



EU4Energy

Covenant of Mayors
for Climate & Energy

Hrazdan Municipality (Armenia) One-pager on Street Lighting Projects

(Identification form for municipal project proposals on EE modernization of street lighting¹)

1. Information about municipality	
Name of municipality:	Hrazdan
Region / Oblast:	Kotayk
Country:	Armenia
Number of citizens:	58288
City budget (most recent year)	2377480 EURO 1245000000 AMD ²
Website of municipality:	www.hrazdan.am
Member of CoM since:	21.05.2013
Date of SECAP approval:	09.06.2015
Name of contact:	Anahit Mnatsakanyan
Position:	Advisor to the Mayor
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2. SEAP/SECAP Sector	Public Lighting / Street Lighting
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3. Description of object		
Parameter	Street N1	Street N2
Street name	Shahumyan	Spandaryan
Classification /category of street ³	Q2	Q2
Length of street, m	1800	1500
Width of street, m	12	12
Sidewalks ⁴	on one side (2 m width, on the side of lighting poles),	
Number of lighting points, pcs	71	54
Distance between lighting poles, m	30	30
Mounting height of a luminaire, m	6	8
Type of installed lamps	HPS	HPS
Capacity of installed lamps, W	150	150
Total installed capacity of street lighting system, kW	12.14	9.23
Annual hours of operation of the system, hours	2555	2555
Average illuminance level, lux		
Control system (Yes/No)	Yes	Yes
Type of control system (e.g. time relay/lighting sensor)	Light sensor	Light sensor
Underground cable wiring (Yes/No)	Overhead	Overhead
Power metering system (Yes/No)	Yes	Yes
Type of power metering system (e.g. two-tariff)	Two-tariff	Two-tariff
Short description (conditions of infrastructure, number of non-operated lamps, metering system e.g. individual or combined with other consumers, other information)	Individual (the meters are installed for the lighting systems only)	

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.

³ Please refer to relevant laws/norms.

⁴ For example: on both sides (1.5-2 m width), or on one side (1.5-2 m width, on the side of lighting poles), or on one side (1.5-2 m width, in front of the lighting poles).

4. Annual energy consumption (MWh/year) and costs over the past 3 years

Year	Energy consumption (MWh/year)	Energy consumption costs		O&M costs		Total costs per year	
		EUR	AMD	EUR	AMD	EUR	AMD
2016	29.55	2251	1182000	2286	1200000	4537	2382000
2017	28.96	2206	1158400	2000	1050000	4206	2208400
2018	27.2	2072	1088000	1867	980000	3939	2068000

5. Photos showing pre-project situation (daylight and night time)



Shahumyan Street

Spandaryan Street

6. Available supporting documents (If necessary, provide links or attach copies of documents)

Reference to any available supporting documents like energy audits, feasibility studies, etc.

Document / Source N1: DIALux Lighting Calculation (see attached)

7. Energy efficiency measures and modernizations to be implemented at Street N1 (in case of more streets, add more tables)

Energy efficiency measure & modernizations	Number of units	Indicative costs per unit (with VAT) ⁵		Subtotal costs	
		EUR	AMD	EUR	AMD
Shahumyan Street					
Installation of street luminaires, pcs.	71	158	82950	11218	5889450
TOTAL				11218	5889450
Spandaryan Street					
Installation of street luminaires, pcs.	54	158	82950	8532	4479300
TOTAL				8532	4479300

8. Other costs

Description	Indicative costs (EUR)	Indicative costs (AMD)
Human resources/PIU		
Structural study		
Energy Audit		
Technical design		
State expertise		
Site supervision		
Installation works (labor)		
Other (please specify)		
TOTAL		

9. Grad total costs

	Street N1	Street N2
EURO	11218	8532
AND	5889450	4479300

10. Description of system after implementation

Parameter	Street N1	Street N2
Street name	Shahumyan	Spandaryan
Number of lighting points, pcs	71	54
Type of new luminaires (e.g. HPS, LED, PV integrated LED)	LED street luminaries	
Individual capacity of new luminaires, W	66	66
Total installed capacity of new street lighting system, kW	4.7	3.56
Average illuminance level, lux	0.6 candela/m ² 10 lux	0.6 candela/m ² 10 lux
Annual hours of operation of the system, hours	2555	2555
Annual energy consumption of the system, MWh ⁶	11.97	9.1

⁵ 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 / country.

Annual energy consumption costs, Euro / AMD	960.4	504210.6	730.1	383318
Annual O&M costs, Euro / AMD	100	52500	75	40000
Annual energy consumption and O&M costs, Euro / AMD	1060.4	556710.6	805.1	423318

11. Expected results			
Annual energy savings, MWh ⁷	6.03		
Annual monetary savings, EUR/local currency	2073.5	1087971.4	
Annual CO ₂ emission reduction ⁸ , tCO ₂	1.34		

12. Timetable of the project	
Description of step	Indicative time needed (days)
Recruitment/Mobilization of IPU	14
Energy audit (drafting ToR, procurement of services, implementation, report)	
Technical design (drafting ToR, procurement, implementation, report)	
State expertise	
Procurement	60
Works/site supervision	21
Final acceptance (incl. correction of defects)	2
Calculation of real savings (measurement & verification)	2
TOTAL	85

13. Other information

⁶ In case of PV integrated solar LED street lights that generate electricity to be accumulated in batteries in the daytime and consumed by the lighting system in the nighttime, or to be supplied to a national grid via a net-metering system (bidirectional electricity meters) in the daytime and consumed by the lighting system in the nighttime, only electricity supplied to the lighting system by a national grid or other sources shall be counted.

⁷ It is important that you fill in reasonable estimates of energy savings. Too optimistic energy savings will raise questions about your trustworthiness as partner.

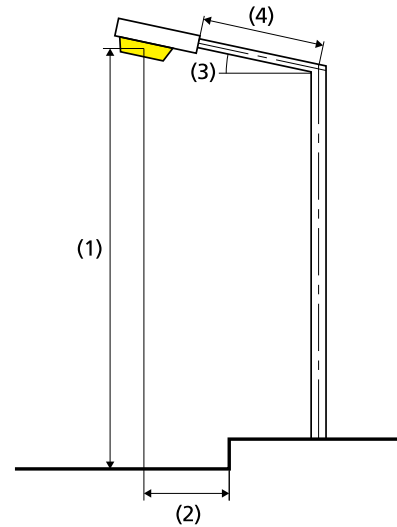
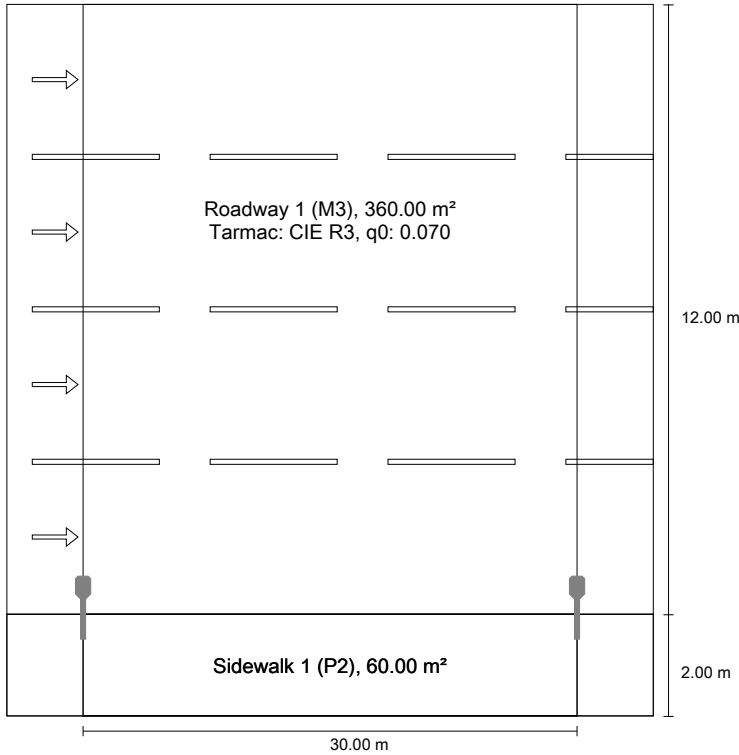
⁸ For calculation of CO₂ emission reduction, please refer to national GHG emission factors (SECAP Guide).



Hrazdan light calculation-12road-8poles-30 distance

Street 1 according to EN 13201:2015

DIALux 117 W L03



Results for valuation fields
Light loss factor: 0.80

Roadway 1 (M3)

Lm [cd/m ²] ≥ 1.00	Uo ≥ 0.40	Ui ≥ 0.60	TI [%] ≤ 15	EIR ≥ 0.30
✓ 1.06	✓ 0.45	✓ 0.65	✓ 14	✓ 0.64

Sidewalk 1 (P2)

Em [lx] ≥ 10.00 ≤ 15.00	Emin [lx] ≥ 2.00
✓ 12.02	✓ 5.23

Results for energy efficiency indicators

Power density indicator (Dp)	0.015 W/lxm ²
Energy consumption density	
Arrangement: SRL 117 740 L03 B064 SN DG1_O165_Bin-N4_TH (468.0 kWh/yr)	1.1 kWh/m ² yr

Lamp:	1x64 LEDs bin N4
Luminous flux (luminaire):	14663.49 lm
Luminous flux (lamp):	14663.00 lm
Operating Hours	
4000 h:	100.0 %, 117.0 W
W/km:	3861.0
Arrangement:	single side bottom
Pole distance:	30.000 m
Boom inclination (3):	15.0°
Boom length (4):	1.000 m
Light centre height (1):	8.000 m
Light overhang (2):	0.500 m

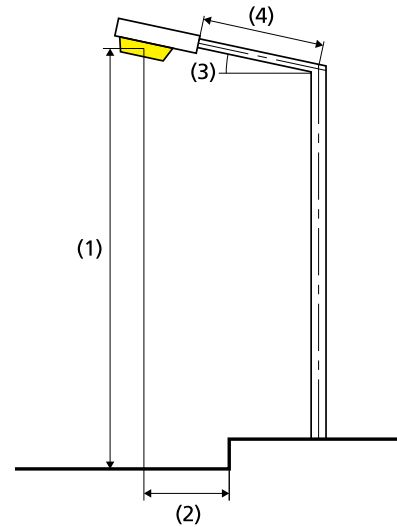
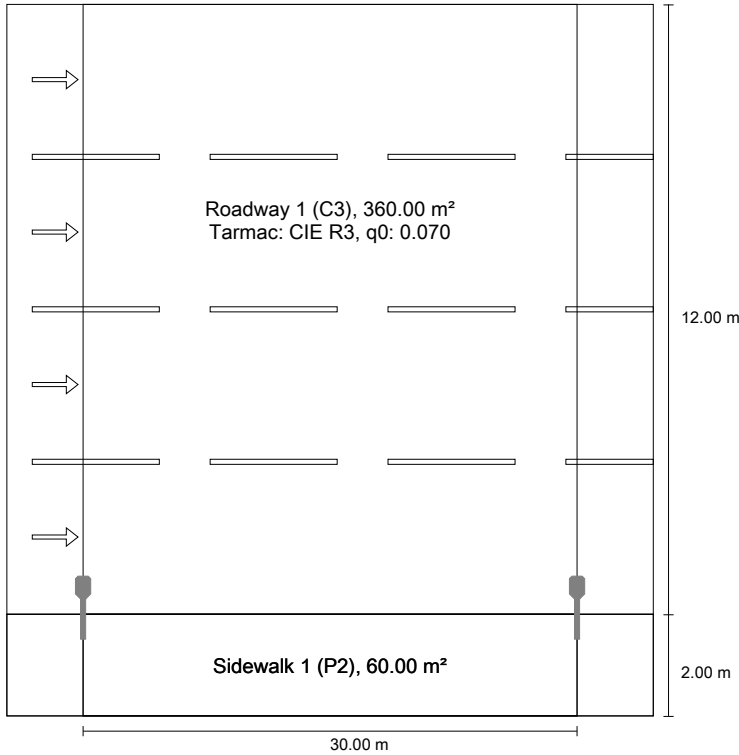
ULR:	0.01
ULOR:	0.01
Maximum luminous intensities	
at 70° and above	554 cd/klm *
at 80° and above	385 cd/klm *
at 90° and above	81.4 cd/klm *
Luminous intensity class:	/

Any direction forming the specified angle from the downward vertical, with the luminaire installed for use.
* Luminous intensity values in [cd/klm] for calculating luminous intensity class refer to the output flux of the luminaire, according EN 13201:2015.

Arrangement complies with glare index class D.0

Street 2 according to EN 13201:2015

DIALux 117 W L03



Results for valuation fields
Light loss factor: 0.80

Roadway 1 (C3)

Em [lx] ≥ 15.00	Uo ≥ 0.35
✓ 19.83	✓ 0.40

Sidewalk 1 (P2)

Em [lx] ≥ 10.00 ≤ 15.00	Emin [lx] ≥ 2.00
✓ 12.02	✓ 5.23

Results for energy efficiency indicators

Power density indicator (Dp)	0.015 W/lxm²
Energy consumption density	
Arrangement: SRL 117 740 L03 B064 SN DG1_O165_Bin-N4_TH (468.0 kWh/yr)	1.1 kWh/m² yr

Lamp:	1x64 LEDs bin N4
Luminous flux (luminaire):	14663.49 lm
Luminous flux (lamp):	14663.00 lm
Operating Hours	
4000 h:	100.0 %, 117.0 W
W/km:	3861.0
Arrangement:	single side bottom
Pole distance:	30.000 m
Boom inclination (3):	15.0°
Boom length (4):	1.000 m
Light centre height (1):	8.000 m
Light overhang (2):	0.500 m

ULR:	0.01
ULOR:	0.01
Maximum luminous intensities	
at 70° and above	554 cd/klm *
at 80° and above	385 cd/klm *
at 90° and above	81.4 cd/klm *
Luminous intensity class:	/

Any direction forming the specified angle from the downward vertical, with the luminaire installed for use.
* Luminous intensity values in [cd/klm] for calculating luminous intensity class refer to the output flux of the luminaire, according EN 13201:2015.

Arrangement complies with glare index class D.0