Technology Fact Sheet

Sector	Agriculture
Category	Irrigation Application, Supply – side
Adaptation needs	**Reducing of water and energy consumption for irrigation needs in agriculture**[i]
Technology Name	**Low-flow, low- pressure and water serving Drip Irrigation technologies**
How this technology contributes to adaptation	The main advantage of drip irrigation is that water comes directly into the root zone of the plants. It provides high irrigation uniformity, optimal soil moisture; more than 50% reduced consumption of irrigation water and reduced water losses to evaporation from the soil surface. Fundamentally new going on fertilizer. Fertilizers are supplied in dissolved form, along with irrigation water directly into the root zone of each plant. Thus, no weeds are fed between the rows, but only cultivated crops. Application rates of mineral fertilizers in drip irrigation are reduced to 3... 4 times. At drip irrigation water does not reach the leaves of fruit and vegetables, hence the plant is less exposed to disease. Drip irrigation systems are designed for the cultivation of various crops in outdoor and indoor conditions. These systems show particularly effective when used in orchards, vineyards and vegetables, ensuring the growth of their yield to 50% and more. By its design and working principle the drip irrigation system best meet the environmental, energy-efficient and resource-saving requirements. For example, the main element of the drip irrigation system - drip tube most modifications works under the pressure not more than 0.8 bar, while working pressure of even low-pressure sprinkler irrigation devices is not less than 2.5 – 3.0 bar. Additional advantages of drip irrigation include: • Drip systems are adaptable to oddly shaped fields or those with uneven topography or soil texture; these specific factors must be considered in designing the drip system. Drip systems also can work well where other irrigation systems are inefficient because parts of the field have excessive infiltration, or runoff. • Drip irrigation can be helpful if water is scarce or expensive. Because evaporation, runoff, and deep percolation are reduced and irrigation uniformity is improved, it is not necessary to "over-water" parts of a field to adequately irrigate the more difficult parts. • Precise application of nutrients is possible using drip irrigation. Fertilizer costs and nitrate losses can be reduced. Nutrient applications can be better timed to meet plants' needs. • Drip irrigation systems can be designed and managed so that the wheel traffic rows are dry enough to allow tractor operations at any time. Timely application of herbicides, insecticides, and fungicides is possible. • Proven yield and quality responses to drip irrigation have been observed in onion, broccoli, cauliflower, lettuce, melon, tomato, and cotton.
Background/Notes, Short description of the technology option sourced from ClimateTechWiki,	To low-flow irrigation systems *(*sometimes called as *local irrigation systems)* include *drip* (*trickle)* and micro-sprinkler irrigation systems. Drip irrigation system delivers water to the crop using a network of mainlines, sub-mains and lateral lines with emission points spaced along their lengths. Each dripper/emitter, orifice supplies a measured, precisely

Seminars, etc	controlled uniform application of water, nutrients, and other required growth substances directly into the root zone of the plant. Water and nutrients enter the soil from the emitters, moving into the root zone of the plants through the combined forces of gravity and capillary. In this way, the plant's withdrawal of moisture and nutrients are replenished almost immediately, ensuring that the plant never suffers from water stress, thus enhancing quality, its ability to achieve optimum growth and high yield. The classic drip irrigation system consists of the following elements: -water source; -pumping station; - fertilizers application device; - water filtration plant; - main pipeline; - submain pipelines of various levels; - drip lines. Improved drip irrigation system must also be equipped with a measuring-information system to provide continuous monitoring of soil water regime. The main element of the drip irrigation system is drip line which may be of various types in their design and methods of manufacturing: drip tube or drip tape with drippers (emitters). Drip tube of the Drip - In type. Drip tube of Drip-In type is a rigid polyethylene tube wall thickness of 1.1 - 1.2 mm and diameter of 12, 16 or 20 mm with built-in emitters (drippers) inside. Drippers are available in two forms: pressure compensated and non pressure compensated. Drip tube of the Drip - On type. Represent the plastic pipe wall thickness of 1.1 - 1.2 mm, and diameter 16 or 20 mm, outside of which various types and modifications of Drippers are installed. Any distance between drippers depending on the needs of various plants may be chosen. The service life of the drip tube is not less than 8 years, so it is mainly used for irrigation of orchards, vineyards and berry fields. Drip tape, in contrast to the Drip tube, is a flexible polyethylene tube wall thickness from 100 to 400 microns (4 to 16 mil), and diameter of 12 to 22.5 mm with built-in dripper. Another distinctive feature of drip tape is the drippers are also designed as the flexible labyrinth. Invention of the drip tape made a revolution in drip irrigation. Its use has reduced the cost of irrigation systems in about 5 times, improve the performance of laying strips in 8 times, reduce the material consumption of irrigation systems in 10-12 times. Currently being developed and produced drip tape of various types and designs, each of which has its own advantages and disadvantages.
Implementation assumptions, How the technology will	At present, Moldova has already implemented several projects contributing to the reconstruction and improvement of old and creation of new modernized irrigation systems:

be implemented and diffused across the subsector?	• Transition to High Value Agriculture (THVA) Project funded by the Millennium Challenge Corporation (MCC) of the United States (*Centralized Irrigation System Rehabilitation Activity (CISRA), Irrigation Sector Reform Activity (ISRA)).* • RISP – II Program (For installation / improvements of irrigational systems the soft loan at a rate of up to $100.000 from fractions of the grant at a rate of up to 20 % is provided to farmers). • Rural Financial Services and Marketing Program – The Consolidated Unit for the Implementation of IFAD Programs. • Moldova – Japan 2KR Project. It is necessary to increase the number and the budgets of projects that will stimulate farmers to use advanced resource-saving irrigation systems. Creation and Government support of Water Use Associations to increase the purchasing capacity of farmer's communities to acquire modern irrigation systems and promote their sustainable use.
Costs	The average cost of Drip Irrigation System in Moldova is 1,100 – 1,500 €/per ha
Country social development priorities	• Hotărîre cu privire la aprobarea Programului de dezvoltare a gospodăririi apelor şi a hidroamelioraţiei în Republica Moldova pentru anii 2011-2020 (nr. 751, 5 octombrie 2011) Monitorul Oficial Nr. 170-175 • ***National Report "Millennium Development Goals Report: New Challenges – New Objectives", NHDR 2009/2010*** http://www.undp.md/mdg/MDG1/poverty.shtml, http://www.endpoverty2015.org • ***National Report "***Climate Change in Moldova: *Socio-Economic Impact and Policy Options for Adaptation****", NHDR 2009/2010*** • Irrigation Engineering, Hydrologic, and Agronomic Assessment Report, Republic of Moldova. The Millennium Challenge Corporation (MCC)/ Utah State University (USU), 2009 • National Strategy for Sustainable Development of the Agricultural Complex of the Republic of Moldova for 2008-2015 (Government Decision No. 282 of 11.03.2008.Official Monitor No. 57-60, 21.03.2008) • The National Development Strategy (NDS) for 2008-2011 • Program of Water Supply and Sewerage in Communities of the Republic of Moldova until 2015 (Government Decision No. 1406 of December 30, 2005, Decree No. 662 of June 13, 2007)
Country economic development priorities – economic benefits	• High value agricultural development • Impacts on water supply • Decreasing of irrigation water consumption
Social benefits	• Increasing of the population incomes from guaranteed high yields • Educational and scientific development • Increased community welfare
Environmental b*enefits*	Decreasing of impact to the country environment

Other considerations and priorities (such as market potential)	• According to the "Hotărîre cu privire la aprobarea Programului de dezvoltare a gospodăririi apelor şi a hidroamelioraţiei în Republica Moldova pentru anii 2011-2020 (nr. 751, 5 octombrie 2011) Monitorul Oficial Nr. 170-175" till 2020 in Moldova 116,0th ha of new irrigation systems will be built and 121,6th ha will be rehabilitated • About half of this area (118,8th ha) will be equipped with Low-flow, low-pressure and water serving Drip Irrigation Systems
Capital costs (per facility)	• 100 ha **Drip Irrigation Systems** average capital cost – 130,000 € • Total capital investments for 118,8th ha – 154,44 million €
Operational and Maintenance costs (per facility)	• 100 ha **Drip Irrigation Systems** average Operational and Maintenance costs – 13,000 €/ per season (120 working days) • Total Operational and Maintenance costs for 118,8th ha – 15,44 million €/ per season (120 working days)
Daily supply capacity per facility	Daily productivity – 35 ha
Up scaling potential	Daily productivity – 50 ha

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change adaptation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**