

# NS-277 - Use of solar energy for domestic hot water production in the Republic of Moldova

## Republic of Moldova

### NAMA Seeking Support for Implementation

| A Overview                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                 |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| A.1 Party                                  | Republic of Moldova                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                 |
| A.2 Title of Mitigation Action             | Use of solar energy for domestic hot water production in the Republic of Moldova                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                 |
| A.3 Description of mitigation action       | <p>The use of solar energy by means of solar panels with vacuum tubes is an acknowledged method that can be successfully applied hot water for different types of beneficiaries. The main purpose of this NAMA is to reduce GHG emissions by substituting natural gas electricity used for preparation of domestic hot water by solar energy panels. Currently, the use of solar energy in the Republic of Moldova is well-known, but it is insufficiently applied due to the high costs of solar panels. These systems are mainly used to substitute electricity consumption in some public buildings with high annual consumption of hot water such as hospitals, boarding schools, sports schools as in hybrid production systems energy. According to preliminary estimates, the implementation of this NAMA will allow to annually reduce consumption of natural gas by 32.84 mil m<sup>3</sup> / year and electricity consumption by 146.35 mil kWh / year, generating an annual reduction of 115,5 ktCO<sub>2</sub>eq of GHG emissions per year. The total number of solar panels required to implement this NAMA by 2030 is 316,054 (area is 1,645 m<sup>2</sup> per collector), and the required investment is 492.75 million euro.</p> |                                                                                 |
| A.4 Sector                                 | <input checked="" type="checkbox"/> Energy supply <input type="checkbox"/> Transport and its Infrastructure<br><input checked="" type="checkbox"/> Residential and Commercial buildings <input type="checkbox"/> Industry<br><input type="checkbox"/> Agriculture <input type="checkbox"/> Forestry<br><input type="checkbox"/> Waste management<br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                 |
| A.5 Technology                             | <input type="checkbox"/> Bioenergy <input type="checkbox"/> Cleaner Fuels<br><input type="checkbox"/> Energy Efficiency <input type="checkbox"/> Geothermal energy<br><input type="checkbox"/> Hydropower <input checked="" type="checkbox"/> Solar energy<br><input type="checkbox"/> Wind energy <input type="checkbox"/> Ocean energy<br><input type="checkbox"/> Carbon Capture and Storage <input type="checkbox"/> Low till / No till<br><input type="checkbox"/> Land fill gas collection<br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                 |
| A.6 Type of action                         | <input checked="" type="checkbox"/> National/ Sectoral goal <input type="checkbox"/> Project: Investment in machinery<br><input type="checkbox"/> Strategy <input type="checkbox"/> Project: Investment in infrastructure<br><input type="checkbox"/> National/Sectoral policy or program <input type="checkbox"/> Project: Other<br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                 |
| A.7 Greenhouse gases covered by the action | <input checked="" type="checkbox"/> CO <sub>2</sub> <input type="checkbox"/> CH <sub>4</sub><br><input type="checkbox"/> N <sub>2</sub> O <input type="checkbox"/> HFCs<br><input type="checkbox"/> PFCs <input type="checkbox"/> SF <sub>6</sub><br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                 |
| B National Implementing Entity             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                 |
| B.1.0                                      | Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Ministry of Agriculture, Regional Development and Environment                   |
| B.1.1                                      | Contact Person 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Vasile Scorpan                                                                  |
| B.1.2                                      | Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 156"A", Mitropolit Dosoftei str., of. 37, MD-2004 Chisinau, Republic of Moldova |
| B.1.3                                      | Phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | +373 22 232247                                                                  |
| B.1.4                                      | Email                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | clima@clima.md                                                                  |
| B.1.5                                      | Contact Person 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marius Taranu                                                                   |
| B.1.6                                      | Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 156"A", Mitropolit Dosoftei str., of. 37, MD-2004 Chisinau, Republic of Moldova |
| B.1.7                                      | Phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | +373 69684528                                                                   |
| B.1.8                                      | Email                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | marius.taranu@clima.md                                                          |
| B.1.9                                      | Contact Person 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                 |
| B.1.10                                     | Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                 |
| B.1.11                                     | Phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                 |
| B.1.12                                     | Email                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                 |

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|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B.1.13                                                               |                                                                                                 | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <a href="#">Add Additional Entity</a>                                |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| C Expected timeframe for the implementation of the mitigation action |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| C.1                                                                  | Number of years for completion                                                                  | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| C.2                                                                  | Expected start year of implementation                                                           | 2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| D Currency                                                           |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| D.1                                                                  | Used Currency                                                                                   | EUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Conversion to USD: 1                                                 |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| E Cost                                                               |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| E.1.1                                                                | Estimated full cost of implementation                                                           | 492,750,000<br>Conversion to USD: 637,451,488                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| E.1.2                                                                | Comments on full cost of implementation                                                         | The average investment portfolio per country is as follows:<br><br>Beneficiaries' investment - 9.3%, international grant - 66.8%, concessional loan - 23.9%. The implementation of this NAMA will be carried out in two stages:<br><br>1. Identification of beneficiaries, preparation of documentation, organization of financing and implementation of the Pilot Project - 1 year;<br><br>2. Large scale implementation of projects - 5 years.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| E.2.1                                                                | Estimated incremental cost of implementation                                                    | <br>Conversion to USD: 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| E.2.2                                                                | Comments on estimated incremental cost of implementation                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| F Support required for the implementation the mitigation action      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| F.1.1                                                                | Amount of Financial support                                                                     | 446,790,000<br>Conversion to USD: 577,994,825                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| F.1.2                                                                | Type of required Financial support                                                              | <input checked="" type="checkbox"/> Grant <input type="checkbox"/> Guarantee<br><input type="checkbox"/> Loan (sovereign) <input type="checkbox"/> Equity<br><input type="checkbox"/> Loan (Private) <input type="checkbox"/> Carbon finance<br><input checked="" type="checkbox"/> Concessional loan<br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| F.1.3                                                                | Comments on Financial support                                                                   | Implementation of this NAMA requires the following financial support: International grant - 329.03 million euro and Concessional loan - 117.76 million euro. Beneficiaries will participate with 45.97 million euro.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| F.2.1                                                                | Amount of Technological support                                                                 | 353,627,000.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| F.2.2                                                                | Comments on Technological support                                                               | Technological support is needed to acquire 286,570 solar collectors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| F.3.1                                                                | Amount of capacity building support                                                             | 200,000<br>Conversion to USD: 258,732                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| F.3.2                                                                | Type of required capacity building support                                                      | <input checked="" type="checkbox"/> Individual level<br><input checked="" type="checkbox"/> Institutional level<br><input type="checkbox"/> Systemic level<br><input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| F.3.3                                                                | Comments on Capacity Building support                                                           | Capacity building will be provided in the form of trainings, workshops and demonstration tools and by informing the potential beneficiaries about the financial and environmental benefits of solar heat collectors implementation and by enhancing the local stakeholders' knowledge needed to scale up the implementation of solar collectors. The capacity building activities are planned for the first year of project implementation and later on as needed. Trainings will cover technical, economical, financial, regulatory and operational aspects of solar collectors deployment and will target different stakeholder groups of owners of residential buildings, educational institutions, hotels, campuses, industry and ESCOs staff, public authorities in energy efficiency, designers, with a special focus on climate change related information. Promotional information and data about the solar heat collectors will be developed and disseminated. |
| G Estimated emission reductions                                      |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| G.1                                                                  | Amount                                                                                          | 0.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| G.2                                                                  | Unit                                                                                            | MtCO2e                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| G.3                                                                  | Additional information (e.g. if available, information on the methodological approach followed) | <p>The most plausible baseline scenario for this NAMA is the use of natural gas fired boilers as well as electricity boilers to meet the needs in hot water supply for the beneficiaries (existing detached houses, schools, hotels, commercial buildings and offices, swimming pools etc.) as system status-quo or Business as Usual Scenario.</p> <p>Greenhouse gas emissions reduction per NAMA equals to the difference between the emissions resulting from burning natural gas and using electricity (Business as Usual Scenario), and the emissions resulting from use of solar energy for preparation of the same quantity of hot water under the mitigation scenario. CO2 emissions in the mitigation scenario equal to zero.</p>                                                                                                                                                                                                                              |

Greenhouse gas emissions from burning natural gas in boilers are calculated based on emission factor for combustion of natural gas according to the 2006 IPCC Guidelines for National Greenhouse Inventories. In the Republic of Moldova all electricity is produced from natural gas. Hence, the GHG emissions produced from the use of electric boilers are calculated based on the same emission factor as gas boilers. The amount of gas consumed to produce electricity for electric boiler takes into consideration the grid losses and the power plant efficiency. It is estimated that solar collectors will substitute 53,5 % of primary energy used by natural gas fired boilers of primary energy – by electricity boilers.

## H Other indicators

## H.1 Other indicators of implementation

This implementation evaluation and monitoring indicators of this NAMA are:

- amount of natural gas and electricity savings per each site where a solar collector is installed;
- number of jobs created by companies selling solar collectors as well as by companies providing services for solar collectors installation, operation and maintenance;
- number of solar collectors implemented and their capacity;
- investments made in solar collectors, including in the form of grant, loan, budget support and beneficiary equity.

## I Other relevant information

## I.1 Other relevant information including co-benefits for local sustainable development

Economic Impact: Substitution of 32.84 mil m3 of natural gas consumed per year. At the existing tariff of 308.3 euro / thousand m3 in 2017 this NAMA will generate 10.12 million euro/year. Substitution of 146.35 million kWh of electricity consumed per year at the minimum rate of 11.1 € cent / kWh in 2017 will save € 16.1 million/year. Social benefits: new jobs, repairs and upgrade of hot water distribution systems, boosting cultural development, reducing energy dependence, interest in measures to reduce environmental impact, stimulating education and research. Combating diseases by providing the beneficiaries increased access to water, especially in the rural environment, is a very important aspect and absolutely necessary for the sustainable development of the country. Currently, on the total area of buildings in urban and rural areas on the right bank of the Nistru river have water supply systems and only 36% have hot water.

Capacity building: Capacity building is considered to be one of the most effective measures to promote energy efficiency and RES in the Republic of Moldova. Experience gained by the local staff in successful implementation of this NAMA will be further used for planning and implementation of other NAMAs related to deployment of renewables and energy efficiency projects.

Attracting local investments: Beneficiaries of solar collectors will invest their financial resources in technology that provides benefits over a long time period. Positive experience gained will foster local investors in new solar collectors construction.

## J Relevant National Policies strategies, plans and programmes and/or other mitigation action

## J.1 Relevant National Policies

- The Energy Strategy until 2030, GD no. 102 as of 5 February 2013. The Strategy provides for reducing energy intensity by 10% in 2020.
- The National Development Strategy Moldova 2020: 8 solutions for economic growth and poverty reduction, approved by the Parliament. no. 121 of 03.07.2014. The document provides for reducing energy consumption in buildings by 10% by 2020; renovation of 10% of public buildings by 2020.
- The Law on promoting the use of energy from renewable sources. no. 10 of 26.02.2016.
- The National Action Plan on Renewable Energy Sources 2013-2020. GD no. 1073 as of 27 December 2013;
- The National Energy Efficiency Program 2011-2020. GD no. 833 of 10.11.2011;
- The Law on Energy Efficiency. No. 142 of 02.07.2010;
- The Law on Energy Performance of Buildings. no.128 of 11.07.2014;
- The Low Emission Development Strategy (LEDS) of the Republic of Moldova until 2030 and the Action Plan for its implementation. GD no. 1470 of 30.12.2016. <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=369528>. According to conditional NDC, 80% of GHG emission reduction is to be reached in the Building sector by 2030 compared to 1990. Implementation of this NAMA is listed in the LEDS among other measures to reach this target.

## J.2 Link to other NAMAs

(none)

## K Attachments

| K   | Attachments            | <div> <div>Title</div> <div>Description</div> </div>          |  |
|-----|------------------------|---------------------------------------------------------------|--|
|     |                        | No records to display.                                        |  |
| K.1 | Attachment description | <div></div>                                                   |  |
| K.2 | File                   | <div> <div>Choose File</div> <div>No file chosen</div> </div> |  |

## L Support received

|                        |                      |                  |             |        |         |      |
|------------------------|----------------------|------------------|-------------|--------|---------|------|
| L.1                    | Outside the Registry | <div></div>      |             |        |         |      |
| L.2                    | Within the Registry  | Support provided | SupportType | Amount | Comment | Date |
| No records to display. |                      |                  |             |        |         |      |