

**Vanadzor Municipality (Armenia)****One-pager on PV/Solar Projects****(Identification form for municipal project proposals on local generation of renewable energy¹)**

1. Information about municipality	
Name of municipality:	Vanadzor
Region / Oblast:	Lori
Country:	Armenia
Number of citizens:	78700
City budget (most recent year)	4411413 EURO 2308502000 AMD ²
Website of municipality:	www.vanadzor.am
Member of CoM since:	07.07.2016
Date of SECAP approval:	30.05.2017
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2. SEAP/SECAP Sector	Local electricity production from renewable sources: solar photovoltaic (PV)
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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*)	Municipal building
Name and address of building/facility, construction date	City Hall of Vanadzor, 22 Tigran Mets, Vanadzor, Lori Region, RA, 1951
Exact GPS coordinates of the site (if available)	40°48'37.9"N 44°29'08.3"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
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)	No
Annual hot water consumption (liter/a or kWh/a)	
- <i>bathing</i>	
- <i>cleaning (laundry)</i>	
- <i>cooking</i>	

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.

- other (specify)	
Days and hours of operation of building/facility (days/a and hours per day)	288 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)	
Primary energy for hot water supply system: natural gas, electricity, diesel, coal, wood, dung, etc.	
Other information	The building is heated from October till April.

* 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	340.46	23,640	12,528,891	52,676	14,580	7,727,572
2017	333.89	25,136	13,322,290	52,689	14,584	7,729,494
2018	376.27	28,327	15,013,173	54,537	15,095	8,000,596

Total energy consumption in the recent year		
Total annual energy consumption	MWh/a	896.02
Total annual costs associated with energy consumption	Euro	43,422
	AMD	23,013,769



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



Location of the target building on the city map

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)	1,386
Type of system (grid tied, battery based)	Grid tied
Total installed capacity of the system (DC peak power) (kW)	31.24
Expected annual production (kWh/a)	39,924
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.	88
Inverters	
Type of inverters (grid tied, hybrid, stand-alone)	Grid tied
Rated input power of inverters (kW)	30
Number of inverters, pcs.	1
Mounting structure	
Orientation of the system (south, southeast, southwest, etc.)	South-East 201° (South, South-West)
Tilt angle (degree)	30°
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



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	88	160	85,000	14,080	7,480,000
Inverters	kW and pieces	30 kW, 1	4,500	2,385,000	4,500	2,385,000
Mounting structure	Sets	8	350	185,500	2,800	1,484,000
Cabling	Meter	800	1.1	600	900	480,000
Transmission line	-	-				
Battery	Pieces	0				
Transformer	Pieces	0				
Substation	-	-				
Auxiliary equipment	-	-				
TOTAL					22,280	11,829,000

9. Other costs		
Description	Indicative costs for PV	
	EUR	AMD
Human resources	300	160,000
Structural survey (in case of roof mounted)	500	265,000
Geological survey (in case of ground mounted)	0	0
Technical design	1,400	750,000
State expertise	100	53,000
Site supervision (technical and author supervision)	500	210,000
Installation works (labor)	300	160,000
Land and license acquisition	0	0
Other (please specify)	500	265,000
TOTAL	3,600	1,863,000
Annual operation and maintenance costs	150	80,000

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.

10. Grand total costs	PV system
Euro	25,880
AMD	13,692,000

11. Expected results	PV system	
Annual renewable energy generation, MWh ⁵	39.924	
Annual monetary savings, EUR/AMD	3,388	1,795,780
Annual CO ₂ emission reduction ⁶ , tCO ₂	8.863	

12. Timetable of the project	
Description of step	Indicative time needed (months)
Recruitment/Mobilization of IPU	1
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	2
Works/site supervision (technical and author)	1
Final acceptance (including correction of defects)	0.2
Calculation of real savings (post intervention measurement & verification audit)	6
Total	13.5

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 31.24 kW on the roof of the City Hall of Vanadzor. The system consists of 88 PV modules with individual peak capacity of 355 W and will generate annually 39.9 MWh of electricity. The total cost of the project is about 26.000 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 CO₂ emission reduction, please refer to national GHG emission factors (SECAP Guide).