ADAPTATION FUND

UN environment programme | CTCN CLIMATE TECHNOLOGY CENTRE & NETWORK

Adaptation Fund Climate Innovation Accelerator

Technology concept submission form

Guidelines:

- Technology concept submission form should be completed by an applicant organisation in collaboration with the national focal points to the CTCN (National Designated Entity, NDE) and the Adaptation Fund (Designated Authority) of the country. Please see updated contact list of the NDEs and the Designated Authorities through web-links as below:
  - NDE: http://unfccc.int/ttclear/support/national-designated-entity.html
  - Designated Authority: https://www.adaptation-fund.org/apply-funding/designated-authorities/
- The form must be signed by the NDE before official submission to UNEP-CTCN.
- The form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file.
- For the technology concept submitted by multiple countries, all the NDEs of the respective countries shall sign identical forms before official submission to UNEP-CTCN.

Country or countries:	Uzbekistan
Title of the technology concept:	*Please reflect the objective of the technology concept in the title (maximum 200 characters).* **Feasibility study of waste water to biogas potential in rural settlements with no centralised sanitation system in Uzbekistan.**
NDE:	*Please add name of the organisation, name of the focal point, position, email and address.* Centre of Hydrometeorological Service of Uzbekistan (Uzhydromet) Mr. Bakhriddin Nishonov First Deputy Director General of Uzhydromet Email: uzhymet@meteo.uz Address: 72, 1st Bodomzor yuli str., Tashkent, 100052, Uzbekistan
Applicant:	*Please add name of the organisation, name of the contact person, position, email and address of the organisation.* Association of Enterprises of alternative fuels and energy of Republic of Uzbekistan Mr Latifjon Umurzokov Head of department Email: u.latif@mail.ru Tel: +99890 9598935 Address: 103, Eski Sarikul str, Tashkent, Uzbekistan

Geographical scope:
☒ Community level

☐ Sub-national
☐ National
☐ Multi-country

If the technology concept is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Problem statement related to climate change (up to one page):

This section should answer the question "what is the problem?" Please summarise the problem related to climate change and/or the negative impacts of climate change in the country that the technology concept aims to address.

By 2014 data, 214.70 million metric tons of carbon dioxide equivalent is the share of Uzbekistan to the total global emissions. The majority of emission share accounts for energy sector (89.4%) followed by agriculture (13.1%), industrial processing (2.7%) and waste sectors (2.4%) [1-3]. The emission trend is instable going down in Uzbekistan since 2002, by 2014 per capita CO2 emissions were higher (7.0 tons) comparing to average World (6.8 tons), and 9% lower from global Top emitters (7.7 tons) [4].

The majority share of energy sources in Uzbekistan rely on burning environmental polluting fossil fuels [5, 6]. The projected scarcity for these natural resources for Uzbekistan are 10-12 years for oil reserves (11 EJ[1]), 28-30 years for natural gas (71 EJ) and 40-50 years for coal (271 EJ) [5, 7]. There is huge potential for developing renewable hydro (48 PJ/annum[2]), solar (3844 PJ/annum), biomass (22 PJ/annum) and wind (295 PJ/annum) energy capacity in the country with current 3.2% renewable energy share over the total energy production [7, 8]. The future prospectus of energy security scheme for Uzbekistan is to shift from fossil fuel consumption and thermal energy production to green economy.

The share of domestic and commercial waste water Co2eq emissions over the total of waste is 12% [9], which includes emissions from centralised sanitation systems only. Share of combustible renewables and waste in Uzbekistan is 0.01%, while the share of investment projects for water supply and sanitation planned and under construction upto 2018 was 4% [10]. According to raw calculations there is 1 million tonnes of waste water sludge is processed in Waste water treatment plants of Uzbekistan [11]. Considering that this number is only share of waste water distributed to the plants only through centralised systems, the share of non-safely managed sludge are times more.

One of the densely populated regions with limited access to the centralised waste water treatment is Namangan province. Share of managed sanitation services in Namangan province is 7%.

93% of the wastewater generated by Namangan province are discharged at various terrains with high risk of leakage to rivers, agricultural areas, underground with proceeding contamination of water, soil, and food crops [10].

Another issue in the region is energy security. There is shortfall of heat and electricity supply during cold seasons in rural areas. Local population is highly dependent on hydrocarbon energy sources.

The technology producing biogas from human faecal waste could be solution, which will reduce the dependence on fossil fuels and providing a localized solution on waste water treatment. However, there is no technology in the country producing biogas from human faecal waste.

[1] Exajoule - EJ
[2] Peta joule - PJ

Furthermore, there are no private companies in the country recycling water waste due to lack of profitable technology to re-use and prospects to generate profit.

Past and on-going efforts to address the problem (up to half a page):

This section should answer the question "what has been done or is currently being done to address the problem?" Please describe past and on-going processes, projects or initiatives implemented in the country or region to tackle the climate problem as described above.

There are no completed projects or pilots on biogas production from human fecal sludge in Uzbekistan. There are pilot projects on biogas production in animal farms from manure. There are 42 biogas installations in Uzbekistan. 2 demo centers are created by GEF Small Grants Programme using animal manure for producing biogas [9, 12].

National level

Uzbekistan holds portfolio of Energy, Water and Urban infrastructure projects by Asian Development Bank, World Bank and European Bank for Reconstruction and Development, which are mobilised for major infrastructure investments. Uzbekistan aimed generating a quarter of all electricity from renewable sources by 2030 in order to meet the power demand and to work towards the Nationally Determined Contributions objectives. Uzbekistan is implementing a strategy to deploy up to 3 GW of wind power capacity by 2030 with the support from the European Bank for Reconstruction and Development for a capacity of up to 1GW under public-private partnership, and the Navoi Scaling Solar Independent Power Producer Project to increase and diversify electricity generation capacity through private investment in Uzbekistan [13].

Private sector participation is one of the main development goals for recent government policy. Furthermore, memorandum was signed between ADB and Government of Uzbekistan to advise on public-private partnerships to improve municipal water infrastructure in four cities including Namangan city.

Academy

Experimental trials of biogas facility are done by Tashkent Institute of Irrigation and Mechanization of Agriculture of Uzbekistan in Bukhara and Khorezm regions. The feedstock used for production was manure from dairy cattle farm [14]. National University of Uzbekistan had laboratory experiments to study the potential of biogas production from some plant species [15].

Most recent legislation

1. Presidential Decree On additional measures to reduce the dependence of economic sectors on fuel and energy products by increasing the energy efficiency of the economy and using available resources, 10.07.2020;
2. Law of the Republic of Uzbekistan on the use of renewable energy sources, 21.05.2019 [16];
3. Resolution President of the Republic of Uzbekistan on Accelerated Measures to Increase Energy Efficiency of Economy and Social Sectors, Implementation of Energy-Saving Technologies and Development of Renewable Energy Sources, 22.08.2019 [17];
4. Resolution Cabinet of Ministers of the Republic of Uzbekistan on Measures to Increase Construction of Biogas Plants in Livestock and Poultry Farms of the Republic, 25.11.2015 [18];
5. Resolution Cabinet of Ministers of the Republic of Uzbekistan about Measures to Expand the Production and Implementation of Biogas Plants in the Republic in the period of 2017 – 2019, 01.06.2017 [19].

Specific technology[3] barriers (up to one page):

This section should answer the questions "what are the technology barriers that hinder national efforts described above" and "how will the technology concept complement these efforts?" Building upon the problem statement and taking into consideration the existing efforts described above, please describe the specific technology barriers encountered by the applicant to identify, assess or deploy climate technology(ies) in an effort to address the problem statement. The described barriers should be within the scope of the technology concept (described in the section below).

Share of managed sanitation services in Namangan province is 7%. It is connected to the sewerage system assembled in 1960s, which discharges waste to Syr-darya river through drain collector with no proper treatment. The topography of province prevents the gravity flow of waste water, which makes connection to centralized system costly with low willingness of population to pay higher tariffs [10].

93% of the wastewater generated by Namangan province are discharged at various terrains with high risk of leakage to rivers, agricultural areas, underground with proceeding contamination of water, soil, and food crops. Currently, such areas are not connected to any waste water treatment system. Very small number of septic tanks are installed in households, usually the pit latrines are not properly constructed to prevent leakage.

Currently, the removal of liquid household waste in cities and large settlements where there is no centralized sewerage system is carried out by enterprises of state unitary enterprise "Toza Hudud" of the State Committee for Ecology, as well as by private entrepreneurs.

Private operators perform services only on removal of sludge from households by sewage trucks on demand basis. The discharge process does not necessarily imply delivery to treatment plant, often waste water is left directly on terrain. The WWTP receives free of charge limited amount of waste water per day from other sources, i.e. private operators removing sewage from un-connected households [10].

There are no any private companies in the country recycling water waste due to nonexistence of profitable technology to re-use and prospects to generate profit. The human waste water does not have economic value, and only the payments for removal service generates profit.

Main barriers of building province wide centralised waste water system is topographic limitations of constructing centralised system. There is a need for costly construction of discharge stations, additional pumping stations, sewerage pipelines. The operation cost of centralised system will increase tariffs for population, will not attract private sector to invest to treatment plant, which makes it solely government subsidy dependent. As well as, payback period of investment in centralised system is high.

State policy on setting up private participation on sanitation system is accounted together with water supply system, which requires bigger investments and longer implementation period, while there is a need for pilot projects to accelerate localized technology, with the creation and access to market for small enterprises.

Sectors:

[3] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

Please indicate the main sector(s) related to the technology concept:

☐ Agriculture	☐ Coastal zone management	☐ Disaster risk reduction	☐ Food security
☐ Forests	☒ Human health	☐ Marine and fishery	☒ Rural development (resilience)
☒ Urban development (resilience)	☐ Water management		

Please add other relevant sectors: Waste Water management, Waste to Energy

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches:

☐ Communication and awareness	☒ Economics and financial decision-making	☒ Governance and planning	☒ Community based
☐ Disaster risk reduction	☐ Ecosystems and biodiversity	☐ Gender	

Technology concept requested (up to one page):

Founded on the problem statement, past/on-going efforts and technology barriers, please describe the technology concept. The technology concept should clearly contribute to adaptation to climate change as described in the problem statement and contribute to overcome the specific technology barriers.

Within a clearly defined scope, the description of the technology concept should be structured into the following:

- *Overall objective*
- *Anticipated groups of activities to be performed by the micro-grants project*
- *Anticipated products to be delivered by the micro-grants project*

Please note that UNEP-CTCN facilitates technical assistance and is not a project financing mechanism.

Considering the above explained the localised small biogas plants can have advantage over centralised systems by relatively small operating cost and easy assembling option.

Objective

The overall objective of project is to conduct feasibility study and pilot a project on a small-scale production facility capable of producing biogas by recycling human faecal waste.

The project aims to pilot an innovative approach triggering the development of localised safe sanitation system and energy security by creating motivation for local population to use septic tanks, rural small enterprises to invest in public infrastructure and provide public services, hence

development of rural infrastructure like sanitation and gas lines, public services, financial instruments, etc.

Project site

The project site is one of the densely populated areas at the periphery of Namangan city with no safely managed sanitation system. The target site for survey is suggested by City municipality and local private operator considering the location, terrain, population size, sanitation conditions. Olvalizor makhalla (subdivision of district) consists of 1225 households with 6521 population.



Activities

1. Development of Feasibility study and Business plan for setting up biogas plant producing energy from human faecal waste from decentralised sanitation systems.

1.1. Feasibility study of the expected feedstock generation and composition capacity at the selected project site. Study of:

A. Waste water generation capacity at the pilot site.
B. Physical composition and Calorific value of waste water from septic tanks and pit latrines.
C. Projected biogas yield and characteristics based on waste water composition.

1.2. Selection of suitable small-scale technology considering the socio-economic, environmental and topographic conditions of project site. Study of

A. Study of population growth and waste generation growth upto 2030.
B. Study of Seasonal climatic conditions and topography variables.
C. List suitable technologies by capacity and productivity. Selection of advisable technology.
D. Development of knowledge profile (professional qualifications) for the key technical employees of the plant, i.e. engineers, operators, etc.

1.3. Calculating the investment cost, financial and profitability analysis.

A. Cost of technology, construction, operations and maintenance, transportation of waste water from households to plant, energy connection to households.
B. Unit price of generated energy by type.
C. Economic analysis of profitability and sensitivity analysis.

Considering the budget of the AFCIA grant, the applicant will attract own sources of finances for the development of tariff and contract development for local operator of production plant.

1.4. Study of risks based on 1.1-1.3 and development of mitigation recommendations.

2. Pilot biogas production plant with the attraction of investment by local businesses, international investors and development grants.

A. Support in connecting with international investors and development grants.

Outputs.

1.1. Report on the technical feasibility study.
1.2. Report on socio-economic study.
1.3. Report on financial analysis.
1.4. Report on risk study and recommendations.

Expected timeframe:

Please indicate the expected duration period for the micro-grants project. Please note that the micro-grants project is limited to a maximum duration of 18 months.

18 months

Anticipated gender and other co-benefits from the technology concept:

Please describe the activities with gender linkages as well as the anticipated gender and other co-benefits (e.g. biodiversity, economic, social, cultural, etc.) that are likely to be generated as a result of the micro-grants project.

For more information you can find guidelines on the CTCN's website here:
https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development

Further reading on gender can be found on the CTCN website here:
https://www.ctc-n.org/technology-sectors/gender

Well managed transportation of sludge will avoid discharge to rural ecosystem, hence help to prevent spread of toxic and bacterial substances. Safely managed toilets will help to decrease transmittable diseases, and help to follow sanitary norms. It will help to decrease exposure of children to pathogens.
Main household works are on hands of women in rural areas, and provision of biogas will decrease their daily burden related to dish washing, laundry, bathing, children care, post-birth care, animal husbandry, cleaning, house heating.
The localized sanitation system will create work places for local unemployed men and women.

Key stakeholders:

Please list the stakeholders who will be involved in the implementation of the micro-grants project and describe their role during the implementation (for example, government agencies and ministries, academic institutions and universities, private sector, community organisations, civil society, etc.).

Stakeholders	Role to support the implementation of the micro-grants project
National Designated Entity	Support in provision of knowledge support.
Designated Authority	N/A
Applicant	Association of Enterprises of alternative fuels and energy of Republic of Uzbekistan Liaison with project partners on effective organization of project implementation, including facilitation of project stakeholders. Reporting to donors. Ensuring the financial compliance of project budget. Work with local business to introduce the project and attract local investments.
Please add as many stakeholders and lines as required.	**Municipality of Namangan province** Liaison with local governments during the implementation of project. Support in following regulative requirements. Support in working with public in pilot area. **Local private operator company.** Provision of data collection and knowledge support in feasibility study and financial analysis.

Alignment with national priorities (up to 2000 characters including spaces):

Please describe how the technology concept is consistent with national climate priorities such as: Nationally Determined Contribution, national development plans, poverty reduction plans,

Technology Needs Assessments, Technology Action Plans, National Adaptation Plans, sectorial strategies and plans, etc.

Uzbekistan pledged *"...to decrease specific emissions of greenhouse gases per unit of GDP by 10% by 2030 from level of 2010"* by the Intended Nationally Determined Contributions for the Paris Agreement [20]. However, according to the CAIT[4] data the CO2e per GDP[5] was 5459.64 tons in 2010, while 584.3 is World average [21]. The long term energy policy targets are focused on: *"...decreasing GDP energy consumption by approximately 2 times as a result of broad introduction of the advanced energy saving technologies"*[20, 22]. Nevertheless, there is no quantification stated, some statistics shows that in 2013 Energy use per GDP[6] was 280.107 [23] and energy intensity was 8.2 MJ per 1 USD PPP 2011 in 2016 [24].

Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).
Nationally Determined Contribution (NDC)	*Direct alignment and contribution to NDC implementation is required. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).* Intended Nationally Determined Contributions of the Republic of Uzbekistan (INDC) [20] page.2: *"It identifies target indices to energy efficiency and the "Program of measures for transition to low carbon development" for the key sectors of economy (electric energy, thermal energy, housing and utilities sectors), which are the main contributors to GHGs emission in Uzbekistan. The measures for energy saving will allow decreasing consumption of primary energy, mainly natural gas. Investments in energy efficiency and renewable energy sources are of high priority from both economic (decrease in costs for energy generation) and climate viewpoint (decrease in volumes of greenhouse gas emissions)".* *page.3:* *"Intention of the country to curb growth rates of greenhouse gas emissions, decreasing their specific emission per unit of GDP by 10% by 2030 from level of 2010, will not create obstacles for the country's socio-economic development, and it corresponds to the general goals of policy for improving energy efficiency, decreasing resources consumption by the economy and increasing the share of RES in the country's energy balance, as well as to the goals of rational use and sustainable development".* *page.4:* *- Decrease in specific fuel consumption for generation and use of electric energy;*

[4] World Resources Institute Climate Analysis Indicators Tool
[5] CO2e per million USD GDP
[6] Energy use (kg of oil equivalent) per 1,000 USD GDP

	- *Development and broad use of alternative energy sources: intensive construction of … creation of biogas plants; …;* *page.7:* *Expansion of sectoral programs for purification of municipal and industrial effluents, ensuring quality of water for drinking wate supply and sanitation" Republic of Uzbekistan INDC [20].*
Technology Needs Assessment	Request for The Technology Needs Assessment (TNA) and Technology Action Plans (TAPs) for Republic of Uzbekistan is submitted to CTCN and under revision.
National Adaptation Plans	NAP Readiness proposal submitted to the Green Climate Fund (GCF), that requested funding to support the development of Uzbekistan's NAP.
Third National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change	Third National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change [9] page 69: *"Table 3.7. Evaluation capacity for introduction of RES for electric power upto 2030* *Indicator: Biogas from sewage water treatment plants" [9].* It accounts only for major cities sewerage treatment plants.

Development of the technology concept (up to 2000 characters including spaces):

Please describe how the technology concept was developed at the national level and the process used by the NDE and the Designated Authority to approve the technology concept before submitting it (who initiated the process, who were the stakeholders involved and what were their roles?) and describe any consultations or other meetings that took place to develop and select the technology concept, etc.

The Association of Enterprises of alternative fuels and energy of Republic of Uzbekistan works on several domains with government agencies, private companies and local communities. The Association in consultation with specialist of State Committee for Environmental Protection and revision of Technical Panel of Association has developed the technology concept. The problem statement was known to the network of specialists well before the development of technology concept. Therefore, Association attracted several more beneficiaries in defining the framing the problem statement. Therefore, local private operator and Municipality of Namangan city were consulted for these purposes.

The proposal was submitted to NDE for review and further suggestions. Feedbacks have been reflected and agreed.

Background documents and other information relevant for the technology concept:

Please list all relevant documents that will help UNEP-CTCN analyse the context of the technology concept and national priorities. Please note that all documents listed/provided should be mentioned in the technology concept in the relevant section(s), and that their linkages with the

technology concept should be clearly indicated. For each document, please provide web-links (if available) or attach to the form. Please add any other relevant information as required.

1. European Bank for Reconstruction and Development, *SURKHANDARYA AND NAMANGAN REGIONAL WATER PROJECTS – FEASIBILITY STUDY. NAMANGAN OBLAST NON-TECHNICAL SUMMARY*. 2019. https://www.ebrd.com/what-we-do/project-information/environment-social-info-documents/1395288960698/Namangan_Regional_WSWW_Non-Technical_Summary.pdf?blobnocache=true
2. Regulatory and legal framework. Page 59-61. Centre of Hydrometeorological Service, *Third National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change*. 2016: Tashkent. https://unfccc.int/sites/default/files/resource/TNC%20of%20Uzbekistan%20under%20UNFCCC_english_n.pdf

Consultation with the Designated Authority of the country:

Please indicate whether the technology concept has been developed in consultation with the Designated Authority of the country.

☒ The Designated Authority of the country has been engaged in the design of the technology concept and will be involved in the further process leading to the implementation of the micro-grants project.

Monitoring and evaluation:

By signing this form, I affirm that processes are in place in the country to monitor and evaluate the micro-grants project funded by the Adaptation Fund through UNEP-CTCN. I understand that these processes will be explicitly identified in the Project Concept Note (response plan of the micro-grants project) and that they will be used in the country to monitor the implementation of the micro-grants project.

I understand that, after the completion of the micro-grants project, I shall support UNEP-CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name: Centre of Hydrometeorological Service of Uzbekistan (Uzhydromet)
Mr. Bakhriddin Nishonov
First Deputy Director General of Uzhydromet
Email: uzhymet@meteo.uz
Address: 72, 1st Bodomzor yuli str., Tashkent, 100052, Uzbekistan

Date: 29.12.2021.

Signature:

THE COMPLETED FORM SHALL BE SUBMITTED THROUGH A WEB-LINK AS BELOW:

https://www.ctc-n.org/adaptation-fund-climate-innovation-accelerator-afcia-unep-ctcn

UNEP-CTCN is available to answer all questions and provide guidance on the application process.

Bibliography

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