Journal of Health Development
e2663-1776

Policy brief

Toward Net-Zero Healthcare: A Policy Framework for Decarbonizing Kazakhstan's Health System

Nurzhan Mukashev [1], Lulu Silas Olan'g [2], Gulnara Kulkayeva [3], Sain Shaikhiyev [4], Rashid Ismailov [5], Laura Shamshutdin [6], Akbota Aman [7*]

[1] Director of Center for Health, Policy and Management, Suleyman Demirel University, Almaty, Kazakhstan
[2] Senior Lecturer Economics Department, School of Social Sciences, Business and Law, Suleyman Demirel University, Almaty, Kazakhstan
[3] Chairman of the Board, National Scientific Center for Healthcare Development named after Salidat Kairbekova, Astana, Kazakhstan
[4] Deputy Chairman of the Board, National Scientific Center for Healthcare Development named after Salidat Kairbekova, Astana, Kazakhstan
[5] Director of the Department of Electronic Health Standards, National Scientific Center for Healthcare Development named after Salidat Kairbekova, Astana, Kazakhstan
[6] Head of the Division for Improvement of Standards and Regulatory Framework of Electronic Health, National Scientific Center for Healthcare Development named after Salidat Kairbekova, Astana, Kazakhstan
[7] Chief Specialist, National Scientific Center for Healthcare Development named after Salidat Kairbekova, Astana, Kazakhstan

* Corresponding author: a.aman@nrchd.kz

Received: 18 October 2025
Revised: 07 November 2025
Accepted: 22 November 2025
Published: 02 December 2025

Citation: Nurzhan Mukashev, Lulu Silas Olan'g, Gulnara Kulkayeva, Sain Shaikhiev, Rashid Ismailov, Laura Shamshutdin, Akbota Aman. Toward Net-Zero Healthcare: A Policy Framework for Decarbonizing Kazakhstan's Health System. J Health Dev. 2025, 60 (6), Special issue, jhd035. https://doi.org/10.32921/2663-1776-2025-60-6-jhd035

This work is licensed under a Creative Commons Attribution 4.0 International License

Abstract/Key messages

Climate change and environmental sustainability have become critical determinants of population health and health system resilience. While providing essential services, healthcare also significantly contributes to greenhouse gas emissions due to high energy use, medical processes, and supply chains. Globally, health systems account for 4-5% of total emissions - comparable to the aviation sector - of which over 70% stem from indirect (Scope 3) sources across procurement and value chains.

This policy brief is intended for policymakers responsible for health and environmental governance, healthcare administrators, sustainability and procurement specialists, and experts involved in climate, digitalization, and health system transformation.

What is the problem?

Kazakhstan's health sector operates without a harmonized system for measuring and managing greenhouse gas emissions across facilities and administrative levels. Existing environmental laws are primarily industry-focused and lack provisions tailored to healthcare operations. The absence of methodological standards for emissions measurement and fragmented governance structures impede systematic decarbonization.

Policy Context and Global Alignment

Kazakhstan's Strategy for Achieving Carbon Neutrality by 2060 (Presidential Decree, 2023) sets clear national targets but does not specify health-sector contributions. Integrating healthcare into this agenda aligns with international frameworks:

– World Health Organization (2023): Encourages sectoral greenhouse gas accounting, low-carbon procurement, and integration of climate resilience into health governance;

– European Union Green Deal (2019): Prioritizes public sector decarbonization through green procurement and energy-efficient infrastructure;

– Organization for Economic Co-operation and Development (2022): Highlights Kazakhstan's opportunity to embed sustainability criteria into procurement law and government tenders.

Examples from the UK, Sweden, and France demonstrate that healthcare decarbonization is feasible when regulatory clarity, digital data systems, and financial instruments are aligned.

Policy options

Option 1: National Regulatory Framework and Institutional Capacity for Net Zero Healthcare.

Option 2: Low-Carbon and Climate-Resilient Healthcare Infrastructure Program.

Option 3: Net Zero Healthcare Demonstration and International Cooperation Program.

Keywords: greenhouse gas accounting, healthcare sustainability, Scope 1-3 emissions, net-zero healthcare, environmental governance, health system resilience, climate policy, sustainable healthcare systems, Kazakhstan.

1. Introduction

Globally, healthcare contributes approximately 4-5% of total greenhouse gas emissions – comparable to the aviation sector - with over 70% arising from indirect (Scope 3) sources within procurement and supply chains. In Kazakhstan, hospitals are among the most energy-intensive public facilities, relying on coal-based electricity and gas heating, and often operating in outdated infrastructure. Yet, the health sector remains largely absent from the country's climate and energy governance frameworks.

Healthcare systems globally face dual imperatives: ensuring service continuity under climate stress and reducing their own environmental footprint. Kazakhstan's Net-Zero 2060 Strategy recognizes health as a key social sector exposed to climate risk, yet its contribution to mitigation remains underdeveloped. Integrating sustainability and climate resilience into the healthcare system aligns with World Health Organization (WHO) and European Union (EU) frameworks that view environmental stewardship as intrinsic to quality care and fiscal prudence [1-9].

Kazakhstan's national Strategy sets the direction toward carbon neutrality by 2060, with a medium-term emissions reduction goal by 2030 (15% unconditional; 25% conditional on international support) [3].

2. International Experience

The Greenhouse Gas (GHG) Protocol is a widely recognized international framework for measuring and managing greenhouse gas emissions, developed by the World Resources Institute and the World Business Council for Sustainable Development. It provides standardized methods for organizations, including public health systems, to identify, quantify, report, and reduce emissions consistently.

Based on the level of organizational control and the source of emissions, the GHG Protocol divides organizational greenhouse gas emissions into three separate categories: Scope 1, Scope 2, and Scope 3. For uniform, transparent, and comparable GHG accounting across industries, including healthcare, this classification offers a common framework [10].

Scope 1: Direct Emissions

Direct greenhouse gas emissions from sources within the organization's ownership or control are included in Scope 1. These emissions are caused by on-site operations and resources that are under the organization's operational control.

Scope 1 emissions in the context of healthcare usually consist of:

- burning of fossil fuels (such as natural gas and diesel) in hospital-owned boilers, furnaces, and backup generators;

- fuel usage from vehicles owned or run by the facility, such as service cars and ambulances;

- medical and anesthetic gases (such as nitrous oxide, desflurane, and sevoflurane) emitted during clinical operations in operating rooms are included in the organizational boundaries.

Due to the ongoing operation of energy-intensive infrastructure and the clinical use of gases with a high potential for global warming, Scope 1 emissions are especially important for hospitals [11].

Scope 2: Purchased Energy's Indirect Emissions

Indirect emissions related to the production of bought energy that the organization uses are included in Scope 2. These emissions are linked to the organization's energy demand even though they really happen in off-site power generation facilities.

Scope 2 emissions in healthcare facilities typically result from:

- purchased electricity for heating, ventilation, and air conditioning (HVAC) and lighting systems;
- information systems, labs, data centers, and diagnostic and imaging equipment all use electricity;
- external utilities provide district heating, cooling, or steam to hospital facilities.

Scope 2 emissions frequently account for a sizable portion of a hospital's reported carbon footprint due to the high and constant energy demand of healthcare services, especially in areas with carbon-intensive electrical grids [11].

Scope 3: Additional Indirect Emissions Throughout the Value Chain

All such indirect emissions that are outside the organization's direct ownership or control but are connected to its operations along the value chain are included in Scope 3. Scope 3 emissions usually make up the majority of total emissions in healthcare systems worldwide:

- purchasing medications, medical equipment, supplies, and laboratory reagents are examples of Scope 3 emission sources associated with healthcare;
- services that are contracted out, including cleaning, sterilizing, catering, and laundry;
- transportation and logistics, including waste removal and supply delivery;
- waste treatment and disposal, especially of hazardous and medical waste;
- employee commuting and business travel; capital goods, including building, renovating healthcare facilities, and purchasing large medical equipment, depending on boundary definitions.

The predominance of emissions from Scope 3 indicates the commuting and business travel for employees. Depending on border definitions, capital goods include building, remodeling healthcare facilities, and purchasing significant medical equipment.

The predominance of Scope 3 emissions highlights the significance of value-chain engagement for successful decarbonization plans and reflects the intricate and multinational nature of healthcare supply chains [10].

While the GHG Protocol addresses overall reporting in the healthcare sector, the Global Roadmap for Healthcare Decarbonization outlines specific actions the health sector can take to align with the ambitions of the Paris Agreement while also achieving global health goals. Both the roadmap and the protocol categorize emissions into three scopes, emphasizing that a significant portion - 71% of emissions in healthcare occurs outside of direct facility operations (Scope 3). This is primarily linked to energy use, specifically fossil fuel consumption, which is at the core of healthcare emissions because it fuels the energy, manufacturing, and transportation associated with health care operations and products [10].

The WHO Operational Framework for Building Climate Resilient and Low-Carbon Health Systems outlines 10 components for climate-resilient health systems, emphasizing mitigation (emissions reduction) and adaptation strategies tailored to country performance, GHG levels, and capacity, such as improving energy access [4]. Countries such as the UK, Sweden, and France have adopted healthcare-specific carbon strategies that have integrated GHG Protocol scopes into healthcare-specific carbon strategies, aligning with the WHO's 2023 framework for low-carbon health systems through national net-zero targets and sector plans [4,11].

National climate acts and regional policy mandates such as Organisation for Economic Co-operation and Development (OECD)-wide NDCs and EU ETS pushed sector plans; laid the groundwork for European countries [10]. Taking the example of UK's 2008 Climate Change Act that prompted the NHS Sustainable Development Unit (SDU) in 2008 for emissions tracking, encouraging local action on sustainability, influence policy and make the case for sustainable healthcare. The launch of the Delivering a 'Net Zero' National Health Service (NHS) report later led to the new Greener NHS National Programme that takes the transitioning to a delivery-focused role, responsible for all aspects of the NHS's work on climate change and broader sustainability [12].

By modernizing the energy systems of NHS buildings, switching to greener mobility choices including electric and hydrogen ambulances, and enhancing waste management procedures, the UK is furthering the NHS's efforts in climate change and sustainability. The requirement for sustainable procurement, which requires suppliers to submit carbon reduction strategies for contracts exceeding £5 million, has been a major turning point. Furthermore,

since 2022, procurement procedures have included a net zero weighting of more than 10% [12].

Several studies have also shown that climate mitigation efforts at healthcare facilities can yield financial benefits. Strategies such as energy savings, waste reduction, and the use of reusable equipment not only cut CO2 emissions but also save costs [13]. In the USA, a study of 18 tertiary hospitals estimated that energy-saving measures and increased recycling could save $1 billion annually in the first five years and $15 billion over ten years. In South Africa, the Western Cape Government health system adopted green building practices, resulting in a single hospital saving over 19 million liters of water, more than 550 metric tons of CO2 equivalent, and over $62,000 annually through laundry efficiency [14].

With interim greenhouse gas reduction targets that guarantee emissions are reduced by at least 55% by 2030 compared with 1990 levels, the European Union's comprehensive climate and sustainability strategy, known as the European Green Deal, aims to make Europe the first climate-neutral continent by 2050 [13]. The European Climate Law, which formalizes the promise to attain net-zero greenhouse gas emissions by 2050 and directs EU policies across energy, transportation, industry, buildings, and agriculture to assist this transition, serves as the legal foundation for this long-term approach. Initiatives to update infrastructure, encourage energy efficiency, implement clean energy technology, and incorporate sustainability concepts into economic governance are all part of the Green Deal [14]. While the Green Deal's particular public procurement laws are still being developed, the EU's climate plan highlights that public authorities - through green. The EU's climate strategy highlights that public authorities can significantly contribute to decarbonization through green public procurement practices by prioritizing low-carbon goods, services, and infrastructure investments, thereby aligning public spending with climate neutrality objectives, even though specific public procurement legislation under the Green Deal is still developing [15].

International healthcare accreditation has started to include environmental sustainability requirements concurrently with changes in European policy toward sustainability. Developed in partnership with the Geneva Sustainability Center of the International Hospital Federation, the Joint Commission International (JCI) 8th Edition Accreditation Standards for Hospitals and Academic Medical Centers features a new Global Health Impact chapter with evidence-based sustainability requirements [16]. These standards, which represent a major advancement in accreditation to motivate hospitals to lower their carbon footprint and integrate sustainability into quality and safety frameworks, concentrate on governance, environmental resource use, green operations, procurement and supply chain, employee engagement, and infrastructure resilience. For JCI-accredited companies, full compliance with the new sustainability requirements is anticipated to be implemented gradually through 2025-2026 [17].

3. Analysis of the current situation in Kazakhstan

The Strategic Landscape: Kazakhstan's 2060 Ambition and the Health Sector

Kazakhstan's climate policy has evolved rapidly over the last decade, transitioning from exploratory concepts to a legally enshrined commitment to carbon neutrality. The foundational document of this journey is the Strategy for Achieving Carbon Neutrality by 2060 (Strategy-2060), enacted in 2023, which sets a definitive course for the structural transformation of the national economy [3,6].

For the health sector, this strategy provides the overarching mandate to reduce its environmental footprint while adapting to the physical risks posed by climate change, such as extreme weather events and shifting disease vectors. While the Strategy-2060 provides overarching emission-reduction targets but it lacks sectoral guidance for healthcare [3].

National Decarbonization Pathways and the NDC 3.0 Framework

The Republic of Kazakhstan is a signatory to the Paris Agreement, and its commitments are articulated through its Nationally Determined Contributions (NDC). The latest update, NDC 3.0, reflects an increased level of ambition, committing to an unconditional reduction of greenhouse gas (GHG) emissions by 15% by 2030 and a conditional reduction of 25%, subject to international investment and technology transfer [7]. For the first time, these national plans explicitly include the health sector as an area requiring both mitigation and adaptation interventions [7]. This inclusion recognizes that the health system's energy intensity is a byproduct of a national energy mix where coal still represents approximately 50% of total primary consumption and 65% of electricity generation [6].

The Health Sector as a Strategic Pillar of the Green Economy

The Concept for Transition towards a Green Economy, adopted in 2013, identified energy efficiency and renewable energy as fundamental pillars for the country's sustainable development [9]. Within this framework, the health sector is positioned as a priority for modernization. The environmental performance of healthcare facilities is no longer seen in isolation but as a component of urban and rural sustainability. In cities like Almaty and Astana, the high population density and economic growth necessitate a rapid expansion of healthcare services, which, if built on traditional energy models, would exacerbate the existing air pollution crisis [15].

The transformation of the health sector into a "green" entity involves more than just energy; it encompasses the "polluter pays" principle established in the Environmental Code, necessitating a holistic view of waste, water, and supply chain management. Article 113 of the Environmental Code creates a legal basis for the introduction of the Best Available Technologies (BAT), which while primarily aimed at heavy industry, nevertheless may be applied to large-scale multidisciplinary hospitals that operate intensive energy systems and high-volume waste treatment facilities [16].

Assessing the Carbon Footprint of the Kazakhstani Health System

Developing an effective decarbonization policy requires a granular understanding of where emissions originate within the health system. Globally, the healthcare sector is responsible for approximately 5% of annual GHG emissions, a figure that is likely higher in carbon-intensive economies like Kazakhstan [17].

Energy-Intensive Infrastructure and the Coal Legacy

The primary driver of emissions in Kazakhstan's health system is the reliance on coal and gas for heating and electricity. In many regions, the heating season lasts over six months, making the thermal efficiency of hospital buildings a critical factor [18,19]. A significant portion of healthcare facilities are connected to district heating systems powered by old coal-fired Combined Heat and Power (CHP) plants [16]. The World Bank reports that coal burning in these plants and households is the leading cause of fine particulate matter (PM-2.5) exposure, which has a direct causal link to the very diseases the health system is tasked with treating [16].

In Almaty, for example, the contribution of large combustion sources like the coal-fired CHP-2 plant accounts for nearly 40% of the population's annual PM-2.5 exposure [16]. This creates a negative feedback loop where the carbon-intensive operation of the health system and its supporting utilities contributes to a rise in healthcare demand. Transitioning the energy supply of these facilities is, therefore, a public health necessity.

Scope 1, 2, and 3 Emissions in Medical Facilities

Citing international benchmarks such as those from the UK NHS and OECD analyses, we can categorize healthcare emissions into three scopes, which help in identifying actionable policy interventions.

Table 1 – Greenhouse Gas Emission Scopes and Their Estimated Contribution in the Healthcare Sector

Emission Scope	Components	Estimated Contribution (%)	Relevance to Kazakhstan
Scope 1 (Direct)	Onsite boilers, medical gases, fleet vehicles	12 –24	High reliance on onsite coal/gas boilers in rural areas [20].
Scope 2 (Indirect)	Purchased electricity, steam, heating/cooling	9–14	Dependence on a coal-heavy national electricity grid [7].
Scope 3 (Value Chain)	Pharmaceuticals, medical devices, supply chain, waste	62 –79	Dominated by imported pharmaceuticals and high-volume waste [21].

In Kazakhstan, Scope 1 and 2 emissions are particularly pronounced due to the harsh climate and the age of the building stock. Buildings in Kazakhstan consume two to three times more energy per surface area than those in Western Europe [22]. Furthermore, the supply chain (Scope 3) represents the largest and most complex area for reduction, as it involves thousands of suppliers and a centralized procurement system that has historically prioritized price and local content over environmental criteria [23].

Decarbonizing Health Infrastructure: From Rural Modernization to Urban Centers

The physical estate of the health system - ranging from primary care posts in remote villages to massive

multidisciplinary hospitals in Almaty and Astana - is the frontline of the decarbonization effort.

The National Project for the Modernization of Rural Healthcare

A pivotal opportunity for decarbonization lies in the "Modernization of Rural Healthcare" National Project, launched in 2023. This initiative aims to construct 655 new primary healthcare facilities and modernize 32 district hospitals. As of late 2025, 645 of the planned primary facilities have been completed, many replacing outdated buildings that lacked modern insulation or efficient heating [24].

The policy implication of this massive construction drive is significant: if these facilities are built using traditional, energy-intensive methods, they will lock in high emissions for decades. However, by integrating renewable energy and high-efficiency building envelopes, they can serve as decentralized hubs of low-carbon healthcare. For the first time, these new rural outpatient clinics are being equipped with day hospitals and laboratory facilities, reducing the need for patients to travel to distant regional centers, which inherently reduces the carbon footprint of patient travel (a component of Scope 3 emissions) [25,26].

Green Building Standards: LEED, BREEAM, and the OMIR Framework

To ensure that new and modernized facilities align with net-zero targets, the mandatory adoption of green building standards is essential. While international certifications like LEED and BREEAM have been applied to over 50 buildings in Almaty and Astana, they have primarily focused on commercial and residential structures [26]. For the health sector, the domestic "OMIR" green construction standard, developed by the Kazakhstan Green Building Council (KazGBC), offers a more localized approach [27].

The government's plan to build 19 new multidisciplinary hospitals to replace 40 outdated ones provides a strategic window to mandate Gold-level LEED or "Excellent" OMIR certification for all new public medical infrastructure [28].

Energy Efficiency Interventions and Urban Transformation

In urban centers like Almaty and Astana, energy efficiency (EE) is being addressed through city-wide transformation plans. A joint study by city municipalities and the World Bank identified that targeted interventions in municipal sectors, including public buildings like clinics and hospitals, could lead to 25% to 43% energy savings [29].

Key interventions include:

- Retrofitting Building Envelopes: improving insulation to combat the extreme temperature ranges (-35°C to +40°C) seen in cities like Astana [26].
- Modernizing Heating Substations: installing automated systems that adjust heat based on external temperatures, reducing waste in district-connected hospitals [19].
- LED and Smart Lighting: rapidly deployable measures that provide immediate reductions in electricity consumption [20].
- Variable Speed Drives for HVAC: ensuring that ventilation and cooling systems in high-intensity areas like operating theaters are optimized for demand [29].

Transforming the Medical Supply Chain and Pharmaceutical Procurement

The supply chain represents the "hidden" carbon footprint of healthcare, often accounting for nearly 80% of total emissions [30,31]. In Kazakhstan, the centralized nature of the pharmaceutical market provides a unique opportunity to use procurement as a tool for decarbonization.

The Role of SK-Pharmacy in Green Procurement

The Single Distributor, SK-Pharmacy, manages the procurement of medicines and medical devices for approximately 2,000 medical organizations [32]. Since 2010, the volume of drugs purchased has increased 15-fold in monetary terms, reaching 480 billion tenge in 2024 [33]. With 14 modern warehouses totaling 300,000 m3 of space, SK-Pharmacy is the backbone of the medical supply chain [33].

Historically, procurement has prioritized price equalization and accessibility [33]. However, as Kazakhstan moves toward its 2030 and 2060 climate goals, SK-Pharmacy should transition into a "Green Distributor." This involves integrating Environmental, Social, and Governance (ESG) criteria into the selection process for the over a thousand types of medicines and medical supplies it manages [32]. By mandating that suppliers meet international standards, such as those set by the Pharmaceutical Supply Chain Initiative (PSCI), SK-Pharmacy can drive decarbonization across its network of domestic and international manufacturers [34].

Sustainable Public Procurement (SPP) and Life-Cycle Assessment

The status of Sustainable Public Procurement (SPP) in Kazakhstan is currently at an "entry-level," focusing primarily on social aspects such as supporting associations of persons with disabilities [23]. To reach net-zero, the "On Public Procurement" law dated

December 4, 2015 No. 434-V must be amended to include "green" criteria. This would allow state buyers to consider the carbon footprint of a product alongside its cost [35].

One key mechanism is Life-Cycle Assessment (LCA), which evaluates the environmental impact of a medical device from raw material extraction through production, use, and disposal [36]. For example, when purchasing energy-intensive diagnostic equipment like CT or MRI scanners, procurement should favor models with high energy efficiency and modular designs that allow for upgrades rather than full replacement [25].

International Collaboration and the PSCI Standards

International pharmaceutical companies operating in Kazakhstan, such as Takeda and SK Biopharmaceuticals, are already signatories to global sustainability compacts. Takeda's "Supplier ESG" program, for instance, aligns suppliers in 70 countries with decarbonization goals and waste reduction targets. SK Biopharmaceuticals, as the first domestic company to join PSCI, uses its platform to audit suppliers across five domains: ethics, labor, health, environment, and management systems [37, 38].

By aligning Kazakhstan's national procurement rules with these international standards, the government can ensure that up to 78% of drugs and medical supplies purchased from domestic producers are also part of the global green transition [32].

Sustainable Medical Waste Management and Circular Economy Principles

Medical waste management is a critical environmental challenge, particularly following the surge in biomedical waste during the COVID-19 pandemic [39]. Kazakhstan generates approximately 5 million tons of solid domestic waste annually, with medical waste representing a highly specialized and hazardous subset of this total [40].

Transitioning to Non-Burn Technologies and Waste-to-Energy

The shift toward a circular economy in healthcare involves moving away from the "collection-disposal" model to one where waste is treated as a resource [40]. Non-burn technologies, such as autoclaving and chemical disinfection, are becoming increasingly common for treating infectious waste, as they minimize the risk of greenhouse gas emissions associated with incineration [41].

The "Waste-to-Energy" (WtE) trend is gaining momentum globally, with modern plants providing both heat and electricity to the facilities they serve. In Kazakhstan, the regulatory framework is beginning to recognize WtE, although it is not yet fully enshrined as a legal priority [40]. Integrating WtE solutions into the hospitals currently being modernized could provide a sustainable method for managing waste while reducing the facilities' reliance on the coal-heavy national grid [25].

Low-Carbon Clinical Pathways and Medical Innovation

Decarbonizing the health system requires not just changing how buildings are powered, but also how care is delivered. Clinical pathways - the specific steps taken to diagnose and treat patients - have significant environmental implications.

Decarbonizing the "Golden Hour": Green Transportation and Logistics

Kazakhstan's vast territory requires a robust emergency medical response system. The "Golden Hour" principle - ensuring that patients with heart attacks or strokes receive high-tech care within the first hour - is central to the rural healthcare modernization strategy [25]. However, this necessitates intensive transportation, from ambulances to medical aviation.

The transport sector accounts for 7.4% of Kazakhstan's total emissions, with road transport contributing 81% of that share [42]. For the health sector, decarbonization involves:

- Ambulance Fleet Modernization: 45% of the national vehicle fleet is older than 20 years [42]. Transitioning to modern, fuel-efficient ambulances or electric vehicles (EVs) for urban centers is a priority [20].
- Medical Electric Vehicles (MEVs): Kazakhstan cooperates internationally to explore the production of medical electric vehicles equipped with AI for optimized logistics and patient care [43].
- Sustainable Aviation: medical aviation has been a part of Kazakhstan's health landscape since the late 1920s [44]. The production and use of sustainable aviation fuel (SAF) could eventually decarbonize the medical flights that serve remote regions [45].

Sustainable Anesthesia and Respiratory Care

Certain clinical practices are disproportionately carbon-intensive. Anesthetic gases, particularly desflurane, have very high global warming potential. Substituting desflurane with sevoflurane or using volatile gas capture and destruction systems can significantly reduce theater emissions [20]. Similarly, in respiratory care, transitioning patients from metered-dose inhalers (MDIs), which use high-carbon propellants, to dry-powder inhalers (DPIs) is a recognized pathway for emissions reduction [21].

Digital Health and Telemedicine as a Mitigation Tool

Telemedicine is a "dynamically developing area" for increasing access to medical care for rural residents [25]. By facilitating remote consultations and diagnostics, telemedicine directly reduces the need for patient and provider travel, thereby lowering the transportation-related carbon footprint of the health system. In 2024, mobile medical complexes served 1.2 million residents in 3,072 settlements, providing 1.2 million consultations and 656 thousand diagnostic procedures [25]. The integration of AI for the early detection of conditions like dementia and weight management, further optimizes care delivery and resource use.

Healthcare-Specific Enablers

Health facilities operate under energy-intensive conditions with limited sustainability oversight. Environmental data systems exist (e.g., Eco-monitor, Energy Efficiency Center), but they are not linked to health information systems. The Ministry of Health has not yet institutionalized climate governance or sustainability reporting. Bridging these gaps is essential to align Kazakhstan's health sector with global net-zero trends.

Factors Underlying the Problem

1) Legislative Landscape

● Absence of a formal national net-zero healthcare roadmap: Although Kazakhstan's climate policy establishes goals for the entire sector, it does not operationalize a clear, healthcare-specific roadmap (targets, timetables, responsible organizations, reporting procedures, enforcement).

● Lack of GHG accounting techniques tailored to the healthcare industry There is no national standard on how hospitals and primary care facilities should create GHG inventories and report Scopes 1-3 in a similar way.

● Limited availability of healthcare-relevant emission factors: Current national emission factors do not adequately account for sources unique to the healthcare industry (e.g., anesthetic gases, medical waste treatment paths, pharmaceutical and medical device supply chains, district heating specialties).

● Weak ties to health governance and disjointed regulatory requirements: Health-sector regulations (such as facility licensing/accreditation, quality standards, procurement guidelines, or performance management) do not consistently incorporate environmental and energy-efficiency criteria.

2) Technical Issues

● Absence of an integrated data architecture for energy and emissions reporting: Energy, fuels, waste, transportation, procurement, and other facility-level data are kept in different systems without a common data model or reporting template.

● Limited system and sector interoperability: Automated, scalable GHG reporting is made impossible by the lack of compatibility between health information systems, procurement platforms, energy monitoring, and environmental reporting technologies.

● Inadequate digital infrastructure for consistent measurement: Many buildings lack the building management systems, metering, and standardized data collection instruments required to accurately monitor energy use, heat consumption, and associated emissions.

● Absence of a centralized platform for transparency and benchmarking It is challenging to compare facilities, find high-impact interventions, and track development over time without a national platform (or interoperable registry).

3) Organizational Factors

● Uncertain mandates and fragmented governance: healthcare decarbonization responsibilities are spread among ministries and agencies (health, ecology, energy, industry, procurement), with no clear responsibility chain or coordinating authority.

● Inadequate facility-level institutional understanding and capacity: instead of viewing emissions reduction as a fundamental component of cost control, resilience, and service continuity, hospital administrators sometimes view it as a "external" environmental objective; skilled sustainability positions are rare.

● Inadequate incentives and financing mechanisms: upfront cash limitations and a dearth of green finance instruments impede retrofits and modernization; current payment and budgeting models offer little incentive for energy savings or low-carbon procurement.

● Change-management obstacles: pilots run the danger of remaining isolated in the absence of scaling mechanisms, direction, and committed implementation assistance; facilities may view reporting and audits as administrative burdens without obvious operational benefits.

4) Methodological and Measurement Gaps

● There is no government guideline on how to establish organizational and operational boundaries (e.g., inclusion of district heating, outsourced services, leased facilities, ambulance fleets) for healthcare emissions.

● Undeveloped Scope 3 approaches for healthcare: the structure of Kazakhstan's healthcare market does not accommodate spend-based and activity-based techniques for procurement-related emissions.

● Limited Measurement, Reporting, Verification (MRV) readiness: credibility and access to climate finance are restricted since current reporting systems are not built for auditability, verification, or alignment with worldwide MRV principles.

5) Infrastructure and Asset Constraints

● Aging stock of healthcare buildings: a large number of hospitals are housed in legacy structures that have antiquated boilers, poor thermal performance, and little room for electrification or renewable energy integration.

● High reliance on carbon-intensive energy sources: in large cities, fossil fuel-based district heating and coal-based power predominate, fundamentally raising Scope 2 emissions.

● Limited resistance to climate and energy shocks: because facilities frequently lack energy flexibility and backup systems, they are more susceptible to supply outages, heat waves, and cold spells.

6) Procurement and Supply-Chain Barriers (Scope 3)

● There are no environmental requirements while purchasing healthcare: GHG disclosure, lifecycle assessment, and supplier sustainability requirements are rarely included in tender papers.

● Low supplier readiness and transparency: product-level emissions data is typically not provided by Kazakhstani pharmaceutical and medical device vendors.

● Disjointed procurement systems: without unified sustainability regulations, centralized and decentralized procurement coexist, restricting control over high-emission categories.

7) Human Capital and Skills Deficits

● Lack of specific sustainability positions in healthcare: medical organizations do not have positions like "sustainability officer," "energy manager," or "GHG focal point."

● Limited interdisciplinary expertise: few experts integrate knowledge of energy systems, procurement, healthcare administration, and climate data analysis.

● Absence of national certification or training programs: for healthcare executives and engineers, sustainability and greenhouse gas management are not integrated into ongoing professional development.

8) Financial and Economic Constraints

● Barriers to upfront investment: capital expenditures for energy retrofits, metering, and digital reporting systems conflict with therapeutic priorities.

● Weak connection between funding and emissions performance: energy efficiency and emissions reductions are not rewarded by hospital budgets or tariffs.

● Limited access to climate finance: eligibility for green bonds, development bank financing, and international climate funds is limited in the absence of sectoral GHG baselines and MRV systems.

9) Policy Integration and Strategic Alignment Gaps

● Climate policy and health system planning are at odds: national climate targets are not converted into infrastructure standards, investment plans, or KPIs for the health sector.

● Inconsistency with global healthcare frameworks: national health policy instruments do not consistently incorporate WHO and EU low-carbon healthcare guidelines.

● There is no official route from pilots to scale: there are no established procedures for national rollout and replication in demonstration programs.

10) Social and Behavioral Factors

● Low perception of climate–health co-benefits: the links between emissions reduction, air quality, operating costs, and patient outcomes are insufficiently communicated.

● Risk of stakeholder resistance: without clear benefits, facilities and staff may resist additional reporting or perceive decarbonization as administrative control rather than operational improvement.

● Public trust considerations: increased data collection and reporting may raise concerns about transparency and accountability if governance safeguards are not clearly articulated.

4. Solutions and Policy Actions

It is possible to identify three primary policy options, each of which represents a distinct strategy for creating an effective, low-carbon, and climate-resilient healthcare system. When taken as a whole, these choices cover infrastructure change, regulatory underpinnings, and practical execution through international collaboration and demonstration.

Solution 1: National Regulatory Framework and Institutional Capacity for Net-Zero Healthcare.

Policy actions

● Adopt a Healthcare Sustainability Regulation under the Ministry of Health establishing GHG accounting for healthcare organizations across Scope 1 (mandatory) and Scopes 2-3 (optional).

● Develop healthcare-specific GHG methodologies aligned with the GHG Protocol, ISO 14064, and WHO frameworks.

● Designate a Ministry of Health focal point and an interministerial coordination mechanism (health-ecology-energy-industry).

● Introduce sustainability officers ("green managers") in major hospitals.

● Integrate GHG indicators into hospital accreditation, quality assurance, and performance monitoring systems.

● Establish a national digital emissions registry interoperable with Eco-monitor and health information systems.

Solution 2: Low-Carbon and Climate-Resilient Healthcare Infrastructure Program

Policy actions

● Launch a national hospital retrofit and modernization program focused on Scope 1 and 2 emissions.

● Conduct standardized energy audits and baseline assessments across healthcare facilities.

● Upgrade heating, cooling, lighting, and building envelopes; integrate renewable energy where feasible.

● Apply climate-resilient and green building standards (e.g., OMIR, LEED/BREEAM equivalents) to all new healthcare infrastructure.

● Prioritize rural and high-risk regions to reduce energy poverty and service disruption.

● Introduce performance-based procurement and Energy Service Company/Public-Private Partnerships (PPP) models to finance upgrades.

Solution 3: Net-Zero Healthcare Demonstration and International Cooperation Program

Policy actions

● Select 10-15 pilot hospitals to implement full-scope decarbonization (Scopes 1-3).

● Test low-carbon procurement, sustainable waste management, and circular economy models within pilot hospitals.

● Collaborate with WHO, United Nations Environment Programme, universities, and international initiatives (e.g., Race to Zero for Healthcare).

● Publish annual progress reports documenting emissions reductions, cost savings, and health co-benefits.

● Establish formal pathways for national scale-up of successful pilots.

Existing Potential Barriers for Three Solutions

Potential Barriers to Solution 1

● Fragmented institutional mandates and unclear ownership of healthcare decarbonization.

● Absence of healthcare-specific emission factors and MRV-ready reporting systems.

● Limited awareness and technical capacity at facility and regional levels.

● Perception of GHG reporting as an administrative burden rather than a management tool.

Potential Barriers to Solution 2

● High upfront capital costs competing with clinical priorities.

● Aging infrastructure with limited technical flexibility for retrofits.

● Dependence on coal-based electricity and district heating systems.

● Weak incentives in current financing and tariff structures.

Potential Barriers to Solution 3

● Risk of pilot fragmentation without formal scale-up mechanisms.

● Limited availability of standardized procurement and waste benchmarks.

● Insufficient coordination between pilot sites and national policymakers.

● Data interoperability and verification challenges.

Potential Opportunities for Three Solutions

Potential Opportunities for Solution 1

● Alignment with Kazakhstan's Net-Zero 2060 Strategy and updated NDC commitments.

● Improved access to international climate finance through credible MRV systems.

● Strengthened governance, transparency, and evidence-based decision-making.

● Integration with ongoing digital health reforms.

Potential Opportunities for Solution 2

● Energy efficiency gains of 25-40%, generating long-term cost savings.

● Reduced air pollution and improved population health outcomes.

● Mobilization of green bonds, PPPs, and development bank financing.

● Synergies with national building modernization and urban sustainability programs.

Potential Opportunities for Solution 3

● Creation of replicable national templates for low-carbon healthcare.

● International visibility and leadership within Central Asia.

https://doi.org/10.32921/2663-1776-2025-60(6)-jhd035

• Workforce upskilling and professionalization of healthcare sustainability.

• Increased public trust through transparent environmental performance.

Evidence shows that each USD 1 invested in hospital energy efficiency yields USD 3-4 in lifetime savings [15]. Co-benefits include reduced air pollution, improved staff health, and reduced service disruption during extreme weather events. The health system can become a catalyst for national green growth, supporting job creation in energy efficiency and sustainable procurement sectors [15].

Financing Pathways:

• Climate bonds and European Bank for Reconstruction and Development Green Cities loans.

• PPP for hospital modernization.

• Inclusion in Kazakhstan's national Green Taxonomy (2026 revision).

Final Policy Recommendations

1. Adopt a National Healthcare Sustainability Regulation (2026): Define GHG reporting standards and assign institutional responsibilities.
2. Develop a Digital GHG Reporting Platform: Integrate with Eco-monitor and health information systems.
3. Establish National Training and Certification Programs: Partner with WHO to create curricula for healthcare sustainability officers.
4. Launch Green Hospital Retrofits (2027): Target 20% of tertiary hospitals in the first phase.
5. Integrate Sustainability into Financing (2030): Link emissions performance to MoH budget allocations and hospital accreditation.

5. Conclusions

Kazakhstan's journey toward net-zero healthcare is both a moral and strategic imperative. Decarbonization enhances efficiency, strengthens system resilience, and positions the country as a regional leader in sustainable health governance. By adopting a phased, evidence-based policy framework grounded in global best practice, Kazakhstan can transform its healthcare system into a model of climate-smart, low-carbon development by 2060.

Conflict of interest. The authors declare no conflict of interest.

Funding. This work is not supported from any granting sources.

Author contributions: Conceptualization, A.A. and N.M.; Writing—original draft preparation, A.A. and N. M.; Writing—review and editing, A.A., N. M., L.O., G.K., S. S., R.I., and L. Sh.

References

1. Health Care Without Harm. Global Road Map for Health Care Decarbonization. Website. [Cited 18 Oct 2025]. Available from URL: https://global.noharm.org/news/global-road-map-health-care-decarbonization
2. Lenzen, M., Malik, A., Li, M., Fry, J., Weisz, H., Pichler, P. P., Chaves, L. S. M., Capon, A., & Pencheon, D. (2020). The environmental footprint of health care: a global assessment. The Lancet. Planetary health, 4(7), e271–e279. https://doi.org/10.1016/S2542-5196(20)30121-2
3. Eckelman, M. J., & Sherman, J. (2016). Environmental Impacts of the U.S. Health Care System and Effects on Public Health. PloS one, 11(6), e0157014. https://doi.org/10.1371/journal.pone.0157014
4. Aziz, T. (2022). The Role of Nordic Countries in Fighting Against Climate Change: A Case Study of Sweden.
5. Hensher, M., & McGain, F. (2020). Health Care Sustainability Metrics: Building A Safer, Low-Carbon Health System: Commentary examines how to build a safer, low-carbon health system. Health Affairs, 39(12), 2080-2087. https://doi.org/10.1377/hlthaff.2020.01103
6. World Bank Group. More Efficient Residential Heating in Kazakhstan Can Help with Cleaner Air and Improved Health, Says New World Bank Report. Website. [Cited 18 Oct 2025]. Available from URL: https://www.worldbank.org/en/news/press-release/2022/09/07/more-efficient-residential-heating-in-kazakhstan-can-help-with-cleaner-air-and-improved-health
7. Ministry of Ecology and Natural Resources of the Republic of Kazakhstan. Updated Nationally Determined Contribution of the Republic of Kazakhstan to the global response to climate change. Website. [Cited 18 Oct 2025]. Available from URL: https://unfccc.int/sites/default/files/NDC/2023-06/12updated%20NDC%20KAZ_Gov%20Decree313_19042023_en_cover%20page.pdf
8. World Health Organization. Building climate-resilient health systems. Website. [Cited 18 Oct 2025]. Available from URL: https://www.who.int/teams/environment-climate-change-and-health/climate-change-and-health/country-support/building-climate-resilient-health-systems

9. Asian Development Bank. Kazakhstan: A Future Without Coal? Website. [Cited 18 Oct 2025]. Available from URL: https://blogs.adb.org/blog/kazakhstan-future-without-coal

10. Commonwealth Fund. Action to Decarbonize the U.S. Health Care System: Lessons from the U.K.'s National Health Service. Website. [Cited 18 Oct 2025]. Available from URL: https://www.commonwealthfund.org/publications/issue-briefs/2022/jul/action-decarbonize-us-health-care-system-lessons-uk-nhs

11. Booth A. (2022). Carbon footprint modelling of national health systems: Opportunities, challenges and recommendations. The International journal of health planning and management, 37(4), 1885–1893. https://doi.org/10.1002/hpm.3447

12. IEA. Clean Household Energy Consumption in Kazakhstan: A Roadmap – Analysis. Website. [Cited 18 Dec 2025]. Available from URL: https://www.iea.org/reports/clean-household-energy-consumption-in-kazakhstan-a-roadmap

13. Green Policy Platform. Evaluation of the status of sustainable public procurement and legal expert assessment. Website. [Cited 18 Oct 2025]. Available from URL: https://www.greenpolicyplatform.org/sites/default/files/SPP%20status%20assessment%20in%20Kazakhstan%20(PPP%20slides%20in%20English).pdf

14. The CaspianPost. Kazakhstan Expands Rural Healthcare with 600 New Facilities. Website. [Cited 18 Oct 2025]. Available from URL: https://caspianpost.com/kazakhstan/kazakhstan-expands-rural-healthcare-with-600-new-facilities

15. National Centre of Expertise.1.2 million rural residents have been provided with medical care thanks to mobile medical complexes. Website. [Cited 18 Oct 2025]. Available from URL: https://nce.kz/en/media/news/206850/

16. Tokbolat, S., & Nazipov, F. (2021). Investigating the application of LEED and BREEAM certification schemes for buildings in Kazakhstan. In Emerging research in sustainable energy and buildings for a low-carbon future (pp. 181-191). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-15-8775-7_11

17. QazaqGreen. "Green" construction in Kazakhstan: a step towards a sustainable future and achieving the SDGs. Website. [Cited 18 Oct 2025]. Available from URL: https://qazaqgreen.com/en/journal-qazaqgreen/industry-news/2492/

18. The International Travel & Health Insurance Journal (ITIJ). Kazakhstan awards lease for new hospital and medical college. Website. [Cited 18 Oct 2025]. https://www.itij.com/latest/news/kazakhstan-awards-lease-new-hospital-and-medical-college

19. World Bank. Kazakhstan: Energy Efficiency Transformation in Astana and Almaty. Website. [Cited 18 Oct 2025]. Available from URL: https://documents1.worldbank.org/curated/en/855641510934183633/pdf/121463-ESM-P130013-PUBLIC-KEEPAmatyEEPlan%20Novengfinal.pdf

20. Remizov, A., Tukaziban, A., Yelzhanova, Z., Junussova, T., & Karaca, F. (2021). Adoption of Green Building Assessment Systems to Existing Buildings under Kazakhstani Conditions. Buildings 2021, 11, 325. https://doi.org/10.3390/buildings11080325

21. Organisation for Economic Co-operation and Development (OECD). Decarbonising Health Systems Across Countries. Website. [Cited 18 Oct 2025]. Available from URL: https://www.oecd.org/en/publications/decarbonising-health-systems-across-oecd-countries_5ac2b24b-en/full-report/overview_570a6f11.html

22. SK-Pharmacy. Website. [Cited 18 Oct 2025]. Available from URL: https://sk-pharmacy.kz/eng/

23. Official Information Source of the Prime minister of the Republic of Kazakhstan. Kazakhstan intends to transform its drug procurement management system. Website. [Cited 18 Oct 2025]. Available from URL: https://primeminister.kz/en/news/kazakhstan-intends-to-transform-its-drug-procurement-management-system-29305

24. The Pharmaceutical Supply Chain Initiative (PSCI) Website. [Cited 18 Oct 2025]. Available from URL: https://pscinitiative.org/resource?resource=2851

25. United Nations Environment Programme. Assesment of Status and Legal Frameworks of Sustainable Public Procurement in the Republic of Kazakhstan. Website. [Cited 18 Oct 2025]. Available from URL: https://admin.un-page.org/wp-content/uploads/2023/04/2021-kazakhstan-assessment-of-status-and-legal-frameworks-of-sustainable-public-procurement-in-the-republic-of-kazakhstan.pdf

26. United Nations Environment Programme. Sustainable Procurement Criteria and Guidelines Introduction in the Republic of Kazakhstan. Website. [Cited 18 Oct 2025]. Available from URL: https://admin.un-page.org/wp-content/uploads/2024/06/spp-guidelines-engl.pdf

27. Takeda. Sustainable Procurement. Website. [Cited 18 Oct 2025]. Available from URL: https://www.takeda.com/science/products/suppliers/sustainable-procurement/

28. SK Biopharmaceuticals. Sustainable Partnerships. Website. [Cited 18 Oct 2025]. Available from URL: https://www.skbp.com/eng/sustainability/partner.do

29.The Astana Times. Innovative Method For Biomedical Waste Management Developed in Kazakhstan. Website. [Cited 18 Dec 2025]. Available from URL: https://astanatimes.com/2021/11/innovative-method-for-biomedical-waste-management-developed-in-kazakhstan/

30. QazaqGreen. Waste Management in Kazakhstan: Problems and Prospects for Technological Solutions. Website. [Cited 18 Dec 2025]. Available from URL: https://qazaqgreen.com/en/journal-qazaqgreen/environmental-policy/2985/

31. Kokkinos, K., Lakioti, E., Moustakas, K., Tsanaktsidis, C., & Karayannis, V. (2023). Sustainable medical waste management using an intuitionistic fuzzy-based decision support system. Sustainability, 16(1), 298. https://doi.org/10.3390/su16010298

32. U Trade and Deve;opment (UNCTAD). Kazakhstan's transport sector: opportunities for decarbonization. Website. [Cited 18 Oct 2025]. Available from URL: https://unctad.org/system/files/information-document/unda2030d25-kazakhstan-transport_en.pdf

33. Yelegen, A. Y., & Sarsembayev, M. A. (2024). Legal Cooperation of Kazakhstan with the BRICS Countries on the Production and Operation of Medical Electric Vehicles with Artificial Intelligence Technologies. BRICS Law Journal, 11(1), 131-148. https://doi.org/10.21684/2412-2343-2024-11-1-131-148

34. National Coordination Centre of Emergency Medicine. Website. [Cited 18 Dec 2025]. Available from URL: https://emcrk.kz/en/home/sanitarnaya-aviatsiya-rk

35. PVKnowhow. Kazakhstan renewable energy: Unique 2030 Expansion Plan. Website. [Cited 18 Dec 2025]. Available from URL: https://www.pvknowhow.com/news/kazakhstan-renewable-energy-unique-2030-expansion-plan/

36. Accounting, A. C. (2004). The Greenhouse Gas Protocol. World Resources Institute and World Business Council for Sustainable Development: Washington, DC, USA

37. European Commission. The European Green Deal. Website. [Cited 18 Oct 2025]. Available from URL: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

38. Joint Commission International. Healthcare Sustainability Certification. Website. [Cited 18 Oct 2025]. Available from URL: www.jointcommission.org/en/certification/healthcare-sustainability

39. Shaltynov, A., Abenova, M., Baibussinova, A., Semenova, Y., Omarov, N., Tanatarova, G., Sepbossynova, A., & Rocha, J. (2025). Inequality in the Distribution and Utilization of Healthcare Resources in Kazakhstan (2002-2023): A Spatiotemporal Analysis. International journal of environmental research and public health, 22(11), 1762. https://doi.org/10.3390/ijerph22111762

40. Olawade, D. B., Popoola, T. T., Egbon, E., & David-Olawade, A. C. (2025). Sustainable Healthcare Practices: Pathways to a Carbon-Neutral Future for the Medical Industry. Sustainable Futures, 100783. https://doi.org/10.1016/j.sftr.2025.100783

41. World Bank Group. Low-Carbon and Resilience Strategies for the Health Sector. Website. [Cited 18 Oct 2025]. Available from URL: https://documents1.worldbank.org/curated/en/322251495434571418/pdf/113572-WP-PUBLIC-FINAL-WBG-Climate-smart-Healthcare-002.pdf

42. NHS England. System Progress. Website. [Cited 18 Oct 2025]. Available from URL: https://www.england.nhs.uk/greenernhs/whats-already-happening/

43. Or, Z., & Seppänen, A. V. (2024). The role of the health sector in tackling climate change: A narrative review. Health policy (Amsterdam, Netherlands), 143, 105053. https://doi.org/10.1016/j.healthpol.2024.105053

44. Daniya, G., & Tang, D. (2024). Green finance and industrial low-carbon transition: A case study on green economy policy in Kazakhstan. Sustainability, 16(17), 7731. https://doi.org/10.3390/su16177731

45. Simion Ludușanu, D. G., Fertu, D. I., Tinică, G., & Gavrilescu, M. (2025). Integrated Quality and Environmental Management in Healthcare: Impacts, Implementation, and Future Directions Toward Sustainability. Sustainability, 17(11), 5156. https://doi.org/10.3390/su17115156

Көміртекті бейтарап денсаулық сақтау жүйесіне қарай: Қазақстанның денсаулық сақтау жүйесін декарбонизациялауға арналған саяси негіз

Мукашев Н. [1], Lulu Silas Olan'g [2], Кулкаева Г.У. [3], Шайхиев С.С. [4], Исмаилов Р.С. [5], Шамшутдин Л.Б. [6], Аман А.М. [7]

[1] Денсаулық сақтау саясаты және менеджменті орталығының директоры, Сүлейман Демирель атындағы университет, Алматы, Қазақстан

[2] Экономика кафедрасының аға оқытушысы, Әлеуметтік ғылымдар, бизнес және құқық мектебі, Сүлейман Демирель атындағы университет, Алматы, Қазақстан

[3] Басқарма төрайымы, Салидат Қайырбекова атындағы Ұлттық ғылыми денсаулық сақтауды дамыту орталығы, Астана, Қазақстан

[4] Басқарма төрайымының орынбасары, Салидат Қайырбекова атындағы Ұлттық ғылыми денсаулық сақтауды дамыту орталығы, Астана, Қазақстан

[5] Электрондық денсаулық сақтау стандарттары департаментінің директоры, Салидат Қайырбекова атындағы Ұлттық ғылыми денсаулық сақтауды дамыту орталығы, Астана, Қазақстан

[6] Электрондық денсаулық сақтау стандарттары мен нормативтік-құқықтық базаны жетілдіру бөлімінің басшысы, Салидат Қайырбекова атындағы Ұлттық ғылыми денсаулық сақтауды дамыту орталығы, Астана, Қазақстан

[7] Бас маман, Салидат Қайырбекова атындағы Ұлттық ғылыми денсаулық сақтауды дамыту орталығы, Астана, Қазақстан

Түйіндеме/ Түйінді ойлар

Климаттың өзгеруі мен экологиялық тұрақтылық халық денсаулығы мен денсаулық сақтау жүйелерінің орнықтылығының негізгі детерминанттарына айналуда. Өмірлік маңызды қызметтерді көрсете отырып, денсаулық сақтау саласы жоғары энергия тұтыну, медициналық процестер және жеткізу тізбектері салдарынан парниктік газдар шығарындыларына елеулі үлес қосады. Жаһандық ауқымда денсаулық сақтау жүйелері жалпы шығарындылардың 4-5%-ын қамтамасыз етеді — бұл авиация секторымен салыстырмалы көрсеткіш, олардың ішінде 70%-дан астамы сатып алулар мен құн тізбектерімен байланысты жанама шығарындыларға (3 есе) тиесілі.

Бұл аналитикалық жазба денсаулық сақтау және экологиялық саясат саласындағы шешім қабылдайтын тұлғаларға, медициналық ұйымдардың басшыларына, тұрақты даму және сатып алу саласының мамандарына, сондай-ақ климат, цифрландыру және денсаулық сақтау жүйесін трансформациялау саласындағы сарапшыларға арналған.

Мәселе неде?

Қазақстанның денсаулық сақтау секторы медициналық ұйымдар деңгейінде және әкімшілік деңгейлерде парниктік газдар шығарындыларын өлшеу және басқарудың үйлестірілген жүйесінсіз жұмыс істейді. Қолданыстағы экологиялық заңнама негізінен өнеркәсіп салаларына бағытталған және медициналық ұйымдардың жұмыс істеу ерекшеліктерін ескермейді. Шығарындыларды есепке алудың әдістемелік стандарттарының болмауы және басқару жүйесінің бытыраңқылығы жүйелі декарбонизацияға кедергі келтіреді.

Саясаттық контекст және халықаралық үйлесімділік

Қазақстан Республикасының 2060 жылға дейін көміртекті бейтараптыққа қол жеткізу стратегиясы (ҚР Президентінің Президент Жарлығы, 2023) ұлттық мақсаттарды айқындайды, алайда денсаулық сақтау секторының нақты үлесін көрсетпейді. Денсаулық сақтауды осы күн тәртібіне енгізу келесі халықаралық негіздермен үйлеседі:

– Дүниежүзілік денсаулық сақтау ұйымы (2023): салалық деңгейде парниктік газдар есепке алуды, төмен көміртекті сатып алуларды және климаттық орнықтылықты денсаулық сақтау жүйесін басқаруға енгізуді қолдайды.

– Еуропалық одақтың жасыл келісімі (2019): мемлекеттік секторды «жасыл» сатып алулар мен энергия тиімді инфрақұрылым арқылы декарбонизациялауды басым бағыт ретінде белгілейді.

– Экономикалық ынтымақтастық пен даму ұйымы (2022): Қазақстан үшін сатып алу заңнамасы мен мемлекеттік тендерлерге тұрақты даму критерийлерін енгізу мүмкіндігін атап өтеді.

Ұлыбритания, Швеция және Франция тәжірибелері реттеушілік айқындық, цифрлық деректер жүйелері және үйлестірілген қаржылық құралдар болған жағдайда денсаулық сақтауды декарбонизациялау жүзеге асатынын көрсетеді

https://doi.org/10.32921/2663-1776-2025-60(6)-jhd035

Саясат нұсқалары

– Көміртекті бейтарап денсаулық сақтау үшін ұлттық нормативтік-құқықтық негіз және институционалдық әлеует.

– Төмен көміртекті және климатқа төзімді денсаулық сақтау инфрақұрылымын дамыту бағдарламасы.

– Денсаулық сақтауда «Net Zero» демонстрациялық жобалары және халықаралық ынтымақтастық бағдарламасы.

Түйін сөздер: парниктік газдарды есепке алу, денсаулық сақтау орнықтылығы, 1-3 шолулары бойынша шығарындылар, денсаулық сақтаудағы нөлдік шығарындылар, экологиялық басқару, денсаулық сақтау жүйелерінің орнықтылығы, климаттық саясат, орнықты денсаулық сақтау жүйелері, Қазақстан.

На пути к углеродно-нейтральному здравоохранению: Политическая основа для декарбонизации системы здравоохранения Казахстана

Мукашев Н. [1], Lulu Silas Olan'g [2], Кулкаева Г.У. [3], Шайхиев С.С. [4], Исмаилов Р.С. [5], Шамшутдин Л.Б. [6], Аман А.М. [7]

[1] Директор Центра здравоохранения, политики и управления, Университет имени Сулеймана Демиреля, Алматы, Казахстан
[2] Старший преподаватель кафедры экономики, Школа социальных наук, бизнеса и права, Университет имени Сулеймана Демиреля, Алматы, Казахстан
[3] Председатель Правления, Национальный научный центр развития здравоохранения имени Салидат Каирбековой, Астана, Казахстан
[4] Заместитель Председателя Правления, Национальный научный центр развития здравоохранения имени Салидат Кайрбековой, Астана, Казахстан
[5] Директор Департамента стандартов электронного здравоохранения, Национальный научный центр развития здравоохранения имени Салидат Каирбековой, Астана, Казахстан
[6] Руководитель отдела совершенствования стандартов и нормативно-правовой базы электронного здравоохранения, Национальный научный центр развития здравоохранения имени Салидат Каирбековой, Астана, Казахстан
[7] Главный специалист, Национальный научный центр развития здравоохранения имени Салидат Каирбековой, Астана, Казахстан

Резюме/ Ключевые положения

Изменение климата и экологическая устойчивость становятся ключевыми детерминантами здоровья населения и устойчивости систем здравоохранения. При оказании жизненно важных услуг здравоохранение также вносит значительный вклад в выбросы парниковых газов вследствие высокого энергопотребления, медицинских процессов и цепочек поставок. В глобальном масштабе системы здравоохранения обеспечивают 4–5% совокупных выбросов — сопоставимо с авиационным сектором — при этом более 70% приходится на косвенные выбросы (Охват 3), связанные с закупками и цепочками создания стоимости.

Аналитическая записка предназначена для лиц, принимающих решения в области здравоохранения и экологической политики, руководителей медицинских организаций, специалистов по устойчивому развитию и закупкам, а также экспертов в области климата, цифровизации и трансформации систем здравоохранения.

В чем заключается проблема?

Сектор здравоохранения Казахстана функционирует без гармонизированной системы измерения и управления выбросами парниковых газов на уровне медицинских организаций и административных уровней. Действующее экологическое законодательство преимущественно ориентировано на промышленные отрасли и не учитывает специфику функционирования медицинских организаций. Отсутствие методологических стандартов учета выбросов и фрагментированность системы управления препятствуют системной декарбонизации.

Политический контекст и международная согласованность

Стратегия Республики Казахстан по достижению углеродной нейтральности к 2060 году (Указ Президента Республики Казахстан, 2023) устанавливает четкие национальные цели, однако не конкретизирует вклад сектора здравоохранения. Интеграция здравоохранения в данную повестку соответствует ключевым международным рамочным документам:

● Всемирная организация здравоохранения (2023): поощряет отраслевой учет выбросов парниковых газов, внедрение низкоуглеродных закупок и интеграцию климатической устойчивости в управление системой здравоохранения.

● Европейский зеленый курс (2019): определяет приоритет декарбонизации государственного сектора через «зеленые» закупки и энергоэффективную инфраструктуру.

● Организация экономического сотрудничества и развития (2022): подчеркивает возможности Казахстана по внедрению критериев устойчивого развития в законодательство о закупках и государственные тендеры.

Примеры Великобритании, Швеции и Франции демонстрируют, что декарбонизация здравоохранения является реализуемой задачей при наличии регуляторной определенности, цифровых систем данных и согласованных финансовых инструментов.

Варианты политики

– Национальная нормативно-правовая основа и институциональный потенциал для углеродно-нейтрального здравоохранения (Чистый ноль в здравоохранении);

– Программа развития низкоуглеродной и климатоустойчивой инфраструктуры здравоохранения;

Программа демонстрационных проектов Чистого нуля в здравоохранении и международного сотрудничества.

Ключевые слова: учет парниковых газов, устойчивость здравоохранения, выбросы охваты 1-3, нулевый выброс в здравоохранение, экологическое управление, устойчивость систем здравоохранения, климатическая политика, устойчивые системы здравоохранения, Казахстан.