Gender in Kazakhstan's Energy Sector

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Motivation and Objectives

Kazakhstan has achieved Very High Human development according to HDI.

According to Gender Development Index, Kazakhstan is in Group 1.

Kazakhstan is among top 15 producers of primary energy

Extractive industries account for 30% of Kazakhstan's GDP

Petroleum sector accounts of 30% of government revenue and 50% of exports.

1. To what extent have women benefited from employment opportunities in Kazakhstan's energy sector?

2. Do female and male earnings in the energy sector differ?

3. What does gender diversity of the energy sector imply for its transition?

Energy profile and emissions
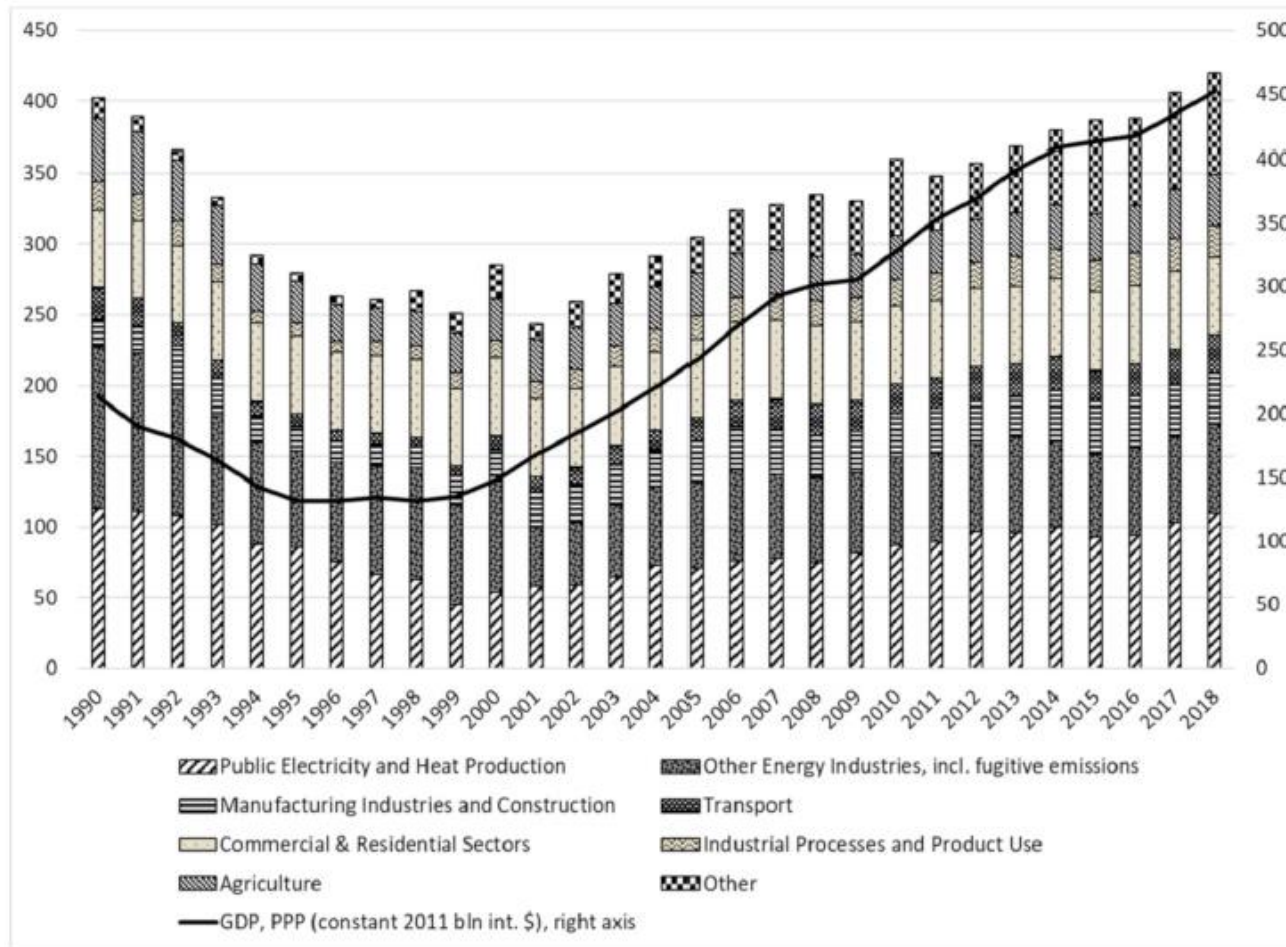
#9 exporter of oil

#9 producer and exporter of coal

Electricity generation:

    Coal – 70%
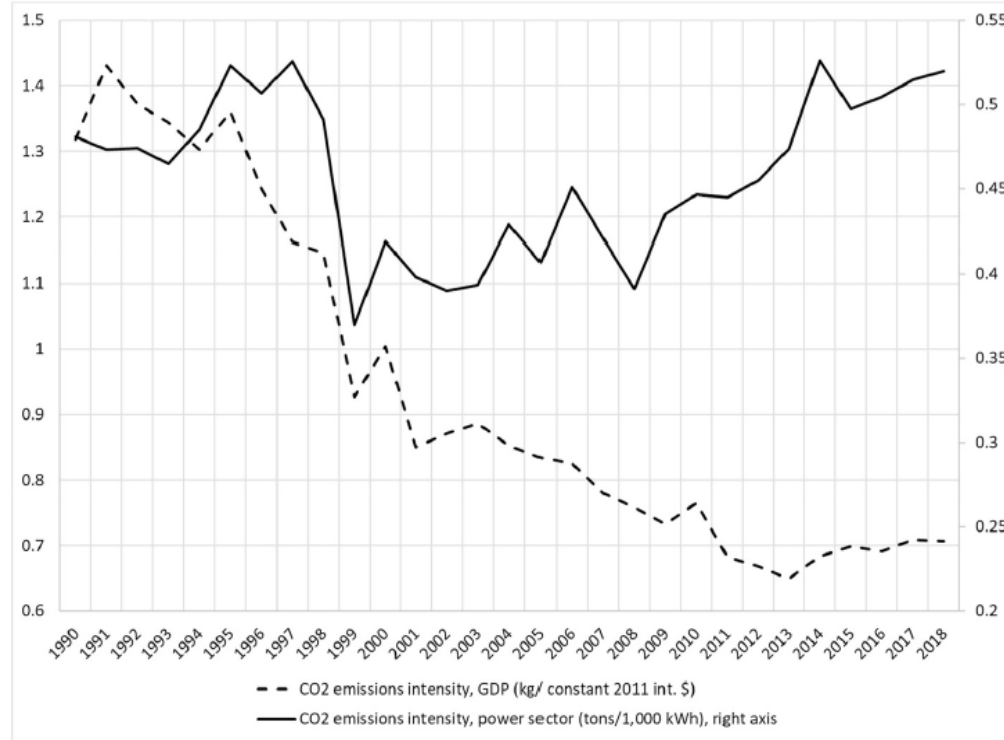
    Natural gas – 20%

    Hydropower – 10%

    Wind & solar <1%

CO_2 emissions (2018) global ranking:

    #14 per capita basis

    #9 per unit of GDP

Challenges of decarbonization

CO2 emissions intensity, GDP (kg/ constant 2011 int. $)

CO2 emissions intensity, power sector (tons/1,000 kWh), right axis

Diversity of workforce is conducive for creativity.
Female leaders are more supportive of management that embraces sustainability.

2009 Kyoto protocol ratified

2013 Emissions Trading Scheme (ETS)

2015 Paris Agreement commitments: by 2030 15% reduction of 1990 GHGs

2019: Kyoto protocol compliance issues raised by UNFCCC

2020 Carbon Neutrality Policy

    ban on new coal-fired generation

    double the share of renewables by 2030

    phase out coal generation by 2050

    transport electrification

Gender development evidence

KAZAKHSTAN

Female work participation is 60%, similar to OECD average

2016: Family and Gender Policy

2020: elimination of list of jobs prohibited for women

Females in public and informal sector jobs

Female earnings are 67% of men's earnings

Women share in student body:

Around 50% overall

30% in energy related university programs

20-25% in oil-gas/chemical vocational programs

15-20% in geology/mining vocational programs

INDUSTRIALIZED ECONOMIES

Rise of services, decline in manufacturing

Female-male earnings ratio: 60% (1960-70s) => 80% (2010)

Reasons: human capital (education, work experience).

Others: race, region, occupation, industry.

Gender roles: parental & child care leave => work interruptions and impact on productivity

Psychological attributes / stereotypes: aversion to risk, competition, bargaining => low female representation in higher-level jobs
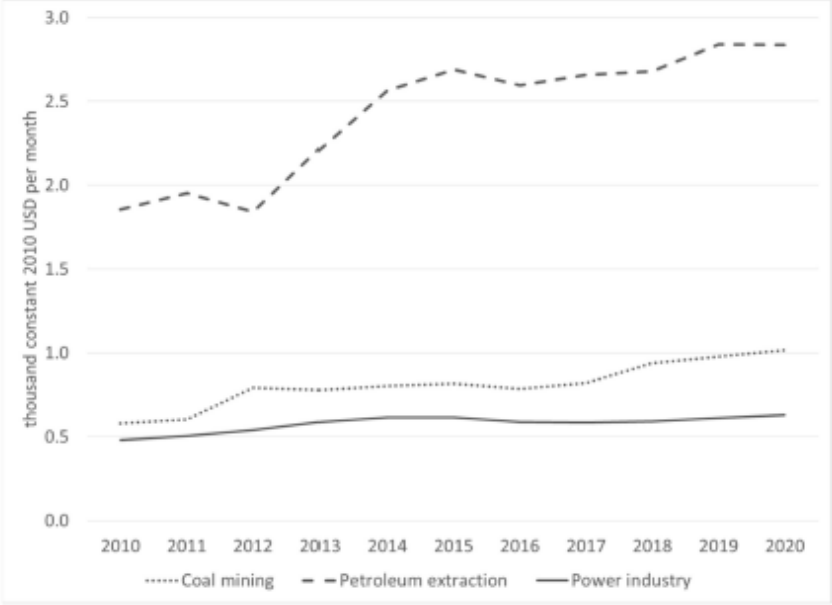
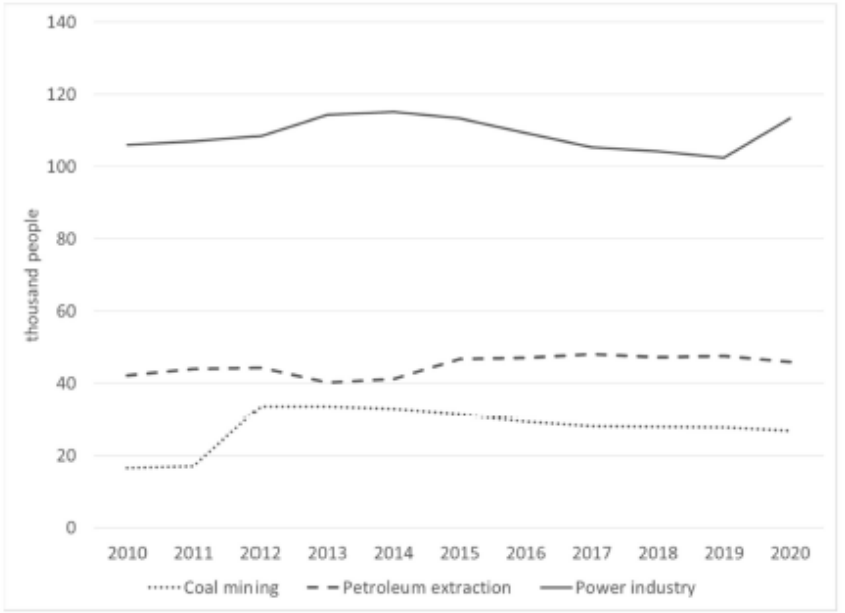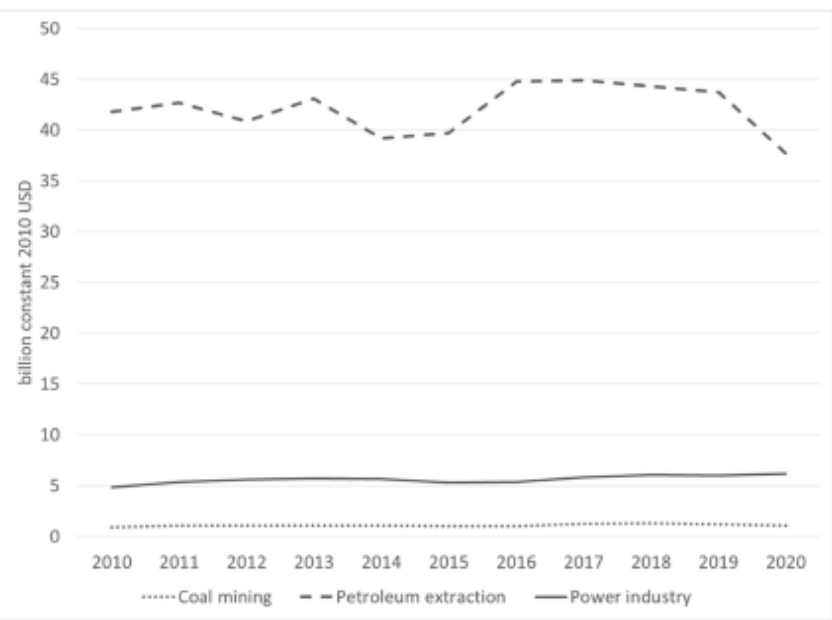**GLOBAL ENERGY SECTOR**

Female representation: 22% in oil-and gas and 32% in renewables vs. 48% across all sectors.

Senior managers: 10% in oil-and-gas vs. 33% across all sectors

Gender diversity initiatives.

Limited gender diversity energy sector's ability to meet multiple challenges, especially those related to climate change.

Three energy industries

Output value, employment, salaries

Materials and Methods

Analysis of employment
Kazakhstan Labor Force Survey (approx. 200,000 individuals, NACE rev. 2)
2010, 2014, 2018, 2020
8 groups of occupations

Analysis of earnings
"Average monthly salaries" annual publication of Ministry of Economy
2010, 2014, 2017, 2021
Salaries by type of occupations

Data analysis of earnings within occupations (for each year)
female-male earnings ratio=100*average monthly salary of women/average monthly salary of men   (1)

Data analysis of earnings across occupations (for each year)
log (average monthly salary of women) = constant + beta*log (average monthly salary of men) + error   (2)
1. Null hypothesis: beta ≥ 1
2. Null hypothesis: beta(t) ≥ beta(t-1)

Analysis of female employment

Table 1. Distribution of total workforce across groups of occupations, average, 2010–2020.

Occupation	Coal	Petroleum	Power
Managers	7%	5%	6%
Engineers, Surveyors	2%	4%	6%
Science/IT professionals	1%	2%	1%
Technicians	4%	8%	11%
Semi-skilled workers	26%	21%	30%
Equipment operators	40%	37%	15%
Unskilled laborers	9%	11%	12%
Other	10%	13%	19%
Total	100%	100%	100%

Source: Ministry of Economy of Kazakhstan "Labor Force Survey", various years.

Table 2. Share of women in the total workforce by occupation, average, 2010–2020.

Occupation	Coal	Petroleum	Power
Managers	16%	14%	16%
Engineers, Surveyors	26%	22%	30%
Science/IT professionals	33%	31%	38%
Technicians	12%	17%	19%
Semi-skilled workers	14%	10%	15%
Equipment operators	15%	6%	19%
Unskilled laborers	56%	32%	53%
Other	63%	60%	64%
Total	22%	18%	30%

Source: Ministry of Economy of Kazakhstan "Labor Force Survey", various years.

Table 3. Average annual growth rate in share of women in occupations, 2010–2020.

Occupation	Coal	Petroleum	Power
Managers	−5%	−5%	9%
Engineers, Surveyors	5%	−2%	−3%
Science/IT professionals	Na	14%	13%
Technicians	Na	1%	3%
Semi-skilled workers	9%	−12%	−6%
Equipment operators	6%	−6%	−1%
Unskilled laborers	7%	6%	7%
Other	1%	4%	3%
Total	−1%	−4%	0%

Source: Ministry of Economy of Kazakhstan "Labor Force Survey", various years.

Women are concentrated in unskilled and auxiliary jobs. Overall share is falling.

	2010	2014	2017	2021	Average 2010–2021
COAL MINING					
Mean (%)	79.36	91.73	88.43	109.55	92.27
Standard deviation (%)	26.18	23.91	23.37	60.76	33.56
Min (%)	43.10	37.30	49.20	46.50	44.03
Max (%)	163.90	141.60	136.70	231.70	168.48
No. occupations held by both women and men and women's salaries reported	29	32	30	11	
% occupations held by women	62	67	63	37	
PETROLEUM EXTRACTION					
Mean (%)	99.67	90.88	91.79	112.42	98.69
Standard deviation (%)	35.31	26.39	25.16	43.54	32.60
Min (%)	45.30	48.60	28.30	36.80	39.75
Max (%)	223.10	170.30	146.10	190.40	182.48
No. occupations held by both women and men and women's salaries reported	34	30	31	29	
% occupations held by women	71	67	66	35	
POWER INDUSTRY					
Mean (%)	85.23	87.77	92.47	98.49	90.99
Standard deviation (%)	15.89	18.57	29.50	32.52	24.12
Min (%)	53.20	42.60	34.20	33.80	40.95
Max (%)	114.50	129.50	219.80	226.40	172.55
No. occupations held by both women and men and women's salaries reported	33	33	32	153	
% occupations held by women	100	100	100	40	

Source: Ministry of Economy of Kazakhstan "Average salaries by sector and occupation", various years.

Analysis of female-male earnings ratios (within occupations)

Note: % occupations held by women went down in 2021 by 40-60%.

Analysis of female-male earnings ratios (across occupations)

Sector	Year	Coefficient Estimate	Standard Error	Constant	Adjusted R²	Num. Obs.	p-Value [1]	p-Value [2]
coal mining	2010	0.8682 ***	0.1949	1.1979	0.4023	29	0.2523	
	2014	0.6789 ***	0.1258	3.6135 ***	0.4757	32	0.0080	0.0714
	2017	0.7043 ***	0.1278	3.3615 ***	0.5033	30	0.0141	0.4219
petroleum extraction	2010	0.7516 ***	0.1262	2.9855 **	0.5111	34	0.0289	
	2014	0.9725 ***	0.0985	0.2156	0.7687	30	0.3911	
	2017	1.1619 ***	0.1238	−2.2496	0.7438	31	0.1006	
	2021	0.7311 ***	0.0977	3.6571 ***	0.6626	29	0.0052	0.0001
power industry	2010	0.9370 ***	0.1000	0.5233	0.7305	33	0.2667	
	2014	0.7565 ***	0.1360	2.6570 *	0.4834	33	0.0416	0.0971
	2017	0.6898 ***	0.1223	3.5161 ***	0.4982	32	0.0083	0.2948
	2021	0.6915 ***	0.0569	3.6567 ***	0.4909	153	0.0000	0.5000

Source: Authors' calculations. Notes: ***: Estimated coefficient is statistically significant at 1%. **: Estimated coefficient is statistically significant at 5%. *: Estimated coefficient is statistically significant at 10%. [1] Testing the null hypothesis: coefficient ≥ 1. [2] Testing the null hypothesis: coefficient (current year) $\geq$ coefficient (previous year).

Discussion, Conclusion, Recommendations

Diverse labor force is required to solve challenges of Kazakhstan's energy sector. However,

- Women are concentrated in un-skilled and non-core (low-paying occupations).
- Women's employment share fell during the pandemic.
- Within occupations earnings ratio is close to one.
- Across occupations, women's skill premium is less than that of men.

Implications:

- High earnings in the energy sector accumulate to mostly men.
- Coal phase-out: re-employment of coal miners is facilitated by technical skills.
- Falling female representation among managers and engineers makes looking for solutions and prioritizing sustainability more challenging.

Recommendations:

- Gender diversity discussion and mainstreaming.
- STEM education for women and girls.

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