

THE PRIVATE SECTOR'S CONTRIBUTION TO IMPLEMENTING UZBEKISTAN'S NATIONWIDE OBJECTIVES IN COMBATING CLIMATE CHANGE



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UNDP/FCDO Project ‘Policy Action for Climate Security in Central Asia – Phase II’

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UNDP assistance to Uzbekistan is intended to achieve common interrelated goals. These include supporting the Government in accelerating reforms in the fields of sustainable economic development, good governance, climate change adaptation, and environmental protection.

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List of used abbreviations

GDP	Gross Domestic Product
RES	Renewable Energy Sources
COP26	26th session of the Conference of the Parties to the UNFCCC
SDM	Sustainable Development Mechanism
CDM	Clean Development Mechanism
NDC	Nationally Determined Contribution
GHG	greenhouse gas
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
CIS	Commonwealth of Independent States
CER	Certified Emission Reductions
MSW	municipal solid waste
PPS	photovoltaic station
A6.4ER	Article 6.4 emission reduction
CO2	carbon dioxide (dioxide)
EPA	Environmental Protection Agency
FCDO	UK Foreign, Commonwealth and Development Office
N2O	nitrous oxide
PDD	Project Design Document
PIN	Project Idea Note

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Introduction

Climate change is one of the main challenges of our time, which directly affects people's quality of life. The global consequences of climate change have reached unprecedented proportions, having fully manifested in the Central Asian region.

Paris Agreement on Climate Change - Roadmap for UN Member States to Reduce Emissions and Strengthen Climate Resilience.¹

The Republic of Uzbekistan is committed to the effective and transparent implementation of the Paris Agreement. This process has been guided by decisions of the Conference of the Parties to the Framework Convention on Climate Change, specifically 4/CMA.1, 1/CP.21, 9/CMA.1 and 18/CMA.1.

In accordance with current national circumstances and capabilities, the Republic of Uzbekistan updated its Nationally Determined Contribution in 2021. The country has increased its commitments to the updated Nationally Determined Contribution (NDC or NDC2) to reduce specific greenhouse gas (GHG) emissions per unit of GDP by 35 percent by 2030, compared to 2010 levels, instead of the previously accepted 10 percent committed to in 2018 (NDC1).²



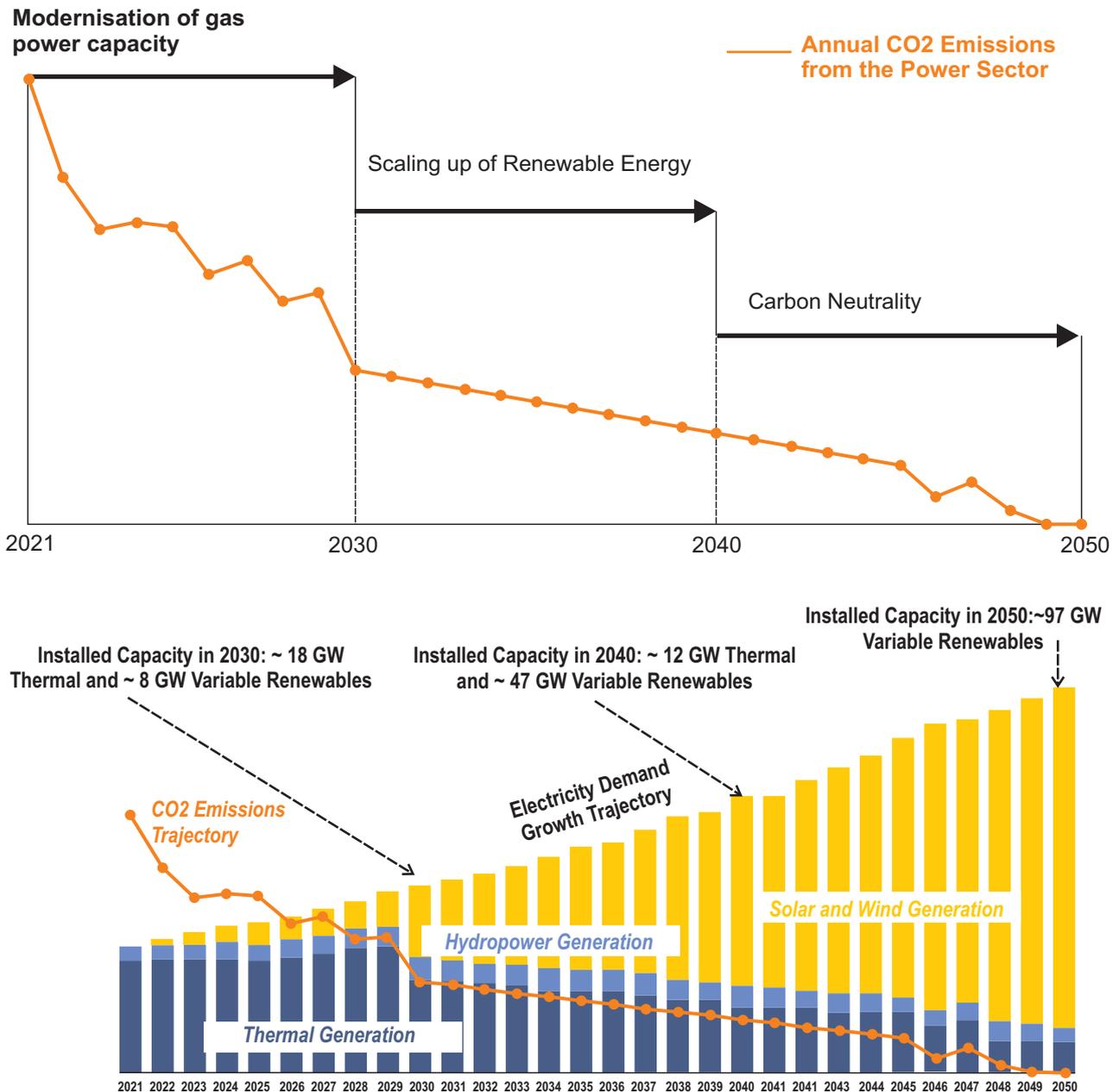
Source: <https://www.gazeta.uz/ru/2021/11/09/cop26/>

Uzbekistan can achieve zero carbon energy as early as 2050, both technically and economically.³

¹<https://lex.uz/uz/docs/3924451>

²https://hydromet.uz/sites/default/files/inline-files/%D0%A4%D0%98%D0%90%D0%9B_%D0%A0%D0%A3%D0%A1%20%D0%9E%D0%B1%D0%BD%D0%BE%D0%B2%D0%BB%D0%B5%D0%BD%D0%B-D%D1%8B%D0%B5%20%D1%86%D0%B5%D0%BB%D0%B8%20%20NDC_0.pdf

³<https://minenergy.uz/ru/lists/view/131>



Source: <https://review.uz/post/minenergo-opublikovalo-plan-perexoda-k-uglerodno-neytralnoy-elektroenergetike>

Uzbekistan has an appropriate regulatory and legislative framework:

- Law of the Republic of Uzbekistan 'On rational use of energy', 1997;⁴
- Paris Agreement, 2015;⁵
- Decree of the President 'On the strategy of action for the further development of the Republic of Uzbekistan', 2017;⁶
- Decree of the President of the Republic of Uzbekistan 'On the program of measures for the further development of renewable energy, and energy efficiency in the economic sector and the social sphere for 2017-2021', 2017;⁷

⁴ <https://www.lex.uz/acts/2054>

⁵ <https://lex.uz/uz/docs/5075088>

⁶ <https://lex.uz/docs/3107042>

⁷ <https://lex.uz/docs/3221897>

- Law of the Republic of Uzbekistan ‘On Ratification of the Paris Agreement (Paris, December 12, 2015)’, 2018;⁸
- Law of the Republic of Uzbekistan ‘On the use of renewable energy sources’, 2019;⁹
- Decree of the President of the Republic of Uzbekistan ‘On accelerated measures to improve the energy efficiency of economic and social sectors, the introduction of energy-saving technologies, and the development of renewable energy sources’, 2019;¹⁰
- Decree of the President of the Republic of Uzbekistan ‘On approval of the strategy for the transition of the Republic of Uzbekistan to a green economy for the period 2019-2030’, 2019;¹¹
- Decree of the President of the Republic of Uzbekistan ‘On approval of the strategy for the management of solid household waste in the Republic of Uzbekistan for the period 2019-2028’, 2019;¹²
- Decree of the President of the Republic of Uzbekistan ‘On approval of the strategy for the transition of the Republic of Uzbekistan to a green economy for the period 2019-2030’, 2019;¹³
- Decree of the President of the Republic of Uzbekistan ‘On approval of the concept of environmental protection of the Republic of Uzbekistan until 2030’, 2019;¹⁴
- Decree of the Cabinet of Ministers of the Republic of Uzbekistan ‘On additional measures to accelerate the implementation of national goals and objectives in the field of sustainable development for the period up to 2030’, 2022.¹⁵

⁸ <https://lex.uz/ru/docs/3924451>

⁹ <https://lex.uz/docs/4346835>

¹⁰ <https://lex.uz/docs/4486127>

¹¹ <https://lex.uz/docs/4539506>

¹² <https://lex.uz/docs/4291733>

¹³ <https://lex.uz/ru/docs/4539506>

¹⁴ <https://lex.uz/docs/4574010>

¹⁵ <https://lex.uz/docs/5873508>

Recommendations for private sector enterprises on introducing energy-saving technologies

Increasing energy efficiency is a task of utmost priority around the world today, due to the shortage of traditional energy resources and the high cost of their production, and the need to mitigate the imminent effects of climate change.

Energy saving, and the introduction of energy-saving technologies, are important approaches to implementing the nationwide task of decarbonization. Given Uzbekistan's population growth (according to UN forecasts, by 2030 the country's population will increase to 37 million people) and the intensive development of the national economy, responsible energy use will help strengthen energy security, and put Uzbekistan on its way to sustainable development.

Due to the gradual denationalization of the economy, the private sector is increasing its share of responsibility in meeting national targets related to reducing greenhouse gas emissions.

According to the Ministry of Energy of the Republic of Uzbekistan, over the past five years the average daily electricity consumption in the country has increased by 44.3 percent, amounting to 205.1 million kWh in 2021. It is predicted that by 2030 this figure will be 330.9 million kWh.¹⁶

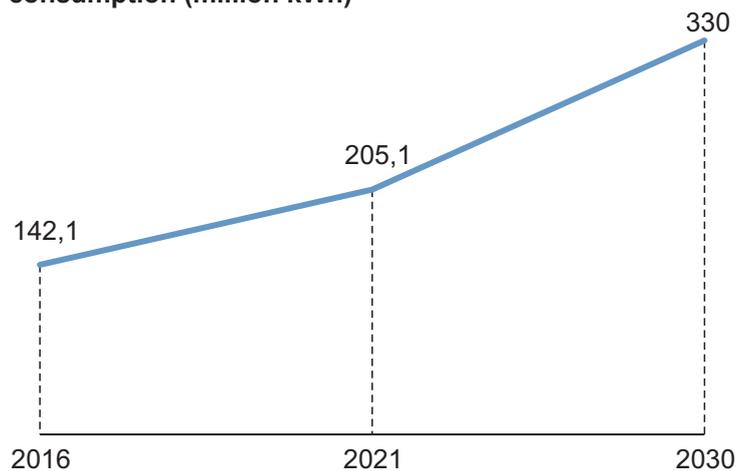
The first step for private companies to introduce energy-saving technologies should be conducting comprehensive and high-quality energy technology audits, involving specialized companies who can contribute relevant experience and knowledge. This step

will make possible the creation of a database on energy-consuming equipment, determination of key energy efficiency indicators, and gauging existing energy saving potential.

Based on the results of the energy audit, the next step will be developing a plan of measures for the phased modernization of production lines, optimization of technological processes and improvement of companies' energy efficiency, including:

1. Gradual abandonment of energy-intensive and obsolete equipment, and transition to the use of modern energy-efficient equipment with greater productivity. This will reduce the specific consumption of electrical, thermal and other types of energy per unit of output.
2. Revision of technological processes and regulation of equipment operation modes, to reduce unnecessary energy costs.
3. Increased level of automation of technological processes, which will allow for quick responses to any deviations in operating systems.

Indicator of average daily electricity consumption (million kWh)



Source: На основании экспертной оценки

¹⁶ <https://minenergy.uz/ru/news/view/1826>

4. Equipping power consumption systems with automatic control and measurement devices.
5. Inclusion and gradual increase of the share of electric and thermal energy produced using renewable energy sources (RES), through installing photovoltaic stations (PVP), solar water heaters, wind turbines, biogas plants, and other such systems.
6. Installation of various sensors, including those related to presence, movement and time relay, which will decrease energy costs by reducing operating time of lighting devices and other energy-consuming devices, tools and equipment.
7. Improving energy efficiency of buildings and structures, their green design, and increasing use of modern heat-insulating materials.
8. Optimizing the heating system and eliminating additional electrical heating devices.
9. The use of simple but effective measures, such as: 1) painting the walls of premises in light colours, thus increasing the level of light on the premises; 2) considering the possibility of using larger, double-glazed windows without compromising the thermal insulation of external enclosing structures; 3) maintaining the cleanliness of natural light sources to increase their light transmission capacity, and; 4) replacing incandescent lamps with LED ones.

Energy conservation behaviours can be introduced through training and retraining personnel in the use of energy-saving technologies and energy-saving skills, which will create a corresponding change in work patterns and the performance of production operations.

Implementing these energy saving measures will positively affect a given company's financial condition. Replacing obsolete equipment with new and more energy efficient options will increase overall productivity, while reducing cost of production and improving product quality.

The given enterprise's contribution to reducing greenhouse gas emissions, and its consistent transition to applying the principles of the green economy, will improve its reputation. As a result, the goods produced by the company, or the services it provides, will receive additional competitive advantages when sold on domestic and foreign markets, generating growth in sales and financial stability.

Experience in participating in Clean Development Mechanism (CDM) projects under the Kyoto Protocol

As a party to the UNFCCC, and as a country not included in Annex No. 1 of the Kyoto Protocol, Uzbekistan participated in implementing CDM projects by attracting investments, new technologies and knowledge.

In Uzbekistan an Authorized National Authority for CDM projects has been created. Accordingly, the institutional and legal framework for implementing CDM projects has been developed and improved.

Through the implementation of such projects under the Kyoto Protocol, with technical support from UNDP's 'Capacity Building for the CDM in Uzbekistan' initiative, more than 80 CDM projects were prepared in the country. This started with CDM project application, and concluded with the provision of assistance in finding investors and submitting a Project Design Document for registering with the UN.

In terms of number of registered projects, Uzbekistan ranks first among countries of the CIS and Eastern Europe. In the global ranking, out of the 94 countries participating in the CDM, the country ranks 16th in terms of reductions, and 31st in terms of number of registered related projects. Uzbekistan has developed and approved a standardized baseline (GHG emission factor for electricity generation) for the national energy system.

UZBEKISTAN PROJECTS PREVIOUSLY REGISTERED WITH THE SECRETARIAT OF THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

Registered	Title	Host Parties	Other Parties	Methodology *	Reductions **	Ref
14 Mar 09	Reduction of N2O emissions at shop#25, production line #3 at "Navoiazot" plant	Uzbekistan	Japan	AM0034 ver. 2	118900	2245
16 Mar 09	Reduction of N2O emissions at shop#25, production line #2 at "Navoiazot" plant	Uzbekistan	Japan	AM0034 ver. 2	132500	2244
27 Mar 09	Reduction of N2O emissions at shop#25, production line #4 at "Navoiazot" plant	Uzbekistan	Japan	AM0034 ver. 2	112500	2246
29 Mar 09	Reduction of N2O emissions at shop#25, production line #1 at "Navoiazot" plant	Uzbekistan	Japan	AM0034 ver. 2	132500	2243
03 Apr 09	Reduction of N2O emissions at «Maxam-Chirchik» plant	Uzbekistan	Japan	AM0034 ver. 2	353153	2308
10 Apr 09	Reduction of N2O emissions at "Ferganaazot" plant	Uzbekistan	Japan	AM0034 ver. 2	170925	2310
19 Dec 09	Akhangaran Landfill Gas Capture Project in Tashkent	Uzbekistan	Japan United Kingdom of Great Britain and Northern Ireland	ACM0001 ver. 11	84908	2750
26 Nov 10	Reduced gas leakage at compressor stations	Uzbekistan		AM0023 ver. 3	504000	3430
27 Nov 10	* Leak Reduction in Above Ground Gas Distribution Equipment in the Gas Distribution Network UzTransgaz- Markazgaz (UzTG)	Uzbekistan	United Kingdom of Great Britain and Northern Ireland	AM0023 ver. 2	1021137	3339
28 Dec 10	*Leak Reduction in Above Ground Distribution Equipment in the Gas Distribution Network UzTransgaz- Zhanubgaz (ZhGT)	Uzbekistan	United Kingdom of Great Britain and Northern Ireland	AM0023 ver. 3	559912	3910
17 Feb 11	Reducing gas leaks in low pressure and medium pressure gas distribution networks in Ferghana Valley	Uzbekistan	United Arab Emirates Netherlands	AM0023 ver. 3	1211629	4085
22 Aug 11	*Leak Reduction in Above Ground Distribution Equipment in the Gas Distribution Network UzTransgaz- Garbgaz (GGT)	Uzbekistan	Switzerland United Kingdom of Great Britain and Northern Ireland	AM0023 ver. 3	818166	4883
09 Sep 11	*Reduction of gas leakages in low- and middle- pressure gas-distribution pipelines in Tashkent City and Tashkent Region	Uzbekistan	United Kingdom of Great Britain and Northern Ireland	AM0023 ver. 3	1053164	5176
07 Mar 12	Leak reduction in above ground gas distribution system in the gas distribution networks in Khorezm region and the Republic of Karakalpakstan	Uzbekistan	United Arab Emirates	AM0023 ver. 3	232184	5166
15 Jan 14*	"Yoshlik" Landfill Gas Capture Project, Uzbekistan	Uzbekistan	Netherlands	AMS-III.G. ver. 8	30593	9730

In the period of 2009-2014, in partnership with foreign investors, Uzbekistan has registered 15 projects with the UNFCCC and declared a volume of emission reductions of 6.536 million tons of CO₂ annually. 15.2 million tons of Certified Emission Reductions (CERs) were issued, including:

- 6 projects to reduce nitrous oxide (N₂O) emissions in the chemical industry according to the approved methodology AM0034 ver. 2;
- 7 projects to reduce gas leaks in the aboveground gas distribution system in the oil and gas sector (gas transportation) according to the methodology AM0023 ver. 3;
- 2 landfill gas capture projects according to ACM0001 ver. 11 and AMS-III.G. ver. 8.

The financial and economic crisis has led to a decrease in emissions from developed countries, and accordingly, a decline in global prices of Certified Emission Reductions (CERs). This situation prevented the receipt of planned income for all projects listed above. At the same time, in addition to the benefits of emission reductions, indicators related to production activities were improved in each of these projects. The CDM mechanism has proven to be effective in transferring technology to developing countries.

According to the experts of SJSC 'Uzkimyosanoat', the results of activities under the CDM projects made it possible to achieve a stable operation of the units, eliminating unscheduled emergency shutdowns and additional repairs.

According to Uztransgaz specialists, the implementation of CDM projects in gas distribution networks by reducing methane leaks ensured annual savings in natural gas, which brings additional income to the industry.

The projects were carried out in the public sector. The private sector and individual consultants, supported by UNDP, have been actively involved through:

- Preparing project proposals (PIN);
- Developing design and technical documentation (PDD);
- Coordinating approval procedures with national authorities;
- Coordinating project implementation processes.

The Clean Development Mechanism (CDM, Kyoto Protocol) continues its operation during the transitional period, in accordance with Article 6 of the Paris Agreement:

- **CDM Project Transition:** Article 6 of the Paris Agreement allows CDM projects to migrate to the mechanism referred to in Section 6.4 of this article, if it is approved by the country



Macquarie Bank Ltd. Consultant Mr. Ziyamov answers the question



Survey of Cabinet-Type Gas Distribution Point with Gasurveyor 3-500

in which the project is being implemented, and if the project complies with the new rules (excluding those regarding methodologies). Projects may continue using previously-approved CDM methodologies until 31 December 2025, or until the end of their current crediting period, whichever comes first. Starting from 2026 they must fully comply with Article 6 of the Paris Agreement.

- **Use of CDM credits:** CDM credits (known as CERs) from projects registered on or after 1 January 2013 can be used to cover the first Nationally Determined GHG Reduction Contributions declared by countries (expiring in 2030 for most countries).

The CDM cannot accept requests for registration, extension of credit periods, or issuance of CERs relating to emission reductions after 31 December 2020. Article 6.4 of the Paris Agreement creates a new multilateral mechanism to replace the old CDM.

Advice to the private sector on developing projects under the Paris Agreement in relation to COP26 on Article 6.4.¹⁷

Uzbekistan signed the Paris Agreement on 19 April 2017, and ratified it on 1 October 2018.¹⁸ In November 2021 at the Conference of the Parties (COP26) held in Glasgow, UK, countries reached new agreements on market mechanisms, essentially supporting transfer of greenhouse gas emission reduction units between countries, while at the same time encouraging the private sector to invest in favourable solutions for climate change.

The Parties also agreed on non-market approaches that will allow countries to work more closely in relation to climate change mitigation and adaptation to the consequences of this global process.

It is expected that the development of projects under the Paris Agreement will be undertaken in accordance with the rules and procedures of the new market-based Sustainable Development Mechanism (SDM), the latter to replace the Clean Development Mechanism (CDM). It is also assumed that the projects will operate in accordance with the Kyoto Protocol, creating a new, international carbon market for trading GHG emission reductions.

The main goal of the Paris Agreement is to direct investment in green projects.

The agreed rules of Article 6 of the Paris Agreement provide countries with the tools needed to protect the environment and combat climate change. Ultimately, they will create conditions for the inflow of private capital into developing countries.

Another feature of the new market mechanism is the involvement of private sector stakeholders in climate change mitigation activities (Article 6.4(b)) through the provision of attractive incentives. This approach also gives non-state actors the opportunity to use this mechanism.

POSSIBLE DIRECTIONS FOR DEVELOPING AND IMPLEMENTING PROJECTS UNDER THE SUSTAINABLE DEVELOPMENT MECHANISM WITHIN THE PARIS AGREEMENT

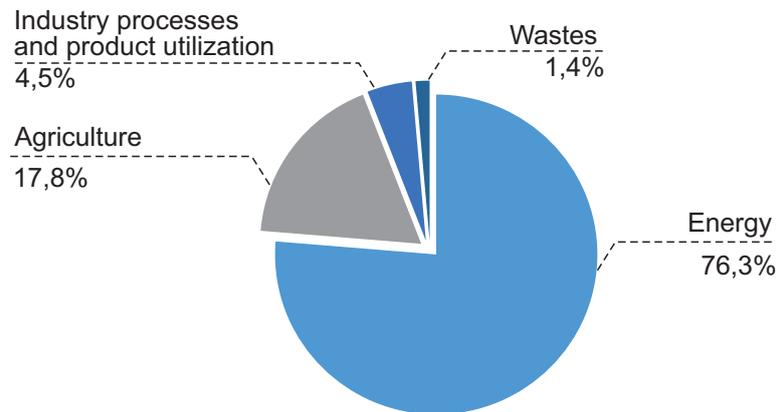
Uzbekistan's contributions to global emissions is about 0.3 percent. The total greenhouse gas emissions in Uzbekistan for 2017, excluding CO₂ absorption, amounted to 189.2 million tons of CO₂-eq, and 180.6 million tons of CO₂-eq, including takeovers.¹⁹

¹⁷<https://lex.uz/uz/docs/5075088>

¹⁸<https://lex.uz/uz/docs/3924451>

¹⁹https://hydromet.uz/sites/default/files/inline-files/%D0%A4%D0%98%D0%9D%D0%90%D0%9B_%D0%A0%D0%A3%D0%A1%20%D0%9E%D0%B1%D0%BD%D0%BE%D0%B2%D0%BB%D0%B5%D0%BD%D0%BD%D1%8B%D0%B5%20%D1%86%D0%B5%D0%BB%D0%B8%20%20NDC_0.pdf

Greenhouse gas emissions by sector, by percentage



Source: Based on expert evaluation

A project that aims to reduce greenhouse gas emissions can be considered appropriate for the Sustainable Development Mechanism (SDM), provided that, at a minimum, it meets conditions of complementarity and sustainable development. When developing SDM projects, a key stage is the assessment of greenhouse gas emissions reduction.

The private sector has an essential role to play as the driving force behind the new mechanism.

1. Opportunities are opening up for new activities, through developing and implementing projects across a number of sectors::

a. Energy: This sector produces 76.3 percent of total GHG emissions (potentially mitigated through introduction of renewable energy sources, modernization of existing generating capacities, and reduction of emissions caused by the extraction, processing and transportation of fuel).

b. Agriculture: This sector produces 17.8 percent of total GHG emissions (potentially mitigated through the use of animal and poultry waste, and improved cropland management).

c. Waste: This sector produces 1.4 percent of total GHG emissions (potentially mitigated through improved municipal solid waste management systems, and the generation of biogas energy at landfills). Landfills are filled with organic material, and when this material decomposes in the absence of oxygen, methane is formed. The US Environmental Protection Agency (EPA) estimates that landfills are the third largest source of human-related methane emissions. Instead of being a danger to the environment, solid waste can be a source of energy generation used for sustainable economic growth. Projects that include composting, anaerobic digestion and even solid waste incineration, are helping establish additional sources of green energy.

d. Transportation: Potential for switching to alternative fuels.

e. Cement industry: Potential waste heat recovery.

f. Silviculture (afforestation, reforestation).

Thirty percent of global greenhouse gas emissions are caused by deforestation and poor agricultural practices. Increasing carbon sequestration in agriculture forestry, and other land uses (AFOLU), is an effective approach to reducing and eliminating emissions. One of the ways to neutralize greenhouse gas emissions is through projects that increase the absorption of CO₂ by forests, including those working in:

- Afforestation, reforestation and revegetation;
- Improved forest management;
- Reducing emissions from deforestation and degradation;
- Preventing conversion of pastures and shrubs.

These projects can become a source of carbon credits which can be traded on the international market, and used in other countries to achieve goals of their NDCs.

2. Participation in developing a register of potential projects that meet the Paris Agreement's requirements.

3. Creation of an internal market for small-scale projects, and development of measures to stimulate growth in the use of renewable energy.

In accordance with Article 6.4 of the Paris Agreement, a global carbon market will be created, overseen by a United Nations entity.

Project developers will request registration of their projects with the Supervisory Authority. A project must be approved by both the host country and the supervisory authority before it can start issuing UN-recognized loans. These loans, known as A6.4ERs, can be purchased by countries, companies or even by individuals.

Considering the experience of implementing CDM projects, and despite the fact that we are currently at the stage of developing tools for a new mechanism (until the end of 2023), early participation is needed in order to:

- Study requirements and new rules for project activities, according to Article 6 of the Paris Agreement;
- Investigate the country's potential to participate in SDM under Article 6.2 and Article 6.4. of the Paris Agreement;
- Identify potential projects in accordance with Article 6.4 of the Paris Agreement;
- Engage potential stakeholders;
- Acquire experience and necessary knowledge (participation in trainings conducted by the UNFCCC).

The new market mechanism for sustainable development has great potential for achieving the Sustainable Development Goals, solving regional environmental problems, and facilitating inflow of foreign investment. The Sustainable Development Mechanism (SDM) will help developing countries achieve their climate change targets.

The development and promotion of projects under Article 6 of the Paris Agreement requires the full support of the public and private sectors, civil society, and international financial institutions. It is possible to use accumulated national experience and structures that worked under the CDM for the new SDM. It is also necessary to create national coordinating bodies:

- An authorized national body (UNO) – the Ministry of Economic Development and Poverty Reduction of the Republic of Uzbekistan;
- Co-chairperson of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection;
- An interdepartmental Council – representatives of all other ministries and departments, including those related to agriculture, energy, industry and transportation – being industries in which projects will be developed and implemented.

It is also necessary to start developing procedural regulations for preparing and implementing investment projects under the new SDM.

Examples of global practices for projects registered in 2021



Electricity generation based on heat recovery at UCWL (Udaipur Cement Works Limited, India)²⁰

Methodology: Waste Energy Recovery (ACM0012 / Version 06.0, EB 87 Appendix-7)

Industry coverage 01 and 04: Energy (renewable/non-renewable) and manufacturing

The estimated amount of the average annual reduction in greenhouse gas emissions is 34,058 tons of CO₂-eq.

Udaipur Cement Works Limited (UCWL) has a cement plant with one clinker production line of a designed capacity of 4,500 tons per day, which can burn various types of coal and coke in a kiln and a precalciner. Most of the heat is used in these processes, while a significant amount is lost through the off gases from the preheater and AQC in the cement plant.

Proposed project activity: The project proposes installing two waste heat boilers with one set of single circuit condensing turbine generators with an installed capacity of 6 MW. The annual projected generation of electricity is 42,048 MWh, and the annual useful supply of electricity to the cement plant is 37,843 MWh. The generated clean electricity will be used to meet the electricity demand of the cement plant's clinker line.

The project activities will replace an equivalent amount of electricity generated by a fossil fuel-fired thermal power plant, thereby reducing greenhouse gas emissions into the atmosphere. Estimated annual and total reductions in CO₂-eq project activities over a fixed credit period of 10 years are expected to amount to 34,058 tCO₂-eq and 340,580 tCO₂e, respectively.



Tamil Nadu Wind Power Project by Green Infra Renewable Energy Limited (SECI-1), India

Methodology: ACM0002 Version 20.0 'Electricity connected to the grid, generation from renewable sources'

Industry coverage 01: Energy (renewable/non-renewable)

Reducing greenhouse gas emissions by 711,367 tons CO₂-eq annually.

This project's main goal is to generate environmentally friendly electricity using a renewable energy source, specifically wind. The project involves installing a 249.9 MW wind farm in the Indian state of Tamil Nadu.

Project activities support the development of new grid-connected renewable energy power plants in India, and cover wind energy technologies. The project aims to secure investment in large grid-connected power plants that export their generated output to India's regional/national power grid. This project's activity is in accordance with the ACM0002 version 20.0 methodology.

During the 10 years of the first crediting period, the project will replace anthropogenic greenhouse gas (GHG) emissions estimated to be approximately 711,367 tCO₂-eq per annum, replacing 755,248 MWh/year of electricity from the generation mix of power plants connected to the Indian power grid, which is currently dominated by fossil fuel power plants.

²⁰ https://cdm.unfccc.int/Projects/DB/KBS_Cert1609391581.81/view



Municipal Solid Waste Treatment Plant at the Tumbovila-Karadiyana site in the western province of Sri Lanka²¹

Applied methodologies and standardized baselines:

ACM0022: 'Large-Scale Consolidated Methodology: Alternative waste recycling processes' (Version 02.0)

Industry areas

(01) Energy (renewable or non-renewable energy sources)

(13) Waste treatment and disposal

Reducing greenhouse gas emissions by 110,964 tons of CO₂-eq.

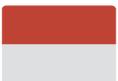
The project aims to maximize energy production with minimal environmental impact, by optimizing the extraction of energy and useful substances from the waste stream.

The project is a new waste treatment complex designed to process 640 tons of municipal solid waste per day, which is currently entering the Karadiyana landfill in Phase-I, followed by 1,140 tons daily after the completion of Phase-II.

The project consists of a biological treatment plant with one anaerobic digester and an incineration plant with one incineration line in Phase-I and an additional one in Phase-II, for a total of two lines. The biological treatment plant will process a maximum of 140 tons of biodegradable organic waste daily, while the waste incinerator will process 500 tons daily in Phase-I, and 1,000 tons daily in Phase-II.

The combustion plant is expected to generate net power of 72,375 MWh per year in Phase-I, and 122,736 MWh per year after the completion of Phase-II. The anaerobic digester is expected to generate 10,880 MWh of net energy annually. The incinerator and anaerobic reactor are expected to operate at plant utilization rates of 81 percent and 92 percent, respectively. Electricity will be supplied to the national grid owned by the CEB (Ceylon Electricity Board) for 20 years. The plant will have a total installed capacity of 21.85 MW, including additional capacity in Phase-II.

The project's estimated emission reductions are 776,751 tons of CO₂-eq during the first crediting period (seven years), with an average 110,964 tons of CO₂-eq annually.



Methane Capture Project, Tintin Boyok Savit Makmur, Indonesia

Methodology: AMS-III.H - Methane recovery from wastewater treatment²²

Industry areas

13: Waste management and disposal

01: Energy (renewable or non-renewable)

Reducing greenhouse gas emissions by 49,101 tons of CO₂-eq.

The small-scale project activity is a methane recovery measure to be implemented in a palm oil refinery treatment plant. Tintin Boyok Sawit Makmur is a subsidiary of the LG International Corporation. The Palm Oil Plant is already operational and has several anaerobic lagoons for the Palm Oil Plant Wastewater Treatment System (POME).

The goal of the project activity is to extract and capture methane-enriched biogas from wastewater treatment, and use it to generate electricity for the work process. Any excess

²¹ <https://cdm.unfccc.int/Projects/DB/KFQ1609362312.99/view>

²² https://cdm.unfccc.int/Projects/DB/KBS_Cert1614228757.17/view

methane gas will be flared in a controlled manner. This reduces emissions of methane into the atmosphere, being a greenhouse gas (GHG) that would otherwise be released from wastewater treatment in anaerobic open lagoons without recovery.

The project activity is to install an anaerobic digestion system (ZPHB® reactor) to treat POME from the palm oil plant and recover the biogas generated during the treatment. The recovered biogas will be burned in a gas engine (inside the mill) to generate energy. Biogas will replace the diesel fuel used to generate electricity for domestic consumption.



Project for constructing a network photovoltaic plant in Cael, Chile²³

Applied methods and standardized baselines

AMS I.D/Version 18 'Power generation from renewable sources connected to the grid'

Industry areas

Sectoral coverage: 01, Energy (renewable and non-renewable energy sources)

Reduction of greenhouse gas emissions by 13,096 tons of CO₂ annually.

The Sol de Septiembre PV CDM project involves the construction and operation of a 9.8 MW photovoltaic power plant in the central region of Chile. The plant is expected to generate 20,618 MWh annually, and is connected to Chile's national power grid (SEN, Sistema Eléctrico Nacional).

DE Energia SpA owns the power plant, which is located in the Chacabuco Province of the Santiago Metropolitan Region, Chile. This photovoltaic power plant uses renewable energy sources to generate electricity, helping reduce greenhouse gas emissions by replacing existing fossil fuel-based power generation activities, including energy generation through oil and coal.

Operation of the proposed solar power plant will result in a CO₂ equivalent reduction of 13,096 tons annually.



Liugui Afforestation Project, China²⁴

VCS project type

Agriculture, forestry and other land use

Activities AFOLU-ARR

VCS methodology - AR-ACM0003

Project covers 33,000 ha

Estimated annual emission reductions of 878,138 tons of CO₂eq annually.

The project is located in the cities of Liuzhou, Guigang, Laibing and Yulin, in the Guangxi Zhuang Autonomous Region of China. The project aims to plant native species on forest-friendly land to remove greenhouse gases, while contributing to achieving local Sustainable Development Goals.

²³ <https://cdm.unfccc.int/Projects/DB/KTRCert1621300061.62/view>

²⁴ <https://registry.verra.org/app/search/VCS/Registered>

Verra — non-profit organization that operates the world's leading carbon credit program, the Verified Carbon Standard (VCS) program, and other programs in environmental and social markets. Verra is committed to helping reduce greenhouse gas emissions, improve lives, and protect natural resources by working with the private and public sectors.

33,000 ha of forests have been planted on lands suitable for forest use, which used to be a unsustainable ecological environments, and examples of karst stony desertification. The implementation of project activities provided 30,321 jobs for residents, including 30,251 temporary landing jobs and 70 long-term jobs for technicians, of whom 65 percent are women.

Project activities are aimed to achieve:

- Greenhouse gas capture and climate change mitigation;
- Improved biodiversity conservation by increasing forest connectivity;
- Improvement of soil and water protection in the Krasny District;
- Income generation and employment opportunities for local communities.

It is expected that the project's implementation will reduce GHG emissions by 18,947,837 tons of CO₂-eq over 30 years, and the average annual removal of GHG emissions will be 631,595 tons of CO₂-eq.



Wind farm Badamsha 2 in Kazakhstan²⁵

VCS project type

Energy (renewable or non-renewable sources)

VCS Methodology - ACM0002

Estimated annual emission reductions of 172,580 tons of CO₂eq.

The project activity is intended to make use of wind turbines that generate electricity to the north of the Aktobe region, 110 km northeast of the city of Aktobe, and southwest of the village of Badamsha, Kargaly district, Kazakhstan.

Badamsha-2 is a 48 MW wind power project generating clean and renewable electricity, which will replace electricity produced from fossil fuels through the operation or establishment of alternative fuel (fossil fuel) power plants in the regional grid. Therefore, this project will reduce greenhouse gas emissions while also preventing various air pollutants.

In addition to helping reduce of greenhouse gas emissions, the project will also:

- Promote renewable energy projects in the region;
- Contribute to the sustainable development of the region, socially, environmentally and economically;
- Help reduce use of fossil fuels, such as coal, oil and gas, and conserve natural resources.

The wind energy project's total capacity is equivalent to 48 MW, while the average annual estimated net electricity generation and estimated annual emission reduction are expected to be of 198.3 GWh/year, respectively 172,580 tons of CO₂-eq annually.



Solar Drip Irrigation Project for Smallholder Farmers in Morocco²⁶

Project type - gold standard for global goals

Renewable energy sources

Land use and forestry – risks and opportunities – N/A

²⁵ <https://registry.verra.org/app/search/VCS/Registered>

²⁶ <https://registry.goldstandard.org/projects/details/2780>

Scale of project activity – microscale

Applied methodology AMS-I.A, Version 17.0

Greenhouse gas reduction and sequestration

This project provides smallholder farmers in Morocco with access to clean electricity needed to power their irrigation systems. This is achieved through the installation and operation of solar photovoltaic systems, replacing fossil fuel-based equipment.

Agriculture is one of the most important sectors of the Moroccan economy. Rainfall is low in many areas, meaning that agricultural activity can only be supported by irrigation. Inefficient pumping and irrigation systems have contributed to the decline of Morocco's groundwater table, threatening soil fertility. Farmers without access to the electricity grid typically feed their pumping systems with diesel and butane gas, which they often extract over long distances. In addition, they are greatly impacted by changes in fossil fuel prices.

To obtain photovoltaic systems with the project's assistance, farmers must switch to water-saving drip irrigation systems. Thus, in addition to reducing greenhouse gas emissions, the project helps to promote resource-efficient and sustainable agriculture. For the project's implementation phase there are plans to install 587 photovoltaic systems with a 7130 kW capacity.

The project is a micro-scale activity, given that the annual emission reduction achieved is less than 10,000 tons of CO₂-eq annually, within the crediting period.

