

NS-284 - Use of energy willow for heat generation 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 energy willow for heat generation in the Republic of Moldova	
A.3 Description of mitigation action	This NAMA considers the potential for using willow biomass as input fuel for heating residential and non-residential buildings in the Republic of Moldova. Currently, 82% of Moldova's final energy consumption is met by imported sources of energy. As such, the development of local projects could positively contribute to the country's energy security. Furthermore, because willow biomass would displace intensive fuels currently used for heating, it would also contribute to improving Moldova's emissions profile. Both of these are strongly aligned with Moldova's strategic policies concerning the energy and environmental sectors. This NAMA aims to support the cultivation of energy willow over 20,000 ha across Moldova, starting with a 62.64 ha pilot project in 2025. It is expected that willow biomass will be used for decentralised heating by both households and non-residential buildings, including hospitals and schools, avoiding between 186 and 295 ktCO₂e of annual emissions from fossil fuels used for heating, which represents the yearly demand for fossil fuels by 3.55%. The energy willow is a dicotyledonous woody plant, which grows extremely fast – up to 3.5 cm per day. One of the main advantages of energy crops over other crops is their ability to grow on damaged or sloping land, where other crops would never grow. It has high productivity, requires few nutrients, and can thus degrade the quality of soil. The energy resulting from a 100 ha plantation can heat up about 100 m³ of living space, i.e. more than 7 thousand flats. The calorific value of pellets or briquettes produced from energy willow (kCal) is higher than that of beech or oak, and is comparable to that of coal and natural gas. To date, there are only a few energy willow plantations in Moldova, totalling an area of up to 50 ha. There is, however, great international experience with processing such biomass (e.g. Sweden, Hungary, and Romania). This, together with the know-how accumulated by local entrepreneurs, provides a good starting point for implementing such projects on a wider scale in Moldova.	
A.4 Sector	☒ Energy supply ☐ Residential and Commercial buildings ☐ Agriculture ☐ Waste management ☐ Other ☐ Transport and its Infrastructure ☐ Industry ☒ Forestry	
A.5 Technology	☒ Bioenergy ☐ Energy Efficiency ☐ Hydropower ☐ Wind energy ☐ Carbon Capture and Storage ☐ Land fill gas collection ☐ Cleaner Fuels ☐ Geothermal energy ☐ Solar energy ☐ Ocean energy ☐ Low till / No till ☒ Other Afforestation/reforestation	
A.6 Type of action	☒ National/ Sectoral goal ☐ Strategy ☐ National/Sectoral policy or program ☐ Other ☐ Project: Investment in machinery ☐ Project: Investment in infrastructure ☐ Project: Other	
A.7 Greenhouse gases covered by the action	☒ CO₂ ☐ N₂O ☐ PFCs ☐ Other ☐ CH₄ ☐ HFCs ☐ SF₆	
B National Implementing Entity		
B.1.0	Name	Ministry of Agriculture, Regional Development and Environment
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B.1.11	Phone	
B.1.12	Email	
B.1.13	Comments	

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C Expected timeframe for the implementation of the mitigation action

C.1	Number of years for completion	8
C.2	Expected start year of implementation	2018

D Currency

D.1	Used Currency	EUR
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Conversion to USD: 1

E Cost

E.1.1	Estimated full cost of implementation	72,480,000 Conversion to USD: 93,764,554
E.1.2	Comments on full cost of implementation	Based on the analysis carried out for this NAMA, the specific average investment in pellets production from willow grown on agric is 1.35 €/tone of pellets (calculated for the entire project lifetime of 25 years). Total investment required for this NAMA implement amounts to €72.48 million, of which €65 million is donor contribution and €7.22 million is beneficiary equity. The remaining funds to support the NAMA Implementation Unit operations, of which €0.04 million are national budget co-financing and €0.22 million a as technical assistance.
E.2.1	Estimated incremental cost of implementation	 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	65,210,000 Conversion to USD: 84,359,638
F.1.2	Type of required Financial support	☒ Grant ☐ Guarantee ☐ Loan (sovereign) ☒ Equity ☐ Loan (Private) ☐ Carbon finance ☒ Concessional loan ☐ Other
F.1.3	Comments on Financial support	The preliminary total requirement for international financing is €65.21 million. Of this, €50.55 million is in the form of loan and €14.66 million is in the form of grant. This reflects the entirety of donor support needed to (i) implement the NAMA projects on 20,000 ha in Mold cover NAMA Implementation Unit management costs.
F.2.1	Amount of Technological support	20,700,000
F.2.2	Comments on Technological support	Technology Support is needed to purchase equipment for pellet plants. Seeding and harvesting of willow will be done by contract machinery to qualified enterprises
F.3.1	Amount of capacity building support	220,000 Conversion to USD: 284,605
F.3.2	Type of required capacity building support	☒ Individual level ☒ Institutional level ☐ Systemic level ☐ Other
F.3.3	Comments on Capacity Building support	The Capacity Building Programme will offer a series of trainings and workshops for the beneficiaries identified in the Site identification and Planning stages staff of the NAMA Implementation Unit, the Energy Efficiency Agency, research institutions and local public authorities. Training sessions will be tailored to the requirements of the audience (e.g. project developers vs. public authorities etc.), but on aggregate will cover the following aspects: • Technical, including necessary equipment, available suppliers, installation procedures, pellet storage requirements, and land productivity; • Economic and financial, including capital costs, available financial resources and their costs, cash flows, pay-back period; • Operational, including asset depreciation, operation and maintenance costs; and • MRV, which are highly specialised and can baffle even domain experts.

G Estimated emission reductions

G.1 Amount	4.37-7.1
G.2 Unit	MtCO ₂ e 
G.3 Additional information (e.g. if available, information on the methodological approach followed)	It is expected that 641 tons of conventional coal (t.c.c.) will be replaced by pellets for heating purposes every two years under the pilot project. This would mean for this NAMA overall. The target is for 3.55% of yearly consumption of fossil fuels to be replaced with willow biomass. GHG emissions reductions for this NAMA are determined using the approach described in (Stolarski, M. J. y otros, 2015. Willow biomass energy generation efficiency and greenhouse gas reduction potential. Polish Journal of Environmental Studies, XXIV(6), pp. 2627-2640.), tailored to a two-year cycle for willow pellets production. Emissions are produced during the soil processing before planting, harvesting the biomass, transportation of the biomass to the pellets production plants and conversion of biomass into heat. Belowground biomass and litter remain in the field. The potential for GHG reduction from replacing fossil fuels with willow biomass as input for energy generation is a function of three variables. The first one is the product between the heat produced from biomass combustion and the GHG emitted from production of energy using fossil fuels. The second variable is the amount of CO₂e sequestered in soil, and the third relates to emissions from willow biomass production. The amount of carbon sequestered in soil and belowground vegetation were based on methodological approach used in two CDM Afforestation/Reforestation projects in Moldova: Soil Conservation Project and Moldova Community Forestry Development Project. Two baseline emissions reduction scenarios are considered. The first baseline scenario (BLS1) assumes that willow pellets will replace fossil fuels proportionate to shares by which these fuels are currently used to heat buildings in the commercial, administrative, social (schools, hospitals, and kindergartens) and household sectors. The second baseline scenario (BLS2) assumes that the main buyers of pellets are those that currently use coal-fuelled boilers. GHG emissions reduction due to fossil fuel replacement are expected to approximate 4,642 GgCO₂e and 7,364 GgCO₂e in the first and second scenarios respectively. This corresponds to an annual average reduction of 295 GgCO₂e and 295 GgCO₂e respectively. On net, it is expected that NAMA implementation would lead to between 4.37 and 7.1 cumulative MtCO₂e emissions reduction over 25 years. Most reductions will be achieved under BLS2, where all willow biomass replaces coal as input for the purpose of heat generation.

H Other indicators

H.1 Other indicators of implementation	Since the measurements of the GHG emissions in this NAMA will cover both the activities where emissions are emitted and where these are avoided, the sequestered carbon the MRV parameters will include parameters related to energy crops planting and harvesting, biomass transportation, and pellets production. The electricity consumed for pellets production (in kWh/year) is used to calculate GHG emissions. The amount of GHG emissions will be calculated from the amount of GHG removals generated by the willow plantations. Such indicator as fuel (in ton/year) used for soil processing, planting, and transportation of biomass will be used to calculate GHG emissions, which also will be subtracted from the GHG removals generated by the willow plantations. At the same time, avoided emissions from replacing the fossil fuels with biomass will be estimated based on the volume of sold pellets. This parameter (measure) will measure the volume of fossil fuels displaced by energy willow pellets as input for fuel for heating. These calculations can then be used to derive emissions avoided due to the switch from fossil fuels to biomass. The implementation evaluation and monitoring indicators of this NAMA are: - The surfaces of the areas planted with willow - The amount of pellets sold - Electricity consumed for pellets production - Fuel used for planting, harvesting and transportation of energy willow, and for producing pellets - Amount of insecticides and fertilisers used for willow growing
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I Other relevant information

I.1 Other relevant information including co-benefits for local sustainable development	In addition to carbon sequestration, the NAMA will have an important impact on sustainable development in the Republic of Moldova by delivering tangible social and economic benefits to the population. Most important environmental benefits will be delivered due to the fact that the use of energy crops as an alternative heating will reduce the pressure on the existing forests and reduce the number of illegal logging for heating purposes. Moreover, this NAMA will contribute to mitigation by supporting the use of climate-friendly fuel for generating decentralised thermal energy at small and medium scale. It is expected that under the pilot project 204,556 tons of conventional coal (t.c.c.) will be replaced by pellets for heating purposes every two years. This would mean 204,556 tons for NAMA overall. The target is for 3.55% of yearly consumption of fossil fuels to be replaced with willow biomass. The use of energy willow as an additional source of thermal energy will reduce the country's import dependence. Socio-economic benefits include an increase of formal employment opportunities for local people in planting and harvesting energy crops, as well as an improved access to heating services. Energy willow as input fuel for heating is cheaper than natural gas. Moreover, this NAMA will make important contributions to achieve a number of Sustainable Development Goals (SDGs) included in the 2030 Agenda 2030 for sustainable development that was adopted by the United Nations (UN) in September 2015.
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J Relevant National Policies strategies, plans and programmes and/or other mitigation action

J.1 Relevant National Policies	In 2010, the Republic of Moldova joined the Copenhagen Accord and submitted an emission reduction target to the UNFCCC Secretariat. The Environmental Strategy for 2014-2023 and the action plan for its implementation were approved in 2014. The Strategy sets out both a national and sector-specific targets for CO₂ reduction by 2020 and relative to the BAU scenario. In particular, the national target is -20%; for the energy sector -25%. The Strategy provides that the energy sector objective shall be achieved through an improved efficiency of energy generation, supply and consumption, alongside with the use of renewable energy resources. The Moldova's Energy Strategy until 2030, which aims to increase the use of energy produced from renewable sources – as share of total internal gross consumption – to 20% by 2030. Biomass for thermal energy production is key in achieving this objective. The Low Emission Development Strategy (LEDS) of the Republic of Moldova until 2030 and the Action Plan for its implementation, GD no. 1470 from 30.12.2016. http://lex.justice.md/DocumentView.aspx?id=369528. The overall target will be achieved through unconditional (and conditional) emissions reduction targets for seven sectors. In particular, by 2020, the emissions reduction target for the energy sector is of 74% (82%) and for the buildings sector -77% (80%). Other important documents with NAMA reference are: The Law on promoting the use of energy from renewable sources (2016); National Action Plan for Renewable Energy 2013-2020; the Law on sustainable development of national forestry sector; the Law on improvement of degraded land through afforestation; the Moldova Climate Change Adaptation Strategy until 2020.
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J.2 Link to other NAMAs

(none)

K Attachments

K Attachments

Title

Description

No records to display.

K.1 Attachment description

K.2 File

Choose File

No file chosen

L Support received

L.1 Outside the Registry

L.2 Within the Registry

Support provided

SupportType

Amount

Comment

Date

No records to display.