CBAM Readiness and the Green Industrial Transition in North Macedonia

Challenges, opportunities, and policy recommendations for decarbonisation, competitiveness and economic resilience

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This report was made possible with the support of the Open Society Foundations - Western Balkans. Its contents are the sole responsibility of Finance Think – Economic Research and Policy Institute - Skopje and do not necessarily reflect the views of the donor.

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Executive Summary

Macedonia's green transition has entered a decisive phase. During 2025, the country accelerated renewable energy deployment, updated its National Energy and Climate Plan (NECP), advanced energy sector reforms, and intensified preparations for coal phase-out and electricity market integration with the European Union. At the same time, the economy remains structurally exposed to carbon-intensive production and EU climate regulation due to the concentration of exports in emissions-intensive sectors such as iron and steel, metals, electricity, and cement, as well as continued reliance on coal-based electricity generation.

The transition therefore presents both a major challenge and a strategic opportunity. If managed proactively, it can strengthen industrial competitiveness, improve energy security, attract investment, modernise infrastructure, and create higher value-added employment. If managed poorly, however, North Macedonia risks declining export competitiveness, stranded carbon-intensive assets, and widening regional and social disparities, particularly in coal-dependent regions such as Pelagonija and the Southwest region.

This report starts from the premise that Green Industrial Policies (GIPs) are not only environmental policies, but strategic instruments for economic transformation. In the context of the green transition, GIPs can support industrial upgrading, accelerate innovation, strengthen domestic resilience, and manage the social costs of structural change. Their relevance for North Macedonia is particularly significant given the country's simultaneous exposure to decarbonisation pressures, EU accession obligations, energy security concerns, and industrial competitiveness challenges.

T**he transition also exposes growing limitations in North Macedonia's existing industrial development framework.** The current Industrial Strategy 2018–2027 was designed before the acceleration of EU green industrial policy, the 2021–2022 energy crisis, and the implementation of CBAM. While the strategy focused on productivity growth, export development, and technological upgrading, the competitive environment within Europe has since fundamentally changed. Industrial competitiveness increasingly depends not only on labour costs and

investment incentives, but also on access to affordable low-carbon electricity, emissions reporting capacity, compliance with sustainability standards, and integration into decarbonised European value chains.

Despite accelerated renewable energy development and stronger policy alignment with the Energy Community acquis, important structural vulnerabilities remain. Coal continues to play a major role in electricity generation, while energy intensity remains above EU averages.

The revised NECP adopted in 2025 sets ambitious targets, including a 42.2% reduction in greenhouse gas emissions by 2030 compared to 1990 levels and a renewable energy share of 31.6% in gross final energy consumption. In parallel, the proposed Law on Renewable Energy Sources strengthens the regulatory framework for renewable deployment, storage infrastructure, and grid integration.

At the same time, North Macedonia remains exposed to CBAM due to the concentration of exports toward emissions-intensive sectors such as iron and steel, metals, electricity, and cement. These sectors are economically important not only for exports, but also for employment, fiscal revenues, and industrial production. Since the definitive implementation phase of CBAM began on 1 January 2026, exporters face growing pressure to reduce emissions intensity, strengthen emissions monitoring systems, and align with EU carbon pricing requirements.

The findings of this report suggest that the transition is advancing asymmetrically. Larger exporters and energy-intensive firms are adapting more rapidly through renewable self-generation, efficiency investments, and emissions monitoring systems, while many SMEs and local suppliers risk falling behind due to financial, technical, and institutional constraints. Larger export-oriented firms have increasingly invested in renewable self-generation, energy efficiency, largely driven by anticipated CBAM costs and customer requirements. However, many firms, particularly small and medium-sized enterprises (SMEs), continue to face significant barriers related to financing, technical expertise, administrative procedures, and regulatory uncertainty. The SME Strategy 2025–2030 identifies green and digital transition gaps, weak innovation capacity, and limited access to finance among the key structural constraints affecting competitiveness.

Interview findings indicate that companies increasingly perceive decarbonisation as a competitiveness and market access issue rather than solely an environmental obligation. Export-oriented firms reported growing pressure from EU buyers regarding emissions reporting, renewable electricity sourcing, and supply chain transparency. At the same time, stakeholders highlighted persistent barriers related to administrative complexity, permitting delays, regulatory uncertainty, grid connection constraints, and limited access to affordable financing, particularly for SMEs.

Financing and institutional constraints remain among the central challenges of the transition. North Macedonia requires substantial investments in renewable generation, electricity networks, storage systems, industrial decarbonisation, transport electrification, and workforce reskilling. The World Bank highlights that climate-related investment needs significantly exceed

current fiscal capacities, while public debt and broader fiscal pressures constrain the state's ability to finance the transition independently. In parallel, the OECD points to persistent energy subsidies, pricing distortions, and social vulnerabilities that complicate the implementation of carbon pricing reforms and market liberalisation.

These challenges underscore the need for a coordinated policy framework that simultaneously addresses industrial development, climate policy, energy reform, and social protection. Green Industrial Policies can provide such a framework by linking renewable energy expansion with industrial competitiveness, carbon reduction with export resilience, skills development with labour market transition, and regional development with just transition objectives. This is particularly important in the context of volatile electricity imports, exposure to fossil fuel price shocks, and increasing competitive pressure from the EU's low-carbon industrial transition.

North Macedonia has already initiated reforms in this direction. The Government adopted the Annual Just Transition Implementation Plan for 2026, focused on coal region transformation, renewable deployment, grid upgrades, reskilling programmes, and regional economic diversification. The plan foresees the gradual coal phase-out by 2030 and approximately 1.7 GW of renewable energy capacity additions between 2024 and 2030 through the Just Energy Transition Investment Platform (JETIP). Nevertheless, implementation capacity, financing pipelines, institutional coordination, and monitoring mechanisms remain underdeveloped.

The report aims to provide updated and contextualised analysis of North Macedonia's green transition and policy developments, while also assessing how CBAM, industrial decarbonisation pressures, and energy transition challenges affect firms, workers, and regions differently. Through desk research and stakeholder interviews, including discussions with major exporters and representatives from coal-dependent regions and energy facilities, the report examines both the risks and opportunities associated with the transition.

> **"CBAM is not only an environmental issue, but a direct issue of export competitiveness." — Policymaker**

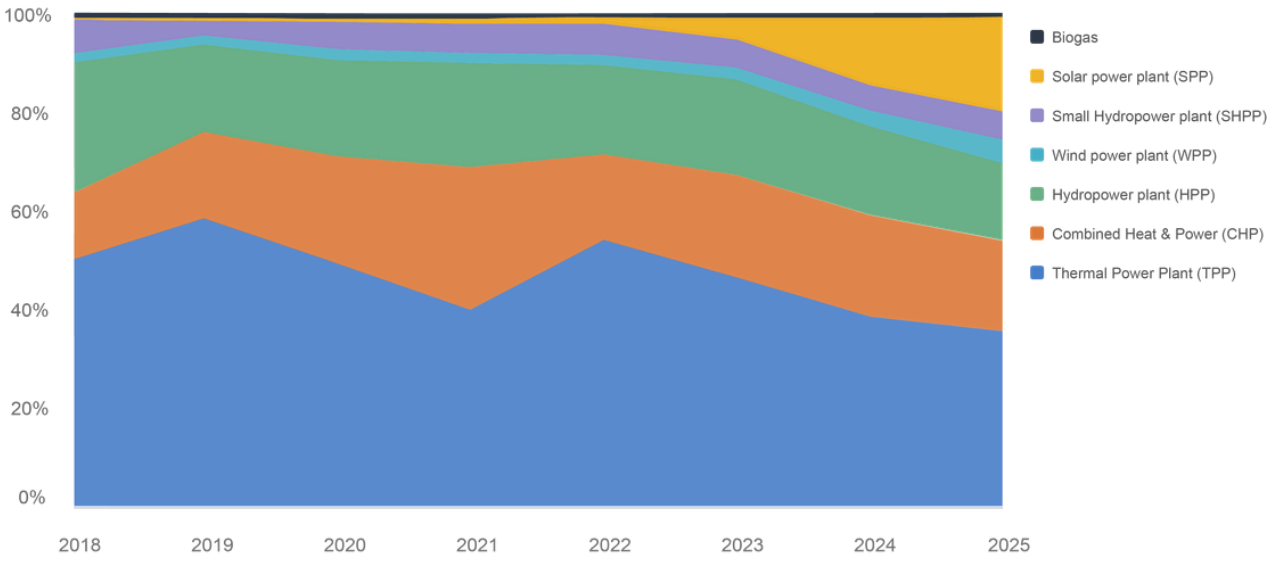
The findings of this report suggest that the success of North Macedonia's green transition will depend not only on renewable energy expansion, but on the country's ability to simultaneously modernise industry, strengthen institutional capacity, mobilise investment, support vulnerable regions and workers, and improve long-term productivity and competitiveness. In this context, Green Industrial Policies represent not only a climate policy framework, but a broader development strategy for economic transformation and EU economic integration.

1 Energy Transition Context and Strategic Relevance

1.1 Energy System Overview

North Macedonia's electricity system remains structurally dependent on fossil fuels, although the energy mix has undergone significant diversification in recent years. Figure 1 illustrates the evolution of electricity generation between 2018 and 2025. Thermal power plants consistently accounted for the largest share of electricity production during this period, although their contribution fluctuated considerably, declining during 2020–2021 before increasing again amid the 2022 European energy crisis. The crisis prompted greater utilisation of domestic thermal generation capacity to stabilise supply during a period of exceptionally high electricity prices, while simultaneously accelerating investment in renewable energy projects. Solar energy experienced the most significant expansion, increasing from a negligible share before 2021 to nearly 20% of total generation by 2025. Hydropower output varied depending on hydrological conditions, while combined heat and power (CHP) plants maintained a relatively stable contribution throughout the period. Overall, the figure illustrates how short-term energy security responses during the crisis period evolved alongside a longer-term structural transition toward renewable energy sources.

Figure 1. Energy Production Mix in North Macedonia (% of total production)



Source: Energy and Water Services Regulatory Commission of the Republic of North Macedonia Annual Reports

By 2025, coal-based thermoelectric plants accounted for 35.4% of total electricity generation, continuing a decline from levels exceeding 50% in 2018. Hydropower represented 21.6% of generation, while solar photovoltaics emerged as a major contributor with a 19.3% share. CHP plants also retained an important role, contributing 18.2% of total electricity generation while supporting district heating systems, particularly in urban areas. Renewable generation expanded rapidly compared to 2024, with photovoltaic output increasing by 27.8% and wind generation by 32.6%, reflecting accelerated deployment of renewable energy technologies, particularly solar PV. At the same time, the structure of installed capacity shifted considerably, with renewable energy sources accounting for more than 58% of total installed electricity generation capacity in 2025 (Energy and Water Services Regulatory Commission, 2026).

Despite this progress, the electricity system continues to rely heavily on lignite-based thermal generation, primarily through TPP Bitola and TPP Oslomej, which remain important for baseload generation and energy security. Domestic coal supply continues to depend on the Suvodol and Brod-Gneotino mines, although current strategic frameworks increasingly position coal within a long-term transition pathway focused on decarbonisation, renewable energy expansion, and the gradual phase-down of lignite generation. This direction is reinforced through the updated National Energy and Climate Plan (NECP), which prioritises renewable energy deployment, energy security, grid modernisation, storage investments, and emissions reduction targets.

Institutionally, the electricity sector continues to be dominated by the state-owned utility Elektrani na Severna Makedonija (ESM), which operates the country's main thermal and hydropower facilities and remains the largest electricity producer. According to the latest report of the Energy and Water Services Regulatory Commission, ESM accounted for 53.4% of total installed generation capacity and 53.0% of domestic electricity production in 2025. Nevertheless, its relative dominance has gradually declined alongside ongoing market liberalisation and the rapid expansion of private renewable energy investments. Between 2021 and 2025, North Macedonia recorded the construction and licensing of a large number of new renewable energy facilities, particularly solar photovoltaic plants, contributing to a significant transformation of the electricity generation structure and accelerating the shift toward renewable energy sources (Energy and Water Services Regulatory Commission, 2026; European Commission, 2025).

North Macedonia also remains structurally dependent on electricity imports, although import reliance has decreased in recent years due to higher domestic renewable generation and lower electricity demand. According to the Energy and Water Services Regulatory Commission (2026), the expansion of solar and other renewable capacities significantly increased domestic electricity production in 2025, reducing import pressures compared to the peak crisis years.

However, import dependence continues to fluctuate depending on hydrological conditions, seasonal demand, and the availability of thermal generation capacity. Structural vulnerabilities also persist due to the ageing lignite fleet and exposure to external electricity price shocks, as demonstrated during the 2021–2022 energy crisis, when the oil-fired TPP Negotino was temporarily reactivated to support supply security (Energy and Water Services Regulatory Commission, 2026; OECD, 2025).

Beyond its role in electricity generation, coal-based production carries important socio-economic implications. Facilities such as TPP Bitola and TPP Oslomej remain major employers and play a central role in regional economies, particularly in the Pelagonia and Southwest regions. As a result, the planned coal phase-out represents not only an energy transition challenge but also a significant labour-market and regional development issue, requiring targeted measures for workforce reskilling, economic diversification, and social support (Just Transition Implementation Plan, 2026; World Bank, 2024).

Energy subsidies continue to shape electricity pricing and market dynamics in North Macedonia, with important implications for market efficiency and the pace of the green transition. OECD analysis shows that electricity prices across the Western Balkans have historically remained below cost-recovery levels through regulated tariffs, fiscal transfers, and support to state-owned utilities, particularly in fossil fuel–based generation (OECD, 2025). In North Macedonia, this support has largely benefited lignite-based electricity production, reducing exposure to market signals and weakening incentives for energy efficiency and investment in cleaner technologies. While these measures have supported affordability and energy security, they have also contributed to market distortions and delayed alignment with EU energy market principles (OECD, 2025).

Between 2018 and 2023, North Macedonia provided approximately EUR 2 billion in total energy support, including EUR 1.4 billion in induced price transfers and EUR 594 million in direct financial and credit support, most of which favoured fossil fuels (OECD, 2025). According to Finance Think (2023), electricity subsidies imposed a significant fiscal burden during the energy crisis, reaching approximately 3.2% of GDP and 9.2% of total government expenditures in 2022. The study also identifies evidence of a crowding-out effect, with higher electricity subsidies associated with lower public health and social spending. These findings suggest that reducing broad and untargeted subsidies could help create fiscal space for structural reforms, targeted social support, energy-efficiency measures, and investments linked to the green transition. Subsidy reform is also likely to reshape the competitive structure of the electricity sector. More cost-reflective electricity prices would improve the relative competitiveness of renewable energy sources, which are characterised by low marginal costs and limited exposure to fuel price volatility. This trend is reinforced by ongoing policy commitments related to renewable energy expansion, including planned photovoltaic projects at TPP Bitola and TPP Oslomej and broader coal phase-down objectives under the Just Transition framework.

At the same time, reform must be carefully managed due to its social and political implications. OECD assessments emphasize that abrupt electricity price increases can disproportionately affect vulnerable households and weaken public support if not accompanied by targeted compensatory measures (OECD, 2025). Best practice therefore points toward a gradual transition from broad energy subsidies to targeted social assistance and energy-efficiency support. In the context of CBAM and the broader decarbonisation agenda, subsidy reform is increasingly becoming not only a matter of fiscal sustainability and market efficiency, but also a strategic requirement for improving investment conditions for renewable energy, reducing exposure to carbon-related trade costs, and accelerating integration into the EU energy and climate framework.

1.2 Renewable Energy Sources Deployment

1.2.1 Renewable Energy Potential

North Macedonia possesses substantial technical potential for renewable energy deployment, particularly in solar photovoltaics. According to The Nature Conservancy (2023), even after excluding all Important Bird Areas (IBA) and Important Plant Areas (IPA), the country retains an estimated potential of approximately 11 GW of solar PV capacity and 0.35 GW of wind capacity. Developing only half of these priority locations could generate around 7.7 terawatt-hours of electricity annually, exceeding current domestic electricity consumption.

Recent years have also demonstrated rapid progress in renewable energy deployment, especially in solar energy, which has become the fastest-growing technology within the electricity system. This expansion has been supported by private investment, regulatory reforms, declining technology costs, and increased investor interest following the 2021–2022 energy crisis. According to the Energy Balance 2025, solar power plants accounted for 30.4% of total installed electricity generation capacity in 2025, making photovoltaics the second-largest generation technology after thermal power plants. The Just Energy Transition Investment Platform (JETIP) additionally foresees the installation of approximately 1.7 GW of renewable energy capacity between 2024 and 2030, alongside investments in grid modernisation and storage infrastructure. As a result, solar energy has emerged as a central component of North Macedonia's near-term decarbonisation strategy (Just Transition Implementation Plan, 2026).

1.2.2 National Decarbonisation Obligations and Targets

North Macedonia has established an increasingly comprehensive framework of international, regional, and domestic commitments shaping its decarbonisation pathway. As a Contracting Party to the Energy Community Treaty and an EU candidate country, the country is expected to progressively harmonise its energy and climate policies with the EU acquis as part of the accession process. At the international level, North Macedonia ratified the Paris Agreement in 2016 and endorsed the Sofia Declaration on the Green Agenda for the Western Balkans in 2020, thereby aligning its climate objectives with broader EU decarbonisation priorities and regional cooperation initiatives.

The European Commission's 2025 Country Report further underlines the country's obligations under the Reform Agenda and the EU Growth Plan for the Western Balkans, particularly regarding decarbonisation, renewable energy deployment, electricity market integration, and climate governance reforms. The report notes that North Macedonia maintained full alignment with the EU's foreign and climate policy orientation and continued implementing green transition reforms, although further progress remains necessary in areas such as emissions reduction, environmental governance, and institutional implementation capacity (European Commission, 2025).

At the national level, the strategic direction for the energy transition was initially established through the Energy Development Strategy to 2040 (2019), which introduced three transition scenarios: Reference, Moderate Transition, and Green. However, subsequent developments, particularly the 2021–2022 energy crisis, rising energy security concerns, and accelerated alignment with EU climate legislation, reduced the relevance of some earlier assumptions and shifted policymaking toward a more ambitious and implementation-oriented decarbonisation agenda.

This shift is reflected in the updated National Energy and Climate Plan (NECP, 2025), which now serves as the central strategic framework guiding the country's energy transition. The NECP sets a target to reduce greenhouse gas emissions by 42.2% by 2030 compared to 1990 levels, or by 51.9% when including LULUCF, while also aiming to achieve a 31.6% share of renewable energy in gross final energy consumption. The updated plan also places greater emphasis on energy security, electricity market integration, renewable energy deployment, grid modernisation, and energy storage infrastructure, while supporting the gradual reduction of coal dependence.

Recent policy developments further indicate a growing shift toward the gradual phase-down of coal-based electricity generation over the coming decade, replacing earlier assumptions of prolonged reliance on lignite-based generation. The 2026 Just Transition Implementation Plan explicitly frames the transition around coal phase-out, renewable energy deployment, infrastructure investment, and regional economic restructuring in coal-dependent regions such

as Bitola and Kičevo/Oslomej. The plan also links the Just Energy Transition Investment Platform (JETIP) to the objective of installing approximately 1.7 GW of renewable energy capacity between 2024 and 2030, alongside investments in grid infrastructure, storage, and community support mechanisms. The broader transition framework additionally emphasises workforce reskilling, economic diversification, and social inclusion measures intended to support a more equitable transition process. Nevertheless, OECD assessments continue to note that the timeline for a complete coal phase-out remains uncertain due to energy security considerations and the continued structural role of thermal generation in the electricity system (OECD, 2025).

Carbon pricing is also emerging as a central component of the country's climate policy architecture. The updated NECP foresees the gradual introduction of a domestic carbon pricing mechanism between 2025 and 2029 as preparation for eventual integration into the EU Emissions Trading System (ETS) (NECP, 2025). Recent assessments emphasise that the gradual introduction of carbon pricing and MRV-aligned regulatory reforms will be important both for reducing CBAM exposure and for preserving the competitiveness of export-oriented industries in North Macedonia (Sundvor et al., 2026).

1.2.3 Progress Achieved by 2025 and 2026 and Major Projects

By 2025, North Macedonia had made notable progress toward its energy transition and decarbonisation objectives, particularly through the accelerated deployment of renewable energy sources. Solar energy expansion, supported by regulatory reforms and growing private-sector investment, has been especially significant in recent years. Nevertheless, important structural challenges persist, including continued dependence on lignite-based electricity generation, limited grid flexibility, and vulnerability to fluctuations in energy imports. In addition, achieving long-term decarbonisation targets will require substantial investment across the energy, transport, and industrial sectors, together with stronger institutional capacity and improved policy coordination (World Bank, 2024).

Recent policy reforms have operationalised the country's coal transition strategy through investment, governance, and workforce measures focused on renewable deployment, infrastructure modernisation, and regional transition support. In 2025, the Energy Regulatory Commission (ERC) issued, for the first time, seven licences for electricity storage facilities integrated within photovoltaic power plants, with a total installed battery storage capacity of 7.1 MW. This represents an important step toward strengthening the integration of renewable energy sources and increasing the flexibility of the electricity system, particularly in the context of the growing share of solar energy and the need for improved grid balancing and system stability (ERC, 2026). In 2025, the Ministry of Energy, Mining and Mineral Resources amended the Rulebook on Renewable Energy Sources, increasing the maximum installed capacity for prosumers from 6 kW to 10 kW for households and from 40 kW to 70 kW for small consumers and public entities. The number of prosumers increased from 918 in 2023 to 1,990 in 2025, reaching a total installed capacity of 33 MW and supplying 16.85 GWh of electricity to the distribution network, reflecting the growing role of decentralized renewable energy generation in North Macedonia (ERC, 2026).

In May 2026, North Macedonia officially launched its intraday electricity market through the national electricity market operator MEMO, representing an important step in the further liberalisation and integration of the electricity market. The intraday market enables continuous trading during the day of delivery, thereby increasing system flexibility, improving balancing efficiency, and facilitating the integration of variable renewable energy sources. The reform also strengthens market-based price signals and supports the country's gradual integration into the EU internal electricity market and regional market coupling processes. Stakeholders further linked the reform to the broader green transition agenda and the need to manage emerging market pressures associated with CBAM and renewable integration (MEMO, 2026).

Taken together, these reforms illustrate a gradual shift from strategic planning toward the operationalisation of the energy transition through concrete regulatory, market, and infrastructure measures. However, despite the progress achieved by 2025 and 2026, accelerating renewable energy deployment at the scale required for long-term decarbonisation will depend on a broader and more coordinated set of green industrial policy instruments capable of reducing investment risks, strengthening grid flexibility, and improving the commercial viability of low-carbon technologies.

1.2.4 Incentives and GIP Tools for Accelerated RES Deployment

Faster deployment of renewable energy sources (RES) in North Macedonia will require a broader mix of green industrial policy (GIP) instruments aimed at reducing investment risks, improving system flexibility, and strengthening the commercial viability of renewable energy projects. Several of these measures are already reflected in the NECP (2025), including provisions related to Contracts for Difference (CfDs), permitting simplification, guarantees of origin, long-term power purchase agreements (PPAs), energy storage deployment, demand response, and increased electricity market integration.

· **Contracts for Difference (CfDs):** Introducing CfDs through competitive renewable energy auctions could improve investment certainty and reduce exposure to electricity price volatility, particularly for large-scale solar and wind projects. The NECP (2025) identifies CfDs as a mechanism for gradually transitioning away from administratively determined feed-in tariffs and aligning renewable support schemes with EU state aid and electricity market rules.

· **Market-based support schemes and long-term PPAs:** Expanding the use of competitive auctions and long-term power purchase agreements (PPAs) could improve market liquidity and support corporate renewable electricity procurement. These instruments are becoming increasingly important for export-oriented industries seeking to reduce CBAM-related exposure and demonstrate access to low-carbon electricity.

"A legal framework should be created to allow large industrial facilities to conclude long-term power purchase agreements with renewable energy producers at fixed prices, providing predictability for both sides."

· **Energy storage and flexibility mechanisms**: As the share of variable renewable generation increases, system flexibility will become increasingly important for maintaining grid stability and reducing balancing costs. Battery energy storage systems (BESS), demand response mechanisms, aggregators, and balancing markets can help absorb fluctuations in renewable generation and improve overall system adequacy. Reflecting these priorities, the NECP (2025) foresees the deployment of at least 200 MW / 400 MWh of battery storage capacity by 2030, alongside reforms supporting active consumers, energy communities, and flexibility markets.

· **Grid modernisation and digitalisation:** Renewable energy expansion will also depend on substantial upgrades to transmission infrastructure, digitalisation, and regional electricity market integration. Investments in smart grids, digital substations, system management technologies, and interconnections can improve operational flexibility and facilitate the integration of decentralised renewable energy sources.

· **Permitting reforms and innovative deployment models**: Administrative bottlenecks remain among the main barriers to faster renewable energy deployment. Simplified permitting procedures, one-stop-shop approval systems, and clearer regulatory frameworks could significantly accelerate project implementation. The NECP (2025) foresees permitting simplification measures, while additional incentives could support innovative renewable deployment models, including agri-photovoltaics, building-integrated photovoltaics, floating solar, and decentralised prosumer systems.

Together, these instruments could support a more investment-oriented and system-integrated approach to renewable energy deployment, while simultaneously strengthening energy security, industrial competitiveness, and alignment with EU decarbonisation and electricity market integration objectives.

1.2.5 Economic Costs of Delayed Transition

Delayed energy transition could impose significant economic costs on North Macedonia, including weaker industrial competitiveness, continued reliance on carbon-intensive production, exposure to volatile fossil fuel imports, and rising pressures from evolving EU climate policies. These risks are particularly pronounced in manufacturing due to the sector's strong integration into EU value chains and dependence on

emissions-intensive inputs such as steel, aluminium, and electricity-intensive products. Rising carbon costs, stricter environmental standards, and shifting demand toward low-emission technologies are expected to accelerate industrial restructuring, while also generating spillover pressures across regional supply chains and downstream industries.

> **"Products with higher carbon intensity will become more expensive when entering the EU market."**

These transition pressures also expose structural weaknesses in North Macedonia's existing industrial development model, which has historically relied on relatively low labour costs, energy-intensive production, and integration into lower-value segments of European supply chains. As EU industrial and climate policies increasingly prioritise decarbonisation, technological upgrading, circular economy principles, and clean manufacturing, maintaining competitiveness will require a shift from traditional industrial policy approaches toward a more comprehensive Green Industrial Strategy. Such an approach would need to combine industrial decarbonisation, renewable energy deployment, technological innovation, workforce upgrading, and targeted support for low-carbon manufacturing sectors, while also strengthening domestic value creation and resilience within emerging European green value chains.

Delayed transition is also likely to generate increasing macroeconomic and fiscal pressures over the long term. According to World Bank estimates, achieving North Macedonia's climate mitigation objectives could require close to EUR 25 billion in investments by 2030 and approximately EUR 35 billion by 2050 (World Bank, 2024). Continued dependence on fossil fuels also imposes substantial public health and productivity costs linked to persistent air pollution. World Bank modelling suggests that the implementation of planned climate measures could prevent approximately 133 premature deaths and reduce pollution-related productivity losses by more than 6,500 workdays annually (World Bank, 2024). Climate-related damages are likewise expected to intensify over time, with flood-related well-being losses alone estimated at around 0.9% of GDP annually, further underscoring the economic consequences of delayed climate adaptation and decarbonisation efforts (World Bank, 2024).

At the same time, the impacts of the transition are likely to be unevenly distributed across sectors and regions, with carbon-intensive industries and coal-dependent areas expected to face particularly strong adjustment pressures.

"The main financial impacts include the need for investments in decarbonisation, reduced competitiveness on the EU market, and increased operational and administrative costs."

Manufacturing remains among the most exposed sectors due to its importance forexports, employment, and fiscal revenues, while coal-dependent regions are likely to face additional adjustment pressures linked to the gradual phase-out of lignite-based electricity generation. These dynamics underscore the importance of proactive industrial, energy, and labour-market policies aimed at supporting technological upgrading, economic diversification, workforce adaptation, and long-term competitiveness throughout the transition process.

1.3 Regulatory Framework for Renewable Energy Deployment

North Macedonia's renewable energy regulatory framework has undergone significant reform in recent years as part of the country's broader alignment with EU energy and climate policies. The main strategic direction is defined through the National Energy and Climate Plan (NECP, 2025), which establishes targets related to renewable energy deployment, decarbonisation, electricity market integration, and energy system modernisation through 2030. Together with the Energy Law, the NECP currently forms the core regulatory and strategic framework guiding renewable energy development and the wider energy transition.

Recent reforms have increasingly focused on improving market integration and reducing administrative barriers to renewable energy investments. The NECP (2025) and the proposed renewable energy legislation foresee the introduction of "one-stop-shop" procedures intended to streamline permitting, licensing, and grid connection processes for renewable energy projects. Additional reforms aim to simplify procedures for strategic renewable investments, strengthen guarantees of origin systems, facilitate the participation of prosumers and energy communities, improve electricity market integration, and support the integration of storage operators into the electricity market.

At the same time, several important legislative reforms remain pending. These include the proposed Law on Renewable Energy Sources, which is intended to strengthen market-based support mechanisms, improve permitting procedures, facilitate grid integration, and further harmonise domestic legislation with the EU energy acquis. In parallel, the proposed Climate Action Law is expected to establish a more comprehensive framework for climate governance, carbon pricing, and monitoring, reporting, verification, and accreditation (MRVA) mechanisms.

Despite the expanding regulatory framework, implementation challenges remain substantial. Permitting and licensing procedures continue to represent one of the main barriers to renewable energy deployment, particularly for solar photovoltaic (PV) projects. Stakeholder consultations indicate that obtaining the necessary approvals can account for a significant share of total project implementation time, increasing both investment uncertainty and overall project costs. Administrative fragmentation between municipalities, regulatory institutions, and central authorities further slows project development, while publicly available evidence regarding the practical effectiveness of the proposed one-stop-shop mechanisms remains limited.

“Secondary legislation has not yet been adopted and there is no predictability.”

“Clear and fast legal solutions that would facilitate large-scale green investments from concept to implementationareoften lacking.”

In parallel, structural electricity market and infrastructure constraints continue to limit renewable energy deployment. Limited transmission capacity, insufficient grid flexibility, and inadequate interconnection infrastructure restrict the ability of the electricity system to integrate larger shares of variable renewable energy sources. In the case of solar PV, market conditions also create additional commercial risks, as peak generation periods often coincide with lower wholesale electricity prices. Furthermore, amendments introduced under the 2025 Energy Law established additional bank guarantee requirements for certain energy projects, increasing capital cost pressures for investors. At the same time, the current regulatory framework still provides limited targeted support for emerging technologies and innovative deployment models, including battery energy storage systems (BESS), agri-photovoltaics, building-integrated photovoltaics (BIPV), and floating solar installations.

1.4 Grid Capacity and Modernization

Grid capacity has emerged as one of the main constraints to further renewable energy deployment in North Macedonia. Most renewable energy projects are currently connected at the distribution level, where available capacity across many substations is already largely exhausted, while parts of the transmission network are approaching their technical limits. Stakeholder consultations consistently identified grid infrastructure as one of the most critical bottlenecks for accelerating renewable energy deployment, particularly given that the existing electricity system was originally designed around centralized thermal generation and remains insufficiently prepared for the large-scale integration of decentralized solar and wind capacities.

Both policymakers and private-sector representatives emphasized the need for substantial investments in transmission and distribution infrastructure, including new transmission lines, substations, smart metering systems, digital grid management technologies, and energy storage facilities. Planned regional interconnections, particularly the new transmission link with Albania, are also expected to play an important role in strengthening regional electricity trade and improving system flexibility.

> **"The current grid is not sufficient for the large-scale integration of new renewable energy sources without significant investments."**

Significant investment is therefore required to strengthen and modernise the electricity grid, as foreseen in MEPSO investment plans and broader Energy Community priorities. However, grid expansion projects remain highly capital-intensive and are often delayed by complex permitting procedures, spatial planning constraints, lengthy land acquisition processes, and limited institutional coordination. These administrative and governance barriers further slow the pace of grid modernisation and renewable integration.

In parallel, more flexible technological solutions are becoming increasingly important for addressing system constraints. Battery energy storage systems (BESS), together with balancing mechanisms and demand-side flexibility measures, can help improve grid stability, reduce congestion, optimise power flows, and facilitate the integration of variable renewable energy sources. Recent energy sector reforms and proposed renewable energy legislation increasingly recognise the importance of storage infrastructure and system flexibility for supporting higher shares of renewable generation.

Digitalisation is also emerging as a key component of long-term grid modernisation. Advanced demand response systems, prosumer integration, smart metering, virtual power plants, and energy community platforms can help better align electricity consumption with renewable

generation patterns, improve system efficiency, reduce network losses, and strengthen resilience to physical, cyber, and climate-related risks.

> **"The most urgent investments are needed in the modernisation of transformer stations, the introduction of digital grid management systems, and the development of energy storage capacities."**

At the same time, these infrastructure constraints increasingly affect industrial decarbonisation efforts. Electrification of industrial processes is generally more energy-efficient and easier to decarbonise than continued reliance on fossil fuel-based thermal systems. However, where adequate grid infrastructure is unavailable near industrial facilities, investors are often required to finance new connections, grid reinforcement, and related system upgrades themselves, significantly increasing project costs and, in some cases, undermining the commercial viability of industrial electrification projects. Although substantial infrastructure investments are necessary for long-term decarbonisation and energy security, they may also generate short-term cost pressures as part of these expenditures is transferred to end users through network tariffs. This further highlights the importance of complementing grid expansion with cost-effective demand-side measures aimed at maximising the use of existing grid assets and reducing peak demand pressures.

1.5 Energy Transition and EU Integration

North Macedonia has continued to advance alignment with the EU acquis in the areas of energy, climate policy, competition, and regional electricity market integration, although important implementation gaps and institutional constraints remain. According to the European Commission's 2025 Country Report, the country made further progress in renewable energy deployment, electricity market reforms, and regional energy integration, while also increasing the share of electricity generation from renewable sources. At the same time, the report assessed progress in environmental governance, competition policy, and institutional implementation capacity as more limited, suggesting that legislative alignment increasingly outpaces practical implementation.

In the energy sector, reforms initiated through the EU accession process and the Energy Community framework have increasingly focused on electricity market liberalisation, regional integration, and decarbonisation. North Macedonia has advanced implementation of the Electricity Integration Package, which establishes the basis for future electricity market coupling with the EU and deeper participation in regional electricity markets. The NECP (2025)

and the Just Transition Implementation Plan (2026) reinforce alignment with EU climate and energy legislation, particularly regarding renewable energy deployment, coal phase-down, and preparation for future carbon pricing mechanisms linked to the EU ETS.

"Full market integration with the EU, alignment with climate and energy legislation, and the introduction of carbon charges for fossil-fuel-based electricity are all steps toward eventual integration into the EU ETS."

These reforms are increasingly shaped by the implementation of CBAM)and the broader EU decarbonisation agenda. According to the World Bank, North Macedonia faces elevated transition risks due to the carbon-intensive structure of its electricity system and the strong dependence of emissions-intensive sectors, particularly metals and electricity-related industries, on exports to the EU market (World Bank, 2024). At the regional level, the Energy Community Secretariat's first quarterly CBAM monitoring report for 2026 identifies early changes in regional electricity trade patterns following CBAM implementation and warns that delays in decarbonisation and carbon pricing reforms could hinder both electricity market integration and renewable energy investment across the Energy Community Contracting Parties (Energy Community Secretariat, 2026a).

North Macedonia's most binding near-term obligations in the area of green transition stem from the intersection of the EU Growth Plan and Reform and Growth Facility (RGF), the Energy Community Treaty, and CBAM-related reforms. Under the Reform Agenda (2024), access to EU financing is conditioned on the implementation of reforms related to electricity market liberalisation, renewable energy deployment, climate governance, decarbonisation, and the establishment of a functional monitoring, reporting, verification, and accreditation (MRVA) system for greenhouse gas emissions. The Reform Agenda specifically identifies the establishment of such a system as necessary for CBAM implementation, underscoring the urgency of aligning domestic climate governance structures with evolving EU carbon regulation requirements.

The draft Climate Action Law forms a central component of this transition framework by introducing provisions related to carbon pricing, emissions monitoring and reporting obligations, and preparatory mechanisms aligned with EU ETS principles. The planned carbon pricing mechanism is expected to cover sectors directly exposed to CBAM, including fossil fuel-based electricity generation, cement, iron and steel, aluminium, fertilisers, and hydrogen production (Reform Agenda, 2024).

At the same time, the Energy Community Secretariat has emphasised that additional reforms remain necessary to strengthen regional integration and long-term energy security (Energy Community Secretariat, 2026b). Key priorities include completing the transposition of the EU renewables acquis, establishing robust emissions monitoring systems, and introducing a carbon pricing mechanism aligned with EU rules (Energy Community Secretariat, 2026b).

"Regional integration with the EU electricity market would improve competitiveness and access to larger markets."

Despite broad strategic alignment with EU climate and energy objectives, tensions remain between decarbonisation obligations and domestic socio-economic considerations. Although electricity market liberalisation remains part of the Reform Agenda, government representatives have publicly stated that there is currently no intention to fully liberalise the household electricity market due to concerns over substantial electricity price increases and their potential impact on household living standards. This reflects the broader political economy challenge of balancing energy affordability, social stability, and compliance with EU-driven market and climate reforms.

2 CBAM and Trade Exposure

2.1 CBAM Framework and North Macedonia's Exposure

The Carbon Border Adjustment Mechanism (CBAM), adopted in April 2023, is a policy instrument designed to align the carbon cost of imported goods with the costs faced by EU producers under the EU Emissions Trading System (EU ETS). By imposing a carbon price on selected imports based on their greenhouse gas (GHG) emissions, CBAM aims to reduce the risk of carbon leakage, preserve the competitiveness of EU industry, and encourage trading partners to align with EU climate policies (Sundvor et al., 2026). In its initial phase, CBAM applies to carbon-intensive sectors including cement, iron and steel, aluminium, fertilisers, electricity, and hydrogen. Reporting obligations began in 2023, while full financial implementation started in January 2026, when EU importers became required to purchase CBAM certificates linked to the EU ETS carbon price.

The Energy Community Secretariat has identified four main carbon pricing pathways for the Western Balkans aimed at mitigating the effects of CBAM: the introduction of a carbon tax, the establishment of a fixed-price ETS, the development of a market-based ETS, and eventual integration into the EU ETS framework (Sundvor et al., 2026). North Macedonia has committed to gradual alignment with the EU ETS and the introduction of domestic carbon pricing mechanisms as part of its broader EU integration and decarbonisation agenda.

North Macedonia remains particularly vulnerable to the effects of CBAM due to the carbon-intensive structure of its economy, continued dependence on fossil fuels, and strong trade orientation toward the EU market. Around three-quarters of the country's primary energy supply is still derived from fossil fuels, particularly coal-based electricity generation and petroleum products used in transport (World Bank, 2024). At the same time, nearly 80% of exports are directed toward the European Union, increasing exposure to EU carbon pricing policies and the competitiveness pressures associated with CBAM implementation.

Interview respondents consistently emphasized that CBAM is increasingly perceived not only as an environmental or climate-related measure, but also as a significant competitiveness challenge with potentially important implications for production costs, export performance, and long-term investment decisions among Macedonian firms.

"More than 90% of the company's exports are destined for the EU market. The company estimates annual additional CBAM compliance costs of more than EUR 10,000."

The introduction of CBAM is expected to increase the cost of emissions-intensive exportsfrom countries without equivalent carbon pricing systems. While compliance obligations formallyfall on EU importers, the economic burden is expected to be transmitted through value chains, affecting exporters through higher costs, emissions reporting obligations, and potential reductions in demand. In this context, domestic carbon pricing and alignment with EU climate regulation increasingly represent not only environmental objectives but also strategic economic priorities.

2.2 CBAM Sectoral Exposure and Industrial Structure

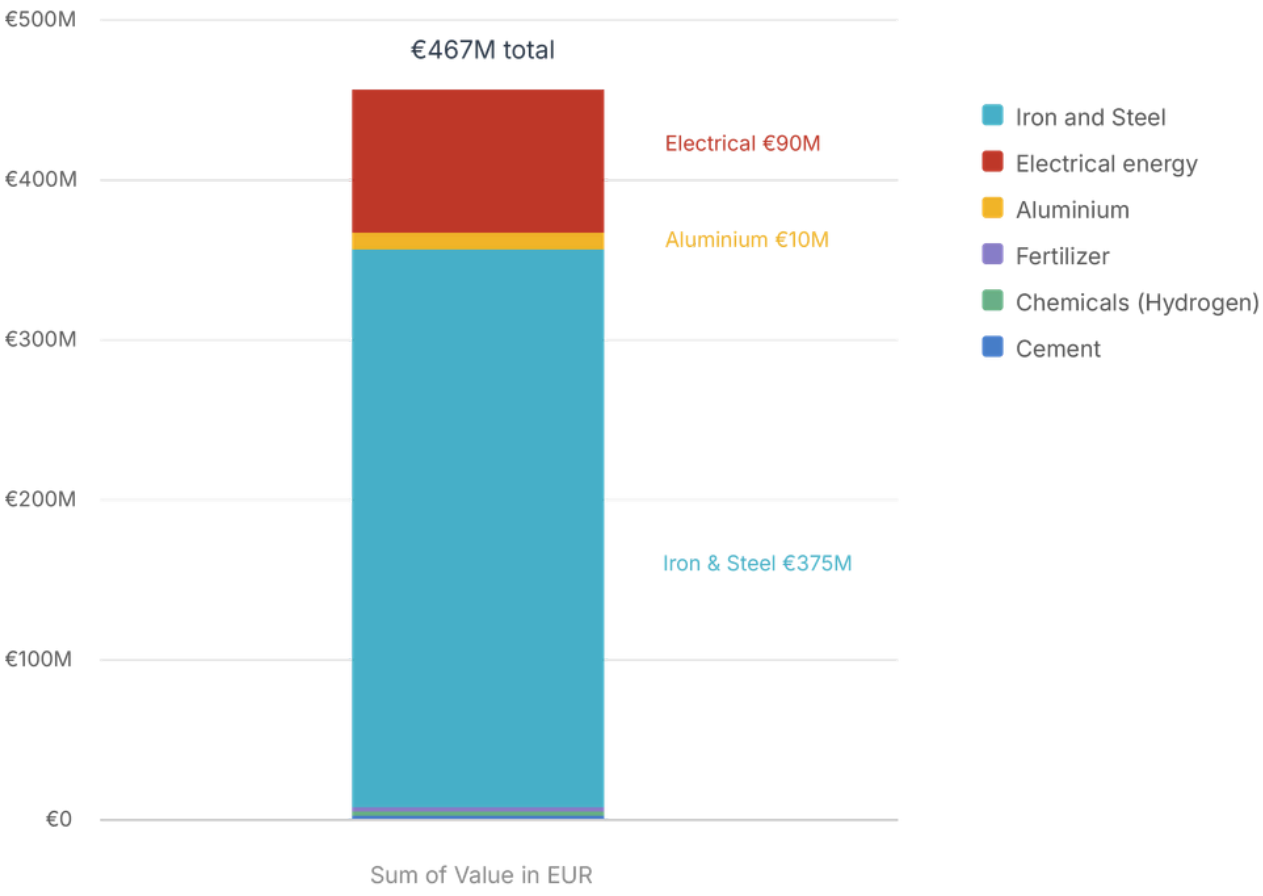
North Macedonia's CBAM exposure is heavily concentrated in emissions-intensive and export-oriented industries, particularly metals and electricity-related value chains. More than 60% of the country's iron and steel exports, as well as nearly half of aluminium exports, are directed toward the European Union, making these sectors especially sensitive to carbon border pricing mechanisms (World Bank, 2024).

In 2025, North Macedonia's exports covered by CBAM amounted to approximately EUR 467.8 million, equivalent to 7.7% of total exports to the EU and an estimated 2.8% of GDP (Figure 2). This reflects a relatively high degree of trade exposure in relation to the size of the economy and highlights the importance of carbon-intensive sectors for export performance and industrial activity. CBAM exposure is strongly concentrated in iron and steel products, which account for approximately EUR 373.5 million, or around 78% of total CBAM-covered exports **(Figure 2)**. In volume terms, the sector represents approximately 85% of total CBAM-covered export tonnage (**Figure 3)**. Electricity exports constitute the second-largest category, amounting to roughly EUR 78.6 million or 16.4% of total CBAM-covered exports. Aluminium exports remain comparatively limited at around EUR 11 million, while cement, fertilisers, and hydrogen-related products account for only marginal shares of total exposure.

At the same time, the implications of CBAM depend not only on the scale of export exposure, but also on the emissions intensity of production processes and the underlying energy mix. Recent World Bank analysis (2026) indicates that estimated excess carbon payments in iron and steel vary considerably across the Western Balkans, ranging from almost zero in North Macedonia to around 4% in Albania, with Serbia and Kosovo positioned in between.

.This suggests that countries with similar levels of trade exposure may nevertheless face substantially different CBAM-related costs depending on their production technologies, electricity systems, and overall carbon intensity. North Macedonia's comparatively low estimated excess carbon payments therefore point to a relatively more favourable emissions profile within the regional context, potentially moderating some of the competitiveness pressures associated with CBAM implementation. More broadly, North Macedonia's industrial structure is somewhat less energy-intensive than in several other Western Balkan economies, reflecting a comparatively more diversified manufacturing base and lower dependence on heavy industrial production. Nevertheless, CBAM-related adjustment pressures remain significant for export-oriented sectors integrated into EU value chains, particularly as carbon costs and reporting requirements become progressively stricter after 2026.

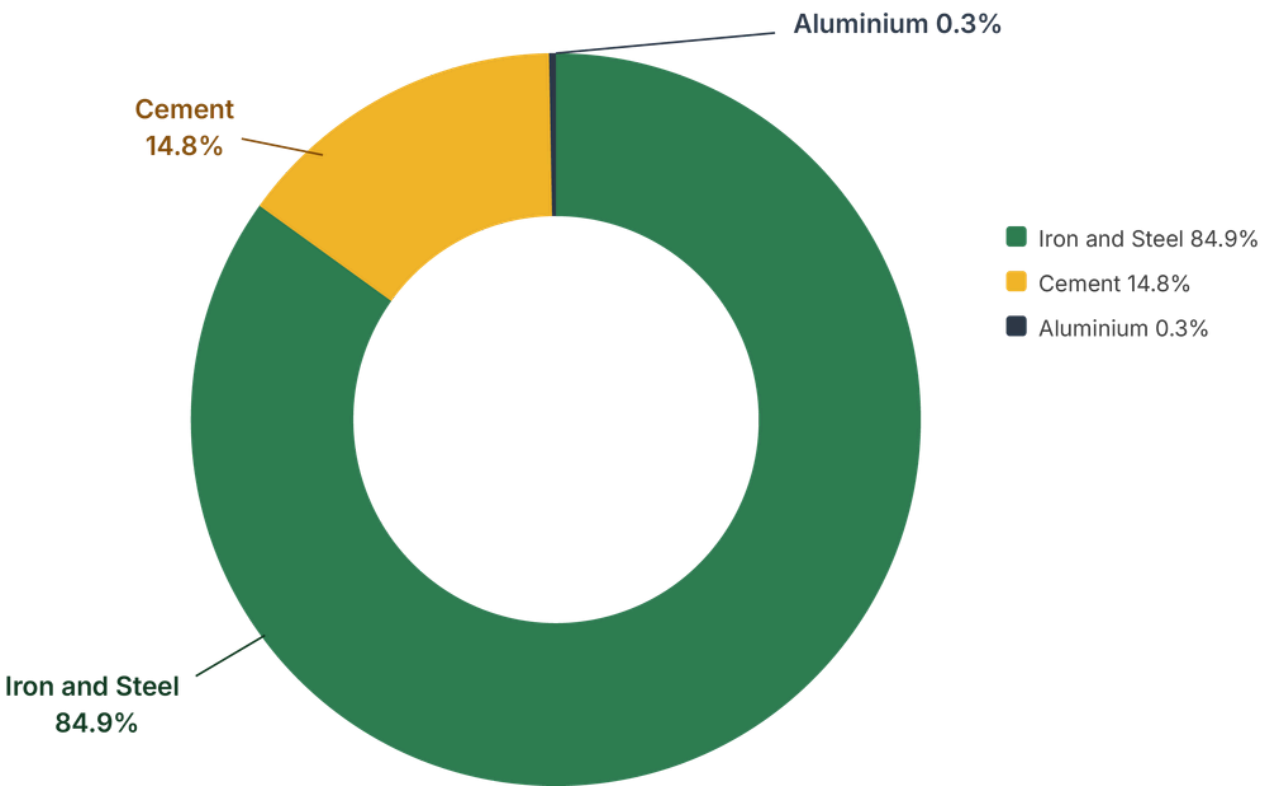
Figure 2. CBAM-Covered Exports by Value (EUR), 2025



Source: Authors' calculations, State Statistical Office data, 2025

Measured by physical export volume, iron and steel products account for approximately 85% of total CBAM-covered exports, while cement represents around 15% of export quantities (Figure 3). All other CBAM-covered sectors account for only marginal shares in volume terms. This further reinforces the highly concentrated nature of North Macedonia's CBAM exposure and illustrates the structural importance of heavy industrial exports within the country's trade profile.

Figure 3. CBAM-Covered Export Volumes by Quantity (KG), 2025



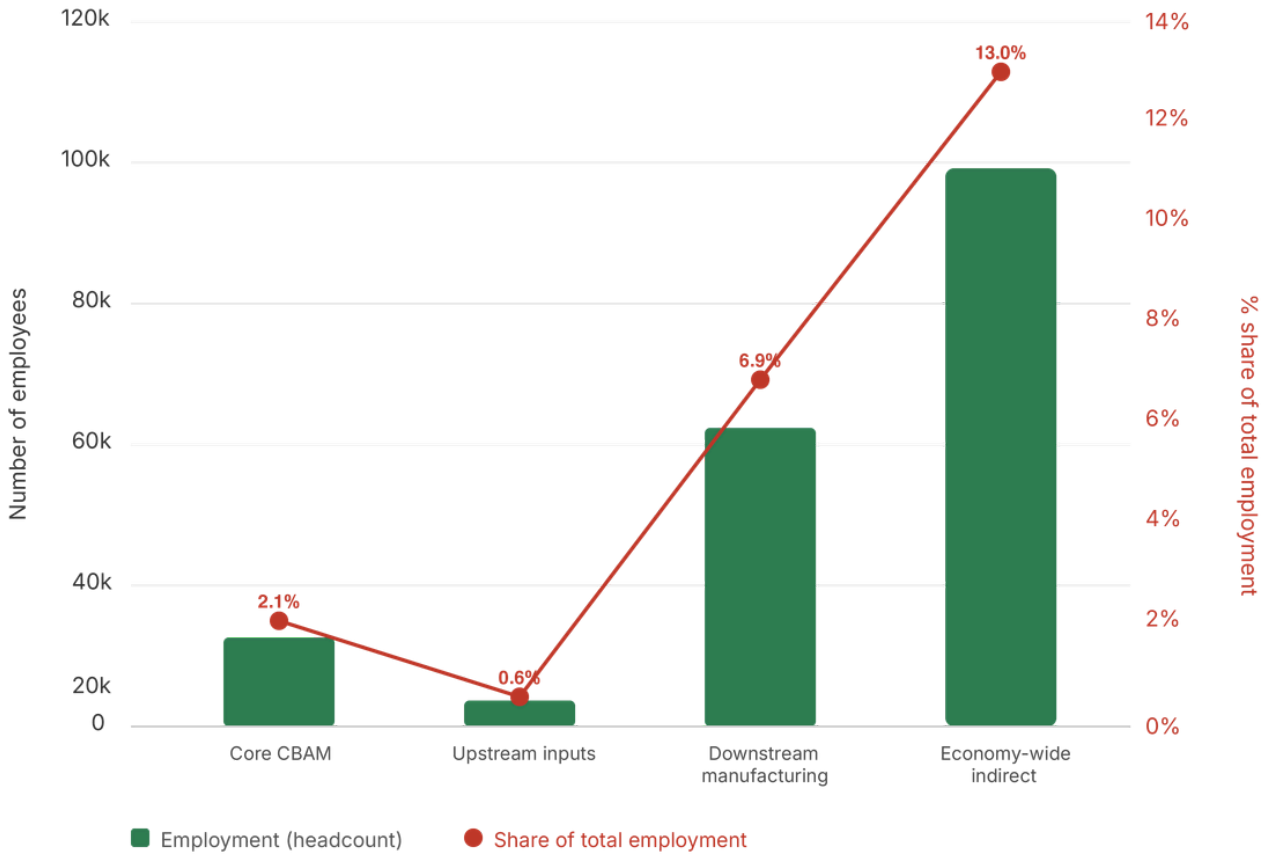
Source: Authors' calculations based on State Statistical Office data, 2025.

Changes in EU carbon pricing, CBAM methodologies, or emissions benchmarks may significantly affect North Macedonia's export competitiveness, industrial output, and investment attractiveness. Several of the most exposed sectors are also among the most difficult to decarbonise. Iron and steel production, electricity generation, and cement manufacturing rely heavily on energy-intensive industrial processes and carbon-intensive energy inputs, making rapid emissions reductions both technologically and financially demanding. As a result, the competitiveness of these sectors will depend increasingly on electricity prices, access to low-carbon energy sources, technological modernisation, and future carbon pricing developments.

CBAM-related risks are also likely to extend beyond directly affected exporters and spread throughout domestic supply chains. Sectors providing intermediate goods and services, including manufacturing inputs, mining, transport, logistics, and energy supply, may experience indirect effects through rising costs and lower demand from carbon-intensive industries. This suggests that the impacts of CBAM are likely to affect a considerably broader segment of the economy through interconnected value chains and industrial linkages, rather than remaining limited to a narrow group of exporting firms (World Bank, 2024).

Figure 4 presents estimated employment exposure to CBAM-related transition risks across different segments of the economy. Employment in core CBAM sectors amounts to 15,665 workers, or 2.1% of total employment, reflecting the relatively narrow scope of sectors directly covered by the mechanism, including metals, non-metallic mineral products, and electricity supply. Upstream input sectors account for approximately 4,670 employees (0.6% of total employment), mainly in activities linked to industrial inputs, logistics, maintenance, and supporting energy services. Downstream manufacturing sectors employ around 51,000 workers (6.9% of total employment), particularly in fabricated metal products, machinery, automotive components, electrical equipment, and other manufacturing activities dependent on carbon-intensive intermediate inputs. The largest category is economy-wide indirect exposure, particularly in construction, transport, warehousing, and related business services, comprising approximately 96,000 employees or 13.0% of total employment. Overall, the data indicate that although direct CBAM exposure remains relatively concentrated, indirect and value-chain effects extend across a substantially larger share of the economy.

Figure 3. CBAM-Covered Export Volumes by Quantity (KG), 2025



Source: Authors' calculations based on State Statistical Office data, 2025.

From 2028 onward, CBAM is expected to expand its scope to include more than 180 downstream products linked to sectors already covered by the mechanism (World Bank, 2026). This expansion could significantly increase future exposure across employment and supply chains, particularly in downstream manufacturing activities related to metals, machinery, automotive production, and construction. At the same time, approximately 3,000 jobs in the

coal sector are estimated to be at risk due to the combined effects of CBAM and domestic decarbonisation policies (Sundvor et al., 2026), illustrating the broader labour-market implications of industrial restructuring and electricity sector transformation.

Progress on decarbonisation and institutional preparedness nevertheless remains uneven. Although North Macedonia has committed to gradual alignment with the EU ETS framework and has initiated the development of domestic monitoring, reporting, and verification (MRV) systems alongside broader climate governance reforms, implementation remains incomplete. In particular, the proposed Climate Action Law, intended to introduce carbon pricing and strengthen emissions governance, has not yet been formally adopted (World Bank, 2026).

While most MSMEs currently fall outside the direct scope of CBAM obligations, they are still likely to experience indirect effects through higher electricity and transport costs, stricter supplier requirements, and future carbon price pass-through effects linked to the implementation of EU ETS 2. Smaller firms additionally face more pronounced administrative and financial constraints, including limited technical expertise, weaker reporting capacities, and more restricted access to green finance and decarbonisation investments.

2.3 Electricity Sector, Carbon Pricing, and Market Integration

CBAM has important implications not only for trade, but also for North Macedonia's electricity sector and broader regional market integration. The country's planned integration into the EU single electricity market increasingly depends on alignment with EU decarbonisation and carbon pricing requirements. If domestic electricity generation remains carbon-intensive and carbon pricing mechanisms remain insufficiently aligned with EU ETS levels, electricity exports may face implicit carbon costs that weaken competitiveness, reduce cross-border trade, and slow market coupling efforts.

Interview respondents highlighted growing awareness of CBAM-related risks for the electricity sector, particularly given North Macedonia's continued reliance on coal-based generation. Stakeholders emphasized that Guarantees of Origin, renewable energy deployment, and regional electricity market integration are increasingly viewed as important mechanisms for improving compliance and strengthening market positioning. At the same time, respondents pointed to persistent uncertainty regarding future carbon pricing mechanisms, delayed climate legislation, and transitional arrangements for electricity exports within the Energy Community framework.

Evidence from the Q1 2026 CBAM monitoring report suggests that these dynamics are already beginning to influence regional electricity market behaviour. According to the Energy Community Secretariat, electricity prices in the WB6 were approximately €30/MWh lower than in neighbouring EU markets during the first quarter of 2026, while commercially scheduled cross-border electricity exchanges with EU Member States declined by 25% (Energy Community Secretariat, 2026a). Recent market developments also indicate weaker price convergence between Western Balkan and EU electricity markets following CBAM implementation, raising

concerns regarding future regional integration dynamics. In this context, carbon intensity is becoming an increasingly important determinant of competitiveness, electricity flows, and investment attractiveness.

Several stakeholders additionally referred to ongoing regional discussions regarding transitional arrangements for electricity-related CBAM obligations. One interview respondent noted that:

> **"North Macedonia, through the Energy Community, is negotiating a possible postponement of these charges until 2030."**

These developments have also generated concern regarding the unintended consequences of CBAM for regional electricity integration. Speaking at the Belgrade Energy Forum 2026, MEMO Director Zoran Gjorgievski argued that CBAM creates a "paradox" by effectively retaining green electricity within national borders and contributing to fragmentation rather than integration of regional electricity markets. At the same time, he emphasized that integrated electricity markets and market coupling mechanisms remain essential for maintaining market liquidity, facilitating renewable energy trade, and reducing transition costs for consumers (MEMO, 2026).

North Macedonia continues to advance preparations related to electricity market integration and market coupling. Remaining components of the Electricity Integration Package are currently undergoing approval procedures before the ERC, while MEMO has become involved in the Italian Border Working Table (IBWT), expected to facilitate future market coupling arrangements following certification. The recent launch of the intraday electricity market additionally represents an important step toward improving balancing efficiency, real-time trading, and operational coordination with neighbouring electricity systems. Such reforms are becoming increasingly important in electricity systems with growing shares of variable renewable energy, where flexibility, balancing capacity, and cross-border coordination play a central role in maintaining system stability and market efficiency.

Energy Community Contracting Parties therefore continue working toward meeting the exemption conditions under the EU CBAM framework for electricity exports. These obligations are closely linked to commitments under the Energy Community Treaty, electricity market integration processes, and broader EU climate objectives. In this context, progress in renewable energy deployment, emissions monitoring, market liberalisation, and domestic carbon pricing is becoming increasingly important not only for decarbonisation, but also for maintaining regional market integration and long-term electricity export competitiveness. Carbon pricing is also expected to significantly affect electricity tariffs and the relative competitiveness of different generation technologies. Current comparisons between coal-based electricity and renewable energy often fail to fully account for future carbon costs associated with EU ETS alignment and CBAM-related pressures

. As carbon pricing mechanisms are gradually introduced, the relative cost advantage of coal-based generation is expected to decline, strengthening the long-term competitiveness of renewable energy despite higher upfront investment costs. In this sense, carbon pricing increasingly functions not only as a decarbonisation instrument, but also as a mechanism reshaping investment incentives, electricity trade patterns, and the future architecture of regional electricity market integration in the Western Balkans.

2.4 CBAM Readiness and Administrative Capacity

Beyond trade exposure, effective CBAM implementation depends on institutional and firm-level administrative readiness. Monitoring, reporting, and verification (MRV) systems in North Macedonia remain under development and are not yet fully standardized or unified across institutions. Current practices suggest the absence of a comprehensive nationally harmonized methodology for emissions accounting, with potential inconsistencies across entities performing similar assessments. Verification is still conducted largely through external independent bodies rather than through a fully operational domestic accreditation framework. A recurring finding across interviews was that many companies remain only partially prepared for CBAM reporting and compliance requirements. Respondents identified major challenges related to emissions monitoring, embedded emissions calculations, reporting methodologies, lack of digital systems, and insufficient technical expertise.

> **“A major challenge is the administrative preparedness for emissions monitoring and reporting.”**

While initial steps toward alignment with EU MRV requirements are underway, including training initiatives and institutional capacity-building efforts, the country has yet to establish a fully operational national system with designated verification bodies and a formal accreditation process capable of ensuring consistent and reliable validation of emissions data. Companies also emphasized operational difficulties associated with missing national emission factors, inconsistent supplier data, and limited institutional guidance. These findings suggest that administrative and technical readiness may become a significant constraint for smaller exporters and industrial firms in the coming years.

> **“The main challenges include emissions measurement and verification, collecting accurate product-level data, high energy costs, limited access to green finance, insufficient technical preparedness, and uncertainty regarding future regulation.”**

Consulting firms involved in preparing CBAM reports and coordinating with verification bodies identify significant capacity gaps at company level, particularly the absence of dedicated environmental, sustainability, or ESG functions within many reporting firms. As a result, internal communication, data management, and reporting preparedness remain weak, especially among smaller firms.

A major challenge concerns emissions data collection across supply chains, since emissions must increasingly be assessed not only at the level of final products but throughout upstream production processes. Companies are therefore required to obtain detailed information from suppliers regarding production methods, embedded emissions, and the carbon intensity of electricity consumption.

"The company's main CBAM compliance obligations include identifying CBAM products, collecting data on direct and indirect emissions, calculating embedded emissions, and submitting data to EU buyers. The company faced difficulties due to the absence of a national electricity emission factor and because suppliers did not provide CBAM-related data."

Administrative adaptation timelines are also uneven. SMEs often face significantly shorter adjustment periods, estimated at between three and six months, compared to up to twelve months for larger firms, increasing compliance pressures on smaller actors with more limited technical and financial capacities. At the same time, EU buyers increasingly require verified CBAM-related emissions data as part of contractual arrangements, reinforcing the importance of credible reporting, certification, and emissions traceability. Compliance is also increasingly linked to energy sourcing. Guarantees of Origin (GoOs), particularly for renewable electricity, are becoming an important component of CBAM-related reporting and verification frameworks, especially for exporters seeking to demonstrate lower embedded emissions in production processes (Bloomberg Adria, 2026).

"North Macedonia adopted a regulation on Guarantees of Origin to certify green electricity and secure an exemption until 2030 if it integrates with the EU market."

2.5 Economy-Wide Impacts and Policy Implications

Delayed compliance with CBAM and broader decarbonisation requirements could generate significant economy-wide pressures for North Macedonia, given the country's strong industrial integration with EU markets and continued reliance on carbon-intensive production (World Bank, 2024). As the scope of CBAM expands over time, transition pressures are expected to intensify across manufacturing and export-oriented industries, particularly those linked to metals, electricity, and energy-intensive supply chains. These effects are also likely to extend beyond directly affected exporters, increasing costs and adjustment pressures throughout domestic value chains (World Bank, 2024).

The transition additionally exposes structural weaknesses in North Macedonia's existing industrial model, which has historically depended on energy-intensive production, relatively low labour costs, and integration into lower-value segments of European supply chains. As EU industrial policy increasingly prioritises decarbonisation, technological upgrading, and clean manufacturing, maintaining competitiveness will require stronger industrial modernisation, renewable energy deployment, and investment in low-carbon technologies and workforce adaptation (World Bank, 2024).

The economic and social effects of the transition are also expected to be unevenly distributed. Manufacturing sectors exposed to CBAM-related costs, together with coal-dependent regions, are likely to face the strongest adjustment pressures, underscoring the need for differentiated policy responses, targeted support measures, and regional transition strategies.

Carbon pricing and decarbonisation reforms may also carry important fiscal and macroeconomic implications. According to World Bank estimates, domestic carbon pricing could generate substantial fiscal revenues, while delayed alignment with EU climate policies could increase long-term exposure to carbon-related trade costs and transition risks (World Bank, 2024). Conversely, earlier alignment with EU climate and energy frameworks may create short-term adjustment pressures but improve long-term competitiveness, investment attractiveness, energy security, and integration into European markets.

Interview respondents similarly highlighted concerns regarding rising operational costs, reduced export competitiveness, and possible employment losses in carbon-intensive industries. At the same time, several stakeholders viewed CBAM and the broader green transition as potential drivers of technological modernisation, energy efficiency improvements, and stronger positioning within future low-carbon European value chains.

> **"In the long term, CBAM could become an opportunity for the company."**

The introduction of CBAM therefore reinforces the strategic importance of domestic carbon pricing, electricity market reform, renewable energy deployment, and industrial modernisation. Establishing a national carbon pricing mechanism aligned with EU ETS principles could help mitigate competitiveness losses, retain carbon-related revenues domestically, strengthen market integration, and support investments in low-carbon technologies and industrial transformation. At the same time, effective adaptation will require stronger green industrial policy (GIP) instruments and targeted policy interventions, including support for industrial electrification, financing for decarbonisation investments, development of industrial renewable energy purchase agreements, strengthening of MRV and accreditation systems, support for Guarantees of Origin certification, targeted technical assistance for SMEs, and incentives for low-carbon industrial modernisation.

3 Just Transition, Employment, and Skills

3.1 Regional and Social Impacts of the Energy Transition

North Macedonia's coal phase-out forms part of a broader structural transformation of the national energy system and coal-dependent regions. According to the NECP (2025), the "With Additional Measures" (WAM) scenario envisages the complete phase-out of lignite-based electricity generation by 2030 through the gradual closure of the country's main coal-fired power plants, particularly TPP Oslomej and TPP Bitola. The transition will require major investments in new energy capacity, including around 700 MW of renewable energy sources, mainly solar and wind power. It also includes building new gas power plants with combined heat and power (CHP) and combined cycle gas turbine (CCGT) technologies that can later be adapted to use hydrogen. Additional investments in system flexibility and energy security are also planned through battery storage systems and pumped-storage hydropower projects such as Chebren.

While the transition is expected to accelerate decarbonisation and energy diversification, its socio-economic impacts are likely to be concentrated in coal-dependent regions, particularly Pelagonia (Bitola and Novaci) and the Southwest region (Kičevo/Oslomej), where mining and thermal power generation remain closely linked to local employment and economic activity. In response, the government adopted the Just Transition Roadmap in 2023, focusing on worker retraining, employment support, economic diversification, environmental remediation, and repurposing former mining sites for renewable energy development (Just Transition Implementation Plan, 2026). The Just Energy Transition Investment Platform (JETIP) further aims to mobilise approximately €3 billion through international climate finance, multilateral support, and domestic co-financing mechanisms.

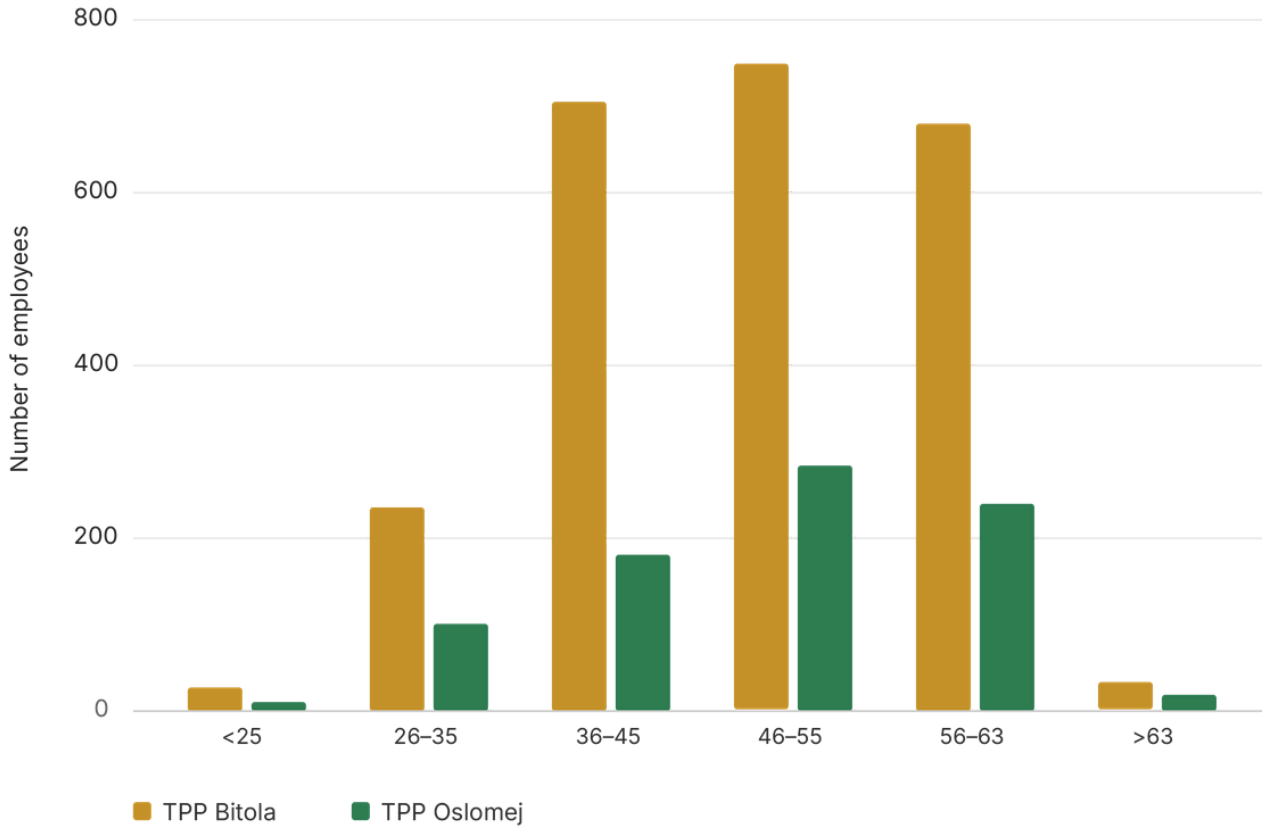
Despite the expansion of the policy framework, labour-market adjustment remains one of the most sensitive dimensions of the transition. Policy documents and stakeholder consultations emphasise concerns regarding employment security and the long-term economic viability of coal-dependent regions. The Just Transition Implementation Plan 2026 therefore foresees retraining programmes, labour-market matching initiatives, career-transition support, and targeted upskilling measures for affected workers and younger populations (Just Transition Implementation Plan, 2026).

> **"There is also a possibility of job losses, whether in the mines or in the affected industries."**

The scale of the workforce transition challenge is substantial. Estimates within thenational Just Transition Roadmap indicate that at least 66,000 workers are currently employed in occupations where significant retraining needs and skills gaps are expected. These findings underline the importance of integrating social policy, education and training systems, and regional development planning into the broader decarbonisation agenda.

Figure 5 demonstrates that the workforce structure in both TPP Bitola and TPP Oslomej is heavily concentrated in the 36–55 age groups, with relatively few employees under 35. Together, the two thermal power plants employ approximately 3,000 workers, the majority in TPP Bitola. This ageing workforce has important implications for the transition process. While a significant share of employees may reach retirement age during the planned coal phase-out period, potentially easing immediate displacement pressures, older workers may also face greater retraining barriers and lower occupational mobility, increasing the risk of long-term labour-market exclusion.

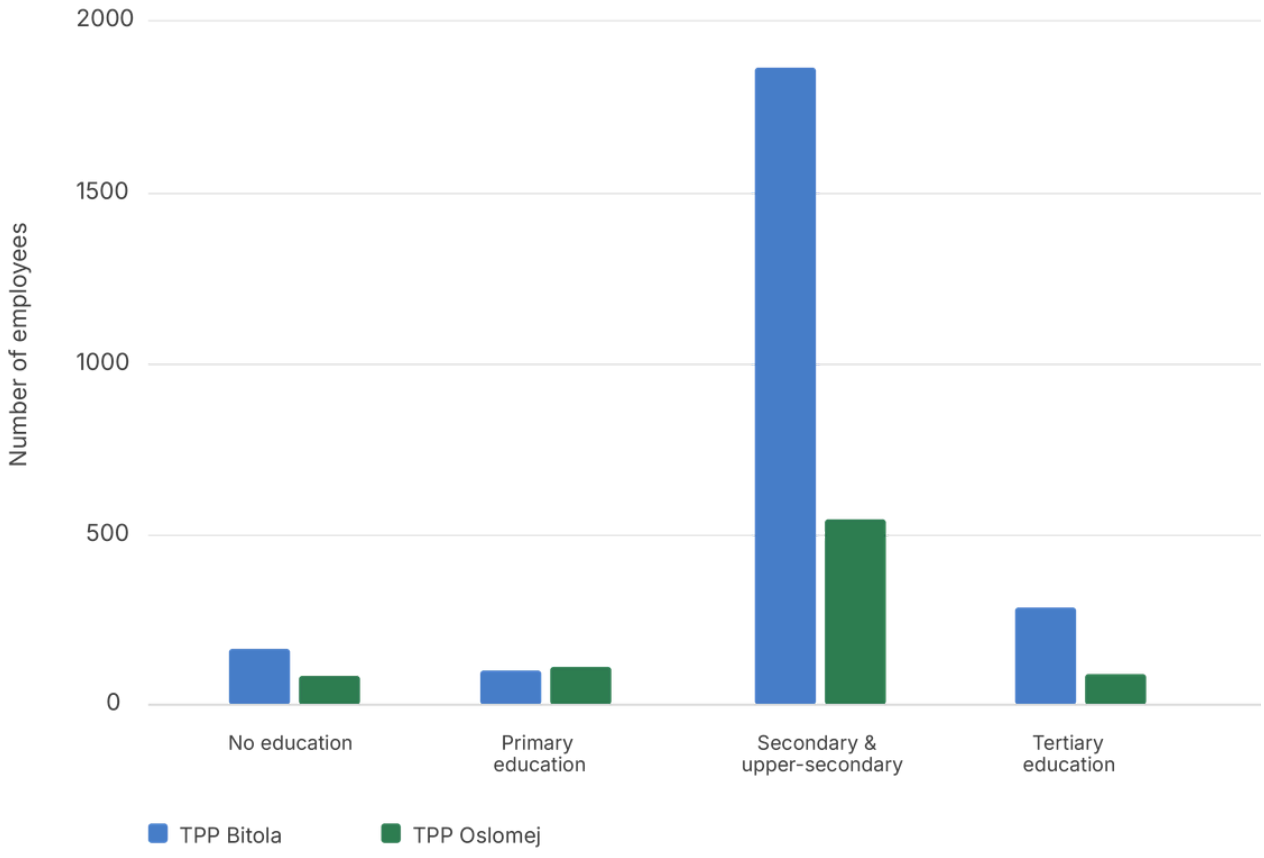
Figure 5. Age structure of employees in TPP Bitola and TPP Oslomej



Source: Authors' calculations based on data from AD ESM, 2024.

Figure 6 further indicates that the workforce is predominantly composed of employees with secondary and upper-secondary education, while tertiary-educated workers remain comparatively limited. This educational structure suggests potential for transition into related sectors such as renewable energy, electrical maintenance, construction, manufacturing, and infrastructure-related activities. However, successful redeployment will depend on targeted reskilling programmes, labour-market absorption capacity, and the availability of economically viable alternatives within affected regions.

Figure 6. Educational structure of employees in TPP Bitola and TPP Oslomej



Source: Authors' calculations based on data from AD ESM, 2024.

Although new employment opportunities are expected to emerge in renewable energy, infrastructure, and green manufacturing, stakeholder consultations suggest that workers in coal-based electricity generation and mining continue to demonstrate relatively limited occupational mobility. The Just Transition Implementation Plan 2026 therefore places particular emphasis on youth-focused reskilling, internships, vocational training, regional skills agreements, and career-transition support, highlighting the need for differentiated workforce-transition policies across demographic and skill groups during the decarbonisation process (Just Transition Implementation Plan, 2026).

International experience further demonstrates that successful just transition processes require substantially more than worker retraining alone. Experiences from countries such as Germany and Spain illustrate the importance of combining labour-market measures with broader place-based development strategies, including industrial diversification, social protection mechanisms, infrastructure investments, and regional economic revitalisation initiatives. In Germany's Ruhr region, for example, the transition away from coal was supported through long-term public investment, regional redevelopment policies, and economic diversification strategies extending beyond narrow job-substitution measures (Arora and Schroeder, 2022). Similarly, Spain's Just Transition Strategy combined retraining and employment support with targeted regional development and economic restructuring measures aimed at supporting vulnerable workers and territories affected by decarbonisation (OECD, 2024). These experiences highlight that effective just transition processes depend on integrating labour-market interventions with broader territorial development and public investment strategies designed to prevent long-term regional decline.

Nevertheless, labour-market mismatches remain a persistent challenge within North Macedonia's transition process. Employers increasingly report labour shortages and rising demand for workers in sectors linked to renewable energy, construction, infrastructure, and manufacturing. However, skills gaps, geographic immobility, and mismatches between wage expectations and available private-sector employment opportunities continue to constrain effective labour reallocation. As a result, the transition requires not only labour supply-side measures such as retraining and reskilling, but also stronger labour-demand policies, improved working conditions, and greater private-sector absorption capacity in emerging green sectors. External policy pressures, particularly the introduction of CBAM, are expected to accelerate these structural adjustments. Carbon pricing and CBAM-related competitiveness pressures may increase the pace of industrial restructuring in sectors such as metals and electricity generation, reinforcing the need for proactive workforce-transition measures and regional economic diversification policies (Sundvor et al., 2026). Without adequate labour-market integration policies, there is a significant risk that older and lower-skilled workers could be disproportionately affected during the transition process.

Alongside labour-market adjustment, energy poverty remains one of the central socio-economic dimensions of North Macedonia's just transition agenda. According to the National Energy and Climate Plan, approximately 29.7% of households experienced energy poverty in 2023, reflecting low incomes, inefficient housing stock, and high energy expenditures. Consequently, the NECP and the Just Transition Roadmap increasingly emphasise that decarbonisation measures must be accompanied by targeted safeguards for vulnerable households in order to prevent the unequal distribution of transition costs.

North Macedonia currently addresses energy poverty through annual support programmes implemented under the Energy Law and the Law on Social Protection. These include direct financial assistance for vulnerable energy consumers, protections against disconnection during the heating season, and support schemes promoting energy efficiency and renewable energy adoption among vulnerable households. Measures include support for inverter air conditioners, solar thermal collectors, pellet stoves, home renovation, window replacement, and household energy audits, increasingly linking social protection objectives with the broader decarbonisation agenda (NECP, 2025; Just Transition Implementation Plan, 2026).

For 2026, approximately EUR 2.4 million was allocated for energy-poverty protection measures, while a separate programme supporting inverter air conditioners in 2025 amounted to approximately EUR 3 million and targeted around 6,000 households. Eligibility criteria primarily include recipients of Guaranteed Minimum Assistance (GMA), elderly social-assistance beneficiaries, persons with disabilities, and single-parent households. In parallel, the government plans to establish an Energy Efficiency Fund that would provide grants covering up to 100% of renovation and renewable energy investment costs for low-income households. These measures reflect a gradual policy shift from temporary subsidy mechanisms toward structural reductions in household energy vulnerability (OECD, 2025; Ministry of Economy and Labour Strategic Plan 2025–2027).

The institutional framework has also evolved in recent years. While earlier policies focused narrowly on "vulnerable energy consumers" linked to income status, the new Energy Law and the Methodology for Measuring Energy Poverty introduced a broader multidimensional definition incorporating energy affordability, minimum living standards, and housing efficiency. The NECP additionally foresees the establishment of a national register of vulnerable households and improved household-level monitoring systems to strengthen policy targeting and effectiveness (NECP, 2025; European Commission, 2025).

3.2 Reskilling and Workforce Development

Ensuring a socially just energy transition in North Macedonia will require substantial investment in workforce adaptation, reskilling, and education systems capable of supporting emerging green sectors. Skills shortages are increasingly recognised as a major structural constraint, particularly in renewable energy deployment, electrical engineering, energy efficiency, grid modernisation, construction, and technical installation services. As investments in renewable energy and low-carbon infrastructure accelerate, demand for technicians, electricians, engineers, and specialised workers in solar, wind, energy storage, and energy-efficiency systems is expected to grow significantly. At the same time, the transition also requires stronger administrative and institutional capacities within companies, including the ability to comply with evolving regulatory requirements, manage reporting obligations, and implement increasingly complex digital systems.

> **"The company requires trained staff, IT systems, regulatory clarity and external consultants."**

This highlights that workforce-transition challenges extend beyond technical labour shortages alone and increasingly involve managerial, digital, and regulatory capacities necessary for firms to adapt to the green-transition.

Concerns also persist regarding the alignment between existing education and vocational training systems and evolving labour-market needs. Although many workers in coal-dependent sectors possess technical and vocational backgrounds that could facilitate transition into adjacent industries, labour-market analyses continue to identify significant skills mismatches and limited availability of specialised green training programmes. Consequently, labour shortages in emerging sectors may coexist alongside unemployment or underemployment in declining carbon-intensive industries, particularly in coal-dependent regions.

Existing policy frameworks increasingly recognise workforce transition as a central component of the decarbonisation process through retraining programmes, active labour-market policies, and regional employment diversification measures. However, **publicly available evidence on implementation outcomes, programme participation, and long-term employment effects remains limited**, highlighting the need for stronger monitoring and evaluation frameworks.

From a policy perspective, ensuring a just transition will require a balanced approach combining targeted social protection with long-term economic transformation. Measures such as retraining programmes, mobility support, early retirement schemes, regional investment incentives, and industrial diversification policies may help reduce labour-market disruption while supporting the creation of sustainable green employment opportunities. In this context, future carbon pricing mechanisms could also provide an important source of financing for workforce transition, regional development, infrastructure investment, and targeted social support through appropriately designed revenue-recycling mechanisms.

3.3 Social Safeguards and Public Engagement

Formal public consultation mechanisms are legally required for most energy and infrastructure projects in North Macedonia. Public consultations are typically conducted through environmental impact assessment procedures, strategic planning processes, local permitting mechanisms, and the national electronic consultation platform ENER, which is used for consultations on draft laws and policy documents. Broader stakeholder consultations have also been incorporated into processes related to the National Energy and Climate Plan, Just Transition planning, and climate-governance reforms.

At the same time, broader policy discussions continue to point to concerns regarding the quality and effectiveness of participatory processes in practice. Affected communities are not always sufficiently informed or meaningfully involved in early-stage decision-making, particularly regarding renewable energy permitting, land-use changes, and local development planning. In some cases, consultation procedures are perceived primarily as formal administrative requirements with limited influence on final policy or investment decisions.

Local-level engagement remains particularly important in coal-dependent regions where the transition may significantly affect employment, municipal revenues, and regional economic development. Recent just transition frameworks increasingly recognise the importance of involving municipalities, workers, trade unions, local businesses, civil society organisations, and affected communities in transition planning and implementation. Institutional mechanisms within the just transition governance framework and dedicated working groups therefore aim to strengthen coordination and stakeholder participation at both national and local levels.

Nevertheless, implementation challenges remain significant. Existing policy analyses and governance assessments frequently identify constraints related to limited local administrative capacities, insufficient interinstitutional coordination, uneven stakeholder engagement, and limited transparency in certain decision-making processes. Strengthening local institutional capacity, improving communication and access to information, and ensuring earlier and more meaningful community participation will therefore remain important for achieving a socially just and politically sustainable transition.

4 Financing the Energy Transition

4.1 Investment Needs and Strategic Priorities

North Macedonia's green and energy transition will require very large-scale public and private investment over the coming decades. According to the World Bank Climate Public Finance Review, achieving the country's climate and decarbonisation objectives could require close to EUR 25 billion in cumulative investments by 2030 and approximately EUR 35 billion by 2050, with annual investments equivalent to around 7.7% of GDP needed to achieve the 2030 emissions-reduction target (World Bank, 2024).

The updated National Energy and Climate Plan (NECP) presents similarly ambitious projections, estimating total investment needs of approximately EUR 39.4 billion between 2025 and 2050, including around EUR 10.1 billion by 2030 (NECP, 2025). Investments are expected to focus primarily on renewable power generation, electricity-grid modernisation, energy-efficiency renovations, transport electrification, district-heating systems, gas infrastructure, and new building construction. The NECP also foresees a structural transformation of the energy system through the gradual coal phase-out, accelerated deployment of solar and wind energy, stronger regional electricity-market integration, and major improvements in energy efficiency.

Strategic documents, particularly the NECP and related Just Transition frameworks, additionally emphasise the need for substantial investments in system flexibility, including battery storage systems, hydropower modernisation, transmission infrastructure, and social support measures for coal-dependent regions undergoing economic restructuring.

The scale of investment required substantially exceeds currently available domestic public resources, making the mobilisation of private and external financing essential. At the same time, strategic public investment will remain necessary for de-risking infrastructure projects, supporting early-stage market development, financing social-transition measures, and crowding in private capital. Achieving the transition objectives outlined in the NECP will therefore require a balanced financing model combining public investment, concessional finance, international climate support, and stronger private-sector participation.

Delayed investment in the energy transition would likely generate substantial economic, fiscal, and competitiveness costs. Strategic documents and international assessments increasingly warn that postponing investments in renewable energy, electricity grids, energy efficiency, and

industrial decarbonisation could increase North Macedonia's exposure to volatile fossil-fuel imports, rising electricity-generation costs, and growing carbon-related trade barriers under CBAM. The OECD additionally notes that insufficient investment in clean-energy infrastructure and market reform could undermine industrial competitiveness and slow integration into the EU energy market, particularly as carbon-pricing mechanisms expand across Europe (OECD, 2025).

The NECP further emphasises that large-scale investment will be necessary to maintain long-term electricity-system adequacy, integrate increasing shares of renewable energy, and avoid future security-of-supply risks. Delayed investment would also slow the planned coal phase-out and increase the financial burden associated with ageing thermal power plants, environmental remediation, and future compliance with EU climate legislation. At the macroeconomic level, transition-related investments are expected to generate positive effects on employment, productivity, technological modernisation, and long-term GDP growth, implying that postponement would also represent a missed opportunity for broader economic transformation.

4.2 Financing Instruments and Institutional Support

Development banks and international financial institutions play a central role in financing North Macedonia's energy transition by providing concessional loans, guarantees, technical assistance, and project-preparation support. Their role is particularly important for municipalities, public enterprises, MSMEs, and innovative projects involving emerging technologies that may not yet be fully financeable through commercial banking channels. Beyond providing capital, these institutions help reduce investment risks, improve project bankability, and accelerate the deployment of low-carbon technologies.

At the regional level, the EU Economic and Investment Plan for the Western Balkans foresees up to EUR 9 billion in grants and aims to mobilise substantially larger volumes of public and private investment through the Western Balkans Guarantee Facility. Within this framework, North Macedonia has benefited from the Western Balkans Investment Framework (WBIF), receiving approximately EUR 64.7 million in WBIF financing under the clean energy pillar for projects related to renewable energy, electricity transmission, and the broader energy transition agenda in the Western Balkans (WBIF, 2026).

Institutionally, the Energy Efficiency Fund established in 2023 under the Development Bank of North Macedonia began operations with an initial allocation of EUR 40 million, primarily targeting public-sector energy-efficiency projects (OECD, 2025). At the system level, the Just Energy Transition Investment Platform (JETIP) aims to mobilise approximately EUR 3 billion for coal transition, renewable energy deployment, grid modernisation, and socio-economic restructuring in affected regions. Additional financing is expected through IPA funds, WBIF facilities, donor-supported energy-efficiency loans, IFI programmes, blended-finance instruments linked to the Reform and Growth Facility, and future carbon-pricing revenues.

Innovative financing instruments are also gradually emerging within the domestic financial system. North Macedonia issued its first green bond in 2023, valued at approximately EUR 10 million, while mechanisms such as public-private partnerships (PPPs), green funds, blended-finance structures, and energy-efficiency financing schemes are increasingly being explored as tools for narrowing the investment gap. Nevertheless, institutional and regulatory constraints — particularly weaknesses in project preparation, administrative coordination, and implementation capacity — continue to limit the effective deployment of available financing instruments (World Bank, 2024).

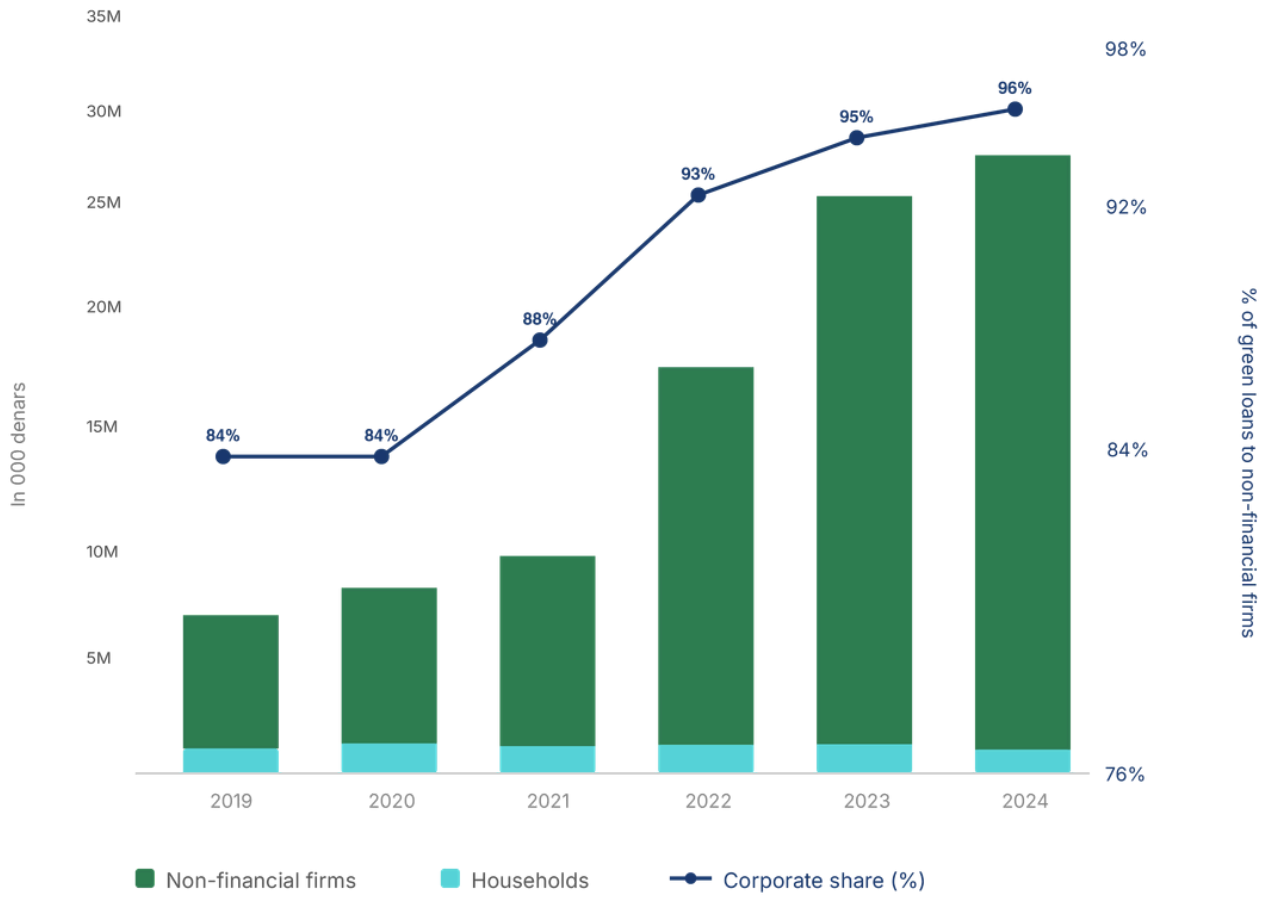
Interview respondents consistently emphasised the importance of stronger institutional and financial support mechanisms to facilitate the transition process. Suggested measures included concessional credit lines, green bonds, subsidies for industrial decarbonisation, grants for monitoring and reporting systems, tax incentives, technical assistance programmes, and improved access to emissions-related methodologies and verification systems. Stakeholders also stressed the importance of regulatory predictability and coordinated institutional support for both large industrial firms and SMEs.

“Additional support is needed in the form of accessible information, methodologies, national emission factors, verification bodies, and financial support for decarbonisation. Subsidies for decarbonisation, access to green finance, tax incentives and grants for monitoring systems would be helpful support mechanisms”

4.3 Green Finance, MSME Barriers, and Energy-Efficiency Support

The domestic banking sector has recorded substantial growth in green lending in recent years. According to data from the National Bank of the Republic of North Macedonia, the total value of green loans increased significantly between 2019 and 2024, rising from approximately EUR 115 million to nearly EUR 480 million. This expansion was driven predominantly by lending to non-financial corporations, while green lending to households remained comparatively limited. Consequently, the corporate share of total green loans increased from around 84% to nearly 96%, indicating that firms have become the primary drivers of demand for green finance.

Figure 7. Green lending to households and non-financial firms in North Macedonia, 2019–2024 (in '000 denars and corporate share of total green loans)



Source: National Bank of the Republic of North Macedonia, Green Indicators (2025).

This trend likely reflects several structural factors, including higher electricity prices faced by firms operating on the liberalised electricity market, growing pressure to improve energy efficiency and competitiveness, and greater financial and operational capacity among businesses to undertake larger-scale renewable-energy and energy-efficiency investments. Nevertheless, access to affordable green finance remains significantly more constrained for households, smaller firms, and municipalities, highlighting the continued importance of concessional financing mechanisms, public guarantees, and targeted financial-support programmes.

Despite the expansion of green lending, access to long-term financing remains a major constraint, particularly for MSMEs. Smaller firms frequently face higher borrowing costs, stricter collateral requirements, shorter loan maturities, and limited internal capacities to prepare bankable green investment projects. These barriers are particularly relevant for firms exposed to CBAM-related transition pressures, many of which require substantial investments in energy efficiency, renewable energy integration, emissions-monitoring systems, and industrial modernisation.

Across interviews, financing constraints emerged as one of the most frequently identified barriers to decarbonisation and renewable-energy investment. Companies reported limited access to favourable long-term financing, insufficient domestic banking support for green projects, and rising compliance-related costs associated with CBAM.

"Green bonds and concessional credit lines through the Development Bank should be established exclusively for energy efficiency and renewable energy projects."

"Investors often face limited access to favourable credit lines and insufficient support from domestic banks for long-term green projects."

Support measures for MSMEs are increasingly linked to the just transitionand industrial decarbonisation agenda. The 2025 Just Transition Annual Plan includesdedicated credit-line schemes for micro and small enterprises affected by coal phase-out, implemented throughthe Development Bank and commercial banks, with an initial allocation of EUR1.5million supported by the EBRD (Just Transition Implementation Plan, 2025). The same frameworkalso foresees concessional lending, grant components, and support for start-ups in coal-dependent regions.

Within the broader transition framework, energy efficiency represents one of the largest expenditure categories. The NECP foresees approximately EUR 1.194 billion in investment needs for energy-efficiency measures by 2030, including building renovation and efficiency improvements across multiple sectors. Public-building retrofitting programmes alone are projected to require around EUR 94 million for central government buildings and EUR 180 million for local government buildings by 2030, while commercial building retrofits are estimated at approximately EUR 360 million.

4.4 Financing Constraints and Policy Solutions

Despite the growing range of financing instruments and support programmes, substantial structural barriers continue to constrain the pace and scale of green investment. Limited fiscal space, underdeveloped domestic capital markets, weak project-preparation capacity, and fragmented institutional coordination reduce the country's ability to absorb and deploy available climate finance effectively. Municipalities and smaller firms often face particular difficulties in preparing technically and financially viable projects, while commercial financing conditions remain challenging for long-term and higher-risk green investments.

Interviews further suggest that financing challenges are closely interconnected with administrative and regulatory constraints. Companies indicated that slow permitting procedures, multiple institutional approval processes, and unclear regulatory frameworks contribute not only to project delays, but also to higher financing costs and reduced investor confidence.

“This not only delays project implementation, but also increases the cost of capital for investors.”

These constraints are especially relevant for industrial firms facing CBAM-related adjustment pressures. Many companies will require substantial investments in industrial electrification, energy-efficiency upgrades, renewable-energy integration, emissions-reporting systems, and low-carbon production technologies over the coming years. However, firms frequently face uncertainty regarding future carbon-pricing trajectories, limited access to affordable finance, and insufficient technical support for preparing decarbonisation investment plans.

Addressing these challenges will require a broader and more coordinated green-financing ecosystem. Priority measures include expanding concessional lending and guarantee schemes,strengthening blended-finance instruments, improving project-preparation and technical assistance facilities, supporting municipal investment capacities, and scaling up green financial products targeted at MSMEs. Additional instruments such as green bonds, revolving energy-efficiency funds, industrial transition funds, and carbon contracts for difference may also help accelerate low-carbon investments and reduce investment risks.

In the medium term, revenues generated through future carbon-pricing mechanisms could provide an additional source of financing for energy-transition policies, including support for vulnerable households, workforce reskilling, industrial decarbonisation, and infrastructure modernisation. More broadly, the effectiveness of North Macedonia’s transition strategy will depend not only on the scale of available financing, but also on the country’s institutional ability to channel financial resources toward economically viable, socially inclusive, and strategically coordinated transition priorities

5 Potential Emerging Issues and Regulatory Considerations

5.1 Data Centers and the Energy Transition

The expansion of data centers in the Western Balkans could create new opportunities for economic diversification and digital industrial development, particularly as demand for cloud computing, artificial intelligence, digital services, and regional data infrastructure continues to increase. For countries such as North Macedonia, data center investments could stimulate demand for engineering, construction, and digital infrastructure services, attract foreign direct investment, and strengthen regional technological competitiveness. In this context, data centers may increasingly form part of broader industrial transformation and economic diversification strategies linked to the green and digital transition. However, the ability of Western Balkan economies to attract large-scale data center investments depends heavily on electricity-system reliability, digital connectivity, regulatory predictability, and broader infrastructure readiness.

At the same time, the energy implications of large-scale data center development are substantial. Data centers are highly electricity-intensive and require stable, reliable, and increasingly low-carbon electricity systems (IEA, 2024). Without adequate planning, rising electricity demand from data centers could place additional pressure on generation and grid infrastructure, particularly in electricity systems that are already undergoing structural transformation and decarbonisation. This is especially relevant for countries such as North Macedonia, where grid modernisation, renewable energy integration, and system flexibility remain ongoing policy priorities under the National Energy and Climate Plan. In North Macedonia, where the electricity sector is simultaneously undergoing decarbonisation, coal phase-out pressures, renewable integration, and CBAM-related industrial adjustments, unmanaged growth in electricity-intensive digital infrastructure could amplify existing system-balancing and investment challenges.

The long-term sustainability implications of data center development depend heavily on the electricity generation mix and the integration of renewable energy sources. If additional electricity demand is supplied primarily through fossil fuel–based generation, data center expansion could increase emissions intensity and slow decarbonisation efforts. Conversely, if operators rely on renewable electricity power purchase agreements (PPAs), battery storage, energy-efficiency technologies, and flexible demand-management systems, data centers could help stimulate additional investment in renewable energy, system flexibility, and grid modernisation (IEA, 2024; World Bank, 2024). Large electricity demand from data centers can

also improve the bankability of renewable-energy projects through long-term PPAs, thereby supporting additional renewable deployment and investment in storage and grid flexibility. In this regard, data centers may function either as an additional decarbonisation burden or as a catalyst for clean-energy investment, depending on the regulatory and investment framework under which they operate.

Infrastructure readiness also remains an important determinant of competitiveness in attracting such investments. International experience suggests that countries with reliable electricity supply, modern transmission infrastructure, strong digital connectivity, and transparent regulatory frameworks are generally better positioned to attract large-scale data center investments (OECD, 2025; European Commission, 2025). This suggests that data center development is more likely to follow existing infrastructure and investment readiness rather than independently drive infrastructure transformation. For smaller Western Balkan economies, this may limit the scale and speed at which such investments materialise, particularly in comparison with larger and more established regional digital hubs.

From a policy perspective, the development of data centers therefore requires coordination between energy policy, industrial policy, digital infrastructure planning, and climate objectives. Policymakers may need to consider mechanisms such as renewable sourcing requirements, grid impact assessments, dedicated renewable generation capacity, energy-efficiency standards, and spatial-planning measures to ensure that future data center investments contribute positively to long-term decarbonisation and economic development objectives. Within the broader context of the green transition, data centers illustrate the growing interdependence between digitalisation, energy security, industrial competitiveness, and sustainable infrastructure development (European Commission, 2025; IEA, 2024).

5.2 State Aid, Competition, and Regulatory Constraints

State aid policy is expected to play an increasingly important role in shaping the pace and structure of North Macedonia's energy transition, particularly as governments seek to support renewable energy deployment, industrial decarbonisation, energy efficiency, and regional transition measures (European Commission, 2025; OECD, 2025). Public support mechanisms are often necessary to address market barriers associated with high upfront investment costs, long payback periods, technological uncertainty, and infrastructure externalities linked to the green transition (World Bank, 2024).

At the same time, state aid measures will increasingly need to align with EU competition and internal market rules as part of North Macedonia's EU accession process (European Commission, 2025). Under the EU framework, public support is generally permitted when it contributes to objectives of common interest such as environmental protection, decarbonisation, innovation, energy security, and regional development, provided that interventions remain proportionate, transparent, and do not create excessive distortions of competition (European Commission, 2022). Consequently, the design of green industrial policy instruments requires careful balancing between accelerating investment and preserving fair market conditions.

One of the principal competition-policy challenges concerns the risk of market distortion and unequal treatment between firms or technologies. Poorly designed subsidies may discourage competition, crowd out private investment, create regulatory uncertainty, or lock in inefficient technologies and business models (OECD, 2025). This is particularly relevant in energy markets where long-term support for fossil fuel–based electricity generation, regulated electricity pricing, or selective industrial subsidies may weaken incentives for renewable energy deployment and market liberalisation.

At the same time, stricter EU state aid rules may constrain the fiscal and industrial policy space available to smaller economies during the transition process. Countries in the Western Balkans often face structural disadvantages compared to larger EU economies with greater fiscal capacity to support industrial transformation and green investment (GAP Institute, 2025). This creates additional challenges in competing for clean technology investment, industrial relocation, and low-carbon manufacturing projects, particularly in sectors affected by CBAM and future carbon-pricing mechanisms (World Bank, 2024).

Within the EU framework, however, significant flexibility increasingly exists for state aid linked to green transition objectives. Instruments such as Contracts for Difference (CfDs), renewable-energy auctions, investment aid for energy efficiency and industrial decarbonisation, guarantees, concessional finance, and support for innovation and storage technologies are increasingly recognised as compatible with EU climate objectives (European Commission, 2022). Similarly, support for coal regions, workforce transition, and vulnerable households may also be justified under broader social cohesion and regional development objectives (OECD, 2024).

For North Macedonia, an effective state aid framework will therefore require stronger institutional capacity, transparent governance, predictable regulatory frameworks, and closer alignment with evolving EU climate and competition policy rules (European Commission, 2025). Strategic use of public support can play an important role in accelerating renewable energy deployment, reducing industrial transition risks, supporting innovation, and facilitating a socially just transition. However, long-term effectiveness will depend on designing support mechanisms that crowd in private investment, encourage technological upgrading, and remain consistent with broader EU integration and market liberalisation objectives.

6 Policy Recommendations

The findings presented throughout this study suggest that North Macedonia's energy transition and CBAM preparedness are no longer exclusively environmental or regulatory questions, but increasingly represent a structural economic, industrial, fiscal, and competitiveness challenge. The findings suggest that decarbonisation will directly influence export competitiveness, industrial productivity, electricity prices, fiscal stability, investment attractiveness, and long-term integration into European value chains. The transition is unfolding in a context characterized by high dependence on carbon-intensive sectors, significant exposure to the EU market, aging energy infrastructure, and growing pressure for alignment with European climate and energy legislation. At the same time, the transition also creates opportunities for technological modernization, renewable energy deployment, improved energy efficiency, and stronger integration into future low-carbon European value chains.

The qualitative findings from the interviews reinforce several recurring themes across the study. Stakeholders consistently identified grid congestion, connection delays, balancing limitations, regulatory uncertainty, administrative complexity, and financing constraints as among the most significant barriers slowing renewable energy deployment and industrial decarbonisation. The findings suggest that renewable capacity expansion without parallel investments in transmission, storage, balancing services, and system flexibility risks creating new structural bottlenecks within the electricity sector. Companies emphasized the growing burden associated with CBAM compliance, including emissions monitoring, reporting requirements, embedded emissions calculations, and rising operational costs. At the institutional level, delayed implementation of climate legislation, limited technical preparedness, and insufficient administrative coordination continue to create uncertainty for both investors and exporters.

A recurring theme across both policy analysis and interviews is the growing gap between strategic planning and implementation capacity. While North Macedonia has adopted an increasingly comprehensive legislative and strategic framework aligned with EU climate and energy objectives, implementation remains constrained by administrative fragmentation, limited technical capacity, insufficient staffing, and weak interinstitutional coordination.

"The most effective package would combine gradual carbon pricing, subsidies or contracts for difference for industrial decarbonisation, concessional loans for energy efficiency, support for industrial renewable energy capacities, guaranteed schemes for green electricity, faster permitting, investments in grids and storage, and technical assistance programmes for CBAM reporting."

At the same time, the interviews also indicate that many stakeholders increasingly perceive the transition not only as a cost or compliance obligation, but also as a potential catalyst for long-term competitiveness and industrial upgrading. Several respondents pointed to the importance of renewable self-generation, energy efficiency improvements, modernization of industrial processes, and integration with EU electricity and carbon markets as necessary components of maintaining competitiveness in the evolving European regulatory environment.

Overall, the findings suggest that the pace and effectiveness of North Macedonia's transition will depend not only on the scale of investments, but also on the state's ability to provide regulatory predictability, strengthen institutional capacities, accelerate infrastructure modernization, and develop coherent green industrial policies that balance decarbonisation objectives with industrial competitiveness and social stability. The policy recommendations below aim to address these interconnected challenges through a combination of regulatory, financial, institutional, and infrastructure measures.

Short-Term Priorities: Strengthening implementation capacity, regulatory certainty, and CBAM preparedness

Improve regulatory transparency and accelerate permitting procedures

North Macedonia should prioritise the simplification and digitalisation of administrative procedures for renewable energy projects, particularly for self-generation and industrial prosumers. Despite notable progress in renewable energy deployment, lengthy permitting procedures, fragmented institutional responsibilities, and grid connection uncertainties continue to constrain investment. Establishing standardised application procedures, clear timelines, and publicly accessible permitting guidelines would reduce administrative burdens and increase

investor confidence. Greater coordination between central institutions, municipalities, transmission and distribution operators, and regulatory bodies is also necessary to avoid delays in project implementation and grid integration. Recent reforms under the proposed Law on Renewable

Energy Sources and the updated National Energy and Climate Plan already provide a basis for prioritising renewable energy projects and streamlining approval procedures, but implementation capacity remains critical.

Enhance CBAM preparedness and carbon accounting capacity

As the EU's Carbon Border Adjustment Mechanism (CBAM) enters its definitive phase, North Macedonia faces growing pressure to strengthen emissions monitoring, reporting, and verification (MRV) systems, particularly in export-oriented and energy-intensive industries. Public institutions should establish technical assistance programmes, sectoral guidance mechanisms, and targeted support instruments for firms exposed to CBAM-related costs, especially in steel, metals, electricity, and manufacturing supply chains. Building domestic verification and accreditation capacity aligned with EU MRVA standards will be essential to reduce compliance costs and maintain export competitiveness. In parallel, authorities should improve awareness among businesses regarding carbon accounting obligations, embedded emissions calculations, and future carbon pricing requirements.

Strengthen institutional coordination for the just transition

Although governance structures for the just transition have been established, implementation remains fragmented and institutionally constrained. The government should operationalise existing coordination mechanisms by strengthening mandates, staffing, financing, and monitoring responsibilities across ministries, agencies, municipalities, and local transition bodies. Particular attention should be given to coal-dependent regions such as Pelagonia and Kičevo/Oslomej, where the socio-economic implications of decarbonisation are likely to be most pronounced. Developing robust monitoring systems with measurable indicators, transparent reporting, and stakeholder participation would improve accountability and policy coherence. The implementation of the Just Transition Roadmap and the 2026 Annual Implementation Plan should therefore focus not only on project pipelines, but also on institutional delivery capacity and local economic diversification.

Medium-Term Actions: Scaling infrastructure, financing mechanisms, and workforce adaptation

Upgrade electricity networks and invest in system flexibility

The accelerated deployment of solar and wind capacity will require substantial investments in electricity transmission, distribution, and storage infrastructure. Grid modernisation should therefore become a central priority of public investment planning, particularly in regions expected to host large-scale renewable projects. Investments in smart grids, balancing services, interconnections, battery storage, and digital network management systems are necessary to improve system flexibility, reduce curtailment risks, and strengthen supply security. At the same time, greater integration with regional electricity markets and cross-border infrastructure projects will support market efficiency and facilitate renewable energy integration. Recent regulatory and infrastructure developments demonstrate progress, but transmission bottlenecks and balancing limitations remain significant structural constraints.

Expand and better target financial instruments for green investment

North Macedonia will require substantially higher levels of public and private investment to meet decarbonisation and energy transition objectives. The government should therefore expand concessional financing instruments, guarantee schemes, blended finance facilities, and green credit lines targeting renewable energy, energy efficiency, industrial decarbonisation, and clean technology deployment. Greater use of climate budgeting, green public procurement, and public-private partnerships could further mobilise investment while improving policy predictability. Financial support mechanisms should be aligned with EU state aid and competition rules to avoid market distortions and facilitate future EU integration.

Given the scale of projected investment needs and fiscal pressures associated with decarbonisation, climate-related fiscal reforms will also become increasingly important. Carbon pricing revenues, climate budgeting mechanisms, gradual fossil fuel subsidy reform, and improved targeting of social support measures could help expand fiscal space while mitigating the distributional effects of the transition. In parallel, reforms to energy pricing and fossil fuel subsidies should be gradually implemented in a socially sensitive manner to strengthen fiscal sustainability and improve investment incentives for clean technologies.

Develop workforce transition and reskilling programmes

A successful just transition will depend on the ability to support workers and communities affected by structural changes in the energy sector. The government should develop targeted labour market programmes focused on retraining, upskilling, career transition support, and job placement services for workers employed in coal-related industries and energy-intensive sectors. Cooperation between educational institutions, vocational training centres, local governments, and private industry should be strengthened to ensure alignment between labour market demand and emerging green economy skills. Programmes should prioritise renewable energy technologies, energy efficiency services, digital skills, industrial modernisation, and environmental rehabilitation activities. Support for SMEs and entrepreneurship in transition regions will also be important to create alternative sources of employment and regional economic resilience.

Long-Term Structural Reforms: Building a competitive low-carbon economy aligned with EU frameworks

Advance a coherent green industrial policy framework

North Macedonia should progressively develop a comprehensive green industrial policy that integrates energy transition objectives with industrial competitiveness, innovation, trade, and regional development policies. Rather than treating decarbonisation solely as a compliance obligation, industrial policy should support the development of domestic low-carbon value chains, renewable energy technologies, circular economy activities, and clean manufacturing capabilities. Leveraging regional integration opportunities within the Western Balkans and strengthening participation in European industrial and supply chain initiatives could improve competitiveness and attract strategic investment. Industrial transformation policies should also be linked to export diversification strategies and support for SMEs adapting to green transition requirements. Particular attention should be given to SMEs integrated into European industrial supply chains, many of which face limited technical and financial capacity to comply with emerging carbon reporting, energy efficiency, and sustainability requirements.

Align carbon pricing and energy market reforms with EU systems

Over the longer term, North Macedonia will need to gradually align its carbon pricing framework with EU climate governance and emissions trading systems. Establishing a phased domestic carbon pricing mechanism would help reduce future CBAM exposure, improve emissions transparency, and generate fiscal revenues that could support green investments and social transition measures. At the same time, electricity market reforms should continue to promote cost-reflective pricing, improve competition, strengthen market integration, and reduce distortive subsidies. Such reforms must be carefully sequenced and accompanied by targeted social protection mechanisms to mitigate distributional impacts on vulnerable households and energy-poor consumers.

Strengthen integration into the EU energy and regulatory framework

Accelerating alignment with the EU acquis in energy, climate, competition, and state aid policy remains essential for both accession progress and long-term economic resilience. Continued implementation of the National Energy and Climate Plan, electricity market integration reforms, renewable energy legislation, and environmental standards will improve investor certainty and facilitate access to EU financing instruments. Greater participation in regional electricity markets and cross-border infrastructure initiatives will also strengthen energy security and reduce long-term exposure to carbon-related trade risks.

Ultimately, the findings suggest that North Macedonia's long-term economic resilience and industrial competitiveness will increasingly depend on the speed and coherence of its low-carbon transition. CBAM and EU climate alignment create short-term adjustment pressures, particularly for energy-intensive sectors, but they may also accelerate technological upgrading, renewable energy deployment, industrial modernization, and deeper integration into European low-carbon value chains. The effectiveness of this transition will depend not only on legislative alignment, but on the country's ability to mobilize investment, modernize infrastructure, strengthen institutional implementation capacity, and ensure that the economic and social costs of decarbonisation are managed in a socially balanced and politically sustainable manner.

References

Arora, A. and Schroeder, H. (2022) 'How to avoid unjust energy transitions: insights from the Ruhr region', Energy, Sustainability and Society, 12(19).

Bloomberg Adria (2026) 'Blinkova Donchevska: North Macedonia is partially prepared for CBAM'. Available at: https://mk.bloombergadria.com/video/start/26640-blinkova-donchevska-m akedonija-e-delumno-podgotvena-za-svam (Accessed: 14 April 2026).

Energy Community Secretariat (2025) CBAM Readiness Tracker. Vienna: Energy Community Secretariat.

Energy Community Secretariat (2026a) CBAM Quarterly Report 2026/1. Vienna: Energy Community Secretariat.

Energy Community Secretariat (2026b) 'North Macedonia must accelerate energy reforms to advance EU market integration, says Lorkowski'. Available at: Energy Community News (Accessed: 14 April 2026).

Energy and Water Services Regulatory Commission of the Republic of North Macedonia (2026) Annual report on the operations of the ERC in 2025. Skopje.

European Commission (2022) Guidelines on State Aid for Climate, Environmental Protection and Energy 2022. Brussels: European Commission.

European Commission (2025) North Macedonia 2025 Report. Brussels: European Commission.

Finance Think (2023) The Fiscal Space in the Western Balkans: Evidence from the Recent Multilayer Crisis. Policy Study No. 51. Skopje: Finance Think – Economic Research and Policy Institute.

GAP Institute (2025) A Framework for Green Industrial Policies in the Western Balkans. Prishtina: GAP Institute.

Government of the Republic of North Macedonia (2018) Industrial Strategy of the Republic of Macedonia 2018–2027. Skopje: Ministry of Economy.

Government of the Republic of North Macedonia (2019) Energy Development Strategy until 2040. Skopje.

Government of the Republic of North Macedonia (2023a) Draft Law on Renewable Energy Sources. Skopje.

Government of the Republic of North Macedonia (2023b) Just Transition Roadmap. Skopje.

Government of the Republic of North Macedonia (2024) Reform Agenda 2024–2027 under the EU Reform and Growth Facility. Skopje.

Government of the Republic of North Macedonia (2025a) Annual Plan for Implementation of the Just Transition 2026. Skopje.

Government of the Republic of North Macedonia (2025b) National Energy and Climate Plan 2021–2030 (updated). Skopje.

Government of the Republic of North Macedonia (2025c) Strategy for Small and Medium Enterprises 2025–2030. Skopje.

International Energy Agency (2024) Electricity 2024: Analysis and Forecast to 2026. Paris: International Energy Agency.

MEMO (2026) 'The MEMO intraday market has launched – a new level of flexibility and efficiency in the energy sector'. Available at: MEMO.mk (Accessed: 13 May 2026).

Ministry of Economy and Labour (2025) Strategic Plan 2025–2027. Skopje.

National Bank of the Republic of North Macedonia (2025) Green Finance Indicators / Financial Stability or Statistical Bulletin. Skopje.

OECD (2024) Employment and Skills Policies for the Green Transition. Paris: Organisation for Economic Co-operation and Development.

OECD (2025) Energy Prices and Subsidies in the Western Balkans: Reforms for a Fair and Green Future. Paris: OECD Publishing. Available at: OECD publication (Accessed: 13 May 2026).

Sundvor, I., Kuci, S. and Johnstone, I. (2026) One Region, Many Transitions: CBAM and Carbon Pricing in the Western Balkans. Carbon Balance Initiative and University of Oxford.

The Nature Conservancy (2023) Building Momentum for a Low-Carbon Future in North Macedonia.

WBIF (2026) Sector Factsheet: Clean Energy. Western Balkans Investment Framework. Available at: WBIF Clean Energy Sector Factsheet 2026 (Accessed: 21 May 2026).

World Bank (2024) North Macedonia Climate Public Finance Review: Integrating Climate Change Perspectives into Fiscal Policy. Washington, DC: World Bank.

World Bank Group (2026) Western Balkans Regular Economic Report No. 29: Adjusting to Shocks, Mobilizing Untapped Potential. Washington, DC: World Bank Group.