UNIVERSITY OF CENTRAL ASIA
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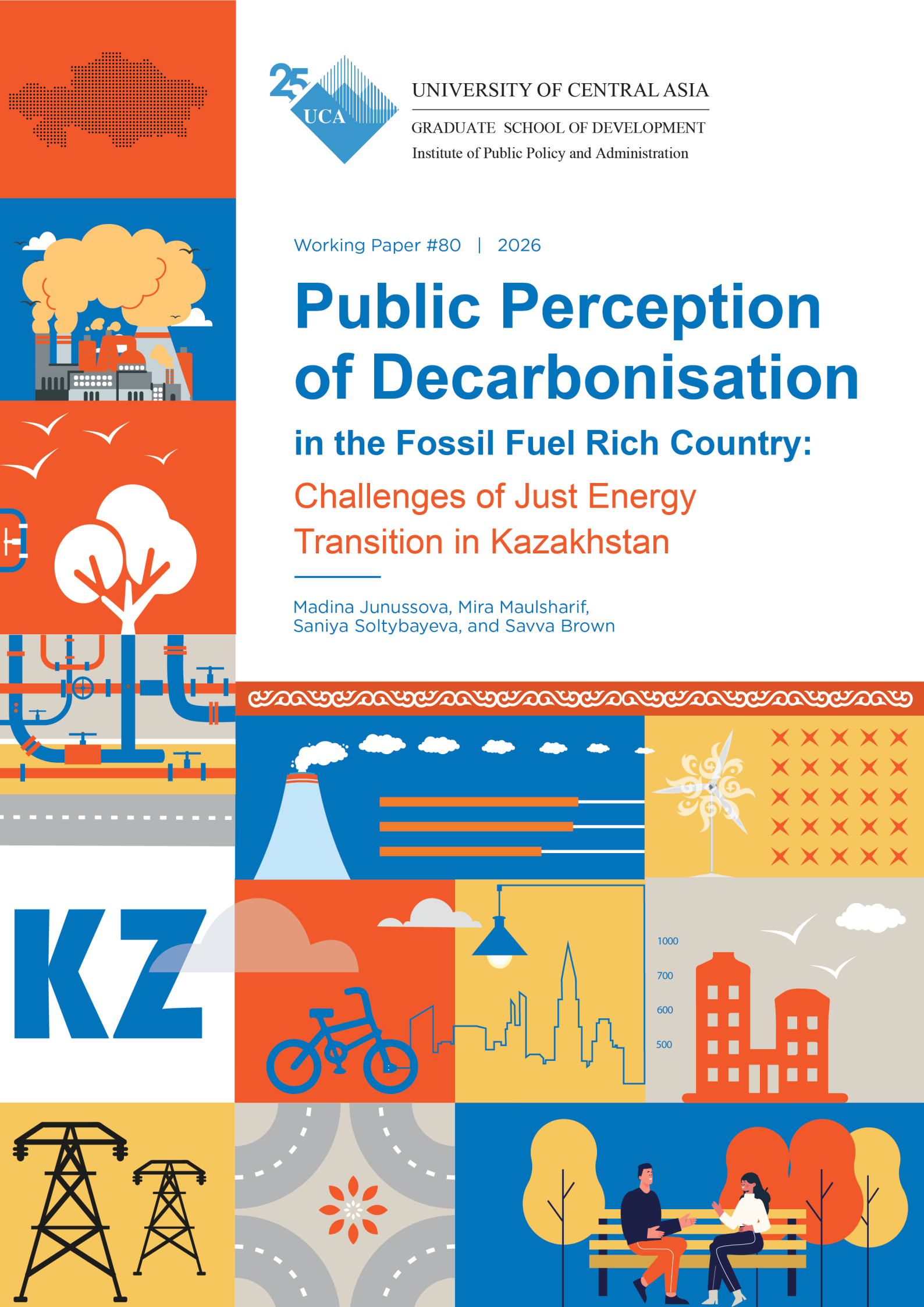
Public Perception of Decarbonisation

in the Fossil Fuel Rich Country:

Challenges of Just Energy Transition in Kazakhstan

Madina Junussova, Mira Maulsharif,
Saniya Soltybayeva, and Savva Brown



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Abstract

The paper presents the results of the first Central Asian study to investigate public perceptions of decarbonisation through a nationwide survey across urban areas, including fossil-fuel-dependent towns and industrial and non-industrial cities of Kazakhstan. The study's findings reveal that, while awareness of climate change is high, only half of the interviewed urban residents are familiar with national energy transition policies. Environmental and health benefits—notably improved air quality—emerge as the strongest motivations for supporting energy transition and renewables. However, fears of unemployment and economic instability persist as mining town dwellers expect job losses and remain unaware of "green job" opportunities. Structural barriers—including insufficient government support, skill shortages, and limited infrastructure—undermine public optimism on decarbonisation and economic diversification, especially in single-industry towns. The authors argue that Kazakhstan's decarbonisation strategy must prioritise inclusive regional policy for achieving a just transition. There is an urgent need for multi-level governance and regionally adapted approaches that link national carbon goals with local economic realities. Ensuring a just transition in Kazakhstan will depend on empowering regions, expanding skills and green job opportunities, and fostering inclusive participation that makes decarbonisation both socially equitable and locally owned.

Keywords: decarbonisation; just energy transition; public perception; Kazakhstan.

JEL codes: Q48; Q54; R58.

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Introduction

Kazakhstan's government has demonstrated its commitment to decarbonisation through several key initiatives, including the *Concept of Transition to a Green Economy* (2013), ratification of the *Paris Agreement* (2016), and adoption of the Strategy for *Achieving Carbon Neutrality by 2060* (2023). The Strategy sets ambitious goals to reduce the nation's dependence on fossil fuels, which continue to underpin the economies of many regions and communities. Yet, this transition presents profound economic and social challenges, particularly for those reliant on mining and extractive industries, where job losses are expected as fossil fuel production declines. Coal remains central to Kazakhstan's energy landscape—accounting for 70% of electricity generation and employing roughly 30,000 people. Despite its vast reserves of around 34 billion tonnes, among the world's ten largest, the country faces a critical dilemma: how to move from a coal-based system toward green energy while maintaining energy security, affordability, and environmental sustainability. This shift is further constrained by outdated infrastructure, limited grid integration, and the relatively low cost and accessibility of coal, all of which slow the pace of renewable energy adoption.

> Kazakhstan's energy infrastructure—particularly in gas processing and transmission—is outdated and fragmented, further complicating the shift from coal to cleaner energy sources. The western regions rich in natural gas remain disconnected from the national grid. Most gas pipelines across the country are over 50 years old and operate with more than 75% wear (IntergasCentralAsia, 2022). These structural weaknesses limit energy diversification and pose a strategic risk: heavy investment in natural gas infrastructure as a temporary solution could become economically unviable as global and national policies accelerate towards carbon neutrality, potentially creating stranded assets. Beyond technical and economic barriers, the transition also carries significant social implications. Recent protests in mining towns such as Zhanaozen and Ekibastuz reveal the socio-political sensitivities surrounding industrial decline and employment insecurity. Ensuring public understanding and engagement in the energy transition—across regions, demographics, and economic sectors—is therefore crucial for maintaining social stability and supporting a resilient, inclusive transformation.

Justice and energy equity are critical parts of the transition. Ensuring all residents, especially vulnerable groups, can benefit from energy transition should be a priority, especially in communities historically relying on fossil fuel industries. The availability of new job opportunities, re-qualification, and economic diversification are among the essential aspects that people may expect to be the main preconditions for just transition. However, people may feel excluded from conversations about energy transition and developing alternative energy sources like renewable energy. They could be stressed by uncertainty and worried that they do not have the skills to participate in a low-carbon economy. Therefore, understanding residents' needs and expectations is valuable for the transition and adjustment of the country's regional policy.

> The paper argues that Kazakhstan's energy transition is not only a technological process but also a social transformation requiring a new type of governance grounded in justice, inclusion, and adequate regional policies. The study employed a nationwide Computer-Assisted Telephone Interview (CATI) survey

of 1,014 Kazakh citizens with an equal number of males and females to examine public awareness and perceptions of the renewable energy transition. The analysis includes regional and socio-economic differentiation through a five-cluster typology of urban areas reflecting Kazakhstan's diverse industrial and developmental contexts. Study findings reveal high climate awareness but limited understanding of national transition policies, highlighting the need for participatory, regionally tailored approaches. Understanding citizens' perceptions and expectations provides an essential foundation for designing socially just and regionally balanced transition policies in Kazakhstan.

The concept of just transition: International best practice and lessons learned

The concept of a 'just transition' addresses the socioeconomic challenges of shifting from high carbon to sustainable economies, ensuring that workers, communities, and industries are not left behind. Based on reviews of just transition initiatives across 25 countries and 74 regions Krawchenko and Gordon (2021) asserted that just transitions are grounded in principles of distributional justice (equity in benefits and burdens), procedural justice (inclusion of stakeholders), and recognitional justice (acknowledging the rights of marginalised groups). These principles are central to ensuring that economic transformations align with fairness and inclusivity.

> At the national level, various countries have implemented governance mechanisms to manage transitions effectively. For example, Canada established a Just Transition Task Force for coal workers, offering recommendations such as funding local infrastructure and creating re-employment centres. Spain employs Just Transition Agreements to phase out coal and nuclear operations, integrating measures like worker retraining and environmental restoration projects. Similarly, the European Union's Just Transition Mechanism mobilizes €150 billion to link decarbonisation efforts with regional economic support, focusing on reskilling and community investments (Marty, 2020). Policies supporting workforce development, energy transition funding, and spatial planning further reinforce national efforts, as seen in Germany's National Skills Strategy, Korea's Green New Deal, and Greece's planning for lignite regions (Krawchenko & Gordon, 2021).

Regional-level initiatives focus on addressing localised challenges, particularly employment losses and economic restructuring. Scotland's Just Transition Commission aligns regional actions with national decarbonisation goals, while New Zealand's Taranaki 2050 Roadmap integrates partnerships to diversify economies impacted by oil and gas declines (Government of New Zealand, 2019). These regional approaches demonstrate the importance of tailoring policies to specific community needs.

> Despite progress, significant gaps remain in implementing just transitions. Policy coordination often suffers from a disconnect between industrial development, workforce training, and infrastructure planning. Urban biases in innovation investments frequently leave rural regions excluded from economic opportunities. Equity issues also persist, with marginalised groups and low-income communities receiving limited attention in existing frameworks (Krawchenko & Gordon, 2021). Most policies are reactive, addressing challenges only after economic disruptions have occurred. Furthermore, environmental rehabilitation of industrial sites, such as abandoned coal mines, is often underprioritised, posing long-term liabilities for affected communities.

Managing just transitions requires proactive, multi-level strategies that emphasize social inclusivity and sustainable growth. The analysis of international practices underscores the importance of aligning policies with fairness and equity principles while addressing systemic challenges through innovation and stakeholder inclusion.

The studies by Bankwatch (2024) "How to Advance a Just Transition in the Western Balkans", Bankwatch (2023) "Repower Communities – Not Fossil Fuels" (Rösch & Epifanio, 2022) "Just transition in 7 central and eastern European countries" argue that:

- just transition policies must be built on structured and inclusive public participation, ensuring that local communities and stakeholders are actively involved in decision-making;
- local governments need to be empowered with financial and institutional capacity to drive transition initiatives at the regional level;
- accessible and transparent financing mechanisms are essential to support economic diversification and social protections for affected workers;
- contradictory policies that promote fossil fuel investments while committing to decarbonisation must be avoided to prevent lock-in effects;
- and strong governance structures with accountability measures are necessary to ensure effective implementation, prevent misallocation of resources, and build public trust.

Particularly, the briefing "How to Advance a Just Transition in the Western Balkans" by Bankwatch (2024) evaluates the progress of coal-dependent countries in the region toward a just transition. An assessment of country-specific approaches reveals stark contrasts. North Macedonia emerges as a regional leader, having adopted a just transition roadmap and set an ambitious coal phase-out date for 2027—a move that helped secure international funding through the Climate Investment Funds Accelerating Coal Transition program. However, despite its relatively advanced planning, the country has struggled with public participation and transparency in decision-making processes. In contrast, Bosnia and Herzegovina lacks a clear coal exit timeline, with some regions—such as Republika Srpska—continuing to permit new coal plants. The country's just transition roadmap remains incomplete, and municipalities exhibit low levels of engagement in transition planning. Kosovo faces similar challenges, with its energy strategy focusing solely on emissions reduction rather than broader economic and social dimensions of the transition. Serbia, while acknowledging the need for just transition, has no coal phase-out date and has prioritised reducing greenhouse gas emissions over economic diversification and social support mechanisms. Montenegro, despite pledging a coal exit by 2035, lacks a finalized National Energy and Climate Plan and has yet to implement meaningful policy actions.

> The briefing highlights the weak role of municipalities in transition planning, with local governments often excluded from high-level decision-making. Many coal-dependent municipalities lack the financial capacity and institutional knowledge to develop sustainable alternatives, leaving them dependent on central government directives. Additionally, international financial support is underutilized, as many municipalities are too small to attract investment or lack the authority to negotiate directly with financial institutions.

The "Repower Communities – Not Fossil Fuels" briefing by Bankwatch (2023) critically evaluates the REPowerEU plan and its implementation across 15 EU Member States through their revised national recovery and resilience plans. One of the key positive findings is that many national REPowerEU chapters include measures to strengthen renewable energy deployment and energy efficiency. The European Commission has reinforced the role of collective self-consumption and citizen participation, highlighting that by 2050, up to 45% of renewable electricity could be community-owned. This pre-

sents a major opportunity for local empowerment and democratisation of the energy system. Some Member States, such as Spain, Lithuania, and Poland, have incorporated ambitious policies supporting energy communities and localised clean energy initiatives. However, implementation has been unequal, with other countries lagging behind in integrating citizen-driven energy solutions.

Despite these advancements, several shortcomings are evident. Public consultation processes in many countries, including Greece and Croatia, have been superficial, rushed, or non-transparent, preventing meaningful civil society participation. Instead of accelerating the transition to clean energy, some governments continue to invest in fossil fuel infrastructure, particularly in liquefied natural gas terminals and gas pipelines, as seen in Croatia, Poland, and Slovakia. These investments contradict the core principles of REPowerEU, which aims to reduce Europe's reliance on fossil fuels. Another major challenge is the slow disbursement of Recovery and Resilience Facility funds, with only 19% of the allocated €800 billion distributed by mid-2023, delaying crucial energy transition projects.

Beyond the financial and governance issues, the report highlights additional areas of concern. Transparency and accountability mechanisms remain weak in some national plans, with missing environmental impact assessments and insufficient clarity on how funds are being allocated. The issue of energy poverty is also inadequately addressed, with some Member States, including the Czech Republic and Slovakia, failing to provide adequate support for vulnerable households struggling with high energy costs. Furthermore, sustainability risks remain a pressing issue, as certain renewable energy projects threaten biodiversity, such as wind farms in Estonia that could lead to deforestation and ecosystem disruption.

The study on "Just transition in 7 central and eastern European countries" aligns with the findings from the reports on the Western Balkans and REPowerEU. The insights from this study reinforce the argument that just transition strategies must be locally driven, financially accessible, and institutionally supported. The paper provides additional empirical evidence on the risks of excluding public engagement, particularly in centralised decision-making systems. Lessons from the experience of Romania, Bulgaria, and Greece include:

- Ensuring structured, community-driven transition policies that prioritise affected workers and local stakeholders.
- Empowering local governments with financial resources and decision-making authority to drive regional economic transformation.
- Addressing financial accessibility and governance constraints to avoid delays in disbursing transition funding.
- Avoiding fossil fuel lock-in by aligning policies with clear decarbonisation roadmaps to ensure coherence between commitments and investments.
- The findings strengthen the broader discourse on just transition, offering concrete examples that can inform policy frameworks and enhance engagement of public opinion in the transition process.

Economic diversification and decarbonisation

For centuries, coal mining has shaped community identity and cultural heritage (Bosca & Gillespie, 2018). Thus, transformation should offer not just material security but also a way for people to preserve their cultural practices. Successful transition assures communities that while their economic activities must change, their core identity and beliefs can remain intact. It implies that transition must be driven from within communities, empowering people to make their own choices rather than imposing top-down, predetermined solutions (Drabik, 2024). While guidance from the government on adapting to new economic and environmental realities is important, it should not dictate specific outcomes. Instead, allowing people to own the process and be responsible for the results ensures that the transition is socially accepted and sustainable.

> Many communities in Kazakhstan have deep historical ties to coal mining, with generations of families having worked in the industry. This strong sense of place attachment and identity tied to mining creates an additional layer of complexity in transitioning to a low-carbon economy (Della Bosca & Gillespie, 2018). The loss of coal jobs threatens not only livelihoods but also the cultural identity of these towns, which can lead to resistance against transition efforts.

Marais et al. (2022) explore similar themes in South African mining towns, where shifts away from traditional industries have led to social discontent and community fragmentation. The study highlights the importance of addressing not only economic impacts but also social dimensions when planning for industry transitions. Programs that facilitate community engagement and involve local leaders in the transition planning process may help mitigate some of the social resistance and enhance community buy-in (Junussova et al., 2024).

> Moreover, Della Bosca and Gillespie (2018) argue that creating alternative narratives and new forms of local identity around sustainable industries can be a powerful tool in easing transitions. By fostering pride in emerging sectors like renewable energy, local governments can help communities embrace change as a positive development. For instance, public outreach and educational programs that highlight the benefits of renewable energy could play a role in reshaping community identity and increasing acceptance of decarbonisation initiatives.

Australia's economic diversification and decarbonisation have exposed a persistent tension between national policy objectives and local realities in coaldependent regions. Coal has historically underpinned Australia's economic stability and identity, especially in towns such as Lithgow, New South Wales, where it remains central to local employment and socioeconomic structures Della Bosca, H., & Gillespie, J. (2018). The entrenched dependence fosters resistance to change and complicates efforts to achieve a "just transition" toward lowcarbon alternatives, with Australia lagging other developed economies in phasing out coal amid ongoing political and infrastructural support for coal extraction and export.

> At the community level in Australia, coal holds deep cultural and emotional significance. In generational coalmining communities like Lithgow, residents' attachments to coal extend beyond economic livelihoods to shared history

and identity, as evidenced in public submissions to planning processes where coal is framed as a multigenerational legacy (Edwards et al., 2022). Such attachments intensify opposition to decarbonisation perceived as threatening community cohesion and local economies, particularly in the absence of comprehensive support for alternative industries (Weldegiorgis, 2025). These dynamics highlight ethical and practical challenges in energy transition policy, underscoring the need for inclusive approaches that recognize sociocultural values and support communityspecific economic diversification to foster equitable transitions in coaldependent regions.

> The experiences of Australia and South Africa offer valuable lessons for Kazakhstan, where mining communities similarly face socio-cultural and economic disruption amid energy transitions. There is a need for public perception studies to understand whether mining is purely an economic backbone or also a source of local identity and intergenerational pride, making communities resistant to externally imposed change. As in Australia and South Africa, Kazakhstan's transition must address not only job losses but also the erosion of community identity and place attachment. Evidence-based, effective transition strategies should empower local communities to shape their futures, supporting bottom-up planning and alternative narratives that honour industrial heritage while embracing new innovative industries for sustainable economic diversification. Public engagement, local leadership, and education campaigns highlighting the potential of renewable sectors can help reframe the transition as an opportunity rather than a threat, thereby enhancing social acceptance and long-term sustainability.

Studies on energy transition in Kazakhstan

While research on Kazakhstan's renewable energy transition has expanded in recent years, most studies remain focused on policy, governance, and institutional dimensions, with limited attention to the social and perceptual aspects of decarbonisation. Much of the existing literature examines the policy environment of the energy transition in Central Asia, particularly Kazakhstan. Using quantitative methods, Radovanovic et al. (2021) assessed policy frameworks and data to evaluate progress in the regional energy transition, while Filipovic et al. (2024) analysed the shift toward green energy in five Central Asian countries using infrastructure and economic indicators. Similarly, Guliyev (2024) compared renewable energy policies in Azerbaijan and Kazakhstan, identifying governance and implementation challenges that shape policy effectiveness.

At the national level, studies increasingly explore how citizens perceive and engage with the energy transition. Nakamura et al. (2023) found through online surveys that knowledge of renewable technologies, particularly solar energy, positively correlates with support for clean energy infrastructure. In contrast, Mouraviev (2021) used qualitative interviews to examine public understanding of energy security and sustainability, revealing persistent uncertainty about government commitments and limited citizen involvement in policy processes. However, few studies explicitly integrate the concept of a just transition into the analysis of Kazakhstan's decarbonisation path.

Recent literature on single-industry towns (monotowns) in Kazakhstan situates energy transition within a broader social and regional policy framework. This work highlights that national-level decarbonisation strategies cannot succeed without addressing local vulnerabilities. Research by Kuznetsova and Vaillancourt (2023), Junussova et al. (2024), and Kalmykov and Malikova (2017) underscores the necessity of a phased and regionally sensitive transition that balances environmental goals with employment, retraining, and social protections in coal-dependent communities such as Ekibastuz. Kuznetsova and Vaillancourt (2023) propose a detailed roadmap toward a 26% coal phase-out by 2030, noting that employment in coal mining could fall by 40%, thus requiring parallel expansion of renewable energy jobs and community-based support programmes. Similarly, Junussova et al. (2024) present three scenarios - unsuccessful, rapid, and gradual decarbonisation - arguing that only the latter, incorporating local input and economic diversification, ensures social stability. Kalmykov and Malikova (2017) stress that coal remains deeply embedded in Kazakhstan's energy system, responsible for over 80% of greenhouse gas emissions, and highlight the persistence of public resistance due to limited viable alternatives and outdated infrastructure.

Broader governance and political economy research situate these challenges within Kazakhstan's post-Soviet institutional context. The green transition unfolds amid structural dependence on natural resources, regional inequality, and hybrid governance arrangements that shape public trust and institutional credibility. Orazgaliyev and Akhmetzharov (2021) describe Kazakhstan's development model as a rent-based system exhibiting traits of the resource curse, where oil and gas dependence entrenches economic and spatial disparities. Rodríguez-Pose et al. (2024) demonstrate how these imbalances translate into uneven well-being and public service quality, fueling political frustration that undermines the legitimacy of sustainability policies. Turganbayev and Diener

(2018) trace the evolution of regional economic strategies, noting a shift from redistributive to growth-pole models that widened urban–rural gaps and limited local participation in environmental decision-making.

> In the political-administrative dimension, Knox and Orazgaliyev (2025) and Kurmanov, Selteyev, and Almaganbetov (2024) highlight Kazakhstan's hybrid governance - where centralised decision-making coexists with selective modernisation reforms. The "Listening State" initiative introduced digital participation mechanisms, but these often serve to legitimise top-down agendas rather than enable genuine feedback. As a result, environmental reforms are often viewed as state-imposed rather than co-created, eroding trust in transition-related policies.

This governance context intersects with Kurmanov et al. (2024), who show that autocratic institutional features weaken public feedback loops, thereby reducing the effectiveness of open government reforms. Rodriguez-Pose et al. (2024) further warn that blanket policies, including infrastructure investment programmes, have failed to address regional disparities because they neglect localised needs and citizen input. Such evidence reinforces the argument that successful energy transition policies must be participatory and regionally adaptive, ensuring that decision-makers have access to accurate, disaggregated information on public attitudes and regional priorities.

> Despite extensive research on Kazakhstan's renewable energy policies and regional inequalities, the social dimensions of the transition remain underexplored. Most studies focus on governance and infrastructure rather than how citizens perceive or experience energy transition. As Kazakhstan moves toward a low-carbon economy, understanding public attitudes and readiness is essential for ensuring that the process is socially legitimate and inclusive. The study addresses this gap by providing a nationwide analysis of public perceptions of the energy transition, linking them to demographic and spatial factors to inform more equitable policy design.

The study objectives

International research on citizen attitudes toward renewable energy transitions and just transition policies typically employs large-scale surveys or targeted qualitative methods. Some studies, such as Ostfeld and Reiner's (2020) research in Scotland, have used focus groups and citizens' juries to explore public views on the just transition. Scotland's extensive shift from fossil fuels over the past two decades makes it a leading case study within the EU. By contrast, Cha (2020) examined attitudes in a single coal-dependent community, the Powder River Basin in Wyoming, USA, using informal interviews through a snowball sampling method. This approach enabled her to integrate into the community and gather nuanced, in-depth perspectives. Both studies effectively assessed public attitudes toward energy transitions and support mechanisms such as subsidies, worker retraining, and investment in new technologies.

> One limitation of qualitative methods such as interviews and focus groups is that they engage only a small segment of the population. To address this, many researchers use large-scale surveys to assess broader public opinion. For example, Kim et al. (2020) conducted an in-person survey of 1,000 South Koreans to evaluate attitudes toward a proposed Energy Transition Plan, incorporating demographic data to identify patterns in responses. Similarly, Chapman et al. (2022) conducted an extensive online survey in Japan with 6,000 participants to measure energy policy literacy and willingness to adopt lifestyle changes for the transition. In a more targeted approach, Gazamararian (2024) compared attitudes in U.S. coal-mining regions with national sentiment by combining data from a 248-participant in-person survey in Appalachia with a 1,000-participant online survey. His study specifically examined support for just transition policies, such as worker retraining, income support, and relocation assistance.

This study aims to capture critical public perspectives, mainly focusing on how regions, including mining towns, non-mining cities, and diverse demographic groups of Kazakhstan, perceive the ongoing energy transition and the prospects for sustainable economic growth. Based on the literature review, including Kazakh studies, the study will analyse factors such as the foundation for a just social transition—focusing on social inequality, mismatches in understanding and awareness, weak communication between local demand and supply, and the identification of unique local strategies—while incorporating any additional factors identified through the review.

> The research questions are as follows:
>
> - What are people's attitudes to decarbonisation and reaching local carbon neutrality? How do they differ depending on age groups, genders, and different urban areas of Kazakhstan?
> - What economic diversification opportunities exist from the perspectives of residents? How do they differ depending on age, gender, and different urban areas of Kazakhstan?

The research findings aim to inform national-level policy decision-makers, support local communities in achieving a balanced and sustainable future, and offer valuable insights into the complex dynamics of energy transitions and economic diversification in Kazakhstan.

Pushing decarbonisation from the top, assuming that residents are aware of the proposed changes or the potential benefits and challenges of decarbonisation, will not bring any progress. Suppose data reveals gaps in awareness or a lack of support for decarbonisation. In that case, a slower decision-making process and more participatory policymaking will provide the necessary space for transition. It would signal an urgent need for the national government to improve dialogue with subnational governments and residents.

The study findings and followed policy recommendations will be valuable for developing better regional policy and recognising the economic diversification opportunities from residents' perspectives. Their understanding of how to gradually transition while minimising harm to their livelihoods will play a crucial role in shaping policies supporting decarbonisation and sustainable regional development.

Methodology

The study started with a literature review and a nationwide phone interview survey of 1,000 Kazakh citizens to capture public perceptions of the renewable energy transition. By incorporating demographic analysis, we aim to assess awareness of energy transition and explore potential variations in attitudes across different regions. The survey method was employed to gather data on public awareness of decarbonisation, just transition, and economic diversification. The survey engaged 1,000 respondents through Computer-Assisted Telephone Interviewing (CATI).

The sample was gender-balanced and reflected Kazakhstan's adult age structure (18+). Interviews were conducted in Kazakh and Russian, allowing participants to respond in their preferred language. Ethical protocols were strictly followed: participation was voluntary, anonymity was guaranteed, and informed consent was obtained from all respondents.

Following a preliminary analysis of the collected data, all urban areas were categorised into five distinct clusters based on their economic profile, industrial orientation, and development prospects:

- Large Cities Cluster includes Almaty, Astana, and Shymkent, each enjoying special republican status. These cities represent diversified urban economies, advanced infrastructure, and serve as main destinations for internal migration.
- Coal Mining Towns includes Karaganda, Zhezkazgan, and Ekibastuz, strategically significant for national coal production. Karaganda's long-standing mining base supports domestic and export needs, while Ekibastuz's open-pit mines and power plants anchor national energy supply.
- Oil and Gas Towns includes Zhanaozen, Aktobe, Atyrau, and Kyzylorda, whose economies depend on hydrocarbon extraction and processing. Kyzylorda, though not a primary extraction site, functions as a transport and processing hub within the national hydrocarbon chain.
- Industrial Cities with Renewable Potential includes Balkhash, Oskemen, Uralsk, Pavlodar, and Taldykorgan. These cities combine strong industrial bases in metallurgy and energy with emerging solar and wind projects.
- Other Mining Towns includes Satpaev, Stepnogorsk, Temirtau, and Ridder, characterised by economic dependency on extractive industries, limited diversification, and infrastructural constraints, which reduce their adaptability to a green transition.

Demographic characteristics

Data was collected from 1,014 respondents. The data shows that the respondents' ages are spread across a wide range, with a mean age of approximately 39 and a broad range from 18 to 80. The study participants' proportions of men and women were equal in each geographic area. Data were collected in Kazakh and Russian, ensuring linguistic accessibility and ethical compliance. The survey covered all large and small industrial and non-industrial cities and towns from various geographic regions of Kazakhstan (Annex 1, Table 1a). Overall, the data shows a wide range of residence durations, with the average respondent having lived in their current location for about 24 years. The shortest period indicated by respondents was just a year, and the longest was more than 70 years.

Educational attainment is balanced between males and females, and the highest representation is seen in bachelor's degrees or specialist diplomas, with very similar participation from both genders: 26,4% and 26,9%. The findings across cities and towns indicate that the majority of the population (53.4%) holds a Bachelor's degree or Specialist diploma, followed by those with a Secondary vocational or college education (36.4%) (Annex 1, Table 2a). The 25-54 age group has the highest educational attainment, with the most prominent proportion holding bachelor's degrees or specialist diplomas (38.6%) and secondary vocational or college education (24.9%). The 18-24 age group shows a lower level of higher education, as many still complete their studies. The 55+ age group exhibits a decline in higher education levels, likely reflecting historical educational access differences.

The service sector stands out as the largest, with nearly 41% of individuals (40.8%) working in self-employment or business, indicating a strong preference for this type of employment. However, the mining and manufacturing sectors also account for a significant portion, with 11.9% of the total, suggesting a robust presence in these industries. Together, the education and healthcare sectors account for 13.6%, indicating a significant portion of individuals working in these essential industries. Similarly, unemployment affects 13.8% of individuals, highlighting potential challenges in job availability or market conditions. The mining, manufacturing, and energy sectors are predominantly dominated by males, with significantly higher percentages of male representation than females (Annex 1, Figure 3a). Both genders are well represented in the service sector, with males slightly leading. In agriculture, while males make up a higher percentage, overall representation remains low for both genders. Unemployment is notably higher among females than males, indicating a potential gender gap in employment opportunities.

1. Citizen Perception of the Energy Transition

This section provides a comprehensive analysis of public perceptions and awareness regarding Kazakhstan's energy transition. It examines the population's understanding of climate change, the primary channels through which information is obtained, and the extent of public knowledge concerning national energy transition policies. Particular attention is given to variations across demographic and geographic groups, including differences by age, gender, and settlement type. The analysis further explores public attitudes towards the anticipated benefits

and challenges of the energy transition, including risks such as job losses and social tensions. Additionally, it assesses levels of support for renewable energy technologies, willingness to undertake supportive actions, and expectations concerning the role of government and other stakeholders in facilitating a just and inclusive transition.

Climate change awareness is critical in shaping public support for sustainable policies and decarbonisation efforts. The survey reveals consistently high awareness (92.3%) across all age groups (above 85%), all settlement types (above 90%) and across both genders (above 90%) (Annex 1, Table 1.1). However, this broad awareness has not translated into an understanding of concrete government policy actions, thereby reflecting cross-national evidence of persistent discrepancies between general climate awareness and policy-specific comprehension (Drews & Van den Bergh, 2016; Pierce et al., 2009). Particularly, more than half of respondents (54.8%) reported knowing nothing about Kazakhstan's energy transition policies (Annex 1, Table 1.2). This reflects limited communication effectiveness and low institutional trust, both shown to weaken policy support (Hammar & Jagers, 2006; Kulin, 2024). There are moderate differences across city types, with unawareness of national strategies ranging from 50.7% in large cities to 61.1% in industrial cities. On average, women are less aware than men (64% vs. 47%), whereas youth show slightly higher unawareness (68.3%) compared to other age groups. Among those who could identify specific government measures, the most frequently mentioned was the Concept of Transition to a Green Economy (2013), acknowledged by 30.4% of respondents. These findings reveal persistent information gaps and uneven patterns of policy awareness across demographic and geographic groups.

Understanding the main channels through which people obtain information about climate change and energy transition policies is essential for designing effective public communication strategies. Consistent with prior studies (Leiserowitz, 2005; Nisbet, 2009), digital platforms dominate as the primary source of information on climate change (82.5%) and energy transition policies (48.7%), far surpassing traditional media (23–25%) (Annex 1, Tables 1.3 and 1.4). Educational and professional contexts represent an additional channel shaping awareness of energy transition policies (21.8%), though their impact is concentrated mainly in large cities (12%). A large majority of respondents (82.8%) regard media coverage as essential for improving awareness, underscoring the continued centrality of both digital and traditional media (Annex 1, Table 1.5). The emphasis on media as a key vehicle of awareness aligns with evidence that media framing significantly affects public perception (Bain et al., 2012). At the same time, the limited perceived effectiveness of community discussions, educational programmes, and government campaigns indicates weak institutional engagement and highlights the need to strengthen structured outreach beyond media channels.

More than half of respondents (68.7%) believe that energy transition will have a beneficial impact, while 17.6% associate it with a negative impact, and 13.7% either see no effect or are uncertain about its impact (Annex 1, Table 1.6). This mirrors global patterns where support for renewables outweighs fossil fuels, particularly when environmental benefits are salient (Bergquist et al., 2020; Groh & von Möllendorff, 2020). Positive perceptions of the energy transition are most prevalent among economically active adults aged 25–54 (47.3%), with substantially lower support among younger (18–24; 10.1%) and older

(55+; 11.3%) respondents. While women (33.1%) and men (35.6%) exhibit broadly similar levels of support, age-based differences are more pronounced, suggesting that attitudes toward the transition are shaped more by life stage and economic activity than by gender. These results contrast with broader international evidence indicating that women and younger people tend to be slightly more supportive of climate action (Olson-Hazboun et al., 2018; Thomas et al., 2022), implying that contextual economic factors and exposure to transition-related discourse in Kazakhstan may play a stronger role than demographic characteristics.

> Positive perceptions of the energy transition are largely driven by expectations of environmental and health improvements, reflecting evidence that environmental sustainability considerations and pollution reduction consistently emerge as the strongest predictors of public support for renewable energy expansion (Groh & von Möllendorff, 2020; Zahran et al., 2006). Nearly all respondents (95.4%) expect better air quality and public health, with this motivation strongest among economically active adults aged 25–54 (65.2%) (Annex 1, Table 1.7). Gender differences are minimal, while economic factors such as energy price reduction and job creation play a relatively minor role in public support.

Concerns about the energy transition centre on labour-market disruption such as job loss fears (61.0%) (Annex 1, Table 1.8) that are consistent with international evidence showing employment insecurity as a dominant risk perception (Tvinnereim & Ivarsflaten, 2016; Carattini et al., 2018). At the same time, rising poverty (43.9%) is seen as a key secondary effect and population outflow (9.8%) as a minor risk. Concerns about job losses are most acute in oil and gas towns (74.9%), followed by coal (59.8%) and industrial cities (58.4%), whereas large cities show the lowest level of concern (53.3%), reflecting the influence of extractive-sector dependency on resistance to renewable policies (Olson-Hazboun et al., 2018). Poverty is perceived most strongly in large cities (53.3%) and least in coal towns (40.2%), indicating differing local understandings of vulnerability. At the demographic level, economically active adults (25–54) express the highest anxiety (67.8%) about job losses, while older respondents (55+) are most concerned about rising poverty (80.3%), reflecting their greater vulnerability to income insecurity during the transition. Gender differences, though modest, show a clear pattern: women are more likely to cite job losses (76.4% vs. 50.1%), whereas men more often anticipate poverty (58.3% vs. 23.6%) and population outflow (12.5% vs. 5.8%). It also aligns with Groh & von Möllendorff (2020), who noted that women tend to emphasize employment security and fairness.

> Concern over job losses linked to reduced fossil fuel extraction confirms that labour-market risks remain central to public perceptions of the energy transition. Such concerns reflect the broader pattern that perceived economic threats reduce support for transition policies (Frondel et al., 2017; Andor et al., 2016). Around half of respondents expressed concern, with 21.4% very and 29.5% moderately concerned about the risk of job losses (Annex 1, Table 1.9). Concern is lowest among youth (18–24), where 40.0% are concerned, and highest among economically active adults (25–54), where 52.1% express concern, followed by older respondents (55+) with 56.0%. Spatially, concern levels are highest in coal towns (58.8%), followed by oil and gas towns (53.3%), and remain significant across industrial and urban areas. Gender differences persist,

with men more likely to be unconcerned (24.3% vs. 12.4%), reinforcing that perceptions of risk are socially differentiated.

> Concern over unemployment is the dominant expected outcome of job losses (69% total) across all demographic and settlement groups, with the highest levels in oil and gas towns (75.3% within the group) and among economically active adults of 25–54 age (70.8%) (Annex 1, Table 1.10). Expectations of social tensions are sizable (up to 54.7% in the group of other mining towns), while population outflow remains a minor expectation (generally 6–14%). Price rises are a minor concern overall but most salient in oil & gas towns (13.6%). These findings suggest that beyond unemployment, people anticipate local social strain rather than large-scale migration or inflation, highlighting concerns about community stability and the social costs of transition in fossil fuel–dependent areas.

Despite persistent concerns over job losses, public attitudes toward the energy transition reveal a cautious optimism: over half (55.2%) expect it to generate new employment, a view consistent across gender and age groups (Annex 1, Table 1.11). Optimism regarding new employment opportunities aligns with findings that perceived economic co-benefits enhance policy support (Ansolabehere & Konisky, 2014; Bergquist et al., 2020). Such optimism peaks in large cities (59.1%), while coal towns exhibit the highest level of scepticism (79%) that underscores spatial divides in perceived economic prospects, reflecting greater uncertainty in regions most dependent on fossil fuels. When asked about the drivers of job creation, respondents predominantly identified government support (45.7%) and local infrastructure development (42.0%) as the principal enablers, cited by nearly half of all groups and most strongly by older respondents (56.6% among those aged 55 and above). Workforce-related factors ranked moderately (around 17–23%), although younger respondents placed greater emphasis on the availability of skilled labour (30.1%). In contrast, private and foreign investments were consistently viewed as secondary (9–13%), with little variation across demographic groups. These results indicate a prevailing expectation that public policy and infrastructure spending—rather than private capital—will drive employment growth during the energy transition.

> Across all settlement types, respondents consistently identify government support (45.7%) and foreign investments (42%) as the main drivers of job creation in the energy transition (Annex 1, Table 1.12). These two factors dominate across all city types, with no significant variation between large, industrial, or mining settlements. Indeed, expectations that the government will drive job creation underscore the centrality of institutional trust and public-sector leadership in socio-political acceptance (Wüstenhagen et al., 2007; Kulin, 2024). Private investment (18.8%) occupies a secondary position, comparable to the availability of qualified personnel (18.3%), and exceeding capacity building (12.3%) and local infrastructure development (10.6%). Overall, the findings indicate a shared expectation that public policy and external financing, rather than domestic private-sector activity, will be the key engines of employment creation during the transition.

Public support for renewable energy development is high (76.8%) with minimal opposition (6.1%), showing broad consensus across genders and age groups (Annex 1,

Table 1.13). Support is strongest among older respondents (55+) (83.6%) and residents of large cities (82.9%), while somewhat lower in other mining towns (66.1%). A moderate neutral share (17.2%) suggests that some respondents remain undecided, indicating room for further engagement and awareness efforts. This overall endorsement translates primarily into support for familiar technologies namely solar (89.9%) and wind (73.5%), which dominate preferences among alternative energy sources across all demographic and settlement groups (Annex 1, Table 1.14). It is consistent with Olson-Hazboun et al. (2016), who found that visible, familiar technologies attract stronger support. Hydropower enjoys moderate backing (44.9%), whereas less familiar options such as green hydrogen (30.1%), geothermal energy (29.6%), and carbon capture and storage (29.1%) receive limited support. By contrast, lower acceptance of nuclear energy (19.7%) corresponds with studies emphasizing perceived safety risks and low trust (Howie et al., 2020; Karaeva et al., 2022). Overall, while public enthusiasm for renewables is strong, it remains concentrated on well-known sources, indicating the need for communication strategies that broaden awareness and confidence in emerging low-carbon technologies.

Support for the energy transition is widespread (73.9%), indicating strong overall alignment with decarbonisation goals (Annex 1, Table 1.15). The remaining 26% of respondents are either opposed (10.2%) or undecided (16.0%), suggesting that while resistance is limited, uncertainty remains a meaningful barrier. Gender and age patterns are largely uniform, though women and younger respondents exhibit slightly higher indecision (19.1% and 19.9%, respectively). Spatially, endorsement is highest in large cities (77.2%) and other mining towns (80.3%), while industrial cities show both the lowest support (68.2%) and the highest uncertainty (21.5%), implying that populations most directly linked to carbon-intensive industries require more targeted engagement and assurance regarding the socioeconomic outcomes of the transition.

Despite broad endorsement, willingness to take personal action remains limited, a pattern documented across contexts, where citizens support government-led rather than individual initiatives (Carattini et al., 2018). Particularly, the dominant form of engagement is support for policies or initiatives (around 46% across genders and 38–55% across settlement types), reflecting expectations that the government should lead the transition (Annex 1, Table 1.16). In contrast, behavioural and entrepreneurial commitments such as adopting public transport (≈18–22%), installing renewables (20–25%), or starting energy-efficient businesses (5%), remain limited, suggesting low readiness for lifestyle or investment shifts. Gender patterns reveal differentiated orientations: women tend toward everyday conservation (energy saving at home 26% vs. 20% for men), while men are more inclined toward technological participation (renewables installation 25% vs. 20%). Across settlements, differences are minor once group size is accounted for, underscoring a general tendency to perceive the transition as a matter of policy support rather than personal transformation.

Public opinion strongly affirms that the energy transition should be a governmental priority (68.4%) (Annex 1, Table 1.17), echoing findings that socio-political acceptance depends on perceptions of competent governance and policy effectiveness (Wüstenhagen et al., 2007; Kulin, 2024). However, the persistence of scepticism (17.9%) and uncertainty (13.7%), particularly among younger respondents and residents of fossil-fuel towns, points to uneven understanding

of how government-led transition policies translate into tangible benefits. Persistent scepticism in fossil-fuel regions is consistent with Tvinnereim and Ivarsflaten (2016), who highlight how perceived cost burdens among affected workers reduce policy support. The narrow gender difference suggests that the key divide is not attitudinal but contextual, shaped by local economic dependencies and varying levels of exposure to transition discourse.

The findings demonstrate that while there is generally high awareness of climate change in Kazakhstan, particularly in large and industrial cities, significant informational gaps remain among younger populations, women, and residents of fossil fuel-dependent towns. Public support for renewable energy, especially solar and wind, is robust, yet knowledge of specific national energy policies is relatively low. Media coverage, especially via digital platforms, is considered the most effective means of enhancing public awareness. Environmental and health improvements are the principal drivers of positive perceptions, whereas fears about job losses and unemployment shape the main negative views. Although there is some uncertainty about the economic implications, most respondents express a willingness to support the energy transition and advocate for stronger governmental leadership. These insights highlight the importance of targeted and inclusive policy communication to foster broad-based engagement and equitable outcomes in Kazakhstan's pathway to sustainable energy.

2. Economic diversification perception

This section examines public perceptions of economic diversification in Kazakhstan, with a particular focus on attitudes toward moving beyond traditional industries such as mining. Drawing on nationally representative survey data, the analysis explores the perceived importance of diversification, the motivations behind support or opposition, and the sectors viewed as most promising for future growth. Attention is given to demographic and spatial variations, especially across age groups, gender, and settlement types. The study also assesses public views on regional readiness for diversification, including perceived sufficiency and gaps in resources, and evaluates willingness to participate in retraining programmes. Additionally, it considers public satisfaction with government efforts and identifies preferred policy actions to support a transition toward a more resilient and inclusive economy.

Support for diversifying local economies beyond traditional industries is consistently high across demographic and settlement groups, hovering around 81% overall (Annex 1, Table 2.1). Gender differences are negligible, while youth show marginally lower support than older cohorts, which likely reflects their limited participation in the labour market and lesser exposure to the economic risks associated with industrial stagnation. Spatial variation is small (78.5–84.8%), indicating broad cross-regional consensus. The remaining undecided share (11.6%), highest in other mining towns (around 16%), marks the main opportunity for targeted communication rather than a deep attitudinal divide. This pattern is consistent with broader research on resource-dependent economies, which shows that public support for diversification is higher when communities recognise risks of dependence on extractive industries (World Bank, 2020; Muhamad et al., 2021).

Across all demographic and settlement groups, concerns about stagnation in traditional industries emerge as the dominant rationale for supporting economic diversification, cited by roughly 38–47% within each group (Annex 1, Table 2.2). The creation of new jobs and reduction of unemployment follows as the second key driver (around 19–28% within group), most pronounced among working-age adults (23.6%) and residents of oil/gas (27.7%) and other mining towns (27.9%), underscoring the centrality of employment concerns. Reducing dependence on volatile sectors ranks third, showing modest gender and spatial variation (men 16.6% vs. women 11.9%; coal towns 19.2%), while environmental sustainability and resilience receive lower, but still notable attention (11–20%), particularly among women (16.0%). This economic-pragmatism emphasis in the form of growth and jobs mirrors findings in resource-dependent contexts where diversification is framed as a pathway out of the volatility trap of commodity-based economies. For example, Jolo et al. (2022) show that in resource-rich countries diversification drivers include shifting away from commodity dependence and building human capital.

By contrast, among respondents who do not view diversification as a priority, the main explanations are insufficient government support (around 30%) and the belief that existing industries already provide sufficient stability and employment (22.6%) (Annex 1, Table 2.3). These views are relatively uniform across gender, age, and settlement types, with only minor variations: women, working-age adults, and large-city residents are somewhat more likely to cite a lack of government support, whereas men more often stress the adequacy of current industries. Structural constraints such as lack of infrastructure or investment (7.2%) and shortages of workforce skills (3.6%) appear less salient. These findings align with research emphasising governance, institutional capacity and policy communication as key enablers of diversification in resource-rich settings. For instance, Muhamad et al. (2021) notes that public sector reforms can reduce a country's degree of dependency on natural resources by strengthening institutional frameworks.

Respondents identify a diverse set of sectors with potential for economic diversification, led by agriculture (11.6%), healthcare (9.9%), education (9.6%), tourism (9.5%), and construction (9.2%) (Annex 1, Table 2.4). These priorities are most pronounced among the 25–54 age group (68.6% of all mentions), underscoring the economic pragmatism of the working-age population. Emerging sectors such as renewable energy (7.8%) and technologies/IT (7.2%) attract growing interest but remain secondary to more established sectors. The mining industry (7.8%) also appears among diversification choices, suggesting that many associate development with modernisation rather than replacement of extractive industries. These preferences are consistent across gender groups. Overall, these findings show that diversification priorities are broadly shared across city types, though their emphasis differs. Large and industrial cities exhibit a more multidimensional outlook, showing relatively strong support for a wide range of sectors, reflecting greater awareness of structural and service-based opportunities. In contrast, coal and oil-and-gas towns display a narrower focus, though some respondents emphasise renewable energy and construction, signalling emerging openness to transition-oriented development within traditional industrial settings.

Perceptions about the sufficiency of local resources for economic diversification are mixed. A combined 67.7% of respondents believe their region is either

entirely sufficient (28.8%) or partially enough (38.9%) (Annex 1, Table 2.5). The highest confidence was observed among the 25–54 age group (20.6% fully enough, 27.0% partially), who are likely the most engaged in the labour force and local development. Confidence is also relatively high in large cities (14.8% entirely sufficient) and industrial towns (7.5%), reflecting more developed infrastructure and services. However, a notable share—25.7%—believes resources are insufficient (21.0%) or insufficient at all (4.7%), with concerns most prominent in coal cities, oil and gas cities, and older age groups. Gender differences are minimal. A small proportion (6.6%) selected "Don't know," suggesting a lack of awareness or access to information. Overall, the results indicate cautious optimism but also highlight infrastructure, education, and capacity gaps in less developed or resource-dependent regions.

> After respondents were asked follow-up questions on which resources their region has or lacks to support diversification, the results revealed striking internal inconsistencies. Across all city groups, the same areas were often cited as both strengths and weaknesses. Education programmes were considered sufficient by around 22–30% (large cities 23.1%, coal 21.9%, oil and gas 30.2%, industrial 23.8%), yet the shortage of a skilled workforce emerged as the most frequent deficit (coal 28.1%, industrial 26.1%) (Annex 1, Tables 2.6 and 2.7). Similarly, infrastructure and access to finance were viewed as moderately adequate (9–13% and 6–10%) but also lacking (11–14% and 8–11%) across all groups. These contrasting assessments point to limited public awareness and uneven access to existing resources, respondents recognise that institutions and facilities exist but may question their quality, effectiveness, or inclusiveness, indicating that diversification readiness depends as much on information and governance capacity as on material resources.

Willingness to participate in retraining is strong but more nuanced across groups. Overall, 65.1% of respondents are willing to retrain (Annex 1, Table 2.8). The 25–54 age group demonstrates the highest readiness (15.9% very willing; 32.3% willing), reflecting their close connection to the labour market. Similar to findings from other transitioning economies, retraining readiness is strongest among working-age populations due to access to information and infrastructure (Rodrik, 2016; Atoyan et al., 2016). Gender differences are small. Spatially, willingness to participate in retraining is highest in oil and gas cities (74.7%), followed closely by coal cities (68.9%), indicating that residents of fossil fuel–dependent areas may perceive reskilling as a critical pathway to maintain employment and adapt to emerging low-carbon industries. Still around 13% remain undecided, pointing to uncertainty about retraining relevance or accessibility.

> Motivations and preferences for retraining reflect a proactive and opportunity-oriented mindset rather than fear of job loss (Annex 1, Table 2.9). The leading driver is interest in learning new skills or industries (48–53% across age and gender groups), followed by the desire for more stable or higher-paying jobs (16–23%), while job-security concerns in current industries remain minimal (2–5%). Notably, interest in new skills is particularly high in resource-dependent areas such as other mining towns (65%), coal (52%), and oil and gas cities (51%), indicating widespread recognition of the need to adapt.

However, the most preferred types of retraining (e.g., technical skills 22.6% and renewable or low-carbon specialisation 15.1%) are primarily associated with large and indus-

trial cities labour market (Annex 1, Table 2.10). The 25–54 age group demonstrates the highest interest across all retraining options (e.g., 16.7% in technical skills and 9.2% in renewable energy), while large (7.4%) and industrial cities (6.0%) show the strongest participation potential, reflecting greater readiness for reskilling in more diversified economies. These findings point to a motivation–feasibility gap: although enthusiasm for retraining is strong, especially among the economically active population, local training opportunities and industry alignment may not yet support this willingness in all areas. Vocational skills development (e.g., carpentry or welding) is also popular, at 14.5%, followed by entrepreneurship programs (11.6%) and digital skills training (9.5%). Gender differences are minimal across most categories. Regional clusters such as industrial cities show greater interest in energy and technical programs, while coal cities and other mining towns show lower engagement.

> However, despite these proactive attitudes, participation in retraining is often constrained by structural and personal barriers. The main obstacle is lack of time due to work or family responsibilities (31.9%), particularly among women (18.5%) and adults aged 25–54 (24.6%), who are balancing employment and household duties (Annex 1, Table 2.11). These gender- and age-related nuances resonate with research on lifelong learning and adult education, which shows that time poverty, caregiving burdens, and rigid work schedules are among the strongest predictors of non-participation (Rubenson & Desjardins, 2009). Studies also highlight that such barriers are structurally embedded in labour market segmentation, where women and mid-career adults face competing demands that reduce access to continuous learning opportunities (Boeren, 2017; Cross, 1981).

Other barriers such as financial constraints (4.0%), limited access to training (3.6%), and doubts about program relevance (4.8%), are cited far less frequently (Annex 1, Table 2.11). More than half of respondents (55.6%) selected “Other,” referring mainly to age and health limitations (48.5%) among older respondents and lack of interest (39.7%) among younger and working-age groups. Together, these findings indicate that while motivation to retrain is widespread, actual participation remains hindered by time, relevance, and motivational barriers, underscoring the need for flexible, targeted, and context-specific approaches to adult learning and workforce reskilling.

> Public satisfaction with local government efforts to promote economic diversification is generally low, with only 3.7% “very satisfied” and 18% “satisfied,” while dissatisfaction prevails (23% dissatisfied, 13% very dissatisfied) (Annex 1, Table 2.12). The 25–54 age group, representing the core working population, reports the highest discontent (around 26%), reflecting unmet expectations for tangible progress. Meanwhile, 43% of respondents selected “don’t know,” particularly among women (23%) and working-age adults (29%). Satisfaction with local diversification efforts is low across city clusters, with high uncertainty (≈38–48%), suggesting limited awareness or communication of local initiatives.

Among those who are satisfied, nearly half (47.5%) cite the active development of new industries, tourism, sustainability, and urban improvements as key drivers of approval (Annex 1, Table 2.13). Another 33% attribute satisfaction to infrastructure, retraining, and investment projects, indicating appreciation for visible development efforts. These reasons of satisfaction are most common among working-age adults (25–54; 47.8%)

and residents of oil and gas (60%), large (42.9%), and industrial cities (45.6%). In contrast, respondents from other mining towns emphasise economic growth (27%) and implementation barriers (18%), reflecting both expectations for tangible progress and concern over delivery capacity. Overall, while satisfaction is modest, it is strongly linked to observable progress in local diversification initiatives, whereas uncertainty elsewhere highlights weak outreach and uneven implementation.

The most valued local government effort is support for small businesses and entrepreneurship (24.9%), followed by communication and transparency about government plans (19.5%), training and education programs (19.2%), and investment in infrastructure (17.7%) (Annex 1, Table 2.14). These preferences reflect a clear appreciation for economic support, capacity-building, and openness in governance. The strong emphasis on transparency and accountability, echoed in respondents' calls to combat corruption, is consistent with political economy studies linking governance quality to successful diversification outcomes (Mehlum, Moene & Torvik, 2006; Robinson, Torvik & Verdier, 2006). By age, working-age adults (25–54) show the strongest interest in entrepreneurship (25.6%) and transparent communication (20.7%), while younger respondents (18–24) emphasize training and education (23.9%). Across city clusters, large cities value infrastructure investment (23.6%) and communication (20.6%), whereas industrial and alternative-energy cities and other mining towns prioritise support for small businesses (29.1% and 37.5%).

The most requested government action to support economic diversification is increased funding for education and training (20.4%), followed by infrastructure development (9.2%), community engagement (9.0%), and private sector investment (10.7%) (Annex 1, Table 2.15). However, nearly half of respondents (48.2%) chose "Other", pointing to deeper concerns. The breakdown of "Other" reveals strong calls to combat corruption (20.4%), expand key sectors like industry and energy (14.5%), and improve science, innovation, job creation, and environmental sustainability. These findings suggest that people want systemic reforms, transparent governance, and support for diverse sectors beyond basic investments as part of a holistic diversification strategy.

Awareness of green jobs, both conceptually and in terms of employment prospects, is low across all groups, reflecting a broad lack of understanding of how the green transition translates into real opportunities. Only 22.2% of respondents report knowing what green jobs are, while 60.7% do not and 17.2% are unsure (Annex 1, Table 2.16). Differences by gender, age, or settlement type are minimal. Awareness of local green job opportunities is also very low across: only 13.0% say they know of any in their area, while 80.0% do not and 7.0% are unsure (Annex 1, Table 2.17). Within groups, awareness remains modest. These findings point to a broad, system-wide information gap: most people neither recognize the concept nor see concrete opportunities locally, underscoring the need for clearer communication and visible pipelines from policy to real green employment.

This pattern is consistent with international evidence on information and perception gaps that hinder just transition processes (Healy & Barry, 2017; Sovacool et al., 2020). Research shows that when citizens are not adequately informed about the nature, accessibility, and benefits of green employment, transitions risk being viewed as technocratic or elite-driven, reducing public engagement and legitimacy.

Perceived barriers to accessing green jobs largely reflect the earlier findings of low awareness and limited visibility of green employment. The most common obstacles include insufficient information about green jobs (21.2%), a lack of training or qualifications (19.2%) and limited job opportunities (17.2%), most frequently cited by the 25–54 age group, the most active in the labour market (Annex 1, Table 2.18). Gender differences are modest. Respondents from large cities (11.1%) show greater concern about qualifications and access, indicating awareness but limited availability of relevant programs. The broad "other" category (42.4%) points to deeper structural or contextual challenges. Among these, the largest shares refer to uncertainty or no clear obstacles (30% and 27.5%), followed by economic constraints (22.5%) and institutional barriers such as bureaucracy or corruption (20.0%), mainly voiced by working-age adults (60%) and large-city residents (40%). Together, these findings highlight that Kazakhstan's green transition is hampered not only by low awareness but also by fragmented access to training, funding, and institutional support, leaving many citizens disconnected from emerging green opportunities.

The findings indicate strong public support for economic diversification, particularly among working-age populations in urban and industrial centres. Key drivers include concerns over economic stagnation and the need for job creation, while opposition stems mainly from perceptions of stability in current industries and insufficient government support. Although sectors such as agriculture, healthcare, education, and renewable energy are widely seen as promising, there remains uncertainty about regional capacity to support diversification—especially in terms of skilled labour, funding, and education programmes. Most respondents expressed willingness to undergo retraining and were motivated more by aspirations for skill development than by job insecurity. However, significant barriers persist, notably time constraints, low awareness, and infrastructural limitations. Satisfaction with government efforts remains limited, with calls for more investment in training, infrastructure, and transparent governance. The results underscore the importance of a coordinated policy approach addressing structural and informational gaps to enable an inclusive and sustainable economic transformation.

Summary of key study findings

The evidence from Kazakhstan enriches the broader literature on just transition, energy justice, and economic diversification by illustrating how public support for decarbonisation and structural transformation is shaped not only by environmental awareness but by institutional trust, employment security, and access to opportunities. Consistent with international research, the findings confirm that transitions toward low-carbon economies are fundamentally social and political processes, where legitimacy depends on fairness, participation, and the credibility of governance structures.

> High levels of climate awareness coexist with limited understanding of transition policies, reflecting the persistent awareness–comprehension gap observed across contexts (Drews & Van den Bergh, 2016; Pierce et al., 2009). This pattern aligns with studies emphasising that environmental concern rarely translates into policy literacy without deliberate, inclusive communication strategies (Leiserowitz, 2005; Nisbet, 2009). In Kazakhstan, as elsewhere, climate awareness appears to be a necessary but insufficient condition for behavioural and political engagement, pointing to the need for targeted information channels and participatory outreach.

The coexistence of optimism about environmental benefits and anxiety about labour-market risks mirrors global research demonstrating that employment insecurity is the central axis of public attitudes toward the energy transition (Tvinnereim & Ivarsflaten, 2016; Carattini et al., 2018). Perceptions that the transition may generate unemployment, poverty, or community decline are particularly pronounced in fossil-fuel-dependent areas, echoing comparative analyses from South Africa and Australia, where the social and cultural attachment to mining industries reinforces resistance to change (Della Bosca & Gillespie, 2018; Marais et al., 2022). This convergence across regions supports the argument that just transitions must address not only distributive but also recognitional dimensions of justice - respecting local identities and lived histories while providing viable economic alternatives (Krawchenko & Gordon, 2021).

> At the governance level, the strong expectation that governments - not markets - should lead job creation and infrastructure investment situates Kazakhstan within a wider body of evidence emphasising the centrality of state capacity and institutional credibility in managing complex transitions (Wüstenhagen et al., 2007; Newell & Mulvaney, 2013). This echoes findings from Europe and Canada, where state-led coordination, dedicated funds, and retraining frameworks have proven essential for mitigating regional inequality and maintaining public trust (Marty, 2020; Krawchenko & Gordon, 2021). Conversely, cases from the Western Balkans and Central and Eastern Europe (Bankwatch, 2023; 2024; Rösch & Epifanio, 2022) illustrate the pitfalls of fragmented governance, opaque financing, and limited local empowerment - issues that similarly constrain Kazakhstan's transition landscape.

Broad public endorsement of renewable energy and diversification further contributes to debates on energy justice and post-extractive development. The strong preference for familiar technologies such as solar and wind parallels global patterns of technological familiarity shaping social acceptance (Olson-Hazboun et al., 2016), whereas limited enthusiasm for hydrogen or nuclear energy reinforces the need for participatory

hybrid governance arrangements - combining technocratic reforms with limited local autonomy - can constrain procedural justice, a challenge observed in other post-Soviet and middle-income states (Knox & Orazgaliyev, 2025; Kurmanov et al., 2024).

> The analysis also contributes to the growing empirical literature on the social dimensions of just transition in emerging economies. Public willingness to retrain and adapt to new industries, driven more by aspirations for skill development than by fear of unemployment, confirms that citizens are not inherently resistant to change. However, the identified barriers of time constraints, low policy visibility, and inadequate local programmes demonstrate that motivational readiness alone cannot compensate for structural deficits. This finding supports the ILO's (2015) call for proactive labour-market and social-protection measures as integral components of transition planning and resonates with the recommendations of Krawchenko and Gordon (2021) and Bankwatch (2024), which stress the importance of accessible financing, empowered municipalities, and early institutional coordination.

Overall, the Kazakhstani evidence underscores three cross-cutting insights that advance the comparative literature. First, public support for transition is conditional - rooted in environmental aspirations but contingent on visible, locally grounded benefits such as employment, skills, and infrastructure. Second, governance capacity and procedural fairness emerge as the decisive factors of legitimacy, confirming that transitions succeed not merely through policy ambition but through transparent, participatory, and regionally adaptive implementation. Third, communication and comprehension are central to justice: the translation of national strategies into tangible local opportunities determines whether citizens perceive transition as inclusive or imposed.

> These insights extend existing theoretical frameworks of just transition and energy justice (Sovacool & Dworkin, 2015; Healy & Barry, 2017; Sovacool et al., 2020) by situating them within a middle-income, resource-dependent governance context. They suggest that in such settings, transition success depends less on persuading citizens why change is necessary than on demonstrating how it can be realised fairly. The case of Kazakhstan thus bridges global discourse and local realities, illustrating that the path to a just transition requires not only decarbonisation but also institutional credibility, participatory governance, and socially grounded economic renewal.

Policy Recommendations

Kazakhstan's strategic commitment to carbon neutrality by 2060 is reshaping its energy and economic landscape. However, the transition from fossil fuels poses serious socioeconomic risks—particularly in regions historically reliant on coal, oil, and gas. Public perception data reveals widespread climate awareness but significant knowledge gaps regarding national energy transition plans. It also highlights concern over job losses, economic uncertainty, and insufficient government responsiveness. Drawing from international best practices and grounded in survey findings, these are preliminary policy recommendations proposing a coherent, just, and inclusive approach to energy transition planning.

If the national government wants to achieve a just energy transition, it should consider:

- Strengthening strategic coordination and communication: Establish a single, cross-ministerial platform for coordinating energy transition, employment, and education policies. Develop a unified national communication strategy that translates technical goals into accessible narratives about economic opportunity, health benefits, and community resilience. National campaigns should focus on youth, women, and regions reliant on fossil fuels, using mainstream and digital media.
- Aligning skills development with emerging green industries: Integrate transition-relevant skills into national vocational and higher-education standards. Encourage partnerships between technical colleges, universities, and enterprises in renewables, IT, and manufacturing. Provide central funding and curriculum support to create a pipeline of qualified specialists for new industries.
- Creating dedicated financial and institutional mechanisms: Establish a national just transition fund to support retraining, SME development, and infrastructure renewal in vulnerable regions. Introduce targeted incentives—such as tax relief and preferential loans—for companies investing in renewable energy, energy efficiency, and circular-economy projects. Strengthen coordination with international partners to leverage concessional financing and technical assistance.
- Improving governance transparency and participation: Embed participatory approaches into transition planning through regular public consultations, open data creating open data showcasing the green transition, funding allocations, and impact reporting on egov.kz. Strengthen the accountability of national programmes by introducing performance indicators on social outcomes, including employment and regional inclusion.

If the national government wants to promote a just regional development, it should pay attention to:

- Developing region-specific transition roadmaps: Each fossil-fuel or industrial region should prepare a roadmap linking short-term job protection with long-term diversification goals. Plans should identify alternative sectors for investment—such as renewables, services, and sustainable construction—while ensuring that local SMEs and communities participate in new value chains.
- Expanding access to retraining and employment support: Establish regional

training hubs that deliver flexible, modular learning for workers in transition-affected sectors. Local administrations should partner with enterprises and employment centres to identify reskilling needs and connect graduates directly with new job opportunities.

- Fostering community participation and trust: Build mechanisms for citizen dialogue through local councils, trade unions, and community organisations. Involve local actors such as civil society and business representatives in project monitoring to enhance accountability and ensure that transition measures reflect community priorities and social concerns.
- Promoting local entrepreneurship and innovation: Facilitate small-business development in renewable energy, recycling, and resource-efficient manufacturing. Simplify licensing and access to finance for local entrepreneurs by engaging National Chamber of Entrepreneurs and creating local sub-divisions of the National development fund. Encourage partnerships between municipalities, universities, and the private sector to pilot innovation projects that can serve as regional showcases.

A coherent just-transition framework for Kazakhstan requires strong national leadership combined with empowered and well-resourced sub-national governments. National institutions should set clear objectives, mobilise financing, and coordinate policy; local governments should operationalise these strategies through community engagement, skills development, and tailored economic planning. Together, these measures would transform public awareness into participation, build trust in institutions, and ensure that the path to carbon neutrality also delivers inclusive and resilient regional development.

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Annex 1. Tables

Table 1a. Main locations of respondents

Name of cities and towns	Frequency	Per cent
Large cities		
Almaty	144	14.2
Astana	131	12.9
Shymkent	131	12.9
Coal mining towns		
Zhezkazgan	50	4.9
Karaganda	49	4.8
Ekibastuz	22	2.2
Oil and gas mining towns		
Atyrau	51	5.0
Kyzylorda	51	5.0
Aktobe	37	3.6
Zhanaozen	21	2.1
Industrial cities with renewable energy potential		
Oskemen	66	6.5
Balkhash	51	5.0
Oral	50	4.9
Pavlodar	50	4.9
Taldykorgan	48	4.7
Other mining towns		
Temirtau	21	2.1
Satpaev	20	2.0
Stepnogorsk	13	1.3
Ridder	8	.8
Total	**1014**	**100.0**

Source: Results from the UCA phone survey, February-March 2025

Table 2a. Education level by age

	18-24	25-54	55+	Total
High school	1.7%	4.9%	1.6%	**8.2%**
Vocational training	.3%	.1%	.4%	**.8%**
Secondary vocational education / professional education/ college	5.8%	24.9%	5.7%	**36.4%**
Bachelor's degree / Specialist diploma	6.8%	38.6%	8.0%	**53.4%**
Academic degree		1.1%	.2%	**1.3%**

Source: Results from the UCA phone survey, February-March 2025

Table 3a. Main economic sectors of occupation

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Mining Industry & Manufacturing	3.8%	1.9%	2.0%	3.0%	1.3%	**11.9%**
Agriculture	.5%	.1%	.1%	.4%		**1.1%**
Service sector & self-employed/ business	18.0%	4.6%	4.7%	11.2%	2.2%	**40.8%**
Public sector	.7%	.4%	.6%	.7%	.3%	**2.7%**
Energy (Renewable/ Non-renewable)	1.7%	.4%	.8%	1.2%	.1%	**4.1%**
Unemployed	5.7%	1.6%	2.1%	3.6%	.9%	**13.8%**
Student	1.6%	.2%	.1%	1.5%		**3.4%**
Pensioner	3.3%	.9%	1.1%	1.4%	.2%	**6.8%**
Education, Healthcare	5.7%	1.7%	2.3%	3.0%	1.0%	**13.6%**
Refusal to Answer	1.1%	.2%		.3%	.2%	**1.8%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.1 Public awareness of the impacts of climate change

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Highly aware	8.1%	2.1%	2.1%	2.8%	.8%	**15.8%**
Moderately aware	16.1%	4.8%	5.5%	12.1%	2.9%	**41.4%**
Somewhat aware	8.4%	2.1%	2.4%	4.6%	1.2%	**18.6%**
Slightly aware	6.6%	2.2%	2.8%	4.0%	.9%	**16.5%**
Total aware	39.2%	11.1%	12.7%	23.6%	5.7%	**92.3%**
Not at all aware	3.0%	.8%	1.0%	2.6%	.4%	**7.7%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.2. Public awareness of government policies on energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Don't know	21.4%	6.7%	7.3%	16.0%	3.5%	**54.8%**
Concept of Transition to a Green Economy (2013)	14.8%	3.8%	3.7%	6.9%	1.3%	**30.4%**
Environmental Code of Kazakhstan (2007; updated 2021)	10.5%	2.6%	4.3%	5.3%	1.2%	**23.9%**
Commitment to achieve carbon neutrality by 2060	8.8%	1.8%	2.1%	3.8%	1.0%	**17.4%**
Total	**42.2%**	**11.8%**	**13.8%**	**26.2%**	**6.0%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.3. The public's primary source of information about climate change

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Internet resources	35.6%	9.7%	11.3%	20.9%	4.9%	**82.5%**
Television and radio	11.1%	2.4%	4.0%	6.2%	1.4%	**25.0%**
Personal observation or experience	3.8%	1.8%	1.2%	2.5%	.7%	**10.0%**
Scientific and research publications	2.2%	.5%	.2%	.6%	.1%	**3.7%**
Newspapers	1.2%	.2%	.4%	1.0%	.2%	**3.0%**
Friends	.9%	.6%	0.0%	.6%	.2%	**2.4%**
Colleagues	.7%	.5%	0.0%	.4%	.1%	**1.8%**
Relatives	.6%	.3%	0.0%	.4%	.1%	**1.5%**
National Government	.1%	0.0%	.3%	.1%	.2%	**.7%**
Educational institutions	.5%	0.0%	0.0%	.1%	.1%	**.7%**
Local government or community programmes	0.0%	.1%	0.0%	.1%	.1%	**.3%**
Political parties	.2%	0.0%	0.0%	0.0%	0.0%	**.2%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.4. The primary source of information about government energy transition policies

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Internet resources	18.8%	7.7%	6.8%	13.2%	2.1%	**48.7%**
Television and radio	10.3%	1.3%	6.4%	4.3%	.9%	**23.1%**
Educational or professional context	12.0%	1.3%	3.8%	3.4%	1.3%	**21.8%**
Social media	4.7%	1.7%	2.1%	2.1%	.4%	**11.1%**
Community discussions or localised campaigns	3.4%	2.1%	2.1%	2.1%	.4%	**10.3%**
Government announcements	3.8%	.4%	0.0%	.4%	0.0%	**4.7%**
Total	**44.4%**	**11.1%**	**17.9%**	**21.4%**	**5.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.5. Public suggestions on how to improve public awareness

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Media coverage	32.5%	10.3%	11.2%	24.1%	4.7%	**82.8%**
Community discussions	4.9%	1.6%	1.4%	3.4%	1.4%	**12.8%**
Educational programmes	4.5%	1.2%	2.4%	2.8%	.4%	**11.4%**
Government campaigns	4.3%	1.2%	.6%	3.4%	.2%	**9.7%**
Total	**38.7%**	**12.2%**	**13.8%**	**29.0%**	**6.3%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.6. Public opinion on the impact of energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Positive impact	31.0%	8.1%	8.6%	17.1%	4.0%	**68.7%**
Negative impact	6.8%	2.1%	2.9%	4.5%	1.3%	**17.6%**
None or I don't know	4.3%	1.8%	2.3%	4.5%	.8%	**13.7%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.7. The main reasons for the positive perception of the energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Improved air quality and public health	44.6%	10.9%	10.6%	23.1%	6.1%	95.4%
Reduce energy prices	3.2%	.8%	1.5%	1.8%	0.0%	7.3%
Increase job creation	.8%	.2%	.5%	.3%	.2%	2.0%
Total	**45.4%**	**11.6%**	**12.3%**	**24.4%**	**6.3%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.8. The main reasons for the negative perception of energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Decrease of working places and unemployment	19.5%	7.3%	14.6%	17.1%	2.4%	**61.0%**
Increasing poverty	19.5%	4.9%	7.3%	12.2%	0.0%	**43.9%**
Outflow of population	7.3%	0.0%	2.4%	0.0%	0.0%	**9.8%**
Total	**36.6%**	**12.2%**	**19.5%**	**29.3%**	**2.4%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.9. Public concern about the risk of job losses because of decreased mining of fossil fuels

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Very concerned	7.9%	3.6%	3.6%	4.7%	1.6%	**21.4%**
Moderate	11.8%	3.4%	3.7%	8.4%	2.2%	**29.5%**
Neutral	7.6%	2.1%	2.8%	4.7%	1.1%	**18.2%**
Not really concerned	5.7%	1.0%	1.7%	3.6%	.5%	**12.4%**
Not at all concerned	9.1%	1.9%	2.0%	4.7%	.8%	**18.4%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.10. Public views on the outcomes of job losses

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Unemployment	25.9%	8.6%	11.6%	18.2%	4.7%	**69.0%**
Outflow of workers and their families	2.1%	1.9%	1.9%	1.7%	1.1%	**8.8%**
Deterioration of local services and infrastructure	3.6%	1.1%	2.1%	1.1%	1.1%	**9.0%**
Social tensions and protests	15.0%	2.8%	5.1%	8.8%	4.1%	**35.8%**
Increase of crime	6.6%	2.8%	3.2%	3.0%	1.5%	**17.1%**
Price increase	1.9%	.4%	2.1%	.9%	.4%	**5.8%**
Total	**38.1%**	**12.2%**	**15.4%**	**26.8%**	**7.5%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.11. Public views on whether the energy transition may lead to new jobs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Likely	14.7%	2.8%	5.0%	8.8%	2.5%	**21.5%**
Very likely	10.2%	3.0%	2.5%	5.0%	.9%	**33.7%**
Unlikely	7.4%	2.4%	2.9%	6.2%	1.3%	**19.9%**
Neutral	7.9%	3.0%	3.0%	4.9%	1.2%	**20.1%**
Very unlikely	2.0%	.9%	.4%	1.2%	.3%	**4.7%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.12. Public views on what can contribute to the creation of new jobs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Government support	21.9%	5.0%	5.3%	10.8%	2.8%	**45.7%**
Development of local infrastructure	19.1%	5.0%	4.0%	10.8%	3.0%	**10.6%**
Capacity building	10.1%	1.8%	2.3%	4.0%	.8%	**12.3%**
Availability of qualified personnel	8.3%	2.0%	2.0%	5.0%	1.0%	**18.3%**
Private investments	4.5%	1.3%	1.3%	4.3%	1.0%	**18.8%**
Foreign investments	3.0%	1.3%	2.0%	3.3%	1.0%	**42.0%**
Other	0.0%	.3%	0.0%	0.0%	0.0%	**.3%**
Total	**45.0%**	**10.8%**	**13.8%**	**24.1%**	**6.3%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.13. Public attitudes toward developing renewable energy sources

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Fully support	22.7%	4.9%	6.7%	11.1%	2.4%	**47.8%**
Support	11.8%	3.9%	3.8%	7.8%	1.7%	**29.0%**
Neutral	5.2%	2.2%	2.6%	5.5%	1.8%	**17.2%**
Don't support	1.0%	.7%	.5%	1.0%	.3%	**3.5%**
Don't support at all	.9%	.4%	.3%	1.0%	0	**2.6%**
Total	**41.6%**	**12.0%**	**13.8%**	**26.4%**	**6.2%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.14. Public views on the most important alternative energy sources

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Sun	40.6%	10.5%	12.6%	21.7%	4.5%	**89.9%**
Wind	33.7%	9.2%	10.5%	16.9%	3.2%	**73.5%**
Hydropower	22.0%	4.9%	4.8%	10.8%	2.3%	**29.6%**
Green hydrogen	15.2%	3.5%	3.0%	7.4%	1.3%	**44.9%**
Geothermal	14.9%	3.9%	2.7%	6.4%	1.7%	**19.7%**
Carbon capture and storage technologies	14.0%	3.5%	3.4%	7.0%	1.2%	**30.4%**
Nuclear energy	9.9%	1.6%	2.1%	5.6%	.6%	**29.1%**
Other	.6%	.1%	0.0%	.4%	0.0%	**1.2%**
Total	**45.0%**	**11.4%**	**13.6%**	**24.6%**	**5.3%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.15. Public willingness to support the energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Yes	32.5%	8.8%	9.9%	17.8%	4.9%	**73.9%**
Not certain	5.1%	2.0%	2.5%	5.6%	.8%	**10.2%**
No	4.4%	1.2%	1.4%	2.8%	.4%	**16.0%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.16. Specific action towards supporting the energy transition

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Supporting policies or initiatives	20.1%	6.3%	7.2%	9.5%	2.9%	**45.9%**
Use of renewable energy sources	10.5%	2.6%	2.9%	5.9%	.9%	**22.7%**
Switching to energy-saving	10.8%	2.1%	2.9%	5.9%	1.1%	**22.7%**
Switching to public transport	9.5%	1.7%	2.6%	4.5%	.8%	**18.9%**
Informing and raising awareness	6.2%	1.8%	2.3%	3.5%	.8%	**14.4%**
Learning new skills	5.3%	1.1%	1.7%	3.5%	.8%	**12.4%**
Doing an energy-efficient business	2.0%	.8%	.5%	2.1%	.3%	**5.6%**
Total	**43.8%**	**11.4%**	**14.1%**	**24.8%**	**5.9%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 1.17. Public opinion on prioritising energy transition by the government

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Yes	30.0%	8.0%	9.5%	16.7%	4.3%	**68.4%**
No	7.1%	2.5%	2.4%	5.3%	.6%	**17.9%**
Not certain	5.0%	1.5%	1.9%	4.1%	1.2%	**13.7%**
Total	**42.1%**	**11.9%**	**13.7%**	**26.1%**	**6.1%**	**100.0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.1. Public perception of the importance of economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Very important	18,7%	5,5%	7,5%	10,7%	2,4%	**44,8%**
Important	12,7%	4,5%	5,9%	10,1%	2,7%	**35,9%**
Don't know	4,8%	1,1%	1,5%	3,3%	1,0%	**11,6%**
Not important	2,9%	0,5%	0,8%	1,9%	0,1%	**6,1%**
Not important at all	0,9%	0,3%	0,1%	0,3%	0,0%	**1,6%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.2 Public views on the importance of economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
To address economic stagnation or lack of growth in traditional industries	16,6%	4,2%	6,1%	10,2%	2,1%	**39,2%**
To create new job opportunities and reduce unemployment	7,9%	3,3%	3,6%	6,2%	1,7%	**22,7%**
To reduce dependence on volatile industries like mining or fossil fuels	6,1%	2,5%	1,4%	3,7%	0,5%	**14,3%**
To improve environmental sustainability and resilience	6,0%	1,8%	2,6%	2,8%	0,7%	**13,9%**
Other	3,8%	1,3%	1,2%	2,6%	1,0%	**9,9%**
Total	**40,3%**	**13,0%**	**15,0%**	**25,6%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.3 Public views on the low importance of economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Lack of government support	10,8%	1,2%	3,6%	4,8%	0,0%	**20,5%**
The current industry provides sufficient economic stability and jobs	7,2%	2,4%	2,4%	3,6%	0,0%	**15,7%**
Lack of infrastructure or investment makes diversification unrealistic	3,6%	1,2%	0,0%	2,4%	0,0%	**7,2%**
The region lacks the workforce skills required for new industries	1,2%	0,0%	1,2%	1,2%	0,0%	**3,6%**
Other	26,5%	6,0%	2,4%	16,9%	1,2%	**53,0%**
Total	**49,4%**	**10,8%**	**9,6%**	**28,9%**	**1,2%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.4. Public view on prosperous sectors for economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Agriculture	4,7%	1,2%	1,7%	3,3%	0,6%	**11,6%**
Construction	4,4%	1,4%	1,6%	2,5%	0,7%	**10,6%**
Education	4,3%	1,2%	1,4%	2,6%	0,5%	**10,1%**
Healthcare	4,2%	1,2%	1,4%	2,6%	0,6%	**9,9%**
Tourism	5,1%	0,7%	1,0%	2,6%	0,4%	**9,7%**
Environment	4,0%	0,8%	1,0%	2,3%	0,5%	**8,6%**
Science	4,0%	0,8%	1,0%	2,0%	0,4%	**8,1%**
Services	3,8%	1,0%	1,0%	1,9%	0,4%	**8,1%**
Mining industry	2,4%	1,2%	1,2%	2,5%	0,5%	**7,8%**
Renewable energy	3,6%	0,8%	1,0%	1,9%	0,4%	**7,7%**
Technologies/IT	3,1%	0,8%	1,0%	1,9%	0,4%	**7,2%**
Other	0,3%	0,1%	0,1%	0,1%	0,0%	**0,6%**
Total	**43,7%**	**11,2%**	**13,5%**	**26,2%**	**5,4%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.5. Public opinion on the availability of resources to support economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Yes, fully sufficient	14,8%	2,4%	3,2%	7,5%	1,0%	**28,8%**
Partially sufficient	15,2%	5,1%	6,7%	9,5%	2,4%	**38,9%**
Don't know	2,3%	0,9%	1,3%	1,9%	0,3%	**6,6%**
Not sufficient	6,3%	2,5%	3,9%	6,4%	1,9%	**21,0%**
Not sufficient at all	1,5%	1,1%	0,7%	0,9%	0,6%	**4,7%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.6. Public view on the sufficient resources to support diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Education programs	11,2%	2,1%	3,5%	6,1%	1,1%	**24,0%**
Skilled workforce	6,6%	1,4%	1,4%	2,8%	0,6%	**12,7%**
Physical infrastructure	6,1%	0,7%	1,0%	2,9%	0,4%	**11,0%**
Access to funding and investment	3,7%	0,6%	0,7%	1,4%	0,5%	**6,9%**
Government support	2,8%	0,6%	0,5%	1,1%	0,5%	**5,4%**
Business support services	2,3%	0,4%	0,4%	1,1%	0,2%	**4,5%**
Private sector support	2,1%	0,2%	0,4%	1,6%	0,2%	**4,5%**
Other	13,5%	3,7%	3,8%	8,6%	1,4%	**31,0%**
Total	**48,4%**	**9,6%**	**11,6%**	**25,6%**	**4,9%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.7 Public view on the lack of resources to support diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Skilled workforce	7,2%	3,9%	3,5%	7,0%	2,5%	**24,0%**
Physical infrastructure	4,3%	1,8%	1,0%	3,1%	1,4%	**11,7%**
Access to funding and investment	3,3%	1,4%	1,8%	1,6%	1,6%	**9,8%**
Private sector support	1,8%	1,0%	2,0%	1,2%	0,8%	**7,0%**
Government support	1,6%	0,8%	1,4%	1,8%	0,4%	**6,1%**
Business support services	0,6%	1,2%	0,8%	0,8%	0,2%	**3,7%**
Other	12,3%	3,7%	5,9%	11,3%	4,5%	**37,7%**
Total	**31,1%**	**13,9%**	**16,6%**	**26,8%**	**11,5%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.8. Public willingness to be retrained for working in new industries

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Very willing	9,2%	2,4%	3,9%	4,6%	1,4%	**21,5%**
Willing	16,5%	5,8%	7,9%	11,1%	2,3%	**43,6%**
Don't know	5,8%	1,9%	1,3%	3,0%	1,2%	**13,1%**
Unwilling	6,5%	1,1%	1,8%	4,4%	1,0%	**14,8%**
Very unwilling	2,1%	0,8%	0,9%	3,0%	0,3%	**7,0%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.9. Public motives to participate in retraining programs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Interest in learning new skills or industries	18,7%	6,6%	8,3%	12,2%	3,1%	**48,9%**
Desire for stable or higher-paying jobs	8,0%	2,1%	3,6%	5,5%	0,9%	**20,1%**
Concerns about job security in current industries	1,0%	0,6%	0,3%	0,8%	0,0%	**2,8%**
Other	14,3%	3,4%	4,0%	5,7%	0,8%	**28,2%**
Total	**42,0%**	**12,6%**	**16,2%**	**24,3%**	**4,8%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.10. Public perception of the most feasible types of retraining programs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Technical skills training (e.g., machinery or IT skills)	7,4%	3,1%	4,9%	6,0%	1,2%	**22,6%**
Renewable/low-carbon energy specialisation (e.g., solar or wind)	4,9%	1,9%	3,4%	3,7%	1,2%	**15,1%**
Vocational Skills Development (e.g., carpentry or welding)	4,6%	2,6%	1,7%	4,2%	1,2%	**14,5%**
Entrepreneurship programs (e.g., starting small businesses)	4,1%	1,2%	3,2%	2,4%	0,6%	**11,6%**
Digital Skills Training (e.g., coding or data analysis)	3,2%	1,2%	2,4%	2,5%	0,1%	**9,5%**
Other	13,2%	3,4%	2,7%	6,2%	1,1%	**26,7%**
Total	**37,5%**	**13,5%**	**18,4%**	**25,1%**	**5,6%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.11. Public views on the main barriers to participating in retraining programs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Lack of time due to current job or family responsibilities	10,5%	3,2%	4,8%	9,7%	3,6%	**31,9%**
Concerns about the effectiveness or relevance of training programs	1,6%	0,4%	1,2%	1,2%	0,4%	**4,8%**
Financial constraints	1,2%	0,4%	0,0%	1,6%	0,8%	**4,0%**
Lack of access to training opportunities in my region	1,6%	0,0%	0,8%	0,4%	0,8%	**3,6%**
Other	23,0%	4,8%	5,6%	21,0%	1,2%	**55,6%**
Total	**37,9%**	**8,9%**	**12,5%**	**33,9%**	**6,9%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.12. Public satisfaction with the local government's efforts to promote economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Very satisfied	2,1%	0,1%	0,8%	0,7%	0,1%	**3,7%**
Satisfied	6,5%	2,0%	3,3%	5,5%	0,8%	**18,0%**
Don't know	15,6%	5,7%	6,6%	12,4%	2,3%	**42,6%**
Dissatisfied	10,1%	2,4%	3,3%	4,8%	2,0%	**22,5%**
Very dissatisfied	5,8%	1,8%	1,9%	2,7%	1,0%	**13,1%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.13. The main reasons for satisfaction with the local government's efforts to promote economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Active development of new industries (tourism), steps towards sustainability, stability and improvements in the city	17,4%	4,5%	10,7%	12,8%	2,1%	**47,5%**
Infrastructure projects, programmes (retraining), investments (NPPs, RES - new jobs) and technical equipment	15,3%	2,5%	5,8%	9,1%	0,4%	**33,1%**
Barriers to implementation (insufficient programme design, limited programmes, corruption, empty promises and lack of expertise)	4,1%	0,8%	0,4%	0,8%	0,8%	**7,0%**
Economic growth	2,1%	0,4%	0,0%	2,9%	1,2%	**6,6%**
Not sure	1,7%	0,8%	0,8%	2,1%	0,0%	**5,4%**
Other	0,0%	0,0%	0,0%	0,4%	0,0%	**0,4%**
Total	**40,5%**	**9,1%**	**17,8%**	**28,1%**	**4,5%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.14. The main reasons for public satisfaction with the local government's efforts

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Support for small businesses and entrepreneurship	8,7%	1,5%	4,2%	8,7%	1,8%	**24,9%**
Communication and transparency about government plans	8,4%	1,8%	2,7%	5,4%	1,2%	**19,5%**
Availability of training and education programs	7,8%	1,5%	2,7%	6,3%	0,9%	**19,2%**
Investment in infrastructure to support diversification	9,6%	1,8%	1,8%	4,2%	0,3%	**17,7%**
Other	6,3%	2,7%	3,9%	5,4%	0,6%	**18,9%**
Total	**40,7%**	**9,3%**	**15,3%**	**29,9%**	**4,8%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.15. Public view on actions should be taken by local government take to improve economic diversification

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Increase funding for education and training programs	8,6%	1,7%	3,0%	5,2%	1,9%	**20,4%**
Engage with local communities in planning and decision-making	5,2%	0,9%	1,7%	2,2%	1,5%	**11,6%**
Develop infrastructure (e.g., transportation, utilities, digital connectivity)	3,9%	1,7%	1,5%	2,1%	1,5%	**10,7%**
Attract private sector investment	3,7%	0,9%	1,5%	2,1%	0,9%	**9,2%**
Other	23,7%	5,8%	5,8%	9,5%	3,4%	**48,2%**
Total	**45,2%**	**11,0%**	**13,5%**	**21,1%**	**9,2%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.16. Public knowledge about green jobs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Yes	9,7%	2,5%	3,8%	4,6%	1,6%	**22,2%**
No	24,3%	7,8%	9,2%	16,3%	3,2%	**60,7%**
Not sure	6,1%	1,7%	2,8%	5,2%	1,4%	**17,2%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.17. Public awareness of green job opportunities

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Yes	5,6%	1,3%	2,6%	2,7%	0,9%	**13,0%**
No	31,7%	10,0%	12,0%	21,8%	4,5%	**80,0%**
Not sure	2,8%	0,7%	1,2%	1,7%	0,7%	**7,0%**
Total	**40,0%**	**11,9%**	**15,8%**	**26,1%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

Table 2.18. Public opinion about barriers to accessing green jobs

	Large cities	Coal mining towns	Oil and gas mining towns	Industrial cities	Other mining towns	Total
Insufficient information about green jobs	11,1%	3,0%	4,0%	3,0%	0,0%	**21,2%**
Lack of training or qualifications	11,1%	1,0%	4,0%	2,0%	1,0%	**19,2%**
Limited green job opportunities	4,0%	3,0%	4,0%	4,0%	2,0%	**17,2%**
Other	18,2%	5,1%	8,1%	8,1%	3,0%	**42,4%**
Total	**44,4%**	**12,1%**	**20,2%**	**17,2%**	**6,1%**	**100,0%**

Source: Results from the UCA phone survey, February-March 2025

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