

Harnessing Sustainable Consumption and Production (SCP) and Circular Economy (CE) Opportunities to Achieve Higher Climate Ambition and Green Growth in Kazakhstan

White Paper

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TABLE OF CONTENTS

1. Executive Summary	7
The SCP, CE and climate nexus: A strategic imperative	7
Kazakhstan: Advancing climate ambition through economic modernisation and circularity	7
Finance as a common denominator: Catalysing the transition	8
Regional collaboration as a multiplier	8
From strategic intent to operational leadership.....	9
2. Introduction	10
2.1. The European Union's SWITCH-Asia Programme.....	10
2.2. Introduction to the Technical Advisory.....	10
2.3. Objectives of the Technical Advisory	11
2.4. Methodology of the Technical Advisory.....	11
2.5. Climate change landscape in Kazakhstan	12
2.6. GHG emissions profile and NDC 3.0 targets.....	13
3. Integrating SCP and CE into Kazakhstan's Development Strategy	14
3.1. Sustainable development challenges in Kazakhstan	14
3.2. The SCP and CE policy landscape of Kazakhstan.....	14
3.3. Climate change policy landscape of Kazakhstan.....	18
3.4. Reflections on SCP, CE and material resource efficiency in Kazakhstan's climate policy landscape	20
4. Recommendations for Operationalising SCP and CE for Enhanced Climate Ambition and Green Growth	25
4.1. Catalysing market transformation in high potential sectors	25
4.2. Strengthening enabling frameworks	27
4.3. Aligning long term planning, institutional capacity and regional cooperation.....	30
5. Financing the Circular Transition: Narrowing the NDC Investment Gap.....	31
5.1. The investment challenge	31
5.2. How circular economy narrows the gap.....	32
5.3. New revenue streams.....	32
5.4. Instruments and actors	32
5.5. From policy signals to investment flows.....	33
6. Conclusion	35
Annex 1: Reflection of SCP, CE and MRE Elements in Kazakhstan's NDC 3.0: Detailed Analysis	36

LIST OF FIGURES, TABLES AND BOXES

Figure 1. NDC 3.0 investment needs, 2026 to 2035 (USD billion)	31
Figure 2. Policy to investment sequencing: ash and slag symbiosis in Pavlodar region (illustrative).....	34
Table 1. Kazakhstan's GHG emissions by sector, 2023.....	13
Table 2. Selected NDC 3.0 targets and indicators for 2035.....	13
Table 3. Main national policies and legal instruments relevant to SCP and CE in Kazakhstan.....	15
Table 4. Alignment of Kazakhstan's NDC 3.0 with global SCP/CE benchmarks	21
Table 5. Sector mapping: SCP/CE status in NDC 3.0, opportunity and priority action.....	22
Table 6. Opportunities for material resource efficiency within NDC 3.0 targets	23
Table 7. Proposed functions and lead roles for CE coordination	29
Table 8. Finance instruments and actors relevant to CE in Kazakhstan	32
Box 1. Circular economy: managing limited material resources, not only waste	7
Box 2. Kazakhstan's waste and secondary resource system in numbers	17
Box 3. The dedicated circular economy measure in Kazakhstan's NDC 3.0.....	19
Box 4. From waste management to resource management: what changes	22
Box 5. How material efficiency cuts emissions	24

LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AIFC	Astana International Financial Centre
BAT	Best Available Techniques
BAU	Business as usual
BTR	Biennial Transparency Report
C&D	Construction and demolition
CAREC	Central Asia Regional Economic Cooperation Program
CBAM	Carbon Border Adjustment Mechanism (EU)
CE	Circular economy
CEAP	Circular Economy Action Plan (EU)
CMUR	Circular material use rate
CRVA	Climate risk and vulnerability assessment
DBK	Development Bank of Kazakhstan
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EPCA	Enhanced Partnership and Cooperation Agreement (EU and Kazakhstan)
EPR	Extended producer responsibility
ESG	Environmental, social and governance
ETS	Emissions trading system
EU	European Union
EUD	European Union Delegation
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
IRP	International Resource Panel
ISO	International Organization for Standardization
KPI	key performance indicator
LCA	Life cycle assessment
LT-LEDS	Long term low emission development strategy
LULUCF	Land use, land use change and forestry
MDB	Multilateral development bank
MENR	Ministry of Ecology and Natural Resources of the Republic of Kazakhstan
MFA	Material flow analysis
MRE	Material resource efficiency
MRV	Measurement (monitoring), reporting and verification
MSW	Municipal solid waste
NAP	National Allocation Plan (ETS) / National Adaptation Plan

NDC	Nationally Determined Contribution
NGO	Non-governmental organisation
PRTR	Pollutant Release and Transfer Register
PSC	Policy Support Component (SWITCH-Asia)
QaJET	Kazakhstan Just Energy Transition investment platform
RES 2026	Regional Ecological Summit 2026 (Astana)
SCP	Sustainable consumption and production
SDG	Sustainable Development Goal
SME	Small and medium sized enterprise
SSP	Shared Socioeconomic Pathway
TA	Technical Advisory
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization
10YFP	10 Year Framework of Programmes on SCP (UNEP One Planet Network)

1. EXECUTIVE SUMMARY

The SCP, CE and climate nexus: A strategic imperative

The way economies extract, process and use materials sits at the centre of the climate challenge. According to the International Resource Panel, the extraction and processing of fossil fuels, minerals, nonmetallic minerals and biomass account for **over 55% of global GHG emissions**, rising to more than 60% when land use change is included.¹ Sustainable consumption and production (SCP) and circular economy (CE) approaches work on exactly this source. They use fewer materials, keep them in use for longer and put residues back to productive use.

Box 1. Circular economy: managing limited material resources, not only waste

Circular economy (CE) is about managing limited material resources effectively, efficiently and sustainably across their whole life cycle. It goes beyond improving the efficiency of individual processes or increasing recycling. It seeks to reduce demand for virgin resources, retain the value of products, materials and assets in the economy for longer, and regenerate natural systems. This means acting across the whole value chain, from design and production to use, reuse, repair, remanufacturing and, where these options are exhausted, recycling and recovery.

This White Paper follows a circular hierarchy when it looks at interventions:

- **Avoid** unnecessary resource use and reduce demand for virgin materials.
- **Retain** products, infrastructure and materials in productive use for longer.
- **Reuse, repair, refurbish and remanufacture** wherever this is feasible.
- **Connect** industries through industrial symbiosis and productive use of byproducts.
- **Recover** materials through high value recycling, and only then through energy recovery or disposal.

Waste management remains an important part of the circular economy, but it is the downstream end of the system. Most of the economic and climate value lies further upstream, in how materials are extracted, designed into products and infrastructure, and used.

The nexus extends to adaptation. Most adaptation actions, such as flood defences, water retention and irrigation systems, resilient housing and transport corridors, need large quantities of materials. Without SCP and CE principles, such investments risk generating large embodied emissions that offset mitigation gains elsewhere. Designed with circularity in mind, they can deliver the same protection with less material, lower emissions and lower cost.

The 2025 NDC 3.0 cycle showed growing recognition of this nexus. Viet Nam, Thailand, Sri Lanka and Uzbekistan all embedded CE principles beyond waste management. Kazakhstan went further than most: its NDC 3.0 includes, for the first time, a **dedicated mitigation measure on circular economy, resource efficiency and SCP**.

Kazakhstan: Advancing climate ambition through economic modernisation and circularity

Kazakhstan enters the new NDC cycle as a resource rich economy closely tied to sectors that use a lot of energy and materials: mining, metallurgy, oil and gas, heavy industry and transport. Its power system still depends heavily on coal. The energy sector accounts for **79.8% of national GHG emissions**.² At the

1 International Resource Panel (2024). Global Resources Outlook 2024: Bend the Trend. UNEP, Nairobi. <https://wedocs.unep.org/items/3ec5991f-1ab2-4d54-9000-c9d3cee81d16>

2 Government of the Republic of Kazakhstan (2025). Nationally Determined Contribution of the Republic of Kazakhstan to the Global Response to Climate Change until 2035 (NDC 3.0). UNFCCC. https://unfccc.int/sites/default/files/2025-11/NDC_Kazakhstan%203.0%20eng.pdf

same time, the country faces growing climate risks from water scarcity, floods, droughts and pressure on transboundary water systems. This creates a dual transition challenge: to modernise and diversify the economy while reducing its carbon and resource intensity and strengthening resilience.

Kazakhstan's NDC 3.0, covering 2026 to 2035, sets an unconditional target to reduce net GHG emissions by **17% below 1990 levels by 2035**, rising to **25% with international support**, and is explicitly aligned with the Strategy for Achieving Carbon Neutrality by 2060.³ It also targets a 20% reduction in the energy intensity of GDP (from 2021), 20% renewable and at least 35% low carbon electricity, a recycling rate of at least 40% and a reduction of about 42% in fugitive methane from the energy and waste sectors, all by 2035.

The dedicated CE provision commits Kazakhstan, by 2035, to improve the efficiency of water, energy and raw material use, increase the share of recycled materials, develop industrial symbiosis and reduce waste generation and process emissions through circular business models and green standards. SCP related approaches also appear across buildings, agriculture, land use and adaptation. The next step is to translate this recognition into **measurable sectoral targets, indicators and investment ready actions**. Read as a whole, the provision treats CE as a way to manage limited material resources effectively, efficiently and sustainably across the economy, rather than as a waste management agenda.

Two market signals make this more urgent. The EU Carbon Border Adjustment Mechanism (CBAM) entered its definitive phase in January 2026; one assessment estimates potential CBAM costs on Kazakh steel exports alone at **more than EUR 100 million a year**.⁴ Kazakhstan's own emissions trading system (ETS), Central Asia's first, covers about 43% of national CO₂ emissions and is moving to tighter caps.⁵ Material efficiency, secondary metals and lower process emissions are now matters of export competitiveness, not only environmental policy.

Finance as a common denominator: Catalysing the transition

NDC 3.0 estimates total investment needs for 2026 to 2035 at approximately **USD 175.6 billion**, of which about USD 128.5 billion is for mitigation and USD 47 billion for adaptation. About **USD 71.8 billion** of the total is additional to business as usual investment, and around **USD 20 billion** is expected to require highly concessional international support.⁶

CE can narrow this gap from both sides. On the cost side, material efficiency, secondary raw materials and industrial symbiosis reduce the capital and operating costs of decarbonisation and help exporters avoid CBAM charges. On the revenue side, ETS allowances and offsets, Article 6 cooperation, extended producer responsibility (EPR) revenues and markets for secondary materials can generate new flows. Kazakhstan already has the instruments to connect these: the Green Taxonomy, green bonds through the Astana International Financial Centre (AIFC), the EPR system operated by JSC Zhasyl Damu, a Country Platform for Climate Finance Mobilization and the QaJET just energy transition platform launched with the EBRD in April 2026. What is missing is a pipeline of circular projects that investors can actually see within this architecture.

Regional collaboration as a multiplier

In April 2026, Kazakhstan hosted the Regional Ecological Summit (RES 2026) in Astana, where Central Asian countries launched the **Central Asia Circular Economy Partnership Framework**, developed with support from the EU SWITCH-Asia Programme.⁷ The Framework provides a common platform to harmonise approaches to secondary materials and EPR, exchange knowledge and technology, and mobilise investment. Regional cooperation matters especially where national markets for certain secondary materials are too small to reach efficient scale, and where water, energy and value chains cross borders.

³ Kazakhstan NDC 3.0 (2025), see note 2.

⁴ GMK Center (2026). The annual cost of the CBAM for exports of steel products from Kazakhstan could exceed €100 million, reporting an assessment by the International Trade Centre and QazTrade presented by the EU Delegation to Kazakhstan. <https://gmk.center/en/news/the-annual-cost-of-the-cbam-for-exports-of-steel-products-from-kazakhstan-could-exceed-e100-million/>

⁵ Kazakhstan NDC 3.0 (2025), see note 2.

⁶ Kazakhstan NDC 3.0 (2025), see note 2.

⁷ SWITCH-Asia (2026). Central Asia commits to circular economy with new EU backed regional framework. <https://www.switch-asia.eu/news/central-asia-commits-to-circular-economy-with-new-eu-backed-regional-framework/>

From strategic intent to operational leadership

This White Paper identifies the strongest opportunities in **mining and metallurgy, waste and secondary materials, construction, agriculture and water, critical raw materials, and residues from oil, gas and coal power**. Its recommendations are organised under four mutually reinforcing priorities:

- **Catalyse market transformation in high potential sectors**, using existing instruments (BAT, the Waste Management Concept 2026 to 2030, the new Construction Code and the ETS) as entry points.
- **Strengthen enabling frameworks**: a national CE/SCP/MRE indicator set linked to NDC MRV, demand side and consumer instruments, cross government coordination, and a just and inclusive transition for workers and regions.
- **Finance the circular transition** by integrating CE projects into NDC investment planning, the Green Taxonomy and blended finance structures, and by using the EU partnership and Global Gateway.
- **Align long term planning and regional cooperation**, embedding circularity in the Carbon Neutrality Strategy roadmap and the Central Asia Circular Economy Partnership Framework.

The paper also shows where material efficiency can be put to work inside NDC 3.0 itself (Table 6): in the energy intensity, recycling, methane, renovation and adaptation targets, in the ETS and Article 6, and in transparency reporting. It recommends **estimating the mitigation potential of material efficiency, reporting it in the Biennial Transparency Reports, screening the NDC investment pipeline for material use and preparing quantified material targets for the next NDC**.

Kazakhstan does not need another layer of strategy. What it needs now is to **put the instruments it already has to work, and connect them**, so that CE, SCP and material resource efficiency make a measurable contribution to Kazakhstan's 2035 target and its pathway to carbon neutrality by 2060.

2. INTRODUCTION

2.1. The European Union's SWITCH-Asia Programme

Through its Green Deal and Global Gateway, the European Union supports partner countries in their transition towards a low carbon, resource efficient and circular economy while promoting sustainable consumption and production patterns. The SWITCH-Asia Policy Support Component (PSC) aims to enhance SCP progress by scaling up and mainstreaming SCP policy across 42 target countries in the Middle East, Central Asia, South Asia, East Asia, Southeast Asia and the Pacific.⁸

The PSC builds on the SWITCH-Asia Programme's long track record of technical assistance and connects with both the SWITCH-Asia Grants component and the priorities of EU Delegations. Through flexible, on demand interventions, it helps countries address the triple planetary crisis of climate change, biodiversity loss and pollution, and meet international commitments including the SDGs and the Paris Agreement. Key entry points include advancing SDG 12, integrating SCP into NDCs and climate action, engaging the private sector and communicating the value of SCP.

This White Paper is an output of the regional Technical Advisory (TA) on *SCP linked Nationally Determined Contributions (NDCs) and Long Term Low Emission Development Strategies (LT-LEDS) in Central Asia*, covering Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. Companion White Papers have been published for Uzbekistan and the Kyrgyz Republic.^{9,10}

2.2. Introduction to the Technical Advisory

The nexus between climate change and sustainable consumption and production

Unsustainable consumption and production patterns are the main drivers of the three interlinked planetary crises. The International Resource Panel's *Global Resources Outlook 2024* finds that the extraction and processing of material resources account for over 55% of global GHG emissions and about 40% of health impacts linked to particulate matter; including land use change, the climate share rises above 60%.¹¹ Material resource efficiency is therefore central to mitigation. Because many adaptation measures rely on infrastructure that uses a lot of materials, it matters for adaptation and resilience too. At its core, circular economy is about managing limited material resources effectively, efficiently and sustainably across their whole life cycle; waste management is only its final stage (Box 1).

Low carbon concrete, recycled aggregates, modular infrastructure and longer asset lifetimes can reduce embodied emissions and resource demand while maintaining protective capacity. Conversely, adaptation investments that ignore SCP and CE risk adding value chain emissions that partly offset mitigation gains.

Nationally Determined Contributions and Long term Low Emission Development Strategies

The NDC is the building block of the Paris Agreement. Parties update their NDCs every five years, and in 2025 they submitted NDC 3.0, the third round of national pledges. Many Asia Pacific countries used this window to strengthen SCP and CE: Viet Nam positioned CE as a cross cutting element in agriculture and industrial value chains;¹² Thailand embedded SCP and CE across energy efficiency, sustainable food systems and resource efficient manufacturing;¹³ Sri Lanka included CE in industrial processes and product use;¹⁴ and Uzbekistan

8 SWITCH-Asia Programme. <https://www.switch-asia.eu/>

9 SWITCH-Asia PSC (2026). Harnessing SCP and CE Opportunities to Achieve Higher Climate Ambition and Green Growth in Uzbekistan. https://switch-asia.eu/site/assets/files/4674/uz_climate_report.pdf

10 SWITCH-Asia PSC (2026). Kyrgyz Republic Climate White Paper. https://switch-asia.eu/site/assets/files/4726/kyrgyzstan_climate_white_paper_final.pdf

11 IRP (2024), *Global Resources Outlook 2024*, see note 1.

12 Socialist Republic of Viet Nam (2022). Nationally Determined Contribution (updated). <https://unfccc.int/sites/default/files/NDC/2022-11/Viet%20Nam%20NDC%202022%20Update.pdf>

13 Kingdom of Thailand (2025). NDC 3.0. <https://unfccc.int/sites/default/files/2025-11/TH%20NDC%203.0.pdf>

14 Democratic Socialist Republic of Sri Lanka (2025). Nationally Determined Contributions 3.0 (2026 to 2035). <https://unfccc.int/sites/default/files/2025-09/Sri%20Lanka%20Nationally%20Determined%20Contributions%203.0%20%282026-2035%29%20submitted%2022.09.2025%20%281%29.pdf>

framed CE as a key driver of sustainable growth and climate mitigation.¹⁵ Kazakhstan's NDC 3.0 incorporates CE and SCP across energy, industry, agriculture and waste, and is one of the few to include a dedicated CE mitigation measure.¹⁶

LT-LEDS are national roadmaps for the transition to a low carbon, climate resilient economy by the middle of the century. Under Article 4.19 of the Paris Agreement, Parties are invited to formulate and communicate them, and they guide successive NDCs.¹⁷ Because they span decades and sectors, LT-LEDS are well suited to embedding SCP and CE as cross cutting pillars. **Kazakhstan's Strategy for Achieving Carbon Neutrality by 2060 serves as its LT-LEDS;** it estimates investment needs of about USD 610 billion to 2060, and a detailed implementation Roadmap is under development.^{18,19}

At the UNFCCC level, SCP and CE are not yet central to formal negotiation themes such as mitigation accounting or transparency, but they feature increasingly in high level discussions, including the first Global Stocktake. The IPCC Sixth Assessment Report stresses that limiting warming requires all available options, including demand side measures, resource efficiency and shifts in consumption and production.²⁰ In practice, SCP and CE remain linked mostly to mitigation and are poorly recognised in adaptation planning.

2.3. Objectives of the Technical Advisory

The TA was designed as an exploratory and scoping initiative with three objectives:

- Identify the potential to integrate SCP and CE into climate ambition, including the NDCs and LT-LEDS of Central Asian countries.
- Enhance the knowledge and capacities of local actors for integrating SCP and CE into NDC 3.0 and LT-LEDS through broader engagement and exchange.
- Provide on demand technical assistance to design and develop sector specific SCP/CE targets under NDC 3.0 and LT-LEDS.

2.4. Methodology of the Technical Advisory

The TA combined (i) a systematic review of national policy documents on SCP, CE and climate change, and (ii) targeted consultations with government ministries, line agencies, research institutions, the private sector and civil society. All Central Asian countries were covered through regional policy assessments, while Kazakhstan, the Kyrgyz Republic and Tajikistan benefited from detailed, locally grounded engagement.

In Kazakhstan, the analysis reviewed NDC 3.0, the Carbon Neutrality Strategy 2060 and the national policy and legal instruments summarised in Table 3, together with recent assessments by the GCF, UNDP, the World Bank, ADB and WMO. Consultations were held with a broad spectrum of national, regional and international stakeholders.

Findings were tested and validated through regional and international platforms, including RES 2026 in Astana, the Central Asia Parliamentarians' Platform dialogues on circular economy, Central Asia Climate Change Conferences, SWITCH-Asia Annual Meetings, and sessions at UNFCCC COP and Subsidiary Body meetings.

Three limitations apply. National data on material flows, secondary material use and industrial symbiosis are limited, so much of the assessment is qualitative. Several policy instruments were adopted or amended during 2025 to 2026, and their implementing regulations are still evolving. The GHG impact of CE measures has not been modelled; estimating it is itself a recommendation of this paper.

15 Republic of Uzbekistan (2025). Third Nationally Determined Contribution. <https://unfccc.int/sites/default/files/2025-11/Uzbekistan%20Third%20NDC.pdf>

16 Kazakhstan NDC 3.0 (2025), see note 2.

17 UNFCCC (2022). Long term low emission development strategies: Synthesis report by the secretariat. https://unfccc.int/sites/default/files/resource/cma2022_08.pdf

18 Kazakhstan NDC 3.0 (2025), see note 2.

19 Strategy of the Republic of Kazakhstan for Achieving Carbon Neutrality by 2060, approved by Presidential Decree No. 121 of 2 February 2023. https://unfccc.int/sites/default/files/resource/Carbon_Neutrlaity_Strategy_Kazakhstan_Eng_Oct2024.pdf

20 IPCC (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report. Cambridge University Press.

2.5. Climate change landscape in Kazakhstan

Kazakhstan is increasingly exposed to the physical impacts of climate change, with rising temperatures, growing water stress, glacier retreat and more frequent extreme weather events affecting ecosystems, infrastructure and key economic sectors. These risks are amplified by geography: Kazakhstan is the world's largest landlocked country, much of its territory is arid or semiarid, and water availability depends significantly on transboundary river systems.

Warming is accelerating. Kazakhstan's Country Programme for the Green Climate Fund reports that the average annual temperature in 2012 to 2021 was already 1.19°C above the climatic norm. By mid century, temperatures are projected to rise by 2.3 to 2.6°C under SSP2-4.5 and 3.0 to 3.5°C under SSP5-8.5.²¹ The WMO's *State of the Climate in Asia 2025* confirms that Asia continues to warm faster than in previous decades, records exceptional temperature anomalies in Kazakhstan during parts of 2025, and reports continued mass loss across all 23 monitored glaciers in High Mountain Asia, including the Tien Shan and Pamir ranges.²²

Water security is emerging as one of the most significant long term risks. The GCF Country Programme estimates a potential water deficit of around 20 billion m³ by 2050, driven by glacier retreat, reduced river flows and rising demand, and reports that the glaciated area of the Tien Shan has declined by about 16.8% over two decades.²³ Industry is the second largest water consumer after agriculture, so water scarcity could constrain both agricultural and industrial output.

Water risk is also inherently **transboundary**. The CAREC Climate Change Action Plan 2025 to 2027 identifies the water, energy and food nexus as one of four priority areas for regional climate action,²⁴ and in June 2026 the Global Environment Facility approved further support for the Chu and Talas basins shared with the Kyrgyz Republic, which sustain irrigated agriculture and water security for about three million people.²⁵

Kazakhstan is also increasingly exposed to **floods, droughts, heatwaves and wildfires**. The large scale floods of 2024 demonstrated the potential for substantial social, infrastructure and economic losses. Since then, flood forecasting has been expanded across key river basins, including the Yesil, Nura and Zhaiyk, an integrated drought early warning system is being developed, and a national Climate Risk and Vulnerability Assessment methodology, based on IPCC AR6, ISO 14091, ISO 31000 and UNDRR frameworks, has been introduced.^{26,27}

Agriculture is particularly exposed to the interaction of heat, water scarcity, drought and land degradation. Without sufficient adaptation, spring wheat yields could fall by 20 to 49% by 2050, with annual losses of up to USD 850 million.²⁸ As Kazakhstan is a major wheat exporter, the consequences would extend to regional food markets.

Kazakhstan's physical vulnerability is compounded by its emissions profile, which is dominated by fossil fuels and energy intensive industry (Section 2.6). The World Bank's recent climate assessment similarly highlights this combination of high emissions and high exposure, underlining that resilience and decarbonisation must be treated as interconnected development challenges.²⁹

21 Green Climate Fund (2025). Kazakhstan Country Programme. <https://www.greenclimate.fund/document/kazakhstan-country-programme>

22 World Meteorological Organization (2026). State of the Climate in Asia 2025. <https://wmo.int/resources/publication-series/state-of-climate-asia/state-of-climate-asia-2025>

23 GCF (2025), Kazakhstan Country Programme, see note 21.

24 Asian Development Bank (2025). CAREC Climate Change Action Plan 2025 to 2027. <https://www.adb.org/documents/carec-climate-change-action-plan-2025-2027>

25 Global Environment Facility (2026). Annex: Approved projects and programs, June 2026 Council. <https://www.thegef.org/annex-approved-projects-programs-june-2026-councils>

26 UNDP Kazakhstan (2026). Annual Report 2025. <https://www.undp.org/kazakhstan/annual-report-2025>

27 UNDP Kazakhstan (2025). Climate Risk Assessment Methodology for the Republic of Kazakhstan. <https://www.undp.org/kazakhstan/publications/climate-risk-assessment-methodology-republic-kazakhstan>

28 GCF (2025), Kazakhstan Country Programme, see note 21.

29 World Bank (2025). Kazakhstan: Climate Change Institutional Assessment. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099080125101031105>

2.6. GHG emissions profile and NDC 3.0 targets

Kazakhstan's net GHG emissions were **349.2 MtCO₂e in 2023**, about 9.4% below the 1990 level of approximately 385 MtCO₂e.³⁰ Energy accounts for almost four fifths of the total (Table 1). This covers power and heat generation, fuel combustion in industry and transport, and fugitive emissions from oil, gas and coal. Coal remains the backbone of power and heat generation, and socioeconomic dependence on coal is significant in several oblasts.³¹

Table 1. Kazakhstan's GHG emissions by sector, 2023

Sector	Emissions (MtCO ₂ e)	Share of net total
Energy	278.5	79.8%
Agriculture	33.4	9.6%
Industrial processes and product use (IPPU)	26.7	7.7%
Waste	7.1	2.0%
LULUCF (net source)	3.3	0.9%
Net total	349.2	100%

Source: Kazakhstan NDC 3.0, national GHG inventory data for 2023.

The sectoral picture understates the role of materials. Much of the energy sector total is consumed by mining, metallurgy, cement and chemicals, so material efficiency and secondary raw materials reduce emissions reported under both energy and IPPU. Organic waste and manure management affect emissions reported under waste and agriculture.

NDC 3.0 translates the long term carbon neutrality goal into the 2035 targets summarised in Table 2.

Table 2. Selected NDC 3.0 targets and indicators for 2035

Target / indicator	2035 level	Basis
GHG emissions, unconditional	17% reduction (net emissions about 320 MtCO ₂ e)	vs 1990, incl. LULUCF
GHG emissions, conditional on international support	25% reduction (net emissions about 288 MtCO ₂ e)	vs 1990, incl. LULUCF
Energy intensity of GDP	20% reduction	vs 2021
Renewable electricity	20% of generation	Share of total generation
Low carbon electricity	at least 35% of generation	Share of total generation
Recycling of waste	at least 40%	Share of waste recycled
Fugitive methane, energy and waste	about 42% reduction	NDC baseline
Long term goal	carbon neutrality by 2060	Carbon Neutrality Strategy

Source: Kazakhstan NDC 3.0.

30 Kazakhstan NDC 3.0 (2025), see note 2.

31 Kazakhstan NDC 3.0 (2025), see note 2.

3. INTEGRATING SCP AND CE INTO KAZAKHSTAN'S DEVELOPMENT STRATEGY

3.1. Sustainable development challenges in Kazakhstan

Kazakhstan's development model has historically been underpinned by abundant natural resources and a strong extractive and industrial base. Oil and gas, mining, metallurgy, energy intensive manufacturing and agriculture remain important drivers of production, exports and regional development. This has supported growth, but it has also produced high energy and material intensity, very large volumes of industrial waste and pressure on water, land and ecosystems. Industry generates about **1 billion tonnes of waste a year, 70% of it from mining and quarrying**.³²

The country therefore faces a structural challenge: how to sustain growth and industrial modernisation while reducing dependence on carbon and resource intensive production. The National Development Plan until 2029 places structural economic renewal and sustainable growth at the centre of national planning; its priorities span the mineral resource base, energy, manufacturing, transport and logistics, the agroindustrial complex and investment, with environmental sustainability as a cross cutting area.³³ The updated Concept for Transition to a Green Economy identifies resource productivity as a key measure of economic performance.³⁴

For Kazakhstan, circularity is therefore not limited to municipal waste. It is increasingly relevant to the competitiveness of core sectors: improving material productivity in mining and metallurgy; recovering secondary raw materials from tailings, slags and ash; reducing energy and water intensity in manufacturing; extending the lifetime of buildings and infrastructure; and closing nutrient loops in agriculture.

The opportunity is therefore not simply to manage Kazakhstan's large waste streams more effectively, but to generate greater economic value from the resources already entering the economy. This means reducing unnecessary material demand, extending the productive life of materials and assets, developing reuse and remanufacturing where feasible, connecting industries through byproduct and resource exchanges, and only then recovering materials through recycling.

The external environment reinforces this imperative. Kazakhstan's energy and carbon intensive exports are exposed to the EU CBAM and to growing buyer demand for low carbon, traceable materials. At the same time, the global energy transition is raising strategic demand for critical raw materials, creating an opportunity to move beyond primary extraction towards higher value processing, recovery and circular management of materials.

SCP and CE can therefore support several national objectives at once: diversification, industrial modernisation, resource security, climate mitigation, resilience to water scarcity, technological upgrading and competitiveness in low carbon markets. They also have a social dimension: the regions most exposed to the decline of coal and to single industry structures are also those where industrial symbiosis and secondary materials processing could create new jobs.

3.2. The SCP and CE policy landscape of Kazakhstan

Kazakhstan has an extensive policy and regulatory architecture relevant to SCP, CE and material resource efficiency. Historically, however, these provisions have been distributed across environmental, industrial, energy, water, agricultural and development policies rather than organised under a single economy wide CE framework. Recent instruments, namely the Waste Management Concept 2026 to 2030, the new Water Code, the new Construction Code, the updated agricultural framework and the Green Economy Action Plan, create

³² The Astana Times (2025). Kazakhstan to tackle gaps in waste management with strategy due by September, citing Government data. <https://astanatimes.com/2025/05/kazakhstan-to-tackle-gaps-in-waste-management-with-strategy-due-by-september/>

³³ National Development Plan of the Republic of Kazakhstan until 2029, approved by Presidential Decree No. 611 of 30 July 2024. <https://adilet.zan.kz/rus/docs/U2400000611>

³⁴ Concept for the Transition of the Republic of Kazakhstan to a Green Economy, approved by Presidential Decree No. 577 of 30 May 2013 (as updated in 2024). <https://adilet.zan.kz/rus/docs/U1300000577>

new opportunities to operationalise CE and SCP across sectors (Table 3).

Table 3. Main national policies and legal instruments relevant to SCP and CE in Kazakhstan

Policy / legal instrument	Key SCP / CE relevance	Relevance for climate and NDC 3.0
Environmental Code, No. 400-VI of 2 January 2021 ³⁵	Legal basis for the waste hierarchy, EPR, BAT, environmental permitting, GHG regulation, emissions trading and green finance.	Enables regulatory implementation of resource efficiency, recycling, secondary material use and cleaner production.
Rules for GHG emissions regulation and the National Allocation Plan for the ETS, under the Environmental Code ³⁶	Output based benchmarks for covered installations in power, heat, extraction and manufacturing.	Price signal for process emissions and material efficiency in about 212 installations covering about 43% of CO ₂ emissions.
Extended Producer Responsibility system, operated by JSC Zhasyl Damu ³⁷	Recycling fees on producers and importers; repayable financing for waste and recycling projects.	Funds collection and recycling capacity towards the 40% recycling target.
Concept for Transition to a Green Economy, Presidential Decree No. 577 of 30 May 2013, updated in 2024 ³⁸	Establishes resource productivity as a central economic indicator; covers water, agriculture, energy efficiency, waste and ecosystems.	Overarching resource efficiency foundation for CE/SCP and economic decoupling.
Action Plan for the Green Economy Concept 2024 to 2030, Government Resolution No. 1019 of 29 November 2024, as amended 26 January 2026 ³⁹	Measurable actions, including expansion of water saving technologies on irrigated land and growth of green loans and bonds.	Operational bridge between green economy objectives and sectoral NDC implementation.
National Development Plan until 2029, Presidential Decree No. 611 of 30 July 2024 ⁴⁰	Productivity, diversification and technological modernisation.	Economic policy entry point for embedding circularity in industrial and development planning.
Strategy for Achieving Carbon Neutrality by 2060, Presidential Decree No. 121 of 2 February 2023 ⁴¹	Long term transformation pathway; serves as Kazakhstan's LT-LEDS.	Long term framework into which CE and material efficiency can be integrated as mitigation pathways.
Concept for the Management of All Types of Waste 2026 to 2030, Government Resolution No. 1201 of 31 December 2025 ⁴²	Calls for a systemic transition to a resource saving, circular model; prevention, recycling, secondary circulation, digitalisation, responsible consumption.	Strongest existing instrument for the NDC's CE provisions, including waste prevention, secondary materials and methane reduction.

35 Environmental Code of the Republic of Kazakhstan, No. 400-VI of 2 January 2021. <https://adilet.zan.kz/rus/docs/K2100000400>

36 International Carbon Action Partnership (2026). Kazakhstan Emissions Trading System. <https://icapcarbonaction.com/en/ets/kazakhstan-emissions-trading-system>

37 JSC Zhasyl Damu (2025). Ecology in numbers: Zhasyl Damu JSC summarizes results of its activities for 2025. <https://recycle.kz/en/press/ecology-numbers-zhasyl-damu-jsc-summarizes-results-its-activities-2025>

38 Green Economy Concept, see note 34.

39 Action Plan for the Implementation of the Concept for the Transition to a Green Economy for 2024 to 2030, approved by Government Resolution No. 1019 of 29 November 2024 (as amended 26 January 2026). <https://adilet.zan.kz/rus/docs/P2400001019>

40 National Development Plan until 2029, see note 33.

41 Strategy for Achieving Carbon Neutrality by 2060, see note 19.

42 Concept for the Management of All Types of Waste in the Republic of Kazakhstan for 2026 to 2030, approved by Government Resolution No. 1201 of 31 December 2025. <https://adilet.zan.kz/rus/docs/P2500001201>

Policy / legal instrument	Key SCP / CE relevance	Relevance for climate and NDC 3.0
Water Code, No. 178-VIII of 9 April 2025, as amended in July 2026 ⁴³	Legal basis for more efficient and resilient water use.	Supports adaptation and the NDC's resource efficiency objective in agriculture and industry.
Concept for Development of the Agroindustrial Complex 2021 to 2030, Government Resolution No. 960, as amended 29 July 2026 ⁴⁴	Productivity, sustainable land management and modernisation of agriculture.	Entry point for water efficiency, nutrient cycling, manure recovery and circular bioeconomy.
Concept for Development of the Manufacturing Industry 2023 to 2029 ⁴⁵	Industrial productivity, technological upgrading and higher value manufacturing.	Platform for material efficiency, industrial symbiosis and secondary material integration.
Concept for Development of Energy Saving and Energy Efficiency 2023 to 2029, Government Resolution No. 264 ⁴⁶	Dedicated framework for reducing energy intensity with measurable indicators.	Model for translating resource efficiency into measurable sectoral indicators.
Construction Code, No. 253-VIII of 9 January 2026 ⁴⁷	New regulatory framework for construction and the built environment.	Policy window for lifecycle approaches, secondary materials and lower embodied emissions.
Green Taxonomy, Government Resolution No. 996 of 31 December 2021, as updated ⁴⁸	Eligible green project categories for bonds and loans, incl. efficient use of natural resources.	Classification framework that can support CE investment pipelines.
Comprehensive Plan for Development of Rare and Rare Earth Metals 2024 to 2028, Government Resolution No. 1221 of 28 December 2023 ⁴⁹	Development of rare and rare earth metals value chains.	Opportunity to link critical raw materials with recovery from secondary sources.
<i>Taza Qazaqstan</i> national environmental initiative ⁵⁰	Nationwide environmental culture and cleanup initiative; schools and volunteers; waste processing growth.	Channel for consumer side SCP, waste separation and behaviour change.

Waste policy as the most explicit circular economy framework

The Concept for the Management of All Types of Waste 2026 to 2030 is the clearest recent institutionalisation of CE in national policy. Its justification refers explicitly to a systemic transition towards an environmentally sustainable, resource saving and circular model, and it links waste management to the Green Economy Concept, the National Development Plan, the Carbon Neutrality Strategy and SDG 12. It covers the full

43 Water Code of the Republic of Kazakhstan, No. 178-VIII of 9 April 2025 (as amended). <https://adilet.zan.kz/rus/docs/K2500000178>

44 Concept for the Development of the Agroindustrial Complex of the Republic of Kazakhstan for 2021 to 2030, approved by Government Resolution No. 960 (as amended 29 July 2026). <https://adilet.zan.kz/rus/docs/P2100000960>

45 Concept for the Development of the Manufacturing Industry of the Republic of Kazakhstan for 2023 to 2029. <https://adilet.zan.kz/rus/docs/P1800000846>

46 Concept for the Development of Energy Saving and Energy Efficiency of the Republic of Kazakhstan for 2023 to 2029, approved by Government Resolution No. 264. <https://adilet.zan.kz/rus/docs/P2300000264>

47 Construction Code of the Republic of Kazakhstan, No. 253-VIII of 9 January 2026. <https://adilet.zan.kz/rus/docs/K2600000253>

48 Classification (Taxonomy) of green projects subject to financing through green bonds and green loans, approved by Government Resolution No. 996 of 31 December 2021 (as updated). <https://adilet.zan.kz/rus/docs/P2100000996>

49 Comprehensive Plan for the Development of Rare and Rare Earth Metals for 2024 to 2028, approved by Government Resolution No. 1221 of 28 December 2023. <https://adilet.zan.kz/rus/docs/P2300001221>

50 Office of the Prime Minister of the Republic of Kazakhstan (2026). "Taza Qazaqstan": How the President's nationwide initiative is changing the approach to ecology and landscaping. <https://primeminister.kz/en/news/taza-qazaqstan-how-the-presidents-nationwide-initiative-is-changing-the-approach-to-ecology-and-landscaping-31801>

lifecycle from prevention to final treatment, envisages a National Waste Management Centre and stronger integration of information systems and EPR, and sets measurable targets: by 2030, municipal waste sent to landfill and industrial waste not returned to secondary circulation are each to fall by 10% relative to 2025.⁵¹ Yet waste policy deals with the downstream end of material flows. Most of the opportunities identified in this paper lie upstream, in how materials are extracted, designed into products and infrastructure, used and kept in use (Box 4).

Box 2. Kazakhstan's waste and secondary resource system in numbers

- Municipal solid waste generated: about **4.5 million tonnes a year**.⁵²
- Share of MSW processed: **25.8% in 2024, 30.6% in 2025**, against a national target of 40%.⁵³
- Industrial waste generated: about **1 billion tonnes a year**, about 70% from mining and quarrying.⁵⁴
- Landfills: about **3,000**, of which only about 20% meet environmental standards; spontaneous dumps fell from 8,600 (2018) to 2,600 (2026).^{55,56}
- EPR recycling fees collected by Zhasyl Damu: **KZT 324 billion** in January to November 2025; about KZT 125 billion allocated on a repayable basis to environmental projects, including KZT 86.1 billion for MSW projects.⁵⁷
- Planned recycling capacity from supported projects: about **885,000 tonnes a year** and 5,100 permanent jobs.⁵⁸

The numbers tell two stories at once. Municipal recycling is rising quickly, and EPR generates substantial revenue. But industrial waste, most of it from mining, is two orders of magnitude larger than municipal waste, and most of it is not yet treated as a secondary resource.

3.2.1. Industry and manufacturing

Kazakhstan's industrial sector is central to CE because of the scale of mining, metallurgy, chemicals and power generation. The Concept for Development of the Manufacturing Industry 2023 to 2029 seeks higher productivity, investment and value added production. CE can complement this agenda through more efficient material use, substitution of virgin raw materials with secondary resources, industrial symbiosis and recovery of valuable materials from residues and tailings.

The Environmental Code's **Best Available Techniques (BAT)** framework is the key regulatory entry point. Kazakhstan has adopted BAT conclusions for sectors including cement and lime, lead, inorganic chemicals, copper and gold, and zinc and cadmium. Government Resolution No. 160 of 11 March 2024 states that energy efficiency, resource conservation and reduced environmental impact should be priority criteria when modernising equipment.⁵⁹ The BAT methodology is directly aligned with circularity: the reference document for cement and lime lists low waste technologies and the recovery and recycling of substances and wastes among the criteria for identifying BAT. This provides a foundation for integrating CE into industrial modernisation rather than building a parallel system.

The **ETS** adds a price signal. It covers power, heat, extraction and manufacturing installations through output based benchmarks, and the draft National Allocation Plan for 2026 to 2030 proposes significant cap reductions.⁶⁰ NDC 3.0 places a stronger emission cap for covered industries alongside its CE measures. Yet ETS benchmarks and BAT requirements do not currently reward the use of secondary raw materials or byproduct exchange as such.

51 Concept for the Management of All Types of Waste 2026 to 2030, see note 42.

52 The Astana Times (2025), see note 32.

53 Office of the Prime Minister (2026), Taza Qazaqstan, see note 50.

54 The Astana Times (2025), see note 32.

55 The Astana Times (2025), see note 32.

56 Office of the Prime Minister (2026), Taza Qazaqstan, see note 50.

57 Zhasyl Damu (2025), see note 37.

58 Zhasyl Damu (2025), see note 37.

59 Government Resolution No. 160 of 11 March 2024. <https://adilet.zan.kz/rus/docs/P2400000160>

60 ICAP (2026), Kazakhstan ETS, see note 36.

3.2.2. Critical raw materials and secondary resources

The Comprehensive Plan for Development of Rare and Rare Earth Metals 2024 to 2028 provides a framework for higher value production in the mineral sector.⁶¹ The **Strategic Partnership between the EU and Kazakhstan on raw materials, batteries and renewable hydrogen**, signed at COP27 in November 2022 and implemented under Global Gateway, adds an external dimension. It covers integration of value chains in line with high ESG standards, supply chain resilience, and cooperation on skills, research and innovation. It explicitly includes joint projects in recycling and the recovery of critical raw materials from industrial mineral waste.⁶² CE can extend this agenda from primary extraction to secondary sources such as mining tailings, industrial residues, scrap and discarded electronics, linking critical materials development with the Waste Management Concept and the NDC's resource efficiency provision.

3.2.3. Construction and the built environment

The new Construction Code of 9 January 2026 creates an opportunity to strengthen circularity in one of the most material intensive sectors.⁶³ The Code is not itself a circular construction policy, but its implementation through technical standards and secondary regulation is an entry point for lifecycle resource efficiency. NDC 3.0 deals with operational energy in buildings (renovation rates and energy efficiency codes) but not with embodied carbon, construction materials or construction and demolition waste.

3.2.4. Agriculture, land and water

The Water Code of 2025, as amended in 2026, provides a renewed legal framework for water management, and the Green Economy Action Plan includes quantified measures to expand water saving technologies on irrigated land.^{64,65} The Concept for Development of the Agroindustrial Complex 2021 to 2030, updated in July 2026, strengthens the link between agricultural productivity and sustainable management of natural resources.⁶⁶ Together, these create opportunities for a circular bioeconomy based on manure and crop residues, biogas, organic fertilisers, nutrient cycling, food loss reduction, soil restoration and efficient water use. Many of these measures already appear in the NDC's agriculture, waste and adaptation components.

3.3. Climate change policy landscape of Kazakhstan

Kazakhstan's climate policy architecture has developed considerably in recent years and increasingly intersects with its green economy and resource efficiency agenda. It now combines a long term strategy, a quantified NDC, a carbon market, a methane regulation programme and a growing adaptation framework.

3.3.1. Mitigation and long term frameworks

The **Strategy for Achieving Carbon Neutrality by 2060** is Kazakhstan's long term strategy and serves as its LT-LEDS. It addresses the transformation of power, industry, buildings, transport, agriculture, waste and land use, recognises the need to reduce dependence on coal, and estimates investment needs of about USD 610 billion to 2060. A detailed implementation Roadmap is being developed.^{67,68}

NDC 3.0 (2026 to 2035) sets an unconditional target of a 17% reduction below 1990 levels by 2035, and a conditional target of 25% (Table 2). Most importantly for this White Paper, it introduces a dedicated mitigation measure on circular economy, resource efficiency and SCP, reproduced in Box 3.

The CE measure is reinforced by sectoral provisions in waste, buildings, agriculture, land use and adaptation, analysed in detail in Annex 1.

61 Rare and Rare Earth Metals Plan 2024 to 2028, see note 49.

62 European Commission. Strategic partnership with Kazakhstan on raw materials, batteries and renewable hydrogen (Global Gateway). https://international-partnerships.ec.europa.eu/policies/global-gateway/strategic-partnership-kazakhstan-raw-materials-batteries-and-renewable-hydrogen_en

63 Construction Code (2026), see note 47.

64 Water Code (2025), see note 43.

65 Green Economy Action Plan 2024 to 2030, see note 39.

66 Agro-Industrial Complex Concept 2021 to 2030, see note 44.

67 Strategy for Achieving Carbon Neutrality by 2060, see note 19.

68 Kazakhstan NDC 3.0 (2025), see note 2.

Box 3. The dedicated circular economy measure in Kazakhstan's NDC 3.0

*"Strengthening the principles of a circular economy, resource efficiency, and sustainable consumption and production in key economic sectors. By 2035, the plan is to improve the efficiency of material and resource use (water, energy, and raw materials), increase the share of recycled materials, develop industrial symbiosis in certain sectors of the economy, and reduce waste generation and process greenhouse gas emissions through the implementation of circular business models and green standards."*⁶⁹

Read with the sectoral provisions analysed in Annex 1, this measure frames CE as the effective, efficient and sustainable management of limited material resources across the economy, not only as waste management.

Three further instruments shape the mitigation landscape:

- **Emissions trading.** The Kazakhstan ETS, launched in 2013 and reformed in 2018, is the first in Central Asia. It covers about 42.9% of national CO₂ emissions from 212 large installations, uses output based benchmarking, and the carbon budget for covered sectors is being reduced by 3.41% a year to 2030.^{70,71} Average secondary market prices are still low, under USD 1 per tonne in 2025, but the draft Phase 6 National Allocation Plan (2026 to 2030) proposes annual cap reductions of 10.4% to 23% relative to 2025, and auctioning is under development.⁷²
- **Methane.** NDC 3.0 envisages a system of state regulation of methane emissions and a National Methane Emissions Reduction Programme, including leak detection and repair and flaring efficiency requirements of at least 98%. By 2035, fugitive methane emissions in the energy and waste sectors are to fall by about 42%, aligned with the EU Methane Regulation and the Global Methane Pledge.⁷³
- **Article 6 and results based finance.** Kazakhstan plans to use international cooperative approaches under Article 6 of the Paris Agreement and results based mechanisms to pilot advanced low carbon technologies.⁷⁴

Just transition is now an explicit element of NDC 3.0. Kazakhstan commits to manage the social and economic implications of decarbonisation by assessing labour markets and skills, supporting retraining and redeployment, diversifying regional economies and providing social protection for affected households. The NDC also commits to mainstream gender in climate laws, strategies and investment plans, including through a Women for Just Transition Network, and to expand youth participation.⁷⁵

The **MRV framework** is anchored in the national GHG inventory maintained by the Ministry of Ecology and Natural Resources, with JSC Zhasyl Damu preparing the inventory report and operating the ETS. It is complemented by the State Carbon and Waste Cadastres, the carbon unit registry and the Pollutant Release and Transfer Register, and the NDC commits to common quality assurance and data validation protocols.⁷⁶

3.3.2. Adaptation and resilience frameworks

NDC 3.0 includes a substantial adaptation component, with estimated costs of about USD 47 billion for 2026 to 2035, of which about USD 37.4 billion is for resilience measures and about USD 9.7 billion for disaster risk reduction.⁷⁷ Priority areas include **agriculture and water**, **health** (heat stress), **energy** (cooling demand and grid reliability), **forestry and biodiversity** (wildfire management) and **disaster risk reduction** (floods and droughts).

69 Kazakhstan NDC 3.0 (2025), Chapter II, Section 2.5 (Mitigation measures), see note 2.

70 Kazakhstan NDC 3.0 (2025), see note 2.

71 ICAP (2026), Kazakhstan ETS, see note 36.

72 ICAP (2026), Kazakhstan ETS, see note 36.

73 Kazakhstan NDC 3.0 (2025), see note 2.

74 Kazakhstan NDC 3.0 (2025), see note 2.

75 Kazakhstan NDC 3.0 (2025), see note 2.

76 Kazakhstan NDC 3.0 (2025), see note 2.

77 Kazakhstan NDC 3.0 (2025), see note 2.

Several adaptation measures are directly relevant to resource efficiency: improved irrigation technologies and reduced water losses, a shift away from water intensive crops, soil restoration and organic fertilisers, and a target of 53% treated wastewater. The national CRVA methodology provides a basis for screening adaptation investments, and could be extended to consider material intensity and embodied emissions of resilience infrastructure. National planning has not yet made this link.⁷⁸

3.3.3. EU partnership and trade context

Kazakhstan's climate and CE agenda is closely tied to its relationship with the European Union, its leading trade and investment partner.⁷⁹

- **Enhanced Partnership and Cooperation Agreement (EPCA).** Signed in 2015 and fully in force since 2020, the EPCA includes cooperation on environment, climate change, energy and raw materials. Leaders reaffirmed it during President Tokayev's visit to Brussels in June 2026, with a commitment to deepen cooperation on critical raw materials, energy and transport under Global Gateway.⁸⁰
- **Strategic Partnership on raw materials, batteries and renewable hydrogen (2022).** Its focus on ESG aligned value chains, recycling and recovery of critical raw materials from industrial mineral waste makes it a natural vehicle for CE in the mining sector.⁸¹
- **Carbon Border Adjustment Mechanism.** CBAM applies to imports of iron and steel, aluminium, cement, fertilisers, hydrogen and electricity, and entered its definitive (paying) phase on 1 January 2026.⁸² An assessment by the International Trade Centre and QazTrade estimates that, if default emission values are used, CBAM costs on Kazakh steel exports could exceed EUR 100 million a year, on steel and aluminium exports to the EU worth over EUR 600 million; about 90% of the impact is concentrated on steel bars and rods.⁸³ Verified product level emissions data, secondary metal content and lower process emissions are therefore directly valuable to exporters.
- **EU Methane Regulation.** Import requirements for oil, gas and coal under the EU Methane Regulation reinforce the NDC's methane measures for an important export sector.⁸⁴

3.4. Reflections on SCP, CE and material resource efficiency in Kazakhstan's climate policy landscape

Kazakhstan now has an extensive set of instruments relevant to SCP, CE and material resource efficiency (MRE): the Green Economy Concept, Environmental Code, Carbon Neutrality Strategy, NDC 3.0, the ETS, the Waste Management Concept 2026 to 2030, the BAT framework, the Water Code, agricultural policy, energy efficiency policy, the Construction Code and the Green Taxonomy. This is a considerably stronger foundation than when circularity was discussed mainly through waste management.

The most important development is **NDC 3.0**, which provides, for the first time, an explicit climate policy mandate to advance CE, resource efficiency and SCP across key sectors. Table 4 shows how its provisions align with global benchmarks.

78 UNDP (2025), Climate Risk Assessment Methodology, see note 27.

79 European External Action Service (2026). Joint press statement: Strengthening the Strategic Partnership between the European Union and Kazakhstan. https://www.eeas.europa.eu/delegations/kazakhstan/joint-press-statement-strengthening-strategic-partnership-between-european-union-and-kazakhstan_en

80 EEAS (2026), Joint press statement, see note 79.

81 European Commission, EU and Kazakhstan Strategic Partnership on raw materials, see note 62.

82 Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism. <https://eur-lex.europa.eu/eli/reg/2023/956/oj>

83 GMK Center (2026), CBAM cost estimate, see note 4.

84 Regulation (EU) 2024/1787 of the European Parliament and of the Council of 13 June 2024 on the reduction of methane emissions in the energy sector. <https://eur-lex.europa.eu/eli/reg/2024/1787/oj>

Table 4. Alignment of Kazakhstan's NDC 3.0 with global SCP/CE benchmarks

Element	Reflection in NDC 3.0	Global benchmark	Alignment
SCP	Named explicitly in the CE/ resource efficiency measure; consumption side elements in buildings (rational energy use, metering) and transport (public and active mobility)	UNEP 10YFP / One Planet Network; SDG 12 (decoupling growth from resource use)	Strong on production efficiency; weak on product and consumption instruments
Circular economy	Dedicated mitigation measure: recycled materials, industrial symbiosis, circular business models, green standards; waste targets (40% recycling, EPR, organic waste)	EU Circular Economy Action Plan (waste hierarchy, product design, recycled content)	Strong strategic recognition; directional rather than quantified outside waste
Material resource efficiency	Efficiency of water, energy and raw materials; reduction of process emissions	IRP <i>Global Resources Outlook 2024</i> ; material productivity and circular material use rate (CMUR)	Recognised but no material productivity or CMUR indicator
MRV	GHG inventory, carbon and waste cadastres, PRTR, ETS registry	Paris Agreement Enhanced Transparency Framework; Eurostat CE monitoring framework	Institutional base exists; no CE/MRE indicators

Even so, there is still a gap between recognising CE in strategy and putting it into practice across the economy:

- **CE is still widely equated with waste management.** Outside the NDC's dedicated measure, most CE instruments and targets concern collection, recycling and landfill. Material productivity, product lifetime, reuse and demand reduction receive far less attention, although they hold most of the economic value.
- **CE objectives are distributed across several policy systems.** Water efficiency sits in water and green economy policy, energy efficiency in dedicated instruments, secondary resources in waste regulation, industrial modernisation in manufacturing and BAT policy, and agricultural resource efficiency in land management instruments.
- **Indicators are uneven.** Kazakhstan has well developed targets for energy efficiency, renewables and some waste streams, but no national indicators for material productivity, circular material use, industrial symbiosis, secondary resource substitution or GHG reductions attributable to CE measures.
- **Production dominates consumption.** The Waste Management Concept recognises responsible household and business behaviour and SDG 12, and *Taza Qazaqstan* has mobilised millions of citizens. But sustainable public procurement, product durability, repair, reuse, ecodesign and recycled content requirements play a minor role.
- **Market instruments are not yet connected to circularity.** BAT, ETS benchmarks, EPR revenues and the Green Taxonomy could each reward secondary material use and byproduct exchange, but none does so systematically.
- **Social dimensions are recognised but not linked.** The NDC's just transition commitments are not yet connected to the jobs potential of recycling, secondary materials processing and industrial symbiosis in coal and single industry regions.

Box 4. From waste management to resource management: what changes

- **Objective.** From safe disposal and higher recycling rates to more economic value from each unit of material, with less virgin input.
- **Scope.** From municipal and industrial waste streams to the whole value chain: extraction, design, production, use, reuse and recovery.
- **Sectors.** From waste operators and municipalities to mining, metallurgy, construction, energy, agriculture and manufacturing.
- **Metrics.** From tonnes collected and recycled to material productivity, circular material use, product lifetime and substitution of virgin materials.
- **Instruments.** From landfill rules, tariffs and EPR fees to BAT, ETS benchmarks, product and construction standards, public procurement and the Green Taxonomy.
- **Finance.** From collection and recycling infrastructure to circular production, longer lived assets, repair and remanufacturing, industrial symbiosis and new business models.

Table 5 maps the main sectors against their status in NDC 3.0 and the CE opportunity, and links each to the recommendations in Chapter 4.

Table 5. Sector mapping: SCP/CE status in NDC 3.0, opportunity and priority action

Sector	Status in NDC 3.0	CE opportunity	Existing entry instrument	Priority action (section)
Waste and secondary materials	Explicit and quantified (40% recycling, EPR, organic waste, landfill gas)	Secondary material markets; organic waste and methane	Waste Concept 2026 to 2030; EPR; Zhasyl Damu financing	Inventory, demand for secondary materials (4.1.2)
Mining and metallurgy	Explicit but qualitative (raw material efficiency, recycled materials, symbiosis, process emissions)	Tailings and slag valorisation; secondary metals; CBAM readiness	BAT; ETS; Manufacturing Concept	Symbiosis pilots; material indicators in BAT/ETS (4.1.1)
Critical raw materials	Implicit	Recovery from tailings, residues and electronic waste	Rare Earth Plan; EU Raw Materials Partnership	Secondary stock mapping (4.1.5)
Oil, gas and coal power	Methane and efficiency explicit; residues absent	Ash and sulphur use; drilling waste; associated gas	Methane programme; BAT; ETS	Residue to resource programme (4.1.6)
Construction and buildings	Operational energy explicit; embodied carbon and materials absent	Recycled aggregates, ash and slag in cement; C&D waste	Construction Code 2026; cement BAT	Secondary material standards; procurement (4.1.3)
Agriculture and water	Explicit (organic farming, residues, manure, irrigation efficiency)	Circular bioeconomy; water productivity; food loss	Agroindustrial Concept; Water Code; Green Economy Action Plan	Manure and residue recovery; water reuse (4.1.4)

Sector	Status in NDC 3.0	CE opportunity	Existing entry instrument	Priority action (section)
Energy and transport	Efficiency and modal shift explicit; vehicle and battery circularity absent	Efficiency as SCP; battery and vehicle end of life	Energy Efficiency Concept; EPR	Integrate into indicator set (4.2.1)
Forestry and land	Explicit (forest protection, restoration)	Sustainable resource management; biomass cascading	NDC LULUCF measures	Link to bioeconomy (4.1.4)

NDC 3.0 itself offers concrete entry points for material resource efficiency. Most of its existing targets can be met at lower cost, and some can only be met, if materials are used better. Table 6 shows where these opportunities sit and how each one links to emissions.

Table 6. Opportunities for material resource efficiency within NDC 3.0 targets

NDC 3.0 target or provision	Material resource efficiency opportunity	Climate link
Dedicated CE measure: recycled materials, industrial symbiosis, process emissions	Sector targets for clinker substitution in cement, scrap use in steel and productive use of industrial waste and tailings	Process emissions (IPPU) and fuel use in industry
Energy intensity of GDP 20% lower by 2035 than in 2021	Less material per unit of output cuts the energy embedded in production, not only the energy used by equipment	A second route to the energy intensity target
At least 35% low carbon and 20% renewable electricity; 10 GW of renewables under QaJET	Plan now for the end of life of solar panels, wind blades and batteries; secondary supply of critical minerals	Avoids future waste and lowers the emissions embedded in the energy transition
Residential renovation rate raised from 0.1% to 0.5% a year	Renovate before building new; recycled aggregates and slag cement; less construction and demolition waste	Embodied carbon, not yet covered by the NDC
At least 40% recycling; fugitive methane about 42% lower	Divert organic waste to composting and anaerobic digestion; capture landfill gas	Methane, the most direct link between circularity and climate
Energy use of manure and crop residues up 16%; organic farming on 3% of arable land	Close nutrient loops and replace synthetic fertiliser with organic inputs	Methane, nitrous oxide and soil carbon
About USD 47 billion of adaptation investment	Design flood protection and irrigation with less material and with recycled inputs, including reconstruction after the 2024 floods	Keeps adaptation from adding avoidable embodied emissions
53% of wastewater treated	Add a target for reuse of treated wastewater	Water savings and lower pumping energy

NDC 3.0 target or provision	Material resource efficiency opportunity	Climate link
ETS caps and Article 6 cooperation	Benchmarks that credit secondary feedstock; crediting methods for composting, landfill gas and blended cement	A carbon price and credit revenue for circular projects
MRV system and Biennial Transparency Reports	Report CE measures as mitigation actions, with indicators	Makes the contribution of circularity visible to the UNFCCC

Source: Authors, based on Kazakhstan NDC 3.0.⁸⁵

Box 5. How material efficiency cuts emissions

- **Using less material.** Better design, less overspecification and longer asset life reduce demand for steel, cement and aluminium before any emissions occur.
- **Replacing virgin with secondary material.** Steel made from scrap in electric arc furnaces emitted about 0.68 t CO₂ per tonne in 2022, against 2.33 t through the blast furnace route.⁸⁶ Each tonne of clinker replaced by slag, fly ash or other supplementary materials avoids about 0.5 t of process CO₂ from calcination alone, before fuel is counted.⁸⁷
- **Keeping value in use.** Repair, reuse and remanufacturing spread the emissions embedded in products over a longer working life.

The scale in Kazakhstan is large. Domestic material consumption reached about 700 million tonnes in 2023, 7.5% more than in 2021, and about 253 million tonnes were added to the stock of buildings, infrastructure and equipment in that year alone.⁸⁸ Exporters gain twice from material efficiency: lower emissions at home and lower CBAM exposure in the EU market.

For the next phase, then, the job is to **make the existing instruments work together**. That means common indicators and sectoral pathways, stronger coordination across climate, waste, water, industrial and agricultural policies, and mechanisms linking CE measures to climate MRV and investment planning.

⁸⁵ Kazakhstan NDC 3.0 (2025), see note 2.

⁸⁶ World Steel Association (2023). Sustainability Indicators 2023 Report: CO₂ intensity by production route, 2022 data. <https://worldsteel.org/wp-content/uploads/Sustainability-indicators-report-2023.pdf>

⁸⁷ IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2 (Mineral Industry Emissions), default emission factor of 0.52 t CO₂ per tonne of clinker. <https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol3.html>

⁸⁸ Bureau of National Statistics of the Republic of Kazakhstan. Material flow accounts, 2021 to 2023. <https://stat.gov.kz/en/industries/environment/stat-speu/publications/509532/>

4. RECOMMENDATIONS FOR OPERATIONALISING SCP AND CE FOR ENHANCED CLIMATE AMBITION AND GREEN GROWTH

Kazakhstan has reached a transition point. NDC 3.0 recognises CE, resource efficiency and SCP as part of the mitigation framework, and recent policies have strengthened the enabling environment. The case for SCP and CE in climate policy has been made. What matters now is turning that recognition into **measurable sectoral outcomes, investment ready projects and coordinated implementation**.

Because Kazakhstan's economy is characterised by large material flows and resource intensive sectors, the greatest near term impact will come from concentrating effort where circular solutions simultaneously reduce emissions, raise resource productivity, protect export competitiveness and create jobs. This chapter groups the recommendations under three priorities: market transformation in high potential sectors, enabling frameworks, and long term planning with regional cooperation. Finance is covered separately in Chapter 5.

Across these sectors, interventions should follow the circular hierarchy set out in Box 1, so that circular economy policy does not become synonymous with waste management. Yet, the starting point and short term steps will be governed by immediate opportunities and aspirations of the country and its stakeholders.

4.1. Catalysing market transformation in high potential sectors

4.1.1. Mining, metallurgy and manufacturing: From resource extraction to resource productivity

NDC 3.0 already mandates better raw material efficiency, more recycled materials, industrial symbiosis and lower process emissions, and the BAT framework and ETS provide regulatory and price levers.

The long term aspiration for the circular economy in these sectors is to obtain more economic value from each unit of material extracted, progressively reduce dependence on virgin inputs, keep materials at their highest productive value, and turn industrial residues and byproducts into inputs for new production.

Priority actions:

- **Develop industrial symbiosis in major industrial regions.** Map material flows in industrial centres such as Pavlodar, Ekibastuz and Karaganda to identify exchanges of metallurgical slags, fly ash, waste heat, industrial water and other byproducts, and launch two or three flagship projects to demonstrate commercial and climate benefits before replication.
- **Integrate material efficiency indicators into BAT and industrial support.** Progressively add indicators for material consumption, secondary resource use, waste recovery and water reuse alongside existing energy and emission indicators in BAT permits and state support programmes.
- **Make the ETS reward circularity.** In finalising the 2026 to 2030 National Allocation Plan and future benchmarks, recognise secondary feedstock (e.g. scrap based steel, slag blended cement) and avoid allocation rules that penalise byproduct exchange between installations.
- **Prepare exporters for CBAM.** Support installation level emissions monitoring and verification aligned with CBAM requirements, so that exporters can report actual rather than default values and capture the benefit of secondary metal content and efficiency gains. The same data can feed ETS reporting and the CE indicator set (4.2.1).
- **Strengthen markets for secondary industrial materials** through technical standards for the safe use of recovered materials in cement, construction products and other applications.

4.1.2. Waste and secondary materials: Building markets around resource recovery

Waste management is an important part of the circular economy, but it represents the downstream end of the transition. The objective should therefore be not only to increase collection and recycling, but progressively to prevent waste generation, preserve the value of materials and products, and create reliable demand for secondary resources.

Waste is the sector with the clearest CE policy framework and the most quantified NDC targets. The priority is to use the Waste Management Concept 2026 to 2030 to develop functioning secondary material markets, rather than focusing only on end of pipe infrastructure. Priority actions:

- **Implement the national waste inventory and digital information system** envisaged under the Concept, creating a reliable evidence base on the generation, composition, treatment and destination of major municipal and industrial waste streams.
- **Strengthen separate collection and material recovery** for high volume and high value streams, building on the rise in MSW processing from 25.8% to 30.6% between 2024 and 2025 towards the 40% target.
- **Use EPR as a market development instrument.** Direct a larger share of EPR revenues and Zhasyl Damu financing to projects that produce high quality secondary materials with identified buyers, and publish recycling rate and offtake data by stream.
- **Prioritise organic waste diversion** through composting, anaerobic digestion and other recovery routes, together with landfill gas capture. This links circular waste management directly to the NDC's methane target.
- **Close and remediate noncompliant landfills** progressively, using the waste inventory to prioritise sites by methane and pollution risk.
- **Develop demand side instruments**, such as standards, procurement criteria and, where justified, recycled content requirements, so that recovered materials have predictable buyers.

4.1.3. Construction and the built environment: Creating a market for circular materials

The new Construction Code provides a timely opportunity to integrate lifecycle resource efficiency into the built environment. Priority actions:

- **Develop standards** for the safe use of recycled aggregates, fly ash, slag and other secondary construction materials.
- **Improve collection, sorting and recovery of construction and demolition waste**, including requirements for on site segregation on large projects.
- **Introduce lifecycle and embodied carbon criteria** progressively into building standards and certification, starting with public buildings.
- **Promote design for durability, adaptability, repair and material recovery.**
- **Use public infrastructure and housing programmes** to create demand for resource efficient and lower carbon materials, consistent with procurement legislation.

4.1.4. Agriculture, water and the circular bioeconomy

Agriculture provides a strong nexus between mitigation, adaptation and resource efficiency. Priority actions:

- **Scale water efficient production and water reuse**, linking irrigation modernisation under the Water Code and Green Economy Action Plan with measurable water productivity indicators.
- **Develop manure and residue recovery systems**, including anaerobic digestion, to reduce methane and produce biogas and organic fertiliser.
- **Develop markets for compost, digestate and organic soil amendments**, supporting nutrient cycling.

- **Reduce food loss** through improved storage, processing and logistics, and productive use of agricultural byproducts.
- **Integrate circular agriculture into climate MRV**, so that reductions from manure management, organic waste recovery and nutrient management are measured and reported.

4.1.5. Critical raw materials and secondary resource recovery

The aim is not to replace primary resource development but to complement it by systematically assessing and developing secondary sources. Priority actions:

- **Map secondary stocks** of valuable and critical materials in mining tailings, industrial residues, scrap and end of life products.
- **Support research, demonstration and investment** in economically viable recovery from technogenic mineral formations and mining residues, using the EU and Kazakhstan Raw Materials Partnership, Horizon Europe and EIB/EBRD instruments.
- **Strengthen collection and recovery of electrical and electronic waste and batteries** through EPR.
- **Integrate secondary resource recovery** into domestic processing and higher value mineral value chains, with ESG standards that meet EU buyer requirements.
- **Plan now for the end of life of clean energy equipment.** The renewables planned under QaJET will in time produce panels, blades and batteries for recovery. Worldwide, recycling solar panels could yield about 78 million tonnes of materials by 2050, worth over USD 15 billion.⁸⁹ Design, procurement and EPR rules adopted now can secure this secondary supply.

4.1.6. Oil, gas and coal power residues: From liabilities to resources

Oil and gas is Kazakhstan's largest economic sector, and coal power its main source of electricity, yet their residues receive little attention in CE policy. Priority actions:

- **Ash utilisation programme for coal fired power plants**, setting targets and standards for the use of fly and bottom ash in cement, concrete, road construction and land reclamation, starting with the largest plants in Pavlodar region.
- **Sulphur and drilling waste valorisation.** Assess markets for byproduct sulphur (fertilisers, sulphur concrete, chemicals) and for treated drilling waste, and set BAT based requirements for their recovery.
- **Associated gas utilisation and flaring reduction**, implemented through the National Methane Emissions Reduction Programme and the NDC's 98% flaring efficiency requirement.
- **Plastics value chain.** As domestic petrochemical capacity grows, link polymer production with EPR financed collection and recycling of plastics, and explore recycled content and chemical recycling options.

4.2. Strengthening enabling frameworks

4.2.1. Establish a national measurement framework for CE, SCP and material resource efficiency

The absence of a common set of indicators connecting circularity with climate outcomes is one of the most important implementation gaps. Kazakhstan should develop a core national indicator set that measures how well materials are used, not only how much waste is recycled. It could include:

- material productivity (GDP per unit of domestic material consumption) and selected material flow indicators;
- circular material use rate, or an equivalent adapted to national data;

89 IRENA and IEA PVPS (2016). End of Life Management: Solar Photovoltaic Panels. <https://www.irena.org/publications/2016/Jun/End-of-life-management-Solar-Photovoltaic-Panels>

- secondary material use in priority industries;
- industrial waste returned to productive circulation;
- waste generation and recycling by major stream;
- water productivity and water reuse in priority sectors;
- organic waste diverted from landfill; and
- GHG reductions attributable to selected CE interventions.

The energy efficiency framework offers a precedent: the Concept for Energy Saving and Energy Efficiency 2023 to 2029 already translates a resource efficiency objective into sectoral targets and monitoring, and the same approach can be applied to materials and water.⁹⁰ The indicators should be connected progressively to existing statistical, environmental and NDC MRV systems, including the waste cadastre and ETS reporting, rather than building a parallel system. A phased approach is appropriate: start with sectors where data exist, establish baselines, and expand coverage as the national waste information system matures. Kazakhstan already has a starting point: the Bureau of National Statistics publishes economy wide material flow accounts, including domestic material consumption. Combined with GDP data, they would give a material productivity indicator that sits naturally next to the NDC's energy intensity target.⁹¹

4.2.2. Create demand for secondary materials and shift consumption

Increasing recycling capacity alone will not create a circular economy if recovered materials lack markets, and production side measures alone will not deliver SCP. Kazakhstan could progressively develop:

- **quality and safety standards** for secondary materials and product specifications enabling recycled inputs;
- **sustainable and circular public procurement** criteria in construction, infrastructure, furniture, equipment and catering, consistent with procurement legislation and competition rules;
- **recycled content requirements** for selected products where supported by technical and economic assessment;
- **incentives for repair, reuse, refurbishment and remanufacturing**, including for SMEs;
- **measures that reduce demand** for materials and energy in buildings, mobility and food, which the IPCC estimates could cut emissions in end use sectors by 40 to 70% by 2050 compared with baseline scenarios;⁹²
- **ecolabelling and consumer information** on durability, repairability and recycled content; and
- **behaviour change campaigns** on waste separation, food waste and sustainable consumption, using the reach of *Taza Qazaqstan*, which has engaged over 6 million people and some 4,000 school "Green Clubs".⁹³

4.2.3. Strengthen coordination and implementation governance

Because CE cuts across ministerial mandates, implementation requires coordination between environment, industry, agriculture, water, construction, energy, finance and economic development institutions. Rather than creating new institutions, Kazakhstan could establish a **cross government CE coordination mechanism linked to NDC 3.0 implementation**, with the functions and lead roles summarised in Table 7.

90 Energy Saving and Energy Efficiency Concept 2023 to 2029, see note 46.

91 Bureau of National Statistics of the Republic of Kazakhstan, Material flow accounts, see note 88.

92 IPCC (2022). Climate Change 2022: Mitigation of Climate Change. Summary for Policymakers, statement C.10. <https://www.ipcc.ch/report/ar6/wg3/>

93 Office of the Prime Minister (2026), *Taza Qazaqstan*, see note 50.

Table 7. Proposed functions and lead roles for CE coordination

Function	Proposed lead	Key partners
Agree national CE/SCP/MRE indicators and baselines	Ministry of Ecology and Natural Resources	Bureau of National Statistics; Zhasyl Damu
Coordinate sectoral implementation pathways	Ministry of Ecology and Natural Resources	Ministries of Industry and Construction, Agriculture, Energy, Water Resources
Resolve regulatory barriers to secondary material use (standards, waste status)	Ministry of Industry and Construction	Ministry of Ecology and Natural Resources; standards body; industry associations
Align CE projects with NDC investment planning and the Green Taxonomy	Ministry of National Economy; Ministry of Finance	AIFC; Development Bank of Kazakhstan; MDBs
Waste data, secondary resource information and technical support	National Waste Management Centre (planned); Zhasyl Damu	Akimats; recyclers
Monitor implementation across ministries and regions	Interdepartmental climate coordination body	Akimats
Engage business, finance, academia and civil society	Ministry of Ecology and Natural Resources	Atameken; AIFC; universities; NGOs

4.2.4. Ensure a just and inclusive circular transition

NDC 3.0 commits to retraining, regional diversification, social protection, gender mainstreaming and youth participation.⁹⁴ CE can give these commitments practical content:

- **Circular jobs in transition regions.** Locate industrial symbiosis hubs, ash and slag processing, and secondary materials facilities in coal dependent and single industry towns, with retraining programmes for affected workers. Recycling projects supported by Zhasyl Damu alone are expected to create over 5,100 permanent jobs.⁹⁵
- **Women's enterprise.** Target finance and capacity building at SMEs led by women in recycling, repair, agricultural processing and organic fertilisers, using the Women for Just Transition Network.
- **Informal waste workers.** Integrate informal collectors into formal collection and EPR systems, with occupational health and safety standards.
- **Youth and skills.** Build CE competencies into technical and vocational education, and support youth led green enterprise through the financing windows the NDC envisages.
- **Affordability.** Phase revisions to waste tariffs, and any recycled content requirements, with attention to effects on low income households and small businesses.

4.2.5. Make the climate contribution of material efficiency visible in the NDC cycle

The link between material efficiency and climate targets is easy to state but rarely quantified. The NDC cycle offers five practical ways to make it visible:

- **Estimate the mitigation potential.** Prepare an indicative estimate of what material efficiency, secondary materials and industrial symbiosis could add to the 17% and 25% targets, starting with steel, cement, aluminium and organic waste, using inventory data and the benchmarks in Box 5.

⁹⁴ Kazakhstan NDC 3.0 (2025), see note 2.

⁹⁵ Zhasyl Damu (2025), see note 37.

- **Report it.** Describe CE measures, their indicators and estimated effects as mitigation actions in Kazakhstan's Biennial Transparency Reports.⁹⁶
- **Screen the NDC investment pipeline for material use.** The USD 175.6 billion programme will itself need large amounts of steel, cement, copper and aluminium. Screening major projects for material use and embodied emissions, and favouring low carbon and secondary materials, keeps the transition from adding new emissions.
- **Prepare quantified targets for the next NDC.** Candidates include material productivity, the clinker to cement ratio, the share of scrap in steel production, recovery of construction and demolition waste, and the share of industrial waste put to productive use.
- **Apply material efficiency to adaptation.** Extend the national CRVA methodology to screen adaptation projects for material intensity, so that the USD 47 billion adaptation programme builds resilience without avoidable embodied emissions.

4.3. Aligning long term planning, institutional capacity and regional cooperation

CE implementation should extend beyond the 2035 NDC horizon. Investments in mines, industrial plants, buildings, water infrastructure and agricultural systems have long lifetimes and will either lock in linear resource use or support a resource efficient pathway for decades.

Long term planning. Kazakhstan should integrate MRE and circularity into the Roadmap for the Carbon Neutrality Strategy 2060 and future NDC updates by:

- developing sectoral circularity pathways for mining and metallurgy, construction, waste and agriculture, with interim milestones aligned to five year NDC cycles;
- incorporating material demand and secondary resource scenarios, based on national material flow analysis, into long term energy and emissions modelling; and
- assessing the contribution of material efficiency to reducing future energy demand and emissions, so that the next NDC can include quantified CE targets.

Institutional capacity. Government agencies, akimats and businesses will need expertise in material flow analysis, life cycle assessment, industrial symbiosis, circular business models and the quantification of GHG impacts from CE measures. Universities and technical institutes can embed these competencies in engineering, environmental, economic and public policy programmes, and one or two national centres of excellence on CE could support government and industry.

Regional cooperation. The Central Asia Circular Economy Partnership Framework, launched at RES 2026 in Astana, gives Kazakhstan, as host and as the region's largest economy, a natural leadership role.⁹⁷ Concrete priorities could include:

- common definitions and quality standards for secondary materials and harmonised approaches to EPR, reducing barriers to regional trade in recyclables;
- a regional market for secondary materials where national volumes are too small for efficient processing (e.g. electronic waste, batteries, certain metals);
- joint indicator development and MRV methods for CE and climate; and
- joint investment pipelines across several countries presented to MDBs and climate funds, which favour regional public goods.

⁹⁶ UNFCCC Decision 18/CMA.1, Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement.

⁹⁷ SWITCH-Asia (2026), see note 7.

5. FINANCING THE CIRCULAR TRANSITION: NARROWING THE NDC INVESTMENT GAP

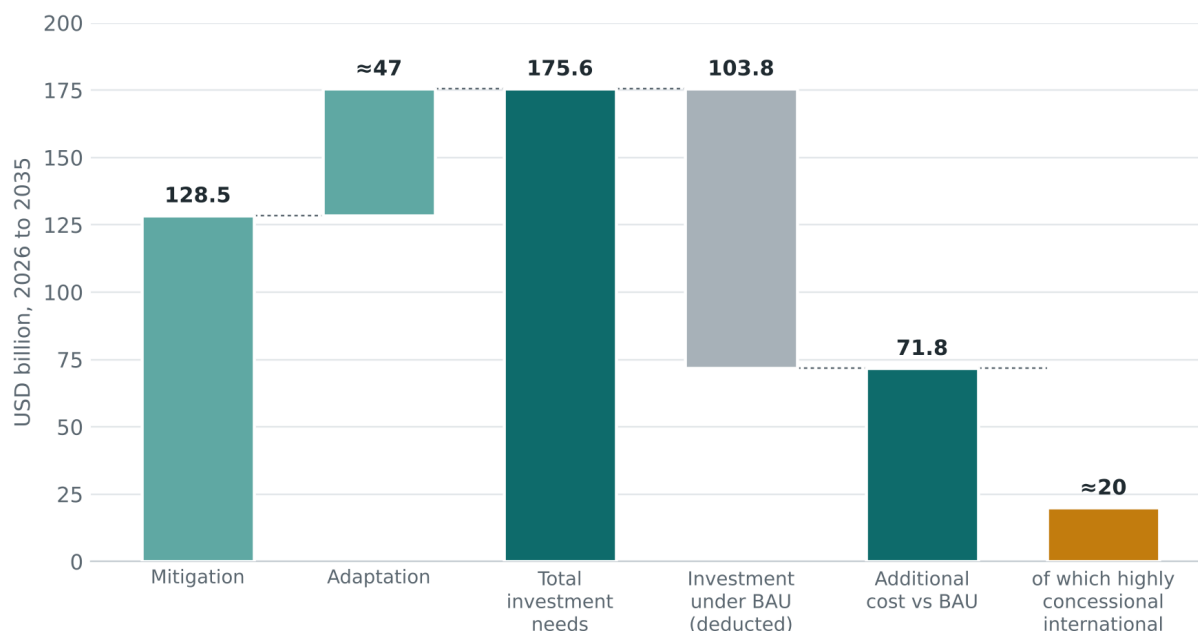
Finance will determine the pace and scale of Kazakhstan's circular transition. NDC 3.0 places strong emphasis on mobilising public, private and international capital, and Kazakhstan has more domestic green finance infrastructure than most countries in the region. The task now is to make CE projects visible and bankable within it.

Financing the circular transition should extend beyond recycling infrastructure. Investment is needed across the circular value chain: resource efficient and circular production, longer lived assets, repair and remanufacturing, industrial symbiosis, water and nutrient loops, secondary material processing, and business models that reduce demand for virgin resources. The investment case is strongest where these interventions cut resource use and emissions while also improving productivity and generating commercially viable revenue.

5.1. The investment challenge

NDC 3.0 estimates total investment needs for 2026 to 2035 at about **USD 175.6 billion**, roughly 5.5% of current GDP a year. Of this, about USD 128.5 billion is for mitigation and about USD 47 billion for adaptation. When only costs above the business as usual pathway are counted, the need is about **USD 71.8 billion** (about 2.5% of GDP a year), of which around **USD 20 billion** is expected to require highly concessional international support (Figure 1).⁹⁸ Over the longer term, the Carbon Neutrality Strategy estimates investment needs of about USD 610 billion to 2060.⁹⁹

Figure 1. NDC 3.0 investment needs, 2026 to 2035 (USD billion)



Source: Kazakhstan NDC 3.0. The BAU component is derived as total needs minus additional costs. Mitigation and adaptation are rounded in the NDC and sum to 175.6.

⁹⁸ Kazakhstan NDC 3.0 (2025), see note 2.

⁹⁹ Kazakhstan NDC 3.0 (2025), see note 2.

5.2. How circular economy narrows the gap

CE should not be seen as one more cost line here. Used well, it lowers the cost of delivering the NDC and creates revenue that can repay investment.

Lower capital requirements. Using less material per unit of output reduces the scale of extraction, processing and manufacturing capacity that must be decarbonised. Using slag, ash and recycled aggregates in cement and construction reduces demand for clinker, the main source of process emissions in cement, without new kiln capacity. Industrial symbiosis lets shared infrastructure (water treatment, waste heat networks, material recovery facilities) serve several enterprises.

Operating savings. Material, energy and water efficiency reduce production costs directly, and the NDC's 20% energy intensity target implies large savings in an economy where energy is used intensively.

Avoided costs. With CBAM costs on steel exports alone estimated at over EUR 100 million a year under default values, lower process emissions and verified secondary content have immediate value for exporters.¹⁰⁰ Remediating the backlog of noncompliant landfills and illegal dumps is costly; waste prevention and recovery reduce the flow that creates future liabilities.

5.3. New revenue streams

- **Carbon markets.** Tighter ETS caps from 2026 will raise the value of reductions in covered installations; domestic offset credits from sectors outside the ETS, such as landfill gas, manure management and organic waste recovery, can be surrendered for compliance.¹⁰¹ Article 6 cooperation offers a further channel for verified reductions.¹⁰² Methodologies developed under the Clean Development Mechanism for composting, landfill gas and blended cement offer a starting point for circular projects under Article 6.¹⁰³
- **Extended producer responsibility.** EPR fees collected by Zhasyl Damu reached KZT 324 billion in January to November 2025, and about KZT 125 billion was allocated on a repayable basis to environmental projects, with a further KZT 100 billion planned.¹⁰⁴ This is one of the largest dedicated domestic funding sources for CE infrastructure in the region.
- **Secondary material markets.** Recovered metals, aggregates, ash, compost, digestate and biogas generate revenue, provided standards and offtake are in place (4.1, 4.2.2).

5.4. Instruments and actors

Kazakhstan already has most of the instruments needed; the gap is in connecting them to CE.

Table 8. Finance instruments and actors relevant to CE in Kazakhstan

Instrument / actor	Current role	Opportunity for CE
Green Taxonomy (2021, updated)	Defines eligible green categories for bonds and loans, incl. efficient use of natural resources	Add or clarify categories for secondary material processing, industrial symbiosis and remanufacturing; screen CE pipeline against it
AIFC green finance and green bonds	Green and sustainability bond issuance; green finance expertise	CE focused bonds or sustainability linked loans with material efficiency KPIs

¹⁰⁰ GMK Center (2026), CBAM cost estimate, see note 4.

¹⁰¹ ICAP (2026), Kazakhstan ETS, see note 36.

¹⁰² Kazakhstan NDC 3.0 (2025), see note 2.

¹⁰³ UNFCCC Clean Development Mechanism, approved methodologies including AMS-III.F (composting), ACM0001 (landfill gas) and ACM0005 (blended cement). <https://cdm.unfccc.int/methodologies/index.html>

¹⁰⁴ Zhasyl Damu (2025), see note 37.

Instrument / actor	Current role	Opportunity for CE
Zhasyl Damu EPR revenues and repayable financing	KZT 125 billion allocated in 2025, mostly to MSW projects	Prioritise projects with secured offtake for secondary materials; cofinance with MDBs
ETS and domestic offsets	Price signal for about 43% of CO ₂ ; offsets from uncovered sectors	Offset methodologies for landfill gas, manure, organic waste; benchmarks rewarding secondary feedstock
Country Platform for Climate Finance Mobilization	Coordinates government, private sector and partners to mobilise NDC finance	Include a CE/resource efficiency window in the platform's pipeline
QaJET just energy transition platform (EBRD, Ministries of Energy and Ecology)	Launched April 2026; about USD 20 billion needed for 10 GW of renewables and grid upgrades ¹⁰⁵	Add industrial efficiency and coal ash reuse in transition regions
GCF Country Programme	Sets national priorities for GCF funding ¹⁰⁶	Include CE and resource efficiency projects with adaptation benefits
MDBs (EBRD, ADB, World Bank, EIB)	Paris aligned portfolios; blended and concessional finance	Credit lines for SME circular investments; first loss guarantees; technical assistance
EU Global Gateway and the Raw Materials Partnership	Cooperation between the EU and Kazakhstan on raw materials, energy and transport ¹⁰⁷	Blended finance for recovery of critical raw materials from mineral waste; EIB/EBRD cofinancing

Priority actions:

- **Build a pipeline of investment ready CE projects** with measurable resource and GHG outcomes, prepared jointly with MDB resident missions and Zhasyl Damu.
- **Screen CE projects against the Green Taxonomy** and international climate finance criteria, and update the taxonomy where CE activities are missing.
- **Bundle smaller projects** in biogas, recycling, water efficiency and ash use into portfolios large enough for institutional and MDB finance.
- **Deploy derisking instruments**, including first loss guarantees, concessional loans and technical assistance grants linked to investment, to lower the risk for early movers with new circular business models.
- **Integrate CE investment needs** into the NDC financing framework, the Country Platform and the Carbon Neutrality Strategy Roadmap.
- **Use the EU partnership** to bring Global Gateway, EIB and EBRD instruments to recovery of critical raw materials and CBAM related decarbonisation of export industries.

5.5. From policy signals to investment flows

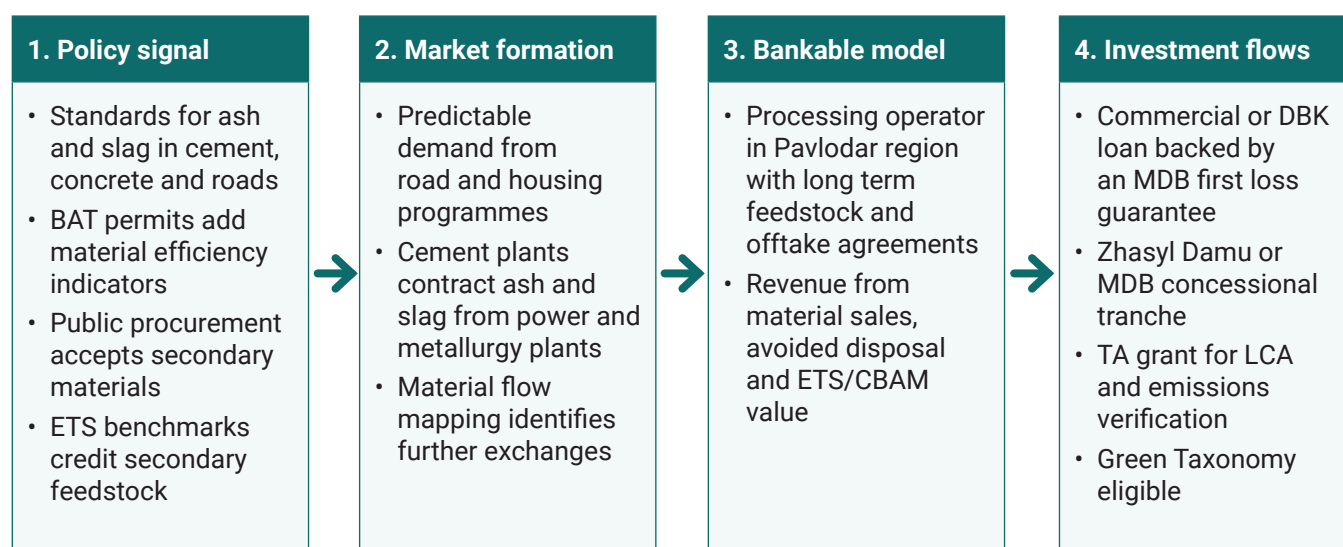
Investment follows structure: predictable demand, clear risk and return profiles and bankable business models supported by regulation. Figure 2 walks through the sequence for one Kazakh case: industrial symbiosis based on ash and slag in the Pavlodar region.

¹⁰⁵ The Times of Central Asia (2026). Kazakhstan launches QaJET investment platform for just energy transition. <https://timesca.com/kazakhstan-launches-qajet-investment-platform-for-just-energy-transition/>

¹⁰⁶ GCF (2025), Kazakhstan Country Programme, see note 21.

¹⁰⁷ EEAS (2026), Joint press statement, see note 79.

Figure 2. Policy to investment sequencing: ash and slag symbiosis in Pavlodar region (illustrative)



Source: Authors. Adapted from the policy to investment sequencing model in the SWITCH-Asia Uzbekistan White Paper.

Each actor has a distinct role. **Government** sets standards, procurement rules and ETS/BAT signals and provides policy predictability. **Financial institutions**, including MDBs, the Development Bank of Kazakhstan, commercial banks and the AIFC, develop derisking instruments and build capacity to assess CE projects. **The private sector**, meaning industrial groups, recyclers, developers and Atameken, identifies projects and adopts circular business models. **The EU Delegation**, through Global Gateway and SWITCH-Asia, can support facility design, connect Kazakh stakeholders with European technology and expertise, and help structure pipelines.

Sequencing matters: early regulatory signals create the enabling environment; technical assistance and pilots demonstrate viability; derisking instruments and blended finance scale successful pilots; and as risks become better understood, commercial finance can increasingly operate without concessional support.

6. CONCLUSION

Kazakhstan's NDC 3.0 places it among the few countries that have written circular economy, resource efficiency and SCP into their climate commitments as a dedicated mitigation measure. With the Waste Management Concept 2026 to 2030, the BAT framework, the ETS, the new Construction and Water Codes, the Green Taxonomy and a growing EPR system, the country already has most of the instruments needed to deliver it.

What is missing is the connection between them. CE objectives remain spread across policy systems, the material side of the economy is not measured, market instruments do not yet reward secondary materials, and CE projects are not identifiable in the NDC investment pipeline. Closing these gaps does not require new strategy; it requires common indicators, a small number of flagship projects in high potential sectors, and finance structured around them.

The stakes are both environmental and economic. Industry generates about a billion tonnes of waste a year, CBAM is now putting a price on the carbon content of Kazakh steel and aluminium in the EU market, and the regions most exposed to the decline of coal are also those where circular industries could create new jobs. Treating CE as an industrial and competitiveness policy, and not only a waste policy, is therefore Kazakhstan's most direct route to a measurable contribution from circularity to its 2035 target and its pathway to carbon neutrality by 2060.

The NDC cycle is the natural vehicle for this. Estimating what material efficiency can add to the 2035 targets, reporting it in the Biennial Transparency Reports and setting quantified material targets in the next NDC would turn circularity from a supporting theme into a measurable part of Kazakhstan's climate commitment.

As host of RES 2026 and the launch of the Central Asia Circular Economy Partnership Framework, Kazakhstan is also well placed to lead the region. The real question is how quickly the coordination, data and finance systems can be put in place to deliver it. In the end, the measure of progress should not be only how much waste Kazakhstan recycles, but how much economic value it creates with fewer virgin resources, how long it keeps that value in the economy, and how effectively it turns existing materials and assets into sources of future growth.

ANNEX 1: REFLECTION OF SCP, CE AND MRE ELEMENTS IN KAZAKHSTAN'S NDC 3.0: DETAILED ANALYSIS

Overall assessment

Kazakhstan's NDC 3.0 integrates SCP, CE and MRE into national climate policy at two levels: through explicit recognition as part of the mitigation framework, and through a broader set of sectoral measures on energy and resource efficiency, waste, buildings, transport, agriculture, land and water. The level of integration differs across the three concepts. CE and resource efficiency are most clearly operationalised through waste and resource management measures; MRE is explicitly recognised but largely unquantified; and SCP is named explicitly, while its consumption side dimension is less developed. All references below are to Kazakhstan's NDC 3.0.¹⁰⁸

Circular economy, SCP and MRE as a dedicated mitigation area

The strongest reference appears in Chapter II, Section 2.5 (Mitigation measures), which includes a dedicated thematic area entitled "Circular economy / resource efficiency" (quoted in Section 3.3.1). Its scope is broader than conventional waste policy: it addresses the efficiency of materials, water, energy and raw materials; recycled materials; industrial symbiosis; waste prevention; circular business models and green standards; and process emissions. The references to recycled materials and industrial symbiosis create a direct connection between mitigation and the circulation of materials within the economy. However, the objectives are directional rather than quantitative: there are no economy wide targets for material productivity, the share of recycled materials or the scale of industrial symbiosis.

Waste and secondary resource circulation

Waste is the most explicitly circular and one of the most quantified CE related sectors. Kazakhstan plans to reduce municipal waste generation, increase separate collection and achieve a recycling rate of at least 40% by 2035, including through improvements to EPR. The NDC also addresses biological cycles: restrictions on landfilling biodegradable waste, composting and energy use of organic fractions, and use of agricultural waste for energy, with energy use of manure and crop residues increasing by 16% over 2026 to 2035. Waste inventories are to be improved and landfill gas capture extended. The implementation challenge is to move from collection and recycling towards effective substitution of primary materials.

Industry: from energy efficiency to material efficiency and industrial symbiosis

Within the overall mitigation pathway, industrial emissions are expected to decline through modernisation and energy efficient technologies. The dedicated CE provision broadens this by adding raw material efficiency, recycled materials, industrial symbiosis and process emissions, and the NDC sets out a stronger ETS cap for covered industries alongside it. Energy efficiency reduces the energy required for production; MRE reduces how much primary material is required and whether residues can replace virgin inputs elsewhere. The explicit inclusion of industrial symbiosis is a particularly strong element, but sector specific targets for material productivity, secondary material substitution and symbiosis are not yet established.

Energy

The energy measures (modernisation of power plants, heating networks and utilities, smart grids and metering, and lower district heating losses) are resource and energy efficiency rather than CE in a strict sense. They contribute to SCP by reducing unnecessary resource consumption. Residues from coal power (ash) and from oil and gas (sulphur, drilling waste) are not addressed, although methane measures are extensive.

¹⁰⁸ Kazakhstan NDC 3.0 (2025), see note 2.

Buildings and urban development

Buildings contain the clearest consumption side SCP elements outside the CE provision: automated metering of heat, water and electricity, digital energy management, and an explicit link to behavioural change and responsible consumer behaviour. The NDC envisages raising annual residential renovation rates from 0.1% in 2023 to 0.5% from 2026, and requiring that at least half of new residential buildings comply with modern energy efficiency codes by 2030. Embodied carbon, construction material efficiency, recycled construction materials, design for disassembly and construction and demolition waste are not addressed.

Transport and urban mobility

The NDC promotes electrification, public transport, rail and active mobility, and urban planning that reduces dependence on private cars. This is a consumption side contribution to SCP, because it changes how people use mobility services. Circularity of vehicles, batteries and end of life components is not addressed.

Agriculture, land use and circular bioeconomy

Mitigation measures include organic farming on 3% of arable land by 2030, restoration of degraded pastures, cover cropping and zero tillage. Read together with the waste provisions on manure and crop residues, they create a direct link between agriculture, biological resource circulation and methane mitigation. The adaptation chapter adds soil restoration, crop rotation, minimum tillage, sustainable pasture management, efficient irrigation and organic fertilisers. These are core building blocks of a circular bioeconomy, though not framed as such.

Water

Water is named alongside energy and raw materials in the CE provision, and is a major focus of adaptation: improved irrigation technologies, reduced leakage and losses, expansion of land under improved irrigation, water quality and reservoirs. The NDC notes that efficient irrigation reduces both water intensity and pumping energy. It sets a target of 53% treated wastewater; treatment supports circular water management, but no target is set for wastewater reuse.

Forestry, ecosystems and land resources

LULUCF measures, including protection of 800,000 hectares of forest from degradation by 2035, sustainable forest management, afforestation and restoration, contribute mainly through sustainable management of natural resources rather than material circularity.

Cross sectoral measurement and implementation

The NDC's MRV framework rests on the national GHG inventory, the State Carbon and Waste Cadastres, the carbon unit registry and the Pollutant Release and Transfer Register, with commitments to common quality standards and data validation (Chapter V). This provides an institutional basis for tracking CE outcomes, but there is no dedicated CE/MRE indicator framework. The practical approach is to integrate a limited set of CE/MRE indicators into existing NDC monitoring and, where methodologies permit, link physical resource indicators to estimated GHG reductions.



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