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GENDER AND WORK IN KAZAKHSTAN'S WIND TRANSITION

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Abstract: This article examines employment and access to technical careers for women at the Zhanatas and Shokpar wind farms in southern Kazakhstan. A documentary comparison records the date, project phase and population for workforce figures from project assessments, a government report and published fieldwork. At Zhanatas, a November 2019 assessment forecast about 15 operations and maintenance staff, while fieldwork in 2024 reported about 20 employees apart from three Chinese technicians. At Shokpar, an assessment projected up to 25 operations and maintenance staff including headquarters personnel, and an April 2026 disclosure set a separate target for training, internships and career advice for at least 25 female students over the loan period. Comparable employment records and trainee follow-up would establish whether the programmes lead to qualifications, paid placements and jobs.

Keywords: just transition, women in energy, vocational training, wind power, labour markets, Kazakhstan

Introduction

For a community hosting a wind farm, promises about employment are meaningful only when residents can tell which jobs will be available, when, and to whom. Project construction can concentrate civil works, electrical installation, delivery and erection in a short period. After commissioning, operations call for a different mix of occupations, including fault diagnosis, electrical safety, mechanical servicing and security. A statement about how many workers a project will employ can therefore carry several meanings. This article examines the distinction through the 100 MW Zhanatas and 100 MW Shokpar wind farms near Zhanatas in Kazakhstan's Zhambyl region. The European Bank for Reconstruction and Development (EBRD) describes both developments as Chinese-backed, with China Power International Holding involved alongside Visor [1] [2]. The projects are sufficiently close to raise a practical question about connecting training to more than one employer or site.

The analysis asks what the public record says about project employment, which gender-related commitments are specific enough to track, and what evidence would establish a path from participation in a programme to sustained technical work. The present analysis examines the more limited question of what can be established from public documentation about work and skills.

Literature review

The International Labour Organization (ILO) [3] approaches a just transition through decent work, social protection and dialogue. Applying that framework at the project level shifts attention

toward the quality, accessibility and durability of employment. Survey research from the International Renewable Energy Agency (IRENA) [4] documents occupational barriers to entering and advancing in wind energy. Its international respondent sample provides context. Project-specific participation in Kazakhstan must be measured through local evidence. The study by Zeng [5] on Zhanatas also illustrates the knowledge that can be gained by interviewing affected residents.

Evidence about wind employment varies with the measurement boundary. The Australian Bureau of Statistics [6] separates annual direct full-time-equivalent work attributable to wind farm construction from work in ongoing operations and maintenance. This is a useful example of defining two indicators around activities with different rhythms. The ILO guide for assessing employment in renewable energy [7] also distinguishes labour in successive project phases, supply chain employment and local spending effects. Headcounts from a contractor's site roster describe only one of those channels. For planning workforce programmes, an employer's inventory of recurring tasks and current vacancies is more informative than an industry-wide employment multiplier.

Empirical work in Brazil shows what becomes possible when a researcher can link wind development to labour records for a wider area. Hernandez-Cortes and Mathes [8] find gains in formal municipal employment with development of wind projects, especially in occupations associated with electricity, construction and transport. Scheifele and Popp [9] report a stronger fiscal than employment effect of Brazilian wind parks in their matched municipal analysis. Their questions, sample and comparison design differ. The published findings motivate two questions for Kazakh projects. First, will workers employed during construction reside or spend earnings near the site? Second, do the associated service and maintenance contracts support lasting work within the same labour market? Answering either requires measures beyond the direct worker figures in a project appraisal.

Kazakhstan's vocational education system offers an institutional base for skills development. The national statistics bureau reported 562,000 technical and vocational students at the start of the 2025–2026 academic year, of whom 47.3% were women. In Zhambyl, total admissions to technical and vocational organisations grew from 7,912 in 2021 to 9,342 in 2025, an increase of around 18% [10]. The Zhambyl figure covers all fields and both sexes and represents regional admissions. A project-specific estimate of the supply of women qualified for a particular job would require data by specialty, residence, and date of expected graduation. A reported national employment rate for vocational graduates has a similarly broad denominator. Any comparison with a wind placement rate would need to start from the same type of graduate cohort and the same definition of employment.

The distinction between aggregate participation and job composition also matters in the energy sector. Atakhanova and Howie [11] examine coal, petroleum and power employment in Kazakhstan using industry and occupation data. Their analysis identifies concentration of women in selected non-core and lower-skilled occupations across those activities, supporting the need to check which jobs are available in a particular transition. IRENA’s international study [12] likewise reports differences in women's representation across technical and administrative roles in renewables. Female representation among all applicants or all workers would be an incomplete indicator of access to wind maintenance. In this study, an inclusion commitment addresses the opportunity to acquire skills or apply. Occupational outcome evidence begins where participants can be observed entering and continuing a technical pathway.

Research on vocational education shows why stages of progression matter. In a Kenya field study, information about returns to different trades encouraged some women to choose training in traditionally male occupations [13]. An experiment in Uganda compared vocational training with employer-provided training, observing skills and labour-market trajectories over several years [14]. Both designs separate educational choice or skills acquisition from subsequent employment. Research on a Romanian education reform adds a reason to track occupation and job entry independently. Malamud and Pop-Eleches [15] report a shift away from manual or craft occupations among affected men alongside similar overall employment participation and earnings. None of

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these programmes provides a numerical benchmark for wind trainees near Zhanatas. Their designs inform which stages to measure, and which populations to follow after each stage.

Training evaluations also help identify outcomes that a project disclosure could track. In a randomized trial in Colombia, Attanasio et al. [16] found that women offered training subsequently had higher earnings and were more likely to enter paid employment, mainly in the formal sector. Differences in programme design limit direct comparison with Shokpar's training commitment. Kluve et al. [17] found small average employment and earnings effects across 113 evaluations of youth employment programmes. They reported that delivery features, including follow-up, helped account for variation between programmes. These studies support collecting comparable employment information after training. A credible estimate of the effect of Shokpar's programme would also need a comparison beyond the trainees themselves.

Graduate tracer methods offer a way to follow these transitions without treating an initial placement as the end of the pathway. Schomburg [18] outlines follow-up surveys that connect education to job entry and subsequent careers. The ILO recommendation on apprenticeships [19] provides terms for identifying whether a placement includes structured learning, workplace protections and an occupational qualification. Together, these approaches support keeping records for training access, work-based learning quality and employment outcomes. They also expose information gaps when public records report the size of a planned cohort but provide no placement or follow-up data.

Materials and methods

The working proposition is that cross-project comparison depends on recording the disclosure date, the project phase and the population behind each staffing or training figure.

The comparison covers adjacent 100 MW projects in the same district. It draws on the two environmental assessment summaries, the EBRD's project files and the Asian Infrastructure Investment Bank's (AIIB) April 2026 update for Shokpar. A December 2019 government report and Zeng's published fieldwork [5] supply additional observations for Zhanatas. National statistics and vocational studies place the case evidence in context. Each figure was checked against the document in which it appeared. When two accounts give different figures, the comparison keeps both dates and attributions visible so readers can see where the records diverge.

For each statement, the analysis recorded the reporting organisation, project phase, date or period, and population. Estimates, commitments and observations are identified in Table 1. A headcount describes people present or expected to be employed within the boundary the source defines. An annual full-time equivalent would require hours or workdays. A training target counts students supported over the loan period. The analysis compares the type and scope of these disclosures and uses published fieldwork to assess one operational account for Zhanatas.

Where a lender repeated a target in several publications, it was counted as the same commitment. The government article quotes a project manager, so it is evidence of what the manager reported at the time. For each proposed employment or training measure, the comparison asks what record would verify it. A dated payroll can confirm staffing and residence, whereas a training register can confirm who took part and in which activity.

OpenAI Codex was used to locate and cross-check public sources, draft substantial portions of the English manuscript, substantively revise the text, and prepare the evidence table, references and formatting. The evidence discussed here is attributed to the cited public records and published studies.

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Results and discussion

Table 1 – Workforce and inclusion at Zhanatas and Shokpar

Project and source	Workforce or inclusion statement	Evidence status
Zhanatas non-technical summary, November 2019	190 workers in November and up to 250 at a reported summer peak. About 15 were expected in operations and maintenance.	Construction counts reported at the time and an operating forecast.
Zhanatas project manager, December 2019	300 people involved in construction, about 30 expected to be hired after commissioning.	Manager's account published by the prime minister's office.
Zhanatas fieldwork, 2024	Around 20 employees apart from three Chinese technicians. Approximately ten employees were from Zhanatas.	Author's fieldwork account, published in 2025.
Shokpar environmental assessment	About 160 workers expected at peak construction and up to 25 in operations and maintenance. The latter includes Almaty headquarters staff.	Forecasts from the site's environmental and social assessment.
Shokpar AIIB update, April 2026	Training, internships and career advice for at least 25 female high school and university students over the loan period.	Planned programme reach.

Source. Zhanatas Wind Power Plant [20, p. 2], Office of the Prime Minister of Kazakhstan [21], Zeng [5, p. 522], Shokpar Wind Power Project [22, pp. 11–12], WSP [23, §3.3.2] and AIIB [24, Gender Aspects].

Zhanatas workforce estimates

In November 2019, the Zhanatas assessment team reported 190 people working on construction following a summer peak of up to 250. It described most workers as coming from nearby villages and Zhanatas and estimated that about 15 people would handle operations and maintenance [20, p. 2]. The following month, the prime minister's office reported the project manager's account of 300 people involved in construction and an expectation of about 30 post-commissioning hires, mainly local residents [21]. The manager's interview gives no payroll dates or staff categories. Changes in project stage and different reporting boundaries are plausible explanations for the difference, and the releases leave the exact reason open.

The November assessment describes a substation control room using supervisory control and data acquisition, or SCADA. Later, during fieldwork carried out from March to June 2024, Zeng [5] reported about 20 employees apart from three Chinese technicians. Roughly ten employees were from Zhanatas. The study uses interviews and observation, with a different evidentiary basis from a staff roster. Together, the sources describe relatively few continuing positions compared with the construction workforce. They leave open how many technical tasks were performed by staff, contractors or call-out teams, and how much the automation system contributed to the size of the operating team.

The EBRD linked Zhanatas to technical training and vocational guidance for women [1]. The project management plan also called for discussions with women in nearby communities, agreement with the construction contractor on a hiring target and training, and an operating-phase target to be reviewed annually [20, Appendix 1, action 2.4]. This makes the project's proposal more specific than the sector-level lender description. The recruitment targets and actual hires by occupation and contractor would be needed to assess implementation.

Shokpar staffing and training plans

Shokpar's non-technical summary projects about 160 construction workers at peak and up to 25 employees during operations [22, pp. 11–12]. The full appraisal specifies that the latter group includes personnel at the Almaty headquarters [23, §3.3.2]. Its local site workforce is therefore a subset of the wider operations figure. The April 2026 AIIB update sets a separate aim to offer training, internships and career advice to at least 25 female high school and university students over the loan period. It calls for work with education providers and participation in a renewable energy internship or apprenticeship programme. The EBRD's 2023 project summary describes the broader goal of improving access to green skills and economic opportunities for women [2].

A fair account of the programme would identify the activity each student was offered and the share who took it up. A student who attends a guidance session and then undertakes an internship counts once toward the target, with both activities recorded. The two activities differ in time spent and the skills that can be assessed. A later update could identify how many students completed a technical module, earned a credential or entered work. The April 2026 disclosure gives the target and its time window, leaving actual reach and placements to be established through programme records [24, Gender Aspects].

Opportunities beyond the wind farm

The Zhanatas management plan ties its proposed hiring targets to the construction contractor and site operations. The Shokpar training target covers students who may enter the labour market after the project has filled most of its positions. A graduate could find work with an equipment service company, another operating asset or an industrial electrical contractor. Recording the employer and occupation would show whether participants used a wind-specific skill, found work related to a transferable skill, or followed a different career path.

Programme participation can also occur before a worker is old enough or suitably qualified to accept a site position. High school and university participants have different pathways and expected dates of labour-market entry. For younger participants, a suitable early indicator could be completion of career guidance followed by application to a relevant course. For vocational or university students nearing graduation, training providers could track completion of an assessed technical module or a paid placement. These indicators preserve the value of early exposure and allow a later review of how frequently that exposure is followed by occupational progression.

From training access to employment outcomes

The differences between the Zhanatas accounts suggest a practical change to employment reporting. A site could publish its month-by-month headcount, the number of distinct people it employed during the construction phase and the number of staff and contractors in its first full year of operations. Each row could identify geography and contract type. Such a record would let residents and researchers distinguish the busiest month from the number of people who worked on the site over the life of construction.

The geographic proximity of the two sites suggests a potential design for skills provision. A technical college, employers and service contractors could agree on a common core of training in electrical safety, diagnostic work and maintenance documentation. Participants could then apply to several employers that recognise the same skills, including operators that have vacancies at different times. This arrangement could be assessed through actual vacancy data, employer commitments and evidence that partner organisations recognise the qualification. Accessibility also deserves attention. Timetables, travel to the placement site, safety equipment and access to suitable facilities can affect who applies and completes an internship. Employers and training providers can test the relevance of these barriers locally by seeking feedback from applicants and participants, including those who leave the programme.

A practical reporting design would begin with agreed indicators. Employers would report direct employees and contractor employees separately, by phase, occupation, broad place of residence and contract duration. Locality would be defined in advance, such as Sarysu District or Zhambyl region, and reported consistently. For gender inclusion, education providers would record unique applicants, offers, starts and completions. Employers could then track paid placements, job offers, industry placements and retention at six or twelve months where participants consent. Each rate should use an explicit denominator. A retention rate calculated among participants placed in work addresses a different question from the placement rate among programme completers. Results can be presented in aggregate, using suppression or pooling of small cells to protect participants' identities while preserving enough detail to assess access to technical roles.

Responsibilities can follow the data. Developers hold records about direct workers and can require contractor reporting in procurement terms. Education partners hold records on enrolment, attendance and completion. Lenders can specify when programme commitments are to be reported and which counts can be published. Local government, worker organisations and residents can help

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interpret which jobs and skills are locally accessible. Where a project seeks to offer other community benefits, those expenditures can be reported in their own right. A training programme offers a possible route into employment, while a community service serves a broader group. A shared reporting schedule makes both visible without double counting the people reached.

Apprenticeship quality and safeguards

Where a placement is called an apprenticeship, its terms can be assessed against ILO Recommendation No. 208, which connects an apprenticeship to structured learning, compensation, workplace safeguards and a recognised qualification [19]. This provides a practical distinction between hosting students for orientation and offering substantive workplace training. A host organisation could set out the supervised tasks, who assesses competency and what independent credential the participant will earn. A college could verify that the experience counts toward the relevant course and prepare students for transition into work. Compensation and travel support can be recorded so that applicants and local organisations can judge whether the opportunity is practically accessible.

Consider a six-month reporting window after completion of a cohort's vocational placements. First, the provider would establish the number of students eligible for follow-up. It would then distinguish those taking up paid work from those continuing their studies and those whose status could not be ascertained. A site placement can be distinguished from employment with a separate operator by recording employer type together with the skill category. If the cohort is small, an annual report can publish counts at a safely aggregated level and document underlying definitions for an agreed oversight body. Whether participants find work through the programme is a separate research question. A descriptive report can show placement and retention without attributing those outcomes to training alone.

Demand planning across projects

An approach tied to actual vacancies would open discussions with operators and contractors before enrolling a cohort in advanced technical training. Employers can state which tasks they perform in-house, how often places become available, and which credentials they recognise. Education partners can map those requirements to portable competencies in areas such as inspection documentation, workplace safety and electrical servicing. Aligning intake and graduation dates with vacancies is particularly relevant where larger cohorts can quickly exceed the demand of two sites. A recognised qualification can still have labour-market value outside wind, which is a reason to record adjacent energy and industrial placements separately from wind-specific ones.

The first annual reporting cycle could test whether the information is usable. It would check if employers applied consistent categories for occupation and local residence, whether contractors reported workers on the same basis, and if education partners recorded enough information to compute conversion at each stage of recruitment and training. This feedback can inform the next intake without turning the project figures into promises of employment. A longer evaluation would require comparable groups or a credible baseline, reliable follow-up after programme completion, and records of simultaneous changes in regional labour demand. Those requirements go beyond the descriptive comparison here and specify what more rigorous evidence of an inclusion effect would look like.

Limitations

The study covers two adjacent farms and uses publicly available material. Zeng's fieldwork provides a later operational account for Zhanatas. The respective workforce figures come from records with different purposes and dates, and both projects lack a published set of directly comparable headcounts by occupation and gender in the material reviewed. Any estimate of training effects would need an anonymised participant record, follow-up and a credible comparison group. An estimate of the effect of automation would additionally need comparable sites and information about equipment, maintenance contracts and operating arrangements.

Conclusion

Public sources show a construction-led workforce at Zhanatas and a much smaller operating team in later fieldwork. At Shokpar, plans for a small ongoing workforce coexist with a

commitment to prepare female students for opportunities across the sector. A dated record of hires by occupation and employer would make local employment visible. A separate record of qualifications, paid placements and subsequent jobs would show how women use the training beyond the two sites.

Data availability

The project disclosures, government publications and published research used in the analysis are linked in the references. Individual participant or employer records were not collected for this study.

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Conflicts of interest

The authors declare no conflict of interest.

Author contributions

Wenbo Li collected the sources and prepared the original drafts (investigation and original draft preparation). Qingshan Tan checked the material and reviewed the drafts (validation and review and editing).

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