United Nations
Framework Convention on
Climate Change

NAMA Seeking Support for Implementation

A Overview

A.1 Party Bosnia and Herzegovina

A.2 Title of Mitigation Action Geothermal Energy for Buldings Heating and Cooling in Visegrad municipality

A.3 Description of mitigation action

Based on the data obtained from the municipal administration:

• Surface of the buildings (public, commercial and residential ones) in the city center, which is heated by individual boiler houses is about 35,000 m^2.

•There are currently about 4,000 households in individual houses in suburban area heated by individual boilers and furnaces.

Assuming that the average size of households is around 100 m^2 then the total surface of individual houses is around 400,000 m^2.

Based on the data obtained from the municipal administration, fuels used for heating of the builings are as follows:

• coal: about 97%, or about 9,000 tons / year and the wood around 30,000 spatial m^3

• electricity: about 3%.

The problems caused by the existing way of heating are :

• Most of the boilers and installation are out dated and it is necessary to make extensive reconstruction,

• For the same reason, energy efficiency is on a very low level,

• Unfavorable geographical position of the city increases the concentration of pollutants because

the city is located in a valley. Pollution increases in certain atmospheric circumstances.

•Most of the boilers are fired by coal and wood, which results in a high level of emissions of pollutants.

<u>Potential of geothermal energy in Visegrad municipality</u>

Potential of geothermal energy of Visegrad can be divided into two sources:

1. City center of Visegrad municipality is located at the confluence of two rivers, Drina and Rzav.

This results in alluviums which contain a large amount of underground water on low depths (10-15 m) and it is relatively easy to exploit of these underground water.

Note that on the confluence of the river Rzav and Drina, "Andrićgrad" with surface of buildings about 30,000 m2 is constructed, which already use geothermal potential of underground water, by heat pumps type water-water. The water pumps has been installed 3 years ago, and since than geothermal energy of underground water is used successfully.

Seven wells was drilled on this location , for heating and cooling of "Andrićgrad", with average flow rate 8 l/s and an average temperature of inlet water of 12°C. These capacities are sufficient for the energy needs of this buildings complex.

Based on this experience and survey, it can be assumed that there is very large unexploited potential of geothermal energy of the underground water, and that there is potential at this location and location right next to the river in the amount of a minimum of 200 l/s of underground water at this alluviums, which is enough for around 4 MW of thermal and cooling capacity.

2. Spa “Vilina vlas” with thermal water is located in the nearby of Visegrad, with total capacity of all 4 wells of 120 l/s in the "C” exploitation mode. There is a huge excess of geothermal potential, because all water from the wellspring, even the one after using in the spa, can be used as geothermal potential.

All of the water from wells that are currently exploiting, in the capacity of about 30 l/s, is discharged into a stream which flows into the Drina river after 2000 m. The temperature of thermal water is in range of 31˚C to 34˚C. The establishment of the heating system (pipelines) which would led this water to the city, would enable using this potential for heating of buildings, hot domestic water and cooling.

Spa is located 6 km from the city, so there would be decrease of temperature in the heating system in the amount of 1˚C to 2°C, depending on the quality of the heating system insulation.

Also it should be pointed that due to the height difference between positions of the wellspring and the city Visegrad, wouldn’t require special amount of power for thermal water supply.

Considering the above, it can be calculated that this thermal water could be used for heat pump type water-water, with following characteristics:

If we take that average ΔT is 32˚C-27˚C=5 °C, at flow rate of 120 l/s with low temperature operating modes in secondary structures temperature would be between 40 °C and 45 °C, with use of high quality and high performance heat pumps with a COP of at least 5. In this case 14 MW of thermal energy could be obtained from thermal water with mentioned characteristics.

It can be concluded that there is a large geothermal potential in the municipality of Visegrad, with the amount of minimum 18 MW of thermal capacity, which can relatively easily be used by by heat pumps type water-water. It should be pointed that in order to utilize the geothermal potential partial or complete reconstruction and replacement of heating installations is needed to get regime in the secondary heating loop 40-45 °C. This potential is sufficient for the heating of a minimum of 200,000 m2 (50 % of total households surface).

Project proposal

Heating system of the municipality of Visegrad should be established gradually, in several stages, in the way that the first heating system should be established in the public buildings with the highest heating costs, in order to have maximum effect in the beginning.

Heating system of the municipality Visegrad should be done in the way that thermal water from the spa “Vilina vlas” should be introduced to the urban and suburban areas of the municipality of Visegrad by pipeline and depending on the position of the settlement to combine the use of this thermal water and water from wells, which would be constructed.

Proposal is to install more water pumps houses with larger capacities (5-6 water pumps with heat capacity 3-4 MW per water pump house), which would use geothermal water.

Using of water for spa center, wouldn’t at all diminish the use of geothermal potential of this water, because all the waste water from the spa center can be fully utilized, and its geothermal potential would be negligible diminished.

In case it turns out that some locations can’t get a whole required amount of underground water that can be compensated with energy from the heat pumps type air-water, which would be integrated together into a single system with the heat pumps type water-water.

It should be mentioned that it is not necessary to immediately make heating system for the whole city, because it can be independently divided into several parts, and heating system can be made for individual parts of the city.

A.4 Sector

- [x] Energy supply
- [x] Residential and Commercial buildings
- [ ] Agriculture
- [ ] Waste management
- [ ] Transport and its Infrastructure
- [ ] Industry
- [ ] Forestry
- [ ] Other

A.5 Technology

- [ ] Bioenergy
- [ ] Energy Efficiency
- [ ] Hydropower
- [ ] Wind energy
- [ ] Carbon Capture and Storage
- [ ] Land fill gas collection
- [ ] Cleaner Fuels
- [x] Geothermal energy
- [ ] Solar energy
- [ ] Ocean energy
- [ ] Low till / No till
- [ ] Other

A.6 Type of action

- [ ] National/ Sectoral goal
- [ ] Strategy
- [ ] National/Sectoral policy or program
- [x] Project: Investment in machinery
- [x] Project: Investment in infrastructure
- [ ] Project: Other
- [ ] Other:

A.7 Greenhouse gases covered by the action

- [x] CO_2
- [ ] CH_4
- [ ] N_2O
- [ ] HFCs
- [ ] PFCs
- [ ] SF_6
- [ ] Other

B National Implementing Entity

B.1.0 Name Visegrad Municipality
B.1.1 Address Kralja Petra I no. 7, 73240 Visegrad

B.1.2 Contact Person Mr. Slavisa Miskovic, major

Alternative Contact Person <Pls enter Alternative Contact Person here>
B.1.3 Phone +387 58 620 602
Alternative Phone <Pls enter Alternative Phone Number here>
B.1.4 Email nacvgd@teol.net

Alternative Email <Pls enter Alternative Email Address here>
+ Add Additional entity

C. Expected timeframe for the implementation of the mitigation action
C.1 Number of years for completion 2
C.2 Expected start year of implementation 2017

D.1 Used Currency BAM
Conversion to USD 1BAM=0,570185566 USD

E Cost

E.1.1 Estimated full cost of implementation 17,290,000 KM
Conversion to USD 9,858,508 USD

E.1.2 Comments on full cost of implementation

Estimation of CAPEX

1. Digging of wells requires about 30 boreholes with average price of 3,000 KM, which gives a total investment for digging of wells: 90,000 KM.

2. For the pipeline from the spa "Vilina Vlas" to the city center (Ø 150 mm or 6", length:6,000 m) a total price with all the works is about 1,200,000 KM.

3. Heat pumps: for 5-6 heat pumps houses with total capacity of 18 MW total price is 6,000,000 KM.

4. Replacement of heating installations, making secondary pipelines and installation of fan coils costs roughly about 10,000,000 KM.

E.2.1 Estimated incremental cost of implementation 0.00
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 15,000,000 BAM
Conversion to USD 8.552.780

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 <Pls enter Comments on Financial Support here>

F.2.1 Amount of Technological Support 0.00
Conversion to USD <to be filled automatically>

F.2.2 Comments on Technological Support <Pls enter Comments here>

F.3.1 Amount of capacity building support 0.00 $ (Dollars)
Conversion to USD <to be filled automatically>

F.3.2Type of required capacity building support

- ☐ Individual level
- ☐ Institutional level

☐ Systemic level
☐ Other

F.3.3 Comments on Capacity Building Support <Pls enter Comments here>

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 17,207

G.2 Unit t CO_2/a

G.3 Additional information (e.g. if available, information on the methodological approach followed):
Specific costs of CO_2 reduced (based on reduction in ten years taking into account CAPEX) is 51 EUR/tCO_2.

H.1 Other indicators of implementation Primary energy saving is 3,432 t_{OE}.

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

The benefits of geothermal energy deployment for district heating in Visegrad are:

- Reduction of local pollution; reduction of sulphur dioxide emission in amount of 107 tons per year,
- Long term reduction of energy costs,
- Providing of cooling for buildings, especially those who didn't previously had cooling system,
- Complete reconstruction of out dated heating and cooling systems,
- Gets the medical system safer, because there is no frigid air from the air conditioner in the summer (which causes various diseases), and there is no drying air from hot radiators in winter.
- Gets the more comfortable heating system, because this system works at low temperature mode and there is no drying of air, and in every room there is a digital thermostat for temperature regulation with the possibility of long-term programming temperature.

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

J.1 Relevant National Policies <Pls enter relevant national policies here>

J.2 Links to other mitigation actions <Pls enter/select NAMA ID>

K Attachments

K.1 Attachment description Excel file with all calculations

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