

**Gavar 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:	Gavar
Region / Oblast:	Gegharkunik
Country:	Armenia
Number of citizens:	29200
City budget (most recent year):	1222000 EURO 647453500 AMD ²
Website of municipality:	gavarihamaynqapetaran.am
Member of CoM since:	19.06.2017
Date of SEAP/SECAP approval:	07.05.2019
Name of contact:	Varsenik Khachatryan
Position:	CoM East and M4EG Municipal Project Officer, Leading Specialist of Legal and Economic Division
Email:	kroyan1970@gmail.com
Phone:	+374 94 776096

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

3. Description of an existing electrical/thermal energy supply system of buildings/facilities	
Parameter	Description
Type of building (e.g. municipal, kindergarten, school, hospital, sport hall, house of culture, residential, tertiary, other, N/A*)	Municipal buildings
Name of building/facility: 1. «Art School of Gavar» SNCO 2. Musical School of Gavar 3. Kindergarten N3 of Gavar «Zangak» 4. Kindergarten N4 of Gavar «Shushan» 5. Kindergarten N7 of Gavar 6. Kindergarten N8 of Gavar 7. «Sport School of Gavar» SNCO	Address: 11 Sayadyan Street 10 Sayadyan Street 3 Sayadyan Street 16 Azatutyan Street Hatsarat District Artsvaqar District 17 Bashnaghyan Street
Construction date: 1. «Art School of Gavar» SNCO 2. Musical School of Gavar 3. Kindergarten N3 of Gavar «Zangak» 4. Kindergarten N4 of Gavar «Shushan» 5. Kindergarten N7 of Gavar 6. Kindergarten N8 of Gavar 7. «Sport School of Gavar» SNCO	2008, roof and building have been renovated 2007, roof and building have been renovated 1987, reconstructed in 2016 1969, reconstructed in 2014 1974, reconstructed in 2016 1966, roof and building have been renovated 2009, roof and building have been renovated
Exact GPS coordinates of the site (if available): 1. «Art School of Gavar» SNCO 2. Musical School of Gavar 3. Kindergarten N3 of Gavar «Zangak»	40°21'12.9"N, 45°07'39.6"E 40°21'13.6"N, 45°07'43.7"E 40°21'27.1"N 45°08'07.2"E

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.

4. Kindergarten N4 of Gavar «Shushan»	40°21'33.8"N 45°07'45.5"E
5. Kindergarten N7 of Gavar	40°20'33.2"N 45°07'03.6"E
6. Kindergarten N8 of Gavar	40°21'05.5"N 45°09'44.2"E
7. «Sport School of Gavar» SNCO	40°20'59.1"N 45°07'27.0"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)	All structures have ind. meters
Heating system (Yes: centralized, local boiler-house, individual gas-fired boiler, other / No)	All structures have individual gas boilers
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)	Structures do not have centralized hot water supply
- Annual hot water consumption (liter/a or kWh/a)	
- <i>bathing</i>	
- <i>cleaning (laundry)</i>	
- <i>cooking</i>	
Days and hours of operation of building/facility (days/a and hours/a)	248 day/a, 1,984 hour/a
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	Heating system is in operation from November till May

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

«Art School of Gavar» SNCO

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	5.061	460	241,261	5,989	1,725	905,165
2017	4.874	419	219,812	5,576	1,478	775,640
2018	3.157	270	142,002	5,436	1,440	755,607

Musical School of Gavar

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	3.837	330	173,714	4,751	1,370	711,833
2017	1.451	244	127,104	1,986	1,484	778,539
2018	2.917	251	131,205	6,385	1,690	887,815

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

Kindergarten N3 of Gavar «Zangak»

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	1.370	123	64,661	5,055	1,455	763,070
2017	1.530	131	68,819	4,362	1,156	606,318
2018	1.437	123	64,661	5,490	1,455	763,070

Kindergarten N4 of Gavar «Shushan»

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	4.842	406	213,000	5,777	1,629	855,000
2017	4.932	415	217,000	5,669	1,598	839,000
2018	5.736	482	253,000	5,378	1,516	796,000

Kindergarten N7 of Gavar

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	1.116	80	42,191	4,105	1413	741,115
2017	1.851	162	84,755	5,223	1419	745,680
2018	4.008	343	179,383	3,577	1063	557,223

Kindergarten N8 of Gavar

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	2.000	188	98,253	3,538	935	491,768
2017	2.955	257	135,342	3,389	897	471,000
2018	4.222	362	189,900	4,425	1,171	615,100

«Sport School of Gavar» SNCO

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)	Annual gas costs	
		EUR	AMD		EUR	AMD
2016	12.523	902	473,374	8,527	2,442	1,281,256
2017	8.385	733	384,045	5,973	1,580	830,247
2018	5.718	491	257,196	7,708	3,240	1,701,412

Total energy consumption in the recent year

Total annual electricity consumption	MWh/a	27.195
Total annual natural gas consumption	MWh/a	365.951
Total annual costs associated with energy consumption	Euro	13,897
	AMD	7,293,574

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



«Art School of Gavar» SNCO (staff: 35, pupils: 417)



Kindergarten N4 (staff: 17, pupils: 9)



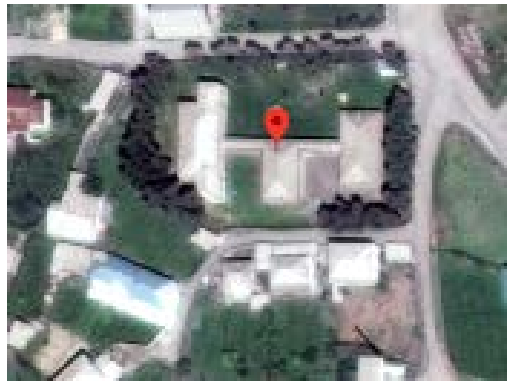
Gavar Sport School (staff: 21, pupils: 210)



Kindergarten N7 (staff: 14, pupils: 85)



Music School of Gavar (staff: 31, pupils: 194)



Kindergarten N8 (staff: 14, pupils: 81)



Kindergarten N3 (staff: 14, pupils: 85)

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)	1,567
Type of system (grid tied, battery based)	Grid tied
Total installed capacity of the system (DC peak power) (kW)	43.5
1. «Art School of Gavar» SNCO	6.0
2. Musical School of Gavar	6.75
3. Kindergarten N3 of Gavar «Zangak»	5.25
4. Kindergarten N4 of Gavar «Shushan»	7.5
5. Kindergarten N7 of Gavar	6.0
6. Kindergarten N8 of Gavar	4.5
7. «Sport School of Gavar» SNCO	7.5
Expected annual production (kWh/a)	61,027
1. «Art School of Gavar» SNCO	8,384
2. Musical School of Gavar	9,417
3. Kindergarten N3 of Gavar «Zangak»	7,394
4. Kindergarten N4 of Gavar «Shushan»	10,599
5. Kindergarten N7 of Gavar	8,130
6. Kindergarten N8 of Gavar	6,481
7. «Sport School of Gavar» SNCO	10,622

PV Modules	
Individual capacity of a PV module (wattage)	375 +/-5
Type of PV module (mono-crystalline / poly-crystalline)	M-Si
Number of PV modules, pcs.	116
Inverters	
Type of inverters (grid tied, hybrid, stand-alone)	Grid tied
Rated input power of inverters (kW)	7
Number of inverters, pcs.	7
Mounting structure	
Orientation of the system (south, southeast, southwest, etc.)	South, South-East, South-West
Tilt angle (degree)	20 ⁰ -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

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	116	180	94,000	21,038	10,904,000
Inverters	kW and pieces	7kW/7	952	500,000	6,664	3,500,000
Mounting structure	Sets	7	1,333	700,000	9,331	4,900,000
Cabling	Meter	2,800	1.1	600	3,080	1,680,000
Transmission line	-					
Battery	Pieces					
Transformer	Pieces					
Substation	-					
Auxiliary equipment	-					
TOTAL					40,113	20,984,000

9. Other costs

Description	Indicative costs for PV	
	EUR	AMD
Human resources	500	260,000
Structural survey (in case of roof mounted)	2,150	1,120,000
Geological survey (in case of ground mounted)	-	-
Technical design	4,500	2,340,000
State expertise	770	400,000
Site supervision (technical and author supervision)	1,825	950,000
Installation works (labor)	1,615	840,000
Land and license acquisition	-	-
Other (please specify)	-	-
TOTAL	11,360	5,910,000
Annual operation and maintenance costs	700	365,000

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		51,473	
AMD		26,894,000	

11. Expected results		PV system	
Annual renewable energy generation, MWh ⁵		61.03	
Annual monetary savings, EUR/AMD		5,280	2,745,000
Annual CO ₂ emission reduction ⁶ , tCO ₂		13.55	

12. Timetable of the project	
Description of step	Indicative time needed (days)
Recruitment/Mobilization of IPU	30
Structural survey of building (drafting ToR, procurement of services, implementation, report)	90
Energy audit (drafting ToR, procurement of services, implementation, report)	30
Technical design (drafting ToR, procurement, implementation, report)	90
State expertise	30
Procurement	60
Works/site supervision (technical and author)	60
Final acceptance (including correction of defects)	10
Calculation of real savings (post intervention measurement & verification audit)	120
Total	520

13. Other information
<p>Within the framework of this proposal it is suggested to install 7 grid-ties PV systems with the total installed (peak) capacity of 43.5 kW on the roofs of 7 municipal objects of Gavar Municipality. The PV systems are to cover electricity demand of all target structures, while, any surplus generation can be used for heating or hot water preparation, or, alternatively supplied to the national grid, thus, generating an additional income. The systems consist of 116 PV modules with individual peak capacity of 355 W and will generate annually 61 MWh of electricity. The total cost of the project is about 51.500 Euro.</p>

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).