Corporate Power Purchase Agreements | Kazakhstan

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On behalf of
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Kazakhstan, 2024

CORPORATE
POWER PURCHASE AGREEMENTS
| KAZAKHSTAN

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ABBREVIATIONS

ABC	Auction Bidding Committee
ACORE	American Council on Renewable Energy
BESS	Battery Energy Storage System
BNEF	Used in the text
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CfD	Contract for Difference
COD	Commercial Operation Date
COP	Conference of the Parties
CPP	Clean Power Plan
EBRD	European Bank for Reconstruction and Development
EPC	Engineering, Procurement, and Construction
ESCO	Used in the text
ESG	Environmental, Social, and Governance
FSC	Financial Settlement Center
FiT	Feed-in Tariff
GW	Gigawatt
IEA	International Energy Agency
IFC	International Finance Corporation
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
ITC	Used in the text
KEGOC	Kazakhstan Electricity Grid Operating Company
kV	KilovoltD
kWh	Kilowatt-hour
LC	Letter of Credit
LCOE	Levelized Cost of Energy
LGC	Used in the text
LLP	Limited Liability Partnership
LOI	Letter of Intent
MoE	Ministry of Energy
MW	Megawatt
MWh	Megawatt-hour
NDC	Nationally Determined Contribution
O&M	Operations and Maintenance
OPEX	Operating Expenditure
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PTC/ITC	Renewable Energy Production Tax Credit (PTC)/ Business Energy Investment Tax Credit
PV	Photovoltaic
RE	Renewable Energy
I-REC	Used in the text
REC	Renewable Energy Certificate
RES	Renewable Energy Sources
ROI	Return on Investment
SCADA	Supervisory Control and Data Acquisition
SPV	Special Purpose Vehicle
TSO	Transmission System Operator
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
VPP	Virtual Power Plant
VPPA	Virtual Power Purchase Agreement
WACC	Weighted Average Cost of Capital

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Executive Summary

Kazakhstan's corporate Power Purchase Agreement (PPA) market stands at a crucial intersection of opportunity and development. With installed renewable energy capacity reaching 2,900 MW in 2024 ((Government of Kazakhstan, 2024) and ambitious national targets of 15% renewable energy share by 2030 and 50% by 2050, the market presents significant potential for corporate renewable energy procurement.

Key market indicators suggest potential corporate PPA demand of 500-700 MW by 2025, primarily driven by mining, technology (crypto mining IT, etc.), and manufacturing sectors. Success factors from early adopters demonstrate that corporate PPAs can achieve cost savings of 15-25% compared to traditional power procurement methods while supporting national sustainability goals.

Drawing from international experience, particularly Australia's similar market structure, two implementation models emerge as most suitable for Kazakhstan: direct bilateral PPAs and virtual PPAs through Energy Supply Organizations (ESOs). These models provide flexible frameworks for corporate renewable energy procurement while accommodating existing market structures.

This report outlines critical pathways for corporate PPA implementation, addressing regulatory frameworks, technical requirements, and risk mitigation strategies essential for market growth. Recommendations focus on creating a robust ecosystem for corporate renewable energy procurement while ensuring alignment with Kazakhstan's energy transition objectives.

INTRODUCTION

Corporate PPAs are agreements between energy producers and corporations that allow businesses to purchase electricity directly from renewable sources. These contracts are pivotal for promoting renewable energy investments, reducing energy costs, and achieving corporate sustainability targets. This report explores successful PPA models globally, evaluates their potential in Kazakhstan, and provides policy recommendations to strengthen Kazakhstan's corporate renewable energy framework.

Corporate Power Purchase Agreement (PPA)

- Long-term contract between power producer and corporate buyer
- Typical duration: 10-20 years
- Direct procurement of renewable energy
- Fixed or pre-agreed pricing structure
- Can be physical or virtual (financial) settlement

Current Market Status

Kazakhstan's renewable energy market has experienced significant growth, with annual capacity additions increasing by 180% between 2019 and 2022. Corporate interest in renewable energy procurement has grown substantially, driven by:

- Global sustainability commitments of multinational corporations operating in Kazakhstan
- Rising conventional electricity prices, making renewable alternatives more competitive
- Enhanced grid integration capabilities and technological improvements
- Strengthening regulatory support for renewable energy projects

Table 1 Market Size Projections

Year	Projected Corporate PPA Capacity (MW)	Expected Investment (USD Million)
2024	250-300	275-325
2025	500-700	550-770
2027	1,200-1,500	1,320-1,650
2030	2,500-3,000	2,750-3,300

Corporate PPA Demand Across Kazakhstan's Key Sectors

Kazakhstan's corporate PPA market shows strong growth potential, with projected demand reaching 2 500 -3 000 MW (Government of Kazakhstan, 2024)by 2030 across three key sectors: mining, manufacturing, and technology. Each sector presents distinct opportunities and requirements for renewable energy procurement.

The mining sector leads potential PPA demand, consuming 28% of Kazakhstan's total electricity demand. With renewable energy targets of 15-20% by 2030, the sector is expected to require 1 500-2 800 MW of renewable energy through PPAs. This substantial demand stems from energy-intensive operations, increasing sustainability requirements, and the need for reliable power supply in remote locations. Mining companies typically seek large-scale projects (50-200 MW) with an emphasis on 24/7 power availability and hybrid solutions.

Manufacturing represents the second-largest opportunity, accounting for 22% of national electricity consumption. With renewable energy targets of 10-15% by 2030, the sector is projected to need 500-700 MW through PPAs. Manufacturing companies prioritize cost competitiveness and power quality, typically pursuing medium-sized projects (20-100 MW) that can integrate effectively with existing industrial processes. Their approach is largely driven by international competitiveness requirements and supply chain sustainability demands.

The technology sector, while smaller at 8% of national electricity consumption, shows the highest renewable energy ambition with targets of 80-100% by 2030, translating to potential PPA demand of 300-400 MW. Technology companies often lead in sustainability commitments, showing greater willingness to explore innovative PPA structures and pay premium prices for green power.

Another, source of corporate PPA demand could come from ESCO companies servicing the public sector. There is an estimated demand of about 350 MW of solar energy including, for example, secondary public schools (Government of Kazakhstan, 2024).

This sectoral distribution creates distinct patterns across Kazakhstan. Mining demand concentrates in central and northern regions, manufacturing clusters around major industrial cities, and technology sector requirements focus on urban centers with strong grid connections. Contract structures vary accordingly, with mining favoring long-term, fixed-price agreements, manufacturing seeking flexible terms with price caps, and technology companies showing interest in virtual PPAs.

Understanding these sector-specific demands is crucial for Kazakhstan's corporate PPA market development. Success will require targeted infrastructure development, diverse project pipelines, and flexible regulatory frameworks that can accommodate various approaches to renewable energy procurement while managing sector-specific risks and requirements.

THE REGULATORY FRAMEWORK, DRIVERS AND BARRIERS FOR CORPORATE PPAS

The Regulatory Framework and Market Landscape

Kazakhstan's renewable energy sector is shaped by a series of policy initiatives and market reforms aimed at increasing the share of renewable sources in the country's energy mix, including the Renewable Energy Law (2013) and subsequent regulatory updates. The Renewable Energy Law (2013) and the introduction of the feed-in-tariff mechanism are some of the notable regulatory steps that have paved the way for renewable energy deployment (Government of Kazakhstan, 2023a). As of 2022, Kazakhstan had around 2,900 MW of installed renewable energy capacity, up from just 177 MW in 2014 (Government of Kazakhstan, 2023b). The government has set targets to increase the share of renewable energy to 6% by 2025, 15% by 2030, and 50% by 2050 (Government of Kazakhstan, 2018). Major renewable energy developers active in Kazakhstan include Total Eren, Eni, Shell, and others (TotalEnergies, 2023)(ENI, 2023).

Drivers for Corporate PPAs

There are several driving factors behind the growing interest in corporate PPAs in Kazakhstan.

- **Sustainability Commitments**: Corporations are increasingly seeking to reduce their carbon footprints and achieve net-zero targets. Corporate PPAs provide a direct route for organizations to source renewable energy and improve their environmental credentials (BNEF, 2023)

- **Economic Benefits**: PPAs offer long-term price stability, which is particularly attractive in volatile energy markets. For corporations in Kazakhstan, where electricity prices are heavily impacted by fossil fuel costs, securing energy through PPAs offers financial predictability.

- **Government Policies and International Commitments**: The Kazakh electricity grid requires modernization to integrate an increasing share of renewable energy sources. The lack of infrastructure, coupled with transmission bottlenecks, poses a significant barrier to scaling corporate PPAs (ADB, 2024).

Challenges in the Implementation of Corporate PPAs

Despite the potential, several challenges hinder the widespread adoption of corporate PPAs in Kazakhstan:

- **Regulatory Complexity**: There are still ambiguities in regulations concerning corporate PPAs, including issues related to direct contracting, third-party sales, and grid access. The current renewable energy sector is governed by the Law on Supporting the Use of Renewable Energy Sources, originally passed in 2009 and last amended in 2021, which was not designed with corporate PPAs in mind.

- **Creditworthiness of Offtakers**: A major obstacle is the perceived credit risk of corporate offtakers, especially in a market where many companies may lack robust financial histories to support long-term agreements.

- **Grid Limitations**: The Kazakh electricity grid requires modernization to integrate an increasing share of renewable energy sources. The lack of infrastructure, coupled with transmission bottlenecks, poses a significant barrier to scaling corporate PPAs (ADB, 2024).

Opportunities for Growth

Developing **standardized contract templates** for corporate PPAs could help reduce the perceived complexity and risk associated with these agreements. Introducing or enhancing the mechanisms **for renewable energy certificates (RECs)** or carbon credits could create additional incentives for corporates to enter PPAs and contribute to meeting national climate targets. Furthermore, engaging stakeholders through **capacity-building initiatives,** such as workshops or public-private dialogues, could bridge knowledge gaps and drive the market forward. **International experiences in markets like the EU**, **where corporate PPAs are well-established,** can serve as valuable case studies for Kazakhstan.

SUCCESSFUL MODELS OF CORPORATE POWER PURCHASE AGREEMENTS (PPAS)

While still limited, some examples of successful corporate PPAs in Kazakhstan include agreements between international corporations and local renewable developers.

Essential PPA Components

- Volume commitments
- Pricing mechanism
- Term length
- Performance standards
- Risk allocation
- Change in law provisions
- Force majeure clauses

Essential Components of Corporate Power Purchase Agreements

Corporate Power Purchase Agreements require careful structuring to ensure they effectively serve both generators and offtakers while maintaining bankability and managing risks. Drawing from international experience, particularly in mature markets like the United States, European Union, and Australia, several components have emerged as essential for successful PPA structures. The foundation of any corporate PPA begins with **clear volume commitments**, which typically follow either a **"take-or-pay" or "as-generated" structure**, with sophisticated agreements often incorporating **floor and ceiling mechanisms** to protect both parties.

Pricing mechanisms have evolved beyond simple fixed prices to include various structures such as indexed pricing, escalators, and hybrid models that combine fixed and variable components, allowing for market responsiveness while maintaining predictability. **Term length** typically ranges from **10 to 20 years**, striking a balance between the generator's need for long-term revenue certainty to support project financing and the corporate buyer's desire for flexibility, with international practice increasingly accepting shorter terms of 7-10 years in mature markets. **Performance standards** form a critical component, establishing clear metrics for availability, generation guarantees, and quality of supply, often including sophisticated performance liquidated damages mechanisms that have become standard in markets like Germany and Spain. **Risk allocation provisions** have become increasingly standardized, with international practice generally placing resource risk with the generator, market price risk shared or allocated based on PPA structure, and force majeure risk typically shared with detailed definitions drawn from international precedent. Change in law provisions have gained importance with evolving renewable energy policies, typically distinguishing between general change in law (shared risk) and specific renewable energy regulation changes (often generator risk with some sharing mechanisms). **Force majeure clauses** have evolved to address renewable-specific concerns, including grid curtailment, natural resource availability, and pandemic scenarios, with international practice generally favoring detailed definitions and clear procedures for force majeure events rather than broad, general provisions.

Globally, successful PPA models include:

- **United States**: Major corporations like Google and Microsoft have signed long-term PPAs, significantly increasing their share of renewable energy (Bloomberg, Corporate PPA Report, 2022; Google Sustainability Report, 2022). Key features include fixed pricing structures and the use of large-scale renewable projects.

- **Germany**: The country has successfully utilized feed-in tariffs to encourage corporate investments in renewable energy. PPAs guarantee stable returns based on government-set fixed rates, providing predictable revenue streams.

- **Australia**: Australia's experience offers particularly relevant insights for Kazakhstan's corporate PPA market development, given significant parallels between the two markets. Australia, like Kazakhstan, has substantial coal reserves (8.57% of world reserves) and has historically relied heavily on coal-fired generation for its electricity supply. With coal-fired plants producing 66% of the country's electricity and renewable sources accounting for 13%, Australia's energy mix closely mirrors Kazakhstan's current situation.

The Australian market demonstrates successful transition pathways through corporate PPAs, particularly through its innovative approach to virtual PPAs. A key enabling factor has been the Large-scale Generation Certificate (LGC) system, where one LGC represents 1 MWh of renewable generation. This system creates additional value streams for renewable projects while helping corporate buyers meet sustainability targets[1].

Shell Energy's market participation in Australia provides a practical model for how energy companies can facilitate corporate PPAs. Their approach includes: (I) Direct project development near corporate facilities (II) Integration of renewable energy into existing retail contracts (III) Implementation of virtual corporate PPAs through wholesale market mechanisms

Top Markets for Corporate PPAs

- United States
- European Union (Spain – Germany – Nordic countries)
- United Kingdom
- Australia
- India

The following comparative analysis examines key elements of corporate PPAs across major renewable energy markets, highlighting how different jurisdictions approach fundamental aspects of PPA structuring. Drawing from experiences in the United States, Germany, Australia, and Kazakhstan, this comparison reveals both common practices and market-specific adaptations in areas such as

[1] https://cer.gov.au/schemes/renewable-energy-target/large-scale-renewable-energy-target/large-scale-generation-certificates

pricing structures, contract durations, regulatory support, market participation, risk management, sustainability goals, PPA structures, grid integration, and overall market maturity. Understanding these variations is crucial for stakeholders in Kazakhstan's emerging PPA market, as it provides valuable insights into successful implementation strategies while highlighting potential development pathways. The comparison particularly emphasizes how mature markets have addressed challenges similar to those currently faced in Kazakhstan, offering practical lessons for market development.

Table 2 Comparative Overview Corportate PPAs

Element	United States	Germany	Australia	Kazakhstan
Pricing Structure	Fixed pricing, with some contracts including escalators	Feed-in tariffs for smaller projects; market-based for larger ones	Fixed or indexed pricing, often with price floors and ceilings	Currently dominated by auction-based pricing for renewables; corporate PPAs not yet established
Contract Duration	Typically 10–20 years	Long-term, often 20 years or more	Usually 10–15 years	Existing PPAs with Financial Settlement Center are 20 years; corporate PPAs not yet established
Regulatory Support	Strong federal tax incentives (PTC, ITC) and state-level Renewable Portfolio Standards	Supportive government policies, including priority grid access for renewables	State-level renewable energy targets and incentives	Recent amendments to Renewable Energy Law, but specific corporate PPA regulations not yet in place
Market Participation	Dominated by large-scale projects and corporations	Encourages participation of small and medium enterprises (SMEs) through community energy projects	Focus on large corporate buyers, with emerging aggregation models for smaller buyers	Currently limited to large industrial consumers in wholesale market; emerging focus on potential corporate buyers
Risk Management	Diverse financing options, including tax equity; well-established hedging mechanisms	Stable returns through regulation; government-backed guarantees for certain projects	Long-term contracts used to mitigate price volatility; growing use of firming products[2]	Limited experience; standardized risk allocation and contracts under development

[2] https://arena.gov.au/assets/2020/11/contract-performance-report-renewable-energy-hub-nov.pdf

Sustainability Goals	Driven by corporate sustainability commitments and Science-Based Targets	Aligned with national climate goals (Energiewende) and EU targets	Mix of corporate sustainability commitments and compliance with state-level targets	Aligns with national sustainability targets (15% renewables by 2030, 50% by 2050)
PPA Structures	Physical, virtual (financial), and sleeved PPAs all common	Primarily physical PPAs, with growing interest in virtual structures	Mix of physical and virtual PPAs, depending on state regulations	Structure not yet defined; likely to start with physical PPAs given market structure
Grid Integration	Advanced integration of renewables, with increasing focus on storage and flexibility	High levels of renewable integration, with cross-border balancing	Challenges with grid constraints in some regions; increasing investment in transmission	Significant grid upgrades required; integration protocols for large-scale renewables needed
Market Maturity	Mature market with high liquidity and standardized processes	Mature market within Europe, with cross-border PPAs becoming more common	Rapidly maturing market, with increasing sophistication in contract structures	Nascent market for corporate PPAs; experience limited to auctions and feed-in tariffs for renewables

FEASIBILITY ASSESSMENT IN KAZAKHSTAN

Kazakhstan has made significant strides in renewable energy regulations. Key improvements include:

- In 2009, Kazakhstan introduced feed-in tariffs for renewable energy projects to stimulate investment.
- In 2013, Kazakhstan adopted legislation on supporting renewable energy use, which established a system of fixed tariffs for renewable energy producers.
- In 2018, Kazakhstan held its first renewable energy auction, moving from fixed feed-in tariffs to a competitive bidding system for new projects. This was aimed at reducing costs and increasing transparency.
- The 2020 Amendments to Renewable Energy Law: Introduced auction mechanisms for projects over 1 MW, simplifying procedures for smaller projects and improving PPA viability.

Current Regulatory Framework

Kazakhstan's renewable energy sector is governed by the Law on Supporting the Use of Renewable Energy Sources, originally passed in 2009 and last amended in 2021. This framework has been instrumental in driving initial renewable energy growth but was not designed with corporate PPAs in mind. Key elements of the current framework include:

Policy	Details	PPA Duration	Start Year
Feed-in tariffs for renewable projects	Stable revenue, differentiated by technology (wind, solar, hydro, biomass), annual inflation adjustments	15years	2014
Renewable energy auctions	Drive cost competitiveness, technology-specific and technology-neutral auctions	15 years	2018
Priority dispatch for renewable energy	Priority in electricity grid, grid operator required to offtake all renewable electricity generated, no distribution costs	In place;	In place; no distribution costs
20-year PPAs with a single buyer	Financial Settlement Center acts as the offtaker	20 years	Not specified

Financial Incentives

Kazakhstan offers several financial incentives designed to promote corporate renewable energy projects:

- VAT Exemption: Corporations benefit from VAT exemptions on imported renewable energy equipment, reducing upfront capital costs.
- Property Tax Exemption: Companies investing in solar energy systems may qualify for property tax exemptions, lowering operational costs.
- Net Metering Policy: Applicable for systems up to 200 kW, allowing corporations to credit excess energy generation against future consumption.
- Auction Mechanism: Competitive bidding processes for projects over 1 MW can secure favorable pricing for corporate PPAs.

Gaps still need to be overcome

While Kazakhstan has established foundational elements for renewable energy development, significant gaps remain between current frameworks and international best practices for corporate PPAs. The existing single-buyer model through the Financial Settlement Center, while providing stability, lacks the flexibility seen in mature markets where multiple contracting options and direct bilateral agreements are common. Markets like the United States, Germany, and Australia demonstrate that successful corporate PPA frameworks require diverse contracting mechanisms, sophisticated risk management tools, and clear technical integration protocols.

Key gaps in Kazakhstan's current framework include the absence of **standardized procedures** for direct corporate procurement, limited risk management mechanisms, and **insufficient technical integration protocols**. While mature markets utilize sophisticated **credit support mechanisms** and well-defined **force majeure provisions**, Kazakhstan's market lacks standardized risk allocation frameworks. Similarly, technical challenges such as **limited grid capacity in key industrial regions** and absence of **clear integration protocols for variable renewable energy** need addressing.

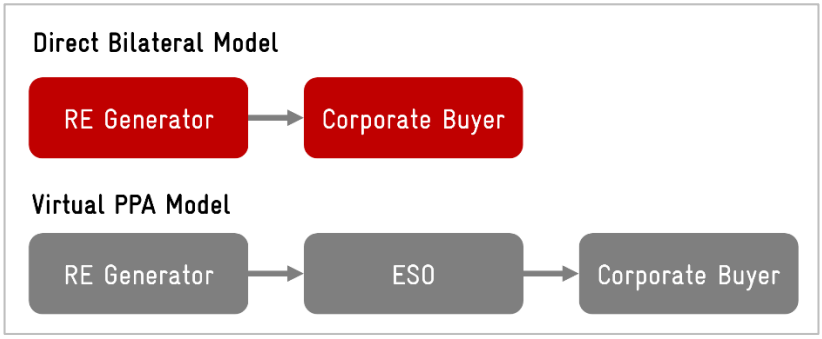
The regulatory framework, although evolving, requires further development to match international standards. Clear procedures for direct corporate procurement, standardized approval processes, and transparent pricing mechanisms commonly found in developed markets are not yet fully established in Kazakhstan. Support mechanisms prevalent in mature markets, such as risk guarantee facilities, green certificate trading systems, and specific tax incentives for corporate renewable procurement, are also currently limited.

IMPLEMENTATION MODELS FOR CORPORATE PPAS IN KAZAKHSTAN

Overview of Implementation Models

The implementation of corporate PPAs in Kazakhstan can follow two primary structural approaches, each serving different market needs and operational requirements (QazaqGreen, 2022):

Figure 1 Structural Corporate PPA approaches



The first model enables direct bilateral agreements between generators and consumers, while the second leverages existing market infrastructure through Energy Supply Organizations (ESOs) to facilitate virtual arrangements. Both models present unique advantages and are suited to different types of market participants and project configurations.

Direct Bilateral Model Framework

The Direct Bilateral Corporate PPA model represents the most straightforward approach to renewable energy procurement. This structure is particularly well-suited for large industrial consumers with significant electricity demands and the capability to manage complex energy infrastructure. Under this arrangement, renewable energy generators and corporate buyers enter into direct contractual relationships, with physical electricity delivery occurring through dedicated or existing grid infrastructure. This model has proven especially effective for mining operations and large manufacturing facilities that require substantial and predictable power supply.

Table 3 Direct Bilateral Corporate PPA Model

Direct Bilateral Corporate PPA Model	
Suitable Project Characteristics:	**Key Advantages:** - Simplified contractual structure

- Parties may be affiliated within the same corporate group - Power can be transmitted through internal grid infrastructure - Limited additional balancing requirements are needed - Direct physical delivery is feasible and beneficial	- Reduced transmission costs - Direct control over generation assets - Clear line of sight between generation and consumption

Virtual Structure Through ESOs

The Virtual Corporate PPA model, facilitated through Energy Supply Organizations, offers a more flexible approach that can accommodate a broader range of market participants. This structure builds upon Kazakhstan's existing market framework and enables corporate buyers to support renewable energy development without requiring direct physical connection to generation assets. The model's innovative approach to financial settlement, combined with the potential integration of I-REC certificates, provides a robust framework for achieving corporate sustainability goals while maintaining operational simplicity.

Table 4 Virtual Corporate PPA Model

Virtual Corporate PPA Through ESOs	
Operational Structure: - Renewable energy facility feeds production into the national grid - Energy Supply Organization (ESO) contracts with both generator and corporate buyer - Physical electricity delivery occurs through standard grid infrastructure - Financial settlements manage the renewable energy premium	**Additional Benefits:** - Integration with existing market structures - Reduced technical complexity for buyers - Potential for I-REC certificate implementation - Enhanced market liquidity

POLICY RECOMMENDATIONS

Kazakhstan's transition to a viable corporate PPA market requires a carefully orchestrated policy framework that addresses both immediate challenges and long-term market development needs. This comprehensive approach must balance regulatory simplification, risk management, and infrastructure development while creating a sustainable ecosystem for renewable energy trading.

In the immediate term (2025-2026), policy priorities should focus on removing existing barriers to market entry and establishing foundational frameworks. The most pressing need is regulatory streamlining, **particularly in PPA contract formation and approval processes.** A **standardized PPA template** as well as mechanism itself should be developed that balances the interests of renewable energy developers and corporate buyers while reducing transaction costs and negotiation timeframes. This should be accompanied by transparent grid access procedures with predictable costs and clear technical requirements.

Risk management must be addressed through the establishment of government-backed guarantee mechanisms, alternative option – secure of developers by moving to single-buyer in case a buyer refuse from the PPA. These should include partial indexation options to manage currency risk and standardized credit support requirements that protect both generators and offtakers. Such mechanisms will be crucial in building market confidence and attracting international investment. Additionally, clear dispute resolution procedures should be established to provide certainty to all market participants.

Infrastructure development cannot be overlooked in this initial phase. Priority should be given to **grid reinforcement projects in key industrial areas where corporate PPA demand is highes**t, particularly in the mining and manufacturing sectors. Smart grid technologies and energy storage integration guidelines need to be developed simultaneously to ensure system reliability and efficiency.

Moving into the medium term (2026-2028), the focus should shift to market maturation and the introduction of more sophisticated trading mechanisms**.** A **bilateral trading platform for renewable energy** should be launched, supported by a **robust renewable energy certificate system similar to Australia's successful model.** This platform should incorporate market-based balancing mechanisms and eventually evolve to include **capacity markets** for renewable energy. These developments should be accompanied by the deployment of advanced grid management systems and dynamic capacity allocation mechanisms to optimize renewable energy integration.

The financial framework should expand during this period to include green bonds programs specifically designed for renewable energy projects. **Tax incentives for corporate renewable energy procurement** should be implemented, along with technical assistance programs to support market participants. These support mechanisms should be tailored to address the

specific needs of different industrial sectors, recognizing their varying capabilities and requirements.

Looking toward the long term (2028-2030), Kazakhstan should aim for **full energy market liberalization** and integration with regional power markets. This includes the implementation of **advanced grid management systems** and comprehensive carbon pricing mechanisms. The market should evolve to support sophisticated financial products for renewable energy trading and cross-border transactions, potentially utilizing blockchain technology for enhanced transparency and efficiency.

Throughout all phases, success will depend on proper governance structures and clear institutional responsibilities. A coordinated approach between government agencies is essential, supported by transparent monitoring and evaluation frameworks. Regular reporting mechanisms should be established to track progress and identify areas requiring adjustment.

Market participants will need support through technical assistance programs and capacity building initiatives. Knowledge sharing platforms should be created to disseminate best practices and lessons learned. Industry standards should be developed collaboratively, ensuring they reflect both international best practices and local market conditions.

For project development, emphasis should be placed on thorough feasibility studies and early stakeholder engagement. Financial structures must be robust, with clear risk allocation frameworks and comprehensive security packages. Technical implementation should focus on grid compliance and quality control systems, supported by effective performance monitoring protocols.

The expected outcomes of this policy framework include significant increases in renewable energy deployment, reduced transaction costs, and enhanced market liquidity. Investor confidence should improve as the market matures, leading to greater participation across all sectors. The framework aims to create a self-sustaining market that can adapt to changing conditions while maintaining steady growth.

Success will require consistent implementation and regular review of progress against established benchmarks. The framework must remain flexible enough to accommodate technological advancements and evolving market needs while maintaining regulatory stability. Regular consultation with stakeholders will be essential to ensure the framework continues to serve market needs effectively.

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