cement grinding and blending, these are a much smaller portion of the supply chain emissions than clinker production.

Total investment in the sector is estimated at US$20 billion, with a combined production capacity of 122 million tonnes per year. In 2024, the industry exported over 29.94 million tonnes of cement and clinker, generating more than US$1.15 billion in revenue – representing a decline of over 4 per cent in volume and nearly 14 per cent in export value (The Hai 2024).

Barriers to low-emissions cement

Upstream clinker production has the most significant barriers to decarbonisation. The sector remains heavily reliant on coal for clinker production, and persistently low clinker prices continue to erode margins, discouraging investment in low-carbon innovation. The economic incentive to switch to alternative fuels or invest in cleaner technologies is further weakened by the absence of carbon pricing or penalties for emissions-intensive practices. Additionally, the depletion of high-quality limestone reserves places long-term pressure on resource sustainability, while the availability of certified low-emissions cement products remains limited due to fragmented standards and a lack of third-party verification systems.

Because clinker production is technically challenging to decarbonise, low-hanging fruit in the supply chain include using supplementary cementitious materials (SCMs), which are finely ground materials including industrial by-products, to reduce the amount of clinker needed per kilogram of concrete. This reduces the embodied emissions of the final products (such as buildings) and makes cement and concrete an opportunity for increased circularity in industrial precincts. But infrastructure limitations impede progress. For example, the logistics required to co-process alternative fuels or transport SCMs at scale remain underdeveloped. The lack of national policy mandates or incentives for using SCMs discourages widespread adoption, despite their proven emissions-reduction benefits.

Access to capital for emissions-reducing technologies is another major constraint, especially for mid-sized and smaller players. Financial institutions often lack clear frameworks to evaluate and support industrial transition projects in the cement sector, making long-term investments in retrofits or low-carbon innovation difficult to secure.

From a regulatory standpoint, the sector operates in an environment where international efforts are being made to set and enforce emissions standards, such as the EU's CBAM or the First Movers Coalition's benchmarks. As a result, exporters face potential market access challenges in carbon-constrained regions.

Lastly, demand-side inertia remains a persistent hurdle. In local construction markets, price often outweighs environmental performance, and green procurement policies are still emerging. This creates a disconnect between the growing availability of lower-emissions products and the market's willingness to adopt them at scale.

BOX 2

What is low-emissions cement?

There is limited consensus on what 'low-emissions cement' might encompass. The First Movers Coalition members make a commitment to purchase lower-emissions cement or concrete. The emissions intensity of cement they target is 184 kilograms of carbon dioxide equivalent ($kgCO_2$) per tonne of cement (WEF 2024), compared with a global average emissions intensity of 600 $kgCO_2$ per tonne of cement (IEA 2023).

Cement is a 'late to abate' sector, partly because of the low commercial maturity of some technologies to reduce emissions from clinker production. While there are projects around the world focused on decarbonising clinker, many are focused on lower-hanging fruit, including using SCMs. Decarbonising the entire supply chain will require interventions along the entire cement and concrete value chain (Mission Possible Partnership 2023).

Pioneer low-emissions cement companies in Vietnam:

+ Fico Tay Ninh Cement has launched a green-labelled cement, with emissions of between 350–600 $kgCO_2$ per tonne of cement, compared with the 850 $kgCO_2$ per tonne of Portland cement – the most common type of cement used globally (Fico YTL 2024).

Global low-emissions cement manufacturing:

+ In Thailand, SCG International targets the market for green construction materials with its low-carbon structural cement. It uses alternative fuels such as biomass and renewable energy sources to reduce emissions across its supply chain (SCG International). SCG's third generation of low-carbon cement is intended to reduce GHG emissions by 40–50 per cent (Bangkok Post 2025).
+ Navrattan Group in India is manufacturing cement with lower-carbon emissions, claiming that its air-curing technology allows developers to use 15 per cent less of their product when compared with traditional cement (The Hindu 2024). Navrattan claims that its Navrattan Green Crete uses 90 per cent disposed and waste materials, slag and fly ash.

Opportunities for low-emissions cement in HCMC

HCMC's cement sector presents several opportunities to drive emissions reductions, particularly in downstream activities. Downstream grinding operations can be decarbonised through the adoption of renewable electricity, enabling a direct reduction in scope 2 emissions. This is especially feasible where firms can invest in rooftop solar or access offsite renewables via Vietnam's DPPA mechanism. Another high-impact lever is the increased use of SCMs – such as slag, fly ash, limestone or calcined clays – to lower the clinker-to-cement ratio. By reducing the reliance on high-emissions clinkers, these materials not only cut carbon intensity but also support circularity by repurposing industrial by-products.

HCMC's cement firms are strategically positioned to accelerate the market uptake of low-clinker blends through green procurement standards. They also serve as a testbed for integrating renewables into industrial energy systems. This local leadership can help stimulate upstream changes in clinker production and shape national supply chains toward lower-emissions outcomes. These upstream changes could include shifts away from coal-based energy sources toward alternatives such as biomass, waste-derived fuels or hydrogen, as well as carbon capture and utilisation technologies as a longer-term solution for mitigating process emissions tied to limestone calcination.

Vehicles and machinery

Sector overview

The automotive and machinery industries are growing contributors to Vietnam's industrial base. Vietnam's automotive manufacturing sector employs approximately 170,000 workers across over 400 enterprises. Most of these are foreign-invested enterprises and include more than 40 automobile assembly companies, 45 firms producing chassis and vehicle bodies and 214 component manufacturers. Vietnam produces over 350,000 cars and three million motorcycles annually (National Statistics Office of Vietnam 2023).

HCMC hosts component makers (e.g. electronics, wiring, moulds) and limited vehicle assembly (e.g. Mercedes-Benz in Go Vap). The machinery sector spans industrial and agricultural equipment, often produced in Tan Thuan, Tan Tao and Hiep Phuoc zones. Vehicle and machinery manufacturing is capital-intensive, and emissions primarily come from materials processing, casting and painting. The sector's energy intensity is medium to high, with electricity primarily consumed for machining, stamping, Computer Numerical Control (CNC) operation and automated assembly, with moderate thermal use in component processing.

Barriers to low-emissions vehicles, machinery and engines

The shift toward low-emissions manufacturing in Vietnam's vehicles and machinery sector faces several constraints. High retrofit costs and limited access to concessional finance make it difficult for firms to upgrade to energy-efficient and low-carbon technologies. Grid infrastructure is often inadequate for the demands of electrified production and electric vehicle component manufacturing, while uncertainty around renewable energy access adds further complexity.

Workforce limitations also constrain progress. There is a shortage of skilled labour in areas such as electric vehicle systems, automation and battery technologies, with training systems yet to fully adapt. At the same time, domestic firms face strong competition from foreign manufacturers with greater research and development (R&D) capacity and global supply chain integration.

Market development for electric vehicles remains nascent, held back by high vehicle costs, limited consumer financing and underdeveloped charging infrastructure. Public procurement and fleet electrification are still in early stages, dampening demand signals.

Finally, the domestic supply chain is fragmented, with reliance on imported components and limited coordination between upstream and downstream actors. This weakens the sector's ability to localise value creation and respond to global low-carbon supply chain shifts.

Opportunities for low-emissions manufacturing of vehicles, machinery and engines in HCMC

The sector offers multiple avenues for emissions reduction and alignment with global decarbonisation trends. Sourcing renewable electricity – through rooftop solar or Vietnam's emerging DPPA mechanism – can significantly cut operational emissions, particularly for energy-intensive manufacturing processes. Incorporating green materials such as low-emissions steel and aluminium and recycled plastics helps reduce the embodied carbon of vehicles and machinery from the outset.

Energy efficiency gains are also achievable through the adoption of smart controls, automation and robotics, which reduce idle time and minimise energy waste on production lines. In parallel, sustainable design practices, including modular construction, battery reuse and product recycling strategies, can extend equipment life and reduce lifecycle emissions.

Beyond manufacturing, the sector supports broader transport decarbonisation by enabling domestic production of electric vehicle components and charging infrastructure. Vietnamese firms like Vinfast are advancing electric vehicle development, while international leaders such as BMW, Volvo and Ford are setting the pace globally by adopting green steel, integrating circular-economy principles and requiring full emissions disclosure across their supply chains. These shifts offer clear pathways for Vietnamese manufacturers to enhance competitiveness and enter emerging low-carbon markets.

Plastics

Sector overview

Vietnam's plastics industry is a vital part of the country's manufacturing ecosystem, with strong linkages to packaging, consumer goods and textiles. In HCMC, plastics manufacturing is well established across multiple industrial zones and includes both upstream material production and downstream processing. Nationally, the sector employs approximately 380,000 workers, with an annual revenue of US$30 billion and exports valued at US$6.5 billion (National Statistics Office of Vietnam 2024; The Saigon Times 2024).

Vietnam produces approximately 10 million tonnes of plastics per year (Dinh Dai 2025). The sector is diverse, encompassing packaging materials, industrial films and automotive components. HCMC's plastics industry also supports downstream garment and textile sectors, producing synthetic fibres and technical fabrics. This interdependence creates opportunities for vertically integrated decarbonisation strategies. While plastic manufacturing is moderately capital-intensive, the sector is under growing pressure from global and domestic policy shifts to reduce single-use plastic and improve recycling.

The sector is highly energy-intensive, depending heavily on thermal energy for extrusion and moulding, and on electricity for motors and cooling. Major efficiency opportunities lie in heat recovery, compressor optimisation, and replacing outdated heating systems with cleaner technologies.

Barriers to decarbonising the plastics sector

Vietnam's plastics industry remains constrained by several systemic and structural challenges. High capital costs associated with transitioning to low-emissions production – such as electrified processing equipment or advanced recycling systems – pose a significant barrier, especially for small and medium-sized enterprises. Existing plants are often locked into fossil fuel-based process heat, and retrofitting is both technically and financially demanding.

Infrastructure gaps in waste segregation, collection and recycling undermine efforts to advance product circularity. A lack of an integrated recycling system limits feedstock availability for mechanical and chemical recycling, while end-of-life emissions remain largely unmanaged. Policy clarity around bioplastics – particularly standards, labelling and composting guidelines – is still emerging, leaving producers uncertain about long-term viability.

In addition, lower-carbon inputs – such as biomass, renewable electricity or green hydrogen – are not consistently available or affordable at scale, especially in industrial zones outside major urban centres. Without targeted regulatory incentives or clear carbon-pricing mechanisms, there is little market pressure to shift from virgin fossil-based plastics to more sustainable alternatives.

Opportunities for decarbonising the plastics sector in HCMC

HCMC is well positioned to become a leader in low-carbon plastics manufacturing, particularly through targeted interventions within its industrial precincts. Process electrification – particularly for moulding and extrusion – can drive significant emissions reductions when paired with rooftop solar or renewable power procured via DPPAs. HCMC's dense industrial footprint and existing policy focus on clean energy provide a favourable environment for these shifts.

Promoting greater circularity is another high-impact lever. Scaling up mechanical and chemical recycling infrastructure, coupled with clear demand signals from major buyers, can reduce dependence on virgin feedstocks and support the development of local waste collection and processing value chains. Supporting policies – such as extended producer responsibility, minimum recycled content standards and green procurement guidelines – would further accelerate this transition.

Bioplastics also present a potential pathway for lower-carbon production, particularly for short-lived packaging applications. While questions around scalability and end-of-life management remain, pilot projects in HCMC could help test standards and build a viable domestic market. As global brands push for supply chain transparency and lower embedded carbon, local producers who embrace these opportunities stand to improve export resilience and enhance competitiveness in emerging sustainable materials markets.

Textiles, garments and footwear

Sector overview

Textiles and footwear represent one of Vietnam's largest industrial employers (approximately 3.5 million workers) and export commodities (Lao Dong 2024). HCMC is a key node in this supply chain, hosting manufacturing for apparel, accessories and sportswear. Total investment in the sector, by FDI corporations, is estimated to exceed US$37 billion. In 2024, revenue was US$54 billion, with US$44 billion in exports (Song Ha 2024).

The bulk of Vietnam's textile sector operates in a cut-make-trim model, with limited local value added due to low domestic content (around 40 per cent). Similarly, most manufacturing in HCMC is moderate in energy intensity, involving cutting, sewing and finishing, although energy-intensive and water-intensive processes like dyeing and washing also occur. The footwear sector comprises various heat-intensive processes, such as moulding and drying, and accounts for a significant portion of energy use in some industrial zones, such as Tan Tao (around 59 per cent).

With global fashion brands facing growing scrutiny on emissions, the textiles and footwear industry is under pressure to decarbonise across its entire supply chain, including energy use, materials and water consumption.

BOX 3

What are sustainable textiles?

According to the United Nations Environment Programme, a single pair of jeans requires 3,781 litres of water and leads to around 33.4 $kgCO_2e$ (UNEP 2018). Textiles manufacturing is emissions-intensive and has other significant environmental impacts, which consumers are increasingly conscious of.

While there is no established standard and definition of what 'sustainable textiles' are, Textile Exchange, a global not-for-profit dedicated to reducing the fashion and textile industry's climate impacts, defines sustainable textiles as 'a fiber or raw material that delivers consistently reduced impacts and increased benefits for climate, nature and people against the conventional equivalent, through a holistic approach to transforming production systems' (Textile Exchange 2023). This definition is endorsed by the Fashion Industry Charter for Climate Action (FICCA) Working Group, convened by the United Frameworks Convention on Climate Change (UNFCCC).

FICCA is a group of companies committed to achieving net zero in the fashion industry by 2050. It has set industry-wide commitments that, if met, will have a significant impact on decarbonisation outcomes in HCMC, including:

- Set scope 1, 2 and 3 emissions targets approved by the Science-based Targets Initiative.
- Secure 100 per cent renewable electricity with minimal environmental or social impact.
- Create engagement and incentive mechanisms for all relevant supplier sites to implement approved science-based targets by 2025.
- Phase out coal from owner and supplier sites as soon as possible and by 2030 at the latest, including no new coal by 2023.

The Higg Materials Sustainability Index (MSI) provides a baseline for comparing the environmental impacts of textiles. The MSI is a data-driven industry best-practice tool that considers the energy, water and chemicals used to make materials, as well as waste generation and water pollution. It represents about half of the apparel and footwear industry and more than US$845 billion of combined annual revenue (Cascale n.d.).

Despite its prevalence, only 31–40 per cent of FICCA signatories who have released a corporate climate transition plan (42 companies) used the MSI. Furthermore, only six out of the 42 FICCA signatories are from the Asia-Pacific region (UNFCCC 2023).

Barriers to decarbonising the textiles, garments and footwear sector

Vietnam's textiles, garments and footwear sector faces a range of interlinked barriers to decarbonisation. Fragmented supply chains, characterised by a high prevalence of small and medium-sized enterprises (SMEs) operating at different stages of production, limit coordination and uptake of low-emissions practices. Many manufacturers operate under cut-make-trim contracts with limited control over design, inputs or procurement, reducing their ability to implement comprehensive emissions reduction strategies.

Access to capital is a major constraint, particularly for factory upgrades related to heat recovery, energy management or renewable energy systems. Financing mechanisms tailored to the sector remain limited, and many firms lack the collateral or credit history needed to secure loans.

Water-intensive processes such as dyeing and finishing further complicate investment prospects. In some provinces, concerns about water scarcity and pollution have resulted in regulatory restrictions on textile operations, constraining new investment and technology deployment.

Workforce capacity also presents a challenge. Skills gaps in areas such as energy efficiency, emissions monitoring and sustainable material sourcing slow the adoption of best practices, particularly among SMEs. Finally, evolving global compliance requirements,such as the EU's CBAM and stricter rules of origin, pose risks for export competitiveness unless supply chains can demonstrate lower embedded carbon and improved traceability.

Opportunities for decarbonising the textiles, garments and footwear sector in HCMC

HCMC, with its dense concentration of apparel and footwear manufacturers, has a strong foundation to be a leader in decarbonising the sector. Many facilities already operate electric machinery, creating a clear opportunity to decarbonise operations through renewable electricity procurement – either via rooftop solar or participation in Vietnam's DPPA scheme.

For facilities engaged in dyeing, finishing or other thermal-intensive processes, emissions reductions can be achieved through solar thermal installations, high-efficiency boilers and heat recovery systems. These measures are particularly suitable for integration into NZIPs, where shared clean heat infrastructure could deliver system-wide benefits.

Downstream interventions, such as increased use of recycled textiles and natural fibres, offer additional mitigation potential, particularly in reducing scope 2 emissions and aligning with ESG performance expectations from global buyers. Uptake of third-party sustainability standards such as the Higg MSI and Textile Exchange guidelines (see Box 3) can improve traceability, strengthen compliance with emerging regulations and open access to preferential markets.

Vietnamese firms are already conducting pilot projects that explore low-carbon textiles through energy optimisation, circular materials, and digital emissions tracking. These projects are supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the National Innovation Centre. International brands like Nike and Patagonia are expanding collaborative supplier programs that offer shared data, pooled renewables procurement and decarbonisation incentives. This provides a strategic window for Vietnamese textiles, garments and footwear manufacturers to position themselves as leaders in sustainability.

Electronics

Sector overview

Vietnam's electronics industry is its largest export sector, with two subsectors – phones and components, and computers and electronics – accounting for approximately one-third of Vietnam's total export value and employing around 1.3 million workers (VnExpress 2022). In 2024, the import value of electronics, computers and components in Vietnam reached US$107.1 billion, accounting for 28.1 per cent of the country's total imports. This is an increase of 21.7 per cent compared to 2023. Exports from this sector totalled US$126 billion in 2024.

HCMC-based electronics operations are primarily focused on assembly, high-precision manufacturing and R&D. Major players include Intel, Samsung, FPT, CMC, Foxconn and Luxshare. The sector is capital-intensive and depends on high-skilled labour and grid-connected energy for 24/7 production. The electronics sector accounts for most of the electricity consumption in some industrial zones, such as Saigon Hi-Tech Park (around 75 per cent).

While emissions per unit are relatively low compared to heavy industry, the scale of production and electricity dependence make the sector a significant contributor to industrial emissions.

Barriers to decarbonising the electronics sector

Vietnam's electronics sector, a cornerstone of national exports and a key anchor of foreign investment, faces several barriers to deep decarbonisation. The industry's rapidly growing electricity demand is currently met by a grid still heavily reliant on fossil fuels, making emissions reduction largely dependent on the pace of national energy transition. While rooftop solar presents a pathway to decarbonise operations, limitations in rooftop space, particularly in high-density industrial facilities, and lingering regulatory uncertainty around grid access and feed-in tariffs constrain uptake.

The capital costs of transitioning to low-carbon manufacturing are substantial. Upgrading cleanroom operations, integrating energy management systems and shifting to low-emissions inputs such as green semiconductors or recycled metals require long procurement cycles, technical expertise and substantial upfront investment. These challenges are amplified for domestic firms and SMEs with limited access to international finance or ESG-aligned credit facilities.

Workforce upskilling and reskilling is another hurdle. As global buyers push for full lifecycle carbon disclosure (scope 1, 2 and increasingly scope 3), Vietnamese manufacturers must build capacity not just in energy efficiency, but in traceability, data systems and ESG reporting. Without stronger regulatory guidance, harmonised emissions benchmarks and grid infrastructure upgrades, the sector risks lagging behind international competitors in meeting emerging sustainability standards.

Opportunities for decarbonising the electronics sector in HCMC

As a leading hub for electronics manufacturing and R&D, HCMC is well placed to advance low-carbon innovation in the sector. The city's integration into global supply chains, particularly through investments from firms such as Samsung, Intel and Apple, creates strong incentives for emissions disclosure and performance improvement. Procurement of offsite renewable energy via DPPAs, alongside targeted rooftop solar deployment, offers a viable path to reduce operational emissions.

Energy management systems and smart factory technologies can unlock near-term efficiency gains and serve as the foundation for ESG data tracking. These improvements also support supplier compliance with the growing expectations of multinational buyers, who are increasingly demanding verified emissions reporting and circularity metrics.

Beyond internal operations, the electronics sector plays a pivotal role in enabling economy-wide decarbonisation. HCMC-based firms are manufacturing components for renewable energy systems, battery technologies, electric vehicles and grid optimisation – positioning the city as both a contributor to and enabler of Vietnam's low-carbon transition.

Vietnam's inclusion in the 'China +1' manufacturing strategy further strengthens its opportunity to attract sustainability-driven investment (Source of Asia 2022). Global leaders like TSMC and Intel are committing to net zero pathways, creating a competitive incentive for Vietnamese suppliers to align with. By scaling energy procurement reforms, investing in skills and ESG systems, and improving access to clean energy infrastructure, HCMC's electronics sector can maintain its export advantage while contributing meaningfully to industrial transition goals.

5.2 Key industrial transition levers based on industrial zone profiles

In addition to sector-specific strategies, several decarbonisation levers can be applied across multiple industrial zones and value chains in HCMC. These cross-cutting interventions are high-impact opportunities that could be scaled, especially when supported by enabling infrastructure, coordinated governance, market creation strategies and targeted finance mechanisms.

BOX 4

Market demand for low-carbon products

The global regulatory landscape and evolving buyer expectations are reshaping market demand for low-carbon products across Vietnam's industrial sectors. The EU's CBAM, set to take effect in 2026, will place a carbon price on emissions-intensive goods like steel, impacting 27 per cent of Vietnam's steel exports and accelerating the need for low-carbon production strategies. In the cement sector, projected global market growth – from US$34.7 billion in 2025 to US$68.5 billion by 2032 – combined with domestic urbanisation is creating clear incentives for climate-aligned production. Electronics, Vietnam's largest export sector at US$102 billion in 2024, faces mounting pressure from multinational buyers such as Apple and Samsung to meet ESG standards, pushing suppliers toward low-emissions manufacturing. Similarly, the EU–Vietnam Free Trade Agreement (EVFTA) is embedding sustainability requirements into the textile and garment trade, influencing US$44 billion in exports.

These trends show that market demand is increasingly shaped by carbon regulation, supply chain transparency and climate risk disclosure. Effective market demand-creation strategies must therefore align industrial policy with decarbonisation targets through mechanisms such as green public procurement, carbon performance standards, preferential financing and product labelling – ensuring that Vietnamese industries remain competitive in the global shift toward low-carbon value chains.

Renewable electricity adoption remains the most immediate and cost-effective opportunity to reduce scope 2 emissions across all sectors. Industrial zones with high electrification rates, such as Tan Thuan EPZ, Dong Nam IZ and Saigon Hi-Tech Park are particularly well positioned to scale rooftop solar and participate in Vietnam's emerging DPPA framework for offsite renewable procurement.

Electrification of thermal processes offers a pathway to reduce direct (scope 1) emissions, particularly in plastics, footwear and food processing sectors. While high-temperature industrial heat currently presents technical challenges, electrifying medium-heat and low-heat applications such as moulding, dyeing and drying and powering them with renewable sources is increasingly feasible.

Green procurement and product standards can drive upstream and downstream emissions reductions. Voluntary and regulatory frameworks, such as environmental product declarations (EPDs), green labelling schemes and embedded carbon benchmarks, enable producers to align with export market expectations, differentiate products and catalyse clean supply chains.

Data and digital MRV systems are essential to support emissions transparency, compliance with international buyer requirements and access to green finance. Embedding digital monitoring, reporting and verification tools into energy systems, production lines and procurement platforms can create verifiable decarbonisation baselines across zones.

Heat decarbonisation and industrial waste reuse can significantly reduce emissions through energy and resource efficiency. Shared heat infrastructure, alternative fuels and potentially carbon capture technologies can reduce fossil fuel combustion in non-electricity-based processes, while waste management and circularity initiatives (such as industrial symbiosis) can reduce lifecycle emissions while lowering input costs and improving resilience.

While these cross-cutting levers provide a shared foundation for NZIPs, their application and impact vary significantly across HCMC's industrial zone with distinct sectoral concentrations, infrastructure capacities and energy profiles that shape the feasibility and sequencing of interventions. As such, their levels of readiness vary considerably. We illustrate how zone-specific characteristics can be leveraged to deploy tailored decarbonisation strategies that align with both local industrial realities and the city's broader net zero ambitions. These key decarbonisation levers require strong cross-sectoral governance and offer significant emissions reductions if executed at scale.

Saigon Hi-Tech Park

Saigon Hi-Tech Park is characterised by high electrification and spatial clustering of high-tech manufacturers, making it ideal for advanced energy solutions. Key transition opportunities include accelerated deployment of rooftop solar, substation upgrades to handle higher renewable loads and development of clean energy zones linked to R&D and high-value manufacturing. Its predictable load profiles and digital infrastructure make it well suited for demand response programs, grid optimisation pilots and high-reliability renewable power procurement – foundational for scaling DPPAs.

Tan Thuan EPZ

With a diverse industry base, particularly in electronics and automotive components, Tan Thuan can benefit from DPPAs, shared renewable infrastructure and green procurement platforms for SMEs. Pilot opportunities include digital MRV systems, low-carbon product certification schemes and traceability tools linked to export compliance mechanisms. Aggregate demand could unlock economies of scale for clean energy and support broader participation in ESG-linked supply chains.

Tan Tao IZ

Decarbonising Tan Tao is primarily based on improvement in thermal process efficiency, particularly within the plastics and footwear sectors. Opportunities include optimisation of moulding, vulcanisation and drying processes, complemented by plant-level investments in energy efficiency and heat recovery. Rooftop solar and demand aggregation can potentially lower scope 2 emissions. Flagship facilities like Pouyuen can lead large-scale retrofits, improving emissions intensity and meeting the supply chain requirements of Multinational Corporations (MNCs).

Hiep Phuoc IZ

Key decarbonisation levers in Hiep Phuoc include electrification, industrial waste heat recovery and co-firing with biomass as a short- or medium-term measure prior to full electrification or renewable fuels. Coordinated industrial symbiosis can reduce lifecycle emissions and improve circularity.

Dong Nam IZ

Considering its high electricity consumption rate, Dong Nam stands out as highly compatible with Vietnam's DPPA framework. It represents a significant opportunity for piloting scalable, blended renewable electricity procurement strategies that can be deployed both onsite and offsite. With a strong orientation toward exports and clean technology, the zone is well positioned to serve as a model for green manufacturing. Enhanced participation in environmental product declarations, sustainability certifications and green value chain programs can strengthen access to MNCs.

TABLE 6: Estimated annual emissions of key energy users (KEUs) in industrial zones in 2023

SECTOR	TRANSITION LEVERS	BARRIERS	INDUSTRIAL ZONES
Iron and steel	+ Electrification of rolling, reheating and forming + Furnace efficiency upgrades + Procurement of green crude steel (e.g. EAF/DRI with renewables or hydrogen) + Demand aggregation via green procurement and standards (e.g. SteelZero, EPDs)	+ High CAPEX for low-emissions technologies (e.g. DRI-H_2) + Limited domestic green steel supply + Considerations around carbon pricing	Hiep Phuoc IZ, Tan Thuan EPZ
Cement	+ Use of SCMs + Electrification of grinding operations + Integration of CCUS at upstream clinker kilns + Co-processing with biomass and industrial waste	+ High reliance on coal + Absence of certified low-carbon cement standards + Resource depletion (limestone), lack of lifecycle MRV tools	Hiep Phuoc IZ
Vehicles and machinery	+ Renewable electricity for parts manufacturing + Low-carbon materials (green steel, recycled plastics) + Design for modularity, disassembly, battery reuse + Heat recovery in paint and casting lines	+ Cost and risk of retooling for low-carbon models + Weak domestic electric vehicle infrastructure + Skills gap in high-precision manufacturing + Intense regional competition	Tan Thuan EPZ, Tan Tao IZ, Hiep Phuoc IZ
Plastics	+ Electrification of process heat (e.g. extrusion, moulding) + Mechanical and chemical recycling infrastructure + Substitution with bioplastics for short-life applications + Lifecycle design and traceability (e.g. through Extended Producer Responsibility)	+ High abatement cost, particularly for virgin plastic substitution + Weak sorting and recycling logistics + Policy uncertainty on bioplastics and standards	Tan Thuan EPZ, Tan Tao IZ

SECTOR	TRANSITION LEVERS	BARRIERS	INDUSTRIAL ZONES
Textiles, garments, footwear	+ Solar thermal and electric boilers for dyeing and finishing + 100 per cent renewable electricity procurement + Circular material sourcing and water reuse + Certification schemes (HIGG MSI, Textile Exchange)	+ Low local value-add and supplier leverage + Limited wastewater and heat reuse systems + Compliance risk from CBAM and EU due diligence rules	Dong Nam IZ, Tan Tao IZ
Electronics	+ Onsite and offsite renewable energy via DPPA + Smart grid integration, sub-metering, energy management systems + ESG traceability for scope 3 emissions + Circularity in packaging, plastics and boards	+ High grid dependency and energy intensity + Limited space on rooftops for solar deployment + Capital cost of electrification and MRV systems	Saigon Hi-Tech Park, Tan Thuan EPZ

Table 6 highlights the key levers and barriers to transitioning HCMC's emissions-intensive and economically significant industrial sectors. While each sector faces unique constraints, cross-cutting opportunities include renewable electricity adoption, electrification of thermal processes, energy efficiency, low-carbon material sourcing and active participation in global low-carbon value chains.

Taken together, these sectoral profiles underscore the importance of designing targeted, place-based decarbonisation strategies. The diversity of industrial activity within HCMC – spanning from heavy industry and materials to light manufacturing and electronics – requires that the city's net zero industrial roadmap be flexible, phased and supported by investment in enabling infrastructure and governance.

The cross-cutting decarbonisation levers provide a foundation for coordinated place-based industrial transition strategies within and across industrial zones, and should be prioritised in infrastructure planning, policy design and public–private investment mobilisation.

6. International examples of industrial transition

HCMC's industrial zones vary in size, types of energy use and sectors, highlighting the value of place-based industrial decarbonisation approaches in accounting for these variations.

By analysing examples of international industrial areas that also vary in size, scope and types of industry, common approaches can be drawn out that could be applied to HCMC's industrial zones.

We analysed four international examples – Gladstone in Australia, Net-Zero Basque Industrial Super Cluster in Spain, and Tianjin Economic-Technological Development Area and Ordos-Envision Net Zero Industrial Park in China. A detailed description of these areas can be found in the Appendix.

While these areas differ in terms of their industrial profiles (heavy or downstream industry), energy system constraints, existing and planned infrastructure and the level of government support and policy and investor certainty, the following common enabling conditions were evident.

Coordination across relevant stakeholders

Industrial transition programs involve an ecosystem of stakeholders including industry partners, utilities, government representatives, financiers, trade partners, transition experts and labourers.

Achieving a shared vision across stakeholders enables alignment on co-investment prospects, fosters trust and attracts investment. At the site level, coordination among industrial partners can enable risk and cost-sharing, making large infrastructure investments viable. Other opportunities include shared infrastructure, shared skills and expertise, and industrial symbiosis.

Depending on the scale of coordination, stakeholder groups may be self-coordinating, managed by industrial cluster authorities and park administrators, or managed by a public regulatory body. In addition to traditional governance strategies, digital solutions are being leveraged to facilitate coordination at scale within industrial zones. This includes artificial intelligence (AI) systems that connect enterprises, optimise aggregate energy demand (e.g. renewable energy and demand management), foster industrial symbiosis relationships and track emissions data across large groups of industrial entities.

Production of an evidence base and decarbonisation pathway

Industrial transition programs involve an ecosystem of stakeholders including industry partners, utilities, government representatives, financiers, trade partners, transition experts and labourers.

Achieving a shared vision across stakeholders enables alignment on co-investment prospects, fosters trust and attracts investment. At the site level, coordination among industrial partners can enable risk and cost-sharing, making large infrastructure investments viable. Other opportunities include shared infrastructure, shared skills and expertise and industrial symbiosis.

Depending on the scale of coordination, stakeholder groups may be self-coordinating, managed by industrial cluster authorities and park administrators, or managed by a public regulatory body. In addition to traditional governance strategies, digital solutions are being leveraged to facilitate coordination at scale within industrial zones. This includes artificial intelligence (AI) systems that connect enterprises, optimise aggregate energy demand (e.g. renewable energy and demand management), foster industrial symbiosis relationships and track emissions data across large groups of industrial entities.

Deployment of low-carbon technologies for new and existing industries

Most industrial transition initiatives involve speeding up the deployment of renewable electricity, electrifying facilities, switching to zero-emissions fuels and feedstocks, and integrating digital platforms to optimise circularity, energy demand and data tracking. Carbon-capture technologies emerge as another significant avenue for industrial transition, specifically for high-emitting sectors. This technology requires either high-quality long-term carbon storage infrastructure or offtakers to use the captured carbon.

To facilitate the development and deployment of technology solutions, initiatives may offer R&D funding to attract innovation and fund pilot projects within the cluster. They may focus on building supply chain partnerships (such as offtaker agreements) or pursue knowledge acquisition partnerships with experts including research institutions.

Leveraging existing policy and support for policy-makers

In industrial transition initiatives, stakeholders leverage existing industrial and energy policies and engage with policy-makers, regulators and energy planners to identify policy opportunities and co-design a favourable policy environment. This support for decision-making comes from individual companies or other entities, or multiple actors may group together to provide a common viewpoint. The key energy users engage in enabling policy mapping and create opportunities for discussion, such as roundtables and public dialogues. Outcomes of this engagement include industry-endorsed energy demand modelling, recommended mechanisms to support emerging industries, or the development of standards to guide future industrial development. In various examples around the globe, governments supported this process by convening forums for industry, governments and other stakeholders to work together.

Financial mechanisms and adapting financing models to project maturity

Industrial transition efforts leverage existing and novel financial mechanisms and adapt their financing model as their initiative scales. Mechanisms to finance projects include government grants and subsidies, concessional loans, sustainability-linked loans, green bonds, green insurance, FDI, trade agreements and philanthropic funding. The World Economic Forum (2023) playbook to accelerate industrial clusters recommends stakeholders engage public and private funders in roundtables to develop funding instruments and maintain an ongoing dialogue about emerging opportunities.

These common enabling conditions are useful for developing targeted, place-based approaches to industrial transition and are consistent with Climateworks' pillars to support effective implementation of NZIPs. These pillars are: coordination and skills development, building enabling infrastructure, decarbonising existing industry and attracting new industries.

The insights gained from evaluating HCMC’s industrial zones in Sections 2–5 and the common enabling conditions discussed in this section underpin Climateworks’ proposed roadmap for implementing NZIPs in HCMC presented in the next section.

7. Roadmap for implementing NZIPs in Ho Chi Minh City

HCMC is well positioned to lead Vietnam's transformation into the clean manufacturing hub of the region through an NZIP approach.

These precincts have the potential to be engines of green economic growth, anchored in net zero compliance, world-class infrastructure, export competitiveness and a just energy transition.

The industrial zones of HCMC can operate with efficient electrified processes sourced by renewable electricity through mechanisms like DPPA. The decarbonisation of Vietnam's grid, currently reliant on fossil fuels, is critical to enabling these industrial zones to flourish. Circular supply chains for key commodities, such as steel, cement, plastics and textiles, can be embedded throughout the zones, while clean industrial heat applications and hydrogen adoption can address emissions-intensive operations.

HCMC's industrial sectors also have the opportunity to align with emerging international trade and sustainability standards such as the EU's CBAM and CSRD, thereby maintaining market access and capturing green premium opportunities. At the same time, this transformation must be inclusive – providing pathways for equitable reskilling, workforce development and socio-economic benefits to surrounding communities.

Realising this ambition requires integrated planning, investment coordination and institutional capacity. With strong leadership from the city and national governments, and support from global financial institutions and technical partners, HCMC can pioneer Vietnam's net zero industrial precincts.

This final chapter outlines a roadmap with short-term and medium-term actions for implementing NZIPs in HCMC. The roadmap is structured around Climateworks Centre's four pillars to support effective implementation of net zero industrial precincts, as well as a fifth cross-cutting pillar:

I. **Multi-stakeholder coordination and skills development:** implementing cross-sectoral governance mechanisms and strengthening institutional capacity across sectors.

II. **Building enabling infrastructure:** deploying the energy, transport and digital infrastructure necessary to decarbonise operations across industrial zones, including renewable electricity, low-carbon transport, green hydrogen and industrial heat recovery networks.

III. **Decarbonising existing industries:** transforming currently high-emitting sectors by supporting process upgrades, electrification, efficiency improvements and low-carbon procurement mechanisms.

IV. **Attracting new clean industries:** investing in innovative, zero-emissions industries to establish HCMC as a regional manufacturing leader, leveraging fiscal incentives and enabling policies to provide policy certainty and private sector confidence.

V. **Cross-cutting enablers:** unlocking capital through sustainable finance mechanisms, including green bonds, sustainability-linked loans (SLLs), Public–Private Partnerships (PPPs), and Just Energy Transition Partnership (JETP) grants and concessional loans.

7.1

Short-term actions (2025–2030)

Multi-stakeholder coordination and skills development

+ Establish a cross-sectoral steering committee or 'Net Zero Taskforce', including HCMC People's Committee, HiDS, HEPZA, industrial zone developers and large tenants (e.g. Pouyuen, Intel), to oversee pilot implementation, policy design and investment facilitation.
+ Use participatory methods for stakeholders to co-develop tailored NZIP transition plans for selected industrial zones, incorporating zone-level MRV baselines, risk-mapping and financing needs.
+ Develop reskilling and upskilling roadmaps across key sectors (electronics, steel, cement, textiles) and partner with Technical Education and Vocational Training institutions to introduce curricula on renewable energy deployment, energy efficiency, MRV systems and low-carbon manufacturing.

Building enabling infrastructure

+ Deploy onsite renewable energy technologies such as rooftop solar (Decree 58/20254/ND-CP)[4] in Dong Nam IZ and Saigon Hi-Tech Park.
+ Develop pilot frameworks for tenant-level DPPA, enabling large energy consumers to procure renewable electricity reliably and transparently.
+ Develop standardised GHG reporting guidelines and install digital energy sub-metering systems for key tenants to enable performance benchmarking.
+ Pilot circular economy initiatives, for example, plastics-to-fibre recycling between Tan Tao and Dong Nam IZs.

Decarbonising existing industries

+ Conduct technical assessments for electrified boilers, biomass or solar thermal integration in the textile sector.
+ Develop a clean heat roadmap for priority sectors that includes technology-specific pilots for heat pumps, electric boilers and solar thermal, and assess temperature thresholds for electrification viability.
+ Promote electrification of low-temperature heat processes, energy efficiency retrofits, and load optimisation in the footwear, electronic and plastics sectors.
+ Implement local mandates for industrial zones to conduct GHG inventories, integrate energy audits into licensing and link public procurement eligibility to emissions performance.

Attracting new industries

+ Incentivise greenfield investments in green hydrogen and green materials (such as recycled aluminium) along with the enabling infrastructure.
+ Design PPP models and fiscal support mechanisms (e.g. fast-tracked permits, land lease subsidies) for businesses adopting low-carbon processes aligned with the ResponsibleSteel and UNFCCC Fashion Charter standards.

Cross-cutting enablers

+ Develop an NZIP blended finance strategy, mapping capital needs across industrial zones and leveraging green bonds, SLLs, JETP concessional finance and PPP structures.

4 Industrial zones and tenant companies can install rooftop solar systems for on-site energy consumption without the need for an electricity operation license, provided the systems are not connected to the national grid or are equipped with anti-backflow devices. Additionally, the sale of surplus electricity to the national grid, capped at 20 per cent of the system's installed capacity, is also allowed to offer a potential revenue stream for industrial zones.

7.2 Medium-term actions (2030–2040)

Multi-stakeholder coordination and skills development

- Implement NZIP transition plans co-developed in the previous phase.
- Implement sectoral reskilling roadmaps at precinct scale and develop social dialogue mechanisms with labour unions and education partners.

Building enabling infrastructure

- Expand substations and grid interconnection capacity to accommodate higher renewable energy penetration and load balancing in zones with high electricity consumption.
- Develop clean heat and green hydrogen supply infrastructure, including feasibility studies for pipelines.
- Embed grid connection and renewable energy integration assessments into industrial zone development criteria and approval processes.
- Establish digital platforms or hubs to coordinate renewable energy procurement for multiple tenants, supporting aggregation and reducing transaction costs.

Decarbonising existing industries

- Roll out decarbonisation pathways for cement and steel supply chains based on process-level innovation (e.g. scaling the use of SCMs to reduce the carbon intensity of cement and concrete production).
- Integrate CCUS.

Attracting new industries

- Foster industrial symbiosis ecosystems, informed by global models such as the Net-Zero Basque Industrial Super Cluster (Spain) or Tianjin Economic-Technological Development Area (China) to attract sustainable material industries and clean technology assemblers.

Cross-cutting enablers

- Formalise green industrial certification for industrial zones, linked to eligibility for green bond and SLLs.
- Strengthen the carbon market with auction-based mechanisms, linking carbon credits to sectoral performance.
- Apply national renewable energy tracking and certification mechanisms into procurement and reporting systems at the industrial zone level, aligning with export standards like CBAM and CSRD.

TABLE 7: NZIP implementation plan

PILLAR	SHORT-TERM ACTIONS (2025–2030)	MEDIUM-TERM ACTIONS (2030–2040)
Multi-stakeholder coordination and skills development	+ Establish a cross-sectoral NZIP taskforce involving key government, developer and tenant stakeholders + Co-design NZIP transition plans, incorporating MRV baselines, risk-mapping and financial requirements + Develop sectoral reskilling and upskilling roadmaps	+ Implement sectoral reskilling and upskilling roadmaps at precinct scale + Implement co-developed NZIP transition plans.
Building enabling infrastructure	+ Scale rooftop solar in industrial zones + Launch circular economy pilots on industrial symbiosis + Develop standardised GHG reporting guidelines	+ Expand clean energy infrastructure + Expand substations and grid interconnection capacity + Develop green hydrogen infrastructure + Embed renewable energy assessments into industrial zone approvals + Coordinate renewable energy procurement for multiple tenants supporting aggregation and reducing transaction costs
Decarbonising existing industries	+ Promote energy efficiency and electrification of heating + Conduct technical assessment for electrified boilers, biomass and solar thermal applications + Develop clean heat roadmap and pilot applications + Integrate GHG reporting and introduce mandates for GHG inventories and audits linked to licensing and procurement	+ Roll out decarbonisation pathways for steel and cement + Integrate CCUS technologies
Attracting new clean industries	+ Anchor hydrogen and clean technology pilot projects + Design fiscal incentives for investors + Greenfield investments in green materials + Introduce fiscal support mechanisms and PPP models	+ Foster industrial symbiosis ecosystems
Cross-cutting enablers	+ Map capital requirements across IZs + Develop NZIP blended finance strategy and framework + Leverage JETP, PPPs, green bonds and SLLs	+ Formalise green industrial certification linked to green bonds + Strengthen carbon market mechanisms + Establish digital platforms to coordinate renewable electricity procurement + Apply renewable energy tracking and certification mechanisms aligned with CBAM and CSRD

HCMC's success in transitioning its industrial zones will hinge on delivery structures that are multi-stakeholder, investment-ready and backed by strong planning and institutional mandates. With the right support and coordination, HCMC is equipped to shape Vietnam's future in becoming the clean manufacturing hub of the region.

Appendix: International case studies

Gladstone, Australia

Industrial stakeholders in Gladstone have made firm net zero targets, and have expressed support for transforming Gladstone into a clean industry hub, having signed the Central Queensland Statement of Cooperation (SOC). This stakeholder group includes industry partners such as Rio Tinto, Orica, Cement Australia, Alpha HPA, energy and infrastructure partners such as Stanwell (the state-owned electricity generation company), Acciona and the Queensland Government. Gladstone is home to the fourth-largest coal terminal in the world, as well as three liquefied natural gas terminals, but is also at the forefront of the Australian energy and low-carbon industrial transition.

Some of the largest industries in Gladstone have strong potential for industrial transition, including alumina, aluminium, commercial explosives, sodium cyanide, cement and lime. New industries under investigation for the region are low-carbon energy exports, such as green hydrogen and green ammonia, and a new green iron industry.

Australia's industrial transition is supported by industrial policies, including the Future Made in Australia agenda (with a framework for guiding public and private investment to enable the transition) and funding from the Australian Renewable Energy Agency (ARENA), the Clean Energy Finance Corporation (CEFC) and the National Reconstruction Fund. The federal government's Net Zero Economy Authority (NZEA) will play a coordinating role in supporting an NZIP strategy in Gladstone.

Overview of decarbonisation initiatives

Through the Australian Industry Energy Transitions Initiative (Australian Industry ETI), Climateworks identified the emissions reduction potential for five of Australia's largest industrial regions, including Gladstone, and how the 'hard to abate' industries within these regions could decarbonise.

Climateworks demonstrated how Gladstone can abate emissions from heavy manufacturing, grow a low-carbon industry and explore new low-carbon exports to maintain prosperity (Climateworks Centre 2025). To do this, Climateworks conducted an energy and product demand analysis and developed a technology deployment roadmap for the decarbonisation of Gladstone's industrial process heat (with emissions abatement and energy-demand requirements).

From this evidence base, Climateworks has published recommended actions for policy-makers and energy planners. These recommendations encourage:

+ the creation of regional energy system plans
+ government support for low-carbon industrial heat at scale
+ expanded energy demand management policies and energy efficiency mechanisms for heaving industry
+ support for early hydrogen demand in existing industries
+ government and industry endorsement of high-quality standards for low-carbon products.

Climateworks supports industrial and government stakeholders to explore technology and economic options, barriers and enablers to decarbonise Gladstone's process heat and how to implement demand management practices.

BOX 5

Climateworks' energy demand modelling and technology deployment roadmap for Gladstone

Climateworks' energy and emissions analysis of existing and future industry in Gladstone showed how the region can abate virtually all emissions from heavy manufacturing, including 93 per cent of scope 1 emissions. Through this work, Climateworks identified gaps that restrict rapid decarbonisation and opportunities for an NZIP approach.

A key limiting factor is access to renewable energy generation at the scale required to provide electricity, heat and alternative feedstock to industries. Existing manufacturing industries such as aluminium, alumina, explosives, cement and new low-carbon energy exports (using regional hydrogen assumptions) could require 74 terawatt hours per year (TWh/year) of renewable electricity by 2040.

Aluminium and ammonia can be produced with very low emissions and demand for these products is projected to increase among key trading partners as the demand for low-carbon products surge.

Tianjin Economic-Technological Development Area (TEDA) and Ordos-Envision Net Zero Industrial Park, China

There are more than 2,500 development zones (also known as industrial parks) in China (UNIDO 2022). National green industry growth commitments, emissions targets and industrial circularity and sustainable development commitments have led to the development of green industrial parks, low-carbon industrial parks, circular transformation industrial parks, eco-industrial demonstration parks, state-level economic and technological development zones and national high-tech industrial development zones (UNIDO 2022). Cities like Changzhou and Shanghai, and provinces including Guangxi, Yunnam and Fujian have all committed to building greenfield zero-carbon parks, which have ambitious emissions reduction targets (State Council Information Office 2025).

Most of China's industrial parks are governed by official public management authorities. In TEDA, the industrial park management committee, an agency of the municipal government of Binhai New Area, is responsible for infrastructure construction, land development, investment promotion and economic management (UNIDO 2022). There are also industry- and government-led management arrangements, such as the Ordos-Envision Net Zero Industrial Park, in which companies lead the development and investment promotion of the industrial cluster and government management committees oversee administration (UNIDO 2022).

Overview of decarbonisation initiatives in TEDA

As one of China's leading pilots for low-carbon industrial transformation, TEDA is embedding carbon-intensity thresholds for new investments and restricting high-pollution, high-energy industries. Its key clusters, covering equipment manufacturing, petrochemicals, electronics and biopharmaceuticals, are advancing decarbonisation through energy efficiency, industrial symbiosis and digital innovation. A circular-economy and zero-waste digital platform, developed under the World Economic Forum's Transitioning Industrial Clusters initiative, lets more than 1,000 companies share resources, recover waste heat and monitor emissions across supply chains. As a result, more than 150 industrial symbiosis relationships were created (WEF 2025b). Recognised by China's Ministry of Ecology and Environment as a national pilot for coordinated pollution and carbon reduction, TEDA has also developed a strong service ecosystem with over 200 green-finance, energy-audit and technology providers supporting firms to meet low-carbon targets (WEF 2025c).

BOX 6

Digital solutions enable large-scale coordination across industrial entities in TEDA

As part of the World Economic Forum and GPIP partnership, TEDA is implementing a digital platform which integrates AI and sensing technologies to enable large-scale industrial symbiosis across downstream industrial operations. It also helps with exchange data and waste management in the cluster. The platform has connected more than 1,000 companies and reduced emissions by 0.17 $MtCO_2$.

Companies are trained to use the platform. AI tools are used to match by-product supply and resource demand, setting up industrial symbiosis relationships between companies. Companies also use digital labels to ensure waste traceability, which has reduced landfill waste by nearly 1 Mt (WEF 2025a, 2025b).

Overview of decarbonisation initiatives in Ordos-Envision Net Zero Industrial Park

Envision Group (a multinational corporation with net zero commitments) and the government of Ordos (Inner Mongolia region) established the first zero-carbon industrial park demonstration pilot and developed local, national and international standards enabling the park's model to be replicated.

The Ordos-Envision Net Zero Industrial Park integrates supply chains of key energy transition materials across 12 industry partners. The greenfield site aims to attract supply chain partners across EV, battery, energy storage and hydrogen fuel cell manufacturing. It also aims to support green technology innovation, including a green hydrogen demonstration project and the establishment of an innovation centre (WEF 2023, IEA 2023, Bureau Veritas 2022).

BOX 7

Greenfield model attracts new industry to Ordos-Envision Net Zero Industrial Park

Envision and the Ordos government took a top-down planning approach to designing and constructing a park with the supporting infrastructure to attract industry partners committed to low-carbon operations (WEF 2023, 2025b, 2025c). They collaborated with the Inner Mongolia government, Bureau Veritas and the China National Institute to develop standards for zero-carbon park development and construction ('Zero-Carbon Industrial Park Construction Specification' and 'Zero-Carbon Industrial Park Measurement and Evaluation Specification') (Bureau Veritas, 2022).

To attract new industries, the park provides sufficient renewable energy supply and innovations to support net zero operations. The park is powered primarily by locally sourced renewable energy (5 TWh/year, making up 80 per cent of the direct supply) supplemented with grid power (using green electricity certificates). Digital infrastructure is deployed across the park, including AI-integrated carbon and energy accounting systems that track energy and emissions data and optimise aggregate power consumption (managing renewables and grid power use, electricity trading and demand response). The park also has battery swap stations to enable battery-powered heavy duty transport in mining operations, and supports green hydrogen R&D and production for onsite industrial processes.

Net-Zero Basque Industrial Super Cluster, Basque Country, Spain

The Net-Zero Basque Industrial Super Cluster (NZBIS) initiative is led by the Basque Government's Ministry for Economic Development, Sustainability and the Environment, Basque Business Development Agency (SPRI). The initiative was announced in 2022, following the passing of the 2021 Basque Climate and Energy Transition Law, which supports PPPs to accelerate efforts towards net zero emissions by 2050. The implementation of roadmaps to enhance Basque's industry and technological competitiveness is also expected to increase the prosperity of the region by €2–3 billion from 2030 onwards (SPRI 2023).

Industry in the Basque Autonomous Community (BAC) is grouped across 16 industrial clusters that are represented by the Basque Industrial Cluster Association. The key emitting sectors involved in the industrial transition initiative are iron and steel, foundry, concrete, and pulp and paper.

The initiative prioritises collaboration, engaging stakeholders with expertise at the strategic, executive and operating levels. This includes public, industrial alliances, financiers, researchers and community stakeholders. Industrial Cluster Associations play a key role in the coordination and development of programs, collaborating with the Basque Energy Cluster Association to drive innovation in the low-carbon fuels value chain (WEF 2023).

Overview of decarbonisation initiatives

The SPRI group conducted energy assessments and industrial processes mapping to inform the development of subsector roadmaps, aiming for a 30 per cent reduction in energy-related emissions by 2030 and net zero emissions by 2050 (SPRI 2022). NZBIS focuses on the key levers to decarbonise energy supply to the highest-emitting industries in the region and increasing energy efficiency. A key driver is enhancing and scaling technological innovation in the region through different pilots and R&D projects, including through knowledge acquisition partnerships with international industry and innovation experts. To enable knowledge-sharing about hydrogen technologies, electrification and energy efficiency, SPRI signed a partnership agreement with the US Energy Power Research Institute (SPRI 2022). SPRI has since released the regional decarbonisation roadmaps for the steelmaking, smelting, cement, refinery, and pulp and paper sectors (SPRI 2023).

BOX 8

Co-designing sectoral pathways to decarbonise existing industry and establish green hydrogen production in Basque Country

Key technologies and services have been identified in the sector roadmaps for Basque's carbon-intensive industries (WEF 2023). These include:

+ Direct electrification of industrial production processes across cement (EAFs), pulp and paper (high-temperature heat pumps replacing gas) and steelmaking (direct electrolysis)
+ Large-scale access to renewable energy through renewable PPAs and the installation of onsite renewables
+ Fuel-switching to synthetic fuels, biogas and biofuels in foundry, steel and cement processes
+ Circularity and material efficiency including secondary steel production and recycling of pulp and paper materials
+ Low-carbon fuels supply chain development including installation of a 2.5 MW alkaline electrolyser piloting smaller-scale hydrogen production, a 10 MW electrolyser for hydrogen for synthetic fuels production and 100 MW electrolyser project to be integrated with the European Hydrogen Backbone.


ICS

References

Apisitniran L (2025) 'SCG targets low-carbon cement with B1bn funding', *Bangkok Post*, accessed 14 May 2025. https://www.bangkokpost.com/sustainability/3020220/scg-targets-low-carbon-cement-with-b1bn-funding

Bureau Veritas (2022) 'Bureau Veritas helps Envision Group develop Zero-Carbon Industrial Park standards', Bureau Veritas, accessed 20 May 2025. https://www.bureauveritas.cn/en/newsroom/bv-envision

Dinh Dai (2025) *Doanh nghiệp ngành nhựa xây dựng 'sáng cửa' trong năm 2025*, Business Forum magazine, accessed 20 Feb 2025. https://diendandoanhnghiep.vn/doanh-nghiep-nganh-nhua-xay-dung-sang-cua-trong-nam-2025-10150656.html

Cascale (n.d.) *Higg Index Tools*, Cascale, accessed 20 Feb 2025. https://cascale.org/tools-programs/higg-index-tools/

Climate Analytics (2021) *What is Vietnam's pathway to limit global warming to 1.5°C?*, Climate Analytics, accessed 6 October 2023.

Pidgeon A & Forth A (2024) *SteelZero Policy Report: Getting to SteelZero*, Climate Group, accessed 20 May 2025. https://www.theclimategroup.org/sites/default/files/2024-11/Climate%20Group%2024893%20SteelZero%20-%20Policy%20Report%20-%20Getting%20to%20SteelZero%20FINAL.pdf

Climateworks Centre (2023a) *The supply chain of key decarbonisation technologies in Vietnam*, Climateworks Centre, accessed 14 April 2025. https://www.climateworkscentre.org/resource/the-supply-chain-of-key-decarbonisation-technologies-in-vietnam/

—— (2023b) *Pathways to industrial decarbonisation: Positioning Australian industry to prosper in a net zero global economy*, Climateworks Centre, accessed 25 March 2025. https://www.climateworkscentre.org/resource/pathways-to-industrial-decarbonisation-positioning-australian-industry-to-prosper-in-a-net-zero-global-economy/

—— (2024) *New program to transform industrial zones launches in Ho Chi Minh City*, Climateworks Centre, accessed 16 April 2025. https://www.climateworkscentre.org/news/net-zero-industrial-precincts-program-launches-in-ho-chi-minh-city

European Commission Taxation and Customs Union (2023) *Guidance document on CBAM implementation for installation operators outside the EU*, European Commission, accessed 22 April 2025. https://taxation-customs.ec.europa.eu/document/download/2980287c-dca2-4a4b-aff3-db6374806cf7_en?filename=Guidance%20document%20on%20CBAM%20implementation%20for%20installation%20operators%20outside%20the%20EU.pdf

—— (2023b) *Carbon Border Adjustment Mechanism*, European Commission, accessed 22 April 2025. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

CORDIS – EU (2019) *A concrete step towards achieving net-zero carbon emissions in cement production*, European Commission, accessed 20 March 2025. https://cordis.europa.eu/article/id/411659-a-concrete-step-towards-achieving-net-zero-carbon-emissions-in-cement-production

Directorate-General for Environment (2021) *Proposal for a regulation on deforestation-free products*, European Commission, accessed 15 February 2025. https://environment.ec.europa.eu/publications/proposal-regulation-deforestation-free-products_en

Fico-YTL (2024) *Fico-YTL Cement pioneers with the green label ECOCem: A journey towards green cement production and sustainable development*, Fico-YTL, accessed 20 May 2025. https://fico-ytl.com/en/media/xi-mang-fico-ytl-ra-mat-nhan-xanh-ecocem

Global Energy Monitor (n.d.) *Xuan Thien Nam Dinh steel plant*, Global Energy Monitor Wiki, accessed 20 May 2025. https://www.gem.wiki/Xuan_Thien_Nam_Dinh_steel_plant

Government of Vietnam (2023) *Decision No. 500/QD-TTg dated May 15, 2023, of the Prime Minister, approving the National Power Development Plan (PDP8) 2021–2030, with vision to 2050*, Government of Vietnam, accessed 20 April 2025. https://thuvienphapluat.vn/van-ban/EN/Thuong-mai/Decision-500-QD-TTg-2023-National-Electricity-Development-Planning-of-2021-2030/566836/tieng-anh.aspx

—— (2024) *Quyết định số 1711/QĐ-TTg của Thủ tướng Chính phủ: Phê duyệt Quy hoạch Thành phố Hồ Chí Minh thời kỳ 2021-2030, tầm nhìn đến năm 2050*, Government of Vietnam, accessed 20 April 2025. https://vanban.chinhphu.vn/?pageid=27160&docid=212234&classid=2

——(2024) *Decision No.1011/QĐ-TTg dated September 20, 2024, the Prime Minister, promulgating the list of key energy-using facilities in 2023*, Government of Vietnam, accessed 20 March 2025. https://thuvienphapluat.vn/van-ban/EN/Thuong-mai/Decision-1011-QD-TTg-2024-list-of-key-energy-using-facilities-in-2023/630927/tieng-anh.aspx

—— (2025) *Decision No. 768/QĐ-TTg dated April 15, 2025, of the Prime Minister, approving the adjustment and supplementation of the National Power Development Plan for 2021–2030, with a vision to 2050* (PDP8-R), Government of Vietnam, accessed 20 May 2025. https://vanban.chinhphu.vn/?pageid=27160&docid=213388

Hasanbeigi A & Springer C (2023) *Industrial Supply Chains Decarbonization in Southeast Asia*, Global Efficiency Intelligence, accessed 17 March 2025. https://www.globalefficiencyintel.com/industrial-supply-chains-decarbonization-in-southeast-asia

Ho BQ, Vu K, Nguyen T, Le Q, Rakholia R & Carbajo RS (2022) 'The Emissions and Measures in Greenhouse Gases Management for Climate Change Mitigation in Developing Countries: A Case of Ho Chi Minh City, Vietnam', *International Journal of Environmental Science and Development*, 13(6), accessed 20 April 2025. https://www.ijesd.org/vol13/1402-ijesd-4670.pdf

Hoa Phat Group (2023) *Hoa Phat Group targets "green steel" development*, Hoa Phat Group, accessed 20 May 2025. https://www.hoaphat.com.vn/news/hoa-phat-group-targets--green-steel--development.html

Ho Chi Minh City Export Processing & Industrial Zones Authority (HEPZA) (2025) *Giới thiệu về pháp lý [Introduction to the Legal Framework]*, HEPZA, accessed 16 April 2025. https://hepza.hochiminhcity.gov.vn/v/gioi-thieu-ve-ban-phap-ly

Ho Chi Minh City People's Committee (2023) *Decision No.1353/QĐ-UBND dated April 11, 2023, approving the project "Định hướng phát triển các khu chế xuất, khu công nghiệp Thành phố Hồ Chí Minh giai đoạn 2023–2030 và tầm nhìn đến năm 2045"*, Ho Chi Minh City People's Committee, accessed 10 Oct 2024. http://www.congbao.hochiminhcity.gov.vn/tin-tuc-tong-hop/uy-ban-nhan-dan-thanh-pho-ho-chi-minh-ban-hanh-quyet-%C4%91inh-so-1353-q%C4%91-ubnd-ve-phe-duyet-%C4%91e-an-%E2%80%9C%C4%91inh-huong-phat-trien-cac-khu-che-xuat-khu-cong-nghiep-thanh-pho-ho-chi-minh-giai-%C4%91oan-2023-2030-va-tam-nhin-%C4%91en-nam-2045%E2%80%9D

HYBRIT Development AB (2025) *Fossil-free steel – a joint opportunity!*, HYBRIT Development, accessed 17 May 2025. https://www.hybritdevelopment.se/en/

Institute for Environment and Resources (2024) *Thành phố Hồ Chí Minh hướng đến mục tiêu Thành phố không phát thải*, Institute for Environment and Resources, accessed 10 April 2025. https://hcmier.edu.vn/vn/chi-tiet/thanh-pho-ho-chi-minh-huong-den-muc-tieu-thanh-pho-khong-phat-thai-21339-2-6

International Energy Agency (IEA) (2020) *Iron and Steel Technology Roadmap*, IEA, accessed 24 May 2025. https://www.iea.org/reports/iron-and-steel-technology-roadmap

—— (2021) *Net Zero by 2050: A roadmap for the global energy sector*, IEA, accessed 20 May 2025. https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf

—— (2023) *Cement*, IEA, accessed 24 May 2025. https://www.iea.org/energy-system/industry/cement

——(2023) *Envision Group helps bring cities in China to net zero*, IEA, accessed 17 June 2025. https://www.iea.org/policies/17712-envision-group-helps-bring-cities-in-china-to-net-zero

Korea Ministry of Economy and Finance (MOEF) (2020) *Government Announces Overview of Korean New Deal*, MOEF, accessed 16 April 2025. https://english.moef.go.kr/pc/selectTbPressCenterDtl.do?boardCd=N0001&seq=4940&utm

Lao Dong (2021) 'Giải bài toán thiếu nhân lực cho ngành dệt may và da giày', *Lao Dong*, accessed 20 Feb 2025. https://laodongthudo.vn/giai-bai-toan-thieu-nhan-luc-cho-nganh-det-may-va-da-giay-131422.html

Lu H, de la Rue du Can S, Letschert VE, Wong HLC, Zhou N, Wijaya F, Hidayati F & Husodo DC (2024) *Industry Decarbonization Roadmaps for Indonesia: Opportunities and Challenges to Net-Zero Emissions*, Lawrence Berkeley National Laboratory, accessed 20 March 2025. https://eta-publications.lbl.gov/sites/default/files/industry_decarbonization_roadmaps_for_indonesia-final-rev2.pdf

Meranti Green Steel (n.d.) *Transforming the Iron and Steel Industry*, Meranti Green Steel, accessed 24 May 2025. https://www.merantigreensteel.com/our-green-steel

Mission Possible Partnership (2023) *Making Net-Zero Concrete and Cement Possible*, Mission Possible Partnership, accessed 20 May 2025. https://3stepsolutions.s3-accelerate.amazonaws.com/assets/custom/010856/downloads/Making-Net-Zero-Concrete-and-Cement-Possible-Report.pdf

NetZero Vietnam (2024) *HCM City Moves Towards Net Zero*, NetZero Vietnam, accessed 10 March 2025. https://netzero.vn/en/hcm-city-moves-towards-net-zero/

Nguyen T & Apanada MJ (2024) *Vietnam's Renewable Energy Policy Is Spurring Decarbonization of Global Brands*, World Resources Institute, accessed 10 April 2025. https://www.wri.org/insights/vietnam-direct-power-purchase-agreement

Nguyen T (2025) 'The quiet revolution of the steel sector across Vietnam', *Vietnam Investment Review*, accessed 13 May 2025. https://vir.com.vn/the-quiet-revolution-of-the-steel-sector-across-vietnam-127728.html

Nhan Dan (2024) 'Ho Chi Minh City confidently rises in the new era', *Nhan Dan*, accessed 20 April 2025. https://en.nhandan.vn/ho-chi-minh-city-confidently-rises-in-the-new-era-post142835.html

National Statistics Office of Vietnam (2024) *Statistical Yearbook of Vietnam 2023*, National Statistics Office of Vietnam, accessed 20 May 2025. https://www.nso.gov.vn/wp-content/uploads/2024/06/NIEN-GIAM-THONG-KE-2023_Ban-quyen.pdf

ResponsibleSteel (2022) *ResponsibleSteel International Standard Version 2.0*, ResponsibleSteel, accessed 20 April 2025. https://assets-global.website-files.com/6538e481169ed7220c330f0a/66034300556ac7c2610cd8d0_ResponsibleSteel-Standard-2.0.pdf

Samsung Electronics (2025) 'SEHC Commences Construction of Nearly 28 MWp Rooftop Solar Project', Samsung Electronics, accessed 10 February 2025. https://news.samsung.com/vn/samsung-electronics-hcmc-ce-complex-sehc-khoi-cong-du-an-dien-mat-troi-mai-nha-cot-moc-moi-trong-chien-luoc-phat-trien-ben-vung-va-trach-nhiem-xa-hoi-tai-viet-nam?utm_source=chatgpt.com

SCG International (n.d.) *SCG Low-Carbon Structural Cement*, SCG International, accessed 10 May 2025. https://scginternational.com/construction-tech/low-carbon-cement/

Simões HM (2023) *Fit for 55 explainer – Carbon border adjustment mechanism*, European Parliament Research Service, accessed 22 April 2025. https://www.europarl.europa.eu/RegData/etudes/ATAG/2023/754626/EPRS_ATA(2023)754626_EN.pdf

Song Hà (2024) 'Dệt may tăng trưởng khá, lấy đà vượt thách thức', VnEconomy, accessed 20 Feb 2025. https://vneconomy.vn/det-may-tang-truong-kha-lay-da-vuot-thach-thuc.htm

Source of Asia (2022) 'Vietnam: a promising option in light of the China plus one strategy', Source of Asia, accessed 20 April 2025. https://www.sourceofasia.com/vietnam-in-the-china-plus-one-strategy-option-in-light-of-the-china-plus-one-strategy/

Source of Asia (2024) 'ESG proof your business for EU exports – How and when to get "ESG compliant"?', Source of Asia, accessed 20 April 2025. https://www.sourceofasia.com/wp-content/uploads/2024/11/Esg-Proof-Your-Business-For-EU-Exports-By-Source-Of-Asia_Updated-additional-slideCTA-v02-MvdP.pdf

South East Asia Iron and Steel Institute (SEAISI) (2024). *Three pathways to green steel in Asia*, SEAISI, accessed 20 May 2025. https://www.seaisi.org/details/24318?type=news-rooms

SPRI Group (2022) *The decarbonisation of Basque industry to now draw on the extensive experience of the US EPRI research centre*, SPRI Group, accessed 17 April 2025. https://www.spri.eus/en/environmental-sustainability-news/the-decarbonisation-of-basque-industry-to-now-draw-on-the-extensive-experience-of-the-us-epri-research-centre/

—— (2023) *Net-Zero Basque Industrial Super Cluster presented at Davos*, SPRI Group, accessed 17 April 2025. https://www.spri.eus/en/tecnology-news/net-zero-basque-industrial-super-cluster-presented-at-davos/

SSAB (2025) *What is green steel?*, SSAB, accessed 25 May 2025. https://www.ssab.com/en/fossil-free-steel/insights/green-steel

State Management Press (2025) *Nhu cầu được hỗ trợ tài chính của doanh nghiệp nhỏ và vừa Việt Nam*, State Management Press, accessed 20 February 2025. https://www.quanlynhanuoc.vn/2025/02/25/nhu-cau-duoc-ho-tro-tai-chinh-cua-doanh-nghiep-nho-va-vua-viet-nam/

SteelRadar (2024) 'VAS Group: Leader in green steel production', SteelRadar, accessed 15 May 2025. https://www.steelradar.com/en/vas-group-leader-in-green-steel-production/

SteelWatch (2025) 'SteelWatch Explainer: Why steelmaking drives climate change – and why it doesn't have to be this way', SteelWatch, accessed 20 March 2025. https://steelwatch.org/steelwatch-explainers/climate/

Textile Exchange (2023) *Preferred fibers and materials: Definitions – Initial guidance*, Textile Exchange, accessed 20 Mar 2025. https://textileexchange.org/app/uploads/2023/02/Preferred-Fibers-and-Materials-Definitions-Guidance-Jan-2023.pdf

The Hai (2024) 'Total investment in Vietnam's cement industry estimated at around 20 billion USD', *Vietnam Investment Review*, accessed 25 May 2025. https://baodautu.vn/tong-muc-dau-tu-nganh-xi-mang-viet-nam-khoang-20-ty-usd-d217730.html

The Hindu (2024) 'Navrattan Group develops "eco-friendly" cement', *the Hindu*, accessed 20 April 2025. https://www.thehindu.com/business/Industry/navrattan-group-develops-eco-friendly-cement/article68876976.ece

The Saigon Times (2024) 'Cơ hội ngành nhựa còn lớn nhưng thách thức từ xanh hóa không nhỏ', *the Saigon Times*, accessed 20 May 2025. https://thesaigontimes.vn/co-hoi-nganh-nhua-con-lon-nhung-thach-thuc-tu-xanh-hoa-khong-nho/

Trading Economics (2025) *EU Carbon Permits price*, Trading Economics, accessed 10 March 2025. https://tradingeconomics.com/commodity/carbon

US Department of Energy (2022) *Industrial Decarbonization Roadmap Fact Sheet*, US Department of Energy, accessed 10 April 2025. https://www.energy.gov/sites/default/files/2022-09/Industrial%20Decarbonization%20Roadmap%20Fact%20Sheet.pdf

UK Department of Energy & Climate Change and Department for Business, Innovation & Skills (2015) *Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050*, GOV.UK, accessed 10 April 2025. https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050

United Nations Industrial Development Organisation (UNIDO) (2019) *Eco-Industrial Park Initiative for Sustainable Industrial Zones in Viet Nam (2014–2019)*, UNIDO, accessed 15 February 2025. https://www.unido.org/sites/default/files/files/2019-12/EIP_Vietnam-Final_project_report_2019.pdf

——(2022) *Comparative Research Report on the Localized Performance Indicator Systems of the International Guidelines for: Industrial Parks in China*, UNIDO, accessed10 June 2025. https://ipp.unido.org/sites/default/files/knowledge/2022-06/English_6.pdf

——(2024) *Industrial Development Report 2024: Turning Challenges into Sustainable Solutions*, UNIDO, accessed 20 April 2025. https://www.unido.org/idr/idr2024#/

United Nations Environment Programme (UNEP) (2018) *Cleaning up couture: what's in your jeans?*, UNEP, accessed 23 Mar 2025. https://www.unep.org/news-and-stories/story/cleaning-couture-whats-your-jeans

United Nations Framework Convention on Climate Change (UNFCCC) (2023) *Fashion Industry Charter for Climate Action: Aggregate Report 2023*, UNFCCC, accessed 25 Mar 2025. https://unfccc.int/sites/default/files/resource/FICCA_Aggregate_Rep_2023.pdf

WTO Centre (2023) *Cơ chế CBAM của EU: Động lực hay thách thức cho ngành sắt thép*, VCCI, accessed 20 March 2025. https://trungtamwto.vn/hiep-dinh-khac/24399-co-che-cbam-cua-eu-dong-luc-hay-thach-thuc-cho-nganh-sat-thep

VietData Research (2024) *Khu công nghiệp 2024: Cập nhật các chỉ số quan trọng*, VietData Research, accessed 20 March 2025. https://www.vietdata.vn/vi/post/khu-c%C3%B4ng-nghi%E1%BB%87p-c%E1%BA%ADp-nh%E1%BA%ADt-c%C3%A1c-ch%E1%BB%89-s%E1%BB%91-quan-tr%E1%BB%8Dng?srsltid=AfmBOop8QFn41lhPoTrvpjjj6EDF_ZELFk6VxNJAQstnSAndwtd9mYo8

Viet Nam News (2024) 'HCM City Moves Towards Net Zero', *Viet Nam News*, accessed 20 May 2025. https://vietnamnews.vn/economy/1654182/hcm-city-moves-towards-net-zero.html

Vietnamplus (2024) 'Vietnam promotes CBAM mechanism to promote sustainable export', *Vietnamplus*, accessed 20 April 2025. https://en.vietnamplus.vn/vietnam-promotes-cbam-mechanism-to-promote-sustainable-export-post303667.vnp

Vietnam Steel Association (2024) *Vietnam Steel Market in December 2024 and Full-Year 2024*, Vietnam Steel Association, accessed 20 March 2025. https://vsa.com.vn/tinh-hinh-thi-truong-thep-viet-nam-thang-12-2024-va-ca-nam-2024/

VnExpress (2022) 'Ngành điện tử thiếu lao động chất lượng cao', VnExpress, accessed 25 Mar 2025. https://vnexpress.net/nganh-dien-tu-thieu-lao-dong-chat-luong-cao-4488113.html

Voice of Vietnam (2024) 'Doanh nghiệp Khu Công nghệ cao TP.HCM kiến nghị sử dụng hàng công nghệ cao nội địa', *Voice of Vietnam*, accessed 24 May 2025. https://vov.vn/kinh-te/doanh-nghiep-khu-cong-nghe-cao-tphcm-kien-nghi-su-dung-hang-cong-nghe-cao-noi-dia-post1193118.vov

World Economic Forum (WEF) (2023) *Transitioning Industrial Clusters towards Net Zero*, WEF, accessed 17 June 2025. https://www3.weforum.org/docs/WEF_Tranisitioning_Industrial_Clusters_2023.pdf

——(2024) *High-emitting sectors: Challenges and opportunities for low-carbon suppliers*, WEF, accessed 25 May 2025. https://www3.weforum.org/docs/WEF_High_Emitting_Sectors_Challenges_and_Opportunities_for_Low_Carbon_Suppliers_2024.pdf

——(2025a) *Unleashing the Full Potential of Industrial Clusters: Infrastructure Solutions for Clean Energies*, WEF, accessed 25 March 2025. https://reports.weforum.org/docs/WEF_Unleashing_the_Potential_of_Industrial_Clusters_2025.pdf

——(2025b) *Five Steps for Digital Collaboration in Industrial Clusters*, WEF, accessed 17 May 2025. https://reports.weforum.org/docs/WEF_Five_Steps_for_Digital_Collaboration_in_Industrial_Clusters_2025.pdf

——(2025c) *Tianjin Economic-Technological Development Area (TEDA): Circular economy and zero-waste digital platform*, WEF, accessed 20 May 2025. https://reports.weforum.org/docs/WEF_TEDA_2025.pdf

World Steel Association (2024) *Sustainability Indicators 2024 Report*, World Steel Association, accessed 20 May 2025. https://worldsteel.org/wider-sustainability/sustainability-indicators/

WWF (World Wide Fund For Nature) (2023) *Vietnam's Energy Sector Vision: Towards 100% Renewable Energy by 2050*, accessed 6 October 2023. https://wwfasia.awsassets.panda.org/downloads/-en--scenario-report_100re-map.pdf

For further information please contact:

BEN KHUAT
Vietnam Policy Manager
ben.khuat@climateworkscentre.org

DR CEREN AYAS
Acting Southeast Asia Lead
ceren.ayas@climateworkscentre.org

DUC NGUYEN
Vietnam Policy Adviser
duc.nguyen@climateworkscentre.org

DR TESSA LEACH
Senior Project Manager (Industry)
tessa.leach@climateworkscentre.org

CAROLINA DOLAN
Research Analyst
carolina.dolan@climateworkscentre.org

TOMMASO MATTIA PRETTO
Project Officer (Industry)
tommaso.pretto@climateworkscentre.org

Climateworks Centre, 2025, *Powering Ho Chi Minh City's future with net zero industrial precincts*

Published by Climateworks Centre Melbourne, Victoria, October 2025

This publication can be downloaded at: www.climateworkscentre.org

Climateworks Centre
Level 8, 750 Collins Street,
Docklands VIC 3008
Wurundjeri Country

MONASH University | MONASH SUSTAINABLE DEVELOPMENT INSTITUTE

Co-founded by philanthropy and Monash University, Climateworks Centre is an independent not-for-profit working within the Monash Sustainable Development Institute.