Hrazdan Municipality (Armenia)

One-pager on PV/Solar Projects

(Identification form for municipal project proposals on local generation of renewable energy[1])

1. Information about municipality	
Name of municipality:	Hrazdan
Region / Oblast:	Kotayk
Country:	Armenia
Number of citizens:	58288
City budget (most recent year):	2377480.7 EUR 1245000000 AMD[2]
Website of municipality:	www.hrazdan.am
Member of CoM since:	21.05.2013
Date of SEAP/SECAP approval:	09.06.2015
Name of contact:	Anahit Mnatsakanyan
Position:	Advisor to the Mayor
Email:	manahit84@mail.ru
Phone:	+374 93 843008

2. SEAP/SECAP Sector	Local electricity production from renewable sources: solar photovoltaic (PV)

3. Description of an existing electrical/thermal energy supply system of a building/facility N1	
Parameter	**Description**
Type of building (e.g. municipal, kindergarten, school, hospital, sport hall, house of culture, residential, tertiary, other, N/A*)	City Hall
Name and address of building/facility, construction date	Administrative building, 1 Constitution Square, Center District, Hrazdan, Armenia, 1970
Exact GPS coordinates of the site (if available)	$40^0$52'0.0576 N $44^0$74'9.2871 E
Electricity supply (national grid, local power producer, other?)	National grid
Feed-in tariff to grid (revenues per kWh), AMD/kWh	22.49
Capacity of transformer/available capacity of grid (in/out)	
Electricity metering system (Yes: individual meter, combined / other / No)	Individual two-tariff
Heating system (Yes: centralized, local boiler-house, individual gas-fired boiler, other / No)	Gas boiler
Primary energy for heating system: Natural gas, electricity, diesel, coal, wood, dung, etc.	Natural gas
Thermal energy metering system for heating (Yes/No)	No
Hot water supply (Yes: centralized, local gas-fired boiler, local electrical boiler, other / No)	Gas boiler
Annual hot water consumption (liter/a or kWh/a)	
- *bathing*	
- *cleaning (laundry)*	
- *cooking*	
- *other (specify)*	

[1] The information provided with this form is for information purposes only. No rights can be exerted because of information provided with this form, nor can the municipality be held accountable for any mistakes or incorrect information provided within.

[2] Use the exchange rate of your national bank on the moment of filling in the form.

Days and hours of operation of building/facility (days/a and hours per day)	240 day/a, 9 hour/day
Any peaks for hot water consumption? (specify period, e.g. a month)	
Thermal energy metering system for hot water supply (Yes/No)	No
Primary energy for hot water supply system: natural gas, electricity, diesel, coal, wood, dung, etc.	Natural gas
Other information	

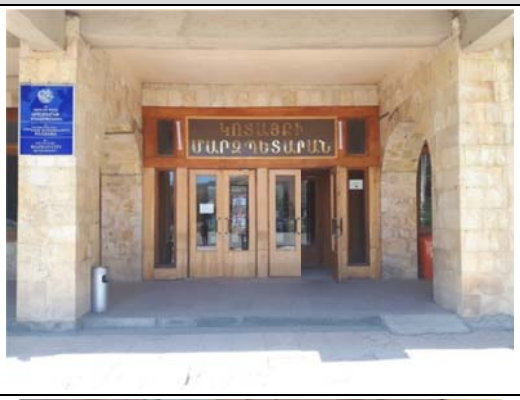
** In case of construction of a new grid-tied PV power plant, that supplies electricity to a national grid.*

4. Annual energy consumption and costs over the past 3 years

Year	Electricity consumption (MWh/a)	Annual electricity costs		Natural gas consumption (m^3/a)[3]	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	10.270	805	431,300	2,539	739	396,100
2017	12.071	1,030	552,100	3,817	790	530,600
2018	6.174	515	276,097	4,835	1,254	672,163

Total energy consumption in the recent year		
Total annual energy consumption	**MWh/a**	771.3
Total annual costs associated with energy consumption	**Euro**	34,174
	AMD	17,941,486
Total specific annual energy consumption in heated area	**kWh/m^2**	109.98

5. Photos showing pre-project situation and orientation of building/object/facility

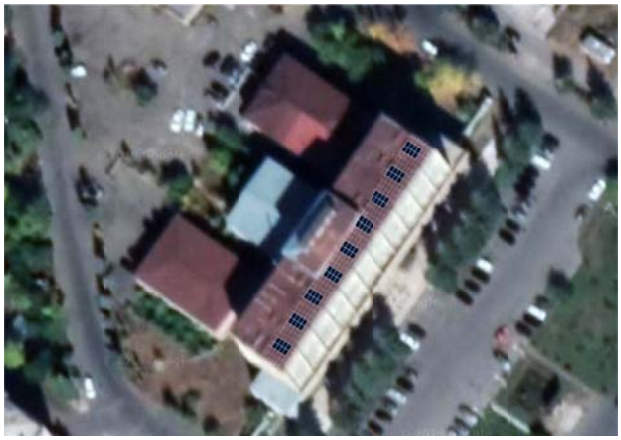


[3] For converting consumption of natural gas (and other energies/fuels) into MWh/year, use conversion data provided in SECAP Guide or national data.

6. Available supporting documents (If necessary, provide links or attach copies of documents)
Reference to any available supporting documents like energy audits, feasibility studies, preliminary assessments, software simulations, etc. Document / Source N1: _____

7. Description of renewable energy generation system to be implemented by the project	
Parameter	**Description**
PHOTOVOLTAIC SYSTEM (PV)	
Annual global horizontal irradiation (kWh/m^2)	1,566
Type of system (grid tied, battery based)	Grid tied
Total installed capacity of the system (DC peak power) (kW)	25.56
Expected annual production (kWh/a)	35,400
PV Modules	
Individual capacity of a PV module (wattage)	355
Type of PV module (mono-crystalline / poly-crystalline)	M-Si
Number of PV modules, pcs.	72
Inverters	
Type of inverters (grid tied, hybrid, stand-alone)	Grid tied
Rated input power of inverters (kW)	25
Number of inverters, pcs.	1
Mounting structure	
Orientation of the system (south, southeast, southwest, etc.)	South, South-West
Tilt angle (degree)	30^0
Material of bearing structure (aluminum, metal, galvanized)	Aluminum
System installation type (ground mounted, roof mounted, BIPV)	Roof mounted
System tracking option (none - fixed, single axis, dual axis)	Fixed
Battery /Transformer	
Battery capacity (Ah)	
Transformer capacity (kVA)	
Number of transformers, pcs.	



Location of PV modules on the roof of the building

8. Energy efficiency measures and modernizations to be implemented within the project						
PV system components	**Unit**	**Number of units**	**Indicative costs per unit (with VAT)[4]**		**Subtotal costs**	
			EUR	**AMD**	**EUR**	**AMD**
PV module	Pieces	72	160	84,000	11,520	6,048,000
Inverters	kW and pieces	25 kW, 1	2,514	1,320,000	2,514	1,320,000
Mounting structure	Sets	9	619.0	325,000	5,571	2,925,000
Cabling	Meter	550	1.1	600	629	330,000
Transmission line	-	-				
Battery	Pieces	0				
Transformer	Pieces	0				
Substation	-	0				
Auxiliary equipment	-					
TOTAL					**20,234**	**10,623,000**

9. Other costs		
Description	**Indicative costs for PV**	
	EUR	**AMD**
Human resources	200	105,000
Structural survey (in case of roof mounted)	304.8	160,000
Geological survey (in case of ground mounted)	-	-
Technical design	600	315,000
State expertise	99	52,000
Site supervision (technical and author supervision)	247.6	130,000
Installation works (labor)	295.2	155,000
Land and license acquisition	-	-
Other (please specify)	3523.8	1,850,000
TOTAL	**5,270.5**	**2,767,000**
Annual operation and maintenance costs	120	62,000

10. Grand total costs	PV system
Euro	**25,505**
AMD	**13,390,000**

[4] These are indicative costs based on the data from real implemented projects under the Covenant of Mayors – Demonstration Projects (CoM-DeP programme). However, municipalities are advised to contact suppliers/service providers to obtain more accurate information for their specific case.

11. Expected results	PV system	
Annual renewable energy generation, MWh[5]	**35.40**	
Annual monetary savings, EUR/AMD	**3,033**	**1,592,300**
Annual CO_2 emission reduction[6], tCO_2	**7.86**	

12. Timetable of the project	
Description of step	**Indicative time needed (months)**
Recruitment/Mobilization of IPU	0.5
Structural survey of building (drafting ToR, procurement of services, implementation, report)	1
Energy audit (drafting ToR, procurement of services, implementation, report)	1
Technical design (drafting ToR, procurement, implementation, report)	1
State expertise	0.3
Procurement	1
Works/site supervision (technical and author)	1
Final acceptance (including correction of defects)	0.3
Calculation of real savings (post intervention measurement & verification audit)	6
Total	**12.1**

13. Other information
Within the framework of this proposal it is suggested to install a grid-ties PV system with an installed (peak) capacity of 25.56 kW on the roof of the city hall of Hrazdan. The system consists of 72 PV modules with individual peak capacity of 355 W and will generate annually 35.4 MWh of electricity. It is expected that the new system will cover about 13% of annual electricity demand of the building. Installation if a system of a higher capacity is not possible because of limited roof space. Generate electricity is to be used for electrical heating of the house of culture. The total cost of the project is 25.500 Euro.

[5] It is important that you fill in reasonable estimates of RE generation with consideration of energy consumption for own needs of the systems. Too optimistic forecasts for RE generation will raise questions about your trustworthiness as partner.

[6] For calculation of CO_2 emission reduction, please refer to national GHG emission factors (SECAP Guide).