Annual Project Progress Report

Project title:	**Energy Efficiency and Renewable Energy for Sustainable Water Management in Turkmenistan**
Award ID:	**00080840**
Project ID:	**00090400**
Implementing partner:	**Ministry of Agriculture and Water Economy of Turkmenistan**
Period covered in this report:	**January – December 2017**
Date of last Annual Report:	
Date of the last Project Board meeting:	**11 October 2017**
Date of last Quality Assurance and rating:	

1.Project Performance

a) Please state the expected Output of the Project, set indicators and corresponding CP Outcome (as per project document/AWP):

COMPONENT 1: Technology transfer and knowledge development in support of innovation in EE water management and SLM in agriculture

OUTPUT 1.1: Technology proving site and educational platform for low-water irrigation and SLM in agricultural croplands developed and implemented

Output indicators 1.1.

- Reduction of water used for specific soil types
- Normalised energy consumption reduced compared with average values for similar soil types

Output targets 1.1.

- Demonstration project achieves comparable yields with 40-50 percent less irrigation water consumption than specified by norms.

a) Were the indicators and output achieved? Yes ☐ No■ Partially ☐

b) If no or partially, please explain why?

Due to late start of practical implementation of the project activities in Geokdepe, demonstration site with all required infrastructure to be ready for low-water irrigation experiments and reclamation of salinized lands by the mid-2018.

- Normalized energy consumption reduced by 30 percent relative to similar sites.

a) Were the indicators and output achieved? Yes ☐ No■ Partially ☐

b) If no or partially, please explain why?

Key project activities that will result in reduction of energy consumption are initiated and expected to be finalized by mid-2018. Methodology and arrangements for energy use monitoring of project activities will be put in place for data collection in 2018 onwards.

OUTPUT 1.2: Audits and servicing of pumps of various sizes in both interdistrict water networks and on farms in all velayats of Turkmenistan

Output indicator 1.2. Number of pump audits completed by project (total and diesel pumps) and energy saving achieved by replacement and/or fixing of old pumps

Output targets 1.2:

- At least 100 pump audits completed by project, including audits of 25 diesel pumps

a) Were the indicators and output achieved? Yes ■ No☐ Partially ☐

b) If no or partially, please explain why?

Project experts in close coordination with and assistance of Ministry of Agriculture and Water Economy conducted audit of efficiency and energy consumption of 121 pumps including 46 diesel pumps in 2017.

- 20 percent energy saving achieved by replacement and/or fixing of old pumps

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

The findings of the audit will help define clear GHG targets and nationwide potential to reduce GHG emissions, given that replication of the pilot activities will be mainstreamed into national planning. Remedial measures including repair or replacement of approximately 10 worn pumps will be implemented in 2018 in consultation with national partner.

OUTPUT 1.3: Renewable-energy applications of water pumping and purification in remote pasture areas

Output indicator 1.3. Number of people directly benefiting from measures on renewable-energy water supply in remote locations

Output target: 1100 people directly benefiting from measures on renewable-energy water supply in remote locations

a) Were the indicators and output achieved? Yes ☐ No■ Partially ☐

b) If no or partially, please explain why?

Project team visited several remote pasture areas in Karakum desert to select the most suitable beneficiaries for installation of renewable-energy applications of water pumping and purification. Practical implementation of renewable-energy related activities in remote area will be completed in 2018.

Component level indicator:

- Area of land protected or reclaimed from salinisation as a result of demonstration projects

Output targets 1.1.

- 300 ha of land protected or reclaimed from salinisation as a result of demonstration projects

a) Were the indicators and output achieved? Yes ☐ No ☐ Partially ■

b) If no or partially, please explain why?

Land reclamation activities and improvements in drainage canals at 145 ha Geokdepe research site will reduce salinization of project pilot site and indirectly benefit neighbouring farms. The project advisory support to selected farms on water use and SLM will also contribute to protection and/or reclamation of lands from salinization.

COMPONENT 2: Scaling-up investment in improved water management infrastructure to reduce water losses, energy use, and land degradation

OUTPUT 2.1: Installation of pipeline and/or channel lining for municipal water supply in Kaakhka, replacing unlined channels and wells, with documentation of results and presentation of recommendations and cost analysis for replication

Output indicators 2.1.

- Reduction in water loss between withdrawal and entrance point of the Kaakhka town Water Treatment facility
- Direct energy savings due to decommissioning of up to 41 wells
- Number of similar projects initiated in in other similar (or mountainous areas) districts of Akhal and Balkan velayats of Turkmenistan

Output targets 2.1.

- Less than 5 percent of water is lost between withdrawal and end use in Kaakhka.
- Water supply reliability is increased, while 41 wells can be decommissioned. Direct energy savings of 486 MWh per year, and reduction of associated GHG emissions by 240 tonnes.
- At least 1 similar project initiated in other similar (or mountainous areas) districts of Akhal and Balkan velayats of Turkmenistan.

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

- Construction of Kaahka pipeline is underway and will be completed by March 2018. Baseline data collection program for the Kaahka pilot project has been prepared and initiated in 2016 through installation of water measuring devices at the source and lower stream of the current open-water channel that supply drinking water to the town of Kaahka. These meters enabled the project to accurately measure and calculate the average monthly water flow and design the pipeline.
- Calculations and water flow monitoring data show that with new gravity pipeline in place 41 pumps can be suspended for nearly nine months. Once Kaahka pipeline is operational, project team will start monitoring of decommissioning process of pumps with proper documentation of results.
- The project will document all relevant information on realization of the gravity water pipeline project including costs, benefits, economic and environmental impact to encourage government implement similar projects in other mountainous areas.

OUTPUT 2.2: Lining of interdistrict canals for reduction of water losses and land salinization, including various technologies

Output indicator 2.2.

- Number of production lines established (from at least 3 potential options) to produce materials for modern canal linings and pipes
- Kilometres of canals newly lined

Output target 2.2:

- Testing of at least three types of materials for canal linings and pipes. Initiation of mass production of new materials and/or cost reduction by 20 percent of mass-producing existing materials, involving at least two types of products.
- Domestic production and installation expanded by 50 percent for at least two types of technologies for canal linings, pipelines, or other materials to reduce losses of water in transit. New lining of at least 400 km of canals. Reduction of water losses from newly lined canals by more than 50 percent.

a) Were the indicators and output achieved? Yes ☐ No ■ Partially ☐

b) If no or partially, please explain why?

According to project workplan 2017 the project team visited three plants of the Ministry of Agriculture and Water Economy in Dashoguz, Mary and Ahal regions to assess the current production of concrete canal lining products and potential of plants for creation of new products manufacturing. The conclusion was made that currently MAWE plants in three velayats produce no or very limited canal lining products due to obsolete production technologies and high costs of production. Other activities of Output 2.2 on assessment of various options of production lines and choosing the most relevant ones have been moved to 2018 due to lack of time of the project team who was mainly involved in the activities related to the research site in Gokdepe district and Kaahka pipeline project.

<u>COMPONENT 3:</u> Planning and capacity-building at the regional and local levels, plus evaluation and compilation of lessons learned

OUTPUT 3.1: Technology Action Plans, including consideration of SLM, developed and implemented at the regional and local levels

Output indicators 3.1. Number of regional Integrated Water Distribution Plans developed and formally submitted for approval

Output targets 3.1. At least 3 velayat Integrated Water Distribution Plans developed and submitted for approval, recommendations are developed for other 2 velayats (Lebap and Balkan)

a) Were the indicators and output achieved? Yes ☐ No ■ Partially ☐

b) If no or partially, please explain why?

There is no progress on development of integrated regional sustainable water management plans in 2017. In 2018 the project will develop methodology on development of inter-farm water use plans to be piloted on the farms of certain private farmers. The outcome of these activities will be used for further works on development of integrated regional sustainable water management plans with consideration of SLM at the level of etraps (districts). Furthermore, initial results of low-water irrigation

demonstrations complemented with land management techniques at Geokdepe green polygon can serve as foundation for development of Water Distribution Plans with proven water and land management practices.

OUTPUT 3.2: Education and direct training provided to water-management system designers, local water management staff and farmers in all regions of Turkmenistan on pump maintenance, irrigation, and other aspects of efficient water management and SLM

Output indicators 3.2.

- Key stakeholders/institutions with relevant mandates involved trained jointly by the MAWE/Project
- 90% positive feedback from training participants

Output target 3.2. Expanded training delivered annually in all five velayats on integrated water management, to a total of 100 specialists and 300 farmers by the end of the project period

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

Over 30 national specialists representing Ministry of Agriculture and Water, Water Design Institute, Ministry of Nature Protection and farmers have been trained locally and abroad since the beginning of the project in various topics related to sustainable water management, energy efficient irrigation techniques, pump maintenance and SLM. Series of local and international trainings focused on low-water irrigation technologies, energy efficient pump operation and various aspects of SLM will be arranged in 2018 for nearly 100 national experts and farmers and project staff.

OUTPUT 3.3: Project evaluation and compilation of lessons learned
No indicators and targets are specified for the Output 3.3 in the project document.

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

In addition to the site-specific technical evaluation of energy savings, water savings, and land melioration conducted under specific outputs as described above, the project will also conduct regular evaluation of its overall effectiveness and results. These efforts will begin with a full inventory of GHG emissions from the pilot sites. GHG emission reduction estimation methodologies have been designed to enable assessment of direct GHG mitigation impact of pilot project activities. GHG emission reductions will start to accrue once these activities get underway in later stages of the project (most likely by mid-2018). GHG impact will be estimated and reported accordingly.

This output will also include Mid-Term and Terminal Evaluations conducted by independent international consultants. Mid-Term evaluation will be carried out by mid-2018.

<u>COMPONENT 4:</u> National policy and regulatory framework established for integrated water resource management

OUTPUT 4.1: Standards and regulations for pump performance and maintenance adopted and enforced

Output indicator 4.1: Number of regulations, norms, and/or standards developed and adopted in support of the new Water Code

Output target 4.1: At least 3 acts related to pump audits, crop-specific irrigation norms, and water/energy saving practices (incl. irrigation infrastructure) to lead to GHG emission reduction developed and adopted in support of the new Water Code.

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

Based on detailed inventory of legislation, as well as mandates of relevant governmental institution in the field of energy efficiency, irrigation water use, GHG emission reduction developed in 2016, in 2017 the project commenced development of four regulatory acts, including (i) operational regulations for pump stations; (ii) regulation for scheduled preventive maintenance and repair of water systems and facilities; (iii) technical regulations of irrigation infrastructure; and (iv) technical regulations of drainage infrastructure. Drafts of regulatory documents were submitted to the Ministry of Agriculture and Water Economy in 2017. In 2018 the project experts will facilitate discussions of elaborated regulations by relevant authorities until ultimate goal i.e. approval/adoption of the documents by MAWE.

OUTPUT 4.2: Policy framework for measuring water consumption, monitoring energy consumption in the water sector, and making the transition to end-use tariffs developed and adopted

No indicators and targets are specified for the Output 4.2 in the project document.

a) Were the indicators and output achieved? Yes ☐ No ■ Partially ☐

b) If no or partially, please explain why?

Due to lack of time of the project team who was mainly involved in the activities of the first two components related to the research site in Gokdepe district and Kaahka pipeline project, insufficient time was spent on Output 4.2 in previous periods of project implementation. In 2018 the project will facilitate discussions among water sector experts on approaches to develop policy framework for metering water consumption, monitoring energy consumption in the water sector, and transition to end-use tariffs. Work on development of regional Integrated Water Distribution Plans (Output 3.1) will also contribute to creation of enabling conditions for transition to end-use tariff system.

OUTPUT 4.3: Policy and state budget framework for widespread deployment of efficiency improvements to irrigation and water infrastructure adopted and implemented

Output indicator 4.3: There is a formal commitment of the government to allocate resources for demonstrated by the project technologies (e.g. inclusion in state-funded programmes and budgets) (Yes/No).

Output target 4.3: Yes

a) Were the indicators and output achieved? Yes ☐ No ■ Partially ☐

b) If no or partially, please explain why?

Practical implementation of project activities in Geokdepe and Kaahka were delayed. Once Geokdepe irrigation technologies and Kaahka pipeline are in place and successfully tested, project will transfer

comprehensive reports with economic and environmental benefits, recommendations and lessons learned to governmental decision makers for replication at most promising technologies through state-funded programmes.

OUTPUT 4.4. Administrative reform for implementation of integrated water resource management and sustainable land management adopted and implemented
Output indicator 4.4: Programme for water measurement is developed and made operational at focus demonstrational sites.

Output target 4.4: Programme for water measurement is developed and made operational at focus demonstrational sites (Yes/No)

a) Were the indicators and output achieved? Yes ☐ No ☐ Partially ■

b) If no or partially, please explain why?

Baseline data collection program for the Kaahka pilot project has been prepared and initiated in 2016 through installation of water measuring devices at the source and lower stream of the current open-water channel that supply drinking water to the town of Kaahka. These meters enabled the project to accurately measure and calculate the average monthly water flow.

Infrastructure for water measurements at Geokdepe demonstration site is in place. Additional water meters will be installed along with drip and sprinkler irrigation systems by April 2018. Intensive data collection will start by mid-2018 with planting of various crops and vegetables.

The project is also planning to test simple water metering devices to measure water distribution among selected farms. After that in 2018 the project will facilitate discussions among water sector experts on approaches to develop National programme for measurement of water end-use.

2.Progress Reporting

a) Please summarize the main achievements during the project cycle:

COMPONENT 1: Technology transfer and knowledge development in support of innovation in EE water management and SLM in agriculture

OUTPUT 1.1: Technology proving site and educational platform for low-water irrigation and SLM in agricultural croplands developed and implemented

- In partnership with the WDI the Project conducted all necessary surveys of the Geokdepe site, including topographic survey, hydrogeological assessment and soil analysis.
- Geokdepe demonstration and research site has ready-to-use infrastructure with pumping station, desilting tank, irrigation system, field camp for national researchers.
- Installation of low-water irrigation technologies is expected to be finalized by mid-2018. Nevertheless, national experts initiated testing of winter barley at 1.8 ha using traditional furrow irrigation.
- WDI signed leasing agreement with farmer on renting 57.5 ha and 5.5 km of irrigation network of Geokdepe 145 ha plot. Farmer will cultivate whole range of crop varieties following recommendations of the Project specialists and by doing this will contribute to research activities.

OUTPUT 1.2: Audits and servicing of pumps of various sizes in both interdistrict water networks and on farms in all velayats of Turkmenistan

- The Project conducted audit of efficiency and energy consumption of 121 pumps including 46 diesel pumps with full support of the Ministry of Agriculture and Water Economy.

COMPONENT 2: Scaling-up investment in improved water management infrastructure to reduce water losses, energy use, and land degradation

OUTPUT 2.1: Installation of pipeline and/or channel lining for municipal water supply in Kaakhka, replacing unlined channels and wells, with documentation of results and presentation of recommendations and cost analysis for replication

Output indicators 2.1.

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- At least 1 similar project initiated in other similar (or mountainous areas) districts of Akhal and Balkan velayats of Turkmenistan.

a) Were the indicators and output achieved? Yes ☐ No☐ Partially ■

b) If no or partially, please explain why?

- The project completed all necessary surveys including topographic survey and hydrogeological assessment required for pipeline construction.
- Baseline data collection program for the Kaahka pilot project has been prepared and initiated in 2016 through installation of water measuring devices at the source and lower stream of the current open-water channel that supply drinking water to the town of Kaahka. These meters enabled the project to accurately measure and calculate the average monthly water flow and design the pipeline. Calculations and water flow monitoring data show that with new gravity pipeline in place nearly 41 pumps can be suspended for nine months.

COMPONENT 3: Planning and capacity-building at the regional and local levels, plus evaluation and compilation of lessons learned

OUTPUT 3.2: Education and direct training provided to water-management system designers, local water management staff and farmers in all regions of Turkmenistan on pump maintenance, irrigation, and other aspects of efficient water management and SLM

- Over 30 national specialists representing Ministry of Agriculture and Water, Water Design Institute, Ministry of Nature Protection and farmers attended local and international trainings since the beginning of the project in various topics related to sustainable water management, energy efficient irrigation techniques, pump maintenance and SLM.

COMPONENT 4: National policy and regulatory framework established for integrated water resource management

OUTPUT 4.1: Standards and regulations for pump performance and maintenance adopted and enforced

- Detailed inventory of legislation, as well as mandates of relevant governmental institution in the field of energy efficiency, irrigation water use, GHG emission reduction developed.

3. Project Risks and Issues

The project Risk Log is maintained throughout the project implementation to capture potential risks to the project and associated measures to mitigate risk. The Project Manager shall maintain and update the Risk Log and ensure that risks are identified, communicated and managed effectively.

A number of potential risks are listed below.

Description of risk	Type and category	Risk management actions	Current situation
Government commits funds to water conservation and energy conservation at a level insufficient to achieve significant scaled-up effects	Political and financial	Government spending is outside the ultimate control of the project itself, as spending decisions are taken by the Cabinet of Ministers. But the project is explicitly designed to be directly consistent with national objectives. One major goal of the project is to provide technical and financial justification to remove doubt and financial risk among decisionmakers. Further countermeasures could include targeted analysis for specific technologies; changes in focus to address matters of highest priority to Government, while still being consistent with project objectives; and intensified communication and outreach.	Risk is increasing due to worsening economic situation in the country.
Farmers and other stakeholders resist change, complicating efforts of project to introduce new technology, practices,	Institutional	Farmers already do widely understand the importance of water conservation, and have participated enthusiastically in past projects of international organizations. This project specifically seeks to reduce risk of stakeholder resistance through targeted outreach and	No change

and norms for low-water irrigation		training. Incentives or mandates may be included in policy efforts under Component 4.	
Demonstration projects need to be significantly changed because of unforeseen local technical or environmental conditions	Technological and Environmental	Water management projects require careful attention to many specific technical and environmental factors, including water sources; end uses; intervening terrain; and other conditions. Each demonstration project will undergo thorough assessment of cost, technical feasibility, expected benefits, and environmental and social impact. Design of projects will be adjusted as needed to account for conditions identified during these assessments. Timetables for demonstration projects will have some flexibility built into them, to allow for needed adjustments.	Reducing
Replication of demonstration project technology and practices lags because of insufficient availability of materials and products	Institutional and economic	Efficient irrigation technology is under development in Turkmenistan, and scaling up domestic production is a priority of the Government. Canal lining technology is likely to be rather simple and not export-dependent. Demonstration projects will emphasize use of technologies and materials that are accessible in Turkmenistan. The project will assess the cost and supply flows of imported products such as pumps before recommending them for wide use.	No change
Reduction in end-use water consumption and increased pump performance does not automatically lead to energy savings and avoided emissions.	Technical	Reduction in end-use water consumption needs to be accurately forecasted, measured, and then coordinated with upstream water management and pumping schedules. This integration is a major emphasis of the project.	No change
Climate change – specifically, increased average temperatures and reduced precipitation – exacerbates problems of water scarcity and land degradation, muting the benefits of the project	Environmental	The Government of Turkmenistan recognizes that as a result of climate change water run-off provided by its major river, Amu-Daria, may further decrease (i.e. 65-75% of the total average amount) and therefore water saving programmes in agricultural sector are among the top of national priorities. The proposed project will help alleviate the risk of water shortage by introducing and promoting improvements in water and energy efficiency and an integrated water-energy management approach in irrigation thus leveraging win-win opportunities for climate change mitigation and adaptation.	No change
Complexity and multi-dimensional nature of the project, which may lead to non or under	Organisational	Mobilisation of stakeholders and regular engagement with all partners. Frequent engagement of project board and National Project Coordinator	Reducing

delivery of some of the planned objectives and goals			
Delays in implementation of planned activities due to lengthy internal decision-making process resulting non-delivery	Operational and Organisational	Bi-weekly meetings and discussions with the Senior Management	Reducing A number of delays have occurred, but probability of reaching delivery target is high
Lack of adequate support from the National Partners	Operational and Strategic	Efforts by the SM in raising the issue during high level meetings and exchange of NVs, and discussions of project team members with the counterparts	Reducing

The project Issue Log is maintained throughout the project implementation to capture potential issues to the project and associated response measures. The Project Manager shall maintain and update the Issue Log and ensure that issues are identified, communicated and managed effectively.

A number of potential issues are listed below.

Description of issue	Type and category	Response / Countermeasures	Current situation
Restrictions in official currency transactions and consequent occurrence of dual/black market exchange rate.	Financial	This is an external factor that neither UNDP nor Project team can have an impact on. The only countermeasure that can be taken is wider distribution of tender announcements among foreign companies. As foreign companies can be paid in hard currency, it will mitigate negative impact of black market exchange rate.	Worsening due to tighter foreign currency restrictions
Project is derailing from its main objective of energy efficiency and too much focus is given to research activities.	Other	The amount of research activities and respective budget allocation is high in 2017 and 2018. In 2019 and onwards it should be reduced by co-sharing of some activities by the Government.	No change
Some major project activities were delayed due to surprizing requirements of the Customs Service.	Regulatory	The project solved the issue by submission of additional documents requested by Customs authorities for custom clearance of diplomatic cargo. However, this unexpected regulatory change caused delay in major project activity. Senior management was advised to raise this issue at high level meetings with the Government.	No change
Automatic agro-weather station does	Operational	Agro-weather station installed in 2017 at Geokdepe Green polygon stopped data transmission after several months of proper	No change

not transmit data collected at the field.		functioning. Technical solutions to fix the problem did not work. Specialists suggest that problem is not with equipment, but with internet connection, so the project will request assistance of the Ministry of Communication.	

4.Lessons learned and follow-up steps (if applicable)

a) Please provide the lessons learned and further steps after the project's closure.

№	Lessons Learned	Follow-Up Steps
1.	Local authorities of Kaahka strongly support the project of building pipeline Hivaabad-Kaahka as it brings two important benefits of increasing access to drinking water and reducing energy consumption by decommissioning water pumps.	Power of local authorities will be used to overcome some bureaucratic hurdles that may appear at the stage of realization of pipeline project.
2.	Key implementing partners, Ministry of Agriculture and Water Economy and its Water Design and Research Institute, most likely will not be able to do significant contributions to project activities that entail financial implications due to their weak financial standings.	The project will try to get key implementing partners involved in project activities with in-kind contributions, for instance mobilize their workers for tree planting at Geokdepe site or use their vehicles/tracks for delivery of needed products, etc.
3.	Guarding the 145 ha Geokdepe site with help of one watchman is not possible.	The project installed surveylance cameras to help with guarding the site and property.
4.	The project can save significant financial resources if it uses its own tractor instead of outsourcing the works to third parties that increase their financial proposals as it includes delivery of equipment to the Geokdepe and 15-20% informal commission of the total amount for conversion of electronic money into actual cash.	The project will purchase tractor if Project Board approves this proposal.
5.	Traditional levelling of land at the Geokdepe research site was not effective.	The project purchased laser levelling equipment.
6.	It is more cost effective to purchase ready to plant seedlings from specialized farmers/companies than build greenhouse for seedlings cultivation.	The project cancelled pertinent activity on greenhouse construction.
7.	Cost estimate of the study tour to Israel revealed that project can cover travel costs of more than 4-5 people.	The project covered study tour related costs of ten delegates including government authorities and project staff.
8.	Timeframes for preparation of designs and tender documents of water infrastructure in Geokdepe and Kaahka is much longer than optimistically set in AWP.	The project extended deadlines of various tenders to reflect realistic periods.

5.Transfer of Assets or other related matter

a) Please state on any past or future transfer of assets made within the project cycle (Attach list of equipment, cooperation frameworks with beneficiaries, etc.)

See attachment 1

7.Financial management

Budget item	Total approved in 2017 (in USD)	Expenses + commitments	Budget utilization in % to planned
Component 1	1,226,643.00	802,959.88	65.46
Component 2	739,860.00	1,011,011.86	136.65
Component 3	132,695.00	103,694.22	78.14
Component 4	92,295.00	114,635.26	124.21
Project management	59,360.00	114,370.84	192.67
Total delivery in 2017	**2,250,853.00**	**2,146,672.06**	**95.37**
In % to total project budget	**36.39%**	**34.71%**	

Prepared by: _____**Geldi Myradov, EERE Project Manager**

Date:

Approved by: _____Rovshen Nurmuhammedov, Programme Specialist

Date: