



ՀՀ բնապահպանության նախարարություն  
 ՀՀ քաղաքաշինության նախարարություն

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 Resilient nations.

# Housing Policy and Energy Efficiency Provisions

Current Situation in Goris Town  
*UNECE Smart City Profile*

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# Country Details



Map source: [www.lonelyplanet.com](http://www.lonelyplanet.com)

- ❑ Area: 29.800 km<sup>2</sup>
- ❑ Population: 3.2 million
- ❑ 65% urban population
- ❑ 40% of energy saving potential is in building sector (402,000 toe)
- The climate in Armenia is continental.
- Average annual temperature is 5.5°C, average winter temperature is -6.7°C.
- The absolute min. temperature is -42°C
- The absolute max. temperature is +43°C





# General Data of and Policy in the Housing Sector



# General Data on Housing Sector (1)

Data	Republic of Armenia	Goris Town
Total area of housing stock, million sq.m	94.652	0.669
Total area of multi-apartment buildings, million sq.m	27.5	0.131
Total area of residential houses, million sq.m	66.8	0.53
Number of multi-apartment buildings, units	18 974	110
Number of apartments in multi-apartment buildings, units	435 427	2 519
Number of residential houses, units	426 593	2 397



## General Data on Housing Sector (2)

Data	Republic of Armenia	Goris Town
Number of buildings with stone-made external walls, units	13 206	109
Number of panel buildings, units	4 340	1
Buildings with monolith reinforced concrete carcass, units	1 244	-
Number of buildings with external walls made of other materials, units	184	-
Number of buildings with sloping roofs, units	14 363	110
Number of buildings with plain roofs, units	4 611	-



## General Data on Housing Sector (3)

Data	Republic of Armenia	Goris Town
Number of 1-storey buildings, units	3 965	5
Number of 2-storey buildings, units	4 630	15
Number of 3-storey buildings, units	1 247	37
Number of 4-storey buildings, units	2 557	38
Number of 5-storey buildings, units	3 597	14
Number of 6- to 8-storey buildings, units	326	1
Number of 9-storey and higher buildings, units	2 652	-



## General Data on Housing Sector (4)

Data	Republic of Armenia	Goris Town
Average provision of living area per capita (total surface), sq.m	31,3	-
Urban, sq.m	26,7	32,5
Rural, sq.m	39,4	-
Number of families in need of improved living conditions, including	60 000	29 (under revision)
homeless families	30 000	29 (under revision)



## General Data on Housing Sector (5)

Data	Republic of Armenia	Goris Town
Number of buildings subject to demolition, units	26 (as of 01.01.2015)	-
Number of third degree damaged buildings, units	450 (as of 2003)	10 (as of 2003)
Multi-apartment buildings managed by communities	10 752 (57%)	110 (100%)
Multi-apartment buildings managed by condominiums, trust managers and fiduciary managers	8 069 (43%)	- (0%)





# Main Stages of Housing Provision in the Republic of Armenia

- In 1991-2000, construction of housing for providing homeless families
- In 2000-2014, programmatic solution of housing provision issues, financial support from the state for purchase of apartments (homes) via real estate market



# Main Directions of Housing Policy

- Continuation of target programs of state support for provision of housing to certain groups of population
  - Provision of housing for homeless families of earthquake zone
  - Provision of housing for persons classified as socially vulnerable and belonging to specific groups (in accordance with provisions of GoA decision #894 of August 1, 2013)
  - Refugee families
  - Large families
  - Families of fallen or disabled military personnel
  - Families owning areas in buildings under the threat of collapse and subject to demolition etc.
- Improving living conditions of socially vulnerable families via development of social housing institution
  - Strategic program on social housing stock development
- Support to improving affordability of housing in the current free market setting
  - Young families, young scientists, state employees etc.



# Programs on development of social housing stock

Social housing stock can be developed:

- Under state funding or in the frames of public-private partnership (PPP): step-by-step approach to improve living conditions of persons classified as socially vulnerable and belonging to specific groups, based on application submitted by the Ministry of Labor and Social Affairs of the RA;
- Initiated by local self-government authorities: under community funding, in case of limited resources – with investor support or PPP-based assistance, e.g. the pilot project of 20-apartment social housing in Goris town



# Five-year strategic program for improvement of management, maintenance and operation of multi-apartment housing stock of the RA

Main components of the project implementation:

1. Ensuring improvement of institutional capacities, development of efficient legal framework and introduction of operational system of financial flows
2. Raising awareness and improving perception of ownership rights on common shared property by owners of building apartments
3. Improving technical condition of multi-apartment housing stock, clarification of state participation framework, ensuring development prospective





# Energy Efficiency Provisions



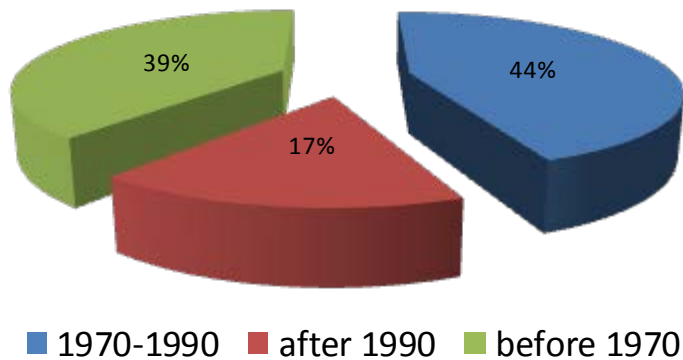
# Housing Stock

- 53% of multi-apartment buildings located in the capital city
- Most of the stock was built 30-60 years ago (as in most of CIS countries)
- Vast majority of the buildings were designed and built without having energy efficiency in mind, thus envelopes' thermal characteristics are significantly lower than required by current code.

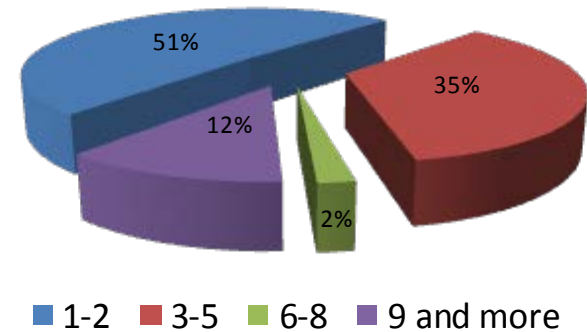


# Characteristics of multi-apartment buildings in Armenia

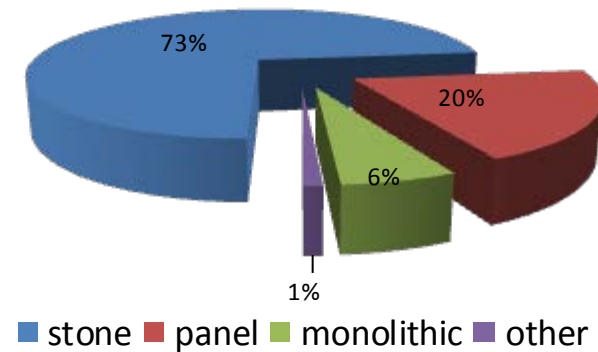
## Construction by years



## By building floors

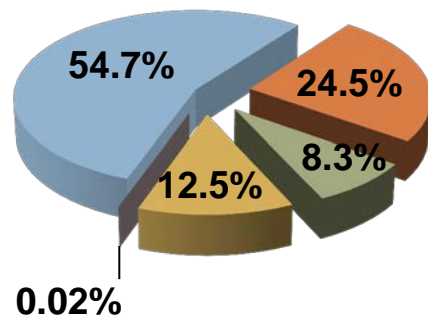


## By type of walls construction

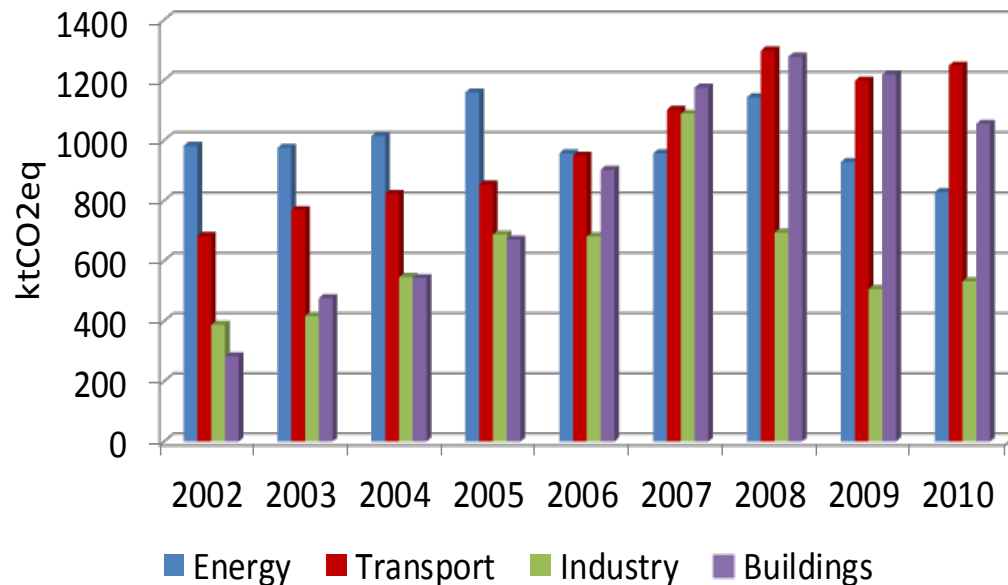


# Energy Production & Consumption in Armenia

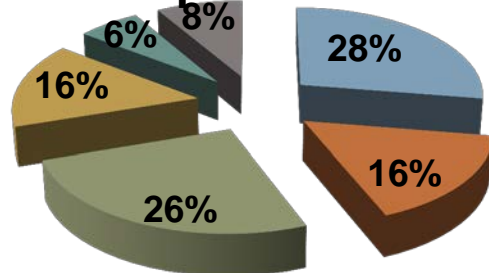
## Production Structure



- Natural gas
- Nuclear power
- Hydro power
- Oil products
- Wind and biogas



## Consumption Structure

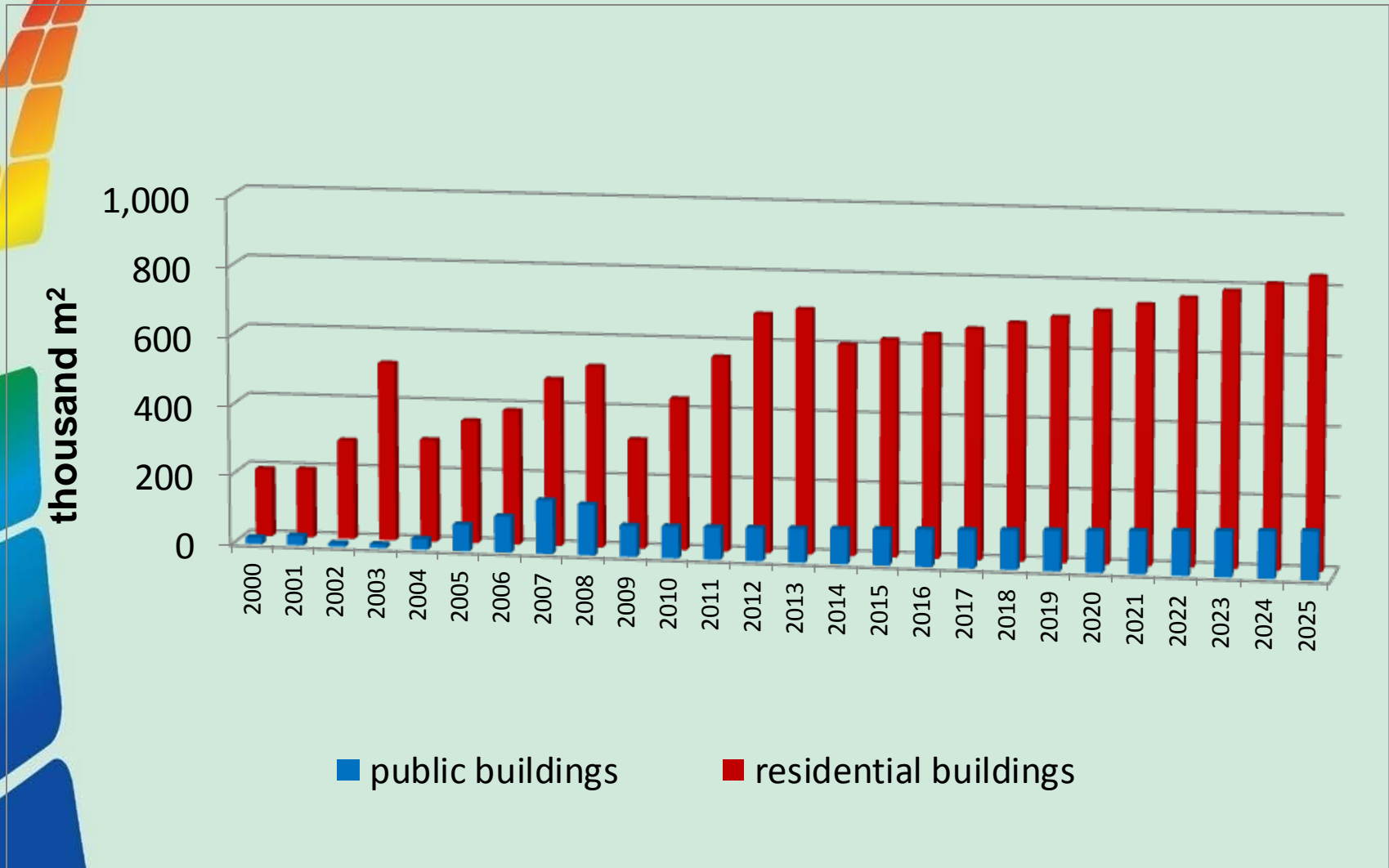


- Population
- Industry
- Transport
- Energy





# Dynamics and forecast of building sector growth in Armenia



# Legal and normative framework of urban development sector in Armenia

## Laws

- Law “On Urban Development” of the RA

## System of normative-technical documentation

- Building codes and manuals to the codes (*RA CN II-7.02-95 Buildings Code: Thermal Physics of Building Envelope; weak enforcement and control, never updated, no certification and no building energy passports*)
- Harmonized interstate building codes and manuals of CIS (MCH)
- National standards (AST)
- Harmonized international and European standards (AST-EN, AST-ISO etc.)

## Interstate agreements

- in the fields of construction, standardization, metrology and certification



# RA laws and government decrees related to EE in urban development sector (1)

- 2004: Law on Energy Efficiency and Renewable Energy (*no targets, no limitations, voluntary basis, no MEPS, no privileges: currently under revision*)
- *Government Decision #1399-N of August 31, 2006: “On Energy Audit Performing Procedure” (building energy audit is not mentioned)*
- *Government Protocol Decision #2 of January 18, 2007: National Program on Energy Saving and Renewable Energy*
- *Government Protocol Decision #17 of May 6, 2010, point 26: Concept of a system of normative-technical documentation in urban development sector*
- *Government Protocol Decision #43 of November 4, 2010, point 47: GoA Action Plan for implementation of the National Program on Energy Saving and Renewable Energy*



# RA laws and government decrees related to EE in urban development sector (2)

- *Government Decision #225-N of March 14, 2013*: on supplementing the charter of the RA Ministry of Urban Development with functions on **energy saving and energy efficiency**
- *President Ordinance #182-N of October 23, 2013*: On approval of **energy security concept** of the RA
- *Government Decision #1504-N of December 25, 2014*: On implementation of energy saving and energy efficiency improvement measures in facilities being constructed (reconstructed, renovated) under the state funding



# Development and enforcement of buildings codes and standards on energy efficiency by UNDP


## In the pipeline, on various stages of approval process:

- Technical Regulation “Buildings, structures, construction materials. Safety”
- Amendments to the RA Laws “On Urban Development” and “On Energy Saving and Renewable Energy”
- Technical Regulation on Energy Performance in Buildings

## Approved Documents:

- RA CN II-7.01-2011 “Construction Climatology”
- Advisory handbook on technical solutions for thermal insulation of envelopes of residential, public and industrial buildings in construction and reconstruction in Armenia
- AST 362-2013 “Energy Saving. Building Energy Passport. General Provisions. Typical Forms” national standard
- Localized versions of the six standards supporting the EU Directive on Energy Performance in Buildings





# Climate Change Projects aimed at Buildings Energy Efficiency



*“Շենքերի էներգետիկ արդյունավետության բարձրացում” ՄԱԶԾ-ԳԷՖ/00059937 ծրագիր*

# Initiatives

- In 2012, Armenia joined the UN initiative “Sustainable Energy for All” (implemented by UNDP)
- Ten Armenian cities joined the EU “Covenant of Mayors” initiative
- For energy efficient renovation of public buildings and social housing stock, Armenia developed a plan of Nationally Appropriate Mitigation Actions (NAMA) in 2014; international assistance is expected on that



# Energy Efficient Social Housing in Goris Town



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- In cooperation with Swiss Development and Cooperation Agency and Government of Armenia
- 940 m<sup>2</sup> total area, 20 apartments
- Total enveloping of the building
- Elimination of “cold bridges”
- Installation of windows and doors with higher thermal resistance
- Construction of tambours of the entrances
- Installation of regulation and metering equipment for heating system

- Incremental cost of EE measures: 8%
- Energy performance improvement: 2 times
- Additional benefit: about 25 m<sup>2</sup> of living area
- Newly constructed demonstration residential multi-apartment building (social housing) in Akhuryan community
- UNDP demonstrated energy efficient solutions and assisted in their replication by “Al Hamra Real Estate” LLC, a developer company





# EE Refurbishment of Existing Residential Building



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- 9-storey, 36 apartment building in Yerevan
- In cooperation and with co-financing from Yerevan Municipality

**Before 178kWh/m<sup>2</sup> year**  
CO<sub>2</sub> emissions: 91 tons/year  
620\$ per flat /year – heating

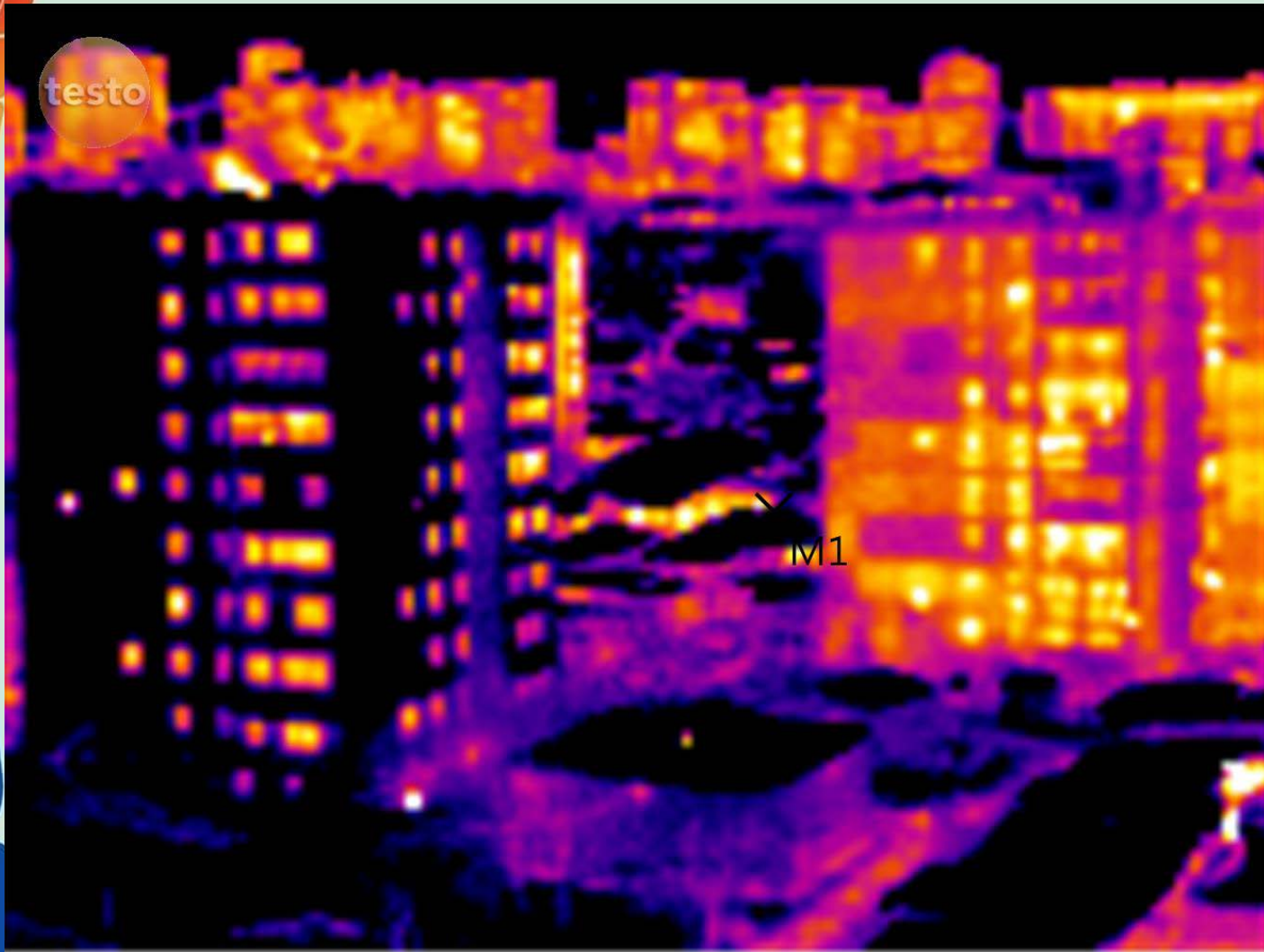
**After 74kWh/m<sup>2</sup> year**  
CO<sub>2</sub> emissions: 31 tons/year  
255\$ per flat/year – heating

**Energy performance improved by 60% !**



“Շենքերի էներգետիկ արդյունավետության բարձրացում” ՄԱԶԾ-ԳԷՖ/00059937 ծրագիր

# Infrared Image of Energy Efficient Building



# Energy Efficient Lighting

**Overall Goal:** To save energy and to reduce emissions of greenhouse gases by increasing energy efficiency of municipal lighting in the cities of Armenia via implementation of municipal investment programs and national policies.

## **Specific Components:**

The Project activities are organized in four interrelated components.

- 1) Municipal energy audits and technical capacity-building
- 2) Demonstration projects on EE municipal lighting
- 3) Replication via municipal lighting programs and associated financial instruments (e.g. municipal revolving funds)
- 4) National policies, codes, and standards on lighting

**Duration:** January 2014 - January 2018

**GEF Funding:** 1.6 mln USD



# Overview of basic parameters of the proposed pilot project



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Indicators	Baseline situation	Results of pilot
Municipality	<b>Yerevan</b>	
Pilot Streets	Isakov Avenue, Tairov and Parakar Str.	
Length, km	9	
Number of poles / luminaries	378 / 756	378 / 482
Average illumination, Lx ( <i>Standard - 20 Lx</i> )	16	26
Installed capacity, kW	215.5	79
Annual power consumption, MWh	794.5	291.2
GHG emissions, t CO <sub>2</sub> /year	352.7	129.3
Total procurement costs, USD	292,750	
Yearly energy saving and emission reduction	63%	
Annual cost savings, USD	49,000	



# Overview of basic parameters of the proposed pilot project



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Indicators	Baseline situation	Results of pilot
Municipality	<b>Alaverdi</b>	
Pilot Streets	Zoravar Andranik, Sayat-Nova and Shahumyan Streets	
Length, km	2	
Number of poles / luminaries	70 / 70	70 / 70
Average illumination, Lx ( <i>Standard - 10 Lx</i> )	6.2	11
Installed capacity, kW	19.95	3.5
Annual power consumption, MWh	29.1	5.1
GHG emissions, t CO <sub>2</sub> /year	12.9	2.3
Total procurement costs, USD	10,300	
Yearly energy saving and emission reduction	82%	
Annual cost savings, USD	2,200	

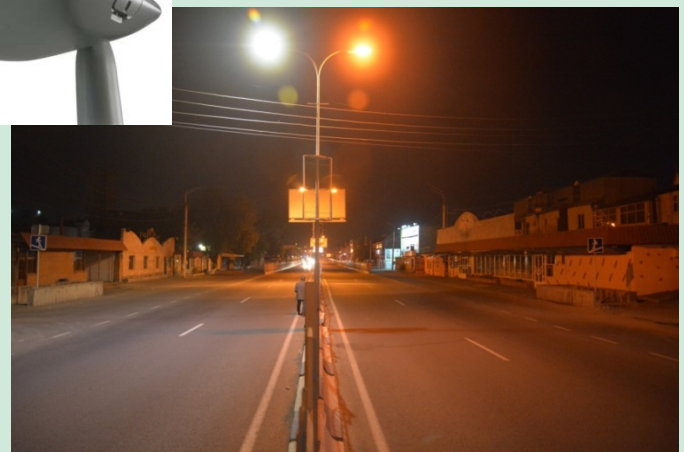


# Testing of the LED street luminary on the pilot street in Yerevan

**BEFORE**



**AFTER**



Expected results: **Energy saving and demonstration of technology benefits**

- Improved illumination level (to reach the norm requirement)
- Elimination of unconformity of illumination of the street



# Energy efficiency project

## Armenia Renewable Resources and Energy Efficiency Fund (R2E2)

- Objective – Reduce energy consumption in public buildings (hospitals, schools, kindergartens, administrative buildings, street lighting, etc)
- WB/GEF Grant - \$1.8mln.
- GOA - \$8mln.
- Beneficiaries – public and municipal agencies
- Typical ESMs – Insulation of walls and roofs, replacement windows, replace street lighting system
- Quasi-ESCO scheme for EE promotion in public buildings is introduced
- Statistics on Energy Efficiency Project in schools
  - Number of Schools: 6 / 19823 m<sup>2</sup>
  - Total investments: AMD 137 mln. or € 249,090 (1€=550 AMD)
    - ❖ From AMD € 34,500 to € 53,000, average € 41,500
    - ❖ From 9.6 to 16,4 €/m<sup>2</sup>, average 13,1 €/m<sup>2</sup>
  - Simple payback: 7.1...7.2 years
  - Energy saving: 52.3... 58.0%





**Solar shower in Shaghik community**



**Boarding school N3 with solar heaters  
(Gyumri town)**

## UNDP/GEF Small Grants Programme



**Multi-apartment building with solar  
heaters (Artik town)**







# Sustainable energy and communities: what can be done?



# Current situation in communities

- Low level of revenue generation, subsidized community budgets
- Existence of obsolete, inefficient social and physical infrastructure, no centralized district heating systems
- High energy expenses for public buildings
- Absence of sustainable urban planning/implementation practices and of procurement rules promoting energy efficiency
- Low level of renewable energy utilization
- Lack of adequate skills and experience
- Low level of awareness



# What can get communities from EE & RE initiatives?

- Funding (grants, soft loans, guarantees)
- Technical assistance
- Capacity building, knowledge transfer
- Information sharing
- Awareness raising for population and other stakeholders



# Potential projects/resources

- “Improving Energy Efficiency in Buildings” UNDP/GEF Project
- “Green Urban Lighting” Project UNDP/GEF Project
- UNDP/GEF Small Grants Programme
- R2E2 Fund projects
- INOGATE
- Sustainable Urban Demonstration Energy Projects (SUDEP)/EC
- Residential Energy Efficiency Project of Habitat for Humanity Armenia
- NAMA (Energy efficient public buildings and housing in Armenia) – in fundraising phase
- Other projects (e.g. IFIs, etc.)



# Recommendations for promotion of sustainable energy practices by communities (1)

## ***Policy level actions***

- Rethinking of communities' role:
  - Community as Planner & Regulator (urban planning, building codes/standards, targets, etc.)
  - Community as Facilitator (financing, fiscal incentives, demonstration projects, etc.)
  - Community as Consumer & Service Provider (procurement, community owned utilities)
  - Community as Advocate (lobbying, awareness raising & outreach, knowledge management)

## ***Strategy level actions***

- Planning of sustainable energy projects into four-year development programs of communities
- Organization of discussions with key national stakeholders
- Establishment of partnerships between communities and NGOs, donors, projects, banks, educational institutions, etc.



# Recommendations for promotion of sustainable energy practices by communities (2)

- Adoption of procurement rules promoting energy efficiency
- Organization of site visits for getting familiar with results of successful EE & RE demonstration projects
- Development of EE & RE small-scale project proposals for communities, implementation, dissemination of lessons learnt
- Development of energy consumption, building stock & energy experts databases for communities
- Organization of training courses for beneficiaries



THANK YOU



*“Improving Energy Efficiency in Buildings”  
UNDP-GEF/00059937  
Project*

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