United Nations
Framework Convention on
Climate Change

NAMA Seeking Support for Implementation

A Overview

A.1 Party	Republic of Moldova
A.2 Title of Mitigation Action	Clinker substitution at cement production
A.3 Description of mitigation action	The overall objective of the NAMA on Clinker Substitution at Cement Production in the Republic of Moldova is to replace the conventional cement production technology (Ordinary Portland Cement – OPC) with a new cement production technology called "Solidia technology" by 2030, which allows to reduce the carbon footprint up to 70% compared to the OPC in the entire process – from production to end use. Currently the OPC technology is used in the country and the share of clinker in total cement production is 81% on average. Clinker production is a high energy-intensive technology leading to around 830 kg CO_2 emissions per tone of produced cement, including 530 kg CO_2 / tone of clinker in the process of calcination. In Moldova there are two cement production plants – one owned by Lafarge, French company, situated in Rezina city and the second is situated in Ribnita city and owned by a Russian company. During the last 15 years cement production in Moldova has been permanently growing, on average by 6% per year. Given this trend, in 2030 cement production output can reach more than 2,300,000 tones generating more than 1,000,000 tones of CO_2 during the calcination process only. Therefore switching from the OPC technology to "Solidia Technology" which is less energy intensive, produces less chemical emissions, and which is curing with CO2, rather than water and needs less time, will allow to emit 30% less of CO_2, use 30% less energy and the CO_2 footprint associated with manufacturing and use of cement can be reduced by up to 70%. Preliminary estimates indicate that replacing the OPC with "Solidia Technology" by 2030 will lead to 300,000 tones of CO_2 emissions reduction due to calcinations process and 176,000 tones of CO_2 due to fuel savings. In addition, the new technology will act as CO_2 absorber and will reduce water consumption by 80%. Moreover, fuel consumption will reduce by 30% and the cement curing time will reduce from 28 days to one day, resulting in time, money and inventory space savings for cement and concrete producers.

To reach its target, this NAMA will follow a two phases approach: a) Preparation Phase (2018-2024) - to extend the national policy and regulatory framework to support cement clinker substitution using one common approach to standardize cement types, as it has been done in Europe, and set standards for cement types, to ensure provision of quality cement to buyers by replacing the OPC with the Solidia Technology; b) Phase II (2025-2030) – to effectively replace the OPC with the Solidia Technology .

A.4 Sector

- ☐ Energy supply
- ☐ Residential and Commercial buildings
- ☐ Agriculture
- ☐ Waste management
- ☐ Transport and its Infrastructure
- ☒ Industry
- ☐ Forestry
- ☐ Other <Pls enter Other text here>

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 <cement technology>

A.6 Type of action

- ☒ National/ Sectorial goal
- ☐ Strategy
- ☒ National/Sectorial policy or program
- ☐ Project: Investment in machinery
- ☐ Project: Investment in infrastructure
- ☐ Project: Other
- ☐ Other: <Pls enter Other text here>

A.7 Greenhouse gases covered by the action

- ☒ CO_2
- ☐ CH_4
- ☐ N_2O
- ☐ HFCs
- ☐ PFCs
- ☐ SF_6
- ☐ Other <Pls add in text here>

B National Implementing Entity

B.1.0 Name: Ministry of Agricultur, Regional Development and Environment
B.1.1 Address: 156”A”, Mitropolit Dosoftei str., of. 37, MD-2004 Chisinau, Republic of Moldova
B.1.2 Contact Person: Vasile Scorpan
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B.1.3 Phone: +373 22 232247
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C. Expected timeframe for the implementation of the mitigation action

C.1 Number of years for completion 12

C.2 Expected start year of implementation 2018

D.1 Used Currency EUR

Conversion to USD <to be filled automatically>

E Cost

E.1.1 Estimated full cost of implementation 81,402,500.00

Conversion to USD <to be filled automatically>

E.1.2 Comments on full cost of implementation

The calculation of total investment was based on 3 steps: 1) Development of appropriate legislative framework and training programs, techniques for relevant specialists. Estimated investment for this step is EUR 540,000; 2) Capacity building for specialists, site workers, students and other categories. Estimated investment for this step is EUR 3,510,000; 3) Technology implementation. This step includes 3 sub-components: refurbishing the cement production plants – EUR 10,0 mln., refurbishing the concrete components production units – EUR 40,0 mln., organizing the marketing process – EUR 30,0 mln.

The investments will be made in two phases: Phase I(2018-2024) - EUR 0,5 mln; Phase II (2024-2030) - EUR 80,6 mln. The investment portfolio is the following: International grant – 49,7%; Central Government budget – 0,52%; international loan (zero% interest rate) – 39,85%, and cement producers – 9,96%.

E.2.1 Estimated incremental cost of implementation

Conversion to USD <to be filled automatically>

E.2.2 Comments on estimated incremental cost of implementation

<Pls enter Comments here>

F Support required for the implementation of the mitigation action

F.1.1 Amount of financial support 72,831,250.00

Conversion to USD <to be filled automatically>

F.1.2 Type of required financial support

- ☒ Grant
- ☐ Loan (sovereign)
- ☐ Loan (Private)
- ☒ Concessional loan
- ☐ Guarantee
- ☐ Equity
- ☐ Carbon finance
- ☐ Other <Pls enter Other text here>

F.1.3 Comments on Financial Support: It is planned that a Grant and a Concessional loan will be contracted for this NAMA implementation, including the international grant of EUR 40.4 mln and the international loan (zero % interest rate) of EUR 32.4 mln.

F.2.1 Amount of Technological Support: 50,000,000.00

Conversion to USD <to be filled automatically>

F.2.2 Comments on Technological Support

The new cement production technology requires modernization of some equipment at the two cement production plants operating in Moldova. The required investment for these equipment is estimated to be EUR 10,0 mln. Additionally, it is necessary to install new equipment at concrete components production units. The investment for this refurbishment is estimated to be EUR 40,0 mln.

F.3.1 Amount of capacity building support: 862,500

Conversion to USD <to be filled automatically>

F.3.2Type of required capacity building support
- ☒ Individual level
- ☒ Institutional level
- ☐ Systemic level
- ☐ Other <Pls enter Other text here>

F.3.3 Comments on Capacity Building Support

Capacity building will be provided in the form of trainings, workshops and demonstration tools and by way of informing the potential beneficiaries and stakeholders about the financial and environmental benefits from the implementation of the new cement production technology, new type of cement, and by enhancing the local staffs' skills needed to scale up implementation of the "Solidia technology". The capacity building activities are planned for the entire duration of project implementation (12 years). It is planned to have at least 10 workshops annually and train 20 persons in each workshop. It is estimated that about 2400 persons will be trained during the entire period.

F.4 Financial support for implementation required ☒
F.5 Technological support for implementation required ☐
F.6 Capacity building support for implementation required ☒

G Estimated emission reductions

G.1 Amount 1.12

G.2 Unit MtCO2e

G.3 Additional information (e.g. if available, information on the methodological approach followed):
To estimate the emission reductions and the trends in cement production until 2030, both data from the National GHG Inventory Reports and macro-economic forecast for the

Industry sector were used. It has been identified that cement production features 5% growth per year. The GHG emissions were estimated according to the UNFCCC *TIER 2* methodology *(IPCC 2006 Guidelines)*. The emission factor for clinker was calculated as 0,5491. It was assumed that in 2025 only one cement production plant will switch to the new technology "Solidia technology" (60% of total production). The second cement production plant will switch to the new technology "Solidia technology" in 2030.

H.1 Other indicators of implementation:

This NAMA implementation evaluation and monitoring indicators are:

- Amount of new type of cement produced,
- Fuel savings,
- Water savings,
- Number of jobs created and
- Investments made for the new technology implementation, including as a grant, loan, budget support and beneficiary equity.

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

The replacement of the existing cement production technology (OPC) with the Solidia Technology will create a lot of benefits, including: 30% reduction of fuel consumption; reduction of cures to full strength in 24 hours instead of 28 days required according to the OPC technology leading to time and financial resources savings; inventory space reduction for cement and concrete producers, decreasing the limestone used, etc. The replacement of the OPC technology with the Solidia Technology will result in creation of new jobs, reduction up to 80% of water consumed during the concrete manufacturing processes. Concrete produced from the new type of cement has higher performance, including higher durability, ensuring higher building reliability.

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

J.1 Relevant National Policies The Energy Strategy of the Republic of Moldova until 2030 approved by the GD no. 102 of 05.02. 2013 provides for improving energy security and energy efficiency. This NAMA enhances national efforts to improve energy efficiency and increase energy security of the country due to the decrease of the amount of fossil fuel for cement production.

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, 56% of GHG emissions reduction should be reached in the Industry sector by 2030 compared to 1990. Implementation of this NAMA is listed in the LEDS among measures to reach this target.

The National Energy Efficiency Program 2011-2020, approved by the GD no. 833 of 10.11.2011 and the draft Action Plan on Energy Efficiency 2016-2018 provides for promotion of efficient technologies, including best cement production technologies.

J.2 Links to other mitigation actions:

K Attachments

K.1 Attachment description: NAMA " Clinker substitution at cement production" report on 15 pages, in Romanian. It can be presented on request.

K.2 File Browse

L Support received

L.1 From outside the Registry <Please enter text here>

L.2 From within the Registry

Source	Amount	Date