2nd Almaty Energy Forum

Building resilient energy systems in Central Asia

Date: 14 – 16 November 2022

Towards to low-carbon and socially oriented economy: Effects of “green" projects in energy, agriculture and water sectors

Case of Uzbekistan

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The regional context of the research

Report on Assessment of social and economic impacts of increased ambition NDC on energy, agriculture and water management sectors in Uzbekistan

full version of the Report at: https://www.uz.undp.org/content/uzbekistan/en/home/ library/environment energy/assessment-of-social-and-economic-impacts-of-increased-ambition-.html

Energy, agriculture and water

- key importance sectors for the Central Asia region in terms of developing coordinated actions for all countries of this region;
- key sectors for low-carbon development of Uzbekistan to fulfill committed NDC to GHG emission reductions.

The research was conducted under the regional project “Policy action for climate security in Central Asia”. Funding is provided by the UK Foreign Office for the Commonwealth and Development. Implemented by the United Nations Development Programme (UNDP) and the Foreign, Commonwealth and Development Office (FCDO) in partnership with the Center of Hydrometeorological Services under the Cabinet of Ministers (Uzhydromet) of the Republic of Uzbekistan.

Objectives: Search for a national low-carbon and socially-oriented development model

Task 1. **Determine Uzbekistan's place in global carbon intensity trend:**

- development of methodology for country's assessment;
- identification of reference countries for Uzbekistan.

Task 2. **Form a set of factors/conditions determining successful transition to low-carbon development at macro level:**

- a set of factors/conditions (correlation analysis, assessment of interconnection degree);
- analysis of international practice based on a set of factors/conditions (econometric analysis).

Task 3. **Propose an approach on sector-based technology selection with consideration of**:

- criterion of carbon footprint reduction;
- assessment of direct and indirect emissions based on the Input-Output approach.

Task 4. **Propose an approach on selection of typical "green" projects in the energy, agriculture and water sectors (micro level) based on the following criteria** :

- GHG emission reduction;
- ensuring financial sustainability;
- minimizing investment costs;
- *maximizing employment growth and incomes of the employed.*

It is necessary to combine climate policy and the social problems solving.

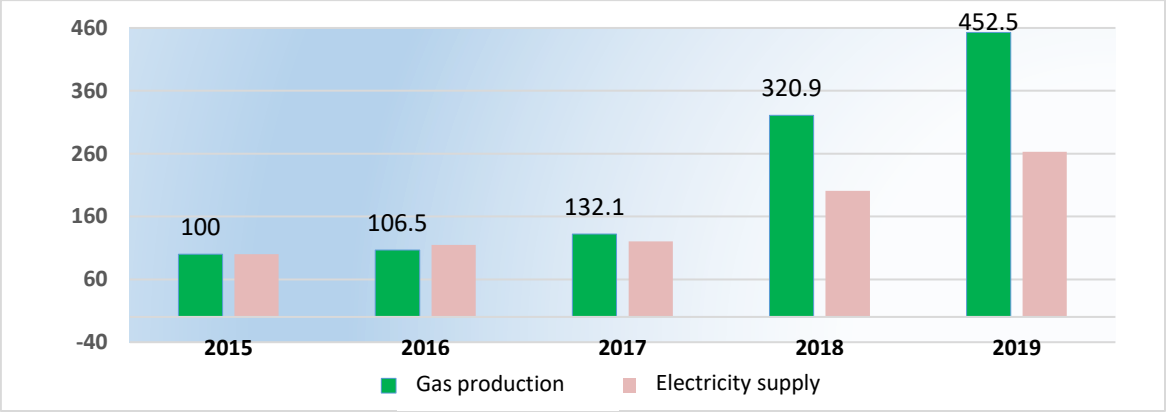
Projects in Power (Electric Energy) Sub-sector

Effects from alternative technological solutions (projects)

Indicator	Conventional generation		Replacement with combined-cycle steam and gas turbine (CCSGT, energy saving) Option 1		Wind Turbine with 20% load Option 2		Wind Turbine with 30% load Option 3	
	bln UZS	%	bln UZS	%	bln UZS	%	bln UZS	%
Electricity output	10,696.4	100.0	10,696.4	100.0	11172.4	100,0	11409,8	100,0
Added value	4,292.3	40.1	4,741.2	44.3	4,547.1	40.7	4,678.0	41.0
incl. depreciation	343.5	3.2	1,119.3	10.5	696.8	6.2	707.2	6.2
Profit (value added - depreciation - remuneration)	1,870.8	17.5	1,543.9	14.4	1,678.7	15.0	1,754.2	15.4
Intermediate consumption	6,404.1	59.5	5,954.9	55.7	6,625.3	59.3	6,731.8	59.0
incl. natural gas	1,548.9	**14.5**	1,101.7	**10.3**	1,553	13.9	1,551.7	**13.6**
Output growth, %	-	-	-	-	4.45%		6.67%	

Source: Expert estimates

Prices for gas production and electricity supply, 2015-2019 (2015 = 100%)

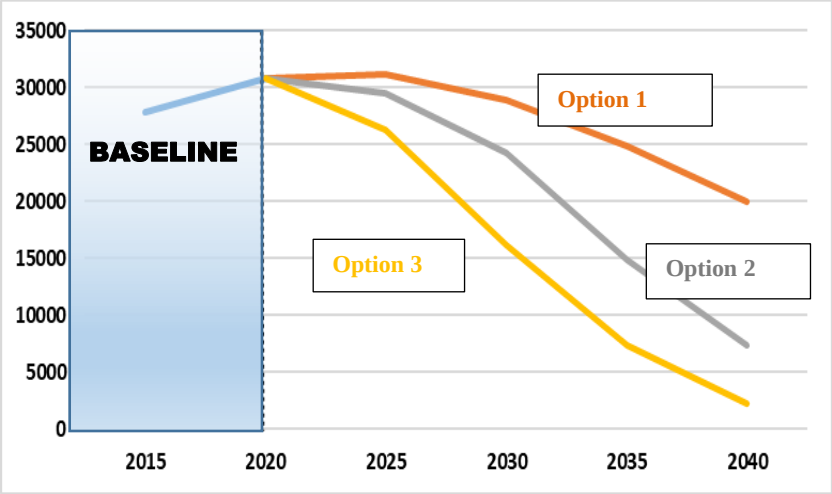


Source: State Committee for Statistics, Uzbekistan

Up to 2017, CCSGT and Wind Turbine projects competed in terms of financial stability. Since 2017, due to the outpacing growth in gas prices, the situation has changed in favor of CCSGT.

Projects in Agriculture

GHG emission forecast up to 2040 at different scales of BGU utilization (ths tons CO2-EQ.)



Indicator	Unit	2020 (basic)	Option	2025	2030	2035	2040
% of coverage of cattle by biogas unit (BGU)	%	0.0001	1%	5%	10%	15%	20%
			2	10%	20%	40%	50%
			3%	20%	40%	55%	70%

Effects on employment from BGU deployment (2040 vs. 2020, number of jobs)

Indicator		If BGU are imported	If BGU are locally produced
Reduced employment resulted from natural gas and fertilizer savings:		**-8,395**	**+20,511**
incl.:	Chemistry	-5,445	-5,334
	Trade	-365	+960
	Agriculture	-267	+84
	Natural gas	-146	-96
	Machinery and Equipment (without cars)	-3	+20,994
	Metallic ores	-151	+1,032
	Basic metals	-7	+812
	Metal products	-32	+377
Service staff		**+7,010**	**+7,010**
Changes in employment, TOTAL		**-1,385**	**+27,521**

Projects in Energy and Agricultures: Aggregated

Comparative effects of typical "green" technologies based on carbon footprint reduction criteria in terms of 1 billion investment

Technology	General assessment of carbon footprint reduction for a typical project (kg CO2-eq./mln. UZS of final consumption)	Required investments (USD, billion)	Reduction of carbon footprint of economy as a whole (kg CO2-eq. per USD 1 billion of investments)
Introduction of WPPs with an efficiency of 20% (energy)	28	1.9	14.7
Introduction of WPPs with an efficiency of 30% (energy)	41	1.9	21.6
Modernization of thermal power plants (TPP) with the introduction of CCSGT (energy)	126	4.0	31.5
Introduction of BGUs in agriculture	80	1.9	42.1

Source: based on Input-Output model calculations

Wind turbines projects are less effective in GHG emission reductions and are neutral in relation to employment and income of employed.

BGU technology is much more promising compared to the WPP technology in terms of GHG emission reductions and natural gas saving.

Projects in Water Resources Sector: water-saving technologies

Assessment of impact of water deficiency on industrial outputs and on economy (reduction in production in % of the base level)

Sector of Economy		Base level	Without adaptation measures (Option 1)			With adaptation measures Capex/Opex (Option 2)		
			10%	20%	30%	10%	20%	30%
1.	Agriculture, forestry and fisheries	100	-5.86	-11.90	-26.83	0	-2.58	-6.42
2.	Gas and oil production	100	-0.02	-0.04	-0.09	0	-0.01	-0.02
3.	Other extractive industries	100	-0.15	-0.30	-0.67	0	-0.06	-0.16
4.	Processing industries	100	-0.30	-0.61	-1.37	0	-0.13	-0.33
5.	Energy	100	-0.58	-1.18	-2.66	0	-0.26	-0.64
6.	Water and Irrigation	100	-0.16	-0.33	-0.75	0	-0.07	-0.18
7.	Transport	100	-0.21	-0.43	-0.97	0	-0.09	-0.23
8.	Construction	100	-0.02	-0.04	-0.09	0	-0.01	-0.02
9.	Education	100	0.00	-0.01	-0.01	0	0.00	0.00
10.	Health	100	0.00	0.00	-0.01	0	0.00	0.00
11.	Other servicing sectors	100	-0.32	-0.66	-1.48	0	-0.14	-0.35
	TOTAL (GDP)	100	**-2.11**	**-4.30**	**-9.68**	**0**	**-0.93**	**-2.32**

Source: Based on Input-Output model calculations

Under conditions of 30% water deficiency, decline in GDP can reach up to 10%. This can lead to a noticeable decrease of the population living standards .

Projects in Water Resources Sector: water-saving Technologies

Assessment of impact of low water availability on unemployment growth
(number of newly unemployed, person)

	Sector of Economy	Without adaptation measures (Option 1)			With adaptation measures Capex/Opex (Option 2)			Employment retention (30% of water deficiency)
		10%	20%	30%	10%	20%	30%	
1.	Agriculture, forestry and fisheries	-49,762	-101,129	-227,943	0	-21,938	-54,578	173,365
2.	Natural gas and oil production	-37	-75	-168	0	-16	-40	128
3.	Other extractive industries	-75	-152	-344	0	-33	-82	261
4.	Food production	-111	-225	-506	0	-49	-121	385
5.	Textile and textile products	-542	-1,101	-2,481	0	-239	-594	1,887
6.	Chemical products	-587	-1,192	-2,688	0	-259	-643	2,044
7.	Other processing industries	-691	-1,403	-3,163	0	-304	-757	2,406
8.	Energy	-482	-980	-2,209	0	-213	-529	1,680
9.	Water and Irrigation	-31	-62	-140	0	-14	-34	107
10.	Transport	-215	-438	-986	0	-95	-236	750
11.	Construction	-39	-79	-179	0	-17	-43	136
12	Trade	-1,180	-2,397	-5,403	0	-520	-1,294	4,110
13	Education	-29	-59	-133	0	-13	-32	101
14	Health	-9	-18	-40	0	-4	-10	31
15	Other servicing sectors	-864	-1,756	-3,958	0	-381	-948	3,011
	TOTAL: newly unemployed, person	**-54,652**	**-111,067**	**-250,341**	**0**	**-24,094**	**-59,941**	**190,400**

Source: Based on Input-Output model calculations

With a 30% water shortage, the release of workers could amount to 250.3 ths persons (2% of the total number of employees). In the most negative scenario (30% water shortage), the use of drip irrigation would potentially save jobs for 190.4 ths people, including 91% in agriculture, where the largest part of the low-income strata of the population is concentrated.

Policy messages and Recommendations

Policy messages:

1. The WWP projects will become effective when the price for natural gas in Uzbekistan reaches the **global average level**. Traditional recommendations on the need in large-scale investments in renewable energy are not effective without reforming the current **subsidized tariff policy** for energy.

2. WWP projects should be considered **selectively** with avoiding their competition with thermal power plants and implementing them in those areas /regions that face **deficiency** in power supply or in need of **more stable** power supply.

3. Use of BGU technology is the most promising option of **agriculture sector transition** to low-carbon and more labor-intensive development model. However, without establishing of **local BGU manufacturing** the effects on employment and income of population will be negative.

4. Harnessing drip irrigation technologies will **significantly reduce** the scale of negative impact of water resources deficiency on the economy (GDP), particular sectors and rural employment.

Recommendations:

1. Development of tools for prioritization (selection) of "green" projects taking into account climate criteria (emissions) and social criteria (employment).

2. Creation of a single register of typical "green" projects that have been assessed taking into account climate and social criteria.